Does Free Primary Education Narrow Gender Differences in Schooling? Evidence from Kenya

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Developing countries have invested heavily in efforts to meet universal primary education targets. While Latin American countries have recently used targeted programs such as conditional cash transfers to boost primary school enrollments, African countries have mostly employed universal approaches such as free primary education programs. Although these programs have enabled countries to make significant progress toward their primary education targets, they have been less successful in eliminating gender gaps in education. The World Bank estimates that the number of out of school children declined from 100 million to 75 million between 1999 and 2006. Despite this progress, data from the World Bank show that girls still accounted for approximately 55 percent of the out of school children in 2006.[1] As a result, the Millennium Development Goal target of gender equality in primary school by 2005 was not achieved and there is uncertainty surrounding the possibility of achieving this target by 2015.

There is a large body of evidence that highlights the importance of female education for development and growth. Overall these studies find positive relationships between increases in female education and GDP per capita, the number of women in the formal labor market, labor productivity, infant and child survival, and the education of subsequent generations (see Herz and Sperling 2004 for a summary of this literature). Despite the empirical evidence supporting the benefits of increasing female education and the recent spread of free primary education programs, there is little rigorous empirical analysis on the efficacy of these policies on

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[1] World Bank Education Statistics database. http://go.worldbank.org/85XM5TBQA0

eliminating gender gaps in education. This paper uses a unique combination of data to examine the extent to which programs such as the Kenyan Free Primary Education (FPE) program can close the gender differentials in primary school completion and achievement.

Prior studies have shown that FPE interventions have the potential to boost enrollment, however they generally do not examine primary school completion or achievement. Deininiger (2003) and Nishimura et al. (2005) found that the Ugandan FPE program lead to an increase in enrollment with a larger effect for girls, while Grogan (2010) found that that the Uganda program decreased the probability of delayed school entry, especially for girls. In Kenya, Lucas and Mbiti (2010) found that free primary education increased the number of students completing primary school, led to increased socio-economic stratification, and resulted in modest achievement declines. However, they did not examine differential effects by gender.

In contrast to the universal policies adopted by African governments, some Latin American countries have employed targeted demand side policies aimed at boosting enrollments. Barrera-Osorio et al. (2007) find that the targeted fee reductions in Bogotá, Colombia significantly increased primary school enrollment equally for both genders. Schultz (2004) estimates that the Progresa program of conditional cash transfers in Mexico led to an increase in the attendance of those who were targeted, with larger increases for girls.

This paper uses the FPE program in Kenya to examine the impact of the nationwide elimination of public school fees on student outcomes. In January 2003 the Kenyan government abolished all school fees in public primary schools, reducing the private cost of attending these schools. We exploit differences across districts in the pre-program dropout rates to identify the effect of FPE. Intuitively, the program should have little or no effect in a district with high primary school completion rates and a much larger effect (or intensity) in districts with a high

dropout rate. We combine the differential effective intensity across districts with a differences-in-differences strategy to identify the effect of FPE on primary school completion and achievement by gender. We find that FPE increased access for both genders, but that boys responded to the program in greater numbers than girls, widening the completion gap. This gap was partly driven by the differential response of boys older than 17 relative to similarly aged girls. Additionally, FPE did not affect the gender gap in test scores.

I. Background and Context

The Kenyan educational system consists of eight years of primary, four years of secondary, and four years of university education. In order to earn a primary school diploma, students must take the national Kenya Certificate of Primary Education (KCPE) examination after the completion of grade 8. Students are eligible to start grade 1 when they are six years old or older at the start of the school year in January. Even though almost all children attend at least a limited amount of primary school, dropping out is common. Based on the 1999 Kenyan Census, 89% of 18-20 year olds had completed grade 1, but only 47% had completed grade 8.

Prior to the FPE program, there were gender differences in school completion and achievement. In the three years prior to FPE, on average 95 girls for every 100 boys graduated primary school, leading to almost 14,000 more boys than girls completing primary school each year. In addition, the average girl's score on the exit exam in the three years prior to FPE was a quarter of a standard deviation below the average boy's score.[2]

Prior to 2003, all public primary schools charged fees to students. These fees varied by school and were used to finance the operations of the school, while the national Teacher Service Commission directly provided schools with teachers (World Bank 2004). Following the December 2002 elections, the newly elected government eliminated all public primary school

[2] Authors' calculations using the Kenya National Examination Data described below

fees effective as of the start of the 2003 school year in January. As part of the fee elimination scheme, schools were granted 1,020 KSh (approximately US$14) per pupil to cover the formerly collected school fees, a level below many public school fees (Alubisia 2004). This funding supported school operations, while the government continued to provide schools with teachers.

II. Empirical Strategy

We utilize the pre-program differences in dropout patterns between districts to identify the impact of the program. Even though the program was nationwide, the effective intensity of the program for a district in a given year varies by the number of students whose decisions about school completion could have been changed by the FPE. If students were dropping out of primary school at a high rate pre-FPE, then that district would be more intensely treated by FPE. We use a cohort- and district-specific measure of the effective intensity that varies by the district in which the student took the exam and the year in which he took it.

Formally, we aggregate our individual data to the gender-district-year level and rely on a difference-in-differences specification:

$$y_{gjt} = \alpha + \beta_1 intensity_{jt} + \beta_2 (intensity_{jt} * female_g) + \beta_3 female_g + \delta_j + \delta_j * trend_t + \delta_t + \varepsilon_{gjt} \quad (1)$$

where y_{gjt} is the outcome for gender *g* in district *j* in year *t*, $intensity_{jt}$ is the effective intensity of the program, $female_g$ is a dummy variable equal to one for female test takers, δ_j are district fixed effects, $\delta_j * trend_t$ are district specific linear trends for all but one district, and δ_t are time fixed effects. Standard errors are clustered at the district level. β_1 measures the effect of FPE on boys, β_2 measures the differential effect of FPE on girls, and $\beta_1 + \beta_2$ measures the total effect of FPE on girls. Our outcomes of interest are the number of test takers in grade 8, a measure of primary school completion, and the average KCPE scores, a national measure of achievement.

We follow Lucas and Mbiti (2010) in our calculation of the effective program intensity. In all districts, the intensity prior to the program is zero. For the years after FPE, the effective intensity varies by district and year with the number of students who could have been induced by FPE to complete school relative to the number of students who annually completed primary school pre-FPE. This is equivalent to calculating the proportional increase in the test-taking cohort if attrition (or dropout) rates for each cohort were set to 0 starting in 2003. The resulting intensity measure varies from 0.10 (a 10% increase completers) to almost 6 (a 600% increase in completers) with an average in the post-FPE period of 1. Further details on the computation of the $intensity_{jt}$ can be found in Lucas and Mbiti (2010).[3]

III. Data

We use several sources of data to evaluate the effect of FPE. Data from the Kenyan National Examination Council contain student level KCPE scores for all test takers in Kenya from 2000 to 2007. These data also contain a limited set of information on individual and school attributes such as the student's gender, age, and district. From the examination data we compute the number of students completing primary school (equivalent to the number of test takers) and mean KCPE performance at the gender-district-year level. We use the 5% IPUMS sample of the1999 Kenyan Census to build our program intensity measure from district level primary school completion rates for each grade prior to the program.[4]

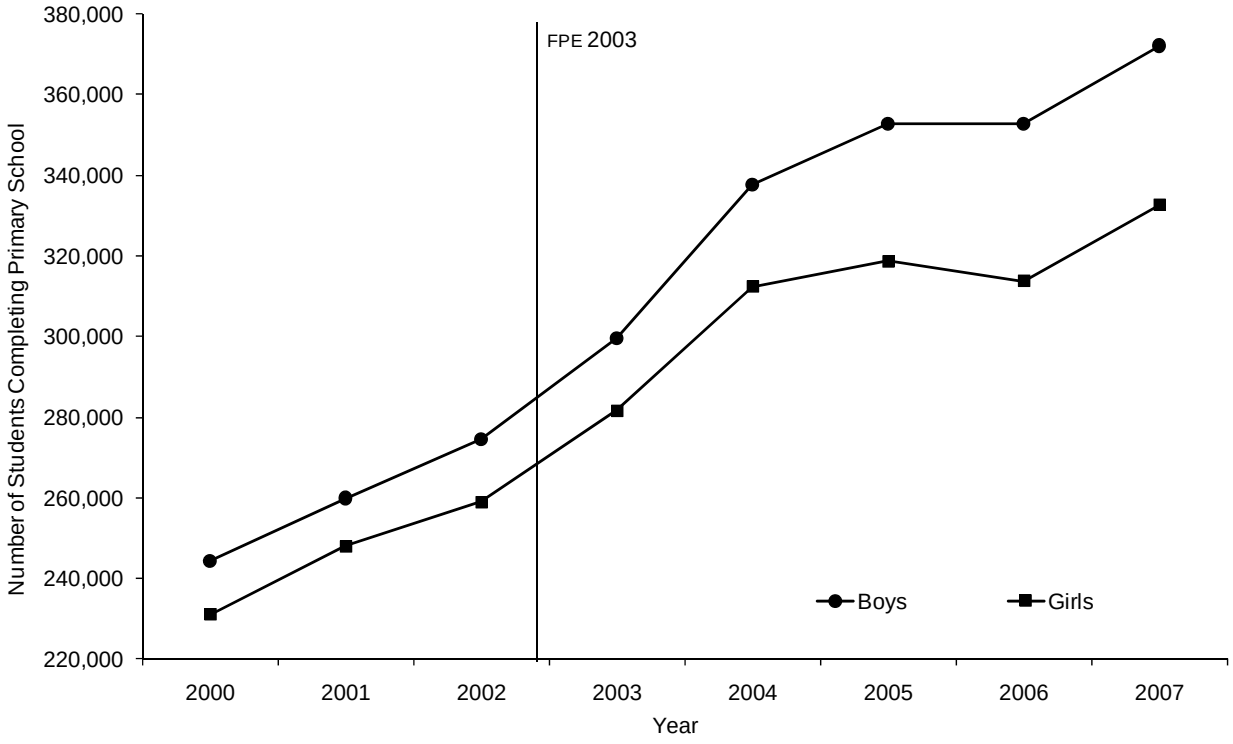
[3] Because of the timing of out test score data (2000-2007) and the program start date (2003) our measure of intensity captures changes in transition rates between grades, not entry of students who had not previously attended primary school. FPE also changed school entry decisions. Students who entered school in 2003 would take the KCPE starting in 2010. Our year and district specific intensity measure is well suited for our analysis since retention is the main channel through which FPE would affect primary school completion prior to 2010.

[4] Since we are using transition rates from 1999, an additional identifying assumption is that any changes in attrition patterns from 1999-2003 are uniform across the country or uncorrelated with prior attrition. We control for countrywide changes in attrition patterns with year fixed effects and linear trends in district level attrition with district specific linear trends.

IV. Results

Figure 1 provides initial evidence of the effect of FPE on the number of students who completed primary school. Prior to FPE, the number of completers per year for both genders was on an upward trend, and the rate of growth increased in the initial years of FPE (2003 and 2004). The rate of increase for boys and girls diverged in 2004, with a widening gender gap in subsequent years, narrowing only slightly in 2007. Even though the total number of girls completing primary school increased after FPE, girls as a percentage of all completers decreased from a high of almost 49 percent in 2001 to 47 percent in 2006.

Figure 1: Students Completing Primary School by Gender



The estimates of Equation (1) with the number of primary school graduates as the dependent variable appear in column (1) of Table 1. As expected, the number of graduates increased more in districts that were more intensely treated by the program. The average value

of our intensity measure post-FPE is approximately 1, indicating a 100% potential increase in the number of primary school completers if all students who would have dropped out were induced by FPE to stay in school. For a district of average intensity, the program increased the number of male graduates by 472 and the number of female graduates by 219, increasing access for both genders, but widening the gender gap in completion. These estimates imply an additional 8,999 male and 4,171 female students completed primary school due to FPE in 2003. The differential responsiveness of girls to the fee elimination could reflect the higher probability that girls are out of school due to pregnancy and marriage than boys (20% for girls versus less than 1% for boys, calculations based on the 1997 Welfare Monitoring Survey). This pattern is consistent with Lloyd et al. (2000) who found that enrollment differences between boys and girls emerge in Kenya when students become teenagers.

Table 1: Effect of Free Primary Education

Dependent Variable:	Number of Completers	Average Age at Completion	Number of Completers Aged 17 or Older	Standardized KCPE Score
	(1)	(2)	(3)	(4)
Intensity	471.6***	-0.061	142.7***	-0.048
	(125.80)	(0.050)	(43.60)	(0.034)
Intensity x Female	-253.0***	-0.0736***	-148.0***	-0.0002
	(50.52)	(0.013)	(31.79)	(0.005)
Female	-179.5**	-0.369***	-381.9***	-0.260***
	(76.120)	(0.018)	(33.66)	(0.013)
H_0: Coefficients on Intensity + Intensity x Female = 0				
F-stat	4.102	6.397	0.014	2.09
p-value	0.047	0.014	0.906	0.153
Observations	1,104	1,104	1,104	1,104
Rsquared	0.985	0.96	0.92	0.912

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors clustered at the district level appear in parentheses. All regressions include district time trends and district and year dummy variables. The unit of observation is district-year-gender.

If part of this differential response is the result of girls having a lower price elasticity due to marriage or pregnancy, then older girls (who are more likely to be married or pregnant) should

respond less to FPE. Column (2) contains estimates of Equation (1) with the average age at completion as the dependent variable. There was no statistically significant change in the age of boys at primary school completion. Female graduates became younger by 0.07 of a year relative to their male peers in a district of average intensity. An alternative measurement of the effect of the program on age at completion is the number of students who graduate at an age well above age for grade.[5] The number of boys aged 17 or older increases, but there is no change in the number of similarly aged girls (column (3)). All students we observe started school pre-FPE, therefore the change in age is not the result of a reduction in the delayed entry. Instead, an increase in the number of younger girls graduating could signal a higher price elasticity for these younger students because they are less likely to be married or pregnant.[6] Since we do not find an increase in the number of older girls taking the KCPE, FPE does not appear to affect the reasons that older girls do not complete school.

A deterioration in school quality (e.g. overcrowding) and changing student composition could combine to alter student achievement. We formally examine the impact of the introduction of FPE on student achievement by estimating Equation (1) with the average test score as the dependent variable. Column (4) shows that the program negatively affected test scores although this effect was imprecisely measured. However, there were no apparent FPE generated gender differences in achievement. Examining the test scores by subject, we find that FPE led to a deterioration of girls' scores in English and math but improved scores in science, the subject with the highest score gap pre-FPE (results available upon request).

[5] If students start school on time at age 6 and have timely progression through primary school then they should be 13 or 14 at the time of the KCPE.

[6] This finding is also consistent with a decrease in grade repetition, perhaps because of enrolled students no longer having intermittent attendance due to lack of fee payment during the school year or because of an increase in social promotion due to overcrowding. We cannot empirically test these alternatives, but they are less likely than marriage or pregnancy to be differential by gender.

Our results are robust in additional specifications that control for contemporaneous programs, pre-existing school quality, interactions between district and post-FPE dummy variables, and interactions of province times year dummy variables (results available upon request).

V. Discussion and Conclusions

The Free Primary Education program in Kenya at the start of the 2003 school year eliminated school fees in all public schools. While the program was successful in increasing the primary school completion rates of both genders, our results show that it widened the gender gap in primary school completion and had no effect on the achievement gap. These results are in contrast to prior studies that have found female enrollment responding more than male enrollment to other free education programs. Our study is different because we measure primary school completion, when girls are older and more likely to drop out of school due to marriage and pregnancy. Our results suggest that FPE programs are not sufficient to narrow the gender gap in primary school completion. Thus additional programs such as conditional cash transfers may be necessary to close gender gaps.

Due to data limitations, our results only pertain to students who entered primary school in or before 2000. We are therefore unable to fully assess the effect of this program on individuals whose entire primary experience was during the FPE regime. As these cohorts complete primary school starting in 2010, further work will estimate the longer term impact of FPE.

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