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Poverty and Social Impact Analysis

Universal Primary Education in Uganda: Equity in opportunities and human capital investment

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Abstract

This paper assesses the effectiveness and progressivity of Uganda's Universal Primary Education program since it was first introduced in 1997, by examining factors driving primary school attendance, grade delay and drop out trends for children between the ages of 6 and 12 over the past two decades. Our findings reveal that primary school attendance has been progressive over time and, in recent years, pro-poor, in the sense that the poorest people have been its major beneficiaries. However, both demand and supply-side factors affecting the provision and use of primary education still stand in the way of achieving optimal and equitable participation from UPE. Our analysis also suggests that policies targeting the poor as well as the poorer parts of the country could yield considerable additional benefits, in terms of greater progressiveness and pro-poorness of the UPE policy.

Key words: Universal Primary Education; Uganda; Poverty and Social Impact analysis.
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I. Introduction

The links between education and development have long been established in the literature, both from a theoretical and an empirical perspective. This link is particularly strong when it comes to basic primary education, with ample evidence indicating that investing in primary education increases labor productivity and that economic returns to such investments are typically high. Improving educational outcomes at this level has also been shown to reduce fertility, improve health and nutrition, and promote other behavioral and attitudinal changes which are positively associated with individual wellbeing, human development and, more generally, socioeconomic development.[1] It follows that national policy and investment strategies that prioritize primary schooling can be an important driver of inclusive growth and socioeconomic development.

With the approval of its Universal Primary Education (UPE) policy in 1997, Uganda placed itself at the forefront of international efforts to extend primary education in developing countries. One of the major justifications for financing free primary education is that it disproportionately benefits children from poor households and, therefore, plays a critical role in efforts to eradicate poverty and ensuring an equitable distribution of the returns of public investment and, more generally, economic growth. Whether in practice this has been the case, however, still needs validation. It is against this background, that this study aims to ascertain the degree to which Uganda's UPE program is pro-poor; investigate the key non-welfare factors responsible for children dropping out of primary school, assess whether the implementation of UPE has significantly impacted on children's participation in primary education, and establish the differential impact that welfare and non-welfare factors have had on school attendance.

The rest of the paper is structured as follows. Section 2 presents a brief discussion of the theoretical and applied literature examining the links between education and development. Section 3 presents an overview of Uganda's Universal Primary Education program. Section 4 discusses a number of methodological considerations, regarding data and statistical estimation methods, that underpin our analysis and which are critical to fully understand the assessment made of the UPE policy and the key findings of our analysis. Section 5 presents the main results derived from the analysis of primary education outcomes conducted for this study, and discusses these results in the context of the government's UPE program. Finally, section 6 concludes with a summary of the main findings, and presents a number of relevant policy recommendations.

II. Education and development: theory and evidence

Education has long been recognized by educational specialists as playing a critical role in child and personal development, and a fundamental element for both individual and community well-being. Primary education, in particular, is considered as important as it usually takes place during children's formative years, when child development goes through its most crucial stages of cognitive and social learning and the acquisition of basic life skills. In this regard, primary education has been linked to a number of desirable individual and societal outcomes, such as improved child and maternal health, lower HIV/AIDS incidence levels, improved reproductive health and lower fertility rates, improved nutritional status, greater income equity and lower poverty incidence, as well as increased competitiveness, productivity and personal earnings (World Bank, 2007).

[1] See Colclough (1982) for a comprehensive review of this literature, up to the early 1980s.

The theoretical literature on education and economic performance largely draws from the seminal work by Jacob Mincer (1958), Theodore Schultz (1961) and Gary Becker (1962), in which human capital emerges as a key factor of production, alongside physical capital and distinctive from physical labor. Also from the more recent endogenous growth literature examining how human capital and knowledge spillovers affect economic growth (Lucas, 1988; Tamura, 1991; Romer, 1993). From this perspective, human capital or, more broadly, knowledge, can be defined as the stock of knowledge, skills and competencies a given person holds, and is the result of the combination of individual biological attributes and learning processes, such as formal education, training, or learning-by-doing, among others. Human capital and knowledge present 'public good' traits, being, to a certain extent, non-excludable and non-rival assets. As a result of these traits, in an endogenous growth setting, knowledge and human capital typically present increasing returns to factor accumulation, leading to economies of scale in production. Ultimately, it is improvements in human capital, knowledge, and technology that drive output production and the sole source of long-run, sustainable economic growth. These very same traits of non-rivalry and non-excludability mean that, left to their own, private agents under-invest in the provision of human capital and knowledge, as they cannot appropriate the full benefits of their investments. The existence of these market failures opens the door for public interventions that optimize the provision of goods, such as education, associated with knowledge and human capital accumulation, and which therefore maximize production, social welfare and long-term economic growth.

Education is also central to other important analytical paradigms in the field of development, including the capabilities and human development approaches (see Sen, 1988 and UNDP, 1990). As a conceptual paradigm that puts people at the center of development, human development analysis is concerned with building human capabilities and enlarging people's freedoms and choices, as a way of enabling them to develop their full potential and lead productive, creative lives in accordance with their needs, beliefs and interests. Critical, among these, are the choices to have a long and healthy life, to obtain an education, to have a decent standard of living, and be able to enjoy political freedoms, human rights and self-respect. Under this conceptual framework, education plays a critical role in enabling people to build and enhance their capabilities and, therefore, broaden the life choices open to them. From this angle, education is a key ingredient to greater human development. Yet this relationship cannot be viewed only from a narrow utilitarian prism, where education is only a means to an end: human development. Education, under this framework, is a desired human development outcome in itself, a choice and freedom that people may aspire to realize in a variety of ways. In other words, education is intrinsic to human development.

In practice, there is a wide spectrum of both public and private returns to education that justify the investment of public funds in education. This is especially the case in the context of poverty reduction efforts in developing countries, where broad-based quality education is widely considered as one of the most powerful instruments known to reduce poverty and inequality (World Bank, 2007). In such contexts, the benefits to individuals include, among others, improved health and nutritional status; increased productivity and earnings as well as reduced inequality. Primary education, in particular, can act as a catalyst for those most likely to be poor, including girls, ethnic minorities, orphans, disabled persons, and rural families, by expanding their livelihoods and income generation choices.[2] More generally, some of the commonly known educational returns include enhanced competitiveness, synergetic poverty-reduction effects; democratization, promotion of peace and stability as well as greater concern for the environment. Moreover, girl child education has been associated with reductions in women's

[2] See Psacharopoulos and Patrinos (2004) for a comprehensive review of the empirical literature on returns to education. According to these authors, the available evidence indicates that the social returns to education tend to be higher in primary education than in any other level of schooling, and are particularly high for countries in the African continent.

fertility rate,[3] lower infant and child mortality rates,[4] lower maternal mortality rates, protection against HIV/AIDS infection, more inclusion in the labor force participation,[5] and reduced inter-generational poverty among others.

Despite the overwhelming evidence of the benefits that primary education holds over a wide range of welfare indicators, and the importance that educational attainment has in the context of development, households in many developing countries still face high direct and indirect education costs, from school fees to scholastic materials, or school uniforms, which often act as an important deterrent for the most needy including the poor, to invest in their education and that of their children.[6] It is this type of poverty trap that lies at the base of most public interventions in the area of primary education in developing countries and which have motivated programs such as the Uganda Universal Primary Education (UPE) policy examined in this paper.

III. Uganda's Universal Primary Education (UPE) policy

3.1. Background and genesis of the Universal Primary Education policy

Government involvement in the provision of formal education in Uganda dates back to the late colonial period.[7] During the early stages of the British colonial rule, formal education was entirely managed by Christian missionaries and only had a limited geographical and social reach. The publication in 1922 of the '*Education in Africa*' report by the Phelps-Stokes Fund, which highlighted the benefits of education for Africa's social and economic development and criticized the neglect that education had received by the British colonial authorities, led to a shift in colonial attitudes towards education in British Africa, paving the way for greater involvement of the public sector in the provision of education. In the wake of the recommendations of the Phelps-Stoke Fund report, the first education commission in Uganda, the De Bunsen Committee, was appointed in 1952. The commission recommended an expansion of secondary education, in order to provide teachers for primary and junior secondary school, the expansion of school facilities, both primary and secondary, especially for girls, and the creation of of new primary schools. In 1961, shortly before Uganda's independence, the Castle Commission was established to examine the educational system in the country and make recommendations on the future of education in post-colonial Uganda. The Commission's report, delivered in 1964, placed particular emphasis on enhancing the quality of education in Uganda, as well as on the urgency of developing the required manpower in Uganda to have a national cadre of managers that could run Uganda's post-independence public and private sector, which most analysis believe lead to an over-emphasis on post-primary education during the first two decades after independence. During this period, several attempts were made to institute a system of free primary education, for instance in the third five-year Development Plan (1972-1976) and the Education Policy Review of 1977. However, these efforts failed to be implemented, mainly due to the deteriorated political situation that characterized the 1970s and early 1980s.

Soon after the fall of the second Obote Regime in 1986, the NRM government instituted a series of commissions to investigate the situation in all areas of government. One such commission was the Education Policy Review Commission (EPRC), which was appointed in 1987 to appraise the

[3] See Bbaale and Mpuga (2011) for an analysis of the links between education and fertility for the case of Uganda.

[4] See, for instance, Ssewanyana and Younger (2007) and Bbale (2011) for an analysis of the impact of education on infant mortality and child health in Uganda, respectively.

[5] See, for instance, Bridges and Lawson (2009) for evidence of the impact of education on labor force participation in Uganda.

[6] See Barham *et al* (1995) for a theoretical presentation of poverty traps driven by barriers to education.

[7] See Tyler (1969) for an in-depth analysis of education policies in East Africa during the colonial period.

entire Ugandan education system and recommend strategies and measures to improve education. Among others, the commission recommended that Universal Primary Education be implemented as a national policy at the earliest possible date. Following the publication of the EPRC report in 1989, the government appointed a White Paper Committee which produced the Government Education White Paper of 1992. Based on the recommendations of the EPRC of 1989, the subsequent relevant stipulations of the Education White Paper of 1992, the enactment of the children's Statute in 1996, as well as on his provisions established in the 1995 Constitution, which establishes education as a fundamental human right and specifies that each child is entitled to basic education, the Universal Primary Education (UPE) policy and program was launched in 1997.

At its onset, in 1997, the Government of Uganda set the following key objectives for the Universal Primary Education (UPE) policy: (a) making basic education accessible to the learners and relevant to their needs as well as meeting national goals; (b) making education equitable in order to eliminate disparities and inequalities; (c) establishing, providing and maintaining quality education as the basis for promoting the necessary human resource development; (d) and ensuring that education is affordable to the majority of Ugandans by providing the facilities and resources that will enable every child to enter and remain in school until they complete the primary school education cycle (MoES, 1999:10). During its initial phases, the UPE policy was only partially implemented as an education program of universal coverage, with government only committing to cover the payment tuition fees for a maximum of four children per family and up to a certain amount, the provision of instructional materials, the construction of basic education facilities, and to pay teachers' salaries training needs. However, in 2003 the UPE policy was amended to cater for all children of school-going age. The implementation of UPE took place alongside the liberalization of the education sector, which enabled private schools and non-profit schools run by religious organizations, NGOs and communities to operate. Implementation of UPE also coincided with a move towards greater decentralization of public service delivery, under efforts to empower and enable district authorities to formulate, approve, and execute their own development plans, including issues relating to education. Accordingly, under the Local Government Act of 1997, nursery, primary schools, special schools and technical schools all fall under the administration and management of District Councils. Registration of UPE children, distribution of textbooks and monthly remittances for schools from central government are all channeled through district administration offices.

3.2. Impact of the UPE program

Since the launch of the UPE program in 1997 there has been a surge in primary school enrollment numbers in Uganda. Part of this increase could be attributed to the fact that the country's population growth rate has remained relatively high, as well as to sustained improvements in the living standards experienced since the mid 1980s. Nevertheless, most Ugandan analysts agree that UPE has been a critical driver in increasing school attendance rates since the late 1990s. Table 1 presents a trend in the Uganda's performance of selected education indicators with particular focus on the pre- and post-UPE periods.

Table 1: Uganda's Key Education indicators for the reference period, 1986-2010

Indicator description	Closest Pre-UPE year		Nearest Post-UPE year		Furthest Post-UPE year	
Literacy rate, adult female (% females aged 15 and older)	44.8	*(1991)*	58.9	*(2002)*	64.6	*(2010)*
Literacy rate, adult male (%males ages 15 and older)	68.2	*(1991)*	78.3	*(2002)*	82.6	*(2010)*
Literacy rate, adult total (% people ages 15 and older)	56.1	*(1991)*	68.1	*(2002)*	73.2	*(2010)*
Primary completion rate, female (% relevant age group	28.0	*(1986)*	53.1	*(2001)*	56.5	*(2010)*

Primary completion rate, male (% relevant age group)	46.4	*(1986)*	66.6	*(2001)*	57.9	*(2010)*
Primary completion rate, total (% relevant age group)	37.3	*(1986)*	59.8	*(2001)*	57.2	*(2010)*
Primary education, pupils (millions)	3.1	*(1996)*	6.3	*(1999)*	8.4	*(2010)*
Public spending on education, total (% of GDP)	3.4	*(1985)*	2.5	*(2000)*	3.2	*(2009)*
Public spending on education, total (% of gov't. expend.)	12.3	*(1983)*	18.3	*(2004)*	15.0	*(2009)*
Pupil-teacher ratio, primary	35.2	*(1995)*	58.5	*(1998)*	48.6	*(2010)*
Ratio of female to male primary enrollment (%)	87.1	*(1996)*	90.7	*(1998)*	101.4	*(2010)*
School enrollment, primary (% gross)	68.7	*(1996)*	121.0	*(1998)*	121.1	*(2010)*
School enrollment, primary (% net)	56.0	*(1986)*	94.1	*(2009)*	90.9	*(2010)*
School enrollment, primary, female (% gross)	64.0	*(1996)*	115.0	*(1998)*	122.0	*(2010)*
School enrollment, primary, female (% net)	52.7	*(1986)*	95.2	*(2009)*	92.1	*(2010)*
School enrollment, primary, male (% gross)	73.4	*(1996)*	126.9	*(1998)*	120.3	*(2010)*
School enrollment, primary, male (% net)	59.3	*(1986)*	93.0	*(2009)*	89.6	*(2010)*

Source: *World Development Indicators, 2012 (online version as viewed on 19 March 2012)*

When assessing the impact of the UPE program, three key aspects are commonly referred to as far as changes in educational outcomes are concerned: enrollment rates, completion rates and education quality. With regard to the first of these outcomes, primary enrollment rates in Uganda increased from 3.1 million in 1997 to about 6.3 million in 1999 and 8.4 million as of 2010 (MoES 2010). This increase is generally attributed to the backlog of school age children who had not been accessing school, and additional children who had reached school age but could not afford education prior to UPE. In this regard, Deininger (2003) argues that, although educational facilities had been widely available before UPE was introduced, the program led to a dramatic increase in enrollment, implying that the direct and indirect costs of schooling constituted a significant obstacle to a wider spread primary school attendance especially by the poor. This appears to be especially true for girls whose enrollment rates increased significantly, in some cases more than doubling, after the introduction of UPE.

Despite progress made in the area of education since the introduction of UPE free primary education in 1997, Uganda's UPE program has been associated with very high drop-out and low completion rates. Thus, as of 2009, the survival and completion rates to grade seven stood at only 28 and 52 percent respectively (MoES, 2010). Part of the reasons given for high drop-out rates is the implicit indirect costs of education that have persisted at relatively high levels despite the official abolition of schools fees. Nishimura *et al's* (2008) study on the impact of UPE on educational attainment in rural Uganda seems to confirm this point, finding that as many as 55 percent of primary school drop-outs in Uganda in the period under study left school due to the cost of schooling. Among the several factors that cause dropping out of primary school, a study conducted by Nakanyike *et al* (2003) revealed, lack of school requirements, loss of parents as well as parents' inability to provide children with school and other requirements as the three major causes. In addition, children's or parent's indifference to education and sickness and calamity have consistently emerged as reasons for dropping out of school (UBOS, 2006, 2011). However, the Ugandan authorities seem to have taken note of the gravity of the situation in this area, with one of the main objectives of Uganda's Poverty Reduction Strategies Papers of the past decade being the reduction of drop-out rates and increase of completion rates (Jjukko and Kabonesa, 2007).

Finally, with regard to the quality of education, the implementation of UPE has been linked to a poor learning environment. Typical concerns include high pupil-to-teacher and pupil-to-classroom ratios, as well as limited availability of textbooks and other instructional materials. Before the implementation of UPE in 1997, the quality of infrastructure in primary schools and the availability of desks and chairs varied and depended on the resources provided by the parents and communities. Typically, schools with well-established Parent Teacher Associations had better infrastructure, compared to those with weak mobilization of resources by the parents. This was supposed to change with UPE, which had the provision of infrastructure as one of its main components, and indeed, during its implementation, government has constructed and furnished many new facilities and complete unfinished classrooms. However, high UPE enrolment rates and education budget constraints have undermined efforts in this area. The rise in enrollment rates associated with UPE has also led to an increase in the demand for teachers in the Ugandan education system, putting additional pressure on the quality of education. Thus, during the first year of UPE implementation, 1997, the pupil-to-teacher ratio in primary education rose to 59.4, up from only 37.6 in 1996. Government responded to this challenge by restructuring its Primary Teacher Education program to increase the number of trained, re-trained and up-graded teachers. As a result, the number of trained teachers has been rising systematically since the early 2000s, from 112,000 in 2002 to 160,000 in 2011. However, this has not been sufficient to bring down pupil-to-teacher ratios, which as of 2011 still stood at 47.8, five percentage points above the average for Sub-Saharan Africa and low income countries as a whole (both groupings at 42.6).

3.3. Policy, institutional and budgetary framework for UPE implementation

To support the implementation of UPE the government developed and launched the Education Sector Investment Plan (ESIP, 1998-2003) in 1998. The broad objectives of the ESIP were achieving equitable access to education at all levels, improving quality of education, particularly at the primary level, enhancing the management of education service delivery at all levels developing the capacity of government to plan, program and manage the education investment portfolio. The ESIP was later followed by the current Education Sector Strategy Plan (ESSP), spanning from 2004/05 to 2014/15. The ESSP builds on and takes forward the successes of the 1998 ESIP, particularly in the implementation of UPE, while addressing its weaknesses and gaps, such as providing adequate treatment of the post-primary and other education sub-sectors. The broad objectives of the ESSP are to build an education system that is relevant to Uganda's national development goals, to ensure that all children participating in the education system achieve the country's education goals and to maintain an effective and efficient education sector. The ESSP commits the government to ensure universal access to primary education as the highest priority, points to the removal of financial impediments, and pays particular attention to gender and regional equity considerations. Actual implementation of the plan was envisaged through shared contributions by the public and private sector, as well as by households and communities.

Public funding for UPE continues to date to be undertaken within the ESIP framework, which still represents a substantial share of the government's education budget. Most of the funds are provided as conditional grants and they include among others a Capitation Grants (CG) and a School Facility Grant (SFG). Under the CG component, government includes a budget item for capitation grants in the development budget, which is disbursed to the districts as a conditional grant. The districts distribute the grants to the schools in accordance with their enrolments. In addition, at least 35% of the grant is spent on extra instructional/scholastic materials, 20% on co-curricular activities, 15% on school management and 10% on administration. On the other hand, the SFG assists the most needy school community to build new classrooms, supply furniture for the constructed classrooms, build latrines and teachers' houses (Mulyalya *et al,* 2003).

The ESIP 1998-2003 set funding for the primary education sub-sector as a share of the total education budget at a minimum of 65 percent. However, this share has since been reduced over time with the expansion of the national budget. Hence, budget performance out-turn figures for the fiscal year 2008/09 indicate that the primary education sub-sector accounted for only 55 percent of total Government spending in the education sector during this period. In terms of Uganda's public spending on education as a share GDP, the trend has varied over time. Uganda's public spending in education experienced a sharp increase following the implementation of UPE, with total public education expenditure increasing from 2.1 percent of GDP in 1995 to 4.8 percent in 2000 (ODI, 2006). This share, however, has since declined to 3.7 percent in financial year 2010/11, mainly because of Government's increasing attention to closing the country's infrastructural gaps. In addition, the data presented in Table 2 shows that Uganda's public spending on education as a share in the national budget is still low when compared to neighboring countries.

Table 2: Uganda's Key Education indicators in comparison to other countries, 2009

Indicator description	Uganda	Kenya	Rwanda	Tanzania	Burundi	SSA-d
Literacy rate, adult female (% females ages 15 +)	64.6[a]	83.5	66.8	66.9	60.9	53.7
Literacy rate, adult male (% males ages 15 +)	82.6[a]	90.5	75.0	79.0	72.6	71.1
Literacy rate, adult total (% people ages 15 +)	73.2[a]	87.0	70.7	72.9	66.6	62.3
Primary completion rate, female,(%)	57.8	n.a.	71.4	103.1	50.7	63.1
Primary completion rate, male (%)	59.2	n.a.	64.6	102.9	54.2	70.7
Primary completion rate, total (%)	58.5	n.a.	68.1	103.0	52.4	66.9
Primary education, pupils	8.3	7.2	2.3	8.4	1.74	135.9
Public spending on education, total (% of GDP)	3.2	6.9[a]	3.9[b]	6.8[b]	8.3	3.8[b]
Public education spending (% total expenditure)	15.0	17.2[a]	20.4[b]	27.5[b]	23.4	18.9[b]
Pupil-teacher ratio, primary	49.3	46.8	68.3	53.7	51.4	46.3
Ratio of female to male primary enrollment (%)	100.7	97.7	102.3	99.9	96.8	91.7
School enrollment, primary (% gross)	124.0	113.3	143.6	105.8	147.1	99.9
School enrollment, primary (% net)	94.1	82.8	98.4	97.2	98.9	75.1
School enrollment, primary, female (% gross)	124.5	111.9	145.2	105.8	144.7	95.5
School enrollment, primary, female (% net)	95.2	83.3	92.2[b]	97.8	99.6	73.0
School enrollment, primary, male (% gross)	123.6	114.5	141.9	105.9	149.5	104.2
School enrollment, primary, male (% net)	93.0	82.3	89.0[b]	96.6	98.1	77.3

Source: *World Development Indicators, 2012 (online version as viewed on 19 March 2012)*
(a) 2010; (b) 2008; ***SSA-d:*** *developing Sub-Saharan Africa.*

Institutionally, both the ESIP and UPE are implemented under Uganda's decentralization policy framework and through a sector-wide approach. Under these arrangements, the Ministry of Education and Sports is responsible for policy and regulatory matters in the execution of the program, while local governments are responsible for its implementation. The capitation grant constituents the largest share of the funds sent to districts for the implementation of UPE and is used for instructional materials and other non-wage spending at primary schools. However,

equity considerations regarding the distributional incidence of this grant rank low. A study undertaken by Reinikka and Svensson, (2011) reveals that about 80 percent of funds under the capitation grant are diverted elsewhere by district officials, with poor students suffering disproportionately, as schools in poorer areas receive, on average, less on account of this grant than schools in relatively affluent parts of the country.

IV. Methodological considerations in assessing the impact of UPE

The main aim of this study is to explore whether the UPE program has increased equitable participation of the eligible population. Doing this requires assessing the impact of UPE on both participation and equity in primary education, as two related, yet separate issues. The analysis undertaken for this study focuses on all children of primary school-going age (6 to 12 years); and seeks to identify factors related to capability deprivation (e.g. ignorance, lack of financial resources among others); which may impinge on their participation and expected benefits from UPE. These factors are likely to undermine the overall impact of UPE if they progress alongside overall macro-economic growth. However, they are often ignored by education sector policy makers and implementers whose role entails ensuring that the program's outputs and outcomes are well distributed and closely monitored for progress and possible improvement.

In terms of the statistical sources used, this Poverty and Social Impact Assessment (PSIA) study draws from the Uganda Integrated Household Survey (UIHS) of 1992/93 as well as the Uganda National Household Survey (UNHS) datasets for the survey years of 1997, 1999/00, 2002/03, 2005/06 and 2009/10. These datasets are used to explore issues related to the impact of UPE and whether equitable primary school participation has been realized over time. All the analytical procedures undertaken relate to each of the study objectives already presented in section one. The approach used to achieve the study objectives combines both simple descriptive statistics and econometric regression techniques.

4.1. The data

The study uses survey data from the UIHS of 1992/93 and the UNHS conducted in 1997, 1999/00, 2002/03, 2005/06 and 2009/10. The data used are part of a series of large-scale nationally representative household surveys that have been conducted by the Uganda Bureau of Statistics (UBOS) since 1988. Sampling design and data collection methods have been consistent across the different survey periods, consequently enhancing comparability over time. For each survey, a two-stage sampling design was utilized where districts were first grouped into separate strata and then divided, based on rural–urban categorization per strata, while enumeration areas served as the primary sampling units. All surveys included a module on education, which solicited data on aspects such as current schooling status, educational attainment, type of school, distance to school, reasons for never attending, and reasons for dropping out from school, among others issues covered in the survey. Data on household consumption expenditure, which was used to construct monetary measures of welfare, individual socio-demographic characteristics, individuals' health status, housing conditions, or household composition, among many others, all of which may have an effect on participation within the primary education sub-sector, was also collected as part of these surveys.

4.2. Definition of variables

The analysis presented in section 5 focuses on two main dimensions deemed relevant for a better understanding of the dynamics in Uganda's primary education sector as per the research objectives set out for this study: school attendance and school drop-out in primary education. The dependent variable used for the analysis of the probability of school attendance is a binary

variable coded as 1 if a person of 6 to 12 years was attending primary school and zero if that person had never attended or had left school at the time of the survey. On the other hand, the dependent variable for the dropping-out of school model is an indicator that is coded as 1 if the child dropped-out of school and zero otherwise. The choice of explanatory variables for this study was informed and based on previous studies that have explored the factors influencing primary school participation and school drop-out (e.g. Grogan, 2008; Deininger, 2003).

The explanatory variables utilized in the analysis were constructed on children 6 to 12 years only and are as follows:

- UPE: A temporal dummy variable used to capture the impact of Universal Primary Education over different survey periods. It takes a value of one (1) if the survey year is later than 1997, and zero (0) otherwise;
- Education level of the household head: where 1=No formal education 2=primary 3=secondary 4= specialized training and 5=Tertiary and above
- Occupation of the household head: where 1=Professionals and technicians 2=Administrators and Managers 3=Clerks 4= Service and Sales workers 5= Agriculture, livestock, Fisheries of Forestry etc 6= Crafts and production 7=Elementary worker/unskilled labourers 8= Plant and machine operators
- Household expenditure per adult equivalent as a continuous variable
- Sex of the household Head: 1=Male and 0=female
- Age of household head, defined as a continuous variable;
- Household size, i.e. the number of people living in the household defined as a continuous variable
- Place of residence: 1=urban areas and 0=rural arrears
- Region of geographical location: 1=Central 2=Eastern 3=Northern 4=Western
- Age of the child as dummy variables for each age (6 to 12 years).
- Sex of the child: 1=Male and 0=female
- Relationship of child to the household head: 1=Biological son/daughter, 0=Others (grand child or other relatives)
- Condition of school buildings and furniture in general: 1=well/averagely maintained 2=poorly maintained
- Ratio of pupils to trained teachers, defined as a continuous variable
- Official school fees per year (in the highest grade i.e. the last year of primary education per child) in Uganda shillings. These fees include the tuition fee only.
- Expenses on text books and other instructional materials per child (highest grade) per year in Uganda shillings
- Average distance to a public primary school

The last four explanatory variables are derived from survey data for the different periods, collected from the most commonly used public primary school at the community level expressed as a mean value of the individual data at the district-level.

4.3. Estimation approach

The impact of UPE on the probability of participation in primary education by the eligible population over time was assessed taking the school attendance status of persons aged 6 to 12 years as the dependent variable. Individual, household and community level characteristics from each of the databases were considered as explanatory variables in the analysis. Different survey years were used in the analysis, in order to allow for the use of different cohorts of pupils in those years, seeking this way to identify the possible impact of UPE on improving educational outcomes across time. This was done to enable comparisons amongst the different survey years that would then be useful in the identification of socio-economic and regional targets that can guide future policy interventions in the area of education in Uganda.

In all, three models were estimated for the following paired survey datasets: Model I for the 1992/93 and 2009/10 UNHS datasets; Model II, for the 1992/93 and 1997 datasets; and Model III, for the 1997 and 2002/03 datasets. The 'pairing' of the models was done in such a way that the impact of UPE on the likelihood of attending school could be captured between periods as well as over time. Model I comprises the pre- and post- UPE implementation periods; Model II the pre-UPE and on-set (start of UPE program), while Model 3 estimates the impact of UPE in the aftermath of the approval of this policy, between 1997 and 2002; in other words, from the start of the program up to 2002. In each of the models, a temporal dummy variable was used to capture the contribution of UPE to the probability of attending school. This variable takes a value of one (1) if the observation was from a post-UPE survey period (2002/03 and 2009/10) and of zero (0) if it was from a pre-UPE period (1992/93, 1997). In the case of Model II, the variable takes a value of one (1) for the year 1997 and of zero (0) for the year 1992/93.

A mixed-effects logistic regression model with both fixed and random effects was used to estimate variations in the probability of primary school attendance within each district. This approach, which entails grouping the lowest-level units (individuals) into higher-level units (districts), was chosen in order to avoid errors that occur when conclusions about groups are drawn by using individual-level data in a single-level regression. It also allows for the simultaneous examination of the effects of district-level and individual-level variables on individual level outcomes, while accounting for the dependency of observations within districts. The analysis was structured in such a way to allow for the examination of variations in urban and rural areas within districts, given that there are usually major differentials in the characteristics of the two areas. This was done by including as an explanatory variable i.e. place of residence (1=urban, 0=rural), in order to obtain group effects in the form of random intercepts as well as random coefficients/slopes.

The model estimated takes on the following form:

$$Log(Odd(\pi_{ij})) = \beta_0 + \beta_1(R_{ij}) + \sum_{k=2}^{K} \beta_k X_{kij} + u_i + v_i(R_{ij}) \quad \text{..... (1)}$$

Where π_{ij} is the probability that child j in district i attends primary school and $\beta_0 + \beta_1(R_{ij}) + \sum_{k=2}^{K} \beta_k X_{kij}$ representing the fixed-effects specification part of the model, with R_{ij} being an indicator variable that is one (1) for urban areas and zero (0) otherwise, and X_{kij} a vector of explanatory variables in the model, with K as the total number of explanatory variables in the model, excluding place of residence, which is already captured by the R_{ij} parameter. This part of the model is similar to standard regression coefficients and is estimated directly. The distinct random effects for urban and rural areas within each district are u_i, which is the effect for rural areas in district i, while $u_i + v_i$ is the effect for urban areas in district i. It should be noted that the random effects are summarized according to their estimated variances and covariance. The distribution of the random effects is assumed to be normal.

In an initial stage of estimation, a simple Logic model was used to estimate whether there was any apparent effect of UPE in the data and how this effect changed by location, before proceeding to the estimation of the more refined model. The mixed-effects logistic model with fixed and random effects was then estimated in order to relate selected individual socio-demographic characteristics (sex, age, relationship to the household head, survival status of parents and health status of the child), household level traits (sex, age, education level,

occupation of the head), as well as community level/supply-side factors (student-teacher ratio, expenses on books and other materials, etc) to the likelihood of attending primary school. A null (intercept-only) model with random effects for place of residence for each of the three afore-mentioned models was then estimated to give an indication of the overall probability of primary school attendance without adjustment for any of the predictors. This was done in order to validate the mixed effects model by comparing the Log-likelihood estimates. The Wald χ^2 test[8] was used to determine the significance of the overall model as well as that of the individual coefficients.

The distributional impact of UPE on attendance in primary school was assessed on the basis of participation rates for persons that had attended school. The analysis was undertaken for the three models specific over the period under consideration using the Distributive Analysis STATA Package (DASP). It should be noted that DASP also generates standard errors and takes into account the sample design (Araar and Duclos, 2009). The estimated means were also tested to establish whether they were statistically significantly different using the student's t test statistic.

Another aspect of the impact of UPE on primary school attendance in Uganda that was examined was the pro-poorness of this policy measure.[9] For this purpose, Benefit Incidence Analysis (BIA) across time and regions was used to assess the pro-poorness of the UPE Program in Uganda over different expenditure quintiles, for the periods 2002/03, 2005/06 and 2009/10, so as to establish whether primary school attendance has been progressive or not. The main purpose of using the approach was to analyze the distribution of benefits accrued by different quintile groups of the population from the use of public primary education, according to the distribution of a household's living standards (welfare) and in order to ascertain the pro-poorness of the program.[10]

Concentration curves derived in DASP were also used to give an illustration of how progressive public spending in the primary education sub-sector is in Uganda. The curves track the cumulative distribution of a household's total benefits against the cumulative population, ranked by per capita expenditures (in this case, by per adult equivalent expenditure). The curves are interpreted based on their position with reference to the Lorenz curve and the 45 degree diagonal line represented in the diagram where concentration curves are graphed. The 45 degree diagonal indicates perfect equality in the distribution of a given benefit. When the concentration curve line is above (below) this line, then the distribution of the benefit under consideration is progressive (regressive) in absolute terms; for instance, it would imply that persons in the poorest quintile overall obtain more (less) than 20 percent of the share of this benefit. The comparison of concentration curves against the Lorenz curve, on the other hand, allows assessing whether the distribution of a given benefit is progressive or regressive in relative terms, relative to income distribution as captured by the Lorenz curve. In this case, a concentration curve above (below) the Lorenz curve denotes that a distribution of the benefit is more progressive (regressive) than the distribution of income among the population under consideration.

Finally, in a bid to investigate the key non-welfare factors responsible for children dropping out of primary school a fixed effects logit model was used to find the best specification fit describing the relationship between the dichotomous (binary) dependent variable (whether a child drops

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[8] The test statistic is constructed by dividing the parameter estimate of model covariates by its corresponding estimated standard error. It is used to test the hypothesis that the coefficients are equal to zero i.e. $\beta_i = 0$. The null hypothesis is rejected if the P-value is less than or 0.05

[9] Pro-poor growth is usually thought of and defined in income terms, as economic growth that benefits the poor (e.g. UN, 2000; OECD, 2001, 2006). Yet, this same concept can easily be extended to other non-income indicators, like education or health, among many others, as argued by Grosse et al (2008).

[10] See appendix for formulae used for the computations.

out of school or not) and a set of explanatory variables that may hinder the success of the UPE program among persons aged 6 to 12 years.[11] Fixed effects were controlled for according to the age of the child.

According to the Stata 11 Reference Manual, (p. 975), marginal effects are an informative way for summarizing how change in a response variable is related to change in a covariate. In terms of interpretation, for categorical variables, the effects of discrete changes are computed, i.e., the marginal effects for categorical variables show how the probability of the response variable being equal to one is predicted to change as a covariate changes from 0 to 1 holding all other variables equal. For continuous independent variables, the marginal effect measures the instantaneous rate of change. If the instantaneous rate of change is similar to the change in the probability of the response variable being equal to one as the covariate increases by one. The effect of a change in a covariate on the probability of the response variable being equal to one depends on the values of all of the predicator variables. The estimations for the drop-out model are based on Average Marginal Effects (AMEs) which are such that the marginal effect is computed for each case, and the effects are then averaged. The AME is preferred because they are thought to provide a better representation of how changes in a covariate affect the probability of the response variable being equal to one.

V. Results and Discussion

This section presents the main findings of the statistical analysis underlying the policy research conducted for this PSIA study on Uganda's UPE policy. This analysis includes a combination of descriptive statistics, estimations from the econometric models outlined in the previous section, as well as a discussion of the results obtained through this analysis. The section starts by examining the overall impact of the UPE policy, in terms of assessing whether the UPE program has had a differential impact on primary school attendance over time. This is followed in section 5.2 by an analysis of factors shaping the probability of attending primary education in Uganda for each of the years for which we have individual level data, as well as for the period under consideration in this study, 1992/93 to 2009/10 as a whole. Given the importance of supply-side factors impinging on the provision of public primary education in shaping patterns of school attendance we explore in section 5.3 some of these considerations in greater depth. This is followed, in section 5.4 by an assessment on how pro-poor and progressive the Ugandan public primary education system has been since the introduction of the UPE policy in 1997, in terms of school attendance patterns observed in Uganda's public education system since 1997. Our analysis concludes, in section 5.5., with an examination of two other parameters without which it is not possible to gain a full picture of primary school attendance: grade delay and decisions to drop out of primary school, which help complement the analysis presented in the rest of this section.

5.1. The impact of UPE on primary school attendance

This section presents an initial assessment of the overall impact of the Universal Primary Education Policy on primary education by examining how the UPE policy has affected school attendance levels in Uganda over time, since it was introduced as a national policy in 1997. This is done by comparing the post-1997 attendance levels captured in the UNHS surveys conducted after the implementation of UPE with data available for the pre-1997 period, and identifying characteristics of the individuals associated with school attendance level differentials. The main results of this analysis are presented in Table 3, which reports results on the differential impact

[11] In the context of this study, success means remaining in school for the whole primary school period without dropping out.

that UPE has had on primary school attendance for the three 'paired' survey periods discussed in Section 4.3, above.[12]

Our findings generally show that, primary school attendance has increased over time regardless of the characteristics presented. Indeed, the introduction of UPE is clearly linked to strong statistically significant differences of the poor, the girl child; those residing in the rural areas; the eastern, northern and western regions, as well as among children whose household heads had no formal education or primary education. Specifically, strong statistically significant differences were observed in the attendance rates in rural areas, the Eastern region, female children, those in the two lowest quintiles and children whose heads had no formal education or primary education (23, 23, 26, 32, 28, 29 and 22 percent respectively) between 1992/93 and 2009/10. Comparing the evolution of school attendance figures between 1997 and 2002/03, there are indications of significant reductions in the attendance rates of persons from the Northern region, and those whose household heads had no formal education or tertiary education. The results also confirm previous findings that have revealed that the introduction of UPE has played a critical role in closing gender disparities in education, in this case disparities between school attendance for boys and girls.

Table 3: Differences[13] in the school attendance rates by selected socio-demographic characteristics (1992/93 to 2009/10)

	MODEL I			MODEL II			MODEL III		
	1992/93	**2009/10**	**Diff**	**1992/93**	**1997**	**Diff**	**1997**	**2002/03**	**Diff**
Place of residence									
Rural	59.9	83.2	**23.3****	59.9	83.0	**23.1****	83.0	86.3	**3.3****
Urban	73.1	87.4	**14.3**	73.1	87.9	**14.8**	87.9	91.0	**3.1**
Region									
Central	69.4	85.9	**16.5**	69.4	86.2	**16.8**	86.2	90.2	**4.0**
Eastern	64.7	87.2	**22.5****	64.7	87.3	**22.6**	87.3	90.2	**2.9+**
Northern	47.7	78.7	**31.0**	47.7	86.1	**38.4****	86.1	75.6	**-10.5**
Western	61.8	81.5	**19.7**	61.8	72.3	**10.9**	72.3	88.5	**15.2****
Quintiles									
Quintile 1	45.3	77.3	**32.0****	45.3	77.1	**31.8****	77.1	77.6	**0.5+**
Quintile 2	55.5	83.1	**27.6****	55.5	82.8	**27.3****	82.8	85.6	**2.8+**
Quintile 3	63.0	84.1	**21.1**	63.0	84.3	**21.3**	84.3	90.2	**5.9****
Quintile 4	66.0	85.1	**19.1**	66.0	86.7	**20.7**	86.7	91.9	**5.2****
Quintile 5	77.0	88.9	**11.9**	77.0	86.8	**9.7**	86.8	89.2	**2.5+**
Education Level of Household Head									
No formal education	48.9	78.3	**29.4****	48.9	78.8	**29.8****	78.8	78.0	**-0.8+**
Primary	61.6	83.5	**21.9****	61.6	84.6	**23.1****	84.6	88.6	**4.0****

[12] Primary school attendance throughout this paper captures attendance in all types of primary schools: public, private and those owned and managed by NGOs and religious organizations unless indicated otherwise.

[13] T-tests were used to establish whether significant differences in the means of school attendance rates for the periods under consideration exist.

Secondary	76.8	88.4	**11.6**	76.8	86.7	**9.9**	86.7	90.3	**3.6**
Specialized training	82.2	91.8	**9.5**	82.2	88.6	**6.4**	88.6	88.7	**0.1+**
Tertiary	86.4	97.7	**11.4**	86.4	95.6	**9.3**	95.6	76.8	**-18.9**
Sex of the Child									
Male	63.5	82.7	**19.2**	63.5	85.1	**21.6****	85.1	86.7	**1.6+**
Female	59.1	84.7	**25.6****	59.1	81.9	**22.8**	81.9	87.0	**5.1****
Total	**61.4**	**83.7**	**22.3****	**61.4**	**83.5**	**22.2****	**83.5**	**86.9**	**3.4****

Data Source: UIHS 1992/1993, UNHS 1997, 2002/2003 and 2009/10

*Note: ** denotes that the differences in mean primary school attendance rates between the survey periods under consideration are statistically significant at □=0.05 while + denotes significance at □=0.01.*

5.2. Primary school attendance, UPE and household characteristics

Having established the overall positive impact that the UPE policy has had on attendance levels in primary education since its implementation in 1997, this section now turns to identify household characteristics and other factors which have contributed to shape this positive impact that UPE has had on primary school attendance.

We first examine these issues separately for the three time-bound periods, which are based on the three 'paired' survey periods, presented in section 4.3. Table 4 presents estimates that show the odd ratios of the predictors on the probability of attending primary school across districts. The results show that for each of the three models, controlling effects of other predicators, the presence of UPE, the household head's level of education, sex and age of the head, household size and socio-economic status of a household, significantly increased the odds of attending school across districts.

With regard to the specific impact of the UPE policy, it is worth noting that the highest statistically significant effect of UPE on the odds of attending school was observed between 1992 and 1997 which is indeed expected following the implementation of the program. A similar tendency is observed for the long-run period going from 1992 to 2009, for which UPE seems to also have significantly contributed to school attendance across districts.

Furthermore, other factors typically positively affecting primary school attendance, alongside the implementation of UPE, such as the household head's level of education, being a biological son or daughter to the household head, also emerge as statistically significant in the analysis, in terms of increasing the odds of school attendance. In addition, a unit increase in the household size is also associated with increased probability of school attendance across districts. This could be because UPE caters for all children of school going age and, hence, larger households are likely benefit more from it.

In terms of factors negatively associated with school attendance, the results presented in Table 4 reveal that across all the years of analysis, children between 6 and 8 years of age were less likely to attend primary school as indicated by the estimates. This is probably due to the fact that parents consider them too young to start school, especially in the cases where they have to travel relatively long distances to school. Finally, as the results reported in Table 4 indicate, unit increases in the student-trained teacher ratio and the average distance to a public school in the district also reduce the probability of attending school.

Table 4: Estimation of the attending primary school models

	MODEL I		MODEL II		MODEL III	
	1992 & 2009		1992 & 1997		1997 & 2002	
Attending school	**Odds Ratio**	**z**	**Odds Ratio**	**Z**	**Odds Ratio**	**Z**
UPE	2.64**	(6.33)	5.43**	(9.58)	0.81	(-1.19)
Place of residence (urban=1)	0.98	(-0.12)	1.22	(1.37)	1.15	(0.87)
Region						
Eastern	1.26	(1.03)	1.19	(0.72)	1.17	(0.68)
Northern	0.58**	(-2.45)	0.56**	(-2.72)	0.74	(-1.28)
Western	1.06	(0.24)	0.74	(-1.40)	0.89	(-0.55)
Education of Head						
Primary	1.96**	(7.51)	1.51**	(7.14)	1.32**	(4.33)
Secondary	2.44**	(7.03)	1.74**	(7.22)	1.42**	(4.15)
Specialised training	3.11**	(5.80)	2.12**	(7.310	1.62**	(4.42)
Tertiary	1.70	(1.01)	2.37**	(3.21)	1.31	(1.12)
Occupation of head						
Administrators and Manager	1.55	(1.33)	0.74	(-1.55)	0.57**	(-2.63)
Clerks	0.81	(-0.76)	0.75	(-1.49)	0.71	(-1.43)
Service & sales workers	0.77	(-1.23)	0.79	(-1.92)	0.95	(-0.37)
Agric/livestock/forestry/fisheries	0.62**	(-2.36)	0.49**	(-5.25)	0.68**	(-2.39)
Craft & production	0.85	(-0.73)	0.65**	(-3.63)	0.67**	(-3.19)
Elementary worker	0.64	(-1.42)	0.36**	(-5.72)	0.51**	(-4.12)
Plant and machine operators					1.05	(0.10)
Sex of head (male=1)	0.65**	(-5.13)	0.88**	(-2.38)	0.95	(-0.85)
Age of head	1.02**	(5.59)	1.01**	(4.61)	1.00	(1.50)
ln (household size)	1.60**	(5.23)	1.16**	(3.76)	1.06	(1.47)
ln (Expenditure per adult equivalent)	1.67**	(8.04)	1.36**	(7.51)	1.14**	(2.96)
Sex of Child (Male=1)	0.78**	(-3.71)	0.80**	(-5.38)	0.89**	(-2.56)
Age dummies for child						
6	0.12**	(-17.57)	0.15**	(-26.00)	0.19**	(-21.88)
7	0.38**	(-7.88)	0.47**	(-9.51)	0.54**	(-7.08)
8	0.64**	(-3.68)	0.79**	(-2.87)	0.95	(-0.60)
9	0.97	(-0.26)	1.14	(1.46)	1.32**	(2.62)
10	1.07	(0.48)	1.42**	(3.90)	1.65**	(4.87)
11	0.94	(-0.45)	1.80**	(5.42)	2.37**	(6.45)
Relationship to head (son/daughter=1)	1.58**	(5.56)	1.73**	(11.02)	1.61**	(8.67)
ln (Average official school fees)	0.97	(-0.44)	1.06	(1.10)	1.02	(0.67)
ln (Average expense on text books & other materials)	1.02	(0.88)	1.08**	(4.59)	1.08**	(4.22)
ln (Average student-trained teacher ratio)	1.34	(1.87)	1.31	(1.54)	0.90	(-0.51)
Average distance to the nearest primary school	0.97**	(-3.66)	0.98**	(-3.19)	0.98	(-0.88)
Log likelihood	**=**	**-2827.04**	**=**	**-7353.17**	**=**	**-6382.49**
No. of Obs.	**=**	**5552**	**=**	**18549**	**=**	**18552**
Wald chi2(32)	**=**	**869.1**	**=**	**2007.75**	**=**	**1540.17**
Prob > chi2	**=**	**0**	**=**	**0**	**=**	**0**

AIC	**=**	**5724.07**	**=**	**14776.34**	**=**	**12836.98**
BIC	**=**	**5955.837**	**=**	**15050.33**	**=**	**13118.8**

Data Source: UIHS 1992/93, UNHS 1997, 2002/03 and 2009/10

*** indicates that the estimate is statistically significant at 0.05.*

Overall, the null models for this analysis, which were estimated without adjusting for any of the predictors presented reveal that the overall expected probability of primary school attendance was 1.23, 1.72 and 2.02 for models I, II and III respectively (See Table 1A in Appendix). In terms of the place of residence, the effect of residing in urban rather than rural areas strongly increased the median odds of primary school attendance across districts for models II and III though they are not statistically significant. Furthermore, the variance of the random effect in rural areas is higher than that in urban areas for model 1 (0.185 and 0.157) while the reverse is true models II and III where the variance of the random effect in urban areas is higher than that in rural areas (0.460 and 0.291 for model II; 0.496 and 0.336 for model III) respectively. Consequently, this implies that the unobserved factors generate a greater disparity in the probability of attending primary school in rural than in urban areas for model I and the reverse is true for models II and III (See Table 1A in the Appendix).

As is well-known, non-observed factors may evolve overtime and consequentially this can bias the estimated impact of the UPE on school attendance. In order to check the extent of such bias, an additional analysis was done by estimating the effect of the trend variable (a proxy of the non-observed factors) on school attendance. This was done by pooling data from all four survey years of analysis (i.e. 1992/3, 1997, 2002/3 and 2009/10) into one single dataset, the mixed effects Logit model was then used to obtain the fixed effects of the explanatory variables on the response variable (school attendance). Table 5 reveals that, by controlling for the other non-observed factors, the UPE continues to have a significant impact on the probability of attending school. In addition, the household head's level of education and age, being above 9 years of age, having better welfare levels, being a biological son or daughter to the household head and household size are positively and statistically significantly associated with the increased likelihood of school attendance. On the other hand, a unit increase in time (years), school cost-related factors, average distance to a public school in the district and the pupil to trained teacher ratio are negatively associated with school attendance controlling for all the other predictors. Children in the Northern region are also less likely to attend school compared to those in the central region. Albeit the effect of time is negatively and statistically significantly associated with primary school attendance, it is expected given that the primary school participation rate increases over time. In addition, controlling for the temporal effect.

Table 5: Estimating the effect of time on the probability of primary school attendance

	1992 to 2009	
Attending school	**Odds Ratio**	**z-statistic**
UPE	6.25**	(10.93)
Place of residence (urban=1)	1.16	(1.39)
Time (year as a continuous variable)	0.96**	(-3.19)
Region		
Eastern	1.21	(1.06)
Northern	0.62**	(-2.78)
Western	0.82	(-1.17)
Education of Head		

Primary		1.53**	(8.30)
Secondary		1.71**	(7.81)
Specialised training		2.02**	(7.52)
Tertiary		1.53**	(1.94)
Occupation of head			
Administrators and Manager		0.80	(-1.23)
Clerks		0.80	(-1.25)
Service & sales workers		0.88	(-1.21)
Agric/livestock/forestry/fisheries		0.57**	(-5.08)
Craft & production		0.72**	(-3.16)
Elementary worker		0.51**	(-4.85)
Plant and machine operators		0.75	(-0.67)
Sex of head (male=1)		0.86**	(-3.17)
Age of head		1.01**	(4.55)
ln (household size)		1.18**	(4.46)
ln (Expenditure per adult equivalent)		1.30**	(7.47)
Sex of Child (Male=1)		0.85**	(-4.23)
Age dummies for child			
	6	0.16**	(-28.25)
	7	0.47**	(-10.61)
	8	0.81**	(-2.78)
	9	1.17	(1.91)
	10	1.38**	(4.01)
	11	1.59**	(4.85)
Relationship to head (son/daughter=1)		1.59**	(10.24)
ln (Average official school fees)		1.01	(0.48)
ln (Average expense on text books & other materials)		1.04**	(2.94)
ln (Average student-trained teacher ratio)		1.16	(1.35)
Average distance to the nearest primary school		0.97**	(-3.93)
Log likelihood	**=**		**-9290.6**
No. of Obs.	**=**		**24104**
Wald chi2(33)	**=**		**2587.9**
Prob > chi2	**=**		**0**
AIC	**=**		**18655.2**
BIC	**=**		**18954.5**

*** indicates that the estimate is statistically significant at 0.05.*

5.3. Supply-side factors impinging on the provision of public primary education

This section examines in detail how supply-side factors in the provision of public primary education have evolved over the past two decades, given the relative importance that these factors appear to have in affecting the odds of children attending primary school, as identified in the previous section. These factors refer to anything from the cost of attending school, as determined by school fees, cost of textbooks and other materials, to issues of education quality and accessibility to public primary school centers.

Table 6 summarizes descriptive statistics on selected public primary school-level characteristics disaggregated by the region of location of the communities and survey year. The results reported present a somewhat mixed picture, although, overall, they tend to point in the

direction of a gradual deterioration of supply-side conditions in the public primary education system.

In terms of the costs that students had to incur, it is clear that the cost of school fees and expenses incurred purchasing text books and other related materials per child (of the highest grade) per year have increased over time, since 1992, even after the implementation of the UPE policy, which was supposed to eliminate this type of costs, or at least, direct school fees. It should be noted, in this sense, that high cost of schooling has typically been reported as one of the major reasons for not attending or dropping-out of school, both in the Ugandan context and elsewhere in the developing world.

The results reported in Table 6 also indicate that the launch of UPE in 1997 led to a significant increase in the average number of students (all grades) per center in public primary schools, from 370 in 1992 to 819 in 1997. Whilst this ratio dropped in some of the subsequent years, it still remained as high as 749 students per center, on average, as of 2009/10. These results suggest that the increase in school attendance brought about by UPE has not been matched by a similar increase in the number of schools built around the country to cater for this increasing number of children attending primary education. A similar trend appears to be emerging when examining the ratio of the average number of pupils to trained teachers over the period under consideration. This ratio, which in 1992/3 stood at 63 pupils per trained teacher, shot up to 102 in 1997, in the aftermath of the introduction of the UPE policy. Since then, it has gradually dropped to more acceptable levels, standing at 59 in 2009/10 survey year. Yet, this figure is still considerably higher than the (more generally) recommended 40:1 pupils-to-teacher ratio under the Education-For-All Fast Track Initiative, as the reference for quality education.

Table 6: Supply-side community level indicators for public primary education, 1992 to 2009

	1992/3					1997				
	Central	Eastern	Northern	Western	Uganda	Central	Eastern	Northern	Western	Uganda
Average distance to the school	2.2	1.8	2.9	2.2	**2.3**	2.3	1.8	1.4	1.6	**1.7**
Average school fee	5500	6800	7200	6800	**6600**	11350	5300	9100	7300	**8300**
Average expenses on text-books and other materials	3400	12100	10800	8800	**8600**	560	190	5150	3200	**2700**
Avg. number of students per school (all grades)	436	370	391	289	**370**	672	713	1100	695	**819**
Avg. number of trained teachers	10	10	9	6	**9**	10	11	13	10	**11**
Avg. number of untrained teachers	5	5	4	4	**4**	3	2	4	3	**3**
Average student to Trained teacher ratio	76	49	60	65	**63**	118	92	92	107	**102**
Buildings well Maintained (%)	15.0	7.3	1.6	6.2	**7.8**	13.5	7.3	6.5	12.5	**9.8**
Furniture well Maintained (%)	11.4	9.4	0.3	2.2	**5.9**	7.4	7.3	5.2	3.6	**5.6**
	1999					**2002/03***				
Average distance to the school	1.9	1.5	1.8	1.6	**1.7**	1.8	1.9	2.1	1.5	**1.8**
Average school fee	40800	4500	2200	700	**12700**	22000	6200	1050	3700	**9750**
Average expenses on text-books and other materials	4400	9800	500	9600	**7100**	17600	9500	2100	2700	**8300**
Avg. number of students per school (all grades)	718	956	822	687	**788**	672	933	1001	723	**817**
Avg. number of	14	13	11	10	**12**	13	14	15	12	**13**

trained teachers										
Avg. number of untrained teachers	1	2	2	2	**2**	3	2	3	3	**3**
Average student to Trained teacher ratio	62	80	104	84	**82**	67	86	81	75	**77**
Buildings well Maintained (%)	26.6	22.7	10.5	29.8	**23.1**	31.8	25.4	21.7	24.2	**26.2**
Furniture well Maintained (%)	19.2	10.2	4.7	10.7	**11.3**					
	2005/06*					**2009/10***				
Average distance to the school	1.9	1.9	2.0	2.4	**2.1**	1.9	2.1	1.8	2.0	**1.9**
Average school fee	5250	550	0	1250	**1750**	11900	5500	2000	1050	**5500**
Average expenses on text-books and other materials	11000	11200	5500	9500	**9500**	36500	19700	45200	8700	**23400**
Avg. number of students per school (all grades)	581	878	954	590	**730**	601	883	899	648	**749**
Avg. number of trained teachers	12	16	16	11	**14**	13	13	14	14	**13**
Avg. number of untrained teachers	1	0	1	1	**1**	0	0	1	1	**1**
Average student to Trained teacher ratio	54	60	67	57	**59**	47	71	71	51	**59**
Buildings well Maintained (%)	24.1	32.3	27.3	33.1	**29.8**	19.1	22.5	18.5	16.5	**19.3**

Data sources: Own computation from UIHS 1992, UNHS 1997, 1999, 2005 and 2009

** The question on the condition of buildings and furniture was combined at the data collection stage for the years with an asterisk (*)*

5.4. Assessing the progressiveness and pro-poorness of Uganda's UPE Program

Having examined the overall impact of UPE on attendance rates in primary education and identified factors which have shaped and driven the observed increase in attendance levels over the period of implementation of the UPE policy, this section now turns to assess how progressive and pro-poor the UPE policy has been.

The distributional analysis of public primary education attendance since the implementation of the UPE policy shows an increase in primary education attendance in the public system for all income quintile groups of the population between 2002/03 and 2009/10, except for the 5th quintile group, into which the richest 20 percent segment of the population falls. This has been the case, despite an initial sharp drop in public primary school attendance between 2002/03 and 2005/06 affecting all income groups of the population. As the results in Table 7 show, the quintile group which experienced the largest increase in public primary school attendance has precisely been the poorest one, with the proportion of children in this income group attending public primary school increasing from 69.3 percent in 2002/03 to 74.3 percent in 2009/10. The share of those in the richest quintile attending public primary schools, on the other hand, decreased from 72.5 percent to 65.5 percent during the same reference period. From this perspective, attendance of public primary schools since the approval of the UPE policy has evolved in a progressive manner since the early 2000s. Moreover, these findings are consistent with those of Table 3 in section 5.1 of the report, which shows that school attendance for children in the poorest (lowest) quintile has been increasing significantly over time.

Despite these overall positive developments, the share in public primary school attendance of different income quintile groups has changed little over time, each of them roughly accounting for a fifth of children attending public primary school throughout the whole period. The analysis of the results presented in Table 7 suggests, in this sense, that whatever change has taken place

at this level, it is mostly accounted for by changes in the bottom and top income quintiles: an increase in the share of attendance to public schools for the poorest quintile of little more than one percentage point between 2002/03 and 2009/10, from 19.5 to 20.7 percent, and a similar decrease in this share for the richest income quintile, from 20.4 to 18.3 percent during the same period.

From an income perspective, the above results suggest that the provision of public primary education since the implementation of UPE has been progressive and pro-poor, in terms of benefiting more than proportionally those in the lowest income quintile group. Having said this, however, greater efforts could have been made to further increase the share of children in the poorest quintile in public primary school attendance, so as to improve the progressiveness of the government's primary education system. Similar efforts could have also been made to increase this share for those in the second income quintile group of the population, where some people often live just above the poverty line and can therefore benefit from more progressive service delivery in primary education. Additionally, the low participation rate of children in the highest quintiles as well as those from households whose head has tertiary education in public primary schools indirectly indicate the low quality of such schools; hence more attention should be given to improving the quality of public primary schools in Uganda.

Table 7: Share of Public primary school attendance and rate of participation by selected household characteristics

	2002/3		2005/6		2009/10	
Household Characteristics	**Share**	**Proportion**	**Share**	**Proportion**	**Share**	**Proportion**
Income Quintiles						
Quintile 1	0.195	0.693	0.186	0.610	0.207	0.743
Quintile 2	0.193	0.691	0.198	0.647	0.197	0.706
Quintile 3	0.206	0.726	0.206	0.673	0.205	0.733
Quintile 4	0.202	0.718	0.207	0.677	0.208	0.745
Quintile 5	0.204	0.725	0.204	0.666	0.183	0.655
Education level of HH.						
No formal education	0.175	0.707	0.005	0.584	0.223	0.696
Primary	0.588	0.709	0.700	0.648	0.605	0.719
Secondary	0.172	0.718	0.202	0.669	0.121	0.732
Specialised training	0.061	0.732	0.082	0.710	0.046	0.748
Tertiary	0.004	0.567	0.010	0.692	0.004	0.619
All	**1**	**0.711**	**1**	**0.655**	**1**	**0.716**

Data Sources: *UNHS* ***2002/3, 2005/6 and 2009/10*** *for data on total number of children 6 to 12 years, number children eligible for primary, number attending public primary school and household expenditure per adult equivalent.*
Notes: ***1- Share:*** *This statistic indicates the share of frequency of the population group;* ***2- Proportion:*** *This statistic indicates the proportion frequency within the population group.*

From a geographical and place of residence lens, public provision of primary education services have also evolved in a somewhat progressive way since the early 2000s, with regional shares of primary school attendance increasing in those regions where poverty has dropped more slowly and therefore concentrate an increasing share of the poor (see Table 8). For instance, the central region, which over the years has seen its share of the total population along with the share of the region's poor drop, has also seen its share of the total number of children attending public primary education facilities fall from 21.3 percent in 2002/03 to 15.5 percent in 2009/10. This same region has also experienced a significant fall in the proportion of its children attending

public primary schools during the same period, from 67.1 to 62.2 percent. At the same time, other parts of the country, such as the Northern region where poverty still constitutes a society-wide problem, have seen their share of public primary school attendance increase since 2002/03.

Table 8: Share of Public primary school attendance and rate of participation by regions and place of residence

	2002/3		2005/6		2009/10	
Public primary education	**Share**	**Proportion**	**Share**	**Proportion**	**Share**	**Proportion**
Regions						
Central	0.213	0.671	0.231	0.64	0.155	0.622
Eastern	0.332	0.745	0.332	0.685	0.387	0.737
Northern	0.190	0.711	0.21	0.665	0.254	0.733
Western	0.265	0.704	0.227	0.619	0.205	0.740
Place of Residence						
Rural	0.92	0.709	0.894	0.654	0.93	0.717
Urban	0.08	0.728	0.106	0.663	0.07	0.704

	2002/3		2005/6		2009/10	
Population and poverty (%)	**% Population**	**Share of poor**	**% Population**	**Share of poor**	**% Population**	**Share of poor**
Regions						
Central	29.6	0.170	29.2	0.154	26.5	0.116
Eastern	27.4	0.325	25.2	0.290	29.6	0.293
Northern	18.2	0.295	19.7	0.385	20.0	0.378
Western	24.7	0.210	25.9	0.171	24.0	0.213
Place of Residence						
Rural	86.2	0.948	84.6	0.932	85.4	0.944
Urban	13.8	0.052	15.4	0.068	15.0	0.056

Sources: UNHS 2002/3, 2005/6 and 2009/10 for data on total number of children 6 to 12 years, number children eligible for primary, number attending public primary school and household expenditure per adult equivalent.
Notes: *1- Share:* *This statistic indicates the share of frequency of the population group;* ***2- Proportion:*** *This statistic indicates the proportion frequency within the population group.*

Nonetheless, in spite of this overall positive evolution over time in the regional distribution of public primary education attendance, the figures presented in Table 8 suggest there is still considerable scope to increase the progressiveness of government interventions to promote UPE at the regional level. Thus, the regional distribution of primary school attendance, which can be taken as a proxy for the reach of public primary schooling in different parts of the country, has evolved more slowly and has not kept pace with changes in the regional distribution of poverty in the country. For instance, the Northern region which has seen its share of the poor increase from 29.5 percent in 2002/03 to 37.8 percent in 2009/10 still only accounts for 25.4 percent of children attending public primary schools in the country, up from 19.0 percent in 2002/03.

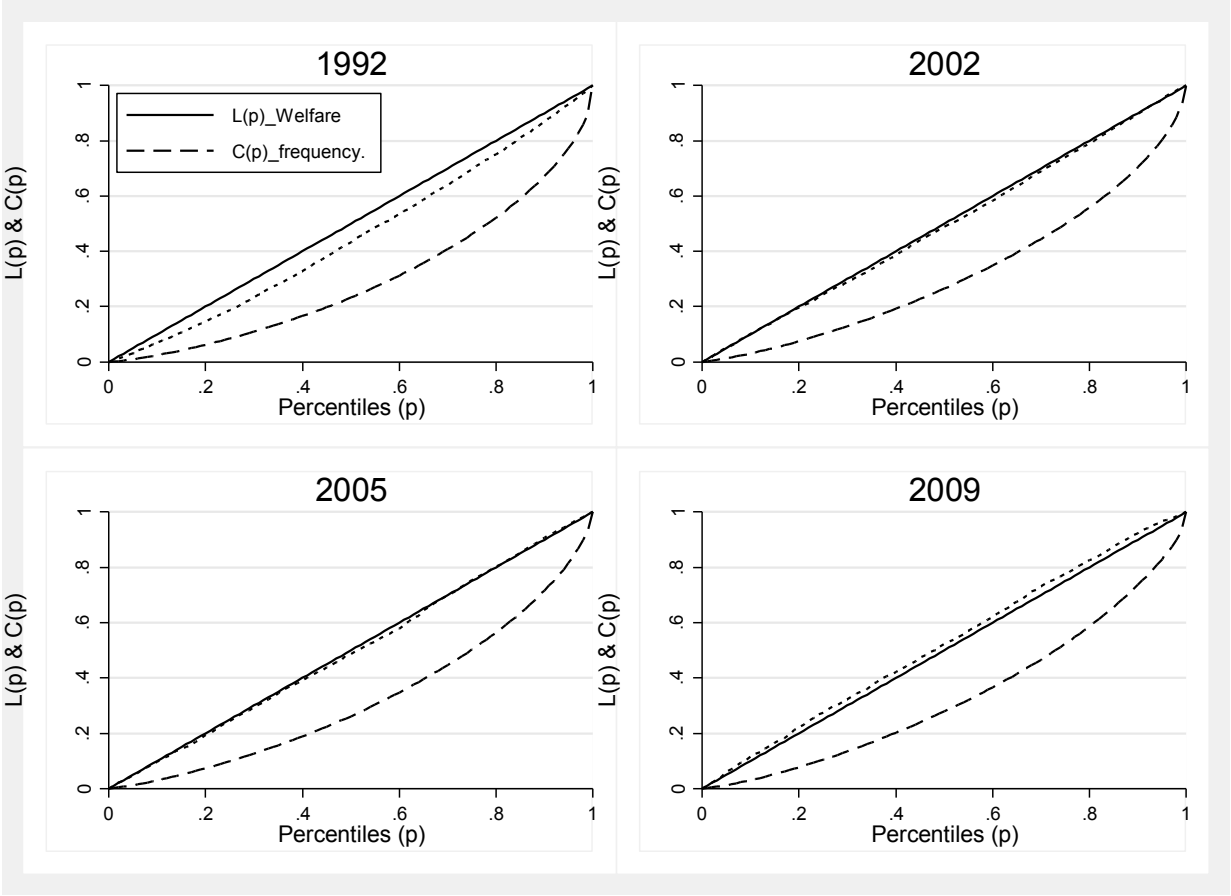
These results suggest that greater focus on providing public primary education services in the poorer parts of the country is required, in order to improve the progressiveness of policy

interventions in this area and contribute to the full universalization of primary education in Uganda. This is even more so, considering that in some of the regions literacy levels lag behind national rates and, in addition, there is little presence of non-government providers of primary education services. For instance, according to figures from UBOS (2011), the proportion of persons aged 10 and above that were literate in the Northern region was as low as 64 percent, considerably lower than in the central region (83%) or the country as a whole (73%). In this same region, the proportion of local communities that reported having private primary school facilities within the community was as low as 7.8 percent, way below the proportion in the central region (60%) and Uganda as a whole (38%).

The progressivity of Uganda's public primary education system can also be appreciated drawing on the analysis of benefit concentration curves. Figure 1, below, presents the graphical presentation of the distribution of public primary school attendance (concentration curve) and the distribution of income (Lorenz curve) in Uganda for children 6 to 12 years of age, for the survey years of 1992,93, 2002/03, 2005/05 and 2009/10, which have been derived using the DASP tool. These curves illustrate whether and how progressive public primary school attendance has been over time.

With the concentration curves for 1992/93, 2002/03 and 2005/06 lying in between the 45 degree diagonal line and the Lorenz curve, the results presented in Figure 1 indicate that public primary school attendance in these three periods was relatively progressive among the eligible population, in relation to the distribution of income. On the other hand, the 2009/10 concentration curve shows that both relative and absolute progressivity were realised from public spending in the primary education sub-sector by the intended beneficiaries; implying that they were better distributed towards the poor group in comparison to the total expenditure in the primary sub-sector. In other words, of the total expenditure, the poorest gained more than those better-off. It should be noted that the ranking of individuals was based on a household's expenditure per adult equivalent.

Figure 1: Progressivity of Public Primary School attendance (1992/93 to 2009/10)



Data Sources: *The same those for Table 7*

5.5. Investigating grade-delay and school drop-outs in primary education

The previous sections have focused on primary school attendance patterns observed in Uganda over the past two decades, trying to shed light on the specific impact of the UPE policy in molding these trends; the demand, welfare and supply-side factors which have impinged on this impact, as well as on whether these trends have been pro-poor and progressive in their distributional impact. In this section, we complement the findings obtained so far, with a brief analysis of grade-delay and drop-out patterns in Uganda's primary education system. Both of these indicators are critical in order to gain a full understanding of attendance dynamics, as they capture those children not attending primary school facilities.

5.5.1. Grade Delay among children aged 6 to 12 years

An individual's overall education attainment may be affected by the age at which he or she starts schooling, as well as by whether he or she repeated a grade earlier. In this sense, we explore in this section, trends in grade delay over time as a proxy indicator for the quality of primary education. For purposes of this analysis, a child was categorized as having delayed if he or she was overdue the age of starting school by two or more years, i.e. above the recommended age of six years. Table 9 presents trends in grade delay among persons 6 to 12 years by selected household and individual level characteristics.

The results reveal that grade-delay has generally been common among children in the western and northern regions of the country, those living in rural areas, boys, those in the poorest quintile, as well as those that are not biological children of the household head (e.g. grand children or other relatives). It however should be noted that some of the delays could have been as a result of repetition of a grade. The high levels of grade delay in 1997 could have been driven by the backlog of school age children who had not been accessing school as well as children who had reached school age but could not afford education prior to UPE.

On the other hand, the high proportions of grade-delay among persons in the Northern region over time could have been driven by the 20-year old internal civil strife that the region experienced while that for persons in the lowest quintile could be attributed to the fact that households were probably not able to afford the direct and indirect costs related to schooling considering that school fees were supposed to have been scrapped off with the introduction of the UPE program in 1997. This however does not seem to have been the case as revealed by the school data analyzed at community level in the years 1997 and beyond (see Table 6).

Table 9: Trends in Grade delay among persons 6 to 12 years (1992/3 to 2009/10)

Grade Delay	1992/3	1997	1999	2002/03	2005/06	2009/10
Region						
Central	0.51	0.52	0.40	0.39	0.28	0.32
Eastern	0.53	0.57	0.40	0.39	0.35	0.42
Northern	0.54	0.68	0.53	0.46	0.34	0.46
Western	0.56	0.64	0.51	0.43	0.36	0.48
Place of Residence						
Rural	0.56	0.62	0.47	0.44	0.35	0.43
Urban	0.38	0.45	0.29	0.25	0.23	0.30
Sex of the Child						
Male	0.54	0.60	0.45	0.43	0.33	0.44
Female	0.52	0.60	0.44	0.40	0.32	0.38
Sex of Household Head						
Male	0.53	0.61	0.43	0.41	0.33	0.42
Female	0.53	0.59	0.45	0.41	0.33	0.41
Quintiles						
Quintile 1	0.61	0.62	0.57	0.52	0.4	0.47
Quintile 2	0.56	0.65	0.5	0.48	0.33	0.45
Quintile 3	0.55	0.61	0.47	0.46	0.36	0.46
Quintile 4	0.57	0.59	0.43	0.4	0.33	0.38
Quintile 5	0.42	0.54	0.32	0.26	0.25	0.32

Relationship Household Head						
Other relatives	0.54	0.59	0.45	0.46	0.34	0.43
Son/daughter	0.53	0.60	0.45	0.40	0.33	0.41
Total	**0.53**	**0.60**	**0.45**	**0.41**	**0.33**	**0.41**

5.5.2. Reasons for dropping out (and not attending) school

With regards to drop-out dynamics in Uganda's primary education system, the results presented in Table 10 show households' reported reasons for dropping out of school as well as those for not attending primary school. Across all time periods, the cost of attendance was highlighted as the major reason for dropping out of school, with this reason being particularly important in 2002 (44%). However, overall, the proportion of persons reporting cost as the major reason for dropping out of school has sharply declined over time and as of 2009/10 this was adduced a reason for dropping out of school by 29 percent of respondents.

In addition, the percentage of children that dropped out of school because, in their opinion, they had completed the desired level of education significantly dropped from 46 percent in the 1992/93 survey to only two percent in the most recent household survey of 2009/10. The proportion of persons that dropped out due to sickness or calamity in the family, on the other hand, increased sharply and has remained at relatively high levels (24 percent of positive responses in 2009/10). This could be an indication that the shocks that households experience greatly impact on the children's participation in education, especially those that are already vulnerable (the poor households).

Regarding reasons for never attending school among children 6 to 12 years old, having children who were considered too young to attend schools has consistently been the main reason advanced for not sending them to school, with this reason being adduced in between 40 and 65 percent of the cases, depending on the survey. This reason is followed by the child's or parent's indifference towards education, although this has become less and less important over the past two decades as a reason for not attending school, as can be appreciated in the bottom section of Table 10. Factors that are related to attitude of parents or child can possibly be overcome by investing in continued public sensitization on the benefits of education. In addition, it is interesting to note that 11 percent of children aged 6 to 12 years of age in 1997 reported never attending school due to costs related to attending school like scholastic materials and uniform among others this could have affected the poorest the most.

Table 10: Reasons for never attending and those for dropping out of primary school (1992/3 to 2009/10)

Reasons for dropping out of school	1992	1997	2002	2009	Total
Completed desired level	46.3	31.7	1.9	2.1	**31.9**
Need to work	1.1	8.1	3.4	2.5	**4.2**
Domestic work	0.0	2.0	4.5	5.9	**1.8**
Cost of attendance	36.0	28.4	43.6	29.4	**33.2**
Transport costs	0.5	0.0	3.3	0.0	**0.6**
Poor quality of school	0.1	0.1	0.1	6.4	**0.7**
Sickness/calamity in family	5.1	0.0	43.2	24,3	**8.8**
Pregnancy	0.0	6.5	0.0	0.0	**2.6**

Others reasons	10.9	23.3	0.0	29,3	**16.3**
Total	100.0	100.0	100.0	100.0	**100.0**

Reasons for never attending school	**1992**	**1997**	**2002**	**2009**	**Total**
Young to attend school	47.4	65.0	46.1	61.7	**57.7**
Sick	0.0	0.0	5.0	0.0	**0.7**
Disabled	0.0	0.0	3.7	2.4	**1.0**
Indifferent to education	45.1	18.1	18.0	7.9	**22.0**
Need to work	2.0	1.7	4.8	4.8	**2.9**
Cost of schooling	0.0	10.9	6.8	5.1	**6.6**
Long distance to school	3.5	0.8	7.0	5.5	**3.3**
Orphaned	0.0	1.4	2.0	1.1	**1.1**
Insecurity in the area	0.4	1.2	1.4	0.1	**0.8**
Others reasons	1.7	0.9	5.3	11.6	**3.9**
Total	100.0	100.0	100.0	100.0	**100.0**

5.5.3. Factors determining the decision of dropping-out of primary education

In order to gain further insight on the drivers shaping drop-out dynamics in the Ugandan primary education system, this section examines possible factors that influence the probability of dropping out of primary school for children aged 6 to 12 years, for the survey periods under consideration. The results of this analysis, presented in Table 11, are interpreted in terms of the marginal effects of each variable; i.e. the average marginal effect of a change in the explanatory variable on the likelihood that a child drops out of primary school.

Focusing on the average marginal effects that are significant at the 5% level, the most important determinants of a child dropping out of school have varied over time, according to our analysis. The findings reveal that for at least any two survey periods, the likelihood of dropping out of school is positively statistically associated with residing in urban areas, compared to rural ones; i.e. children living in urban areas are more likely to drop-out than those residing in rural parts of the country as well as an instantaneous rate of change in the distance to a public primary school in the district holding all other covariates constant.

Focusing on the most recent household survey, that of 2009/10, children from other regions relative to those in the central region (i.e. those residing in Western, Eastern and Northern Uganda), those that lived in areas far from a public primary school in the district, boys, and older children were more likely to drop out of school than others.

Considering the household head's occupation, children whose household heads were sales or service-sector workers, engaged in agriculture, livestock, forestry or fisheries and crafts and production were more likely to drop out of school in 1992/93 though the predicted change is not statistically significant. The dropping-out could have been due to the fact that such children are usually required to contribute to the household's income by participating in the household's livelihood activities; as also observed in the reasons for dropping out of school presented in the previous section (see Table 10). However, a reverse trend is observed in 1997 the period when UPE was introduced and implementation.

The education level of a child's parent or guardian has commonly been known to directly or indirectly impact on a child's likelihood to education attendance. The results further show that, in 1992/93, children whose household heads had specialized training, were less likely to drop out of school relative to those whose heads had no formal education. However, in 1997, children 6 to 12 years old, living in a household with the head having primary education were more likely to drop out of school relative to those whose heads had no formal education. Additionally, an instantaneous rate of change in the age of a child is negatively associated with dropping out of school except for the survey year 1997. This implies that the likelihood of dropping out of primary school increased with the age of a child for that period.

Table 11: Estimates for the probability of dropping out of Primary School

	1992		1997		2002		2009	
	Marginal Effect	**z statistic**	**Marginal Effect**	**z statistic**	**Marginal Effect**	**z statistic**	**Marginal Effect**	**z stati**
Region								
Eastern	-0.43**	-4.2	-1.26**	-12.8	-0.45**	-2.3	0.15	
Northern	-0.17	-1.6	-1.07**	-11.6	0.15	0.79	1.09	
Western	-0.37**	-3.6	-1.00**	-10.3	-0.31	-1.61	0.39	
Urban	0.21**	2.1	0.06	0.7	-0.13	-0.73	-0.51	-
Log of Household size	-0.39**	-4.4	0.05	1.0	-1.15**	-6.9	-0.90	-
Sex of household Head (Male)	0.11	1.2	-0.08	-1.0	0.13	0.74	-0.61	-
Occupation of household head								
Administrators and Managers	-0.67	-1.9	0.59**	2.6	1.35**	2.6	1.59	
Clerks	-0.09	-0.3	-0.43	-1.5	1.03**	2.29	-0.21	
Service and Sales workers	0.07	0.4	-0.05	-0.3	0.19	0.59	18.37	
Agriculture/livestock/ Fisheries and forestry	0.27	1.4	-	-	0.01	0.04	17.42	
Crafts and production	0.03	0.1	-0.22	-1.7	0.13	0.34	18.87	
Elementary/unskilled labourers	0.37	0.9	-0.67**	-2.1	0.32	0.85	17.47	
Plant and machine operators			-	-	0.40	0.73	-	-
Education of Household Head								
Primary	-0.11	-1.2	0.24**	2.5	-0.57**	-2.77	-0.85	-
Secondary	-0.33**	-2.4	0.03	0.3	0.12	0.51	-1.35	-
Specialised training	-0.22	-1.2	0.12	0.9	0.38	1.25	0.05	
Tertiary	-0.23	-0.6	-0.53	-1.5	1.11**	2.25	-14.15	
Sex of child (male)	0.13	1.7	-0.09	-1.4	-0.03	-0.18	0.52	
Age of child	-0.07	-1.1	-0.24**	-2.1	0.20**	5.71	0.16	
Relationship to head (son/daughter)	-0.52**	-6.3	-0.39**	-5.2	-0.15	-0.95	-0.40	-
Average distance to Public school in district	0.04**	4.8	-0.01	-0.5	-0.06	-1.03	0.28**	
No. of Observations		**6948**		**21002**		**5681**		**1**

Data Source: UIHS 1992/93, UNHS 1997, 2002/3 and 2009/10

*-The symbol ** indicates that the estimate is significant at 0.05.*

VI. Conclusion and policy implications

This study has sought to assess the effectiveness and progressiveness of Uganda's Universal Primary Education (UPE) program, which has been a cornerstone of the government's education policy and, more broadly, its poverty reduction and development efforts since it was first introduced in 1997. This has done by centering the analysis on four main areas: examining the differential impact that the UPE program has had on school attendance and grade delay over time; identifying factors which have shaped the differential impact that the UPE policy has had on primary school attendance, assessing the extent to which this policy has been progressive and pro-poor; as well as investigating the non-welfare factors that influence dropping out of primary school among children 6 to 12 years of age, as well as how these factors have changed over time, since the implementation of the UPE policy. The analysis undertaken as part of this study builds on a considerable body of literature that has endeavored to explore the impact of the UPE policy in several dimensions; for instance, on educational attainment (Nishimura *et al,* 2006); cost of schooling (Deininger, 2003) and social inequality (Zuze and Murray, 2011), among others.

The results of this study suggest that the UPE program implemented in Uganda since 1997 has significantly contributed to increased access to primary education for Ugandan children, as reflected in the large increase in primary school attendance levels experience since its implementation that can be directly attributed to this program. Moreover, it has done so in a progressive and, in later years, pro-poor way, in the sense of disproportionately benefiting the poorest segments of the Ugandan society. The various analysis undertaken for this study, however, do indicate there are a number of areas where additional progress could be made as part of the government's program for Universal Primary Education.

Firstly, although the UPE program has been progressive and, in recent years, pro-poor, the results of our analysis suggest there is still considerable scope for increasing its pro-poorness that may warrant targeted approaches to UPE implementation, with a greater geographical focus of public education efforts on the poorer parts of the country. This is especially so for the case of Northern Uganda, which is the poorest part of the country and the one presenting the worst educational indicators, and where the reach of non-government schools is smallest. The analysis undertaken for this study also points to the fact that demand-side factors significantly impact on school attendance, grade delay and issues related to dropping out of school. These factors include poverty, education and occupation of the household head, as well as place of residence, specifically the rural areas. Also the direct and indirect costs to attending school that many public primary schools continue to levy user fees, and act as deterrent to education. Therefore, increasing public expenditure on primary education may not be sufficient since a number of the factors that negatively affect school attendance pertain to the characteristics of households. Finally, our analysis also shows that supply side factors, relating to the quality, availability and accessibility to primary education, as well as societal attitudes towards education also appear to affect efforts to universalize primary education in Uganda, sometimes negatively. Measures to improve Ugandan education infrastructure, the provision of school materials and the quality and number of teachers, together with efforts to sensitize people on the importance o education could go a long way in addressing these constraints.

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Appendix

Formulae for Benefit incidence Analysis

The share of a *g* in sector s is defined as follows:

$$SH_g^s = \frac{\sum_{i=1}^{n} w_i f_i^s I(i \in g)}{\sum_{i=1}^{n} w_i f_i^s} \quad \text{..... (2)}$$

While the rate of participation of a group g in sector s is defined as follows:

$$CR_g^s = \frac{\sum_{i=1}^{n} w_i f_i^s I(i \in g)}{\sum_{i=1}^{n} w_i e_i^s I(i \in g)} \quad \text{..... (3)}$$

Where;

w_i is the sampling weight of observation i ;

y_i is the living standard of members belonging to observation i (i.e., per adult equivalent expenditure);

e_i^s is the number of "eligible" members of observation i, i.e., members that "need" the primary education provided by the primary education sub-sector. There is 1 sector in this case;

f_i^s is the number of members of observation i that effectively use the public service provided by sector s;

g_i is the socio-economic group of eligible members of observation i (typically classified by income percentiles);

Table A1: Variance components and Standard errors for intercept-only models with random slopes; and multilevel models predicting the probability of primary school attendance with random slopes for Place of residence (urban/rural)

		1992 & 2009		1992 & 1997		1997 & 2002	
	Random-effects	**Parameters Estimate**	**Std. Err.**	**Parameters Estimate**	**Std. Err.**	**Parameters Estimate**	**Std. Err.**
Null Model	_intercept	1.227	0.068	1.719	0.089	2.016	0.070
	var(urban)	0.202	0.070	0.696	0.112	0.521	0.094
	var(rural)	0.418	0.080	1.748	0.312	0.803	0.144
	cov(urban, rural)	0.154	0.058	0.915	0.166	0.291	0.121
Full Model	var(urban)	0.157	0.099	0.460	0.125	0.496	0.134
	var(rural)	0.185	0.078	0.291	0.085	0.336	0.091
	cov(urban, rural)	0.034	0.053	0.092	0.107	0.041	0.130