Short and Medium Term Impacts of the Elimination of School Fees on Girls' Education in Benin, West Africa

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Abstract

This study measures the impact of the abolition of primary school fees for girls in rural areas of Benin, West Africa. To assess the impact of this policy initiated in 2000, the difference in differences method with multiple groups has been applied to birth cohorts using the National Demographic and Health Surveys of 1996, 2001 and 2006. As a result, the policy decreases the likelihood of non-enrollment and dropout of the recipients solely in the short term. Yet, there is no significant impact on the lower quintiles of wealth compared to the higher quintiles. Furthermore, the free primary education may have no significant impact on the achievement of girls in rural areas in the short term, nor in the medium term. These results are robust to migrations across regions, to introduction of distance to school and to several groups, which are used as control experiments. In conclusion, the elimination of direct school costs may enhance access to education, but has no plausible impact on the achievement of the beneficiaries.

JEL codes: H43, I24, I25, O15

Keywords: Impact evaluation, school fees, distance to school, girls' education, natural experiment.

1. Introduction

One subject extensively discussed in the literature is which public policy could reduce the gender gaps in education in developing countries. In fact, limited by resources, a government must be perspicacious in selecting policies that promote education. Some studies provide evidence that the enhancement of a school's infrastructure at the supply side increases achievement. Indeed, even a mere redistribution of public resources improves achievement, especially for girls and for the poor (Duflo, 2004; Chin, 2005). On the demand side, cash transfers or scholarships and the abolition of schooling costs are among other incentives used to encourage children's education. In terms of subsidies, a conditional cash transfer influences the enrollment of the recipients, to a larger extent for girls than for boys (Schultz, 2004; Filmer and Shady, 2006). Most studies indicate that educational policies — whether gender neutral or not — encourage girls' education.

Specifically, the rationale behind the elimination of costs is that in the case of high total costs parents may decide not to send their children to school, due to the lack of sufficient funds. Otherwise, considering the marginal benefit and costs of education, one child could be sent to school to the detriment of the other children. This may explain the success of gender targeted policies in cultural contexts that are more challenging for girls (Glick, 2008). In most cases, the abolition of school fees culminates in an upsurge in enrollment, and reduces gender gaps. However, a change mainly in direct costs may have only a "restricted" effect on education (Behrman and Knowles, 1999). This paper demonstrates that in the case of Benin, West Africa, the elimination of direct costs enhances enrollment, but may not be enough to improve achievement.

In Sub-Saharan Africa, most countries have implemented a Free Primary Education (FPE) policy in order to abolish school fees for children of school-going age. Nevertheless, only a few studies to date have assessed these policies in Africa, possibly due to the lack of available data. Benin is an interesting country in which to measure the impact of gender targeted policies. Before the implementation of the FPE policy for all in 2000, the government first targeted their policies towards girls' education. In fact, Benin had to deal with significant discrimination against girls in education. For example, the enrollment and achievement rates of girls lagged behind those of their male counterparts: in 1998 the boys' gross enrollment rate was 91.2% with a promotion

rate[1] of 52.2%, while the girls' enrollment rate was 59.1% with a promotion rate of 24.8%. Thus, Benin implemented the FPE for girls living in rural areas, and in 2001 the state began supporting the policy with more subsidies for schools to enroll girls. Nonetheless, discrimination against girls in education has persisted. In fact, in 2002 the boys' gross enrollment rate was 103.9%, whereas the girls' enrollment rate was 76.2% (INSAE, 2009)[2]. In 2006, Benin introduced a second policy that abolished school fees for every child. However, this current paper focuses on the evaluation of the first policy of 2000, eliminating school fees for girls. The analysis of the 2006 policy will be the subject of a future study.

This paper evaluates the impact of the elimination of fees on girls in rural areas in the short and medium terms. Essentially, it attempts to address one of the main critics of the impact of evaluations in developing countries, which is the tendency to focus on short run analysis (Duflo, 2004). Thus, the difference in differences method with multiple groups has been applied using the National Demographic and Health Surveys (DHS) of 1996, 2001 and 2006, in order to evaluate the short and medium term influence of the policy on education. The main challenges of the evaluation are to find a good counterfactual for the beneficiaries, and to identify the effect of the policy with the number of years of surveys available. In this regard, girls in urban areas are the most appropriate control group. Even so, the divergence between rural and urban areas could be a major weakness for the estimations. These issues are overcome with the use of birth cohorts within the different groups. Additionally, to properly disentangle the impact of the FPE from other policies, it is necessary to increase the number of groups. As a result, the study also assesses the effects on birth cohorts of girls in urban areas as a control group. It also includes a placebo experiment on birth cohorts of boys in rural and urban areas. Consequently, the impact is evaluated over approximately eight groups and three years. As an additional robustness analysis, this paper analyzes the effect of the distance to school as a proxy for the other schooling costs that may better explain achievement than school fees. It also analyzes potential migration between regions. All those robustness checks support the outcome of the evaluation. The FPE decreases the probability of non-enrollment solely for girls in rural areas, who are the target of

[1] The promotion rate per grade is the percentage of children per cohort from a given grade and in a given school year who actually continued onto the next grade in the following year (UNESCO, 2009).

[2] All the figures in this paragraph are from the report INSAE (2009). Furthermore, the gross enrollment rate could be over 100% because it is irrespective of age. In other words, older or younger children could be included.

the policy. This impact is more pronounced for wealthy households than others. The FPE also decreases the probability of dropout but achievement has not been impacted.

The noteworthy points of this study are threefold. First, it is one of the first evaluations of the FPE in Benin, and is a part of the literature on impact evaluation in Africa. Second, the paper considers more than one educational outcome, namely non-enrollment, dropout and years of schooling, in order to take into account the potential effects of the policy. Third, the analyses are in the short and medium terms. This assessment of FPE could help to improve the policy and to minimize girls' underachievement. The study is comprised as follows: Section 2 presents Benin's implementation of the FPE; Section 3 explains the methodology; and Section 4 provides the results of the evaluation. Section 5 presents the different robustness checks for the evaluation and Section 6 concludes the paper.

2. Benin's implementation of the Free Primary Education policy

Article n°3 of Benin's Fundamental Law of December 11, 1990 stated that, "…education is mandatory and the State and the communities are responsible to make it progressively free." Hence, within the framework of the Highly Indebted Poor Countries (HIPC) initiative, the government decided to eliminate school fees for girls in the rural areas. This measure was only relevant for girls in public schools, and was implemented at the beginning of the academic year[3] 2000-2001. Indeed, in order to compensate for the elimination of fees, in 2001 the government provided financial support to schools. On October 14, 2006 the newly elected government[4] declared that access to pre-primary and primary education should be *free of charge* for every child of school-going age. However, the data to date permits only the study of the impact of the first FPE initiated in 2000.

It must be noted that the declaration of the second FPE was within the period of data collection of the DHS 2006. In fact, this period of data collection was from August 3 to November 18, 2006, and relates to the end of academic year 2005-2006 and the beginning of academic year 2006-2007. The important issue to note is that enrollment may have increased due to the new

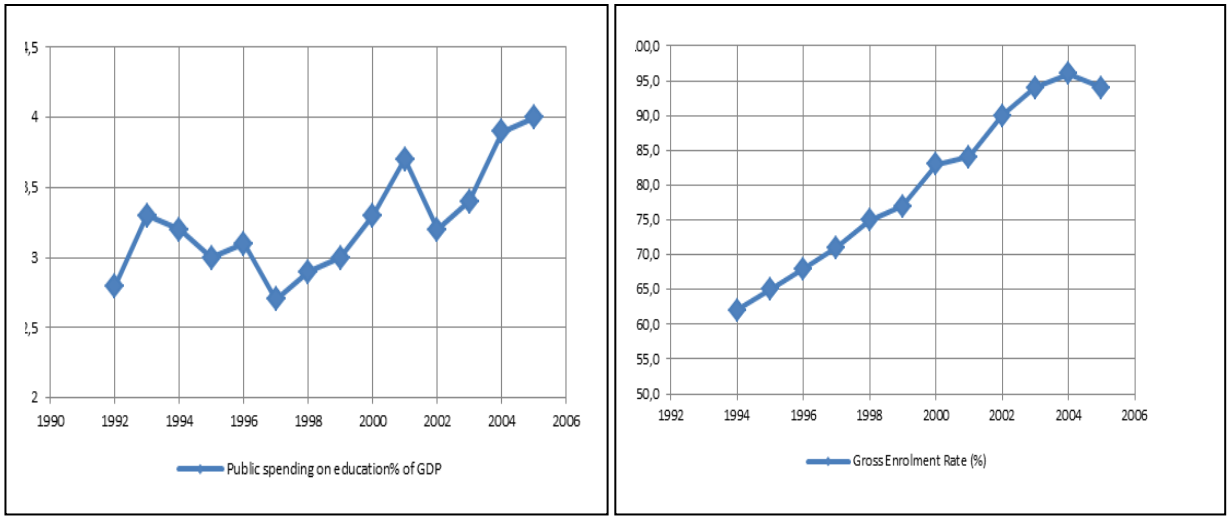
[3] An academic year in Benin is from October of one year to July of the following year.

[4] Based on the National Report "*Impact de la gratuité de l'enseignement maternel et primaire sur la pauvreté, le social et les OMD*" a report of the "*Observatoire du Changement Social*" which is a division of the Benin Ministry of Development and Economic Analysis in 2012.

policy, but the measure is an effect of the first FPE policy. Indeed, the second FPE policy began in October 2006, when the first FPE policy was still in effect. Nonetheless, the short period (one month) between the launch of the second policy and the end of data collection for DHS 2006 helped avert the potential confusion as to the impacts of both policies. However, this paper will check and discuss the possible effect.

At the time of writing, the statistics on the actual schooling fees on a national scale were not available, thus it was not possible to analyze the decline of costs. Yet, the following figures on the public spending on education (PSE), as a percentage of the gross domestic product (GDP) and of the gross enrollment rate (GER), confirmed that the government made important investments in education in 2001.

Figure 1: Development of the public spending on education in % of GDP (1992-2005) and the GER (1994-2005)



Source: Statistics from World Bank (2009)

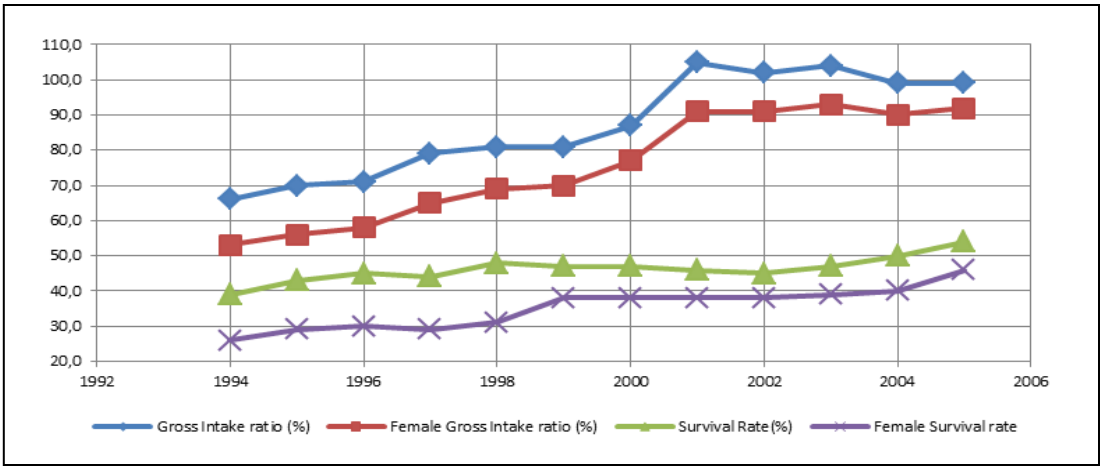
The Public Spending on Education (PSE) is the amount of financial resources that the government devotes to national education. Yet, the percentage includes not only the primary level, but also other levels of education. Generally, Benin's investments in education have increased from 2.8% of GDP in 1992 to 3.9% in 2005. With regard to the period studied (1996-2006), the PSE had one of its highest rates of 3.8% in 2001. This latest year corresponds with the start of the FPE for girls living in rural areas. Therefore, the efforts of the government in the effective execution of the policy may be observed in the development of the PSE.

The primary school's Gross Enrollment Rate (GER) is the percentage of children registered in primary schools against the number of children who *should* be in primary schools. The main disadvantage of this indicator is that it does not take into account the age of the registered children. Hence, older or younger children in a cohort of pupils could be included in the statistics. Figure 1 indicates that the GER is relatively stable. However, the slope is steeper after 2001, and this may reveal a general increase in enrollment after this year.

This analysis would be incomplete without an examination of girls' education in Benin. Indeed, Figure 2 displays the development of the Gross Intake Ratio (GIR) of primary schools and the survival rates (SR) from 1994 to 2005. The GIR is the number of children registered in the first grade of primary schools over the number of children who should be in primary schools, however it does not take the age of the children into account. Still, it reveals the capacity of the system to receive children, and more importantly, the number of children who do indeed access the first grade of primary schools. The SR is the number of children (from the initial cohort registered in the first grade of primary schools), who actually reach the last grade (sixth grade). The difference between the GIR and the female GIR is that the latter considers girls only instead of all children evenly for the SR (UNESCO, 2009).

Figure 2 illustrates that both GIRs and the SRs increased over time. For example, from 53% of girls in 1994, 92% of girls entered primary schools in 2005. In fact, it appears that by 2005, Benin had almost solved the problem of access to the first grade of primary school. In addition, the biggest improvement occurred between 2000 and 2001 with the increase of the female GIR from 77% to 91%. It is also clear that the general GIR has improved. This period corresponds to the year of implementation of the FPE and may be an explanation for this increase.

Figure 2: Development of the gross intake rate and survival rates from 1994 to 2005



Source: Based on statistics from PDDSE 2006-2015

Additionally, Figure 2 shows that the survival rate is relatively stable during this period. For example, in 2001, 92% of girls entered the first grade, with only 38% actually completing the primary level. Therefore, the dropouts have only slightly changed, and thus remain important. Furthermore, the elimination of fees for girls may not affect their achievement, which is the primary concern of this paper.

3. Methodology

This section covers the descriptive evidence, the identification strategies and the estimation procedures.

3.1 Data and descriptive evidences

3.1.1 Data

The data comes from the National Demographic and Health Survey (DHS) for the periods 1996, 2001 and 2006 ("*Enquête Démographique et de Santé du Benin*"), and are gathered by the National Institute for Statistics and Economic Analysis (INSAE, Benin) in collaboration with Macro International. DHS 1996 was used as the pre-treatment year, because no child was a recipient of the policy at that time. Thus, the comparison of the outcomes of 1996 and 2001 gives an idea of the effect of the policy within the first year of execution. This is the short term analysis. The DHS 2006 was also a post treatment year and its comparison with DHS 2001 may reveal the medium term effects. Furthermore, this paper restricts the household members' data sets to children aged six to fourteen years old, in order to obtain a specific dataset of these ages only. Essentially, the primary school age in Benin is theoretically between six and eleven years old. However, in 2002 the World Bank revealed that girls usually complete primary school at fourteen years of age. This determined the primary school age as six to fourteen years old, instead of eleven years old. To complete the information available for each child, the data sets containing the children's information have been merged with the individual data sets which include details of the mothers. The data set of 1996 captures 4,482 children, the 2001 data set 4,871 captures children and the 2006 data set captures 15,334 children. Section 3.1.2 further describes those datasets.

3.1.2 Descriptive evidence

Table 1 displays the percentage of dropouts and non-enrollment, according to different groups. These statistics come from the merged datasets. Table 1 reveals that the percentage of dropouts is low in primary schools. However, some inequalities can be noticed between the girls and the boys depending on their area of residence. In 1996 for instance, the percentage of dropouts of boys in urban areas (5.2%) are lower than that of boys in rural areas (8.5%), and this difference is roughly the same for girls from urban and rural areas. It appears that children in rural areas may have more incentives to abandon school than children from urban areas. However, in the rural areas girls abandoned schools more than the boys. In 2001, the percentages have reduced in all areas. In 2006, the percentages have decreased again. Yet in 2006, the disparities between gender and those according to the area of residence noticed in 1996 have broadened once more.

Table 1: Percentages of dropouts and non-enrollment per gender according to the area of residence for children 6 to 14 years old*

Variables		% Non-enrollment			% Dropouts		
Years		1996	2001	2006	1996	2001	2006
Area or residence							
Male	Urban	21.9	17.3	21.7	5.2	4.9	1.2
	Rural	50.7	38.7	35.9	8.5	4.7	2.7
Female	Urban	33.7	27.8	24.6	5.9	4.1	2.6
	Rural	71.7	53.8	44.3	9.6	4.3	3.3

*The differences between those totals and the ones given in the text are due to the missing data. Also in 1996, the dropouts are only computed with the children who have enrolled in schools.
Source: Author's own computations from Benin's DHS (1996, 2001, 2006)

Non-enrollment differentials between girls and boys are substantial. In 1996 for instance, more than 70% of girls from rural settings had not enrolled compared to around 50% of boys. In 2001, the non-enrollment rates have decreased mostly among girls in rural areas, with the largest decrease of around 20 percentage points between 1996 and 2001. In 2006, the rates have reduced again, but about 44% of the girls in rural areas were still not registered in primary schools. The discriminations have generally not ceased either in 2001 or 2006. In comparison to boys, girls remain disadvantaged, with the girls in rural areas being the least favored.

More importantly, the analysis of the relationship between income and children's outcomes may better explain those inequalities. In fact, Table 2 presents the percentages of dropouts and

non-enrollment per gender, and quintiles of wealth in 1996, 2001 and 2006. The DHS does not contain information on a household's income per se, but rather an index of wealth calculated according to the household assets (Filmer and Pritchett, 1998).

Table 2: Percentages of dropouts and non-enrollment per gender according to the quintiles of wealth from children 6 to 14 years old

		% Non-enrollment			% Dropout		
Years		1996	2001	2006	1996	2001	2006
Quintiles of wealth							
Male	Lowest quintile	68.3	50.9	49.2	10.2	4.8	2.5
	Second quintile	58.1	43.1	39	8	3.5	2.5
	Middle quintile	39.7	32.7	29.5	10	5.6	2.7
	Fourth quintile	26.9	15.8	18.4	6.1	5.4	1.6
	Highest quintile	6.2	4.3	3.7	3.8	4.3	0.8
Female	Lowest quintile	88.5	70.7	62.5	13	2.2	3.1
	Second quintile	77.4	61.8	47.1	6.5	3.4	3.2
	Middle quintile	68.0	44.6	34.4	11.2	7	3.3
	Fourth quintile	45.2	27.3	21.1	10.3	4.7	3
	Highest quintile	12.2	11.2	6.2	4.3	4.0	2.4

Source: Author own computations from Benin's DHS (1996, 2001, 2006)

Although the percentages of dropouts are generally low, there is a gap depending on the levels of income. In 1996, the children from the lowest quintile have a higher dropout rate than children from the highest quintile. In 2001, there is no clear difference between children from different levels of wealth. The disparities remarked in 1996 are noticed again in 2006, but to a lesser extent.

In terms of non-enrollment, in 1996 around 68% of boys from the lowest quintile are not registered in primary school in contrast to 6% of boys of the highest quintile. Furthermore, girls are more often not enrolled according to the household income than boys. Indeed, about 68% of boys from the lowest quintile are not enrolled while about 88% of girls from the same quintile are enrolled. In summary, disparities relating to the area of residence and wealth have not stopped, in 2001 nor in 2006.

Table 3: Means of years of schooling per gender, area of residence and quintiles of wealth from children 6 to 14 years old

		Means of years of schooling completed		
		1996	2001	2006
Gender	Male	1.3068 (0.03393)	1.7698 (0.03479)	1.9900 (0.02489)
	Female	0.8449 (0.03159)	1.2871 (0.03535)	1.7507 (0.02239)
Type of residence	Urban	1.8173 (0.05135)	2.1798 (0.04921)	2.3122 (0.02701)
	Rural	0.8245 (0.02456)	1.2905 (0.2787)	1.6527 (0.02112)
Wealth	Lowest quintile	0.3731 (0.03006)	0.8294 (0.0372)	1.1316 (0.02744)
	Second quintile	0.6529 (0.04082)	1.1399 (0.04911)	1.4895 (0.03010)
	Middle quintile	0.9266 (0.4545)	1.4319 (0.05097)	1.9150 (0.4600)
	Fourth quintile	1.5018 (0.05840)	2.0616 (0.05613)	2.3684 (0.03519)
	Highest quintile	2.5130 (0.06625)	2.9334 (0.06966)	3.1477 (0.03990)

(): standard deviations

Source: Author's own computations from Benin's DHS (1996, 2001, 2006)

Table 3 shows that discriminations observed in terms of non-enrollment and dropouts are similar to those in term of years of schooling completed. Indeed, in 1996, boys achieved on average more years of schooling than girls. The difference can also be observed between children from urban and rural areas, with the grade completed appearing to depend on the level of income. Children from the highest quintile achieved far more years of schooling on average than children from the lowest quintile. Moreover, those discriminations have not changed in 2001 nor in 2006.

3.1.3 Strategies

The FPE policy was aimed at girls' education in rural areas from 2001 onward. This paper examines Benin's implementation of the FPE as a natural experiment. In fact, the policy focused only on the primary school-aged girls in rural areas in 2001. Hence, the girls in rural areas aged six and fourteen years old are the treatment group and the other children between six and fourteen years old are potentially the control groups. To evaluate the impact of the policy, a simple differentiation of the outcomes has been used. However, the main drawbacks are the temporal trends and other events which could provide a misleading effect on the policy, and consequently

the difference in differences (DID) procedure may be more appropriate. However, a selection bias could appear in a DID procedure with these control groups. In fact, none of these groups fits a good counterfactual. First, girls living in the urban area and rural areas could be compared, with the main advantage being that all of these girls are under the same cultural constraints regarding their education. Still, the type of residence is an important difference. In the context of a developing country, the rural and urban areas could be different mainly in terms of infrastructure (for example, the number of schools), and with each district or region having its own educational policies. Second, girls and boys living in the rural areas could be compared. One issue for this comparison is that the disparities between genders in term of education could persist even with the policy. Still, the estimation could benefit from the fact that they live in the same environment and are under the same difficulties in terms of accessibility to schools. Moreover, the boys cannot benefit directly from the policy.

Finally, the birth cohorts of girls in rural areas only were considered. The DID was applied with different cohorts of age as control groups, and the sample was divided into three births cohorts: the girls who should enter the primary schools (six to eight years old); those who should already be attending school (nine to eleven years old); and those who should complete this level. For instance, the girls aged six to eight years old in 1996 did not receive the FPE at that moment in comparison to the same group of age in 2001. Therefore, the girls aged six to eight years old in 1996 are used as counterfactual for the girls of the same age in 2001. The advantage of this method is that the assumption of common trends for the DID is not violated. Furthermore, the effect of birth cohort and time has been controlled for by reproducing the same experiment for the girls in urban areas as separate control experiments in order to ascertain the validity of the identification strategy. The following table summarizes the different groups:

Table 4: Summary of the DID strategies for the short term impact

	Experiments 1: Younger cohort 6 to 8 years old		Experiment 2: Middle cohort 9 to 11 years old		Experiment 3: Old cohort 12 to 14 years	
	1996	2001	1996	2001	1996	2001
	Control					
Class of age	**6 to 8***	11 to 13	**9 to 11**	14 to 16	**12 to 14**	17 to 19
	Treatment					
Class of age	1 to 3	**6 to 8**	4 to 6	**9 to 11**	7 to 9	**12 to 14**

*Bold Characters are for the actual groups of age compared in the estimations.
Source: Author

Table 4 shows, for example, that children aged six to eight years old in 2001 were one to three years old in 1996, and thus too young to start primary school. Consequently an effect detected in this group is the impact on the children's access to schools. Likewise, the children older than eight years old in 2001 should have been in schools before the implementation of the policy. Yet, their comparison groups are old enough in 2001 to have finished primary school, and they therefore do not directly benefit from the FPE. The difference in the medium term impact is that those different effects are observed five years later. These strategies have been applied using regressions.

3.2 Estimation procedure

After the identification of the groups, the estimation of the different effects is straightforward. The objective of the paper is to assess the impact of the FPE on enrollment and attainment: the outcome variables are the probability of non-enrollment, of dropout and of a grade completion. Here, we chose non-enrollment instead of enrollment because the cases of non-enrollment were important in developing countries and less studied. Yet, non-enrollment and enrollment both explained the same phenomenon, that is, the access to education. The DID equations correspond to the following:

$$Y = \alpha_0 + \alpha_1 X + \alpha_2 cohort + \delta_0 fpe2001 + \delta_1 cohort * fpe2001 + \mu \quad \text{(equation 1)}$$

$$Y = \alpha_0 + \alpha_1 X + \alpha_2 cohort + \delta_0 fpe2006 + \delta_1 cohort * fpe2006 + \mu \quad \text{(equation 2)}$$

With Y the educational outcome; X a set of demographic variables on household; child and parents; *cohort* equals 1 when the girl is in this cohort (eg. six to eight years old) and 0 otherwise; *fpe* is a dummy for the post-treatment year (2001 or 2006) which represents the trend in the outcome; *cohort*fpe* is an interaction variable, which takes 1 if the girl is from this cohort in the post-treatment year and 0 otherwise; $\alpha 0$, α_1, α_2, δ_0 are constants and μ is the error term. δ_1 gives the impact of the FPE with regards to this strategy.

The explanatory variables describe the child, the parents and the household. The household structure's variables are: the number of daughters at home; the number of sons at home; and the number of births in the last five years. Chernichovsky (1985) showed that the presence of younger siblings could be a barrier to girls' education because of the need for child care. Also, the number of siblings in the household could reveal the potential competition in terms of

resources devoted to education (Glick and Sahn 2001, Tansel 2002, 1997). The number of sons and daughters at home has been used as a proxy for the number of siblings. The household's head variables include gender, age and the household level of wealth. The vector of child variables contains also age and gender. Finally the parents' characteristics include the parents' levels of education and their professional activities.

The following tables comprehensively describe the effects of the control variables used in the estimations of non-enrollment and dropout. The determinants of achieved years of schooling are not presented because they are similar to those used for the first two outcomes (non-enrollment and dropout).

Table 5: Average marginal effects of the determinants of children's non-enrollment (1996/2001)

VARIABLES	Girls	Girls rural	Girls urban	Boys	Boys rural	Boys urban
Child's age	-0.223***	-0.248***	-0.173***	-0.268***	-0.275***	-0.228***
	(0.0296)	(0.0358)	(0.0484)	(0.0245)	(0.0309)	(0.0350)
Child's age*2001 dummy	-0.0689	-0.0978*	0.00773	-0.0302	-0.0374	-0.0220
	(0.0433)	(0.0533)	(0.0689)	(0.0378)	(0.0484)	(0.0526)
Square child's age	0.0112***	0.0126***	0.00849***	0.0119***	0.0120***	0.0105***
	(0.00150)	(0.00183)	(0.00243)	(0.00121)	(0.00151)	(0.00177)
Square child's age*2001 dummy	0.00313	0.00457*	-0.000682	0.00123	0.00162	0.000689
	(0.00219)	(0.00273)	(0.00347)	(0.00186)	(0.00237)	(0.00266)
Household head's age	-0.00520	-0.00594	-0.00435	-0.00601	-0.00449	-0.0100
	(0.00438)	(0.00504)	(0.00832)	(0.00447)	(0.00524)	(0.00862)
Household head's age*2001 dummy	-0.000262	0.00257	-0.0130	0.00992	0.00947	0.0100
	(0.00654)	(0.00747)	(0.0119)	(0.00645)	(0.00777)	(0.0109)
Square household head's age	5.99e-05	6.49e-05	5.65e-05	7.16e-05*	6.05e-05	0.000103
	(4.16e-05)	(4.74e-05)	(7.75e-05)	(4.08e-05)	(4.76e-05)	(8.05e-05)
Square household head's age*2001 dummy	-5.37e-06	-3.42e-05	0.000126	-9.73e-05	-0.000102	-7.24e-05
	(6.26e-05)	(7.11e-05)	(0.000112)	(5.95e-05)	(7.16e-05)	(0.000101)
Female household head	-0.0211	-0.0432	0.00336	0.0277	0.0102	0.0571*
	(0.0328)	(0.0437)	(0.0465)	(0.0357)	(0.0500)	(0.0321)
Female household head* 2001dummy	0.0489	0.0679	0.0148	-0.0644	-0.0780	-0.0272
	(0.0429)	(0.0560)	(0.0648)	(0.0461)	(0.0609)	(0.0489)
Father no formal education	0.207***	0.206***	0.181***	0.186***	0.201***	0.114**
	(0.0298)	(0.0403)	(0.0482)	(0.0342)	(0.0433)	(0.0464)
Father no formal education* 2001dummy	-0.00120	0.0175	-0.00328	-0.0365	-0.0412	-0.00553
	(0.0414)	(0.0542)	(0.0679)	(0.0459)	(0.0596)	(0.0623)
Father primary education	0.0877***	0.0677	0.0925**	0.0939**	0.0755	0.0983**
	(0.0332)	(0.0489)	(0.0431)	(0.0408)	(0.0551)	(0.0477)
Father primary education* 2001dummy	-0.0430	-0.0240	-0.0471	-0.0555	-0.0465	-0.0697
	(0.0446)	(0.0625)	(0.0607)	(0.0523)	(0.0705)	(0.0621)
Mother no formal education	0.230***	0.458***	0.135**	0.272***	0.258	0.182**
	(0.0678)	(0.137)	(0.0650)	(0.102)	(0.178)	(0.0827)
Mother no formal education* 2001dummy	-0.00343	-0.270*	0.0894	-0.0440	-0.0360	-0.00805
	(0.0861)	(0.152)	(0.0931)	(0.119)	(0.202)	(0.103)
Mother primary education	0.114	0.349**	0.0231	0.153	0.0849	0.149*
	(0.0750)	(0.143)	(0.0808)	(0.105)	(0.183)	(0.0808)
Mother primary education* 2001dummy	0.0325	-0.235	0.127	-0.0128	0.0482	-0.0589
	(0.0935)	(0.159)	(0.108)	(0.125)	(0.211)	(0.106)
No. Births in the last 5years	0.0455***	0.0515***	0.0347*	0.0145	0.0140	0.0116
	(0.0113)	(0.0133)	(0.0196)	(0.00994)	(0.0126)	(0.0148)
No. Births in the last 5years * 2001dummy	-0.0120	-0.0139	-0.0138	-0.00675	-0.00810	0.00293
	(0.0170)	(0.0205)	(0.0298)	(0.0135)	(0.0170)	(0.0204)
Dummy for lower wealth quintile	0.346***	0.343***	0.377***	0.245***	0.253***	0.217***
	(0.0382)	(0.0474)	(0.0751)	(0.0336)	(0.0415)	(0.0494)
Dummy for lower wealth quintile* 2001dummy	-0.0943*	-0.0561	-0.202**	-0.0252	0.0262	-0.161***
	(0.0503)	(0.0605)	(0.0935)	(0.0462)	(0.0605)	(0.0606)
Observations	4,207	2,937	1,270	5,065	3,645	1,420
χ^2	937.34	737.04	328.02	1011.94	617.05	544.40
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log-likelihood	-2086.6814	-1518.7963	-543.68223	-2464.6499	-1991.8577	-436.42735
Pseudo R^2	0.2830	0.2180	0.2945	0.2607	0.2034	0.3572

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%.

Source: Author's own computations from Benin's DHS (1996, 2001)

Table 5: Average marginal effects of the determinants of children's non-enrollment (1996/2001) (continued)

VARIABLES	Girls	Girls rural	Girls urban	Boys	boys rural	boys urban
Dummy for second wealth quintile	0.218***	0.219***	0.159***	0.194***	0.186***	0.189***
	(0.0357)	(0.0442)	(0.0566)	(0.0325)	(0.0406)	(0.0436)
Dummy for second wealth quintile*2001dummy	-0.0298	-0.0147	0.0263	-0.00225	0.0263	-0.00316
	(0.0477)	(0.0593)	(0.0736)	(0.0447)	(0.0601)	(0.0557)
Dummy for middle wealth quintile	0.159***	0.159***	0.110**	0.0775***	0.0779**	0.0243
	(0.0325)	(0.0421)	(0.0507)	(0.0290)	(0.0374)	(0.0395)
Dummy for middle wealth quintile*2001dummy	-0.0586	-0.0535	0.00552	0.0392	0.0639	0.0520
	(0.0423)	(0.0537)	(0.0645)	(0.0424)	(0.0555)	(0.0582)
Atacora	-0.0770	-0.0946	-0.0548	-0.00124	-0.0210	0.0757
	(0.0561)	(0.0716)	(0.0606)	(0.0492)	(0.0624)	(0.0535)
Atacora* 2001dummy	0.115	0.0905	0.200**	0.0413	0.0597	-0.00371
	(0.0739)	(0.0902)	(0.0955)	(0.0652)	(0.0836)	(0.0721)
Atlantique	-0.0745	-0.000252	-0.188***	-0.0735	-0.0548	-0.0655
	(0.0476)	(0.0636)	(0.0508)	(0.0500)	(0.0647)	(0.0445)
Atlantique01* 2001dummy	0.0155	-0.103	0.245***	-0.0606	-0.115	0.0381
	(0.0665)	(0.0873)	(0.0784)	(0.0719)	(0.0956)	(0.0649)
Borgou	-0.00513	0.0170	-0.0591	0.119**	0.137*	0.108**
	(0.0674)	(0.0960)	(0.0553)	(0.0576)	(0.0761)	(0.0475)
Borgou* 2001dummy	0.0239	0.00124	0.101	-0.0813	-0.0883	-0.0807
	(0.0837)	(0.116)	(0.0802)	(0.0702)	(0.0927)	(0.0646)
Mono	0.0234	0.0256	0.0466	-0.0173	-0.0273	0.0568
	(0.0505)	(0.0608)	(0.0679)	(0.0483)	(0.0605)	(0.0448)
Mono* 2001dummy	-0.0492	-0.0683	-0.0152	-0.0902	-0.111	-0.0588
	(0.0700)	(0.0835)	(0.110)	(0.0615)	(0.0754)	(0.0884)
Oueme	-0.0925**	-0.0800	-0.121**	-0.0669	-0.0890	0.0195
	(0.0458)	(0.0593)	(0.0493)	(0.0482)	(0.0619)	(0.0436)
Oueme* 2001dummy	0.0960	0.0661	0.192**	0.0115	-0.0173	0.0484
	(0.0603)	(0.0757)	(0.0781)	(0.0653)	(0.0829)	(0.0685)
fpe01 (2001dummy)	0.295	0.600	0.0543	-0.0315	0.00718	-0.134
	(0.279)	(0.366)	(0.443)	(0.269)	(0.380)	(0.377)
Rural	0.0721**			0.0858***		
	(0.0311)			(0.0282)		
Rural* 2001dummy	-0.0228			0.00942		
	(0.0424)			(0.0415)		
Observations	4,207	2,937	1,270	5,065	3,645	1,420
χ^2	937.34	737.04	328.02	1011.94	617.05	544.40
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log-likelihood	-2086.6814	-1518.7963	-543.68223	-2464.6499	-1991.8577	-436.42735
Pseudo R^2	0.2830	0.2180	0.2945	0.2607	0.2034	0.3572

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%.

Source: Author's own computations from Benin's DHS (1996, 2001)

The main observations with regards to girls, for example, are that the parent's education has a positive link with the probability of non-enrollment. For instance, the mothers with no formal education increased the probability to not be enrolled by 45.8%, whereas the mothers with a primary education augmented it by 34.9% for the girls in rural areas. This is important in three ways. First, the mother's education has more influence on the child's enrollment than the father's

education. However, girls in urban areas are an exception. Glick and Sahn (2000) have established similar results, but in their study maternal education had more influence on girls' schooling than on boys'. Second, even the parents with a primary education raised the probability to be not enrolled. Most likely, the parents with a primary education have fewer chances of getting qualified jobs than the parents with higher degrees. The probability is even lower for those who have not completed their primary degree. Consequently, they may not see as much benefit in the child's education or may not be able to afford a higher education for their children as can highly educated parents. The following table indicates that most of the parents with the lower levels of education are in the agriculture or trade sectors in the databases.

Table 6: Cross tabulation of the levels of education and occupation of the parents in 1996, 2001 and 2006.

Occupation		%Agriculture			% Sales		
Education / Years		1996	2001	2006	1996	2001	2006
Mothers	No education	37.9	46.0	49.0	54.6	43.9	39.0
	Primary education	14.0	18.2	23.0	69.6	61.6	60.0
	Secondary education	0.5	2.2	63.1	53.8	52.7	4.1
Fathers	No education	84.2	82.0	80.5	2.0	2.0	9.9
	Primary education	52.9	44.5	52.1	4.5	5.3	23.8
	Secondary education	23.2	15.5	22.8	7.6	7.8	31.6
Total	Mothers	4477	4477	4866	4866	15274	15274
	Fathers	4432	4432	4811	4811	14982	14982

Source: Author's own computations based on the DHS 1996, 2001, 2006

Third, parents with an education have less of an effect on the child's non-enrollment compared to the parents without formal education. This implies that the education of the child may benefit from the parents with higher degrees. The result complies with the theory of human capital.

Furthermore, various other family background variables are to a certain extent statistically significant. For instance, an increase in the child's age of one year is associated with a probability to not be enrolled of 22.3% for girls and 17.3% for girls in urban areas in particular. In other words, a younger child has a significantly higher probability of non-enrollment, which means that parents have a preference to enroll the older children to the detriment of the younger children. Additionally, the number of births in the last five years is related to a non-enrollment probability of 4.55% for girls, and the percentage is higher for girls in rural settings compared to urban areas, with the girls possibly contributing to the domestic activities (for example, child care) which may affect their studies (Chernichovsky, 1985; Al Samarrai and Peasgood, 1998; Tansel, 1997, Glick and Sahn, 2000). The regions are only significant for the girls in urban areas. Clearly, the girls

from the region Atlantique (respectively Oueme) have a lower non-enrollment probability of 24.5% (respectively 12.1%) compared to the other regions. But in fact, the economic capital of the country Cotonou and the political capital Porto Novo are respectively part of the regions Atlantique and Oueme. Therefore, the educational infrastructures are potentially more important in those regions and may favor the education of children. The various influences of the regions reveal an inequality in terms of educational infrastructure in the country. Unfortunately the DHS databases do not contain the data on accessibility to schools and quality of education which could help the in depth analysis of this issue. However, the statistics on the pupils/teacher ratio per district in 2006 shed more light on this point, where the pupils/teacher ratio is an indicator of the average number of pupils per teacher in a level of education (UNESCO, 2009).

Table 7: Statistics on the numbers of pupils and teachers in the primary schools according to the districts in 2006-2007

Indicators	Alibori-Borgou	Atacora-Donga	Atlantique-Littoral	Zou-Collines	Mono-Couffo	Ouémé-Plateau
Number of pupils	202,954	182,265	307,788	263,679	252,080	265,440
Number of teachers	4,219	3,919	7,847	6,137	5,107	6,414
Number of school	927	912	1,314	1,169	1,008	1,178
Ratio pupils/teacher	48.10	46.51	39.22	42.97	49.36	41.38

Source: INSAE, 2009

Table 7 indicates that the pupils/teacher ratio differs between regions. The lowest pupils/teacher ratio in 2006 was for the regions Atlantique/Littoral[5] and Ouémé/Plateau. In other words, those regions appeared to have more facilities than the other regions, because the number of schools situated there, for example, is among the highest. Those figures confirm the estimations' results. The region Alibori/Borgou has the highest ratio, and this statistic also confirms that the region Borgou may be disadvantaged in terms of educational infrastructure compared to the other regions.

[5] The law n°97-028 of January 15, 1999, referring to an administrative partition of the Republic of Benin, states that the country now comprises twelve districts (Alibori, Atacora, Atlantique, Borgou, Donga, Collines, Couffo, Mono, Littoral, Plateau, Oueme, Zou) instead of the six previous districts (INSAE 2003, pp14-15). In fact, each old district has been divided into two new districts. Table 2 provides the new and the previous districts, according to their actual locations. However, the new districts have been merged with the old ones in order to make the analysis explicit. Thus, in the DHS 2006 there are six districts instead of twelve.

4. Impact of the Free Primary Education policy on girls in rural settings

The section consists of three parts: the impact of the FPE on the non-enrollment; the dropout; and the years of schooling. Each subsection contains the analyses of the short and medium term estimations. In all DHS, the variables regarding non-enrollment and completed years of schooling are available, however, there is no information on the dropouts in the DHS 1996. For this year, I deduced dropouts[6] from a question on whether or not the child is still enrolled.

4.1 Impact on the non-enrollment

4.1.1 Short term impact on the non-enrollment

In general, the estimations[7] in Table 8 reveal a significant influence of the policy on the girls in rural zones. Also, there is no effect on any other group than the target group (girls in rural areas).

First, the outcome indicates no statistically significant impact on the younger cohort, and means that the FPE may have no effect on the children who start primary schools in 2001. Second, the policy has most likely significantly reduced the probability of non-enrollment of the middle cohort of 6.05% in 2001. Third, the elimination of costs has plausibly increased the probability of non-enrollment of the older cohort by 13.9%. In conclusion, the results suggest that the policy has improved enrollment of the girls in rural areas only.

[6] The DHS 1996 does not contain information on the child's dropout per se. As a result, it has been assumed that a child who is enrolled in year t-1 and not enrolled in year t has abandoned school. Thus, the answer "no" to the question "Is the household member still enrolled?" has been recoded as "yes" for dropout.

[7] All the equations on non-enrollment have a null probability of chi squared, which indicates that the models are globally significant. The likelihood ratio tests of the heteroscedastic probit model are also not significant at 0.05. It shows no significant improvement of the generalization of the homoscedastic models with different other independent variables (such as the parents' professional activities). As a result, the tests do not prove any misspecification of the models. In terms of predictions, the equations have passed the Hosmer-Lemeshow goodness of fit test, which implies that our specifications fit the data quite well.

Table 8: Average marginal effects of the policy on girls' non-enrollment in the short term

	Girls rural			Girls urban		
VARIABLES	Younger cohort	Middle cohort	Old cohort	Younger cohort	Middle cohort	Old cohort
Fpe01	0.221	0.327*	0.449**	-0.236	-0.148	-0.162
	(0.206)	(0.182)	(0.194)	(0.222)	(0.155)	(0.187)
Younger cohort	0.0925**			0.0439		
	(0.0380)			(0.0525)		
Younger cohort* 2001 dummy	0.0576			0.0418		
	(0.0568)			(0.0760)		
Middle cohort		-0.0838***			-0.0416	
		(0.0196)			(0.0319)	
Middle cohort* 2001 dummy		-0.0605**			-0.0106	
		(0.0307)			(0.0475)	
Old cohort			0.169***			0.0846
			(0.0386)			(0.0643)
Old cohort* 2001 dummy			0.126**			-0.0131
			(0.0576)			(0.0908)
Observations	2,937	2,937	2,937	1,270	1,270	1,270
χ^2	508.59	552.23	597.25	360.02	352.19	342.59
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log-likelihood	-1568.0458	-1553.0016	-1545.7739	-572.08114	-571.56284	-571.89839
Pseudo R^2	0.1927	0.2004	0.2042	0.2577	0.2583	0.2579

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%. The equations included variables on parent's education, household head's gender, household's head age, child's age, districts, births and quintiles of wealth that are not presented.
Source: Author's own computation based on DHS 1996 and 2001

Moreover, Table 9 suggests that only the higher quintiles of wealth may have benefitted from this policy. In fact, considering only the middle cohort, the probability of non-enrollment of girls in rural areas has diminished significantly by around 37.6% for the middle quintile of wealth and 33.4% for the fourth quintile. This probability is not significant for the low and second quintiles. Despite the abolition of fees, it appears that only wealthy households can afford to send their children to school.

Table 9: Average marginal effects of the FPE on non-enrollment of girls in rural areas according to the household's level of wealth (Middle cohort)

VARIABLES	Equation
Fpe01	0.420
	(0.390)
Middle cohort	-0.226*
	(0.120)
Middle cohort* 2001 dummy	0.235
	(0.206)
Middle cohort*Dummy low quintile	0.333***
	(0.123)
Middle cohort* Dummy low quintile* 2001 dummy	-0.281
	(0.212)
Middle cohort*Dummy second quintile	0.212*
	(0.123)
Middle cohort* Dummy second quintile* 2001 dummy	-0.219
	(0.215)
Middle cohort*Dummy middle quintile	0.297**
	(0.126)
Middle cohort* Dummy middle quintile* 2001 dummy	-0.376*
	(0.215)
Middle cohort*Dummy fourth quintile	0.305***
	(0.115)
Middle cohort* Dummy fourth quintile* 2001 dummy	-0.334*
	(0.200)
Observations	2,937
χ^2	755.26
Prob > χ^2	0.0000
Log-likelihood	-1511.9921
Pseudo R^2	0.2215

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%. The equations included variables on parent's education, household head's gender, household's head age, child's age, districts, births and quintiles of wealth that are not presented.
Source: Author's own computation based on DHS 1996 and 2001

Table 10: Average marginal effects of the FPE on the non-enrollment of girls in rural areas, according to the household's level of wealth (Older cohort)

VARIABLES	Equation
2001 dummy	0.501
	(0.347)
Older cohort	-0.0809
	(0.140)
Older cohort* 2001 dummy	-1.139***
	(0.185)
Older cohort*Dummy low quintile	0.0895
	(0.144)
Older cohort* Dummy low quintile* 2001 dummy	1.192***
	(0.183)
Older cohort*Dummy second quintile	0.0169
	(0.145)
Older cohort* Dummy second quintile* 2001 dummy	1.227***
	(0.185)
Older cohort*Dummy middle quintile	0.0639
	(0.146)
Older cohort* Dummy middle quintile* 2001 dummy	1.278***
	(0.179)
Older cohort*Dummy fourth quintile	-0.00686
	(0.141)
Older cohort* Dummy fourth quintile* 2001 dummy	1.281***
	(0.171)
Observations	2,937
χ^2	1384.80
Prob > χ^2	0.0000
Log-likelihood	-1515.7807
Pseudo R^2	0.2196

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%. The equations included variables on parent's education, household head's gender, household's head age, child's age, districts, births and quintiles of wealth that are not presented.
Source: Author's own computation based on DHS 1996 and 2001

Conversely, the increase in the probability of the non-enrollment of the older cohort of girls seems to be common within all levels of wealth. Indeed, Table 10 suggests that from the low to the fourth levels of wealth, the probability of non-enrollment of the older cohort has increased by more than 100%. This may be a measure of prioritizing younger children, which accompanied the elimination of costs.

4.1.2 Medium term impact on the enrollment

Overall Table 11 shows no significant impact of the policy in the medium term. This means that the effects of the FPE may have dwindled over time.

Table 11: Average marginal effects on the non-enrollment of girls in the medium term

	Girls rural			Girls urban		
VARIABLES	Younger cohort	Middle cohort	Older cohort	Younger cohort	Middle cohort	Older cohort
2006 dummy	0.269*	-0.251	-0.271	0.221	0.0329	0.0321
	(0.146)	(0.339)	(0.297)	(0.364)	(0.323)	(0.274)
Younger cohort	0.160***			-0.0156		
	(0.0453)			(0.0582)		
Younger cohort*2006 dummy	-0.0639			0.00957		
	(0.0518)			(0.0658)		
Middle cohort		-0.00215			0.0354	
		(0.0369)			(0.0419)	
Middle cohort*2006 dummy		0.0411			-0.0473	
		(0.0414)			(0.0472)	
Old cohort			0.0782			-0.0870
			(0.0663)			(0.0768)
Old cohort*2006 dummy			-0.0999			0.135
			(0.0735)			(0.0848)
Observations	6,071	6,071	6,071	3,176	3,176	3,176
χ^2	918.58	1091.91	1097.19	546.53	548.24	564.33
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log-likelihood	-3529.8776	-3437.2876	-3438.3053	-1221.324	-1220.8547	-1219.9385
Pseudo R^2	0.1571	0.1792	0.1790	0.2955	0.2958	0.2963

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%. The equations included variables on parent's education, household head's gender, household's head age, child's age, districts, births and quintiles of wealth that are not presented.
Source: Author's own computation based on DHS 2001, 2006

In summary, the elimination of costs has plausibly encouraged enrollment of the beneficiaries, that is, girls in rural areas. However, the level of wealth is still an important determinant of enrollment. In fact, the results imply that only wealthy households in those areas may be able to afford an education for girls. Finally, the effects observed seem to have reduced over time. The next section states the effects on dropouts.

4.2 Impact of the FPE on dropouts

4.2.1 Short term impact of the FPE on dropouts

Table 12 discloses the influence of the FPE on the dropouts of girls.[8] The policy has a significant negative effect on the middle cohort of girls living in rural areas. In other words, the

[8] The models are globally significant, because the probability of the chi squared is significant for all equations. However, the McFadden pseudo R squared is relatively low for the dropouts compared to the former estimations. Yet, the likelihood ratio test of the heteroscedastic probit model indicates no improvement of the specifications with

policy led to a decrease of 9.94% of the probability to drop out of schools for girls in rural areas. This impact is only observed in the beneficiaries. In fact, there is no significant effect for girls in urban areas.

Table 12: Average marginal effects of the policy on the dropout of girls in the short term

	Girls rural			Girls urban		
VARIABLES	Younger cohort	Middle cohort	Older cohort	Younger cohort	Middle cohort	Older cohort
Fpe01	0.466	0.627*	1.006***	0.575	0.501	0.237
	(0.508)	(0.353)	(0.345)	(0.591)	(0.369)	(0.285)
Younger cohort	-0.135			0.0609		
	(0.0857)			(0.0776)		
Younger cohort*2001 dummy	0.140			-0.0952		
	(0.0912)			(0.0893)		
Middle cohort		0.0938**			-0.0508	
		(0.0373)			(0.0430)	
Middle cohort*2001dummy		-0.0994**			0.0814	
		(0.0453)			(0.0503)	
Older cohort			-0.0991**			0.0671
			(0.0466)			(0.0611)
Older cohort*2001 dummy			0.110			-0.109
Observations	1,084	1,084	1,084	845	845	845
χ^2	470.30	477.49	505.42	879.88	703.72	639.24
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log-likelihood	-264.79648	-264.31739	-265.31554	-148.16394	-147.45893	-147.71462
Pseudo R^2	0.1527	0.1543	0.1511	0.1705	0.1744	0.1730

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%. The equations included variables on parent's education, household head's gender, household's head age, child's age, districts, births and quintiles of wealth that are not presented.
Source: Author's own computations based on DHS 1996, 2001

4.2.2 Medium term impact of the dropouts

In the medium term, Table 13 indicates no significant effect of the FPE on the dropout. However, the tendency to withdraw a girl from school in rural areas has diminished, but no particular causal effect is linked to the year 2006.

the generalization of the homoscedastic probit model with other variables such as parent education. The models have also passed the Hosmer-Lemeshow goodness of fit test. Hence, their predictions fit the data relatively well.

Table 13: Average marginal effects of the policy on girls' dropout in the medium term

	Girls rural			Girls urban		
VARIABLES	Younger cohort	Middle cohort	Older cohort	Younger cohort	Middle cohort	Older cohort
Fpe06	-0.357***	-0.373***	-0.374***	-0.0837	-0.0510	-0.0582
	(0.0499)	(0.0462)	(0.0573)	(0.0680)	(0.0398)	(0.111)
Younger cohort	0.0133			0.00273		
	(0.0143)			(0.0189)		
Younger cohort*2006 dummy	-0.00820			0.0138		
	(0.0171)			(0.0234)		
Middle cohort		-0.00790			-0.00347	
		(0.00988)			(0.0110)	
Middle cohort*2006 dummy		0.00274			-0.0190	
		(0.0115)			(0.0139)	
Older cohort			0.0101			-0.0213
			(0.0185)			(0.0243)
Older cohort*2006 dummy			-0.000175			0.0595**
			(0.0214)			(0.0293)
Observations	5,956	5,956	5,956	2,933	2,933	2,933
χ^2	2827.39	2806.25	2699.33	78.97	89.31	123.19
Prob > χ^2	0.0002	0.0004	0.0005	0.0000	0.0000	0.0000
Log-likelihood	-811.9244	-811.67046	-811.69765	-348.27627	-345.26427	-340.47514
Pseudo R^2	0.1161	0.1166	0.1164	0.1030	0.1107	0.1231

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%. The equations included variables on parent's education, household head's gender, household's head age, child's age, districts, births and quintiles of wealth that are not presented.

Source: Author's own computations based on DHS 2001, 2006

In conclusion, the FPE has significantly reduced the likelihood of dropping out of schools for girls in rural areas. The outcome on girls in urban areas might imply that the effect observed is in fact due to the policy and not to another event.

4.3 Causal effects of the FPE of the years of schooling or on grade completion

The variable "years of schooling" corresponds to the grade completed in the year of the data collection. To focus only on the primary level, the grades are limited to the first six levels. In fact, the primary level in Benin includes only six grades. Years of schooling have been estimated with the ordered probit model, because the grade attained is the parent's decision to make the child reach one grade or another. In this case, the variable is not continuous but has six distinct categories. Glick and Sahn (2000) used the same procedure. Therefore, the ordered probit estimations give the probability of a grade's completion, when the other grades are held constant.

Mainly, the FPE has no significant effect on years of schooling of the girls in rural areas in the short or the medium term.

4.3.1 Short term impact of the years of schooling

Table 14 showed no significant impact of the FPE on the grade completion of girls in the short term. [9]

Table 14: Ordered probit estimations of FPE on girls' years of schooling in the short term

	Girls rural			Girls urban		
VARIABLES	Younger cohort	Middle cohort	Older cohort	Younger cohort	Middle cohort	Older cohort
Years of schooling completed						
2001 dummy	-2.636	-2.524	-3.030	3.110	1.886	1.838
	(2.400)	(2.331)	(1.955)	(2.548)	(2.272)	(1.897)
Younger cohort	-0.0664			-0.177		
	(0.195)			(0.304)		
Younger cohort*2001 dummy	-0.164			-0.125		
	(0.285)			(0.357)		
Middle cohort		0.0549			0.222	
		(0.167)			(0.187)	
Middle cohort*2001dummy		0.146			-0.0897	
		(0.221)			(0.228)	
Old cohort			-0.0709			-0.383
			(0.329)			(0.306)
Old cohort*2001 dummy			-0.200			0.391
			(0.418)			(0.406)
Observations	964	964	964	791	791	791
χ^2	700.51	712.17	697.02	701.32	744.55	759.72
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log-likelihood	-1164.589	-1164.1518	-1164.5832	-995.34924	-995.27512	-995.49994
Pseudo R^2	0.2086	0.2089	0.2086	0.2572	0.2572	0.2572

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%. The equations included variables on parent's education, household head's gender, household's head age, child's age, districts, births and quintiles of wealth that are not presented.
Source: Author's own computation based on DHS 1996, 2001

[9] The equations on years of schooling are globally significant, due to the probability of the chi squared equal to zero. They have also passed the link test for model specification which indicates that the models are correctly specified. Finally, the average predictions of the model are reasonably good because they are within 0.05 of the sample frequencies for each grade.

4.3.2 Medium term impact on the years of schooling

The estimations in Table 15, established that the FPE has no significant impact on the grade completion of the girls.

Table 15: Ordered probit estimations of the FPE on girls' years of schooling in the medium term

	Girls rural			Girls urban		
VARIABLES	younger cohort	middle cohort	old cohort	younger cohort	middle cohort	old cohort
Years of schooling completed						
2006 dummy	-0.730	-0.779	-0.0637	-3.439**	-2.530*	-1.239
	(1.656)	(1.491)	(1.199)	(1.477)	(1.364)	(1.148)
Younger cohort	-0.224			-0.269		
	(0.191)			(0.178)		
Younger cohort*2006 dummy	0.220			0.461**		
	(0.208)			(0.202)		
Middle cohort		0.195			0.118	
		(0.131)			(0.126)	
Middle cohort*2006 dummy		-0.187			-0.239	
		(0.145)			(0.146)	
Older cohort			-0.261			0.00565
			(0.238)			(0.245)
Older cohort*2006 dummy			0.245			0.0753
			(0.270)			(0.288)
cut1 Constant	4.448***	4.374***	5.106***	3.884***	4.560***	5.291***
	(1.516)	(1.345)	(1.063)	(1.312)	(1.183)	(0.977)
cut2 Constant	5.500***	5.426***	6.158***	5.033***	5.708***	6.438***
	(1.515)	(1.344)	(1.064)	(1.311)	(1.185)	(0.982)
cut3 Constant	6.243***	6.170***	6.902***	5.902***	6.577***	7.307***
	(1.514)	(1.343)	(1.064)	(1.317)	(1.191)	(0.988)
cut4 Constant	6.973***	6.900***	7.632***	6.634***	7.309***	8.040***
	(1.514)	(1.342)	(1.061)	(1.319)	(1.190)	(0.988)
cut5 Constant	7.843***	7.769***	8.501***	7.524***	8.200***	8.930***
	(1.515)	(1.344)	(1.063)	(1.322)	(1.193)	(0.989)
Observations	3,051	3,051	3,051	2,168	2,168	2,168
χ^2	1641.82	1658.70	1664.09	1287.39	1286.85	1287.46
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log-likelihood	-4044.4868	-4044.0823	-4044.4727	-2851.2127	-2851.9498	-2853.2447
Pseudo R^2	0.2065	0.2066	0.2065	0.2421	0.2419	0.2415

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%. The equations included variables on parent's education, household head's gender, household's head age, child's age, districts, births and quintiles of wealth that are not presented.
Source: Author's own computation based on DHS 2001, 2006

In summary, the FPE has no significant impact on the probability of completion of school for girls in rural areas. It might suggest that the change in direct cost has no effect on achievement. The different robustness checks may shed more light on this point.

5. Robustness check

5.1 *Migration effect*

Despite the improvement of girls' enrollment, a weakness within the DID procedure could be due to migration. In fact, the launch of the FPE may provide incentive for parents to move to rural areas to enroll their children. However, the waves of migration in Benin are generally from the rural to the urban areas (INSAE, 2002). In fact, the urban areas are substantially more developed than the rural areas. People are typically looking for job opportunities and better living standards, and as a result, it is uncommon that migration occurs in the other direction.

Nevertheless, migration could be problematic for this strategy because the initial treatment group could vary simply due to migration, and may suggest a misleading effect of the policy. Therefore, a variable "moved" has been created. The DHS databases contain a variable on the number of years the household has lived in the current place of residence. This variable comes from the mother dataset, which has been recoded here to obtain the variable "moved", which takes the value 1 when the household has moved in the last five years and 0 otherwise. Hence, when a household has lived less than five years in the current place of residence, they are considered to be moved. The period of five years has been retained because the interval of time between the DHS's data collection is about five years. The following table shows that around 10% of the population had moved in the last five years in each database.

Table 16: Descriptive statistics of the variable "moved" for the years 1996, 2001, 2006

Years		1996	2001	2006
Moved (%)	No	90.0	88.8	92.3
	Yes	9.7	11.0	7.1
	Total	4482	4871	15334

Source: Author's own computations based on the DHS 1996, 2001, 2006

To check this possibility, the population was further limited to those who did not relocate in the last five years. Then, each equation was estimated again considering this new dataset, assuming that all households considered have not migrated in 1996, 2001 and 2006. The estimations confirmed the general improvement on the non-enrollment, that is, the impact of the FPE on non-enrollment of girls in rural areas is genuine and not due to a potential migration.

5.2 *Impact of the FPE on boys' education*

Another interesting argument is to analyze the effects of the policy on the education of boys. Indeed, households have limited resources, and the reduction of the marginal costs for a child could result in the choice of education for a son to the detriment of the other children. In this particular case, boys may be disadvantaged by the policy. This hypothesis was controlled by running the same experiment for boys, which also provided a control experiment. In fact, the estimations may help to check whether the improvement in non-enrollment applies only to the targeted population. In this experiment, the birth cohort and the area of residence were also considered. The estimations were as good as those for girls and passed all applicable tests.[10] In this section, the core findings only are presented.

5.2.1 *Impact of on the non-enrollment*

Appendix A1 presents the impact of the policy on boys' non-enrollment. Overall, the FPE has no significant effect on their non-enrollment in the short or medium term. This outcome confirms that the decrease in the probability of non-enrollment of girls in rural areas is an impact of the FPE and not of another event. Concerning the control variables, the essential observation is that the household head's gender is generally not significant. However, a household headed by a female raises the probability of non-enrollment of boys in the urban areas by 6.29%. These households may have less income than the male headed households. Additionally, the number of births in the last five years is not significant for boys in rural areas, even though it is significant for boys in urban areas. This result indicates that the need for child care potentially affects girls in rural areas and not boys. However, in the urban areas this need probably influences both girls and boys. The cultural aspects appear to be more pronounced in the rural areas than in the urban ones. In fact, the parents may have a preference to give the domestic chores to the girls rather than the boys. Connelly and Zheng (2003) also found the discriminations against girls to be less extensive in the urban areas.

[10] The test used is the same as in the case of girls' education depending on the type of estimation (Hosmer Lemeshow goodness of fit, heteroscedasticity, global significance, t test, linktest).

5.2.2 *Impact on the dropout*

Table 17 indicates that the policy has no significant effect on the dropout of boys either in rural or in urban areas. This outcome also confirms the idea that the impact observed on girls in rural areas is genuinely due to the FPE.

Table 17: Average marginal effects of the FPE on the boys' dropout in the short term

	Boys rural			Boys urban		
VARIABLES	Younger cohort	Middle cohort	Older cohort	Younger cohort	Middle cohort	Older cohort
2001 dummy	1.063***	0.848***	0.868***	0.533	0.593*	0.572**
	(0.351)	(0.265)	(0.203)	(0.404)	(0.336)	(0.260)
Younger cohort	-0.0112			-0.00408		
	(0.0498)			(0.0533)		
Younger cohort* 2001 dummy	-0.0245			0.00575		
	(0.0589)			(0.0612)		
Middle cohort		0.00949			-0.0165	
		(0.0263)			(0.0346)	
Middle cohort*2001 dummy		-0.0219			0.00485	
		(0.0338)			(0.0403)	
Older cohort			-0.0124			0.0392
			(0.0330)			(0.0431)
Older cohort*2001 dummy			0.0750			-0.0110
			(0.0495)			(0.0581)
Observations	1,972	1,972	1,972	1,087	1,087	1,087
χ^2	1092.94	1065.21	1119.18	768.26	667.68	630.47
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log-likelihood	-463.13418	-463.41494	-462.03011	-193.92884	-184.29879	-183.96899
Pseudo R^2	0.1015	0.1010	0.1036	0.1163	0.1174	0.1190

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%. The equations included variables on parent's education, household head's gender, household's head age, child's age, districts, births and quintiles of wealth that are not presented.

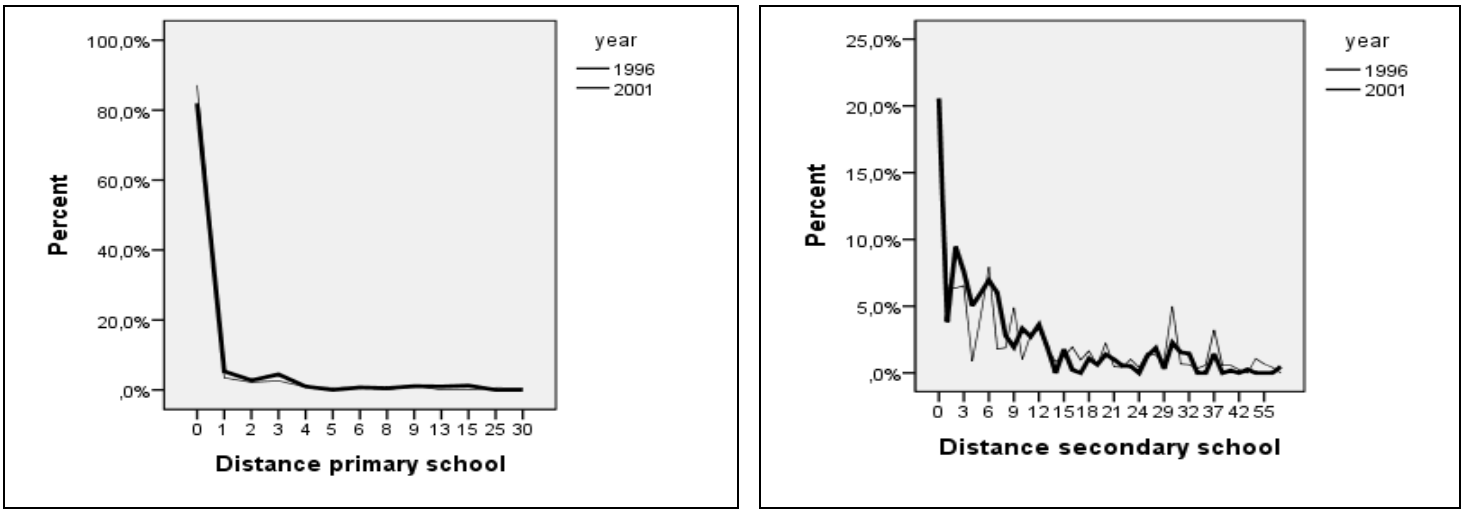
Source: Author's own computation from DHS 1996, 2001

The results on years of schooling are not presented because there is also no significant effect of the policy. In summary, the elimination of costs has not significantly influenced the education of boys.

5.3 *Effects of distance to school*

Other than school fees, the parents' decision to provide education for their child also depends on the indirect schooling costs. These costs are, for example, the distance to school, or the opportunity costs of the time spent in school instead of working in the household. In this section, the effects of these costs on schooling decisions under the FPE are analyzed, for two main reasons. First, the school fees might have reduced, but the remaining costs may still be a burden for parents. This could explain why, even with the elimination of costs, there continues to be non-enrollment. Second, other costs, such as the distance to school, may have more impact on achievement than the direct costs. This could explain the absence of the direct impact of the policy on achievement. As a result, the distance to primary school and secondary school has been used here as a proxy for the other educational costs. The DHS databases contain details of these distances (kilometers) in 1996 and 2001 only, at the community level. These correspond to the short term analysis. The following figures display the changes in distances to primary and secondary school between 1996 and 2001 in this sample.

Figure 3: Distribution of the distance (kilometers) to primary and secondary schools for six to fourteen years old children in 1996 to 2001



Source: Based on statistics of DHS 1996-2001

The figure on the left indicates that the distribution of distance to primary school may not have changed between 1996 and 2001. More importantly, about 80% of children in the sample are less than one kilometer away from a primary school. This statistic suggests that the distance to

primary school may not be an issue for these children. Instead, the important instability noticed in the distance to secondary school (figure on the right) specifies potential differences between children in the sample. Thus, an econometric analysis could give more details on those dissimilarities.

From this time, the estimations of the impacts of the policy were repeated with the analysis of the distance to secondary school in the short term. The subsequent parts contain the main observations.

5.3.1 *Effects of the distance to secondary school on non-enrollment and dropout*

Mostly, Table 18 shows that the probability of non-enrollment increased with the distance to secondary school for all birth cohorts of girls in urban areas.

Table 18: Average marginal effects on the non-enrollment from the DID with distance to secondary school in the short term

	Girls rural			Girls urban		
VARIABLES	Younger cohort	Middle cohort	Older cohort	Younger cohort	Middle cohort	Older cohort
Distance to secondary school	0.00147	0.00148	0.00150	0.00909*	0.00904*	0.00878*
	(0.00109)	(0.00110)	(0.00111)	(0.00496)	(0.00505)	(0.00510)
Distance to secondary school * 2001 dummy	-0.00144	-0.00141	-0.00138	-0.0104**	-0.0103**	-0.0101**
	(0.00122)	(0.00123)	(0.00123)	(0.00497)	(0.00507)	(0.00511)
2001 dummy	0.207	0.308*	0.417**	-0.0840	-0.0615	-0.0917
	(0.209)	(0.179)	(0.191)	(0.229)	(0.156)	(0.185)
Younger cohort	0.0926**			0.0739		
	(0.0420)			(0.0535)		
Younger cohort*2001 dummy	0.0558			0.00952		
	(0.0592)			(0.0772)		
Middle cohort		-0.0857***			-0.0549	
		(0.0213)			(0.0336)	
Middle cohort*2001 dummy		-0.0563*			0.00461	
		(0.0316)			(0.0491)	
Older cohort			0.175***			0.0929
			(0.0427)			(0.0675)
Older cohort*2001 dummy			0.115*			-0.0255
			(0.0603)			(0.0941)
Observations	2,757	2,757	2,757	1,225	1,225	1,225
χ^2	513.40	540.98	577.68	337.01	331.90	324.91
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log-likelihood	-1465.6764	-1451.1712	-1444.1134	-554.4623	-554.0007	-554.6222
Pseudo R^2	0.2028	0.2107	0.2146	0.2508	0.2514	0.2506

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%. The equations included variables on parent's education, household head's gender, household's

head age, child's age, districts, births and quintiles of wealth that are not presented.
Source: Author's own computation from DHS 1996, 2001

The effect is not significant for girls in rural areas. It indicates that the distance to secondary school has more influence on the schooling decisions for girls in urban areas. Also, the impact of the FPE is the same in spite of the inclusion of the distance to school.

Table 19 shows no significant effect of the distance to secondary schools on the probability of dropout. It might mean that dropouts are more explained by direct costs than the opportunity costs of education in those areas.

Table 19: Average marginal effects of the FPE on the dropout of girls in rural areas (introduction of the distance to secondary school) in the short term

	Girls rural			Girls urban		
VARIABLES	Younger cohort	Middle cohort	Older cohort	Younger cohort	Middle cohort	Older cohort
Distance to secondary school	-6.08e-05	7.04e-05	0.000108	0.00219	0.00215	0.00220
	(0.00138)	(0.00137)	(0.00133)	(0.00233)	(0.00231)	(0.00232)
Distance to secondary school * 2001 dummy	-0.00102	-0.00115	-0.00119	-0.00235	-0.00231	-0.00236
	(0.00144)	(0.00144)	(0.00140)	(0.00234)	(0.00232)	(0.00233)
2001 dummy	0.709	0.785**	1.066***	0.589	0.502	0.247
	(0.540)	(0.387)	(0.374)	(0.607)	(0.359)	(0.276)
Younger cohort	-0.0994			0.0577		
	(0.0829)			(0.0812)		
Younger cohort*2001 dummy	0.102			-0.0880		
	(0.0885)			(0.0916)		
Middle cohort		0.0726*			-0.0485	
		(0.0377)			(0.0416)	
Middle cohort*2001 dummy		-0.0801*			0.0732	
		(0.0458)			(0.0486)	
Old cohort			-0.0823*			0.0650
			(0.0494)			(0.0580)
Old cohort*2001 dummy			0.103			-0.0948
			(0.0734)			(0.0697)
Observations	1,059	1,059	1,059	860	860	860
χ^2	576.94	564.21	599.39	983.77	872.14	797.43
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log-likelihood	-256.5628	-256.15007	-256.57796	-141.83908	-141.24937	-141.4873
Pseudo R^2	0.1603	0.1617	0.1603	0.1692	0.1726	0.1712

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%. The equations included variables on parent's education, household head's gender, household's head age, child's age, districts, births and quintiles of wealth that are not presented.
Source: Author's own computation from DHS 1996, 2001

The results imply that despite the elimination of costs, distance to school may still be an important barrier to the access of education.

5.3.2 *Effects of the distance to secondary school on achievement*

Table 20 establishes that the distance to secondary school has a significant negative effect on achievement in rural areas. We notice first that the distance decreased the probability of completion of higher grades for girls in rural areas. Second, it does not significantly affect achievement of girls in urban areas.

Table 20: Ordered probit estimations of the FPE on girls' years of schooling in the short term (introduction of the distance to secondary school)

	Girls rural			Girls urban		
VARIABLES	younger cohort	middle cohort	old cohort	younger cohort	middle cohort	old cohort
Years of schooling completed						
Distance to secondary school	-0.00910**	-0.00906**	-0.00916**	-0.0431	-0.0435	-0.0445
	(0.00441)	(0.00436)	(0.00432)	(0.0335)	(0.0333)	(0.0330)
Distance to secondary school * 2001 dummy	0.0139***	0.0138***	0.0139***	0.0450	0.0455	0.0465
	(0.00466)	(0.00461)	(0.00458)	(0.0335)	(0.0333)	(0.0331)
2001 dummy	-3.307	-3.289	-3.540*	3.692	2.072	1.775
	(2.318)	(2.233)	(1.896)	(2.633)	(2.348)	(1.952)
Younger cohort	-0.136			-0.0772		
	(0.205)			(0.297)		
Younger cohort*2001 dummy	-0.0892			-0.232		
	(0.293)			(0.354)		
Middle cohort		0.126			0.190	
		(0.170)			(0.184)	
Middle cohort*2001dummy		0.0705			-0.0559	
		(0.223)			(0.229)	
Old cohort			-0.181			-0.403
			(0.341)			(0.312)
Old cohort*2001 dummy			-0.0840			0.412
			(0.428)			(0.415)
Observations	938	938	938	760	760	760
χ^2	667.16	682.41	671.40	653.50	691.63	695.35
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Log-likelihood	-1132.2999	-1131.7795	-1132.2341	-954.67421	-954.66081	-954.59609
Pseudo R^2	0.2122	0.2126	0.2122	0.2572	0.2572	0.2573

Standard errors in parentheses adjusted robust for clustering. *** Significant at 1%, ** Significant at 5%, *Significant at 10%. The equations included variables on parent's education, household head's gender, household's head age, child's age, districts, births and quintiles of wealth that are not presented.
Source: Author's own computation from DHS 1996, 2001

Finally, the distance to school as proxy for other educational costs (opportunity costs) may significantly affect access to education and achievement. These outcomes suggest that there are other plausible costs that may impinge on girls' education. More importantly, the introduction of distance to secondary school does not change the core results on the impact of the FPE on the population treated. Consequently, even after taking into consideration differences in terms of other educational costs the causal effect of the policy is the same.

6. Conclusion

This paper intends to measure the impact of the FPE on girls' education in the short and medium terms in Benin, West Africa. Considering the design of this natural experiment, different procedures have been applied on birth cohorts with the girls in rural areas as the group of treatment.

Essentially, this evaluation raises three interesting points. First, the elimination of fees significantly decreases the likelihood of non-enrollment of the beneficiaries. Yet, there is no significant improvement on the non-enrollment of the lower quintiles of wealth compared to the higher quintiles. As a result, income is still a key determinant of non-enrollment. Second, the policy has also reduced the likelihood of dropout of the beneficiaries from school. Consequently, dropouts in rural areas might be explained by school fees, among other factors. Third, the policy has not affected the probability of achievement of the beneficiaries. Overall, the effects are similar in the short and medium terms. The different robustness checks support the impact evaluation.

Thus, this study complies with the idea that girls' demand for education is price responsive (Glick, 2008). Nevertheless, it is necessary ensure that the FPE reaches its intended beneficiaries. Most importantly, this experiment denotes that the abolition of the direct schooling costs may not be sufficient to complete primary school for the girls in rural areas. The fees are a likely barrier to access education, but other factors could also explain these achievement issues. Future articles should analyze in depth the impact of the opportunity and indirect costs on attainment. Indeed, the national investments to enroll girls could be negligible if girls do not complete primary schools. This paper suggests that the abolition of costs is beneficial for education and should be generalized. However, the government should subsidize the other educational costs and build schools in order to improve achievement.

Furthermore, one of the main limitations of this paper is the lack of data on the actual schooling fees; indeed, the evaluation could not cover the extent of the cost reduction. In addition, the data on the schools' facilities, the pupils' performance and the communities' infrastructure would have allowed a more thorough examination of the supply side factors. However, none of these limitations lessen the validity of the results.

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