DISSERTATION

AN EMPIRICAL ANALYSIS OF THE IMPACTS OF THE UNIVERSAL PRIMARY EDUCATION POLICIES ON EDUCATIONAL PERFORMANCES IN EAST AFRICA: A COMPARATIVE STUDY OF UGANDA'S UPE AND KENYA'S FPE

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AN EMPIRICAL ANALYSIS OF THE IMPACTS OF THE UNIVERSAL PRIMARY EDUCATION POLICIES ON EDUCATIONAL PERFORMANCES IN EAST AFRICA: A COMPARATIVE STUDY OF UGANDA'S UPE AND KENYA'S FPE

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DOCTOR OF PHYLOSOPHY IN DEVELOPMENT ECONOMICS

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Abstract

Since cognitive skills have been shown to be more important than years of schooling in cross-country economic growth models, it is now widely accepted that mere school attendance is not an effective measure of future earnings at both individual and national levels. Several studies have assessed the impacts of the Universal Primary Education (UPE) policies in the developing countries of Sub-Saharan Africa (SSA), mainly focusing on the enrolment benefits. Very little attention in the literature has been devoted to assessing, at the pupil-level, the actual learning attained from public school classrooms. Also, internationally valid empirical studies addressing learning attainment in SSA currently are still lacking. This study utilizes an internationally standardized and comparable dataset from the Southern and East African Consortium for Monitoring Education Quality (SACMEQ) to measure the learning impacts of the UPE interventions in Uganda and Kenya. It, further, assesses the pathways to the learning outcomes and the differential impacts of the interventions across gender and socioeconomic statuses. We utilize the grade six pupils' reading and math test scores from the SACMEQ region of fifteen countries to estimate the impacts of the UPE Quality Enhancement Initiatives (QEIs) in Uganda and the Free Primary Education (FPE) policy in Kenya. The study finds significant declines in test scores for both subjects in both countries' public schools. In Uganda, since test scores for private schools declined more than they declined in public schools, the intervention was associated with improvements for both subjects although the overall impacts for mathematics were not statistically significant. The FPE policy in Kenya was associated with declines in public school pupils' achievements for both subjects and private schools' test scores improved greatly. Significant gender and socioeconomic learning impact differences were found for both countries. Poor learning outcomes were observed in Ugandan rural schools – especially for girls - and in Kenya's urban schools – for boys. Grade six teacher effort, frequency of school inspections, teacher

absenteeism, the proportion of open-air classes and local community involvement in school operations were found to be the important channels explaining the observed test score changes.

To my mother

Beatrice

Summary

The skills that a nation's human resources possess are critical for its development prospects. Universal Primary Education policies have, since the 1990s, been introduced in many developing countries of Sub-Saharan Africa. Previous studies that assessed the impacts of these policies have concentrated on the participation benefits and largely ignored measuring the actual learning achievement impacts of such interventions. The few studies that have attempted to evaluate the cognitive skills acquisition impacts of UPE policies in Africa are highly context-dependent such that their findings may not be of significant policy value beyond their specific locational boundaries. The global education agenda in the post-2015 development framework will emphasize the attainment of equitable and inclusive quality life-long learning. This change in focus from emphasizing mere school access to ensuring quality learning achievement will necessitate an increased focus on measuring actual skills attained from school, a principal task that this study focuses on.

This dissertation shifts the focus from the participation to the learning achievement impacts of the UPE policies in SSA. Using a unique repeated cross-sections international dataset obtained from the Southern and Eastern Africa Consortium for Monitoring Education Quality (SACMEQ), we empirically estimate the learning achievement impacts of the UPE policies in two East African countries – Uganda and Kenya. For this estimation, we use the internationally standardized grade six pupil test scores for reading and mathematics as our main outcome variables. Furthermore, we examine the mechanisms or channels through which the interventions affected the pupils' learning achievements and establish whether there were differential learning impacts across gender and socioeconomic status variables. Thus, this study enables us to draw important policy lessons that are likely to be externally valid for several other countries of SSA. Due to the differences in the timings of the UPE

policies in the two countries, we evaluate the UPE Quality Enhancement Initiatives in Uganda and the Free Primary Education (FPE) policy in Kenya.

Using a difference in differences estimation methodology and taking private school pupils as the comparison group, this dissertation finds significant absolute declines in grade six pupils' learning achievements for both subjects in both countries. Whereas there were test score declines in both public and private schools in Uganda, only public schools test scores declined in Kenya – mainly for boys in urban public schools. An especially unique finding was that test score declines for private schools in Uganda were larger than the declines for public schools, thus suggesting that the QEIs intervention was successful at reducing the UPE-associated test scores' decline in public schools. This positive impact of the QEIs is likely to have been achieved through the significant reduction in the proportion of open-air classes. Comparing impacts by the physical location of the school reveals significant differences, with rural schools performing worse than urban schools in Uganda and the reverse being true in Kenya. Whereas the poor learning achievements in rural Ugandan schools reflect mainly the low performance by girls, boys in Kenyan public schools performed worse than girls in both subjects. Especially for math, the FPE policy was associated with large improvements in private urban schools' test scores. This result is thought to have been driven by the increased competition for students in urban areas which ensured private school teachers exerted extra effort.

At the pupil level, grade repetition and absenteeism seem to have worsened in Uganda. Since both variables have previously been associated with poor learning achievement, these seem to be important efficiency variables that need to be addressed. In Kenya, the probability of repeating a grade significantly increased for boys in urban schools, suggesting that this was one of the pathways explaining their poor achievements. Two common school level pathways that explain the observed test score changes in both countries

were found to be teachers' extra effort and the frequency of inspections and monitoring activities at the schools. On the other hand, the QEIs study highlights the teacher absenteeism problem, which seems to have worsened in rural schools. Local community involvement in school activities was found to be an important pathway explaining the test score changes in Kenya. In public schools, where this measure declined, the pupil test scores too declined, and the reverse occurred in private schools where community involvement increased.

The worsening grade repetition problem in Uganda could be reversed through tracking pupils according to their learning abilities so as to force teachers to adapt their teaching to the learning abilities of the pupils. Pupil absenteeism could be minimized by increasing the parents' involvement in the schools. Parents' involvement is critical too for improving teacher effort and reducing teacher absenteeism through the monitoring role their involvement plays.

The inefficiency of the public sector in most developing countries is clearly demonstrated in this study's findings through the drastic reductions in the number of school inspections conducted in the two years that preceded the SACMEQ studies. Since school inspections are likely to be expensive, local community involvement seems to be the most viable policy suggestion that will guarantee sufficient teacher effort, and reduce pupil and teacher absenteeism.

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Chapter 1

Introduction

Future earnings, economic development and the eradication of poverty are highly correlated with the knowledge and skills of the workforce and not just their mean years of schooling (World Bank, 2011). Since the 1990s, the now widely introduced Universal Primary Education (UPE) policies across the countries of Sub-Saharan Africa (SSA) have achieved massive school enrollments and grade completions that have mainly benefited the poor who previously could not afford the associated cost of schooling. However, the quality of education has since declined and many children are merely graduating but not achieving the minimum learning proficiency requirements (UNESCO, 2005). The United Nations post-2015 development agenda will seek to reverse the learning quality declines so as to achieve equitable and inclusive life-long learning for all (UN report, 2012). This dissertation assesses the extent of the quality decline that is associated with the UPE policies in Uganda and Kenya. It further examines the pathways to these declines and delineates these impacts by gender and socioeconomic status. Internationally standardized grade six pupil test scores for reading and mathematics are used to measure learning proficiency, a significant improvement on the existing studies from this part of the World. The study sums up by drawing primary education policy lessons that could be of greater relevance in most of SSA.

In this chapter, I briefly discuss the value and importance of education for economic growth, the challenges involved in the estimation of education production functions, determinants of schooling outcomes, Universal Primary Education studies in SSA, and issues of school effectiveness in developing countries. I then define the gap that this dissertation seeks to fill and briefly explain how we achieve this objective. I conclude the chapter with a brief discussion of the main findings.

That education attainment is an important correlate for economic growth is a widely accepted proposition in economic circles (Becker, 1962; Glewwe, 2002; Caselli, 2005; Banerjee and Duflo, 2005; Hanushek and Woessman, 2007). However, years of schooling become unimportant in cross-country analyses that control for cognitive skills[1]. More importantly, these specifications that control for standardized test scores as a measure of learning achievement have shown more explanatory power of the variations in cross-country economic performances (Hanushek and Kimko, 2000; Hanushek and Woessman, 2007). The loss of statistical significance and the reduction in magnitude for the years of schooling coefficient coupled with the gain in both statistical significance and magnitude of the test scores coefficient illustrates that the value of education lies in the skills acquired and not just the number of years spent in school.

Most education production function[2] studies that utilize observational data have been found to suffer from omitted variable biases due to hard-to-observe factors such as the child's innate learning ability and motivation, and the parents' preferences and motivation for the child's schooling (Glewwe, 2002; Glewwe & Kremer, 2006). Fortunately, most of these factors are fixed and can therefore be easily dealt with when the same units are observed more than once. Another way to deal with these unobservable variables is by taking advantage of conditions that create a natural experiment setting or by using randomized controlled trial studies (RCTs) which guarantee baseline equivalence for both the treated and comparison groups (Duflo, 2001; Kremer, 2003; Miguel and Kremer, 2004; Glewwe and Kremer, 2006; Glewwe, Kremer and Moulin, 2009; Glewwe, Ilias and kremer, 2010; Duflo, Dupas and Kremer, 2011). The RCTs have gained prominence in most of the recent

[1] In their cross-country study of 39 countries, Hanushek and Kimko (2000) measure cognitive skills using achieved test scores in standardized international mathematics and science tests.
[2] A simple education production function for learning is defined by Glewwe (2002) as $A = \alpha f(Q) g(S)$; where α is a measure of the child's learning efficiency, Q is a measure of school quality, and S is a measure of the years of schooling.

education literature in developing countries. In the absence of either a longitudinal dataset or randomized assignment to treatment and control, another option is to utilize a significantly large sized repeated cross-sections dataset. Given random sampling, these large sized datasets are not any less efficient and their estimators depict relatively less sampling variance (Heckman and Robb, 1985). This dissertation utilizes large repeated cross-sectional datasets to estimate the impacts of the UPE policy interventions in Uganda and Kenya.

Most of the studies on education in developing countries have dwelt on the question of identifying what the critically important determinants of schooling outcomes are. A comprehensive review of the relevant literature is given by both Glewwe and Kremer (2006) and Hanushek (2006). The earlier literature on the determinants of schooling outcomes dwelt more on the importance of schooling inputs. Then, school resource factors such as class size, textbooks, physical structures and teacher training were thought to be of greater significance to education attainment. However, the recent literature has focused less on resource-related and more on incentives-based variables that emphasize teacher efficiency and pupil motivation aspects (Chaudhury et al. 2006; Glewwe, Ilias and Kremer, 2010; Duflo, Dupas and Kremer, 2011).

Lewin (2005) notes that because the 2015 target for the second Millennium Development Goal (MDG) emphasizes universal enrolment and primary-cycle completion for all school-age children, studies on UPE policies in SSA have mainly been focused on assessing the achievement of this target (e.g. Deininger, 2003; Grogan, 2008; Nishimura, Yamano and Sasaoka, 2008; Lewin, 2009; Hoogeveen and Rossi, 2013). Although a majority of these studies highlight the school quality declines that followed the UPE policy interventions, only a few have been devoted to measuring and explaining this decline (e.g. Lucas and Mbiti, 2012a; Bold, Kimenyi and Sandefur, 2013; Jones et al. 2014). In most of the SSA countries that introduced UPE policies, private primary schooling has since become

a prominent feature of the education sectors. This rapid emergence of private primary schooling can be seen as being partly an externality or spillover effect of the UPE policies. In Kenya, for example, the growth in private schooling has been quite prominent and a number of studies have sought to explain this trend (Tooley and Dixon, 2005; Tooley, 2007; Oketch et al., 2010; Oketch and Ngware, 2011; Nishimura and Yamano, 2013). Since private primary schools charge enrolment fees, the majority of these studies have emphasized the role of family wealth and parental education as important determinants in the school choice decision - what has been termed as "affluent flight to private schools"(Bold, Kimenyi and Sandafur, 2013; Nishimura and Yamano, 2013) . This dissertation measures the quality decline in public schools using grade six pupil test scores and utilizes the private school enrollees as a comparison group. Since our estimation strategy involves comparing private to public, we are able to estimate the intervention's absolute spillover effects on private schools.

School effectiveness concerns in developing countries have featured prominently in many of the recent studies (Reinnikka and Svensson, 2004; Chaudhury et al. 2006; Glewwe, Ilias and Kremer, 2010; Duflo, Hanna and Ryan, 2012). Most of these studies highlight the central role the teacher plays in the child's learning process. Therefore, several studies have paid attention to teacher effort and behaviors such as absenteeism, pedagogical practices and time-use. An emerging consensus indicates that teacher effort is critical for pupils' learning and that this can be enhanced by instituting incentive mechanisms that guarantee accountability for pupils' schooling outcomes (Glewwe, Ilias and Kremer, 2010; Duflo, Dupas and Kremer, 2011; Duflo, Hanna and Ryan, 2012; Jimenez and Sawada, 2014). This dissertation assesses teacher effort and analyses the role the community plays in the primary schools as an avenue for ensuring local accountability.

Although considerable attention has been paid to assessing the impacts of the UPE policies in SSA, only a few attempts have been made to estimate the pupil learning

achievement impacts of these policies. The majority of the existing empirical studies covering the East African region only acknowledge the school quality declines but proceed to focus their rigorous analyses on the enrolment and grade completion impacts (Deininger, 2003, Grogan, 2008, Nishimura, Yamano and Sasaoka, 2008; Hoogeveen and Rossi, 2013). Several of these studies covered only certain geographic regions of the particular country in which the study was conducted, thereby making it difficult to generalize their findings even within the same country (Duflo, Dupas and Kremer, 2011; Nishimura and Yamano, 2013). The few studies that utilized a national level sample for Kenya (Bold, et al. 2010; Lucas and Mbiti, 2012a; Lucas and Mbiti, 2012b; Bold, Kimenyi and Sandefur, 2013), rely on test scores from the national end-of-primary-cycle exam as a measure of grade eight pupil's learning attainment. These exams, while valid within Kenya, may not be relevant for the other countries both in the East African region and the rest of SSA because of the cross-country variations in the education systems. Furthermore, these studies may suffer from selection bias arising from the nature of the end-of-cycle exams being of high stakes or consequences to the future of both the pupils and the schools.

This study evaluates the pupil learning achievement impacts of the UPE interventions in Uganda and Kenya. It utilizes a nationally representative sample of grade six pupils' internationally standardized test scores for reading and mathematics to measure cognitive skills. The study utilizes a rich school-based dataset obtained from the Southern and East African Consortium for Monitoring Education Quality (SACMEQ) for both countries. A repeated cross-sections difference in differences (DIDs) approach accounting for district and rural peculiarities is used to estimate the intervention impacts in both countries. To achieve the study objectives, a before and after private and public school comparison is done using data for the two years 2000 and 2007. Since the year-2000 grade six pupils in Uganda had partially benefited from UPE, the Ugandan study assesses the learning impacts of the UPE

Quality Enhancement Initiatives (QEIs) which were undertaken by government to improve school quality in the wake of the learning declines that had followed the introduction of UPE. Since the grade six pupils in 2007 were already enrolled in school – at least in grade two - at the time the QEIs were introduced, our impact measures may represent an underestimation of the full effects of the intervention thereby reflecting only initial impacts of the policy. A more complete assessment of the policy's impacts may be obtainable by utilizing the SACMEQ 4 data set when it becomes available.

On the other hand, the Kenyan study assesses the impacts of the Free Primary Education (FPE) policy that was introduced in January 2003. Similar to the QEIs intervention in Uganda, this evaluation of FPE impacts in Kenya represents an underestimation of the full policy effects because the grade six pupils in 2007 were not full beneficiaries of the intervention. For each of the two countries, this dissertation answers three main questions. First, what were the grade six pupil learning impacts of both the UPE QEIs in Uganda and the FPE policy in Kenya? Second, what were the main mechanisms through which the observed learning outcomes were achieved? Finally, what were the differential policy impacts across gender and socioeconomic status? The dissertation draws cross-country themes by making a thorough comparison between Uganda's and Kenya's UPE policies and makes appropriate policy recommendations. Comprehensive robustness checks are undertaken to assuage selection bias concerns that might arise from the non-random school choice decisions before and after the introduction of the UPE policies.

The findings of this study therefore, are not limited by context and since we do not aggregate pupil test scores, we are able to recover important individual pupil aspects. Since the SACMEQ tests are administered at the sixth grade across the whole SACMEQ region of fifteen countries, this study is the first empirical assessment that facilitates a comparative analysis of the universal primary education policy impacts in the region. The pupil-level

analyses made in this study utilize quite large samples, and this enables the assessment of the differential impacts in rural as opposed to urban areas. This non-trivial delineation has not been highlighted before in the previous literature, and it lies at the core of assessing how the poor – who mostly live in rural areas - were affected by the UPE policy interventions in Uganda and Kenya.

In Uganda, absolute test scores for either subject in both public and private schools declined considerably. Since the test score declines for private schools – our control group – were larger, this study finds that the QEIs were effective in reducing the reading test score decline rates in public schools. The test score impacts for math, although positive, were statistically insignificant. The overall improvement in test scores may have been achieved primarily through the reduction in the proportions of classes that were held in the open-air. Specifically, the intervention was associated with an improvement of 0.459 standard deviations (SDs) in reading test scores. Further analysis of this outcome reveals that this improvement occurred only in urban schools and specifically for boys. In rural schools, girls' reading test scores declined by 0.356 SDs. Although this study does not find a statistically significant overall impact on math test scores, the detailed analysis indicates that urban schools' math scores significantly improved. Similar to reading test scores', the improvement in math test scores was significant for boys only. These findings therefore, reveal that the QEIs intervention may have worsened the learning inequalities in favor of urban schools, and specifically, boys.

At pupil level, increased grade repetition and a significant drop in the measure for availability of basic scholastic materials seem to be the main pathways that explain the significant poor learning attainment for girls in rural public schools. At school level, the relevant pathways include significant declines in teacher effort – measured in terms of extra

hours spent on lesson preparation and grading of pupil's home works -, excessive pupil to teacher ratios, and increased teacher absenteeism.

In Kenya, the study finds that the FPE intervention was associated with significant test score declines of 0.415 SDs and 0.510 SDs for reading and math respectively. Unlike in Uganda, the test score declines in Kenya occurred in urban schools, and specifically for boys – reading test scores decreased by 0.588 SDs while math test scores decreased by 0.739 SDs. Girls' test scores for either subject in both rural and urban schools were not significantly altered by the FPE policy. The FPE policy in Kenya was not associated with any test scores decline for private schools. In fact, math test scores for urban private schools improved significantly by 0.38 SDs. At pupil level, the probability that a grade six male pupil had repeated a grade at least once increased by 17.7% points – for boys in urban schools, this proportion increased by 25.7% points - thus suggesting that grade repetition was a major pathway associated with the low test score achievements for boys. At school level, the pathway analyses for the observed pupil test score changes in Kenya reveal the considerable importance of the teachers' effort[3]. Furthermore, the frequency of school inspections and monitoring activities greatly declined in public schools and local community involvement in school operations too declined.

The rest of this dissertation is organized as follows: Chapter 2 reviews the relevant literature to establish the existing knowledge about UPE policies in SSA and to identify this study's unique contribution. Chapter 3 explains the SACMEQ studies that constitute the main data source for this dissertation. Chapters 4 and 5 dwell in detail on the UPE policies respectively for each of the two countries, elaborate the empirical estimation methodology

[3] We use the self-reported average number of extra hours per week that the grade six math or reading teacher spent on lesson preparation and grading of pupils' assignments to proxy or infer teacher effort. These hours are in fact additional to the official time the teacher is required to teach.

and discuss the estimation results. Chapter 6 establishes themes by highlighting policy lessons and then concludes.

Chapter 2

Literature review

2.1 Introduction

A big proportion of the previous studies on education outcomes has been primarily concerned with the estimation of either the quantity or the quality of schooling attained. Since Deininger (2003), a growing body of literature assessing the impacts of UPE policies in the developing countries of SSA can be categorized in one or both of the two education outcome categories above (Grogan, 2008; Nishimura, Yamano and Sasaoka, 2008; Glewwe, Kremer and Moulin, 2009; Bold et al. 2010; Duflo, Dupas and Kremer, 2011; Lucas and Mbiti, 2012a & 2012b). Another mostly qualitative body of literature relates to the impacts of the UPE policies on school management structures, emphasizing such critical aspects as local community participation, decentralization and accountability (Chapman et al. 2002; Suzuki, 2002; Barrett, 2005; Somerset, 2009; Sasaoka and Nishimura, 2010). This chapter reviews the literature on education outcomes in the developing countries of SSA giving primary emphasis to studies on UPE policies. The overriding goal is to highlight the important gaps in the existing literature that this dissertation seeks to fill.

The studies reviewed are primarily from the SSA region and the major emphasis will be placed on studies covering the countries in the SACMEQ region[4] since the data used in this study covers these same countries. In the following sections, I start by reviewing the several primary education RCTs that have been conducted mainly in Kenya emphasizing the standard results that these studies have revealed in the recent past. I then review studies that have looked at the school choice outcomes of the UPE policies. This is followed by a review

[4] The SACMEQ region is composed of fifteen countries: Angola, Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

of the qualitative studies focusing on school management and then the most relevant studies for this dissertation are reviewed in the last two sections of this chapter. First, I review the studies whose primary outcome measure is related to the number of years of schooling and then I end the chapter with studies that have attempted to estimate the learning achievement outcomes of the UPE policies in Uganda and Kenya.

2.2 Measuring education outcomes using random assignment

In the recent past, a substantial number of randomized evaluation programs have been conducted in many SSA countries. The basic motivation for RCTs in estimating the causal impacts of policy interventions is that randomization eliminates selection bias concerns (Angrist and Pischke, 2009). The study sample (pupils, teachers, classes, schools, communities, districts, etc.) is randomly assigned to one of two groups (treatment or control) and then the treatment group – say, schools - gets the intervention – say textbooks - while the control group gets nothing. At the end of the program, the mean outcomes – say, pupil test scores – for the two groups are compared and the difference represents the causal impact of the program. Several education outcome measures have been studied using RCTs, especially in Kenya, and they include pupil test scores, school participation rates, teacher performance incentives, pupil peer effects, class size effects, drop out incidence rates and pupils' health statuses (Miguel and Kremer, 2004; Glewwe, Kremer and Moulin, 2009; Glewwe, Ilias and Kremer, 2010; Duflo, Dupas and Kremer, 2011). In her study of the impacts of the Sekolah Dasar INPRES program in Indonesia, Duflo (2001) took advantage of the differences in cohort exposure and the locational intensity of the program to define a naturally randomized experiment. The study by Lucas and Mbiti (2012a) follows a similar identification method - by exploiting variations in district-level dropout rates in Kenya – to measure the impacts of the FPE policy.

The success of RCT studies conducted with relatively limited financial resources and in poor community settings is a major reason why this methodology has gained prominence in development economics circles (Glennerster and Takavarasha, 2013). Between 1997 and 2001, the nongovernmental organization (NGO) called International Child Support Africa (ICS) conducted a school-based phase-in RCT study involving 75 primary schools in the western Kenya district of Busia (Miguel and Kremer, 2004). The basic aim of the project - the Primary School Deworming Program (PSDP) – was to establish how school-based mass deworming of children in a poor and densely populated high helminthes prevalence region would impact their education and health outcomes. This study found that the program greatly improved both the health and school participation outcomes of children in treated and untreated schools. The enormous externality benefits that accrued to the untreated children made this intervention highly cost effective. However, the intervention did not have any significant impacts on the pupil's learning outcomes. One criticism that many RCTs suffer from is the fact they are usually based on relatively small samples and this was the case with this study. Because of this weakness, baseline equivalence between control and treatment groups was not attained on some of the measures at the start of the program.

The debate on whether school resources are critical for children's learning outcomes has persisted for a long time in the education literature, but the evidence for both developed and developing countries is still unconvincing. The reason why resources have been quite popular in many policy endeavors to improve children's learning is mainly due to the fact they represent the one thing that governments have full control over: budget allocations to the education sector. However, many education scholars are of the view that mere resource interventions that do not alter the existing incentives are ineffective in improving schooling outcomes (Hanushek, 2006). In 1995, the Dutch nonprofit organization (NPO) - International Christelijk Steunfonds - funded a School Assistance Program (SAP) that

provided textbooks to rural primary schools in a study involving 100 schools from the two Kenyan districts of Teso and Busia (Glewwe, Kremer and Moulin, 2009). The 100 schools were randomly subdivided into four groups with the first group getting textbooks at the start of 1996 and then for each one of the remaining groups, it got a grant that was used to buy textbooks and for classroom construction at the start of every subsequent year until all the groups were eventually treated. This study found that provision of textbooks was not sufficient to raise the average pupil's test scores although it raised the best performing pupils' scores. Since these were the officially recommended textbooks, this study illustrated that the primary school curriculum in Kenya was geared towards the abilities of the top performing pupils. This result is thought to be true for several other countries in SSA whose education curricula are designed to suit the top students.

In another study in which pupils were tracked according to their academic abilities, lower achieving pupils were found to have greatly benefited from tracking since this forced the teachers to adapt their teaching methods to the pupils' ability levels (Duflo, Dupas and Kremer, 2011). Another related study evaluated an intervention that randomly assigned a less qualified locally hired short contract extra teacher (Duflo, Dupas and Kremer, 2009). The study found that reduction in class size alone – a pure resource intervention - led to reduced teacher effort and did not significantly alter the pupils' test scores. However, test scores for pupils in reduced class sizes that were also taught by a contract teacher – whose performance was regularly monitored and used as a basis for contract renewal - significantly increased.

Whereas RCTs have greatly contributed to the current knowledge of what works in developing countries, they have their own associated limitations. For the purposes of this dissertation, two limitations of RCTs stand out. First, many of the RCT studies that have been carried out in developing countries can be said to be context-specific even within the country where they have been conducted – their findings may be relevant for only those specific

communities and environments in which they were conducted. Yet in practical terms, it is not possible to conduct a country-level randomized intervention as this would be prohibitively expensive and therefore infeasible in the poor countries of SSA. This external validity concern of most RCT findings has been emphasized by economists who have urged for cautious adoption of the methodology in the fight against world poverty (Ravallion, 2012; Rosenzweig, 2012).

The second limitation – which is directly linked to the first – relates to scalability. While the findings from an RCT study involving a few schools or communities may seem highly credible, implementing such interventions at country levels may pose numerous other challenges that never arise when the RCTs programs are designed and carefully implemented at smaller levels.

2.3 UPE and school choice

Standard economic theory would suggest that, prima facie, the introduction of free primary education in SSA would crowd out whatever little private schooling that existed. This presumption, however, would be based on the strong assumption that public and private schooling are perfect substitutes of each other even after the introduction of UPE. As it turned out, the introduction of UPE policies greatly altered school choice, albeit in an unforeseen way. The abolition of tuition fees in public primary schools resulted in massive enrolments and low learning achievement in public schools. Both outcomes were easily observable to the parents in form of overcrowded classes and low test score achievements in the end-of-cycle national examinations (Deininger, 2003; Nishimura and Yamano, 2013). In what has been termed "affluent flight" to private schooling, the UPE policies sparked a rapid emergence of private primary schooling in most of SSA as demand for better schools significantly increased. For Uganda's case, no empirical evidence has been provided yet that estimates the extent of private primary schooling and its' important correlates. However, Deininger (2003)

alludes to education expenditure increases in urban areas after the introduction of UPE. He explains that this was the result of the perceived decisions to opt out of public schools into the expensive private schools for children of the affluent. It is worth noting that reliable statistics on the extent of private schooling are not easily accessible in Uganda. In fact, Lewin (2011) highlights the tendency for official government administrative statistics in developing countries to either underreport or completely mask enrolments in private primary schools because of regulation, taxation, accountability and other political economy concerns. In Kenya, Nishimura and Yamano (2013) note a four-fold growth in the number of private primary schools in just the first three years following the introduction of FPE. The authors estimate the determinants of school choice using a panel dataset of 725 households from 99 randomly selected rural communities in western and central Kenya. They apply a multinomial logit model and find a 7 percentage point increase in the proportion of children enrolled in private schools between 2004 and 2007. They reason that due to overcrowding in public schools, parents responded by switching their children to private or other schools. However, since parents have to pay tuition fees in private schools, household wealth - measured in terms of the value of home assets - was the more important determinant in the decision to switch to private school. In addition, they found that the child's gender was significantly important since the probability of enrolling into a private school was found to be significantly higher for boys.

Amidst the mushrooming of private primary schooling has been the new phenomenon of private schools for the poor (Tooley and Dixon, 2005; Oketch, et al., 2010). These refer to private schools that target the children from poorer households mainly in urban slum areas and in rural areas. In urban areas, these schools are thought to offer low quality education and their existence is mainly justified by the excess demand model which implies a shortage of public schools in areas where the urban poor live (Oketch et al., 2010). In rural areas, private

schools for the poor offer better quality education than the available public schools and are targeted at children from households with more educated parents who are willing to make the financial sacrifice because of their higher preference of education for their children – hence the differentiated demand model (Nishimura and Yamano, 2013).

Since the major enrolment benefits of UPE had mostly accrued to children from a lower social economic background, the decline in public school quality is expected to be most detrimental to their future prospects. The emergence of higher quality private schooling targeting those who can pay the private tuition fees brings back to prominence the importance of social economic status in the school sorting mechanism. This trend will likely make it difficult to achieve social equity thereby constraining the ability of the poor to break free of the chains of poverty (Lewin, 2009)[5].

2.4 UPE and impacts on community involvement and accountability

Many SSA countries underwent structural adjustment programs in the 1980s and 1990s. Part of the results of these adjustment programs was the introduction of decentralized governance structures that emphasized ordinary peoples' active participation in their government so as to improve accountability and service delivery by bringing decision making as close to the ordinary people as possible. The introduction of UPE policies seems to have generated a contradiction of the decentralization policy since it seemed to re-emphasize the need for schools to account upwards to the central government that provided the per-pupil school grant and not downwards to the local communities from where the children came. The study by Sasaoka and Nishimura (2010) found that the centralized political power of the UPE policy in East African countries had led to the weakening of local control and thus reduced

[5] While it is true that the introduction of the universal primary education programs greatly reduced both income and gender related enrolment inequalities (Deininger, 2003), learning inequalities may be worsened if the cognitive skills accumulated in free public schools are significantly lower than in fee-paying private schools. Children of the poor will thus remain less productive due to lower productivity skills acquired from public schooling.

community participation in school governance. This issue is critical since local community participation in the life of the school is believed to facilitate local ownership, a good thing which is thought to ensure local demand for accountability from the school. In the study on parental participation and accountability in Uganda, Suzuki (2002) analyzes the school governance structures after the introduction of UPE and notes the clear difficulty of trying to ensure School Management Committees (SMCs) – which were entrusted with managing the schools post-UPE – account to the local communities. The author highlights the composition of the SMCs and their hostile relationship with the Parents Teachers' Association (PTA) and concludes that the existing structure, rather than facilitate, actually hinders parental participation.

2.5 Enrolment and grade completion impacts of UPE

The majority of the literature on the impacts of UPE policies in the developing countries of SSA has concentrated on measuring the school access benefits of the interventions. This can be attributed to mainly two reasons. First, the 2015 second MDG target is clearly defined in terms of enrolment and grade completion. Although the sixth Education For All (EFA) goal agreed at the Dakar framework for action in year 2000 advocates for the improvement of education quality, this goal has in the past not been given the requisite priority in the global education discourse (UNESCO, 2005). It is worth noting that the currently ongoing discourse concerning the post-2015 MDGs for education is primarily focused on defining new targets that emphasize the measurement of the actual learning that is taking place in schools in developing countries (UN report, 2012; UN report, 2013). The second reason could be the lack of good quality standardized international test score data for the developing countries of SSA. As a result of this data inadequacy constraint, studies that have attempted to measure learning achievement have concentrated on such factors as the pupil-to-teacher ratios and grade attainment – measures that do not directly measure acquired skills.

In one of the earliest studies of UPE policies in SSA, Deininger (2003) assesses the impacts of Uganda's UPE program on school access, attendance for the poor and on quality - measured by the pupil-to-teacher ratio and grade attainment. Applying a simple before and after analysis framework, this study utilizes two-waves of nationally representative repeated cross-sectional household surveys. From the descriptive evidence and the repeated cross-sectional estimates, the study finds dramatic enrolment increases for primary school aged children mainly from the lowest quintile of the income distribution. Moreover, girls were found to have benefited more from UPE than boys, a clear indication that when lack of resources forced parents to choose between their children, the poor always favored educating the male children in the pre-UPE era. Thus UPE greatly helped to reduce both the gender bias in enrolment and the rural-urban enrolment bias that had previously favored urban dwellers. To ascertain the measured impacts were indeed attributable to UPE, this study found that the observed changes at primary schooling level did not occur at the secondary schooling level.

Utilizing a rural-based dataset compiled in 2003 involving a cross-section of 940 households, Nishimura, Yamano and Sasaoka (2008) evaluate the impacts of Uganda's UPE on delayed enrolment and grade completion. The study compares outcomes for the treated and the non-treated cohorts depending on the individual's age at the time of the introduction of the UPE policy. The study uses a probit estimation and finds that UPE significantly increased school enrolment and reduced the probability of delayed enrolments by 24.3 percentage points for girls and by 25.8 percentage points for boys. This study further finds that UPE increased grade completion up to grade five for girls and up to grade four for boys. The findings of this study are further confirmed by Grogan (2008) who estimates the UPE impacts on the age at which children first enrolled into school and finds a 3% increase in the probability that children enrolled before age nine after the introduction of UPE. Like all the other studies of UPE impacts in SSA, the enrolment impacts were found to be most

pronounced in rural areas and for girls. Studies by Oketch and Somerset (2010) and by Hoogeveen and Rossi (2013) assess the UPE policies in Kenya and Tanzania and basically find qualitatively similar outcomes as the Ugandan studies reviewed above.

2.6 Pupil learning impacts of UPE

Whereas the school quality impacts of UPE interventions have been discussed in most of the previous literature, the actual measures of school quality studied so far can be described as highly varied and therefore not easily comparable. These have included important school resource ratios such as the number of pupils per teacher, the number of pupils per textbook and the number of pupils per desk; the proportions of trained teachers in a school; the dropout and grade completion rates; the proportions of classes held in the open air; and the end of primary cycle test scores. Goal number six in UNESCO's education for all (EFA) framework defines quality in terms of learning outcomes mainly in literacy, numeracy and other essential life skills. For the OECD countries, the standard measure of learning has long been established as internationally standardized test scores for reading, mathematics and science. Consequently, we can categorize school quality measures into two groups, direct and indirect. This dissertation argues the case for utilizing direct measures, namely test scores, to assess the school quality impacts of UPE in SSA.

Discussing the education quality and quantity trade off facing the developing countries of SSA that had introduced UPE policies, Deininger (2003) noted that the introduction of UPE in Uganda had left schools with possibly the highest student-to-teacher ratios observed anywhere in the world. This was quickly manifested in terms of primary leaving examination (PLE) failure rates as a quarter of all exam takers in 1999 failed this exam.

In their study of the quality impacts of FPE in Kenya, Bold et al., (2010) conduct a before and after analysis and carefully analyze the variations in outcomes for primary and secondary schools to ascertain that the observed outcomes were due to FPE. They utilize both household survey data and end of primary cycle average test scores data at the school level in a panel analysis of all schools in Kenya. They find an increase in private schooling expenditures and significant declines in public schooling expenditures. Utilizing a conditional logit model and proxying for wealth with parental education, they find that FPE increased access for the poor and triggered the exit of children from the wealthy families into private schools. This study relies on this prima facie evidence to conclude that this revealed preference of private schooling by the rich was an indication of a decline in school quality for public schools. By following Bayer and Timmins (2007), this study models peer effects and finds that the decline in public school quality did not reflect a decline in value-addition by the public schools but rather a decline in peer quality induced by the enrolment of lower quality pupils after the introduction of FPE.

Similar to the study by Bold et al., (2010), Lucas and Mbiti (2012a) utilize the high-stakes national primary school exit exam scores to estimate the FPE impacts on pupils' learning achievements in Kenya[6]. This study uses a Difference in Differences (DIDs) framework by exploiting the exogenous district-level variations in grade-specific dropout rates before and after the intervention thereby establishing a measure of the effective intensity of the intervention. This study finds that FPE spurred private school entry in addition to increasing grade eight completion rates and generally enhancing participation. Concerning learning achievements, the study finds that FPE did not lead to substantial declines in the test scores of those students who would have taken the Kenya Certificate of Primary Education

[6] High-stakes exams have an undesirable characteristic of being highly consequential for either the school or the students and in most cases, for both. As such, these exams have previously been associated with such practices as cheating, private tutoring, sifting and teaching to the test (Koretz, 2002; MacLeod and Urquiola, 2009; Glewwe, Ilias and Kremer, 2010; Figlio and Loeb, 2011).

(KCPE) exams in the absence of the program. Their attained scores reflected a minor decline in the range of between zero and five percent of a standard deviation.

These latest studies that have primarily focused on estimating the quality impacts of the FPE policy in Kenya using test scores from KCPE exams represent considerable progress of this literature. However, the use of end-of-cycle test scores introduces selection bias concerns arising mainly from the nature of these exams being of high consequence on the future of the children and the schools. Furthermore, the grade eight KCPE results cannot provide sufficient explanation of what happened to learning in public schools both in Kenya and in the other countries of SSA. Because the countries of SSA operate different education systems with unique curriculums – in Uganda, the end-of-cycle exams are administered at grade seven -, it is important to assess learning impacts using internationally standardized test scores. To achieve this requires that the pupils who write these tests either be in the same grade or belong to the same age cohort. The SACMEQ dataset used by this study assures these requirements since all the test-takers were enrolled in the same grade regardless of the country. Thus, this dissertation extends the literature by utilizing a more relevant dataset that facilitates cross-country comparisons of UPE impacts on pupils' learning achievements. In addition, unlike the previous attempts which utilize average pupil test scores, the test score analyses in this dissertation are at the pupil level and the principle outcome variable is the internationally standardized deviation score of each pupil in the sample.

2.7 Conclusion

In the foregoing discussion, I have reviewed the relevant literature relating to primary education outcomes, and more specifically to impacts of the UPE policies in SSA. This dissertation improves the existing literature by filling the gaps that have so far not been sufficiently addressed. The contributions of this study therefore are three-fold. First, this

study assesses the direct learning impacts of the UPE policies by utilizing the pupil-level test scores for mathematics and reading. This represents a new approach to basic education empirical analyzes for the developing countries of SSA.

Second, this dissertation uses a unique international dataset from the SACMEQ region covering fifteen countries in Eastern and Southern Africa. Moreover, this has enabled the international standardization of pupil test scores such that each individual pupil's score represents a standardized deviation from the international mean score. This means that the findings of this study are internationally comparable across the whole region. In fact, this dissertation makes a direct comparison of the findings between Uganda and Kenya.

Finally, this dissertation makes a detailed analysis of the pathways explaining the observed learning impacts in both countries. It, therefore, reveals important cross-country themes that may be relevant for the other member countries in the SACMEQ region. Furthermore, this study delineates the impacts and pathways by school location – rural or urban – and by the pupil's gender – female or male. These delineations are in fact nontrivial since they provide the means of ascertaining the equity dimensions of the UPE policies.

Chapter 3

Data source

3.1 Introduction

Developing country policy studies whose findings are externally valid across country boundaries are difficult and therefore, of high value in development economics policy circles. The two-country case studies in this dissertation whose themes and policy implications extend beyond their own geographical boundaries represent an initial effort towards the enhancement of education policy for several countries in SSA. This dissertation's main empirical analyses use the SACMEQ country datasets for Uganda and Kenya. In fact, since the same tests were administered across the whole SACMEQ region, we standardize each pupil's reading and Math test score at the regional level –that is, from each pupil's absolute score, we subtract the regional mean score and then divide by the regional standard deviation. For both country case studies, the main regression analyses utilize the SACMEQ2 and SACMEQ3 data collected at the same time in both countries in the years 2000 and 2007 respectively. In defining education quality, UNESCO emphasizes the learner's cognitive, creative and emotional development skills (UNESCO, 2005). In line with these core quality aspects, this dissertation utilizes the now widely used learning outcome measures – literacy and numeracy test scores – as the main dependent variables.

In addition to using the same data source, this study utilizes the same statistical analysis framework to assess the intervention impacts for both countries – a Difference In Differences (DIDs) approach making before and after comparisons between public and private schools. To achieve unbiased identification of the policy impacts, this study employs the conditional independence assumption (CIA) controlling for family background factors

which have been identified in the previous literature to be most critical for the decision to select into public or private schools in SSA.

The next section dwells in detail on the SACMEQ datasets that we use in our empirical analyses.

3.2 The SACMEQ studies

SACMEQ is an international non-profit organization composed of fifteen African education ministries working together to enhance their education planning and policy expertise through the use of scientific methods to monitor and evaluate the conditions and quality of schooling in the Eastern and Southern African region[7]. It is modeled in a similar manner to the International Association for the Evaluation of Educational Achievement's (IEA) TIMSS[8]. The consortium receives technical and financial assistance from UNESCO's International Institute for Education Planning (IIEP) and the government of the Netherlands respectively. The survey micro datasets used in this dissertation were obtained on a CD-ROM from the SACMEQ coordinating center – Paris, France - on a written request by the author.

Since 1995, SACMEQ has completed three school-based international studies (1995, 2000 and 2007) that involved administering standardized tests in reading and mathematics for grade six pupils and their teachers in the fifteen member countries[9]. At the national level, the SACMEQ survey sample schools are selected by first stratifying according to regions and then according to school size. Thus, a Probability Proportional to Size (PPS) sampling technique is applied to ensure the selected schools reflect a fair representation of national shares by school type and location (Wamala, Kizito, & Jjemba; 2013). By using the attendance register in the selected schools, a simple random sample of about twenty grade six

[7] Organization's description obtained from SACMEQ home page http://www.sacmeq.org/
[8] TIMSS is the acronym that stands for Trends in International Mathematics and Science Study.
[9] Except for the first study (SACMEQ1) which was conducted in only seven countries. The seven countries that were involved in SACMEQ1 are Kenya, Malawi, Mauritius, Namibia, Zambia, Zanzibar and Zimbabwe (Nzomo, Kariuki and Guantai, 2001).

pupils is generated from those who are present at school on the first day of the survey. These pupils complete the two tests and a pupil questionnaire in two days. The respective grade six mathematics and reading teachers also complete their respective teacher tests and a questionnaire. The school head teacher completes a questionnaire that solicits information on the school head's characteristics and other school variables.

For the two waves that we use for the main regression analyses – SACMEQ 2 and 3 -, the whole regional sample comprised of 103082 pupils (41686 in 2000 and 61396 in 2007) and 9,050 grade six teachers in 4,525 schools. Table 1 shows a summary of the country-level averages of the standardized pupil test scores for five countries that include the three other SACMEQ member countries that are located geographically closest to Uganda and Kenya. Among this group of five countries, Malawi was the first to introduce UPE for all grades in 1994, followed by Uganda in 1997 and then Tanzania and Zambia both in 2002 before Kenya in 2003. The three East African Community member countries have a common market regional block that allows for the free movement of all the factors of production. Whereas the mean test scores for Uganda remained higher than for Malawi between 2000 and 2007, Uganda's reading scores declined three times more than the decline in Malawi's test scores for the same period. Moreover, Ugandan schools had the biggest decline in math scores of all the five countries. By the year 2007- after four years of implementing the FPE policy in Kenya – the test scores in Kenya were considerably higher than Uganda's test scores at the same stage, that is after four years of implementing UPE - in the year 2000. Tanzania is the only country in the five country sub-region that achieved better scores under the UPE policy than in its' pre-UPE era. This could possibly be attributed to the comparatively better preparations in terms of plans and provisions that Tanzania made well in advance of introducing the UPE policy. Beginning in year 2000, Tanzania implemented financial provisions for improving both the numbers and quality of primary teachers in the country and

for constructing and repairing classrooms in preparation for the introduction of the universal primary education policy (Hoogeveen and Rossi; 2013).

The above simple sub-regional test scores' analysis suggests that the introduction of UPE policies was followed by quality declines in several countries of SSA. Even for the first UPE-adopting countries in SSA, the quality declines ought to have been predictable considering that the available education literature indicates that quality declines had followed universal education policy interventions in many other countries even before the 1990s. For example, in South Korea in the 1950s, the introduction of free elementary education was associated with significant declines in school quality (UNESCO, 2005). It had resulted in overcrowded classrooms and excessive competition for places in secondary and tertiary institutions.

For the purposes of this study, we re-construct the school location variable into two locations[10], rural and urban. The SACMEQ datasets provide identification information up to the regional (province) level only, which makes it practically difficult to control for school level effects. For the analyses in this dissertation, we obtained further information that allowed us to identify the relevant districts. Since the district is still a higher level of aggregation, we do not make a district-level panel analysis but rather we control for district dummies in all the regression analyzes. In all our impact estimations, standard errors are adjusted by clustering at district x rural/urban level. This leads to eighty-two clusters for the QEIs study and one hundred and fourteen clusters for the FPE study.

We constructed some important variables that are used in some of the analyses made in this study. Parental education is constructed as the average of the number of years of schooling attained by both parents. Home possessions are constructed as a non-weighted average of dummies for the presence, at a pupil's home, of each of the five important social

[10] Schools located in either isolated or rural areas are all grouped under "rural" and those located either near a small town or near a large town/city are all grouped under "urban".

economic status items namely, electricity, piped water, television, radio and telephone. School Amenities are constructed as a non-weighted average of the eight dummy variables representing the presence of a radio, television, staffroom, counsel room, sports ground, sick bay/first aid room, electricity, and kiosk/cafeteria at the school. Community involvement is constructed as a non-weighted measure of the extent to which parents (local community) are involved in school activities such as building classrooms and teacher houses, repair of school equipment and furniture, purchase of stationary and textbooks, extra-curricular activities, assisting teachers in teaching and provision of school meals. We use the self-reported grade six teacher's average number of extra hours per week spent on lesson preparation and grading of pupils' assignments as a proxy for teacher effort.

3.3 Conclusion

This dissertation uses a school-based micro dataset obtained from SACMEQ which covers fifteen countries from Eastern and Southern Africa. The strongest point of these datasets is that they contain pupil level test scores – which we standardize internationally – for both reading and mathematics. Because of the differences in timings of the UPE policy interventions, our main estimation for Uganda measures the learning impacts of the UPE QEIs whereas for Kenya we estimate the learning impacts of the FPE policy.

Chapter 4

Uganda's UPE and the QEIs

4.1 Introduction

As discussed in the preceding two chapters, there is a scarcity of policy-relevant empirical studies assessing the direct learning impacts of the universal primary education policies that have recently been introduced in many developing countries of SSA. This is in contrast to the fact that several studies on other UPE impacts – notably enrollment, grade completion and school choice - are readily available for many of these countries (e.g. Deininger, 2003; Chimombo, 2009; Nishimura and Yamano, 2013; Hoogeveen and Rossi, 2013). From these studies, it is well established that UPE has reduced the age at first enrolment into school and increased the participation and grade completion rates mainly for the poor and for girls. However, recent studies have highlighted the worsening problem of the failure to reach or complete the last grade of primary schooling in SSA (Lewin, 2009; UNESCO, 2013-14). On this measure – primary cycle completion by cohort – SSA has regressed (58% in 1999 and 56% in 2010). A small part of the explanation for this negative trend in Uganda can be found in the high prevalence of grade repetition, especially at grade six – just one class to the completion of the cycle. Uganda ranks at the top of countries in SSA with extremely high gross enrolment rates (GER) in early grades and extremely low participation rates in higher grades. For instance, of the 2.2 million children who enrolled in the first grade at the inception of UPE in 1997, only 500,000 were found to be enrolled in grade seven in 2003 (Lewin, 2009). Some of the important risk factors for this attrition have therefore been highlighted and they include late enrolment, grade repetition and low achievement.

This dissertation, therefore, seeks to extend the literature in several ways. First, since low learning achievement appears to be a main threat to cycle completion, it seems important

to focus on establishing how pupils' learning can be enhanced. By using the direct measure of pupils' learning attainment – the test score – the findings of this study may help keep children in school by establishing the mechanisms through which test scores can be improved. Second, the findings from the QEI pathway analyses could be useful for other SSA countries that are planning school quality improvement initiatives as they seek to reverse the negative learning effects of the UPE policies in the post-2015 education agenda. Moreover, this study is particularly suited for this purpose – validity beyond national borders – since our main outcome variable – pupil test score - is the internationally standardized test score obtained at an internationally administered standard test.

In the analysis of the QEIs' impacts on learning achievement in Uganda, we make two main estimations. We first estimate the direct effect of the QEIs, i.e., establish whether the initiatives improved grade six pupils' learning outcomes. Next, we estimate the QEIs indirect effects on learning. This second estimation of the QEIs impacts on the determinants of learning outcomes illuminates the pathways through which the estimated learning impacts were reached. This is essentially an assessment of the implementation effectiveness of the initiatives.

Based on our earlier discussion of the existing literature on UPE, the descriptive evidence from the SAQMEQ datasets and considering the numerous studies that have highlighted the pervasiveness of institutional decay, inefficient governance, accountability failure and the high incidence of public sector corruption in many countries of SSA – Uganda features prominently in this grouping -, we hypothesize that the QEIs would suffer from inefficient and therefore ineffective implementation. This would be reflected in a failure to improve pupil's test scores post-intervention.

The findings from our analyses of the impacts of the QEIs are in some ways consistent with our hypotheses and not consistent in other ways. We find that post-intervention, public school pupils' test scores declined for both subjects. We, however, find that some initiatives were effectively implemented; for example, the incidence of open air classes greatly declined in public schools. On the other hand, some school quality measures worsened; for instance, the frequency of monitoring and inspecting schools greatly declined. Since pupils' test scores declined more in private schools (the control group) post-intervention, we find that the QEIs were associated with improved test score performances in public schools achieved through a lower than expected decline as compared to the private schools' decline.

The remainder of this chapter is organized as follows. In the next section we explain the UPE policy in Uganda and give a detailed description of the QEIs intervention. Section three highlights the SACMEQ data set for Uganda and provides summary statistics and descriptive evidence. In section four, we detail the QEIs study objectives, state the hypotheses and pose the questions to be answered empirically. The fifth and sixth sections explain the estimation methodology and discuss the results thereof. The last section discusses future research implications of our results and concludes.

4.2 The UPE policy in Uganda

Following the 1996 presidential election campaign promise of free primary education for all Ugandans, President Museveni's government introduced Universal Primary Education (UPE) in public schools across the country beginning with the Academic year starting in January 1997 (MoES[11], 1999). This policy allowed up to four children from each household to attain free access to public schooling. Deininger (2003) finds that the dramatic increases in enrollments that followed this policy led to extreme pupil to teacher ratios of up to 70 pupils

[11] Ministry of Education and Sports.

per teacher in rural areas. This status soon manifested itself in the high PLE failure rates that peaked at 25% in 1999. In 2003, the National Assessment of Progress in Education (NAPE)[12] tests of grades three and six students showed that more than half of the tested students achieved poor (inadequate) mastery of literacy and numeracy skills (ESSAPR[13], 2004).

4.2.1 The UPE Quality Enhancement Initiatives

In its 1998-2003 Education Sector Investment Plan (ESIP), the MoES stated the UPE's main objective as "the expansion of access through getting all school-aged children into school and elimination of gender, income, rural, and regional inequalities". From this stated sector objective, it appears that the overriding consideration was to ensure all eligible children got an opportunity to attend primary school regardless of their economic, gender and locational statuses. In direct contrast, the next Education Sector Strategic Plan (ESSP) 2004-2015 clearly reflected a new focus with the re-stated main policy objective being "to improve the quality of education attained by UPE children thereby enhancing literacy, numeracy and basic life skills". This change in policy focus may have been precipitated by the tremendous declines in PLE test score achievements that followed the introduction of UPE.

To achieve this new objective, the subsequent ESSAPRs for the years 2004 to 2006 report in detail on the several initiatives that were undertaken by the ministry supported by major development partners[14] who provided a big part of the funding in consonance with Uganda's Poverty Eradication Action Plan (PEAP). The overriding goal of the QEIs was to

[12] NAPE is a UNEB (Uganda National Examinations Board) driven annual initiative undertaken country wide to ascertain grades three and six pupils' competence levels in numeracy and literacy (ESSAPR, 2004).
[13] The Education and Sports Sector Annual Performance Reports (ESSAPR) are ministerial annual performance reports that are presented and discussed at annual Education Sector Review (ESR) sessions through which all stakeholder performance is achieved under the auspices of the Sector Wide Approach (SWAp) to policy making and implementation.
[14] The development partners were organized under their inter-donor harmonization and liaison forum called the Education Funding Agencies Group (EFAG) which included international agencies, Non-Government Organizations (NGOs) and religious organizations. Some of the major partners were the World Bank under its' Poverty Reduction Support Credit (PRSC) projects; The African Development Bank; DFID; USAID; DANIDA; NORAD; Irish Aid; JICA; UNICEF; The European commission; and The government of The Netherlands (MoES, 1999).

attain significant improvement in the learning environment at school and the quality of classroom instruction that would enable pupils to gain mastery in literacy, numeracy and basic life skills (Byamugisha, 2009). The specific interventions that were implemented starting in 2003 included the establishment of the Education Standards Agency (ESA) which would be responsible for school inspections, monitoring and quality evaluation; the increased provision of instructional materials such as text books and furniture; the increased recruitment of teachers to cut down the extremely high PTRs; the revision of the minimum entry requirements to Primary Teachers Colleges (PTCs); the construction of new class rooms, toilets and teacher houses; the elimination of cost sharing in PTCs; the implementation of in-service teacher training courses; and the provision of school management training for school heads. In this dissertation, these initiatives are referred to as the Quality Enhancement Initiatives (QEIs). It seems, therefore, that the QEIs aimed to considerably improve the provision of school resources, improve teacher quality and enhance school monitoring and management. Since the roll-out of the QEIs was at the national level, this rules out the possibility of using some public schools as a comparison group in this study.

4.3 SACMEQ data for Uganda

Uganda introduced UPE beginning in January 1997. By this time, the SACMEQ1 study had already been completed in six of the seven countries that were involved. Uganda's first participation in the SACMEQ studies was in September 2000 when SACMEQ2 was conducted in the expanded group of 15 countries. This non-participation in the pre-UPE SACMEQ1 study makes it difficult to strictly assess the UPE policy impacts using the DIDs approach since the public school grade six enrollees in year 2000 were partial beneficiaries of the UPE intervention – for a period of four years. As a result, therefore, this dissertation assesses the impacts of the UPE QEIs on grade six pupils' learning achievements in Uganda using data from SACMEQ 2 and SACMEQ 3 studies. Since the 2007 grade six cohort had

been exposed to the QEIs for a period of only four years, this study's estimations will reflect initial impacts of the intervention[15].

4.3.1 Descriptive evidence

The UPE QEIs study in Uganda uses data collected from a pooled sample of 427 primary schools involving 854 grade six teachers and 7,949 pupils. A bigger proportion of the sample – 5307 grade six pupils – belongs to the 2007 cohort. For both cohorts, the share of pupils enrolled in rural schools is just under three quarters (74% in 2000 and 73% in 2007), and the proportion of private enrollees almost doubled during the period covered by this study – from 5.8% in 2000 to 11.2% in 2007. Table 4.1 illustrates the comparison of grade six pupils' test scores by school type and location. The overriding message from this simplified test scores' summary is that between 2000 and 2007, the average performances declined for all children regardless of school location and type. However, it is worthwhile noting that for both subjects, the test score declines were greater in private schools and in rural schools. Without controlling for the other important determinants of pupils' learning outcomes, we cannot authoritatively conclude from this simple analysis the impacts of the QEIs. However, prima facie, this analysis suggests that the initiatives achieved their objectives by reducing the declines that would have otherwise occurred in public schools.

Since we use the private schools as a comparison group, it would have been simpler to assess the intervention impacts if their average test scores had not significantly changed. Given the emergence of private primary schooling after the introduction of UPE (Deininger, 2003; Nishimura and Yamano, 2013), there are two possible avenues through which test scores in private schools could have declined. First, if pupils who switched from public to private schools were of comparatively lower ability than the private enrollees before the QEIs intervention, then the post-intervention average test scores in private schools would likely

[15] This study is, therefore, likely to underestimate the full impact of the QEIs intervention. Once available, use of data from the currently ongoing SACMEQ 4 study will enable estimation of the full impacts.

decline. However, this scenario may not be sufficient to justify the greater test scores' decline in private than in public schools. Second, if due to the rampant mushrooming of private schools, the newly licensed private schools were of significantly lower quality – high PTRs, unqualified teachers, poor school administration and lack of basic facilities -, then their poor test score achievements would lower the overall average test scores for private schools. Unfortunately, we are unable to directly control for both aspects – pupils' ability and new or old school – since they are unobserved in the SACMEQ datasets. However, following Cox and Jimenez (1991) we rely on the grade repetition variable to partly capture grade six pupils' learning ability levels. Since the dataset provides several measures of school quality, we rely on these to assess whether there were any significant declines in the quality of private schools.

Table 4.2 gives the descriptive statistics of pupil, teacher and school variables highlighting changes between 2000 and 2007 by school type and location. First, grade six pupils in private schools are younger than their grade-cohorts in public schools by about one year. However, since children would be expected to be in grade six at age 12, it appears that even those enrolled in private schools have either started school late or repeated at least one grade. At least half of all the grade six children in the sample had repeated a grade in 2000, and this was irrespective of the school type or location. This fraction declined for private and urban schools during the period covered by this study. As would be expected, measures of parental education and home possessions are significantly higher for private school children and for urban school children. This difference in parental education in 2000 was quite large – over 2.5 years – and widened even more by 2007. Concerning home assets too, the gap was quite large in 2000 and widened even more by 2007 in favor of private and urban children.

Second, concerning grade six reading and math teacher quality we assess their test scores, teaching experience and additional effort. The grade six reading teachers' test scores

were below the SACMEQ regional mean scores in 2000 and did not significantly change in 2007. On the other hand, although grade six math teachers' scores in Uganda were higher than the SACMEQ regional mean scores in 2000, private teachers' scores declined significantly in 2007. The teacher training and teacher experience variables might provide an explanation why private teachers' test scores are either lower –for reading teachers - or declined – for math teachers - in Uganda. Grade six private school teachers for both subjects had fewer years of teacher training in 2000 and did not get any more training, unlike their counterparts in public schools. Furthermore, private schools had the biggest proportions of new teachers[16] in 2007. It is rather instructive that in year 2000, the proportions of grade six math or reading new teachers in Uganda were virtually zero. This could mean that the test score declines after the introduction of UPE were driven, in no small ways, by overcrowded grade six classes. However, it is also possible that new teachers were allocated to teach lower grade classes such that the most experienced ones were left to teach the upper grades. Concerning teacher effort, grade six reading teachers in rural areas devoted the highest extra effort in 2000, but also had the largest decline in effort in 2007. Conversely, grade six math teachers in urban schools devoted the most extra effort pre-intervention. Math teachers too reduced their effort in 2007, except for those in private schools. However, given that we observe declines for several school monitoring and accountability measures – inspections, community involvement and teacher evaluation – this decline in grade six reading and math teacher effort may not be too surprising.

Finally, I elaborate on other school-level quality variables including physical class facilities, school inspections, teacher performance evaluation, community importance and level of community involvement in the school. The proportion of classes held in complete class structures increased by 14% points in public schools – from 58% - and mainly in rural

[16] For the Ugandan study, a grade six "new teacher" is one who started teaching after the introduction of UPE in 1997. This means that new teachers in 2000 have less than five years' teaching experience whereas new teachers in 2007 are those with less than twelve years' teaching experience.

schools – a 16% point increase. This increase is reflected in terms of the reductions in the proportions of classes held in the open air for public and rural schools. This reduction might be explained by the intervention since new classroom constructions constituted a major component of the QEIs using funds under the School Facilitation Grant (SFG). The school inspections variable measures the number of times the school had been inspected by officials from either the district education office or the ministry headquarters in the two years preceding each survey. There were marked declines in the frequency of school inspections, and this happened across all schools. The grade six reading and math teachers were asked how frequently the school head advised them about their work – monthly or termly. It seems that head teachers are increasingly doing less and less teacher performance evaluation as is shown by the increases in the proportions of teachers who reported that their work was being evaluated on a termly basis. This increase is most significant in public and rural schools, and especially for math teachers. Concerning community involvement in school activities, there were no significant changes in this variable before and after the intervention. However, the variable measuring community importance shows that a very small proportion of school heads consider the local community to be important in their daily activities of managing the school[17].

4.4 Objectives, hypotheses and questions

From the foregoing discussion, the study of the QEIs in Uganda has three main objectives relating to the impacts on grade six pupil test scores, effectiveness of implementation of the initiatives, and impacts on UPE's learning equity objective. First, this study's main objective is to establish whether the QEIs achieved their overarching goal of improving school quality. We use a direct outcome measure of school quality, that is, the grade six pupils' reading and math test scores.

[17] The community importance variable is a dummy indicating the school head ranks local community contacts among his top two priorities in his work as head teacher.

The second objective of this study is to assess the pathways through which the pupil test scores were affected. By establishing the mechanism through which the learning was impacted, this dissertation assesses the components of the QEIs that accounted for the grade six pupils' learning outcomes. Using school-level and grade six pupil and teacher outcome variables, this dissertation evaluates the QEIs' learning impact logic through which the observed test scores were attained.

The third objective of this study is to estimate whether the QEIs learning impacts were equitable. Since the majority of the pupils attend rural schools, it is important to estimate how this intervention affected their learning achievement. Furthermore, though the gender gap in primary school enrolment seems to have been overcome in Uganda, this dissertation seeks to ascertain how the QEIs affected the gender gap in learning achievement. By using both the rural and the female indicator variables, this dissertation measures the QEIs' learning impacts on these pupil categories.

From the reviewed literature on Uganda's UPE policy and the descriptive evidence discussed above, it is compelling to hypothesize that the QEIs intervention did not achieve its' stated goal of improving the quality of education in public schools in Uganda. A closer look at all the specific interventions that constituted the QEIs, reveals that they were primarily school resources focused initiatives. As discussed earlier on, a number of developing country education studies have, to a great extent, emphasized that mere resource interventions are doomed to fail mainly because of the inadequacy of the existing schooling institutions (Hanushek and Woessman, 2008; Duflo, Dupas, and Kremer, 2009; Halsey and Vegas, 2009). In addition to these education specific studies, a wide array of studies on the failure of public service delivery in the developing countries of SSA reveals the extreme difficulties that pure resource policies such as the QEIs have to overcome in order to be effective (Reinikka and Svensson, 2004; Luiz, 2009; Manda and Mwakubo, 2013; Bold and

Svensson, 2013). Some of these difficulties relate to inadequate capacity, poor targeting, local elite capture, outright corruption and embezzlement, low internal efficiency, inadequate local ownership and monitoring, etc. Consequently, this dissertation proposes the following three hypotheses – each relates to a unique study objective:

Hypothesis 4.1: Though designed to reverse the UPE-associated school quality declines, the QEIs did not fully succeed in reversing the declines and this would be reflected in the failure to sufficiently improve the grade six test scores for pupils enrolled in public schools such that they could attain a net positive learning impact.

Hypothesis 4.2: Since the QEIs involved several school-level initiatives such as classroom construction, in-service teacher training, school management training, school inspections and monitoring and teacher recruitment, the implementation of many of these incentives was riddled with enormous difficulties that made their contribution to learning improvement quite minimal.

Hypothesis 4.3: Due to an ineffective institutional framework that leads to poor targeting – public resource policies designed to unfairly benefit the elites- and the lack of local community involvement in the monitoring of the QEIs, the learning impacts of the QEIs favored the children of the rich who mostly attend public schools in urban areas. The learning impacts for girls may not have been significantly improved either.

Accordingly, this study answers three research questions: 1): What were the impacts of the QEIs on grade six pupil test scores for reading and math? 2): What were the pathways to the learning outcomes? 3): What were the impacts of the QEIs on the test scores for pupils enrolled in rural schools and female pupils?

4.5 Empirical estimation

Following Glewwe & Kremer (2006), we assume parents make important life choices for their children when the children are still young. In making these decisions, parents seek to maximize their (and the children's) life-cycle utility functions. Such a utility function's main arguments include measures of the inter-temporal levels of goods and services consumed, years spent in school and skills accumulated. This function is maximized subject to various constraints such as the education production function, the time value opportunity cost of enrolling in school, the economic returns to schooling, an inter-temporal budget constraint, and a credit constraint – in case school access is not free. The education production function reflects a structural relationship that depicts skills acquisition as being a function of the time spent in school, the characteristics of the school attended, the child's own characteristics, and the characteristics of the household from which the child originates.

In this dissertation, we estimate the reduced form impacts of the UPE QEIs in Uganda. As in Glewwe & Kremer (2006), our main education outcome variable is the pupil's test score for either reading or math. We exploit the pre and post-intervention nature of the 2000 and 2007 datasets to identify the impacts of the policy interventions by comparing public and private schools in a Difference in Differences (DIDs) setup using two repeated cross sections. We rely on the Conditional Independence Assumption (CIA) by controlling for those pupil variables that have been identified as the most important determinants of school choice in the developing countries of SSA. Since our study utilizes observational data, relying on this selection on observables assumption equates to assuming that sorting into public or private school is random when we condition on the pupil's ability and family background (Angrist and Pischke, 2009). Since we do not observe the child's innate ability and motivation for schooling, our results can be interpreted as overstating (understating) the negative (positive) learning impacts of the interventions.

4.5.1 Impacts on pupil test scores

This dissertation's main analysis involves the estimation of a reduced form education production function shown in equation (1) below:

$$A=a\ (\boldsymbol{C}, \boldsymbol{H}, EP, \alpha), \quad (1)$$

where:

A represents the pupil's cognitive skills measured as the standardized test score.

C is a vector of the child's various characteristics such as age and gender.

H is a vector of the child's home characteristics including parents' education and social economic status measures.

EP (education policy) is a dummy that equals 1 for year 2007 indicating a period after program implementation.

α is a measure of the child's unobserved variables – mainly relating to innate ability and motivation for schooling.

To estimate the production function in (1) above, we follow the specification for the standardized pupil test scores' equation as given in equation (2) below:

$$Z_{ijt} = \alpha_0 + \beta_P P_j + \beta_Q QEI_t + \beta_{QP}\left(QEI_t * P_j\right) + \beta_R R_j + \beta_C C_{ijt} + \beta_{CR}\left(C_{ijt} * R_j\right) + \sum_{d\in D}\left\{\alpha_d I_{dj} + \alpha_{dR}(I_{dj} * R_j)\right\} + \varepsilon_{ijt}, \quad (2)$$

For pupil *i*, in school *j*, at time *t*.

where:

Z is the standardized reading or mathematics pupil test score; *P* is a dummy for public school; *QEI* is a dummy for year 2007; *R* is a dummy for a rural school; *C* is a vector for child characteristics; I_{dj} is a district dummy which takes 1 if school *j* is located in district *d*; *D* is a

set of survey districts; and ε_{ijt} is the idiosyncratic estimation error term. Standard errors are adjusted by clustering at district times rural/urban level.

Using equation (2), we are able to estimate both the overall differential learning impacts in public schools and the direct absolute learning impacts in private schools. By focusing on the coefficient β_{QP} we are able to test hypothesis 4.1 in order to establish the impact the QEIs intervention had on learning achievement in public schools. We expect to obtain a positive and statistically significant coefficient, however this coefficient is expected to be not large enough to reverse the common UPE-associated learning decline experienced by both public and private schools and represented by β_Q. To ascertain whether the intervention impacts were different for pupils enrolled in rural as opposed to urban schools (hypothesis 4.3), we estimate the fully saturated model shown in equation (3) below:

$$Z_{ijt} = \alpha_0 + \beta_P P_j + \beta_Q QEI_t + \beta_{QP}(QEI_t * P_j) + \beta_R R_j + \beta_{QR}(QEI_t * R_j) + \beta_{RP}(R_j * P_j) + \beta_{QRP}(QEI_t * R_j * P_j) + \beta_C C_{ijt} + \beta_{CR}(C_{ijt} * R_j) + \sum_{d \in D}\{\alpha_d I_{dj} + \alpha_{dR}(I_{dj} * R_j)\} + \varepsilon_{ijt}, \quad (3)$$

To estimate the differential impacts by pupils' gender (hypothesis 4.3), we estimate equations (2) and (3) for girls and boys separately.

4.5.2 Pathways analyses

To estimate the intervention impacts on the various pupil-level pathways, we utilize several variants of equations (2) and (3) in which only the dependent variables change. Estimation of the impacts on grade six teacher-related pathways and all the other school-level pathways (hypothesis 4.2) is depicted in equations (4) and (5) below:

$$Q_{jt} = \beta_0 + \beta_P P_j + \beta_Q QEI_t + \beta_{QP}(QEI_t * P_j) + \beta_R R_j + \beta_S S_{jt} + \beta_{SR}(S_{jt} * R_j) + \sum_{d \in D}\{\alpha_d I_{dj} + \alpha_{dR}(I_{dj} * R_j)\} + \varepsilon_{jt}, \quad (4)$$

For school *j*, at time *t*.

where:

Q is a measure for school quality or community role; *P* is a dummy for public school; *QEI* is a dummy for year 2007; *R* is a dummy for a rural school; S is a vector for grade six teacher characteristics (appears only in teacher pathways regressions)*;* I_{dj} is a district dummy which takes 1 if school *j* is located in district *d*; *D* is a set of survey districts; and ε_{jt} is the idiosyncratic estimation error term. Standard errors are adjusted by clustering at district times rural/urban level. The saturated model specified in equation (5) enables the delineation of the school level pathways analysis by school location – rural or urban school.

$$Q_{jt} = \beta_0 + \beta_P P_j + \beta_Q QEI_t + \beta_{QP}(QEI_t * P_j) + \beta_R R_j + \beta_{QR}(QEI_t * R_j) + \beta_{RP}(R_j * P_j) + \beta_{QRP}(QEI_t * R_j * P_j) + \beta_S S_{jt} + \beta_{SR}(S_{jt} * R_j) + \sum_{d \in D}\{\alpha_d I_{dj} + \alpha_{dR}(I_{dj} * R_j)\} + \varepsilon_{jt}, \quad (5)$$

Whereas the main coefficient of interest in equations (2) and (4) is β_{QP} – which measures the differential policy impacts in public schools -, our coefficients of main interest in both equations (3) and (5) are β_Q, β_{QP}, β_{QR}, and β_{QRP}. We carry out joint hypotheses tests to establish the absolute impacts in public rural schools, public urban schools, private rural schools, and private urban schools. We ascertain whether these impacts are different between rural and urban schools by comparing within rural schools – private rural versus public rural – and within urban schools – private urban versus public urban. This analysis of differential intervention impacts arising from the location of the school is assumed to depict the policy's effect on the comparatively wealthy households – whose children predominantly enroll in urban schools - and the poor – whose children predominantly enroll in rural schools (hypothesis 4.3).

4.5.3 School choice

As a robustness check, we use the linear probability model (LPM) to estimate a school choice equation to ascertain the validity of the conditional independence assumption (CIA). The specification for this estimation is shown in equation (4) below:

$$\Pr(Private_j = 1) = \delta_0 + \delta_Q QEI_t + \delta_R R_j + \delta_{QR}(QEI_t * R_j) + \delta_C C_{ijt} + \delta_{CQ}(C_{ijt} * QEI_t) + \sum_{d\in D}\{\alpha_d I_{dj} + \alpha_{dR}(I_{dj} * R_j)\} + \varepsilon_{ijt}, \quad (6)$$

For pupil *i*, in school *j*, at time *t*.

where:

Private is the dummy variable for private school, it takes 1 if private and 0 if public; *QEI* is a dummy for year 2007; *R* is a dummy for a rural school; *C* is a vector for child characteristics; I_{dj} is a district dummy which takes 1 if school *j* is located in district *d*; *D* is a set of survey districts; and ε_{ijt} is the idiosyncratic estimation error term. Standard errors are robust to heteroskedasticity.

4.6 Study findings

We report the QEIs study findings derived using ordinary least squares (OLS) multivariate regression analyses with "Stata version 13" in tables 4.3 – 4.13. From the fully saturated model specifications shown in equations (3) and (5), we are also able to estimate the absolute intervention impacts in private and public schools – depending on their locations either in rural or urban areas - separately. Since previous literature on UPE policies has suggested considerable spillover effects for private schooling in several countries, this dissertation also discusses the absolute impacts on private schools.

4.6.1 Impacts on learning

We report the reduced form estimations for equations (2) and (3) in tables 4.3 to 4.8. In tables 4.3 and 4.6, our coefficient of main interest measuring the differential impacts for public schools is β_{QP} . Likewise in tables 4.4, 4.5, 4.7 and 4.8, the main coefficients of interest are β_Q, β_{QP}, β_{QR}, and β_{QRP}. For the impacts in rural schools, we conduct a joint hypothesis test ($\beta_{QP} + \beta_{QRP} = 0$) and the impacts in urban schools are reflected by the coefficient of interest β_{QP}. Our preferred results appear in the columns where we control for other relevant test score correlates and district times rural dummies.

From table 4.3, we find that the QEIs were associated with significant improvements in grade six pupils' reading test scores by 0.459 standard deviations. Since the reading test score declines for private schools – our comparison group's impact is shown by the coefficient for the 2007 dummy - were in absolute terms significantly larger than this improvement in public schools, this finding only suggests that the QEIs had a test score decline-reduction impact for the treated schools. A joint hypothesis test of the two coefficients reveals that public schools' reading test scores declined in absolute terms by 0.233 SDs – this result is significant at 5 % level of significance. This finding is consistent with our hypothesis 4.1 in which we highlighted that we expected a positive impact of the intervention which is however, not large enough to fully reverse the UPE learning decline.

An analysis of these impacts by school location – as shown in table 4.4 – reveals that these learning decline-reduction impacts were realized in urban schools only – an improvement of 0.71 SDs[18]. A further delineation of the test score impacts by the student's gender shows no significant differential impacts among girls, and a considerable decline-reduction effect among boys. Table 4.5 reveals that rural public school girls' reading test

[18] Table A1 in appendix A shows the summarized impacts. The differential impacts for rural public schools are shown in row (g) while for urban public schools are in row (h).

scores declined by 0.356 SDs – reading test scores for rural private school girls did not significantly change - while the boys' test score decline-reduction impact was not statistically significant – although in absolute terms the 0.556 SDs decline for private rural boys reading test scores was larger. In urban schools, whereas boys' reading test scores improved by 1.040 SDs, the 0.341 SDs improvement for girls was not statistically significant (summarized results from table 4.5 are shown in appendix A table A2). The large positive result for boys in urban public schools was largely achieved as a result of the significantly large decline in reading test scores for private urban boys – the 0.612 SDs absolute decline in reading test scores for private urban girls was only half the decline for private urban boys. From these results, it is clear that the QEIs reading test score decline-reduction impacts in public schools were biased to the benefit of urban schools and mainly for boys. These gender and school location differential impacts are consistent with our hypothesis 4.3 in which we highlighted the possibility of inequitable benefits arising from the QEIs policy.

Regarding the math test score impacts, we find that the QEIs did not succeed in reversing the UPE-associated decline – of 0.989 SDs - in grade six pupils' math learning achievements for public schools (hypothesis 4.1). The overall test scores differential impacts for public schools were not statistically significant, thereby implying that similar levels of math test score declines were experienced in public and private schools as shown in table 4.3 – the joint hypothesis test for the two coefficients is rejected at 1% level of significance. However, when the impacts are delineated by school location and student's gender (tables 4.3, 4.4 and A2), we find qualitatively similar impacts as the ones for reading – the intervention reduced declines in urban schools only and this positive effect was predominantly to the benefit of boys (hypothesis 4.3). Although the intervention did not have significant differential impacts among rural schools, the absolute math test score performances for pupils – both boys and girls – in rural public schools significantly declined.

On the other hand, the positive differential impacts observed in urban public schools were as a result of the larger test score declines for pupils – both boys and girls – in private urban schools.

4.6.2 Pathways to learning impacts

To explain the above test score findings, we show the pathways results for pupils, grade six teachers and other school quality variables in tables 4.6 to 4.12. Beginning with the pupil-level pathways in tables 4.6 to 4.8[19], we analyze regular school attendance, grade repetition and the availability of basic scholastic requirements. We find that grade repetition significantly increased in all public schools. Our findings suggest that the probability that a grade six pupil in a public school had repeated a grade at least once significantly increased by 23.5% points – grade repetition in private schools declined by 17% points. No significant impacts were observed for pupil absenteeism and measures of basic scholastic items in both public and private schools.

A more detailed analysis of these pupil-level pathways however, suggests differential gender and locational impacts (hypothesis 4.3). Pupil absenteeism seems to have been a major problem in urban public schools mainly affecting boys – this was influenced by the fact absenteeism for private urban boys declined by 26% points. Grade repetition, on the other hand, increased for both girls and boys. There is a clear gender divide on this variable with girls repeating more in rural public schools whereas boys repeated more in urban public schools. The increased boy's repetition in urban schools is driven more by the significant reduction in the absolute incidence for boys' repetition in private urban schools. A similar finding in rural areas seems to explain the increased proportion of girls repetition in public rural schools – grade repetition incidence for girls in private rural schools declined significantly. The measure for the availability of basic scholastic materials was found to have

[19] Appendix tables A3 and A4 show the summarized pupil-level pathway impacts for tables 4.7 and 4.8.

declined in rural schools, mainly reflecting the increased availability of the same for pupils enrolled in private rural schools. This decline affected only girls since we do not find significant declines in this measure for boys.

Thus, we find that whereas for boys the pupil-level pathway outcomes were worse in urban schools – grade repetition and absenteeism -, worse outcomes for girls – grade repetition and lack of basic scholastic materials - were seen in rural schools. Since both absenteeism and grade repetition are associated with learning achievement declines (Lewin, 2009), it is likely they had a significant impact on test score declines in rural public schools. Also, since the measure for basic scholastic materials[20] significantly decreased for girls in rural schools, this may be a major reason for the gender performance gap observed especially in reading proficiency. This finding is mainly driven by the fact that private school pupils were found to have experienced an increased measure in the availability of these materials, thus suggesting that girls who enrolled in private rural schools were more likely to come from comparatively wealthy households than those attending public schools. The significant improvement in boys' performances for both subjects in urban schools was achieved in spite of increases in absenteeism and grade repetition. This seems to suggest that these particular factors are not so important for urban pupil's learning attainments. This finding may be reflecting the differences in home background variables between rural and urban.

Table 4.9 shows the equation (4) estimations for grade six reading and math teacher pathways. For grade six reading teachers in public schools, no statistically significant differential QEI impacts were observed on their test scores, number of extra hours and frequency of in-class testing of students' subject proficiency. The same result could be said for private school reading teachers as the respective coefficients for the 2007 dummy suggest

[20] The pupil-level variable measuring the availability of scholastic materials is constructed as a non-weighted average of essential scholastics – exercise and note books, geometry instruments, pens and pencils – that a pupil has.

– they are all statistically not significant. Public school Math teachers, on the other hand, had their test scores improve significantly – by more than a standard deviation, mainly due to the over 0.66 SDs decline in private school math teachers' test scores. The proportion of math teachers who conducted weekly in-class written tests to ascertain how well their pupils had grasped the curriculum decreased by about 47% points – this too reflects the increased incidence of weekly testing in private schools. Table 4.10 – also summarized in appendix table A5 – reveals teacher quality differences by school type and location. On teacher test scores, our findings suggest differences in teachers' subject knowledge between public and private schools in both rural and urban locations. These differences are more evident amongst math teachers since we find that their test scores declined in private schools only – both rural and urban. Additionally, in rural public schools, math teachers' absolute test scores improved significantly by 0.521 SDs.

Another critical teacher variable is the self-reported number of extra hours (teacher effort) the grade six teachers put into their school work. Especially in rural schools, teacher efforts declined tremendously for both reading and math teachers. We find declines of about 11.88 hours and 9.19 hours respectively for reading and math teachers in rural public schools. We also find that teacher effort in private urban schools declined immensely for both reading and math teachers. As will be argued later, this dissertation holds that the large declines in teacher effort could be attributed to the absence of effective monitoring and supervision which implies lack of accountability for pupils' learning achievements at school level. As will be seen later, both school inspections and parental involvement in private urban schools declined.

Tables 4.11 and 4.12[21] depict the estimations for other school-level pathways including school inspections, the proportion of classes held in the open-air, the pupil to teacher ratio, parental involvement and the teacher absenteeism problem. Beginning with school inspections, the QEIs were associated with major declines in the number of inspections conducted across all school types in the two years preceding the survey – the coefficient on the dummy for year 2007 indicates a decline of about five inspections and the joint hypothesis test for the two coefficients is rejected at 1% level of significance. Because the declines were across all schools in both rural and urban areas, no significant differential impacts were observed by school location. Concerning classroom quality – an important correlate for learning achievement in developing countries (Glewwe and Jacoby, 1994; Glewwe and Ilias, 1996) -, the proportion of classes held in the open air declined by 13% points in public schools.

On class size, we find that the pupil to teacher ratio (PTR) increased by about fifteen pupils in public schools. A further analysis of this class crowding effect suggests that it was predominantly in rural public schools where the PTR differential impact was an increase of 19 pupils per teacher – the average PTR in the comparison private rural schools decreased by about seventeen pupils. Another important school-level variable is the measure of community/parental involvement in school operations. Overall, this study found no significant impacts for this variable. However, this measure declined in private urban schools – thereby showing a significant increase for public schools in urban areas -, thus suggesting that this change may have had a lot to do with explaining the reduction in urban private school teachers' efforts as discussed earlier.

On teacher absenteeism, we find that it worsened in rural public schools - there was a 58.7% point decrease in the proportion of rural public school heads who reported that the

[21] Summarized impacts for other school level pathways are shown in Appendix table A6.

teacher absenteeism problem had "never" been a concern for the school. The absolute increase in rural public schools' teacher absenteeism problem – a decrease in the response "never a problem" by 11.4% points – was not so large. However, we found that the comparison rural private schools experienced a net reduction in teacher absenteeism since "never" increased by 47% points. Taken together with the fact rural private schools did not experience significant pupil test score declines – especially for math -, these findings are consistent with Duflo and Hanna (2005) who found that reduced teacher absenteeism improved students' learning in India.

In sum, the pupil-level pathway analyses in this dissertation revealed that the determinants of pupil test score performances differed by school location and gender. Whereas increased absenteeism and grade repetition did not seem to negatively affect boys performances in urban schools, girls performances in rural schools declined due in part to these same factors, mainly grade repetition. Grade six teacher effort was found to be important in predicting pupil test score performances in all schools and school locations. Teacher absenteeism was found to be quite important at predicting pupils' performances in rural public schools.

4.6.3 Robustness – school choice estimation

Table 4.13 reports the results of the linear probability school choice model for equation (6). We find that home possessions and parent education strongly predict the probability of a grade six pupil to enroll in private school pre-intervention. Post-intervention, the importance of home possessions significantly increases while that for parents' education does not change significantly. First, these results confirm the CIA on which we base our identification of the QEIs impacts. This is because the home background variables on which we condition our main estimations in equations (2) and (3) have significant explanatory power in equation (6). Second, these findings show that despite the government's intervention to rectify the quality

decline in public schools, wealthy parents did not trust that the intervention would effectively reverse the quality decline and therefore opted to switch their children to private schools.

4.7 Implications and conclusions

From the foregoing discussion of our findings, it can be surmised that the QEIs intervention to reverse the quality decline in public schools managed only to decelerate the learning deterioration rate but not to fully reverse it. Because we observed that private schools' performances declined post-intervention, the QEIs may have had negative spillover effects on private school learning possibly due to the excessive demand for private schooling as a remedy for the poor learning attainment in public schools. This may have triggered the emergence of low quality private schools targeting poor families in urban areas as was the case for Kenya (Oketch et al., 2010). However it is difficult to argue this issue since we do not have sufficient data pre-intervention that would have enabled us to ascertain the common trend assumption that we presume in our estimations. Future research focusing on the school choice issue and comparing outcomes in rural and urban areas would provide more enlightenment on why private schooling learning outcomes declined more in urban areas.

Chapter 5

FPE in Kenya

5.1 Introduction

Kenya's free primary education (FPE) policy has been the subject of many education policy evaluation studies done in SSA. A number of these studies have included a measure of the actual learning effects of FPE. Yet, these studies remain a minority and their findings can be improved by using more appropriate measures of pupils' attained cognitive skills. The two leading studies that have examined the learning impacts of the FPE policy in Kenya - Bold et al., (2010) and Lucas and Mbiti (2012a) - have both utilized the school-level grade eight Kenya certificate of primary education (KCPE) exam results showing average scores categorized by gender. Not only are the high-stakes exams not a very good measure of achieved learning, the differences in primary schooling systems and curriculums make the findings from these studies difficult to relate to the situations in the other countries of SSA. In comparison to Uganda, Kenya has low attrition rates before primary completion. Despite this, pupils' learning achievements in Kenya are still quite low (Lewin, 2009).

This dissertation, therefore, uses pupil-level and regionally standardized test scores to assess the learning impacts of FPE. We first estimate the direct FPE impacts in order to ascertain whether FPE led to improved learning for grade six pupils. Then, we estimate the indirect FPE impacts – pathways' analyses - that measure the impacts on the determinants of learning outcomes.

Similar to the QEIs study discussed in the previous chapter, the FPE intervention was primarily a resource intervention policy aimed at expanding the availability of schooling resources to enable universal access. As argued earlier, pure resource policies that do not alter

the institutional framework in the schools – especially in terms of failing to measure and reward or punish performance – are likely not to achieve the desired goal of improving pupils' learning in public FPE schools. We hypothesize, therefore, that the introduction of the FPE policy in Kenya did not improve learners' skills attainment. The findings from this study are consistent with our hypotheses since the FPE policy was found to be associated with significant test score declines for both math and reading in public schools. Unlike in Uganda's case, we do not find test score declines for private schools in Kenya. However, this finding does not rule out the existence of FPE spillover effects since we find that FPE was associated with test score improvements for private schools.

The rest of this chapter is organized as follows: The second section explains the FPE policy in Kenya. Next, we briefly explain the SACMEQ data set for Kenya and discuss the summary statistics therefrom. Section four enumerates the objectives of the study, states the hypotheses and poses the questions that will be answered through empirical analysis. The estimation methodology and the results are explained in sections five and six respectively. The seventh section discusses the implications of our findings for future research and concludes.

5.2 The FPE policy in Kenya

In December 2002, a national coalition government was voted into power in Kenya after almost forty years of a single party rule[22]. In fulfillment of a presidential campaign promise for free basic education for all Kenyans, the FPE policy was implemented effective January 2003. Primary school enrollment jumped from 5.9 million in 2002 to 7.2 million in 2003, instantly pushing the net enrollment ratio (NER) from 61.8% to 74.2% (World Development Indicators – see table 5.1). Together with the introduction of FPE, a new curriculum

[22] The Kenya African National Union (KANU) party ruled Kenya for almost forty years from the time the country acquired its independence (1963) from Great Britain. In 2002, the National Alliance of Rainbow Coalition (NARC) defeated the KANU party and assumed government leadership in January 2003.

designed to reduce both student and teacher workload was implemented at both primary and secondary school levels (Wanyama and Koskey, 2013).

In June 2003, the new government embarked on a three-year "national Economic Recovery Strategy for wealth and employment" (ERS). Among other sector reforms, the ERS entailed education sector reforms that were to operationalize the FPE policy. They were first defined in the "sessional paper number 1 of 2005" and then extensively articulated through the Kenya Education Sector Support Program (KESSP). In particular, the KESSP spelled out the adoption of the Sector Wide Approach (SWAp) for education planning, and the decentralization of education and training services to provincial and district levels (GoK MOEST, 2005). Several investment programs were undertaken, many of which focused on tackling the various educational challenges that had been manifested at the primary schooling level – most notably classroom overcrowding. The "Primary School Infrastructure Investment Program" involved the construction of new schools in areas where there had been none and the construction of additional classrooms to alleviate the extreme class overcrowding effects. Other interventions were directed at issues such as in-service teacher training, instructional materials provision, school health and feeding, expanding opportunities in Arid and Semi-Arid Lands (ASALs), etc.

Almost immediately after the introduction of FPE, parents became dissatisfied with the quality of education in FPE schools as they observed the extreme overcrowding effects the policy had generated. This disquiet was immediately reflected in the rapid emergence of private primary schooling in the country. In their study of the school choice decisions in rural Kenya, Nishimura & Yamano (2013) note that private schools in Kenya increased four-fold between 2002 and 2005. This was despite the fact that pre-FPE, few private primary schools had existed in Kenya and had traditionally offered superior quality education and targeted the wealthy in mainly urban locations. In a detailed study of the private schooling trends in four

commonwealth countries, Tooley and Dixon (2005) highlight the relatively newer concept of private schools for the poor – the so called "budget private schools". In a report to the common wealth education ministers, Tooley (2007; pages 137-140) dwelt in greater detail on these types of schools highlighting that they targeted the poorest in both urban and rural areas. Oketch et al., (2010) make the point that in urban areas, these budget private schools are of the lowest quality and are mainly located in slums where FPE schools are in short supply.

5.3 SACMEQ data for Kenya

In Kenya, the Free Primary Education (FPE) policy was introduced in January 2003, six years after Uganda's UPE. Kenya was involved in all the three completed SACMEQ studies, implying that we have data for both periods before and after the policy intervention. The SACMEQ1 (1998) survey involved testing pupils only, and in only one subject - reading proficiency. For Kenya, no observations for private schools are reflected in this baseline study, and thus we cannot use this data to make across school-type comparisons. The subsequent surveys (SACMEQ2 in 2000; and SACMEQ3 in 2007), however, do contain both public and private school observations, thereby allowing us to compare between school types. In addition, these latter two surveys do contain test scores for both reading and mathematics, and for both grade six pupils and their teachers. Since the baseline survey (SACMEQ1) does not provide a comparison group for public schools, all our regression analyses utilize only the last two surveys (SACMEQ 2 and 3). We utilize the SACMEQ1 survey data for additional robustness checks to test the common trend assumption for identifying the DIDs causal impacts. Whereas grade six is either the last or penultimate primary school grade in the majority of SACMEQ member countries, it is the third last grade in Kenya (Nzomo, Kariuki and Guantai, 2001). Since the grade six pupils that were exposed to the SACMEQ3 tests in 2007 were at least enrolled in grade two in January 2003, our findings reflect a measure of

FPE impacts after a five-year program exposure period – see table 5.2. This dissertation, therefore, assesses the impacts of the FPE policy on grade six pupils' learning achievements in Kenya.

5.3.1 Descriptive evidence

The pooled sample for all the three surveys involves 10,968 pupils, 1070 teachers, and 563 head teachers in 563 schools from all the eight provinces covering 57 year-2000 Kenya districts. The respective pupil sample shares for the first, second and third surveys are 30%, 30% and 40%. Whereas for the first two surveys the rural-urban shares are fairly balanced at 55% - 45%, the post-FPE survey share is heavily biased in favor of rural – 62%. For the 2000 and 2007 survey waves, the proportions of pupils enrolled in private are 5% and 10% respectively. Tables 5.3, 5.4 and 5.5 report the descriptive summaries – by school type and location - for important variables and their respective changes from one survey to the next.

Table 5.3 shows a summary of our main dependent variable, the standardized grade six pupil test scores for reading and math. In 1998, the country achieved an average test score of 0.43 SDs, which was significantly higher than the SACMEQ regional mean – only seven countries participated in this SACMEQ1 baseline study. This superior achievement was mainly driven by urban schools whose mean test score (0.65 SDs) was 0.38 SDs higher than the mean test score for rural schools. Between 1998 and 2000, there was a moderate increase of reading test score achievements by 0.04 SDs almost wholly driven by significant improvements in rural schools. During this period, the net enrollment ratio (NER) also increased three percentage points from 62 percent to 65 percent – see table 5.1. At the same time, this period involved an average wealth (home possessions) decline for both rural and urban households - see table 5.4. This test score performance improvement could be attributed to among other things, the extra teacher effort as shown by the increased number of extra teacher hours. We are unable to state whether this growth in teacher effort followed an

increase in payments although this possibility cannot be ruled out since such effort responses could be expected in cases of increases in PTA fees in the pre-FPE period. This positive test scores trend within a two-year gap is suggestive evidence of a continuous performance improvement before the FPE policy was introduced. We can, therefore, reasonably assume a positive linear test score achievement trend – at least for reading in public schools.

Between 2000 and 2007, however, the public school reading test scores declined by 0.22 SDs. Similarly, the test scores for mathematics declined, by 0.19 SDs. These declines were entirely driven by rural FPE schools. This decline ironically coincided with improvements in household wealth for public school pupils both in rural and urban areas. However, in this case, teacher effort (extra hours) declined in public schools – by 6.66 hours in rural schools and 5.47 hours in urban schools. It seems that pupil test score performances were positively correlated with teacher effort. Assuming a common trend, these test score changes would seem to suggest that FPE was associated with a 0.26 SDs (0.04 + 0.22) decline in public school reading test scores and a 0.31 SDs (0.09 + 0.22) decline for rural FPE schools. However, since there is a five year gap post-FPE we may not reasonably justify this result alone as an assessment of the FPE impacts. Additionally, since this conclusion would merely reflect a difference in mean scores, we would need to control for other test score determinants in order to disentangle the FPE effect.

For the two surveys for which we have private schools data – 2000 and 2007 –, there were no observed declines in test scores for pupils enrolled in private schools. In fact, math test scores for private schools increased by 0.18 SDs.

In table 5.4 we report the summary statistics for variables that exist in all the three waves of the SACMEQ studies. First, at the average age of 12.93 years in 2000, grade six pupils in private schools are younger than their public cohorts by just under one year. This

could be partly due to the high incidence of grade repetition in public schools – 60% as opposed to 48% in private schools. Grade repetition considerably declined across all schools in Kenya between 2000 and 2007; in fact, it reached just below the 50% mark in public schools. Second, in year 2000, parental education attainment was 2.45 years higher for grade six pupils in private schools. A similar trend was observed for the wealth measure; that is, private pupils came from households that were more than twice as wealthy as public school pupils. However, by 2007 the public schools had considerably bridged the gap on both indicators of socioeconomic wellbeing. Although parents' education generally declined during the period, the greatest decline – 2.33 years – was in private schools. This decline in parental education for private schools could be related to pupil transfers from public or even, to new enrolments into private schools for the poor as suggested by Nishimura and Yamano (2013) and Oketch et al., (2010). Similarly, whereas there was no significant change in the average wealth measure for private school enrollees, the public school pupils' wealth measure significantly increased. This across-schools general improvement in social economic status (SES) is consistent with the Kenya demographic and health survey (DHS) trends between 2003 and 2008 that showed average improvements in housing characteristics, access to safe drinking water and availability of certain durable consumer goods in the household (Kenya DHS report, 2003; Kenya DHS report, 2008).

Between 1998 and 2000, the two variables that measure teacher effort – extra hours and weekly test dummy – significantly increased across all public schools. However, by 2007, both variables had declined considerably in public schools only. To put this teacher effort decline into perspective, we make a connection with the other relevant variables that may have influenced the observed teacher effort responses post-intervention. First, the curriculum changes adopted at the start of 2003 academic year entailed reductions in teacher

workloads. This workload reduction could be expected to have a similar effect on the amount of extra teacher hours. A closer analysis of the effort and workload declines over the period, however, reveals that effort declined more than twice the proportionate declines in work load, thus suggesting that something else may have been behind the teacher effort declines. Second, the frequency of school inspections considerably declined in public schools after the introduction of FPE. These declines – as shown in table 5.5 – mirror the teacher effort declines in that the biggest impact seems to have been in rural schools. Other related variables are the measures of community involvement and of community importance in the school. These measures too considerably declined between 2000 and 2007. Since school inspections and community involvement are factors that enhance school performance through effort monitoring and accountability for results, it seems plausible to assume that their decline post-intervention was partly to blame for the observed decline in public schools' teacher effort.

Other grade six teacher quality measures include their test scores, teaching experience and length of teacher training. For both public and private schools, grade six reading teachers' test scores were higher than the regional mean before and after the FPE intervention. The private teachers' test scores remained slightly higher than for public school reading teachers. Yet the proportion of new reading teachers[23] remained considerably higher in private schools throughout the period of our analysis – 56% as opposed to 30% in public. With their test scores being considerably higher than the mean regional score by more than one SD (in fact for private schools, more than two SDs), grade six math teachers in Kenya performed significantly better than many in the SACMEQ region in 2000. However, these test score performances declined drastically in 2007, most notably for private schools. Yet the teacher experience measure shows that the proportion of new math teachers remained quite

[23] In this study of FPE in Kenya we define a new grade six teacher as one who had less than six years' teaching experience. We use this measure to assess whether teachers who were recruited after the introduction of FPE had differing impacts on the observed outcomes.

small and did not change significantly between 2000 and 2007. However, considering that teacher education, experience and test scores have not been found to strongly predict pupil test score outcomes (Hanushek and Rivkin, 2006), this study does not place much emphasis on these variables.

5.4 Objectives, hypotheses, questions

This study of the impacts of the FPE policy in Kenya has three main objectives relating to grade six pupil learning achievements, the main mechanisms to the observed learning outcomes, and across gender and socioeconomic status outcomes. First, the study's main objective is to estimate the FPE effect on learning attainment as measured by the grade six pupils' reading and math test scores.

The second objective is to establish the pathways through which the pupil test scores were affected. This analysis is of particular importance since it enables the identification of the relevant factors that mostly influenced pupils' learning. Pathways identification is meant to ease education policy making by ensuring resources are directed at the variables with the highest return on pupils' cognitive skills.

The third objective is to break down the learning impacts of the FPE policy by gender and socioeconomic status. These analyses establish how equitable the FPE intervention was in terms of ensuring that both boys and girls not only had access to school but also acquired cognitive skills in a non-discriminatory manner. Furthermore, since the majority of the pupils enrolled in rural public schools were from the lower wealth quintiles, the analysis of the effects on rural schools' learning outcomes is quite critical for assessing the chances of the poor to overcome the chains of poverty in the future. Tables 5.4 and 5.5 show that on average pupils from homes with lower parental education, fewer home possessions and lower school scholastics measures, and a lower probability of having at least two meals on a regular basis

attend rural schools. In our pooled sample of 563 schools, 58 percent are located in rural areas and they account for 59 percent of the total number of grade six pupils involved in this study

Considering the evidence of considerable quality declines attributed to UPE in Uganda (Deininger, 2003; Nishimura, Yamano and Sasaoka, 2008), it seems that unless the FPE policy involved a unique school-performance-incentives-based strategy to directly address quality concerns, it was reasonable to anticipate that the intervention would result in significant learning deficiencies. First, since the policy abolished tuition fees payments as a precondition for enrolment it was expected to attract and keep children from poorer and less educated households enrolled in FPE schools. For such children, school may represent the only avenue of acquiring important skills and thus, would require extra effort from teachers. Also, to the extent that socioeconomic status is an indicator of innate ability and assuming that innate ability is inheritable, then these children from poor backgrounds would be expected to possess lower ability and motivation for learning.

Second, the elimination of the requirement for parents to pay tuition fees would be expected to distance them and the local community from the school. This could result from either the school deliberately blocking parents' attempts to remain involved, or the parents losing interest in playing the school monitoring role since they no longer have a financial stake in the school or both. Third, the overcrowding effects resulting from fee elimination especially in urban areas would be expected to negatively affect quality. In this case, top-tier public schools in urban areas would be expected to feel the worst overcrowding effects since such schools would attract previously privately enrolled pupils (Lucas and Mbiti, 2012a).

Another line of argument that would tend to predict quality declines after the introduction of FPE relates to the public service delivery deficiencies and poor institutions

argument we made in the previous chapter on Uganda's QEIs. Consider the Ugandan experience of local capture of UPE funds (Reinikka and Svensson, 2004). It is not unreasonable to predict that this kind of occurrence could have befallen the FPE policy since the intervention also involved a significant empowerment of provincial and district bodies. Moreover, at the time of FPE's introduction, Kenya's public sector was perceived to be more corrupt than Uganda's[24]. That the Kenya Education Sector Support Program (KESSP) forensic audit of 2010 unearthed huge misappropriations of FPE funds meant for the KESSP projects for the period 2005-2009 is clear evidence that the FPE program was not excused from the financial management scandals that were experienced by Uganda's UPE[25]. From the above arguments, this dissertation proposes the following three hypotheses, with each relating to one of the three study objectives identified above:

Hypothesis 5.1: Since the FPE policy in Kenya basically sought to increase resources and attract school age children to enroll without any significant improvements in the performance incentive mechanisms at school level, it was associated with significant declines in school quality which would be reflected in declining learning achievements for grade six pupils enrolled in public schools.

Hypothesis 5.2: The introduction of the FPE policy made schools less accountable to their local communities and thus led to a deterioration of several important education outcome pathways at both district and school level.

[24]Transparency International's Corruption Perceptions Index (CPI) rank for Kenya in 2002 and 2003 was 96 out of 102 countries and 122 out of 133 countries respectively. In contrast, Uganda's CPI ranks for the two years were better than Kenya's at 93 and 113 respectively (information retrieved from http://archive.transparency.org).

[25] In Uganda's case, the UPE program suffered the effects of a corruption and embezzlement scandal in which excessive amounts of UPE funds were misappropriated. The report of the commission of inquiry into the mismanagement of UPE and USE (2012) funds attributed the scandal to corruption, fraud and embezzlement; poor supervision, monitoring and maintenance of school building projects; existence of ghost pupils, teachers and schools; etc. A copy of this report was obtained from www.education.go.ug

Hypothesis 5.3: Because of an inefficient and ineffective institutional setup, the learning benefits of the FPE policy were unfairly distributed such that female pupils and pupils from lower socioeconomic backgrounds bore the brunt of the declines in public school education quality.

This study therefore, seeks to answer the following three main questions: 1): What were the grade six pupil learning achievement impacts of the FPE policy in Kenya? 2): What were the main mechanisms through which the observed learning impacts were achieved? 3): What were the FPE impacts on the test scores for pupils enrolled in rural schools and for female pupils?

5.5 Empirical Estimation

We estimate the reduced form impacts of the FPE policy in Kenya. As in Glewwe and Kremer (2006), our main education outcome variable is the pupil's test score for either reading or math. We exploit the pre- and post-intervention nature of the 2000 and 2007 datasets to identify the impacts of the policy intervention by comparing public and private schools in a Difference in Differences (DIDs) setup using two repeated cross sections. We rely on the Conditional Independence Assumption (CIA) by controlling for those pupil variables that have been identified as the most important determinants of school choice in the developing countries of SSA. Since our study utilizes observational data, relying on this selection on observables assumption equates to assuming that sorting into public or private school is random when we condition on the pupil's ability and family background (Angrist and Pischke, 2009). Since we do not observe the child's innate ability and motivation for schooling, our results can be interpreted as overstating (understating) the negative (positive) learning impacts of the interventions.

5.5.1 Impacts on pupil test scores

This dissertation's main analysis involves the estimation of a reduced form education production function shown in equation (1) below:

$$A=a\ (\boldsymbol{C}, \boldsymbol{H}, EP, \alpha), \quad (1)$$

Where:

A represents the pupil's cognitive skills measured as the standardized test score.

C is a vector of the child's various characteristics such as age and gender.

H is a vector of the child's home characteristics including parents' education and social economic status measures.

EP (education policy) is a dummy that equals 1 for year 2007 indicating a period after the FPE policy was implemented.

α is a measure of the child's unobserved variables – mainly relating to innate ability and motivation for schooling.

To estimate the production function in (1) above, we follow the specification for the standardized pupil test scores' equation as given in equation (2) below:

$$Z_{ijt} = \alpha_0 + \beta_P P_j + \beta_F FPE_t + \beta_{FP}\left(FPE_t * P_j\right) + \beta_R R_j + \beta_C C_{ijt} + \beta_{CR}\left(C_{ijt} * R_j\right) + \sum_{d\in D}\left\{\alpha_d I_{dj} + \alpha_{dR}(I_{dj} * R_j)\right\} + \varepsilon_{ijt}, \quad (2)$$

for pupil *i*, in school *j*, at time *t*.

where:

Z is the standardized reading or mathematics pupil test score; *P* is a dummy for public school; *FPE* is a dummy for year 2007; *R* is a dummy for a rural school; *C* is a vector for child characteristics; I_{dj} is a district dummy which takes 1 if school *j* is located in district *d*; *D* is a

set of survey districts; and ε_{ijt} is the idiosyncratic estimation error term. Standard errors are adjusted by clustering at district times rural/urban level.

Using equation (2), we are able to estimate both the overall differential impacts in public schools and the direct absolute impacts in private schools. Using the coefficient of main interest β_{FP}, we test hypothesis 5.1. We expect to find a negative and significant coefficient indicating that learning declined in public schools. To ascertain whether the intervention impacts were different for pupils enrolled in rural as opposed to urban schools (hypothesis 5.3), we estimate the fully saturated model shown in equation (3) below:

$$Z_{ijt} = \alpha_0 + \beta_P P_j + \beta_F FPE_t + \beta_{FP}(FPE_t * P_j) + \beta_R R_j + \beta_{FR}(FPE_t * R_j) + \beta_{RP}(R_j * P_j) +$$

$$\beta_{FRP}(FPE_t * R_j * P_j) + \beta_C C_{ijt} + \beta_{CR}(C_{ijt} * R_j) + \sum_{d\in D}\{\alpha_d I_{dj} + \alpha_{dR}(I_{dj} * R_j)\} + \varepsilon_{ijt}, \quad (3)$$

To estimate the differential impacts by pupils' gender (hypothesis 5.3), we estimate equations (2) and (3) for girls and boys separately.

5.5.2 Pathways analyses

To estimate the intervention impacts on the various pupil-level pathways, we utilize several variants of equations (2) and (3) in which only the dependent variable changes. Estimation of the impacts on grade six teacher-related pathways and all the other school-level pathways (hypothesis 5.2) is depicted in equations (4) and (5) below:

$$Q_{jt} = \beta_0 + \beta_P P_j + \beta_F FPE_t + \beta_{FP}(FPE_t * P_j) + \beta_R R_j + \beta_S S_{jt} + \beta_{SR}(S_{jt} * R_j) +$$

$$\sum_{d\in D}\{\alpha_d I_{dj} + \alpha_{dR}(I_{dj} * R_j)\} + \varepsilon_{jt}, \quad (4)$$

for school *j*, at time *t*.

where:

Q is a measure for school quality or community role; *P* is a dummy for public school; *FPE* is a dummy for year 2007; *R* is a dummy for a rural school; S is a vector for grade six teacher characteristics (appears only in teacher pathways regressions)*;* I_{dj} is a district dummy which takes 1 if school *j* is located in district *d*; *D* is a set of survey districts; and ε_{jt} is the idiosyncratic estimation error term. Standard errors are adjusted by clustering at district times rural/urban level. The saturated model specified in equation (5) enables the delineation of the school level pathways analysis by school location – rural or urban school (hypothesis 5.3).

$$Q_{jt} = \beta_0 + \beta_P P_j + \beta_F FPE_t + \beta_{FP}(FPE_t * P_j) + \beta_R R_j + \beta_{FR}(FPE_t * R_j) + \beta_{RP}(R_j * P_j) + \beta_{FRP}(FPE_t * R_j * P_j) + \beta_S S_{jt} + \beta_{SR}(S_{jt} * R_j) + \sum_{d \in D}\{\alpha_d I_{dj} + \alpha_{dR}(I_{dj} * R_j)\} + \varepsilon_{jt}, \quad (5)$$

Whereas the main coefficient of interest in equations (2) and (4) is β_{FP} – which measures the differential policy impacts in public schools – the coefficients of main interest in equations (3) and (5) are β_F, β_{FP}, β_{FR}, and β_{FRP}. We carry out joint hypotheses tests to establish the Average Treatment Effects (ATE) on public rural schools, public urban schools, private rural schools, and private urban schools. We ascertain whether these impacts are different between rural and urban schools by comparing within rural schools – private rural versus public rural – and within urban schools – private urban versus public urban. This analysis of differential intervention impacts arising from the location of the school is assumed to depict the policy's effect on the comparatively wealthy households – whose children predominantly enroll in urban schools - and the poor – whose children predominantly enroll in rural schools.

5.5.3 School choice

As a robustness check, we estimate a school choice equation to ascertain the validity of the conditional independence assumption (CIA). The specification for this estimation is shown in equation (6):

$$\Pr(Private_j = 1) = \delta_0 + \delta_F FPE_t + \delta_R R_j + \delta_{FR}(FPE_t * R_j) + \delta_C C_{ijt} + \delta_{CF}(C_{ijt} * FPE_t) + \sum_{d \in D}\{\alpha_d I_{dj} + \alpha_{dR}(I_{dj} * R_j)\} + \varepsilon_{ijt}, \quad (6)$$

for pupil *i*, in school *j*, at time *t*.

where;

Private is the dummy for private school, it takes 1 if private and 0 if public; *FPE* is a dummy for year 2007; *R* is a dummy for a rural school; *C* is a vector for child characteristics; I_{dj} is a district dummy which takes 1 if school *j* is located in district *d*; *D* is a set of survey districts; and ε_{ijt} is the idiosyncratic estimation error term. Standard errors are robust to heteroskedasticity.

5.6 Study findings

In tables 5.6 – 5.16, we report the OLS study findings for Kenya's FPE intervention derived using "Stata version13". First, tables 5.6, 5.7 and 5.8 show the main learning impact estimations for which the dependent variables are either pupils' reading or math test scores. In tables 5.9, 5.10 and 5.11 we show the pupil level pathway analyses followed by the grade six reading and math teachers' pathway analyses in tables 5.12 and 5.13. Estimations for the school-level pathways are showed in tables 5.14 and 5.15. Table 5.16 gives the school choice estimations that we use for checking the validity of the CIA.

5.6.1 Impacts on learning

The reduced form estimations for pupils' learning achievement equations (2) and (3) are reported in tables 5.6 and 5.7. In table 5.6, our coefficient of main interest measuring the differential impacts of the FPE policy on public schools is β_{FP}. The preferred results appear in the third columns where we fully address possible concerns of omitted variable biases by controlling for other relevant test score correlates – mainly family background and child

specific characteristics - and school locational area specificities – district dummies and their interaction with the rural dummy.

We find that FPE was associated with declines of 0.415 SDs and 0.510 SDs in reading and math achievements for pupils enrolled in Kenya's public schools. This result is consistent with our expectation as spelt out in hypothesis 5.1, and is quite different from the Ugandan result in that for both subjects, the learning declines in Kenya occurred in public schools only. A more detailed analysis of these learning outcomes (table 5.7) suggests that these declines were predominantly in urban schools[26] - reading test scores in urban declined by 0.492 SDs while math scores declined by 0.606 SDs. These declines were driven by both the absolute learning declines experienced in public schools and the significant learning improvements that took place in the comparison private schools in urban areas.

Table 5.8 shows the learning outcomes estimated separately for girls and boys[27]. This analysis suggests significant gender differences with all the learning declines being experienced by boys – reading test scores declined by 0.588 SDs while math declines were even larger at 0.739 SDs. These test score declines for boys in urban schools reflect both the absolute learning declines in public schools and more importantly, the significant learning improvements for boys in private urban schools. On the other hand, the differences in girls' learning achievements between public and private urban schools were not significant, thus suggesting that girls enrolled in urban private schools in Kenya were not performing as well as boys in the same schools. Otherwise, the absolute test score declines for girls in urban public schools are not significantly different from the declines for boys in the same schools. The observed learning improvements in private schools could be explained by the teacher effort trends as already discussed in the descriptive statistics - only private schools' teacher

[26] Table B1 in Appendix B shows the summarized impacts. The differential impacts for rural public schools are shown in row (g) while for urban public schools are in row (h).
[27] Appendix table B2 gives the summarized impacts by pupil gender.

effort variables showed no decline between 2000 and 2007. Since some private schools in urban areas experienced net enrolment declines after the introduction of FPE, we may expect that the increase in private school teacher effort reflects competition for pupils in urban areas. Considering that even before the FPE intervention, public school sizes in urban areas were significantly bigger than those in rural areas[28], this seems to suggest that class size was one of the pathways to the observed declines in urban public school test scores.

5.6.2 Pathways to learning impacts

The pathways regressions are reflected in tables 5.9 – 5.15. Pupil absenteeism is estimated to have significantly decreased in public schools post-FPE. We find that the proportion of grade six pupils who had been absent at least once in the month preceding the survey had decreased by 37.5% points. A significant part of this reduction is due to the fact pupil absenteeism increased in private schools – an increase in the proportion by 19.6% points. A more detailed analysis – location and gender differences - suggests that the increase in private school grade six pupils' absenteeism incidence was most extreme in urban schools for both girls and boys (see appendix B tables B3 and B4).

Turning to the other pupil-level pathways, we find no significant public school differential impacts for the proportion of pupils who had ever repeated a grade and for the measure of basic education materials that the grade six pupils possessed. Over the period, both variables declined by similar magnitudes in public and private schools – as indicated by the negative and significant coefficients for the 2007 dummy variable in table 5.9. Beginning with grade repetition, detailed analysis by school location and pupils' gender reveals absolute declines for public rural schools – likely to have been driven by the automatic promotion

[28] The average urban public school in 1998 with 710 pupils had 260 pupils more than the average rural public school. Comparing with private urban schools, this difference was over 210 pupils more in year 2000. Between 2000 and 2007 the school size differences became even more pronounced by over 80 and about 200 pupils when comparing with public rural and with private rural schools respectively.

requirement of the FPE policy – and for private urban schools – likely to have been driven by the increased teacher effort and competition for pupils. In urban public schools, grade repetition significantly increased for boys whereas the impact was insignificant for girls. This increase for urban boys seems to be fully explained by the significant reduction in the comparison group – absolute grade repetition for boys in private urban schools decreased by 31% points. Although the absolute decline in grade repetition in public rural schools occurred for both girls and boys, the decline for girls was larger – 17% points as opposed to 11.8% points – possibly due to the differential gender-related enrollment/grade completion benefits of the FPE policy.

On basic scholastic materials that the pupils possessed, we find that this measure declined, in absolute terms, for both rural and urban schools regardless of school type. On comparing the absolute declines, we find that due to the larger decline that occurred in private rural schools, the overall impact for public rural schools was an increase. This large decline in basic scholastics measure in private rural schools affected both boys and girls but was more felt by girls. This may suggest that when forced to choose better quality private education for their children, the poorer rural households gave priority to girls. Alternatively, it may imply that poorer households with girls responded faster by choosing private schools for their children than the poorer households with boys. Yet, these findings do not suggest that pupils enrolled in rural private schools came from significantly poorer homes than those enrolled in rural public schools. However, the home possessions measure reveals that pupils enrolled in private rural schools post-FPE came from more economically deprived homes than in the pre-intervention period. This finding is consistent with the school choice findings by Tooley (2007) and Oketch et al., (2010) indicating that the poor in both rural areas and urban slum areas were choosing private schools for the poor, the so called "budget private

schools". In urban areas, this choice is thought to be driven by the short supply of public schools in areas inhabited by the poor.

Table 5.12 shows the grade six reading and math teacher pathways – teacher test score, teacher effort and frequency of giving in-class written tests to grade six pupils. We find that there were no significant differential impacts for public schools' grade six teachers' test score and test frequency for the reading. In fact, the intervention seems to have had no impact on both variables for both private and public reading teachers. On teacher effort however, a 12 hours' decline in effort exerted by public school reading teachers was estimated. There was no significant spillover impact on private reading teachers' efforts. For math teachers, whereas there were no significant differential impacts in teacher test scores, there was a general decline in test score performance for both public and private schools – a decrease by 0.913 SDs. Just like the reading teachers, public school math teacher effort declined by 13.8 hours. This decline was larger mainly because private school math teachers' effort increased by about 6 hours.

We analyze these teacher pathways by school location in table 5.13 (also see appendix B table B5). Whereas there were absolutely no significant FPE effects on reading teacher test scores, the math teacher test scores increased by 0.566 SDs in public urban schools. However, it is important to note that this increased math teacher test score performance was achieved mainly because private school math teachers' test scores declined more than the decline for public urban teachers. Thus, we find that the general performance of math teachers declined in all schools after the introduction of FPE. For both reading and math teachers, large declines in teacher effort were observed in urban public schools. Whereas the declines were, for both subjects, driven by the increased absolute efforts made by urban private teachers, the absolute efforts for public urban math teachers also declined by over 7 hours. The absolute teacher effort reductions discussed here are quite large representing about

28% decline for reading teachers and over a 40% decline for math teachers. Whereas it can be argued that the reduction in teacher extra hours could have been due to the curriculum changes that were aimed at reducing teachers' workload, this reasoning gets defeated by the finding that these effort declines represented more than double the proportionate falls when compared to actual workload declines.

Another variable measuring teacher effort is the frequency with which teachers tested their pupils' learning using in-class written tests. We find that the proportion of reading teachers who tested their pupils on a weekly basis increased in rural public schools by 58.8% points. However, this result conceals the fact that the actual proportions declined for both public and private schools in rural areas – in fact the decline for private was so huge as to reflect an increase for public schools. For math teachers, this proportion decreased by 53.7% points in urban public – mainly because the absolute proportion for private urban increased – and increased by 36.7% points in rural public – mainly because the absolute proportion for private rural decreased. Thus we see a clear difference between urban and rural private schools on this particular variable.

In tables 5.14 and 5.15 we show the estimations for other school-level pathways[29]. Beginning with the pupil to teacher ratios (PTR), we find that there were no significant FPE policy effects on PTR in both private and public schools in Kenya. This finding is consistent with the literature that shows there were only small enrolment gains attributable to FPE in Kenya since the pre-intervention enrolment rates were already quite high – unlike the case of UPE in Uganda. Closer analysis of this outcome variable however, reveals that absolute increases in PTR occurred in rural schools, with the largest increases going to private schools. Whereas public rural schools increased by an average of 7 additional pupils per teacher, the absolute increase for private rural schools was 13 additional pupils.

[29] Appendix table B6 gives the summarized impacts for other school pathway variables.

On the number of inspections carried out at the school in the two years preceding the survey, we find that the frequency significantly declined in public schools only. Absolute declines occurred for both rural and urban public schools however the differential impacts were significant only among rural schools. This finding is quite surprising since it suggests that district authorities deliberately do less monitoring and supervision activities in public schools.

To obtain an objective measure of community involvement in the daily life of the schools, principals were asked to indicate the school activities if any, in which parents were actively involved. Examples of such activities included building and maintaining school facilities, construction and repair of school furniture, extra-curricular activities, provision of school meals, payment of additional teacher salaries, and payment of fees. We categorized these activities into two mutually exclusive categories on the basis of whether the activity involved parents having to make payments to the school. Using the measure for community involvement in non-payment related activities, we find that FPE was associated with significant decreases in this measure for public schools. The decline occurred in both rural and urban public schools driven by both the absolute involvement declines in public schools and the absolute increases in private schools' parental/community involvement measures – especially in private urban schools. This result is well understood when we assess the head teacher's subjective/perceptive ranking of the importance of local community contacts in his routine activities as school principal. On this aspect, FPE was associated with an over 10% point absolute decline in the proportion of rural public school principals who ranked the maintenance of community contacts among their top two priorities. Combining the two impacts – decreased school inspections and decreased parental involvement – in public schools may suggests plausible explanations for the observed teacher effort declines discussed above. Thus, it seems apparent that a major mechanism explaining the pupil test

score declines in Kenya relates to the low teacher effort stemming from the lack of measures aimed at ensuring accountability for pupils' performances at the school level.

Concerning classroom quality, we find that the FPE policy was associated with a 17.9% points reduction in the incidence of open-air schooling in rural public schools in Kenya. However, this impact was mainly driven by the absolute deterioration in classroom quality for private rural schools – the proportion of classes conducted in the open-air increased by 16.6% points in private rural schools. This may indicate the high levels of inefficiency in monitoring new private schools in rural areas. With FPE being associated with public school size growth rates of over 32%, the decline in school supervision and monitoring is considered a major FPE accountability failure that could considerably explain the observed pupil test score declines.

5.6.3 Robustness checks

In the study on Ghanaian middle school students' achievements and school choices by Glewwe and Jacoby (1994), the authors did not find evidence of selection biases originating from the child's innate ability in the school choice problem. The Nishimura and Yamano (2013) study on school choice in rural Kenya identifies the important determinants as those relating to the child's home background variables, specifically wealth and the child's gender.

We undertake three forms of robustness checks. First, we assess the distributional patterns of the home possessions and parents' education variables by school type before and after the introduction of FPE. Figure 5.1 shows two box plots illustrating the pupil-level quartile distributions of home possessions and parents' average education attainment by school type before and after the introduction of FPE in Kenya. Pre-intervention, the median public school grade six pupil came from a household that was a half as well-off as their counterpart in the post-FPE period. This trend is also true for the private school median pupil,

although in the latter case the between period difference is not as pronounced, an indication of some sort of convergence in SES. This uniform gain in wealth effect across school types indicates that it may not after all be unrealistic to compare across years within the same school types. The between school-type comparison is also stable, with the median private school pupil pre-FPE coming from a 40% point wealthier family than their public school counterpart, and the difference is maintained in the post-intervention period. These arguments do not so much as deny the existence of pupil transfers from public to private as they emphasize the fact that pupil transfers did not systematically disadvantage public schools. In fact, Tooley and Dixon (2005) report a net decline in enrolments for about 70% of the private schools serving Kibera, and this is clearly reflected in the net gains by the public schools found in the same area. It is, thus, reasonable to assume that transfers happened across the whole distribution.

Regarding parents' average education attainment, the within school-type comparisons indicate post-intervention declines for both school types. Since the decline is greater for private schools, this complicates the between schools comparison. However, since the average test scores for private school grade six pupils did not decline post-intervention, there must be another reason against which to attribute achievement changes. The between school-type analysis of parents' education shows that the gap greatly narrowed in favor of public schools, which should reflect a gain in test scores for public school pupils. Obviously, our findings contradict this assertion, thereby providing further evidence of the existence of another factor responsible for the observed test score changes.

Second, figure 5.2 shows two box plots illustrating the quartile distributions of home possessions and parents' average education attainment by school location (rural or urban) before and after the introduction of FPE. Within school locations across years, the pre-FPE pupil comes from a home that is less wealthy than the post-FPE pupil by 20 percentage points

for both rural and urban school enrollees. This is quite consistent with the social economic wellbeing findings from the Kenya demographic and health survey reports for 1998, 2003 and 2008. On comparing between school locations within years, the home possessions gap between the median pupils before and after FPE introduction is also stable at 20% points' difference. When we consider parent's average years of schooling, the median pupil attending an urban school is always from a more educated home than the one attending a rural school. However, post-FPE, parent's education declines more in rural schools. This implies that pre-FPE, the biggest proportion of pupils who dropped out of school before grade six in rural schools came from families with less educated parents. This is true for urban schools too, although it was more serious in rural schools.

In table 5.16, therefore, we show the regression estimates of a school choice linear probability model (LPM). In this estimation, the outcome variable is a dummy for private school. We control for school location (Rural), a dummy for the post-intervention period (FPE), all pupil-level variables on which we conditioned our main pupil test scores' estimations and their interactions with the post-intervention period dummy, and we take care of geographical peculiarities at the district level. Consistent with most of the earlier studies that have highlighted the swift emergence of private schooling in the post-FPE era, we find that the probability of attending a private school increased by 27% points after the FPE intervention. This increase was bigger in urban than in rural areas by 4.7% points, and this too is consistent with the fact that people in rural areas mostly enroll their children in public schools. We also get the expected signs on the two most important selection variables - home possessions and parent education - on which we conditioned our test scores main estimations. More wealthy and educated parents were found to be more likely to have their grade six children enrolled in private schools. An interesting finding is that before FPE, parental education was not a significant determinant of private enrolment, and this changed after the

intervention as the more educated parents became significantly more likely to enroll their children in a private school. Though home possessions remained an important determinant of private enrolment, their degree of importance reduced after the introduction of FPE. This provides clear evidence of the "private schools for the poor" phenomenon that has been highlighted by Tooley & Dixon (2005) and Tooley (2007).

In summary, if parents' education attainment and wealth are fairly good indicators of their own ability- and there are good reasons to think that this is true- and if innate ability is genetic, then controlling for these home background variables should go a long way in eliminating the estimation biases arising from lack of an explicit measure of the child's own ability and thereby addressing, to a considerable extent, the possibility of selection biases confounding our main findings. The findings from the robustness checks we have done in this study convince us that our main results may not be subject to confounding arguments arising from concerns of selection bias.

5.7 Implications and conclusions

The FPE policy introduced in Kenya starting in January 2003 outlawed the requirement for payment of school fees before enrolment into a public primary school all over the country. This intervention was mainly geared at ensuring that every Kenyan gets an opportunity to acquire basic education that would provide them with important knowledge and skills to live meaningful and productive lives. Through this study, we have assessed the impacts of this policy on grade six pupils learning achievement in two important child cognitive development areas of literacy and numeracy.

Contrary to the existing literature that has previously emphasized the FPE enrollment benefits mainly for the poor, we find that conditional on reaching grade six, the intervention was associated with declines in learning attainments for both reading and mathematics.

Furthermore, this study's findings contradict the findings by previous studies (Lucas & Mbiti 2012a, 2012b) which did not find significant learning declines in Kenya. By using grade eight KCPE test scores, these studies may have suffered from selection bias concerns that could not allow the true identification of the learning impacts of the FPE policy. Our analysis relied on utilizing the private school as a comparison group and we controlled for the most important child-level, household-level and school-level determinants of learning achievement.

Our analysis of the main pathways to these results showed significant declines in grade six math and reading teacher effort, declines in the regularity of school inspections by the district/provincial authorities and considerable disengagement of the local community/parents in the day-to-day operations of the schools. These effects were worse in mainly rural public schools than in urban schools. Public schools in urban areas were found to have experienced large absolute overcrowding effects, and we hypothesize that this was due to pupils who switched from private to public schools. As a result of this switching pattern in mainly urban areas (especially big towns), teachers in private schools increased their effort in order to provide a differentiated, superior education service and this is reflected through the test score performance improvements in both subjects for pupils enrolled in urban private schools as opposed to the declines in urban public schools.

The implementation framework for the FPE policy in Kenya was mainly characterized by the decentralization of powers from the education ministry headquarters to the school - through the School Management Committee - which was to be supervised by the provincial and district education boards. This structural change coupled with the fact that the parents were no longer required to pay school fees for their children to remain enrolled in the public school may have created a performance incentives gap at the school. Considering the governance inefficiency and high incidences of public sector corruption issues in developing

countries, we suggest that this lack of performance incentives at school level in the post-FPE period was the major reason why pupil test scores declined in Kenya.

In their study of the EDUCO program effects in El Salvador, Jimenez and Sawada (2014) emphasized the importance of the local community's active involvement in management of the school and especially in supervising teacher effort in ensuring the positive enrollment effects that the program generated. Whereas the history of the EDUCO program makes it quite a unique program that may be extremely difficult to replicate in any of the developing countries of SSA, the importance of local accountability that this study emphasizes is quite relevant in our study of UPE polices in SSA. The unique characteristic of the EDUCO schools was that they were owned by the local communities. The introduction of UPE policies in SSA effectively took away the ownership of the schools from the parents/local community to the governments. Yet the governments were not anywhere near as good at demanding for accountability from the school administrators as the parents had done previously. We suggest that a policy that returns some decision making power to the parents would plug the ownership gap and ensure schools are once more accountable to the local community that constitutes the primary beneficiaries of that particular school. This study therefore suggests that interventions such as the use of school vouchers could provide an effective remedy to the existing public school education challenges across many of the SSA countries implementing UPE programs.

Chapter 6

Policy Implications and conclusions

6.1 Introduction

In the past, most studies on basic education outcomes in SSA have focused on school participation and other measures of school quality, but not actual measures of pupils' learning achievements such as test scores from standardized tests. In the recent past, however, the realization that mere enrolment into school was not sufficient for actual learning has led to a new and growing focus on actual learning assessment. This study, an improvement on the few others that have been accomplished before it, constitutes part of this new and growing body of basic education studies in SSA. For both countries in this study – Uganda and Kenya -, we measured the impact of education policy interventions on grade six pupil test scores attained from an internationally administered test for both reading and math proficiency. Furthermore, the dissertation studied the possible mechanisms explaining the achieved test scores and the interventions' impacts across gender and socioeconomic statuses.

The next section briefly explains the study's main findings by highlighting both the cross-country common themes and the country-specific unique themes. Implications for education policy and future research are elaborated in the third section. The fourth section identifies the weak points of our study and the questions that we failed to answer through this research study. Section five concludes.

6.2 Main findings

It is important to note that the two policy interventions that form the main subject of this dissertation were essentially different. Whereas the FPE policy in Kenya marked the introduction of universal primary education, the QEIs intervention in Uganda was in fact a corrective response to the school quality declines that had followed the introduction of

universal primary education. However, since UPE had been introduced much earlier in Uganda, the introduction of FPE in Kenya seems to have benefited from the lessons learned from Uganda's experience. Thus, the FPE policy came along with education sector reforms – some of which were quite similar to the initiatives undertaken in Uganda under the QEIs intervention - that were meant to effectively operationalize it. The first common finding is that post-intervention, grade six pupil test scores declined in both countries. Whereas analyzing the pre-FPE reading test scores' trend makes it easier to attribute the post-intervention declines to FPE in Kenya, the lack of sufficient pre-intervention data makes it more difficult to attribute the observed declines in Uganda to the QEIs intervention. However, since the UPE intervention in Uganda had been associated with high PLE failure rates in 1999 (Deininger, 2003), it seems more reasonable to infer that the pre-QEIs test scores trend was in fact negative. Since the QEIs did not manage to overturn the test scores decline, this turns our QEIs' analysis into a measure of the effectiveness with which the intervention managed to reduce the test scores' decline rate. On this measure, the QEIs had a positive impact on pupil test scores. Whereas the finding that test scores declined in Kenya is consistent with the literature on FPE impacts, the deduction that the QEIs managed to reduce the test scores decline rate in Uganda is, to the best of our knowledge, a novel finding.

A further analysis of pupils' test scores however, reveals that for private schools, the test score trends were quite different in the two countries. Whereas in Kenya the test scores either did not change – reading - or improved – math -, both subjects' test scores declined in Uganda, in fact they declined more than the declines in public schools. We are unable to pinpoint the specific reasons why the private school test score paths – as a response to the introduction of universal primary education – differed between these two countries. However, one possible explanation relates to the observed differing trends in private teacher effort. Whereas grade six teacher effort declined in Uganda, the reverse happened in Kenya.

Concerning intervention impacts across school locations – rural and urban -, we found significant differences in the test score changes for public schools in both countries. The QEIs policy seems to have benefited only urban public schools for whom both reading and math test scores improved greatly while there were no significant changes for public rural schools. Focusing on private schools in Uganda, we found that their absolute test score declines were larger for urban than rural private schools. In Kenya, the main test score declines affected only urban public schools. Whereas urban private schools significantly improved their test score achievements – especially for math – rural private schools' test scores did not significantly change. Similarly on gender effects, we found significant country-level differences. In Uganda, girls in both rural and urban public schools performed comparatively worse than boys, especially in reading – in rural schools – and in both subjects – for urban schools. In private schools however, girls seem to have performed better than boys in both subjects both in rural and urban private schools. Since their differential test score declines were not statistically significant, girls in Kenya's urban public schools seemed to have achieved better performances than boys. In rural public schools however, boys generally performed better than girls. In rural private schools, girls' absolute test score impacts were better than for boys, whereas boys' test score impacts were found to be significantly better in urban private schools.

On the mechanisms explaining the observed test score changes, increased grade repetition for boys in Kenya's urban public schools seems to be an important pathway explaining why their test score performances were so poor. When compared with boys in urban private schools. Since both grade repetition and pupil absenteeism increased in Uganda's public schools, they seem to be important pupil-level variables in explaining the absolute public school test score declines in Uganda. Conversely, both incidences of grade repetition and absenteeism declined in Kenyan public schools. On the measure for basic

scholastic materials, FPE seems to have been associated with declines across all schools whereas the reverse happened in Uganda. It appears as though parents in Kenya interpreted free schooling to mean not just the elimination of school tuition fees but also the provision of all the necessary schooling aids. This could have resulted from parents' perceptions that the extra interventions that were made in certain disadvantaged areas – e.g. urban slums and ASALs – should have been extended to all schools.

The extra time that grade six teachers put into lesson preparation and grading pupils' assignments – our main measure of teacher effort - is the one variable that seems to consistently explain the observed test scores in both countries. Except for rural private schools in Uganda and all private schools in Kenya, teacher effort declined in all public schools and in private urban schools in Uganda. This finding is quite consistent with the literature which has found public primary school teachers in Uganda and Kenya to be among some of the most inefficient and perpetually absent in the world. Concerning teacher absenteeism, this seems to have worsened amongst rural schools in both countries – except for private rural schools in Uganda. Unlike in Kenya though, the teacher absenteeism problem in Uganda represents another variable that consistently explains the observed pupil test scores. Another consistent variable that may have played a contributory role in the observed test score declines in both countries is the frequency of school inspections. This factor has direct connections to teacher effort since it represents the only form of direct supervision that the ministry makes at the school. The number of school inspections that had been conducted in the two years preceding the interventions significantly declined in all public schools in both countries and in private urban schools in Uganda. Also consistent with the reviewed literature, the grade six teacher's subject knowledge – measured by the teacher test score – seems to be of no significant importance in explaining the observed pupil test scores in both countries.

Another critical variable is parental involvement in school operations, which seems to consistently predict pupil test scores for private urban schools in both countries. In fact, parental involvement turns out to be a very consistent predictor of pupil test score performances for both subjects in all schools in Kenya. The larger test score declines in rural public schools are directly matched by the larger declines in the measure for parental involvement in rural public schools in Kenya.

The reviewed literature on the post-FPE school choice decisions in Kenya highlighted the importance of home background factors in the decision to enroll in a private school – relating to the ability to pay the tuition fees and to parents' appreciation of the value of their children's education. Whereas we have not come across post-UPE school choice studies in Uganda, our findings underline that the same home background factors influence the decision in Uganda. However, unlike for Kenya where socioeconomic status became less important for private school enrolment in the post-FPE era – possibly due to the emergence of private schools for the poor -, it appears that household wealth became more important for private school enrolment in Uganda after the QEIs intervention.

6.3 Policy implications, future research

Grade repetition and pupil absenteeism have previously been identified as high risk factors for early drop out and low achievement (Lewin, 2009). It is, therefore, likely that the grade six pupils who have repeated a grade before represent only a fraction of the repeaters, others having already dropped out – primary dropout rates in Uganda are higher in the early grades. A high incidence of grade repetition could be an indicator of teachers' tendencies to teach to the top of the class distribution and to ignore the children who lag behind – a common malaise in many developing country schools. It could also be indicative of late enrolment – overage pupils tend to be poor at acquiring the required subject proficiency levels for graduation and thus end up being held back in the same grades. On the other hand, pupil

absenteeism could, at the basic level, be an indicator of parents' low appreciation of the value of their children's education or that the opportunity cost of attending is high.

Even without delving into these factors in detail, it seems obvious to conclude that an education system that does not hold the teachers to account for the learning achievements of all their pupils will lead to high incidences of grade repetition. Furthermore, late enrolment and frequent pupil absenteeism are occurrences that seem to suggest a community that does not sufficiently value its children's education. Both these two factors seem to have worsened in public schools in Uganda, especially rural schools. This observation is quite consistent with previous literature that has associated the UPE policy in Uganda with resource wastages because of high levels of inefficiency (Nishimura, Yamano and Sasaoka, 2008; Muhanguzi et al., 2012). It is, therefore, recommended that the basic education system in Uganda ought to focus more on increasing efficiency. To achieve this, policies like tracking children according to their learning achievements, holding teachers accountable for pupil learning achievements and increasing parents' involvement in the life of the schools their children attend will likely bear great impact.

That teacher effort seems to be the most consistent variable that predicts pupil test scores in this study is not quite surprising since it is likely to reflect the teacher's actual effectiveness in the classroom and thus the quality of the pupils' learning experience. Since, in both countries, teacher contracts in private schools are determined at the school level, teachers are likely to have an incentive to exert effort. The lack of school level influence over teacher contracts in public schools might make it difficult to ensure teachers exert effort and this is reflected by the finding that grade six public school teachers' effort declined in both countries. It appears, therefore, that in public schools, teachers who want to exert effort get discouraged by the lack of an effort rewarding mechanism. Consistent with Jimenez and Sawada's (2014) findings that the active involvement of the community enhances teacher

effort, our findings in Kenya indicate that this pattern may be at play. In schools where teacher effort either increased or did not decline, parents' involvement in the school increased or did not decline, and the reverse was true. In Uganda, the connection seems to be with the severity of the teacher absenteeism problem in the school. This means that in schools where teacher absenteeism worsened, teacher effort too declined. In a rural community setting, teacher absenteeism and community involvement in the school would be expected to have a strong but negative relationship. Thus, it is recommended that the education policies need to focus on increasing teacher effort. To achieve this may require changing the structure of teacher contracts to reflect reward and sanctions based on observed actual effort exerted. For rural public schools, the most efficient and cost effective approach is likely to be the active involvement of parents in monitoring teacher effort. In our analysis, we found that the parents' involvement variable in Uganda consistently predicted both teacher effort and pupils' test scores performances in urban areas, especially for private urban schools. It is not clear why parents' involvement in private urban schools declined, a direct reversal of the observed trend in Kenya. This observation seems to suggest that wealthy parents in urban areas in Uganda – who can afford private school tuition fees – became more detached from their children's education after the intervention. However, it may also be an indication of the emergence of private schools for the poor who live in urban areas. A study on primary school choice trends in Uganda would go a long way in clarifying several of the findings in this dissertation that relate to private primary schools in Uganda.

Finally, the significant decline in the frequency with which schools were inspected in both countries underscores the lack of accountability at the school and the ineffectiveness of the state structures in ensuring an efficiently performing education system. Since school inspections require financial resources to conduct, inexpensive ways of achieving the

supervision roles that will effectively guarantee the all-important teacher effort ought to be pursued.

6.4 Weaknesses of our study

The main shortcoming of this study relates to the fact we use a school-based dataset. This introduces a selection problem in that we are unable to make a global evaluation of the interventions since we do not have access to children who are not enrolled possibly because they dropped out before grade six or they never enrolled at all. The other disadvantage a school-based dataset has is that we rely on pupil's responses on important variables such as their parents' attained education and their household wealth status. Besides, several other relevant questions cannot be reliably responded to by grade six pupils, thus limiting our ability to address certain issues.

Again relating to constraints imposed by the dataset, our study on the impacts of the QEIs suffers from the lack of sufficient pre-intervention data that would have enabled the establishment of the trends before the QEIs were introduced. This forced us to rely on the common trend assumption that we could not verify and may have biased our estimates. In the case of FPE, we relied on the available pre-intervention data for reading in public schools and assumed that similar trends may have happened for math and in private schools too.

In this study, we were unable to conclusively deal with the decline in test scores for private schools in Uganda. In fact, this made the QEIs analysis quite difficult since our estimation methodology uses the private school as the comparison group for the treated public schools. Given that private schools in Kenya either significantly improved or did not significantly change their test score performances, it appears that there is a unique feature of private schools in Uganda that we do not observe in our analysis. This underscores the need for a definitive study of the features of private schooling in Uganda.

Concerning parents' involvement in school operations, we were unable to decipher the causal direction of the involvement decline. It is possible that after the introduction of universal primary schooling policies, parents were systematically sidelined from active involvement by the school administrators or that parents simply stayed away from schools because they did not have a financial stake since the need to pay tuition fees had been removed. Still it is possible that both arguments are valid. To address this issue effectively would require the linking of our school-based data to relevant household survey datasets.

6.5 Conclusion

This dissertation examined the learning impacts of the QEIs and the FPE interventions in Uganda and Kenya respectively. We used grade six pupils' standardized test scores for reading and mathematics to measure learning attainment. We assessed the channels through which the test scores were affected and delineated the impacts by gender and socioeconomic status. We found that for both subjects, public school test scores declined in both countries. We also found that there were significant gender and location impact differences in both public and private schools in both countries.

Teacher effort declines and the reduction in the frequency of school inspection operations were found to be the two cross-country common pathways that explained the test score declines in both countries. Country-specific pathways that explained the observed test score changes included parental involvement in Kenya; and grade repetition, classroom quality, pupil and teacher absenteeism in Uganda. A critical analysis of all these pathways reveals that they all emphasize the point that mere resource interventions that do not alter the incentives structure or that do not guarantee accountability for performance, are not sufficient to ensure learning attainment.

Finally, this study's main contribution relates to its education outcome measure. Whereas getting children to enroll in school is critically important, it is not sufficient to achieve the critically needed life-improving skills. Since acquired cognitive skills represent a more important determinant of future earnings than mere years of schooling, an increased policy focus on the actual learning taking place in schools is a necessity for many of the developing countries of SSA.

References

Angrist, J. D., & Pischke, J.-S. (2009). *Mostly Harmless Econometrics: An empiricist's companion.* Princeton: Princeton press.

Banerjee, A. V., & Duflo, E. (2005). Growth theory through the lens of development economics. In P. Aghion, & S. N. Durlauf, *Handbook of economic growth* (Vol. 1A, pp. 473-552). Massachusetts: Elsevier B V.

Barrett, A. M. (2005). Teacher accountability in context: Tanzanian primary school teachers' perceptions of local community and education administration. *Compare, 35*(1), 43-61.

Bayer, P., & Timmins, C. (2007). Estimating equilibrium models of sorting across locations. *Economic journal, 117*, 353-374.

Becker, G. S. (1962). Investment in human capital: a theoretical analysis. *Journal of political economy, 70*(5), 9-49.

Bold, T., & Svensson, J. (2013). Policies and institutions for effective service delivery: the need of a miroeconomic and micropolitical approach. *Journal of African economies*, ii16-ii38.

Bold, T., Kimenyi, M. S., & Sandefur, J. (2013). Public and private provision of education in Kenya. *journal of African economies, 22*, ii39-ii56.

Bold, T., Kimenyi, M., Mwabu, G., & Sandefur, J. (2010, December 30). Does abolishing fees reduce school quality? Evidence from Kenya. . *CSAE Working Paper WPS/2011-04*. Oxford, Oxford, UK: Centre for the study of African Economies, University of Oxford.

Byamugisha, A. (2009). Governance for Quality of Primary Education in Uganda; The role of international cooperation. In C. S. Ministry of Education, *Japan Education Forum VI.Collaboration toward Greater Autonomy in Educational Development.* (pp. 82-87). Tokyo.

Caselli, F. (2005). Accounting for cross-country income differences. In P. Aghion, & S. N. Durlauf, *Handbook of economic growth* (Vol. 1A, pp. 679-741). Elsevier B.V.

Chapman, D., Barcikowski, E., Sowah, M., Gyamera, E., & Woode, G. (2002). Do communities know best? Testing a premise of educational decentralization: community members' perceptions of their local schools in Ghana. *International journal of educational development, 22*, 181-189.

Chaudhury, N., Hammer, J., Kremer, M., Muralidharan, K., & Rogers, F. (2006). Missing in Action: Teacher and Health Worker Abscence in Developing Countries. *Journal of Economic Perspectives, 20*(1), 91-116.

Cox, D., & Jimenez, E. (1991). The relative effectiveness of private and public schools. Evidence from two developing countries. *Journal of Development Economics., 34*, 99-121.

Deininger, K. (2003). Does cost of schooling affect enrollment by the poor? Universal primary education in Uganda. *Economics of Education Review, 22*, 291-305.

Duflo, E. (2001). Schooling and labor market consequences of school construction in Indonesia.: evidence from an unusual policy experiment. *The American economic review, 91*(4), 795-813.

Duflo, E., & Hanna, R. (2005). Monitoring works: getting teachers to come to school. NBER working paper 11880. *National bureau of economic research*.

Duflo, E., Dupas, P., & Kremer, m. (2009, May). Additional resources versus organizational changes in education: experimental evidence from Kenya.

Duflo, E., Dupas, P., & Kremer, M. (2011). Peer effects, teacher incentives, and the impact of tracking: evidence from a randomized evaluation in Kenya. *American economic review, 101*, 1739-1774.

Duflo, E., Hanna, R., & Ryan, S. P. (2012). Incentives work: getting teachers to come to school. *American economic review, 102*(4), 1241-1278.

Figlio, D., & Loeb, S. (2011). School Accountability. In *Handbook of the Economics of Education* (pp. 383-421). Stanford: Elsevier.

Glennerster, R., & Takavarasha, K. (2013). *Running randomized evaluations: a practical guide.* Princeton: Princeton university press.

Glewwe, P. (2002). Schools and Skills in Developing Countries: Education Policies and Socioeconomic Outcomes. *Journal of Economic Literature, XL*, 436-482.

Glewwe, P., & Ilias, N. (1996). The determinants of school attainment in Sub-Saharan Africa: A case study of Ghana. *Journal of International Development, 8*(3), 395-413.

Glewwe, P., & Jacoby, H. (1994). Student Achievement and Schooling Choice in Low-Income Countries: Evidence from Ghana. *The Journal of Human Resources, 29*(3), 843-864.

Glewwe, P., & Kremer, M. (2006). Schools, Teachers and Education outcomes in Developing Countries. In E. A. Hanushek, & F. Welch, *Handbook of the Economics of Education* (Vol. 2, pp. 945-1017). Elsevier B.V.

Glewwe, P., Ilias, n., & Kremer, M. (2010). Teacher incentives. *American Economic Journal: Applied Economics, 2*, 205-227.

Glewwe, P., Kremer, M., & Moulin, S. (2009). Many children left behind? Textbooks and test scores in Kenya. *American economic journal: Applied economics*, 112-135.

Government of Kenya, M. o. (2005). *Kenya Education Sector Support Program 2005-2010: Delivering quality equitable education and training to all Kenyans* . Nairobi.

Grogan, L. (2008). Universal Primary Education and School Entry in Uganda. *Journal of African Economies, 18*(2), 183-211.

Halsey, R. F., & Vegas, E. (2009). No More Cutting Class? Reducing Teacher Absence and Providing Incentives for Performance. *The World Bank*, Policy Research Working Paper No. 4847.

Hanushek, E. A. (2006). School Resources. In H. A. Eric, & F. Welch, *Handbook of the Economics of education* (Vol. 2, pp. 865-908). Elsevier B.V.

Hanushek, E. A., & Kimko, D. D. (2000). Schooling, labor-force quality, and the growth of nations. *The American economic review, 90*(5), 1184-1208.

Hanushek, E. A., & Rivkin, S. G. (2006). Teacher quality. In E. A. Hanushek, & F. Welch, *Handbook of the economics of education* (pp. 1051-1078). Elsevier BV.

Hanushek, E. A., & Woesmann, L. (2007). Education Quality and Economic Growth. *The World Bank.*

Hanushek, E. A., & Woessmann, L. (2008). The role of cognitive skills in economic development. *Journal of economic literature, 46*(3), 607-668.

Heckman, J., & Robb, R. J. (1985). Alternative methods for evaluating the impact of interventions. An overview. *Journal of econometrics, 30*, 239-267.

Hoogeveen, J., & Rossi, M. (2013). Enrolment and grade attainment following the introduction of free primary education in Tanzania. *Journal of African economies, 22*(3), 375-393.

Jimenez, E., & Sawada, Y. (2014). Does Community Management Help Keep Children in Schools? Evidence Using Panel Data from El Salvador's EDUCO Program. *Economic Development and Cultural Change, 62*(2), 307-338.

Jones, S., Schipper, Y., Ruto, S., & Rajani, R. (2014). Can your child read and count? Measuring learning outcomes in East Africa. *Journal of African economies*, 1-30.

Kenya national bureau of statistics. (1999). *Kenya demographic and health survey 1998.* Nairobi: central bureau of statistics.

Kenya national bureau of statistics. (2004). *Kenya demographic and health survey 2003.* Nairobi: central bureau of statistics.

Kenya national bureau of statistics. (2010). *Kenya demographic and health survey 2008-09.* Nairobi: central bureau of statistics.

Koretz, D. M. (2002). Limitations in theUse of Achievement Tests as Measures of Educators' Productivity. *The Journal of Human Resources, 37*(4), 752-777.

Kremer, M. (2003). Randomized evaluations of educational programs in developing countries: Some lessons. *Amerian Economic Association papers and proceedings*, 102-106.

Lewin, K. M. (2005). Planning post-primary education: taking targets to task. *International journal of educational development, 25*, 408-422.

Lewin, K. M. (2009, May). Access to Education in Sub-Saharan Africa: Patterns, problems and possibilities. *Comparative Education*, 151-174.

Lewin, K. M. (2011). *Taking targets to task revisited: how indicators of progress on access to education can mislead. Research monograph number 54.* Sussex: University of Sussex.

Lucas, A. M., & Mbiti, I. M. (2012a). Access, Sorting, and Achievement: The Short-Run Effects of Free Primary Education in Kenya. *American Economic Journal: Applied Economics, 4*(4), 226-253.

Lucas, A. M., & Mbiti, I. M. (2012b). Does free primary education narrow gender differences in schooling? Evidence from Kenya. *Journal of African economies, 21*(5), 691-722.

Luiz, J. M. (2009). Institutions and economic performance: Implications for african development. *Journal of international development, 21*, 58-75.

MacLeod, B. W., & Miguel, U. (2009, June). Anti-lemons: School reputation and educational quality. Cambridge, Massachusetts, USA.

Manda, D. K., & Mwakubo, S. (2013). Institutions and service delivery in Africa: An overview. *Journal of African economies*, ii4-ii15.

Miguel, E., & Kremer, M. (2004). Worms: Identifying impacts on education and health in the presence of treatment externalities. *Econometrica, 72*(1), 159-217.

Muhanguzi, E., Lukwago, N. R., Batumbya, P., & Mukiibi, L. (2012). *Commission of inquiry (mismanagement of funds under universal primary education (UPE) and universal secondary education (USE)).* Kampala: MoES.

Nishimura, M., & Yamano, T. (2012). Emerging Private Education in Africa: Determinants of School Choice in Rural Kenya. *World Development, xx*(x), xxx-xxx.

Nishimura, M., & Yamano, T. (2013). Emerging Private Education in Africa: Determinants of School Choice in Rural Kenya. *World Development, 43*, 266-275.

Nishimura, M., Yamano, T., & Sasaoka, Y. (2008). Impacts of the universal primary education policy on educational attainment and private costs in rural Uganda. *International Journal of Educational Development, 28*, 161-175.

Nzomo, J., Kariuki, M., & Guantai, L. (2001). *The Quality of Primary Education in Kenya: some policy suggestions based on a survey of schools.* Paris: UNESCO-IIEP.

Oketch, M., & Ngware, M. (2010). Free primary education still excludes the poorest of the poor in urban Kenya. *Development in practice, 20*, 603-610.

Oketch, M., & Somerset, a. (2010). *Free primary education and after in Kenya: Enrolment impact, quality effects, and the transition to secondary school. Research monograph number 37.* University of Sussex.

Oketch, M., Mutisya, M., Ngware, M., & Ezeh, A. C. (2010). Why are there proportionately more poor pupils enrolled in non-state schools in urban Kenya in spite of FPE policy? *International Journal of Educational Development*, 23-32.

Ravallion, M. (2012). Fighting poverty one experiment at a time: A review of Abhijit Banerjee and Esther Duflo's poor economics: A radical rethinking of the way to fight global poverty. *Journal of economic literature, 50*(1), 103-114.

Reinikka, R., & Svensson, J. (2004). Local Capture: Evidence from a Central Government Transfer Program in Uganda. *The Quarterly Journal of Economics, 119*(2), 679-705.

Rosenzweig, M. R. (2012). Thinking small: a review of poor economics: a radical rethinking of the way to fight global poverty by Abhijit Banerjee and Esther Duflo. *journal of economic literature, 50*(1), 115-127.

Sasaoka, Y., & Mikiko, N. (2010). Does universal primary education policy weaken decentralization? Participation and accountability frameworks in East Africa. *Compare, 40*(1), 79-95.

Somerset, A. (2009). Universalising primary education in Kenya: the elusive goal. *Comparative education, 45*(2), 233-250.

Sports, M. o. (1999). *The Ugandan Experience of Universal Primary Education.* Kampala: Ministry of Education and Sports.

Suzuki, I. (2002). Parental participation and accountability in primary schools in Uganda. *Compare, 32*(2), 243-259.

Tooley, J. (2007). Private schools for the poor: Implications for Commonwealth Ministers of Education. In Commonwealth, *Commonwealth education partnerships 2007.* (pp. 137-140). London: Commonwealth secretariat.

Tooley, J., & Dixon, P. (2005). *Private Education is good for the poor: A study of private schools serving the poor in low-income countries.* Washington, DC: CATO institute.

UNESCO. (2005). *Education for All Global Monitoring Report. The Quality Imperative.* Paris: UNESCO Publishing.

UNESCO. (2014). *Education for All: Global monitoring report 2013-14: Teaching and learning. Achieving quality for all.* Paris: UNESCO.

United Nations. (2012). *The future we want.* United Nations.

United Nations. (2013). *A regional perspective on the post-2015 United Nations development agenda.* United Nations.

Wamala, R., Kizito, O. S., & Jjemba, E. (2013). Academic Achievement of Ugandan Sixth Grade Students: Influence of Parents' Education Levels. *Contemporary Issues in Education Research, 6*(1), 133-142.

Wanyama, M. P., & Koskey, N. J. (2013). Education reforms in Kenya for innovation. *International Journal of Humanities and Social Science, 3*(9), 123-145.

World Bank, G. (2011). *Education Strategy 2020: investing in people's knowledge and skills to promote development.* Washington, DC: World Bank Group.

Tables and figures

Table 3.1: Pupil Test Score Summaries and Mean Differences – Five Countries

Country	Observations		Mean (2000)		2007 - 2000	
	2000	2007	Reading	Math	Reading	Math
Kenya	3299	4436	0.57	0.70	-0.202***	-0.133***
Uganda	2642	5307	-0.12	0.08	-0.195***	-0.375***
Tanzania	2854	4194	0.45	0.22	0.235***	0.268***
Zambia	2611	2895	-0.62	-0.66	-0.128***	-0.1***
Malawi	2333	2781	-0.70	-0.63	-0.066***	0.001

Source: Author's own computations from SACMEQ regional dataset.
*significant at 10%; ** significant at 5%; *** significant at 1%

Uganda's UPE and the QEIs

Table 4.1: Grade Six Pupil Test Score Summaries and Mean Differences

	Test score (reading)		Test score (math)	
	Mean (2000)	2007 - 2000	Mean (2000)	2007 - 2000
Public	-0.166	*-0.216***	0.044	*-0.384***
Private	0.602	*-0.397***	0.641	*-0.585***
Diff.	-0.768	0.181	-0.597	0.201
Rural	-0.216	*-0.251***	0.011	*-0.418***
Urban	0.149	*-0.062***	0.275	*-0.272***
Diff.	-0.365	-0.189	-0.264	-0.146

Source: Author's own computations from SACMEQ Uganda dataset
*significant at 10%; ** significant at 5%; *** significant at 1%

Table 4.2: Descriptive Statistics and Mean Differences – Pupil, Teacher and School Variables

variable	Mean 2000				Diff: 2007 - 2000			
	Public	Private	Rural	Urban	Public	Private	Rural	Urban
Pupil Age (years)	14.2	13.08	14.30	13.66	-0.02	0.32**	0.01	-0.17**
Repeat dummy	0.52	0.51	0.53	0.51	0.03**	-0.16***	0.02	-0.04*
Parent education	5.86	8.72	5.40	7.82	0.60***	0.89**	0.61***	1.18***
Scholastics	2.67	3.08	2.65	2.84	0.15***	0.47***	0.14***	0.38***
Home possessions	0.35	0.47	0.32	0.43	0.00	0.10***	-0.01*	0.09***
Speaks English outside	0.84	0.84	0.84	0.85	0.01	0.04	0.00	0.04**
Takes Extra lessons	0.81	0.78	0.81	0.81	-0.30***	-0.28***	-0.35***	-0.18***
Repeating grade six	0.22	0.12	0.22	0.2	0.07***	0.02	0.09***	0.00
Absent last month	0.66	0.65	0.68	0.62	0.00	-0.05	0.01	-0.04*
Homework help	0.78	0.75	0.76	0.82	-0.07***	0.00	-0.08***	-0.05**
Regular meals	0.63	0.70	0.61	0.69	-0.05***	0.01	-0.04***	-0.03
RTeacher extra hours	19.43	19.56	21.05	14.95	-8.25***	-7.87	-10.10***	-2.89
MTeacher extra hours	17.77	17.14	16.91	19.80	-6.98***	-6.01	-6.17***	-8.68***
Rweekly written test	0.34	0.22	0.37	0.26	-0.03	-0.02	-0.02	-0.08
Mweekly written test	0.22	0.00	0.18	0.28	0.12**	0.41***	0.19***	-0.03
Rweekly load	25.73	22.78	26.30	23.52	-0.67	-0.30	-0.85	-0.64
Mweekly load	21.90	22.57	23.55	17.91	2.24	-1.26	0.87	4.20*
School Amenities	0.36	0.44	0.34	0.45	-0.05***	0.00	-0.06***	0.00
school size	815.3	534.7	755.7	922.8	-35.28	-51.36	-29.94	-113.00
Pupil-Teacher ratio	58.79	39.09	59.54	52.57	-2.09	-5.99	-1.80	-8.95*
Complete classes	0.58	0.68	0.52	0.77	0.14***	0.01	0.16***	0.04
Incomplete classes	0.25	0.32	0.29	0.15	-0.03	-0.04	-0.04	0.01
Open air classes	0.17	0.00	0.20	0.08	-0.11***	0.03*	-0.12***	-0.05**
Teacher test score (read)	-0.28	-0.21	-0.36	-0.05	0.02	-0.08	0.04	-0.08
Teacher test score (math)	0.33	0.80	0.28	0.55	0.05	-0.59**	0.05	-0.10
New reading teacher	0.00	0.00	0.00	0.00	0.73***	0.89***	0.74***	0.79***
New math teacher	0.00	0.00	0.00	0.00	0.75***	1.00	0.78***	0.78***
years trained (read)	4.31	4.33	4.17	4.69	0.33***	-0.26	0.38***	-0.06
years trained (math)	4.37	3.57	4.28	4.46	0.33***	0.19	0.32**	0.15
termly evaluation (read)	0.16	0.143	0.18	0.08	0.09**	-0.01	0.09*	0.06
termly evaluation (math)	0.08	0.250	0.10	0.07	0.20***	-0.07	0.20***	0.13*
School inspections	12.68	11.44	12.07	14.12	-7.65***	-7.99**	-7.61***	-8.12***
Community involvement	12.38	13.67	12.10	13.44	-0.30	-0.22	-0.18	-0.31
Community importance	0.09	0.111	0.09	0.09	0.06*	0.03	0.06*	0.04
Head teacher experience	19.15	15.33	18.38	20.49	1.89**	-2.64	1.81**	-0.58
Permanent teachers' prop.	0.84	0.89	0.83	0.86	0.08***	0.02	0.07***	0.08***
Female teachers' prop.	0.34	0.55	0.30	0.49	0.03*	-0.09	0.03	0.05
Female students' prop.	0.50	0.50	0.50	0.50	0.00	0.02	0.00	0.01
Grade six size	38.42	36.33	38.46	37.88	43.08***	23.36***	33.17***	62.76**
Female grade six prop.	0.47	0.44	0.46	0.49	0.02**	0.08**	0.03**	0.03*

Source: Author's own computations from SACMEQ Uganda dataset.
*significant at 10%; ** significant at 5%; *** significant at 1%

Table 4.3: Impacts of UPE QEIs on Pupil Reading and Math Standardized Test Scores

	Reading			Math		
	(1)	(2)	(3)	(1)	(2)	(3)
Public school	-1.050***	-0.780***	-0.801***	-0.953*	-0.743	-0.777
	(0.259)	(0.220)	(0.228)	(0.562)	(0.530)	(0.532)
2007 dummy	-0.661**	-0.677***	-0.692***	-0.948*	-0.934*	-0.989*
	(0.269)	(0.228)	(0.229)	(0.562)	(0.521)	(0.519)
2007 x Public	0.450*	0.471*	0.459*	0.554	0.556	0.585
	(0.269)	(0.239)	(0.244)	(0.562)	(0.524)	(0.524)
Rural school		-1.001***	0.373		-0.392	1.284***
		(0.361)	(0.357)		(0.406)	(0.389)
Constant	0.846***	1.964***	1.986***	0.985*	1.526***	1.568***
	(0.270)	(0.325)	(0.324)	(0.563)	(0.523)	(0.518)
Other controls	No	Yes	Yes	No	Yes	Yes
District x Rural dummies	No	No	Yes	No	No	Yes
Observations	6,200	6,200	6,200	6,200	6,200	6,200
R-squared	0.075	0.179	0.230	0.068	0.122	0.182

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Pupil's age, gender, meals, home possessions and parental education

Table 4.4: Impacts of UPE QEIs on Pupil Reading and Math Standardized Test Scores – saturated model

	Reading			Math		
	(1)	(2)	(3)	(1)	(2)	(3)
Public school	-1.258***	-1.053***	-1.053***	-1.470**	-1.319*	-1.319*
	(0.219)	(0.292)	(0.293)	(0.658)	(0.698)	(0.700)
2007 dummy	-0.859***	-0.886***	-0.886***	-1.435**	-1.433**	-1.433**
	(0.175)	(0.265)	(0.266)	(0.597)	(0.630)	(0.632)
2007 x Public	0.740***	0.710**	0.710**	1.155*	1.121*	1.121*
	(0.257)	(0.334)	(0.335)	(0.629)	(0.663)	(0.665)
Rural school	-1.201***	-1.635***	-0.237	-1.839***	-1.771***	-0.0728
	(0.184)	(0.350)	(0.404)	(0.608)	(0.596)	(0.602)
2007 x Rural	0.703**	0.611	0.582	1.498**	1.429**	1.324*
	(0.327)	(0.369)	(0.412)	(0.634)	(0.660)	(0.667)
Rural x Public	0.919***	0.719**	0.678	1.679**	1.533**	1.489**
	(0.275)	(0.349)	(0.410)	(0.671)	(0.712)	(0.723)
2007 x Rural x Public	-0.807**	-0.651	-0.663	-1.638**	-1.517**	-1.456**
	(0.399)	(0.436)	(0.478)	(0.683)	(0.709)	(0.721)
Constant	1.261***	2.175***	2.175***	1.619***	1.990***	1.990***
	(0.129)	(0.283)	(0.284)	(0.607)	(0.573)	(0.575)
Other controls	No	Yes	Yes	No	Yes	Yes
District x Rural dummies	No	No	Yes	No	No	Yes
Observations	6,200	6,200	6,200	6,200	6,200	6,200
R-squared	0.124	0.181	0.232	0.099	0.130	0.189

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Pupil's age, gender, meals, home possessions and parental education

Table 4.5: Impacts of UPE QEIs on Pupil Reading and Math Standardized Test Scores – by gender

	Girls		Boys	
	reading	math	reading	math
Public school	-0.718**	-0.900	-1.349***	-1.713***
	(0.355)	(0.767)	(0.248)	(0.610)
2007 dummy	-0.612**	-1.097	-1.122***	-1.721***
	(0.295)	(0.678)	(0.280)	(0.568)
2007 x Public	0.341	0.663	1.040***	1.552***
	(0.397)	(0.733)	(0.310)	(0.578)
Rural school	-2.402***	-2.466***	0.212	0.373
	(0.500)	(0.792)	(0.410)	(0.723)
2007 x Rural	0.727**	1.094	0.566	1.521**
	(0.339)	(0.728)	(0.363)	(0.707)
Rural x Public	0.827**	1.250	0.646**	1.724**
	(0.397)	(0.830)	(0.285)	(0.716)
2007 x Rural x Public	-0.697	-1.081	-0.746*	-1.805**
	(0.448)	(0.784)	(0.409)	(0.748)
Constant	2.461***	2.330***	1.934***	1.673***
	(0.447)	(0.638)	(0.363)	(0.602)
Other controls	Yes	Yes	Yes	Yes
Dist. x Rural dummies	Yes	Yes	Yes	Yes
Observations	3,019	3,019	3,181	3,181
R-squared	0.248	0.188	0.239	0.205

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Pupil's age, meals, home possessions and parental education

Table 4.6: Impacts of UPE QEIs on Pupil Absenteeism, Repetition and Scholastics

	Absent dummy		Repeat dummy		Scholastics	
	(1)	(2)	(1)	(2)	(1)	(2)
Public school	-0.0989	-0.107	-0.0555	-0.0918	-0.142	0.00598
	(0.0880)	(0.108)	(0.0794)	(0.0916)	(0.302)	(0.372)
2007 dummy	-0.0920	-0.0790	-0.179**	-0.171*	0.361	0.420
	(0.102)	(0.116)	(0.0773)	(0.0865)	(0.458)	(0.507)
2007 x Public	0.122	0.131	0.213***	0.235***	-0.276	-0.325
	(0.106)	(0.121)	(0.0778)	(0.0865)	(0.459)	(0.509)
Rural school	-0.249	-0.166	0.294*	0.0408	-0.414	-1.016
	(0.160)	(0.163)	(0.151)	(0.146)	(0.740)	(0.691)
Constant	0.750***	0.745***	-0.213	-0.202	3.502***	3.401***
	(0.150)	(0.159)	(0.146)	(0.150)	(0.778)	(0.833)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
District x Rural dummies	No	Yes	No	Yes	No	Yes
Observations	6,200	6,200	6,200	6,200	6,200	6,200
R-squared	0.023	0.047	0.041	0.078	0.051	0.116

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Pupil's age, meals, home possessions and parental education

Table 4.7: Impacts of UPE QEIs on Pupil Absenteeism, Repetition and Scholastics – saturated model

	Absent dummy		Repeat dummy		Scholastics	
	(1)	(2)	(1)	(2)	(1)	(2)
Public school	-0.139**	-0.139**	-0.0877	-0.0877	-0.519	-0.519
	(0.0668)	(0.0670)	(0.0639)	(0.0641)	(0.384)	(0.385)
2007 dummy	-0.158*	-0.158*	-0.197***	-0.197***	0.0619	0.0619
	(0.0807)	(0.0809)	(0.0694)	(0.0696)	(0.570)	(0.572)
2007 x Public	0.167*	0.167*	0.183***	0.183***	0.0779	0.0779
	(0.0995)	(0.0998)	(0.0671)	(0.0674)	(0.611)	(0.613)
Rural School	-0.396	-0.325	0.171	-0.0476	-1.284	-2.351**
	(0.256)	(0.309)	(0.220)	(0.265)	(0.915)	(0.916)
2007 x Rural	0.182	0.224	0.0654	0.0841	0.866	1.118
	(0.245)	(0.297)	(0.169)	(0.212)	(0.658)	(0.815)
Rural x Public	0.137	0.142	0.122	0.0642	0.987**	1.477**
	(0.205)	(0.269)	(0.171)	(0.226)	(0.405)	(0.610)
2007 x Rural x Public	-0.153	-0.161	-0.00155	0.0256	-0.939	-1.187
	(0.255)	(0.306)	(0.170)	(0.213)	(0.692)	(0.844)
Constant	0.798***	0.798***	-0.180	-0.180	3.794***	3.794***
	(0.150)	(0.150)	(0.138)	(0.139)	(0.790)	(0.793)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
District x Rural dummies	No	Yes	No	Yes	No	Yes
Observations	6,200	6,200	6,200	6,200	6,200	6,200
R-squared	0.023	0.048	0.042	0.079	0.052	0.119

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Pupil's age, gender, meals, home possessions and parental education

Table 4.8: Impacts of UPE QEIs on Pupil Absenteeism, Repetition and Scholastics – by gender

	Girls			Boys		
	Absent	Repeat	scholastics	Absent	Repeat	scholastics
Public school	-0.0998	-0.0407	-0.384	-0.184**	-0.131**	-0.667
	(0.122)	(0.112)	(0.269)	(0.0785)	(0.0641)	(0.543)
2007 Dummy	-0.0701	-0.134	0.503	-0.261**	-0.261***	-0.410
	(0.127)	(0.124)	(0.456)	(0.100)	(0.0758)	(0.676)
2007 x Public	0.115	0.154	-0.245	0.233**	0.209**	0.461
	(0.147)	(0.129)	(0.563)	(0.114)	(0.0891)	(0.710)
Rural school	0.198	0.844***	-2.191*	-0.704***	-0.349	-2.051*
	(0.400)	(0.227)	(1.110)	(0.261)	(0.304)	(1.038)
2007 x Rural	0.0676	-0.163	1.261**	0.349	0.255	1.193
	(0.375)	(0.157)	(0.567)	(0.229)	(0.180)	(0.863)
Rural x Public	0.0193	-0.144	2.081***	0.224	0.189	1.080
	(0.342)	(0.141)	(0.360)	(0.201)	(0.213)	(0.724)
2007 x Rural x Public	-0.0200	0.211	-1.567**	-0.269	-0.0909	-1.078
	(0.381)	(0.172)	(0.658)	(0.242)	(0.184)	(0.894)
Constant	0.390*	-0.448**	3.352***	1.133***	0.0878	4.330***
	(0.224)	(0.195)	(0.969)	(0.145)	(0.172)	(0.856)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
District x Rural dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,019	3,019	3,019	3,181	3,181	3,181
R-squared	0.060	0.093	0.149	0.054	0.084	0.113

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Pupil's age, meals, home possessions and parental education

Table 4.9: Impacts of UPE QEIs on Teacher's Test Score, Effort, and Testing Frequency

	Reading Teacher			Math teacher		
	Test score	Effort	Test	Test score	Effort	Test
Public school	0.0700	-4.619	0.0207	-0.775***	-3.659	0.291***
	(0.393)	(7.541)	(0.197)	(0.204)	(7.495)	(0.0727)
2007 dummy	-0.0691	-10.09	-0.109	-0.665***	-11.12	0.496***
	(0.425)	(8.397)	(0.231)	(0.249)	(6.915)	(0.123)
2007 x Public	-0.0327	4.188	0.0738	1.021***	3.528	-0.472***
	(0.394)	(8.160)	(0.238)	(0.236)	(7.348)	(0.122)
Rural school	-0.206	15.66	0.415*	0.186	-4.168	-0.377***
	(0.328)	(11.27)	(0.229)	(0.284)	(4.804)	(0.0918)
Constant	-0.108	18.23**	0.286	1.261***	23.66***	0.0646
	(0.385)	(7.532)	(0.213)	(0.169)	(6.884)	(0.0674)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
District x Rural dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	333	340	340	333	340	340
R-squared	0.160	0.246	0.185	0.195	0.251	0.125

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Teacher's gender, experience and living condition

Table 4.10: Impacts of UPE QEIs on Teacher's Test Score, Effort and Testing Frequency – saturated model

	Reading teacher			Math teacher		
	Test score	Effort	Test	Test score	Effort	Test
Public school	0.0573	-16.36*	-0.148	-0.713**	-10.94	0.396***
	(0.390)	(9.079)	(0.322)	(0.334)	(11.02)	(0.105)
2007 dummy	-0.106	-18.73*	-0.0711	-0.889**	-20.17**	0.296*
	(0.602)	(9.792)	(0.377)	(0.353)	(8.420)	(0.172)
2007 x Public	-0.153	16.76*	0.0497	0.853**	11.32	-0.501***
	(0.479)	(9.572)	(0.387)	(0.338)	(10.46)	(0.184)
Rural School	-0.297	-8.934	0.0948	0.116	-23.55**	-0.261*
	(0.860)	(14.19)	(0.393)	(0.290)	(9.770)	(0.150)
2007 x Rural	0.00978	23.41**	-0.100	0.309	22.34**	0.311
	(0.896)	(10.42)	(0.394)	(0.480)	(8.988)	(0.246)
Rural x Public	0.0619	26.70***	0.340	-0.0530	19.34*	-0.194
	(0.828)	(9.421)	(0.329)	(0.380)	(11.19)	(0.146)
2007 x Rural x Public	0.200	-28.87***	0.0747	0.249	-20.51*	0.0281
	(0.809)	(10.47)	(0.404)	(0.454)	(11.25)	(0.252)
Constant	-0.0604	28.27***	0.435	1.332***	30.93***	0.0335
	(0.362)	(8.782)	(0.325)	(0.200)	(8.863)	(0.0764)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
District x Rural dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	333	340	340	333	340	340
R-squared	0.162	0.265	0.196	0.202	0.262	0.136

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Teacher's gender, experience and living condition

Table 4.11: Impacts of UPE QEIs on Other School Quality Measures and Community Involvement

	(1) Inspections	(2) Complete classes	(3) Incomplete classes	(4) Open-air classes	(5) PTR	(6) Amenities	(7) Involvement	(8) Absent Never	(9) Absent sometimes	(10) Absent often
Public school	5.555**	-0.0740	-0.0704	0.144***	3.437	-0.00655	-2.336***	-0.0104	0.219	-0.208
	(2.259)	(0.151)	(0.173)	(0.0343)	(8.102)	(0.0922)	(0.545)	(0.220)	(0.292)	(0.310)
2007 dummy	-4.680**	-0.0331	0.00501	0.0281	-16.14**	0.0541	-1.415	0.0184	-0.0834	0.0650
	(1.930)	(0.164)	(0.174)	(0.0267)	(6.594)	(0.0883)	(1.059)	(0.212)	(0.265)	(0.315)
2007 x Public	-3.411	0.137	-0.00658	-0.131***	14.97**	-0.0933	1.313	-0.140	-0.00396	0.144
	(2.094)	(0.172)	(0.180)	(0.0316)	(7.469)	(0.0921)	(1.038)	(0.216)	(0.274)	(0.326)
Rural School	1.335	0.0862	-0.0456	-0.0406	-3.089	-0.0587**	3.449*	-0.109**	-0.280	0.389*
	(2.420)	(0.101)	(0.0607)	(0.0460)	(7.122)	(0.0233)	(1.732)	(0.0479)	(0.192)	(0.208)
Constant	9.474***	0.810***	0.212	-0.0220	48.36***	0.453***	15.25***	0.160	0.424	0.416
	(2.071)	(0.146)	(0.168)	(0.0243)	(7.940)	(0.0895)	(0.562)	(0.215)	(0.286)	(0.307)
District x Rural dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	340	340	340	340	340	340	340	340	340	340
R-squared	0.380	0.233	0.214	0.280	0.332	0.207	0.218	0.127	0.156	0.197

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%

Table 4.12: Impacts of UPE QEIs on Other School Quality Measures and Community Involvement – saturated model

	(1) Inspections	(2) Complete classes	(3) Incomplete classes	(4) Open-air classes	(5) PTR	(6) Amenities	(7) Involvement	(8) Absent Never	(9) Absent sometimes	(10) Absent often
Public school	7.057***	-0.151	0.0631	0.0881**	7.610	0.0316	-2.931***	-0.161	0.391	-0.230
	(2.391)	(0.0911)	(0.0894)	(0.0347)	(13.28)	(0.137)	(0.572)	(0.324)	(0.308)	(0.311)
2007 dummy	-4.854***	-0.0629	0.0411	0.0218	-15.68	0.115	-2.500*	-0.271	0.0417	0.229
	(0.998)	(0.121)	(0.112)	(0.0204)	(10.46)	(0.135)	(1.271)	(0.249)	(0.239)	(0.268)
2007 x Public	-3.974	0.103	-0.0271	-0.0760*	7.834	-0.162	2.223*	0.140	-0.266	0.126
	(2.707)	(0.129)	(0.121)	(0.0383)	(12.30)	(0.141)	(1.240)	(0.280)	(0.261)	(0.293)
Rural School	3.931	-0.187	0.301	-0.113	-1.737	0.0334	1.595	-0.535*	-0.0235	0.559
	(5.490)	(0.350)	(0.391)	(0.0737)	(14.04)	(0.150)	(1.820)	(0.307)	(0.657)	(0.725)
2007 x Rural	0.357	0.0843	-0.103	0.0182	-1.206	-0.156	2.802*	0.744**	-0.324	-0.421
	(4.896)	(0.371)	(0.397)	(0.0614)	(10.95)	(0.144)	(1.610)	(0.328)	(0.582)	(0.754)
Rural x Public	-3.418	0.244	-0.358	0.114	-6.417	-0.0945	1.674**	0.401	-0.358	-0.0423
	(5.450)	(0.345)	(0.394)	(0.0695)	(13.70)	(0.155)	(0.725)	(0.335)	(0.643)	(0.708)
2007 x Rural x Public	0.761	0.00413	0.0850	-0.0892	10.82	0.167	-2.539	-0.727**	0.521	0.206
	(5.409)	(0.385)	(0.411)	(0.0718)	(13.28)	(0.150)	(1.625)	(0.354)	(0.600)	(0.773)
Constant	8.667***	0.909***	0.0909	0.0000	48.27***	0.417***	16***	0.333	0.333	0.333
	(1.287)	(0.0805)	(0.0805)	(9.33e-09)	(12.17)	(0.133)	(0.511)	(0.295)	(0.295)	(0.295)
District x Rural dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	340	340	340	340	340	340	340	340	340	340
R-squared	0.385	0.245	0.232	0.287	0.338	0.210	0.224	0.154	0.163	0.209

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%

Table 4.13: Determinants of Private School Choice – A Linear Probability Model

	(1) Private	(2) Private	(3) Private
2007 dummy	0.108***	0.0825	0.0563
	(0.0196)	(0.0655)	(0.0652)
Rural School	-0.0939***	-0.0734***	-0.112***
	(0.0158)	(0.0143)	(0.0188)
2007 x Rural	-0.0733***	-0.0273	-0.0568***
	(0.0206)	(0.0197)	(0.0193)
Age in years		-0.00841***	-0.00720**
		(0.00295)	(0.00291)
2007 x Age		-0.00678	-0.00277
		(0.00416)	(0.00412)
Girl		-0.00751	-0.0137
		(0.0113)	(0.0111)
2007 x Girl		0.0113	0.0150
		(0.0142)	(0.0141)
Home Possessions		0.104***	0.115***
		(0.0318)	(0.0312)
2007 x Possessions		0.135***	0.0946**
		(0.0409)	(0.0398)
Parental Education		0.00315***	0.00398***
		(0.00106)	(0.00107)
2007 x Parent Educ.		0.00109	-2.55e-05
		(0.00159)	(0.00157)
Regular Meals		-0.0146	-0.0132
		(0.0114)	(0.0113)
2007 x Reg. Meals		0.0340**	0.0311**
		(0.0141)	(0.0141)
Constant	0.119***	0.184***	0.158***
	(0.0151)	(0.0467)	(0.0464)
District x Rural dummies	No	No	Yes
Observations	5,955	5,955	5,955
R-squared	0.060	0.115	0.170

Notes: Robust standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%

FPE in Kenya

Table 5.1: Kenya Education Statistics Before and After FPE Introduction

	2002 percent	2003 percent
Gross Enrolment Rate	91.6	106.9
Net Enrolment Rate	61.8	74.2
Pupil-Teacher Ratio	34.4	38.0
Girls share	48.4	48.5
Net Enrolment for Girls	62.1	74.2
Net Enrolment for Boys	61.6	74.2

Source: World development indicators, 2014

Table 5.2: Years of Exposure to FPE for the 2000 and 2007 Grade Six Cohorts

Grade six Cohort	Years of Exposure							
	Non-repeater		Repeated once		Repeated twice		Repeated thrice	
	Pre-FPE	*FPE*	*Pre-FPE*	*FPE*	*Pre-FPE*	*FPE*	*Pre-FPE*	*FPE*
2000	6 yrs since 1995	0 yrs	7 yrs since 1994	0 yrs	8 yrs since 1993	0 yrs	9 yrs since 1992	0 yrs
2007	1 yrs since 2002	5 yrs	2 yrs since 2001	5 yrs	3 yrs since 2000	5 yrs	4 yrs since 1999	5 yrs

Souce: Author's own computations from Kenya's SACMEQ 2 and 3 datasets

Table 5.3: Grade Six Pupil Test Score Summaries and Mean Differences

	Test score (reading)				Test score (Math)	
	Mean (1998)	2000-1998	Mean (2000)	2007-2000	Mean (2000)	2007-2000
Public	0.43	0.04*	0.47	-0.22***	0.60	-0.19***
Private			1.07	0.02	1.13	0.18*
Diff.			-0.62	-0.22	-0.53	-0.36
Rural	0.27	0.09***	0.36	-0.22***	0.56	-0.18***
Urban	0.65	0.01	0.67	-0.04	0.74	-0.02
Diff.	-0.38	0.09	-0.30	-0.22	-0.18	-0.18

Source: Author's own computations from Kenya's SACMEQ 1, 2 and 3 datasets
*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table 5.4: Descriptive Statistics and Mean Differences – Pupil, Teacher and School Variables

Variable	mean 1998			Diff: 2000-1998			Private	Diff: 2007-2000			
	Public	Rural	Urban	Public	Rural	Urban	(mean 2000)	Public	Private	Rural	Urban
Pupil Age (years)	13.75	14.07	13.31	0.07	-0.09*	0.24***	12.93	-0.03	0.02	-0.16***	0.01
Repeat dummy	0.62	0.69	0.52	-0.02*	-0.03*	-0.03	0.48	-0.11***	-0.15***	-0.17***	-0.09***
Parent education	8.16	7.38	9.23	0.07	0.62***	-0.62***	10.61	-1.68***	-2.33***	-1.50***	-1.61***
Scholastics	3.49	3.42	3.58	-0.17***	-0.13**	-0.23***	4.08	-0.79***	-1.09***	-0.79***	-0.77***
Home Possessions	0.38	0.29	0.48	-0.09***	-0.03***	-0.16***	0.64	0.21***	0.00	0.17***	0.26***
Teacher extra hours	10.39	11.11	9.77	8.11***	7.45***	8.65***	20.56	-6.31***	-6.61	-6.66***	-5.47***
Weekly written test	0.57	0.65	0.49	0.14***	0.06	0.19***	0.67	-0.39***	-0.29	-0.39***	-0.37***
Weekly load	35.02	36.57	33.69	4.58***	3.91***	4.69***	39.33	-3.92***	-8.86***	-4.96***	-3.77**
School Amenities	0.43	0.36	0.53	0.00	0.03*	-0.04	0.51	0.01	0.03	0.01	0.05
School Size	564.60	452.9	713	-27.10	20.14	-75.42	426.6	48.30	4.31	47.58	85.46
Pupil-Teacher ratio	32.72	33.67	31.46	1.54	0.89	2.37	26.07	10.14***	1.56	9.59***	7.42***
Complete classes	0.80	0.72	0.92	0.05*	0.09**	0.00	0.96	-0.03	-0.19**	-0.03	-0.04
Incomplete classes	0.18	0.25	0.07	-0.05*	-0.09**	0.00	0.03	0.03	0.21**	0.04	0.04

Source: Author's own computations from Kenya's SACMEQ 1, 2 and 3 datasets. *** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table 5.5: Descriptive Statistics and Mean Differences – Pupil, Teacher and School Variables

Variable	mean 2000				Diff: 2007-2000			
	Public	Private	Rural	Urban	Public	Private	Rural	Urban
Speaks English outside	0.88	0.95	0.86	0.91	0.03***	-0.01	0.03***	0.04***
Takes Extra lessons	0.86	0.74	0.87	0.83	-0.18***	-0.04	-0.20***	-0.13***
Repeating grade six	0.16	0.10	0.19	0.11	-0.02***	-0.01	-0.05***	-0.01
Absent last month	0.47	-0.00	0.48	0.42	-0.18***	0.25***	-0.16***	-0.19***
Homework help	0.87	0.89	0.83	0.91	-0.04***	-0.07**	-0.02**	-0.05***
Regular meals	0.85	0.93	0.82	0.88	-0.04***	-0.16***	-0.01	-0.09***
Teacher test-score (read)	0.69	0.81	0.69	0.69	-0.07	0.03	-0.12	0.04
Teacher test-score (math)	1.47	2.04	1.57	1.41	-0.48***	-0.89*	-0.54***	-0.43***
New reading teacher	0.13	0.56	0.19	0.09	0.17***	0.13	0.15**	0.23***
New math teacher	0.19	0.22	0.22	0.17	0.03	0.15	0.03	0.06
years trained (read)	2.05	2.11	2.08	2.03	0.04	-0.59	-0.19*	0.26**
years trained (math)	2.09	1.88	2.15	1.99	0.00	-0.61	-0.10	-0.04
termly evaluation (read)	0.18	0.22	0.18	0.19	0.04	0.04	0.04	0.05
termly evaluation (math)	0.16	0.13	0.16	0.17	0.11**	-0.01	0.09*	0.08
School inspections	15	9.38	14.32	15.33	-9.88***	-2.43	-9.42***	-9.33***
Community involvement	15.72	13.13	16.01	15.09	-4.12***	-1.23	-4.51***	-3.23***
Community importance	0.18	0.11	0.19	0.16	-0.12***	-0.11	-0.14***	-0.12**
Head teacher experience	20.32	17.50	19.61	20.96	1.15*	-2.66	0.59	0.95
Permanent teachers' prop.	0.95	0.85	0.95	0.93	-0.07***	-0.25	-0.10***	-0.08**
Female teachers' prop.	0.47	0.40	0.38	0.57	0.00	0.09	0.01	0.04
Female students' prop.	0.47	0.52	0.48	0.45	0.01	-0.06	-0.00	0.03
Grade six size	67.32	58.25	53.54	84.32	4.88	60.91	-1.08	35.29**
Female grade six prop.	0.49	0.47	0.49	0.48	-0.00	-0.03	-0.00	-0.01

Source: Author's own computations from Kenya's SACMEQ 2 and 3 datasets.
*** 1% level of significance; ** 5% level of significance; * 10% level of significance.

Table 5.6: Impacts of FPE on Pupil Reading and Math Standardized Test Scores

	Reading			Math		
	(1)	(2)	(3)	(1)	(2)	(3)
Public school	-0.623**	-0.206	-0.177	-0.526**	-0.250	-0.216
	(0.260)	(0.154)	(0.183)	(0.213)	(0.153)	(0.173)
2007 dummy	0.0204	0.0499	0.105	0.175	0.194	0.262
	(0.309)	(0.192)	(0.213)	(0.254)	(0.199)	(0.213)
2007 x Public	-0.241	-0.350*	-0.415**	-0.362	-0.424**	-0.510**
	(0.308)	(0.183)	(0.204)	(0.253)	(0.191)	(0.206)
Rural school		0.258	-0.0297		0.411	-0.00542
		(0.513)	(0.593)		(0.474)	(0.545)
Constant	1.074***	1.832***	1.794***	1.125***	1.621***	1.575***
	(0.267)	(0.555)	(0.573)	(0.219)	(0.513)	(0.525)
Other controls	No	Yes	Yes	No	Yes	Yes
District x Rural dummies	No	No	Yes	No	No	Yes
Observations	5,958	5,958	5,958	5,958	5,958	5,958
R-squared	0.071	0.207	0.291	0.078	0.163	0.233

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Pupil's age, gender, meals, home possessions and parental education

Table 5.7: Impacts of FPE on Pupil Reading and Math Standardized Test Scores – saturated model

	Reading			Math		
	(1)	(2)	(3)	(1)	(2)	(3)
Public school	-0.421	-0.102	-0.102	-0.406	-0.183	-0.183
	(0.336)	(0.187)	(0.188)	(0.273)	(0.184)	(0.185)
2007 dummy	0.232	0.202	0.202	0.401	0.384*	0.384*
	(0.410)	(0.217)	(0.218)	(0.312)	(0.229)	(0.230)
2007 x Public	-0.369	-0.492**	-0.492**	-0.550*	-0.606***	-0.606***
	(0.417)	(0.195)	(0.195)	(0.308)	(0.199)	(0.200)
Rural School	0.0818	0.616	1.553**	0.0731	0.711	1.644**
	(0.490)	(0.650)	(0.689)	(0.414)	(0.617)	(0.626)
2007 x Rural	-0.571	-0.452	-0.492	-0.609	-0.536	-0.514
	(0.610)	(0.387)	(0.496)	(0.503)	(0.403)	(0.474)
Rural x Public	-0.367	-0.337	-0.440	-0.230	-0.231	-0.261
	(0.470)	(0.282)	(0.403)	(0.397)	(0.302)	(0.377)
2007 x Rural x Public	0.479	0.439	0.463	0.569	0.522	0.470
	(0.608)	(0.372)	(0.488)	(0.498)	(0.385)	(0.468)
Constant	1.047***	1.715***	1.715***	1.102***	1.513***	1.513***
	(0.357)	(0.573)	(0.576)	(0.289)	(0.527)	(0.529)
Other controls	No	Yes	Yes	No	Yes	Yes
District x Rural dummies	No	No	Yes	No	No	Yes
Observations	5,958	5,958	5,958	5,958	5,958	5,958
R-squared	0.105	0.208	0.292	0.094	0.166	0.234

Notes: Clustered standard errors in parenthesis
*** 1% level of significance; ** 5% level of significance; * 10% level of significance.
Other controls: Pupil's age, gender, meals, home possessions and parental education

Table 5.8: Impacts of FPE on Pupil Reading and Math Standardized Test Scores – by gender

	Girls		Boys	
	reading	math	reading	math
Public school	-0.113	-0.190	-0.119	-0.202
	(0.235)	(0.203)	(0.146)	(0.180)
2007 dummy	-0.0485	0.170	0.359*	0.522**
	(0.275)	(0.240)	(0.182)	(0.243)
2007 x Public	-0.304	-0.394	-0.588***	-0.739***
	(0.275)	(0.241)	(0.163)	(0.227)
Rural school	1.614**	1.631**	1.680***	1.800***
	(0.794)	(0.646)	(0.593)	(0.633)
2007 x Rural	0.0795	-0.0420	-1.050***	-0.915**
	(0.603)	(0.530)	(0.337)	(0.406)
Rural x Public	-0.253	-0.146	-0.760***	-0.458*
	(0.497)	(0.442)	(0.198)	(0.254)
2007 x Rural x Public	-0.0815	-0.00454	0.994***	0.878**
	(0.606)	(0.534)	(0.337)	(0.413)
Constant	1.740***	1.312**	1.693***	1.510***
	(0.635)	(0.502)	(0.528)	(0.564)
Other controls	Yes	Yes	Yes	Yes
Dist. x Rural dummies	Yes	Yes	Yes	Yes
Observations	2,910	2,910	3,048	3,048
R-squared	0.347	0.265	0.280	0.218

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Pupil's age, meals, home possessions and parental education

Table 5.9: Impacts of FPE on Pupil Absenteeism, Repetition and Scholastics

	Absent dummy		Repeat dummy		Scholastics	
	(1)	(2)	(1)	(2)	(1)	(2)
Public school	0.397***	0.380***	0.00167	-0.00631	-0.488***	-0.459***
	(0.0310)	(0.0483)	(0.0668)	(0.0863)	(0.178)	(0.161)
2007 dummy	0.229***	0.196***	-0.166**	-0.160*	-0.937***	-0.948***
	(0.0296)	(0.0533)	(0.0743)	(0.0947)	(0.275)	(0.280)
2007 x Public	-0.386***	-0.375***	0.0408	0.0461	0.0781	0.0693
	(0.0381)	(0.0571)	(0.0765)	(0.0954)	(0.268)	(0.274)
Rural school	-0.181	-0.277	0.171	0.211	-0.158	-0.862**
	(0.193)	(0.195)	(0.198)	(0.213)	(0.317)	(0.339)
Constant	0.0151	0.0340	-0.781***	-0.777***	3.822***	3.806***
	(0.161)	(0.169)	(0.164)	(0.172)	(0.307)	(0.293)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
District x Rural dummies	No	Yes	No	Yes	No	Yes
Observations	5,079	5,079	5,958	5,958	5,958	5,958
R-squared	0.059	0.081	0.098	0.127	0.248	0.307

Notes: Clustered standard errors in parenthesis
*** 1% level of significance; ** 5% level of significance; * 10% level of significance
Other controls: Pupil's age, gender, meals, home possessions and parental education

Table 5.10: Impacts of FPE on Pupil Absenteeism, Repetition and Scholastics – saturated model

	Absent dummy		Repeat dummy		Scholastics	
	(1)	(2)	(1)	(2)	(1)	(2)
Public school	0.416***	0.416***	-0.0279	-0.0279	-0.271	-0.271
	(0.0364)	(0.0366)	(0.0826)	(0.0830)	(0.163)	(0.164)
2007 dummy	0.230***	0.230***	-0.177*	-0.177*	-0.817**	-0.817**
	(0.0305)	(0.0306)	(0.0906)	(0.0910)	(0.360)	(0.361)
2007 x Public	-0.412***	-0.412***	0.111	0.111	-0.170	-0.170
	(0.0457)	(0.0460)	(0.0975)	(0.0980)	(0.336)	(0.338)
Rural School	-0.146	-0.243	0.143	0.321	0.328	-0.0889
	(0.203)	(0.193)	(0.227)	(0.343)	(0.500)	(0.350)
2007 x Rural	-0.0162	-0.233	0.0387	0.0641	-0.414	-0.733
	(0.0637)	(0.178)	(0.152)	(0.314)	(0.560)	(0.446)
Rural x Public	-0.0472	-0.237	0.0466	0.0326	-0.572	-0.798***
	(0.0656)	(0.151)	(0.144)	(0.306)	(0.421)	(0.233)
2007 x Rural x Public	0.0543	0.239	-0.127	-0.142	0.608	0.911**
	(0.0806)	(0.174)	(0.158)	(0.315)	(0.546)	(0.429)
Constant	-0.00118	-0.00118	-0.753***	-0.753***	3.632***	3.632***
	(0.160)	(0.161)	(0.173)	(0.174)	(0.277)	(0.278)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
District x Rural dummies	No	Yes	No	Yes	No	Yes
Observations	5,079	5,079	5,958	5,958	5,958	5,958
R-squared	0.059	0.081	0.099	0.128	0.251	0.310

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Pupil's age, gender, meals, home possessions and parental education

Table 5.11: Impacts of FPE on Pupil Absenteeism, Repetition and Scholastics – by gender

	Girls			Boys		
	Absent	Repeat	scholastics	Absent	Repeat	scholastics
Public school	0.370***	0.0323	-0.224	0.459***	-0.0717	-0.327**
	(0.0493)	(0.0845)	(0.260)	(0.0374)	(0.102)	(0.153)
2007 Dummy	0.247***	0.000550	-0.797*	0.220***	-0.309***	-0.839**
	(0.0574)	(0.113)	(0.432)	(0.0263)	(0.104)	(0.361)
2007 x Public	-0.376***	-0.0826	-0.154	-0.450***	0.257**	-0.168
	(0.0657)	(0.118)	(0.419)	(0.0429)	(0.110)	(0.335)
Rural school	-0.209	0.232	0.300	0.0585	0.372	-0.502
	(0.210)	(0.451)	(0.504)	(0.323)	(0.299)	(0.412)
2007 x Rural	-0.333*	-0.0947	-1.023*	-0.119	0.138	-0.342
	(0.191)	(0.391)	(0.563)	(0.184)	(0.222)	(0.403)
Rural x Public	-0.258	0.0202	-0.941**	-0.195	0.000664	-0.621***
	(0.171)	(0.381)	(0.363)	(0.147)	(0.210)	(0.170)
2007 x Rural x Public	0.302	0.00652	1.123**	0.165	-0.204	0.595
	(0.193)	(0.394)	(0.554)	(0.179)	(0.224)	(0.389)
Constant	-0.0980	-0.869***	3.503***	0.0640	-0.658***	3.765***
	(0.175)	(0.238)	(0.369)	(0.230)	(0.226)	(0.361)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
District x Rural dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,506	2,910	2,910	2,573	3,048	3,048
R-squared	0.101	0.149	0.343	0.092	0.140	0.301

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Pupil's age, meals, home possessions and parental education

Table 5.12: Impacts of FPE on Teacher's Test Score, Effort, and Testing Frequency

	Reading Teacher			Math teacher		
	Test score	Effort	Test	Test score	Effort	Test
Public school	-0.493	8.300**	0.0519	-0.747***	9.389***	-0.0101
	(0.381)	(3.764)	(0.322)	(0.148)	(3.549)	(0.261)
2007 dummy	-0.236	5.436	-0.346	-0.913***	5.932*	0.224
	(0.584)	(4.067)	(0.329)	(0.297)	(3.411)	(0.300)
2007 x Public	0.272	-12.10***	-0.125	0.357	-13.80***	-0.295
	(0.591)	(4.450)	(0.337)	(0.322)	(4.218)	(0.310)
Rural school	-1.464***	3.635	-0.765**	-1.258***	7.152	-0.599*
	(0.530)	(5.309)	(0.364)	(0.358)	(5.082)	(0.320)
Constant	1.213**	14.76***	0.518	2.017***	8.780*	0.514*
	(0.531)	(5.005)	(0.342)	(0.314)	(4.840)	(0.286)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
District x Rural dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	298	298	298	298	298	298
R-squared	0.186	0.287	0.404	0.246	0.333	0.305

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Teacher's gender, experience and living condition

Table 5.13: Impacts of FPE on Teacher's Test Score, Effort and Testing Frequency – saturated model

	Reading teacher			Math teacher		
	Test score	Effort	Test	Test score	Effort	Test
Public school	-0.798*	7.657*	0.258	-0.769***	10.44**	0.244**
	(0.412)	(4.081)	(0.312)	(0.144)	(4.811)	(0.108)
2007 dummy	-0.291	7.987*	-0.0526	-1.122***	7.217*	0.489**
	(0.689)	(4.575)	(0.332)	(0.126)	(4.064)	(0.211)
2007 x Public	0.449	-12.42**	-0.373	0.566**	-14.61***	-0.537**
	(0.719)	(4.845)	(0.339)	(0.230)	(5.448)	(0.226)
Rural School	-1.921***	1.230	-0.565	-1.297***	8.329	-0.312
	(0.598)	(5.929)	(0.365)	(0.453)	(6.698)	(0.197)
2007 x Rural	0.163	-9.251	-1.046***	0.857	-4.624	-0.943***
	(0.745)	(6.782)	(0.376)	(1.117)	(6.732)	(0.287)
Rural x Public	0.935**	0.266	-0.760**	0.121	-4.077	-0.907***
	(0.461)	(6.040)	(0.348)	(0.339)	(6.006)	(0.157)
2007 x Rural x Public	-0.412	4.832	0.961**	-0.855	3.765	0.904***
	(0.785)	(8.094)	(0.384)	(1.121)	(8.608)	(0.311)
Constant	1.525***	15.43***	0.310	2.035***	7.666	0.254*
	(0.558)	(4.757)	(0.331)	(0.330)	(5.814)	(0.149)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
District x Rural dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	298	298	298	298	298	298
R-squared	0.195	0.294	0.411	0.250	0.333	0.313

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Teacher's gender, experience and living condition

Table 5.14: Impacts of FPE on Other School Quality Measures and Community Involvement

	(1) Inspections	(2) Complete classes	(3) Incomplete classes	(4) Open-air classes	(5) PTR	(6) Amenities	(7) Involvement	(8) Absent Never	(9) Absent sometimes	(10) Absent often
Public school	9.210***	-0.115	0.0868	0.0286	18.45***	-0.303***	4.679***	-0.667***	0.628***	0.0392
	(3.082)	(0.192)	(0.146)	(0.0620)	(3.809)	(0.0880)	(0.467)	(0.116)	(0.135)	(0.0287)
2007 dummy	-3.451	-0.275	0.255	0.0197	8.322	-0.114	1.715*	-0.280	0.283	-0.00248
	(3.060)	(0.245)	(0.210)	(0.0593)	(5.086)	(0.107)	(1.003)	(0.220)	(0.236)	(0.0225)
2007 x Public	-6.232**	0.252	-0.225	-0.0264	0.739	0.133	-5.479***	0.159	-0.183	0.0241
	(2.790)	(0.237)	(0.202)	(0.0643)	(5.340)	(0.116)	(0.953)	(0.243)	(0.258)	(0.0402)
Rural School	4.752*	-0.0463	0.0282	0.0181	34.03***	-0.420***	6.181***	-1.109***	1.129***	-0.0200
	(2.800)	(0.196)	(0.150)	(0.0594)	(3.649)	(0.0853)	(0.428)	(0.108)	(0.128)	(0.0216)
Constant	7.248**	1.046***	-0.0282	-0.0181	15.47***	0.795***	10.82***	1.109***	-0.129	0.0200
	(2.800)	(0.196)	(0.150)	(0.0594)	(3.649)	(0.0853)	(0.428)	(0.108)	(0.128)	(0.0216)
District x Rural dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	298	298	298	298	298	298	298	298	298	298
R-squared	0.404	0.350	0.317	0.273	0.410	0.342	0.576	0.298	0.277	0.144

Notes: Clustered standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%

Table 5.15: Impacts of FPE on Other School Quality Measures and Community Involvement

	(1) Inspections	(2) Complete classes	(3) Incomplete classes	(4) Open-air classes	(5) PTR	(6) Amenities	(7) Involvement	(8) Absent Never	(9) Absent sometimes	(10) Absent often
Public school	9.179**	0.0763	-0.0446	-0.0317	15.13***	-0.265**	4.799***	-0.567***	0.522***	0.0448
	(4.308)	(0.0728)	(0.102)	(0.0311)	(3.983)	(0.112)	(0.510)	(0.0585)	(0.0611)	(0.0287)
2007 dummy	-4.143	-0.0734	0.112	-0.0385	6.234	-0.0536	2.214*	-0.286	0.286	0.000
	(4.172)	(0.183)	(0.195)	(0.0306)	(5.549)	(0.131)	(1.306)	(0.205)	(0.205)	(0.000)
2007 x Public	-4.724	0.0678	-0.106	0.0384	4.734	0.0893	-5.513***	0.207	-0.266	0.0594
	(3.648)	(0.183)	(0.200)	(0.0317)	(5.864)	(0.154)	(1.120)	(0.250)	(0.241)	(0.0577)
Rural School	5.000	0.150**	-0.111	-0.0385	31.58***	-0.375***	6.500***	-1.000	1.000	0.000
	(3.978)	(0.0578)	(0.0884)	(0.0306)	(3.832)	(0.0995)	(0.398)	(0.000)	(0.000)	(0.000)
2007 x Rural	2.932	-0.710**	0.506	0.204***	6.924	-0.223*	-1.898	0.0862	-0.0852	-0.00106
	(4.606)	(0.330)	(0.337)	(0.0306)	(9.225)	(0.133)	(1.347)	(0.224)	(0.224)	(0.00371)
Rural x Public	-0.241	-0.674***	0.469***	0.205***	10.32**	-0.143	-0.705	-0.356***	0.395***	-0.0390
	(4.367)	(0.0772)	(0.106)	(0.0319)	(4.079)	(0.112)	(0.569)	(0.0712)	(0.0729)	(0.0349)
2007 x Rural x Public	-4.441	0.678**	-0.461	-0.217***	-10.57	0.190	1.010	-0.162	0.232	-0.0698
	(4.283)	(0.333)	(0.344)	(0.0341)	(9.677)	(0.157)	(1.256)	(0.278)	(0.271)	(0.0681)
Constant	7.000*	0.850***	0.111	0.0385	17.92***	0.750***	10.50***	1.000	-0.000	0.000
	(3.978)	(0.0578)	(0.0884)	(0.0306)	(3.832)	(0.0995)	(0.398)	(0.295)	(0.000)	(0.000)
District x Rural dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	298	298	298	298	298	298	298	298	298	298
R-squared	0.406	0.365	0.326	0.292	0.415	0.347	0.582	0.306	0.290	0.149

Notes: Clustered standard errors in parenthesis

*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table 5.16: Determinants of Private School Choice – A Linear Probability Model

	(1) Private	(2) Private	(3) Private
2007 dummy	0.0713***	0.242***	0.274***
	(0.0148)	(0.0639)	(0.0640)
Rural School	-0.0723***	-0.0297***	-0.0357**
	(0.0112)	(0.0107)	(0.0155)
2007 x Rural	-0.0485***	-0.0529***	-0.0468***
	(0.0162)	(0.0163)	(0.0154)
Age in years		-0.00863***	-0.00549*
		(0.00299)	(0.00298)
2007 x Age		-0.00713*	-0.00799**
		(0.00399)	(0.00392)
Girl		-0.00982	-0.00162
		(0.00926)	(0.00896)
2007 x Girl		-0.00570	-0.00842
		(0.0134)	(0.0128)
Home Possessions		0.467***	0.442***
		(0.0403)	(0.0374)
2007 x Possessions		-0.315***	-0.314***
		(0.0462)	(0.0429)
Parental Education		0.000851	0.000644
		(0.00110)	(0.00111)
2007 x Parent Educ.		0.00377**	0.00414**
		(0.00178)	(0.00177)
Regular Meals		-0.00358	0.00588
		(0.0109)	(0.0111)
2007 x Reg. Meals		-0.0341**	-0.0535***
		(0.0163)	(0.0162)
Constant	0.105***	0.0559	0.0121
	(0.0101)	(0.0468)	(0.0473)
District x Rural dummies	No	No	Yes
Observations	5,958	5,958	5,958
R-squared	0.036	0.109	0.222

Notes: Robust standard errors in parenthesis
*significant at 10%; ** significant at 5%; *** significant at 1%

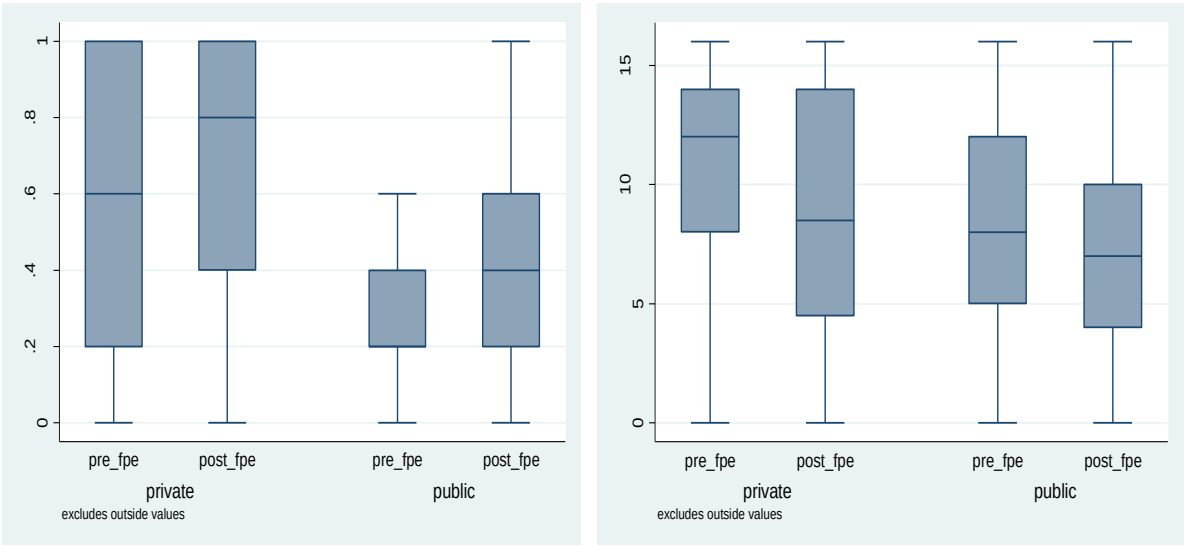

***Figure 5.1*: Pupil-level home possessions and parents education distributions by school type**

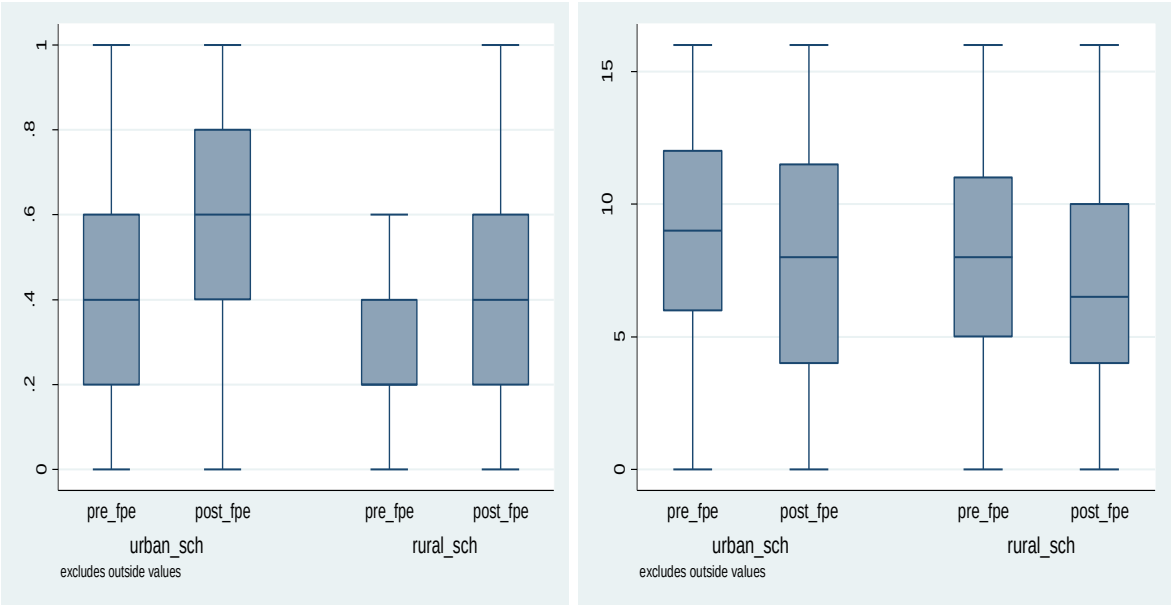

***Figure5.2:* Pupil-level home possessions and parents education distributions by school location**

Appendix A: Summarized Impacts for the QEIs intervention in Uganda

Table A1: Impacts on Pupils' test scores

	Details	Hypothesis test	Reading	Math
(a)	Public Rural	$\beta_Q + \beta_{QP}+\beta_{QR}+\beta_{QRP}$	-0.257**	-0.444***
(b)	Public Urban	$\beta_Q + \beta_{QP}$	-0.176	-0.312**
(c)	(a) Vs. (b)	$\beta_{QR} + \beta_{QRP}$	-0.081	-0.132
(d)	Private Rural	$\beta_Q + \beta_{QR}$	-0.304	-0.109
(e)	Private Urban	β_Q	-0.886***	-1.433**
(f)	(d) Vs. (e)	β_{QR}	0.582	1.324*
(g)	(a) Vs. (d)	$\beta_{QP} + \beta_{QRP}$	0.047	-0.335
(h)	(b) Vs. (e)	β_{QP}	0.710**	1.121*

*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table A2: Impacts on Pupils' test scores by gender

			Girls		Boys	
	Details	Hypothesis test	Reading	Math	Reading	Math
(a)	Public Rural	$\beta_Q + \beta_{QP}+\beta_{QR}+\beta_{QRP}$	-0.241**	-0.421***	-0.262**	-0.453***
(b)	Public Urban	$\beta_Q + \beta_{QP}$	-0.271	-0.434**	-0.082	-0.169*
(c)	(a) Vs. (b)	$\beta_{QR} + \beta_{QRP}$	0.030	0.013	-0.180	-0.284
(d)	Private Rural	$\beta_Q + \beta_{QR}$	0.115	-0.003	-0.556**	-0.200
(e)	Private Urban	β_Q	-0.612**	-1.097	-1.122***	-1.721***
(f)	(d) Vs. (e)	β_{QR}	0.727**	1.094	0.566	1.521**
(g)	(a) Vs. (d)	$\beta_{QP} + \beta_{QRP}$	-0.356*	-0.418	0.294	-0.253
(h)	(b) Vs. (e)	β_{QP}	0.341	0.663	1.040***	1.552***

*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table A3: Impacts on Pupils' absenteeism, grade repetition and scholastics measure

	Details	Hypothesis test	Absent	Repeat	Scholastics
(a)	Public Rural	$\beta_Q + \beta_{QP}+\beta_{QR}+\beta_{QRP}$	0.072*	0.096**	0.071
(b)	Public Urban	$\beta_Q + \beta_{QP}$	0.009	-0.014	0.140
(c)	(a) Vs. (b)	$\beta_{QR} + \beta_{QRP}$	0.063	0.110**	-0.069
(d)	Private Rural	$\beta_Q + \beta_{QR}$	0.066	-0.113	1.180**
(e)	Private Urban	β_Q	-0.158*	-0.197***	0.062
(f)	(d) Vs. (e)	β_{QR}	0.224	0.084	1.118
(g)	(a) Vs. (d)	$\beta_{QP} + \beta_{QRP}$	0.006	0.209	-1.109*
(h)	(b) Vs. (e)	β_{QP}	0.167*	0.183***	0.078

*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table A4: Impacts on Pupils' absenteeism, repetition and scholastics measure by gender

	Details	Hypothesis test	Girls			Boys		
			Absent	Repeat	Scholas.	Absent	Repeat	Scholas.
(a)	Public Rural	$\beta_Q + \beta_{QP}+\beta_{QR}+\beta_{QRP}$	0.093*	0.068	-0.048	0.052	0.112***	0.166
(b)	Public Urban	$\beta_Q + \beta_{QP}$	0.045	0.020	0.258	-0.028	-0.052	0.051
(c)	(a) Vs. (b)	$\beta_{QR} + \beta_{QRP}$	0.048	0.048	-0.306	0.080	0.164**	0.115
(d)	Private Rural	$\beta_Q + \beta_{QR}$	-0.003	-0.297***	1.764***	0.088	-0.006	0.783
(e)	Private Urban	β_Q	-0.070	-0.134	0.503	-0.261**	-0.261***	-0.410
(f)	(d) Vs. (e)	β_{QR}	0.068	-0.163	1.261**	0.349	0.255	1.193
(g)	(a) Vs. (d)	$\beta_{QP} + \beta_{QRP}$	0.095	0.365***	-1.812***	-0.036	0.118	-0.617
(h)	(b) Vs. (e)	β_{QP}	0.115	0.154	-0.245	0.233**	0.209**	0.461

*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table A5: Impacts on Grade six teacher variables

	Details	Hypothesis test	Reading teacher			Math teacher		
			Score	Effort	Test freq.	Score	Effort	Test freq.
(a)	Public Rural	$\beta_Q + \beta_{QP}+\beta_{QR}+\beta_{QRP}$	-0.049	-7.2***	-0.042	0.521**	-7.05***	0.134
(b)	Public Urban	$\beta_Q + \beta_{QP}$	-0.259	-1.97	-0.021	-0.036	-8.85**	-0.205
(c)	(a) Vs. (b)	$\beta_{QR} + \beta_{QRP}$	0.210	-5.23	-0.021	0.557	1.80	0.339*
(d)	Private Rural	$\beta_Q + \beta_{QR}$	-0.096	4.68	-0.171	-0.583*	2.14	0.607***
(e)	Private Urban	β_Q	-0.106	-18.73*	-0.071	-0.889**	-20.17**	0.296*
(f)	(d) Vs. (e)	β_{QR}	0.010	23.41**	-0.100	0.306	22.31**	0.311
(g)	(a) Vs. (d)	$\beta_{QP} + \beta_{QRP}$	0.047	-11.88***	0.129	1.104***	-9.19**	-0.473***
(h)	(b) Vs. (e)	β_{QP}	-0.153	16.76*	0.050	0.853**	11.32	-0.501***

*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table A6: Impacts on other school level variables

	Details	Hypothesis test	Impacts					
			Inspection	Open-air classes	Involve	PTR	Never	Often
(a)	Public Rural	$\beta_Q + \beta_{QP}+\beta_{QR}+\beta_{QRP}$	-7.763***	-0.125***	-0.056	1.937	-0.114**	0.145*
(b)	Public Urban	$\beta_Q + \beta_{QP}$	-8.828***	-0.054*	-0.277	-7.846	-0.131	0.355***
(c)	(a) Vs. (b)	$\beta_{QR} + \beta_{QRP}$	1.065	-0.072	0.221	9.783	0.017	-0.21
(d)	Private Rural	$\beta_Q + \beta_{QR}$	-4.497	0.04	0.302	-16.887***	0.473**	-0.192
(e)	Private Urban	β_Q	-4.854***	0.022	-2.500*	-15.680	-0.271	0.229
(f)	(d) Vs. (e)	β_{QR}	0.357	0.018	2.802*	-1.207	0.744**	-0.421
(g)	(a) Vs. (d)	$\beta_{QP} + \beta_{QRP}$	-3.266	-0.166***	-0.358	18.824***	-0.587***	0.337
(h)	(b) Vs. (e)	β_{QP}	-3.974	-0.076*	2.223*	7.834	0.140	0.126

*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Appendix B: Summarized impacts for the FPE intervention in Kenya

Table B1: Impacts on Pupils' test scores

	Details	Hypothesis test	Reading	Math
(a)	Public Rural	$\beta_F + \beta_{FP} + \beta_{FR} + \beta_{FRP}$	-0.319***	-0.266***
(b)	Public Urban	$\beta_F + \beta_{FP}$	-0.290***	-0.222**
(c)	(a) Vs. (b)	$\beta_{FR} + \beta_{FRP}$	-0.029	-0.044
(d)	Private Rural	$\beta_F + \beta_{FR}$	-0.290	-0.130
(e)	Private Urban	β_F	0.202	0.384*
(f)	(d) Vs. (e)	β_{FR}	-0.492	-0.514
(g)	(a) Vs. (d)	$\beta_{FP} + \beta_{FRP}$	-0.029	-0.135
(h)	(b) Vs. (e)	β_{FP}	-0.492**	-0.606***

*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table B2: Impacts on Pupils' test scores by gender

			Girls		Boys	
	Details	Hypothesis test	Reading	Math	Reading	Math
(a)	Public Rural	$\beta_F + \beta_{FP} + \beta_{FR} + \beta_{FRP}$	-0.355***	-0.271***	-0.285***	-0.254***
(b)	Public Urban	$\beta_F + \beta_{FP}$	-0.353***	-0.224**	-0.229**	-0.217
(c)	(a) Vs. (b)	$\beta_{FR} + \beta_{FRP}$	-0.002	-0.047	-0.056	-0.037
(d)	Private Rural	$\beta_F + \beta_{FR}$	0.031	0.128	-0.691**	-0.393
(e)	Private Urban	β_F	-0.049	0.17	0.359*	0.522**
(f)	(d) Vs. (e)	β_{FR}	0.08	-0.042	-1.050***	-0.915**
(g)	(a) Vs. (d)	$\beta_{FP} + \beta_{FRP}$	-0.386	-0.399	0.406	0.139
(h)	(b) Vs. (e)	β_{FP}	-0.304	-0.394	-0.588***	-0.739***

*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table B3: Impacts on Pupils' absenteeism, grade repetition and scholastics measure

	Details	Hypothesis test	Absent	Repeat	Scholastics
(a)	Public Rural	$\beta_F + \beta_{FP} + \beta_{FR} + \beta_{FRP}$	-0.176***	-0.144***	-0.809***
(b)	Public Urban	$\beta_F + \beta_{FP}$	-0.182***	-0.066	-0.987***
(c)	(a) Vs. (b)	$\beta_{FR} + \beta_{FRP}$	0.006	-0.078	0.178
(d)	Private Rural	$\beta_F + \beta_{FR}$	-0.003	-0.113	-1.550***
(e)	Private Urban	β_F	0.230***	-0.177*	-0.817**
(f)	(d) Vs. (e)	β_{FR}	-0.233	0.064	-0.733
(g)	(a) Vs. (d)	$\beta_{FP} + \beta_{FRP}$	-0.173	-0.031	0.741***
(h)	(b) Vs. (e)	β_{FP}	-0.412***	0.111	-0.170

*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table B4: Impacts on Pupils' absenteeism, repetition and scholastics measure by gender

	Details	Hypothesis test	Girls			Boys		
			Absent	Repeat	Scholas.	Absent	Repeat	Scholas.
(a)	Public Rural	$\beta_F + \beta_{FP}+\beta_{FR}+\beta_{FRP}$	-0.160***	-0.170***	-0.851***	-0.184***	-0.118***	-0.754***
(b)	Public Urban	$\beta_F + \beta_{FP}$	-0.129**	-0.082*	-0.951***	-0.230***	-0.052	-1.007***
(c)	(a) Vs. (b)	$\beta_{FR} + \beta_{FRP}$	-0.031	-0.088	0.1	0.046	-0.066	0.253*
(d)	Private Rural	$\beta_F + \beta_{FR}$	-0.086	-0.094	-1.820***	0.101	-0.171	-1.181***
(e)	Private Urban	β_F	0.247***	0.001	-0.797*	0.220***	-0.309***	-0.839**
(f)	(d) Vs. (e)	β_{FR}	-0.333*	-0.095	-1.023*	-0.119	0.138	-0.342
(g)	(a) Vs. (d)	$\beta_{FP} + \beta_{FRP}$	-0.074	-0.076	0.969***	-0.285	0.053	0.427**
(h)	(b) Vs. (e)	β_{FP}	-0.376***	-0.083	-0.154	-0.450***	0.257**	-0.168

*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table B5: Impacts on Grade six teacher variables

	Details	Hypothesis test	Reading teacher			Math teacher		
			Score	Effort	Test freq.	Score	Effort	Test freq.
(a)	Public Rural	$\beta_F + \beta_{FP}+\beta_{FR}+\beta_{FRP}$	-0.091	-8.852**	-0.511***	-0.554***	-8.252***	-0.087
(b)	Public Urban	$\beta_F + \beta_{FP}$	0.158	-4.433	-0.426***	-0.566***	-7.393***	-0.048
(c)	(a) Vs. (b)	$\beta_{FR} + \beta_{FRP}$	-0.249	-4.419	-0.085	0.002	-0.859	-0.039
(d)	Private Rural	$\beta_F + \beta_{FR}$	-0.128	-1.264	-1.098***	-0.265	2.593	-0.454**
(e)	Private Urban	β_F	-0.291	7.987*	-0.053	-1.122***	7.217*	0.489**
(f)	(d) Vs. (e)	β_{FR}	0.163	-9.251	-1.046***	0.857	-4.624	-0.943***
(g)	(a) Vs. (d)	$\beta_{FP} + \beta_{FRP}$	0.037	-7.588	0.588***	-0.289	-10.845	0.367*
(h)	(b) Vs. (e)	β_{FP}	0.449	-12.42**	-0.373	0.566**	-14.61***	-0.537**

*** 1% level of significance; ** 5% level of significance; * 10% level of significance

Table B6: Impacts on other school level variables

	Details	Hypothesis test	Impacts					
			Inspection	Open-air classes	Involve	PTR	Never	Often
(a)	Public Rural	$\beta_F + \beta_{FP}+\beta_{FR}+\beta_{FRP}$	-10.376***	-0.013	-4.187***	7.322***	-0.155*	0.167**
(b)	Public Urban	$\beta_F + \beta_{FP}$	-8.867***	-0.000	-3.299***	10.968***	-0.079	0.020
(c)	(a) Vs. (b)	$\beta_{FR} + \beta_{FRP}$	-1.509	-0.013	-0.888	-3.646	-0.076	0.147
(d)	Private Rural	$\beta_F + \beta_{FR}$	-1.211	0.166***	0.316	13.158*	-0.199**	0.201**
(e)	Private Urban	β_F	-4.143	-0.039	2.214*	6.234	-0.286	0.286
(f)	(d) Vs. (e)	β_{FR}	2.932	0.204***	-1.898	6.924	0.086	-0.085
(g)	(a) Vs. (d)	$\beta_{FP} + \beta_{FRP}$	-9.165***	-0.179***	-4.503***	-5.836	0.045	-0.034
(h)	(b) Vs. (e)	β_{FP}	-4.724	0.038	-5.513***	4.734	0.207	-0.266

*** 1% level of significance; ** 5% level of significance; * 10% level of significance