Universitat Autònoma de Barcelona

Essays in Development Economics

Florence Nimoh

UNIVERSITAT AUTÒNOMA DE BARCELONA

DOCTORAL THESIS:

Essays in Development Economics

Author:

Florence Nimoh

Supervisor:

Joan Llull

A thesis submitted to the Department Economia i Historia Economica in fulfillment of the requirements for the degree of Doctor of Philosophy at the International Doctorate in Economic Analysis (IDEA)

June 7, 2018

To my parents and my sisters, Hellen and Rich, thanks for believing in me and pushing me to always do better.

Acknowledgments

I am forever grateful to God Almighty for how far He has brought me, His grace saw me through this journey.

I am deeply indebted to my supervisor, Joan Llul, who has over the years become like a brother and a friend to me, for his invaluable supervision and guidance. I have been extremely lucky to have a supervisor who was so patient and cared so much about my work. I will forever appreciate his encouragement, motivation, support and all that he taught me throughout these years.

A special thank you goes to Hannes Mueller for his countless support and the peculiar interest he took in my work. To Susanna Esteban, thanks for supporting me in any way you could, your words of encouragement, especially during the time you were the director of this program, are very much appreciated.

Completing this work would have been all the more difficult were it not for the support and friendship provided by my colleagues, especially Alejandra Ramos and Augustin Tapsobah. I am indebted to them for their help.

To the entire IDEA department, I couldn't have imagined myself in a better department. I am very thankful to Ines Macho and Franscec Obiols for being wonderful directors of the program, to Merce Vicente and Angels Lopez Gracia for their administrative work, Ada Ferrer-i-Carbonell and the entire Professors at the Department and the Institute for their countless contributions and support to this work.

All these wouldn't have been possible without my family. I am grateful to them for believing in me and investing in my potential. I am thankful to my spiritual parents, Pastor and Mrs. Afful, my best friends, Jennifer Andoh, Wilhermina Lugukwaga, Thomas Attah-Fosu, Wisdom Dogbe, Benjamin Adjei, Samuel Asare and the entire Church of Pentecost, Spain, especially Sabadell Assembly, for their prayers, support and encouragement.

Finally, I would like to thank FI AGAUR for providing the funding which allowed me

to undertake this research study.

Contents

Introduction

In this doctoral thesis, I use empirical strategies in Applied economics to provide quantitative evidences that can help improve welfare policies in developing countries. My main aim is to understand the effectiveness of policies, and how economic factors can alter the decisions of individuals. Specifically, I concentrate on the domain of gender and education. In the domain of gender, I study how the marital decisions of women can be altered when they are exposed to economic shocks such as conflict. And in the domain of education, I look at the impact evaluations of educational programs aimed at improving access to education.

In chapter 1, *Evaluation of Educational Policies on Enrollment Rates in Ghana,* I analyze the impact of educational policies implemented in Ghana in 2004 and 2005 on enrollment rates at the basic school level. These policies; the Capitation Grant, School Feeding Program, and Compulsory Kindergarten, were implemented with the main aim of increasing access to education at the basic level. Using district level data from the Ministry of Education, Ghana, and survey data from Ghana Demographic and Health Surveys, I study how these policies have increased enrollment rates over time. I measure enrollment rates as Net Enrollment Rate (NER) and Gross Enrollment Rates (GER): the NER measures the percentage of the official age population of a particular grade that are enrolled in that grade while the GER measures the total enrollment irrespective of age, expressed as a percentage of the official age population. The district level data shows that, compared to 2004, NER increased by 25% in 2006 and has since fluctuated around this number, while GER increased by 10% in 2006 and has increased over time, to about 20% in 2014. The individual level data also shows an increment in NER by 10% in 2008 and 8% in 2014, as compared to 2003. Examining how the policies affected different districts and individuals, both

data sets show disparities in enrollment rates by wealth and place of residence, but no evidence of gender disparity. In addition, the gap that exists between the northern and the southern regions has reduced. From policy perspective, these findings call for attention on the equity and sustained effects of these policies.

In chapter 2, *Early Marriage and Conflict, Evidence from Biafran War in Nigeria,* I study how exposure to conflict affects early marriage decisions, one harmful cultural practice that affect lot of girls in developing countries. I use variation across ethnicity and cohorts provided by the Nigerian civil war, known as the Biafran war, to analyze how this war affected the probability of getting married early for exposed women. This war mainly affected ethnic groups living in the south-eastern part of Nigeria called Biafra, so I am able to use this differential impacts as an identification strategy. Using retrospective data from the Nigerian Demographic and Health Surveys in 1990 and 2003, and employing a difference-in-difference estimation, I compare the evolution of early marriage of exposed and non-exposed women. The estimated result shows that, the Biafran women who were at ages 10 to 15 years during the war were on average 6% more likely to get married before age 16 years than those in the same age bracket that were not exposed to the war. This finding is informative for policy aimed at reducing early marriage in that it provides evidence that early marriage decisions are indeed shaped by economic shocks, such as conflict, hence much attention should also be paid to conflict affected regions if this harmful practice is to be eradicated.

In chapter 3, *The impact of Conflict on the age at marriage in Sub-Saharan Africa,* I show that exposure to conflict has different impact across the age spectrum. Using variation in temporal and locational exposure in the intensity of conflict experienced during the marriageable years of women, I estimate a discrete-time hazard model to examine the impact of conflict on the age at which women enter their first marriage in Sub-Saharan Africa. Here, it is assumed that the main identification strategy comes from within-location variation in conflict and marriage outcomes, which the random timing of conflicts play a role. Estimated result shows different impacts across the age spectrum: conflict increases the hazard into marriage at the ages of 18 to 21 years, with no effect on the other age sub-population.

Chapter 1

Evaluation of Educational Policies on Enrollment Rates in Ghana

1.1 Introduction

In pursuit of the UN Millennium Development Goals (MDG) and the Education for All (EFA) initiative, many governments in Sub-Saharan Africa have put a number of policies in place towards achieving universal primary education. Arguably, the most prominent is the full subsidy to fees in public primary schools, since financial constraint is seen as the major roadblock to enrollment in this region. These have led to increases in enrollment rates in this region.[1] However, it remains the region where inequalities in access to education still persist with many poor and socially disadvantaged groups still having difficulty in access: for instance the number of rural children enrolled in school is half that of urban children, and also studies have shown a positive correlation between household poverty and primary school attendance (UNESCO, 2014).

To remove all financial barriers and achieve universal basic education by 2015, the government of Ghana took a bold step in abolishing all forms of school fees in basic school. This policy, known as the Capitation Grant, was first implemented in Ghana's 40 most deprived districts in 2004, and was extended to the remaining dis-

[1] since 1999, the number of children enrolled in primary schools in this region increased by 75% to 144 million in 2012 (UNESCO, 2015).

tricts in 2005. In addition, the government introduced the School Feeding Program in 2005 and also incorporated Compulsory Kindergarten Education into the basic education in 2004. In this paper, I evaluate the combined impacts of these policies on enrollment rates in basic schools by looking at the total as well as the differential impacts on different districts and individuals.[2] I measure enrollment rates in two ways; the Net Enrollment Rates (NER) and Gross Enrollment Rates (GER). The NER measures the percentage of the official age population of a particular grade that are enrolled in that grade while the GER measures the total enrollment irrespective of age, expressed as a percentage of the official age population. Analyzing the impacts on both enrollment rates and comparing them highlight how the policies have affected over-age participation, an important feature of school participation in Ghana. In addition, the NER provides a precise measure of the level of achievement of the universal basic education goal of the government.

I use two sources of data for the analysis; district level data from The Education Management Information Service (EMIS) of the Ministry of Education, for 2002 to 2014 academic years, and also individual level data from Ghana Demographic and Health Surveys in 2003, 2008 and 2014. The rational behind the use of two data sets are due to the facts that: 1) the use of the district level data alone could lead to an overestimation of results because the data are collected at the beginning of the academic year and do not take into account attrition in the course of the year. Moreover, since the amount of money the schools receive is dependent on the number of pupils enrolled, they may have the incentives to overestimate enrollment rates; and 2) the use of the survey data alone will not allow the ruling out of the possibility that enrollments increased gradually and any increases in enrollments can not be attributed to the policies alone since 2008 and 2014 are used as post-implementation years (Deininger, 2003). Therefore, the use of the two data sources complement each other and rules out these setbacks otherwise.

Comparing the evolution of enrollments rates of children that were exposed to these policies and those that were not, the results from the district level data shows that, compared to 2004, NER increased by 25% in 2006 and has since fluctuated around this number, while GER increased by 10% in 2006 and and has increased

[2] I do not disentangle the impacts of the policies since they occurred concurrently and moreover, data on each policy is very limited

over time, to about 20% in 2014. The individual level data also shows an increment in NER by 10% in 2008 and 8% in 2014, as compared to 2003. Both data sets show disparities in enrollment rates by wealth and place of residence, but no evidence of gender disparity. In addition, the gap that exists between the northern and the southern regions has reduced. The estimates also show that even though more children are enrolling at the right age, over-age participation still persists, especially at the Junior High School (JHS) level, and are more of a characteristic of the poor.

This is not the first study on these policies in Ghana, however, it is the first to look at the combined and the nationwide effects, both at the district and individual levels. Most of the existing literature (Osei *et al.*, 2009; Akyeampong, 2011; Yendaw & Dayour, 2014; Uduku, 2011) look at the effects of one of the policies on various educational outcomes without taking into account the other policies. Since the timing of the policies coincide, their impacts are not exclusive, and a holistic study reduces the bias of conclusions. Other studies, including the one that have considered more than one policy (Osei-Fosu, 2011), also look at the effects on selected districts and individuals.

In addition, this paper looks at the long term (9 years after the implemetations) effects of the policies by using the current data available, which is also missing in the exisitng literature. Long term impact analysis is of policy relevance, since it gives an idea of the extent to which the policies are able to sustain high participation over time.

In terms of using two data sources (district and individual level data), and also analyzing the differential impacts of the policies, this paper is closely related to the work in Akyeampong (2011), which reassessed the impact of the school capitation grants on educational access in Ghana. However, this paper differs in terms of the methodology; while this paper uses an econometric approach to test formally how effective the policies have been, Akyeampong (2011) uses descriptive statistics.

This paper also adds to the long strand of literature on the effects of universal school policies in Africa. This literature has shown positive impact on various educational factors in countries where they were implemented: Deininger (2003) and Nishimura *et al.* (2008) in Uganda; Lucas & Mbiti (2012a) in Kenya; Dennis & Stahley (2012) in Tanzania; Kadzamira & Rose (2003) in Malawi. Some extend the

analysis to school quality and find a trade off between quantity and quality (Lucas & Mbiti, 2012b; Bold *et al.*, 2010).

The remainder of the paper is structured as follows: in the next section, I give an overview of the education system in Ghana, including the policies. Sections 1.2 and 1.3 show the analyses at the district and individual levels respectively. In section 1.4, I present the analysis of educational participation and attainment by cohorts, and conclusion follows at section 1.5.

1.2 Overview of The Education System and The Policies in Ghana

1.2.1 The Structure of The Education System in Ghana

Education in Ghana dates back to the pre-colonial era. This early form of education was informal and indigenous, where knowledge and skills were passed on from the elderly to the youth by oral tradition or by way of apprenticeship (Adu-Agyem & Osei-Poku, 2012). Formal education was introduced by the British and since independence in 1957, universal education has become an important political objective. Currently, Education runs through Basic to Tertiary. The Basic School, which is compulsory, lasts 11 years (age 4 to 14). It is made up of two years of Kindergarten, six years of Primary and three years of Junior High School (JHS).[3] Upon a successful completion of JHS, which involves a passing grade in Basic Education Certificate Examination (BECE), students can enroll into three years of Senior High School (SHS) or Vocational/Technical School.[4] A student qualifies to enroll into any of the tertiary institutions, being it University (4 years), Training College (3 years) or Polytechnic (3 years) after successfully passing the West African Senior School Certificate Examination (WASSCE).[5] Any of these levels could be public or private. While public

[3]Middle School or Lower Secondary

[4]The BECE is the main examination that is used to give students admission into SHS or Vocational Schools and a person is said to have qualified if he passes all the four core subjects which are Math, English, Social and Science.

[5]This is a standardized test offered to candidates residing in Anglophone West Africa.

Basic school is free, fees are normally subsidized in public SHS and tertiary schools. The Ministry of Education (MOE) is responsible for the administration and the co-ordination of public action regarding Education. The main medium of instruction is English.

Education indicators in Ghana reflected gender gap and disparities between rural and urban areas, as well as between southern and northern parts of the country. These disparities have driven government actions against illiteracy and inequalities in access to education. These actions over the past decade have been successful in closing some of these disparities especially at the Basic level, which has rendered Ghana as far ahead the Sub-Saharan average. According to report by MOE, 2014, 91% (90.8% and 91.2% for boys and girls respectively) of children of primary school age (6-11) were enrolled in primary.

1.2.2 Educational Policies

As part of its commitment to achieving universal primary education by 2015, the government of Ghana sought to remove all financial barriers that hindered access to basic school, especially for those from poor households. The government therefore introduced what is known as the Capitation Grant in public Basic schools. Under this grant, each public Basic school receive a fixed amount of money for each child enrolled. This amount was equivalent to $2.10 in 2005 and was increased to $4.50 in 2009. Most importantly, no child attending public basic school was supposed to be driven away from school for school fees. This was first implemented in Ghana's 40 most deprived districts in 2004.[6] The selection of these districts were based on Input Criteria (seating place per pupil, core textbooks per pupil, per student budget, pupil teacher ratio), Access Criteria (GER and percentage of girls enrolled) and Achievement Criteria (pass rate in BECE for english and math). Due to the success of this policy in the pilot districts, it was extended to the remaining 70 districts in 2005.[7] Enrollment data record a success of the policy over the years especially in the first year following the implementation. According to the MoE, overall, enrollment at the

[6]Districts are the second level administrative subdivisions in Ghana.

[7]GER in the pilot increased by nearly 5% as compared to an average increase of 0.2% in the non-pilot districts (MoE, 2005).

basic level increased by 16.7% in 2005/2006 academic year compared to 2004/2005. However the implementation has raised concerns about the quality of education and inadequacy of the grant to cover the total expenditure of schools.[8] The inadequacy and delayed payment of the grant have led to the charging of special levies and fee by schools which leads to absenteeism if children are unable to pay (National Development Planning Commission, 2014).

Other supporting policies were also pursued alongside the Capitation Grant. To keep the children in school, the government also launched The Ghana School Feeding Programme (GSFP) in 2005. The GSFP was to provide pupils with one meal every school going day. The implementation was first rolled out on pilot basis, one public school from each of the ten regions in Ghana, and has since been extended to cover all public schools. There was also an incorporation of compulsory Kindergarten (KG) Education into Basic Education with the main aim of preparing children adequately for Primary School. The inclusion of KG Education in the Basic Education demanded that, all Primary Schools have a KG attached to them. As a result, the total number of KGs increased by 70.2% in 2005 with public KGs increasing by 66.4% and private by 81.4%.[9]

1.3 Analysis at the district level

Analyses in this paper are done at two levels, the district level and the individual level. In this section, I present the analysis done at the district level.

1.3.1 Data

The data source for the district level analysis comes from the Education Management Information System (EMIS) of Ministry of Education(MOE). The EMIS provides annual basic data and planning parameters on enrollments, population, teaching staff,

[8]The grant only covers about 38% of the total expenditure.

[9]Ministry of Education, Science and Sports, Ghana: Report on Basic Statistics and Planning Parameters for Basic Education in Ghana 2005/2006

school facilities and examination results. I use information provided for each district on enrollments, school facilities and teaching staff for both public and private schools from 2002 to 2014 academic years. New districts were created in 2006 and 2012, making the number of districts unequal for all the academic years.[10] To simplify the analysis, I add the parameters of the new districts to those of the districts they were carved out from using information provided by the Ghana Statistical Service. Thus the number of districts used in this paper is 110 for all the academic years.[11] Using information on enrollments and population, I calculate the Gross Enrollment Rates (GER) and the Net Enrollment Rates (NER) in each district for Basic Schools and its composition - Primary and JHS.[12][13]

Insert Figure 1.1

Figure 1.1 shows the number of schools for the academic years for both public and private schools. The number of private schools increased after the implementation years with more kindergartens than Primary and JHS: while the number of public Primary and JHS schools have slightly increased over time, the number of public kindergartens increased drastically after 2004. This could be explained by the Kindergarten policy demanding that the number of Primary schools should match the number of Kindergarten schools. In both types of schools, the number of Junior High Schools are very low as compared to Primary Schools.

Insert Figure 1.2

Figure 1.2 shows the number of pupils per teacher for both types of schools. The number of pupils per teacher increased from about 25 (18) in 2004 to almost 40 (32) in 2005 for public (private) Kindergarten, and has remained around 35 (30) on average. For public(private) Primary and JHS, the number is on average 35 (25) and 18 (15).

Insert Figure 1.3

Figure 1.3 shows the enrollment rates over time. The policies brought about an increase in enrollment rates for public schools at all levels especially in NER and also Kindergarten enrollment increased more. For private schools, GER gradually

[10] The number of districts increased from 110 to 138 in 2006 and then to 216 in 2012.

[11] The analysis is carried out using the number of districts as they were in each academic year and results are very similar.

[12] See to the appendix for how these rates are calculated and the relationship between them.

[13] I exclude Kindergarten since it was not part of the Basic Education till 2004.

increased over time.

1.3.2 The Overall Effects of the Policies

To examine the impact of these polices more formally on enrollment rates at the district level, I first estimate the overall effects of these policies over time on all districts.

To do that, I run the following regression ;

$$Y_{it} = \beta_0 + \sum_{\tau=1}^{T} \beta_{1\tau}\delta_{\tau t} + \phi X_{it} + \mu_i + \epsilon_{it} \tag{1.1}$$

where Y_{it} is the enrollment rate (NER or GER depending on the equation) at time t in district i. $\delta_{\tau t}$ is a time dummy equal to 1 if in year t and t equals τ and 0 otherwise. The coefficients ($\beta_1 s$) capture the effect of the policies over time. X_{it} is a vector of district school parameters such as average distance to school, number of books per pupil, number of seats per pupil, number of schools per pupil, number of teachers per pupil and number of trained teachers per pupil. μ_i is district fixed effect. ϵ_{it} is an independently and identically distributed error term.

Results

Insert Figures 1.4 and 1.5

In figures 1.4 and 1.5, I plot the estimates of the coefficients of the time dummies ($\beta_{1\tau}$) for NER and GER respectively. We can infer from Figure 1.4 that, before the implementation of the policies, NER was falling. After the implementation of the policies, NER in 2006 increased by about 24% points at the basic level with a higher increase in Primary (25%), while JHS increased by 23% points in relation to that of 2004. These increments have since stabilized around the same numbers for JHS, and Basic in general, however that of primary has shot up to about 30% in 2014 compared to that of 2004. The GERs before the implementations were rising but at a lower rate. Figure 1.5 shows that GER increased by about 10% in 2006 for basic level with the magnitude increasing over time to about 18% in 2014 as compared to 2004.

When the effects are split for Primary and JHS separately, GER in JHS increased by about 7% in 2006 and has since increased to about 20% in 2014 in reference to 2004, and that of Primary increased by 14% in 2006 and has since increased to about 24% in 2014. Even though the increments in GER overtime are still less than those of NER, these increments indicate a rise in the participation of overage children since the increments in NER have been fairly constant over time. This implies that while more children are enrolling in school at the correct age, there are also more over-aged children enrolling.

1.3.3 Differential Impacts of The Policies

The policies may have had differential effects depending on district characteristics, type of school and gender. In other words, different conditions in different parts of the country may affect enrollment rates. Analysis that look at these differential impacts is very crucial in designing interventions because evidence-based targeted interventions are needed if increased enrollment is to translate into high attendance and completion (Akyeampong, 2011). In this section, I explore these heterogeneous effects.

To this end, I run the following regression;

$$Y_{it} = \beta_0 + \sum_{\tau=1}^{T} \beta_{1\tau}\delta_{\tau t} + \sum_{\tau=1}^{T} \beta_{2\tau}(\delta_{\tau t} * D_i) + \phi X_{it} + \mu_i + \epsilon_{it} \tag{1.2}$$

where Y_{it} is the enrollment rate (NER or GER depending on the equation) at time t in district i. $\delta_{\tau t}$ is a time dummy equal to 1 if in year t and τ equals t and 0 otherwise. D_i is a dummy defined using the type of school, gender or district. X_i is a vector of district school parameters as in the first equation. μ_i is district fixed effects. ϵ_{it} is an independently and identically distributed error term.

The estimates for the betas are plotted in figures 6 through 14. When the dummy is equal to one, the coefficients plotted is $\beta_{1\tau} + \beta_{2\tau}$ and when the dummy is 0, the $\beta_{1\tau}$ is plotted.

Results

i) Effects on GER in Public and Private Schools.

Insert Figure 1.6

Figure 1.6 shows the impact of the polices on GER for Public and Private schools.[14] With the exception of the compulsory Kindergarten policy which also affected private schools, all the other policies were implemented in public schools. We can infer from the graph that, while GER for the public increased by 10% at the basic level in 2006 and gradually increased to about 15% in 2014, that of private school remained constant over time till after 2011. GER for public JHS increased by 6% in 2006 and has gradually increased to 13% in 2014; and 10% in 2006 to 20% for Primary. The no change in GER for private schools after the implementation of the policies buttresses the fact that, increments in enrollment rates after 2005 are solely due to the capitation grant and the school feeding program. If there were other factors influencing enrollments other than these polices, it would have reflected in the enrollment rates for private schools as well since every child in the country would be affected, whether enrolled in public or private. This increase could be due to the implementation of the Kindergarten policy which would have had its full effect by 2012, since the oldest cohorts would have completed primary by then.

ii) Effects on Gender.

Insert Figures 1.7 and 1.8

In figures 1.7 and 1.8, I show the effects for boys and girls. The average NER for boys in 2004 was about 50.6% (27.7% for JHS and 60% for Primary) and that of girls was 50.1% (27.5% for JHS and 58.7% for Primary). Even though enrollment rates were very low in JHS, there was no indication gender disparity. However, boys in Primary school age were 1.3% more likely to be enrolled than girls of the same age. This could be explained by the discrimination against girl child education because of the traditional roles they play, in addition to financial constraint. After the implementation of the policies, NER increased by 23% (21%) in 2006 for boys (girls) at the Basic level. The increment hovered around those figures but eventually decreased to

[14] I show only for GER because data is not available on NER.

20% for both. We can infer from the graph that the gap in the rate of increment in JHS has eventually closed in 2014. For Primary, it is almost the same increment for both boys and girls.

In 2004, the GER for boys at the Basic level was 82.8%, 71.5% in JHS and 87.3% in Primary. Girls were 10% and 6% less likely to be enrolled in JHS and Primary respectively (7% in Basic school). However from figure 8, the polices increased the GER for both, from 6% in 2006 to 10% in 2014 for boys and 8% in 2006 to 21% in 2014 for girls in JHS, and for Primary, 14% in 2006 to 20% in 2014 for boys and 15% in 2006 to 26% in 2014 for girls. Thus more girls who were not initially enrolled in school took advantage of the policies and enrolled. These results show that gender even though girls may be enrolling at a latter age than boys, gender disparity if not 0, is very small.

iii) Effects on Deprived and Non-Deprived Districts

I also explore how the policies affected enrollment rates of the first 40 districts that received the capitation grants. These were Ghana's most deprived districts in 2004 characterized by low gross enrollment rates, inadequate school facilities and low examination pass rates. The results are shown in Figures 1.9 and 1.10.

Insert Figure 1.9

In 2004, the NER for the non-deprived at the Basic level was 53% (32% for JHS and 61% for Primary) with that of the deprived about 6% (11% for JHS and 5% for Primary) less. The implementations of the policies brought about an increase of about 22% for the deprived and 25% for Non deprived (22% for deprived and 24% for non-deprived in JHS; 23% for deprived and 28% for non-deprived in Primary) in 2006. However, the increase in 2014 in relation to 2004 is 20% for both types of districts in JHS and 30% in Primary. This means for these districts, the rate at which children are enrolling has decreased in JHS and increased in Primary over time. Despite these increments in NER, the policies have not been able to bridge the gap between the deprived and non-deprived districts.

Insert Figure 1.10

The GER for non-deprived in 2004 was about 84% (75% for JHS and 88% for Primary) while the deprived lagged behind by almost 13% (20% for JHS and 10% for

Primary) at the basic level. A year after the receipt of the grant by those deprived, their GER increased by about 8% with that of the non-deprived also going up by 7% with no difference between the two statistically. The surge in the GER for the non-deprived, even though they did not receive the grant, could be explained by the implementation of the school feeding program, or an ex-ante action by parents in these districts to enroll their children in school due to the perception of not paying fees the following year. In 2006, when the grant had been extended to other districts, GER increased by about 15% (8% for JHS and 16% for Primary) in the deprived districts, and about 10% (6% for JHS and 13% for Primary) in non-deprived districts. These numbers hovered around the same figures till 2012 when they all started increasing. These results show that late entry is more of a characteristic of enrollment in deprived than non-deprived. The gap between the two in terms of the marginal effects has since decreased after 2011 with no significant difference. This means that while GER has increased for both types of districts, the disparity between the deprived and the non-deprived still remains.

iv)Effects on Northern and Southern Districts

There is an evidence that the inability to be enrolled in school in the northern part of Ghana is not seen as an opportunity denied and that education was not embedded in normal childhood as done in the southern part (Hashim, 2005). The probability of a child enrolling in school is dependent on some factors such as educational level of parents, the types of livelihoods pursued in the households, migration and fosterage. As a result, enrollments in this part of Ghana lags behind that of the southern part. Most of the deprived districts were also found in this region. I evaluate how the policies have affected this part of the country. Results are shown in figures 11 and 12 for NER and GER respectively.

Insert Figure 1.11 and 1.12

The NER in 2004 for the southern districts was about 52% (31% for JHS and 61% for Primary), and the northern lagged behind by 7% (13% for JHS and 6% for Primary). In 2006, NER increased by almost the same quantum for both; 24%, 23% and 26% for Basic, JHS and Primary respectively. It took some years before the policies affected the northern part more the southern (after 2008), with the impact more pro-

nounced for JHS, reducing the pre-existing gap.

For GER, the impact was quite substantial and significant for the Northern districts (between 18% and 20% as against 15%) till the last three years where the difference has narrowed up, particularly in Primary. For JHS, enrollment has increased tremendously for the north (10% in 2006 to 20% in 2014) and for the south, between 6% in 2006 and 15% in 2014.

v) Effects on Rural and Urban Districts.

Studies on education in Ghana have shown that children in rural areas are less likely to be enrolled in school than those in urban centers, and this difference is substantially high. I explore how these policies have benefited these two groups. Results are shown in Figures 1.13 and 1.14.

Insert Figure 1.13 and 1.14

In 2004, the NER in the rural was about 8% behind that of the urban, and GER was about 11% less at the Basic level in general. The NER (GER)for the urban were 39% (83%) and 64% (91%) with the Rural lagging behind by 14% (20%) and 6% (8%) for JHS and primary respectively. This means that progression to JHS was more problematic for those in rural than those in urban. The results show that, even though NER has increased for both rural and urban, it has not done so much enough to close the pre-existing gap. In terms of magnitude, between 2006 and 2014, NER (GER) have increased between 24% and 25% (10% and 20%) for rural while that of the urban have been between 27% and 25% (10% and 15%).

The results obtained in this section indicate that, even though enrollment rates, especially GER, have increased for all districts irrespective of their characteristics, they have not increased in such a way that the pre-existing disparities between these districts have closed up. The use of district level data for the analysis of the impacts of educational policies could be limited in a couple of ways: within districts, there exist some heterogeneity between individuals, therefore, using district characteristics to classify districts does not take into considerations these heterogeneity. In addition, the data does not allow for the control of demand side factors which affect enrollment such as educational background of parents, household size and household income (Osei *et al.*, 2009). Another limitation is the inability of this data to

reflect attrition during the year since data is collected at the beginning of the academic year. Also, the allocation of grants is based on the number of pupils enrolled and this could serve as an incentive for schools to overly report enrollments. These would tend to overestimate the effects of the policies. Using a micro level data for the analysis could overcome some of these limitations and this is what is done in the next section.

1.4 Micro Level Analysis

In this section, I estimate the impact of the educational policies on enrollment rates using individual level data. First, I describe the data used, followed by the methodology used and then present and discuss the results.

Data

Data used for this analysis comes from Ghana Demographic Health Surveys (Ghana DHS) in 2003, 2008 and 2014. The choice of these years allows to do analysis before and after the implementation of the policies. Analyzing the policies 5 years after its implementation however does not rule out the fact that any increment found could be due to time trend. However, I show as a robustness check that this is an issue. The Ghana DHS is a national representative survey of the Ghanaian population with the main objective of providing information on health indicators. There are three questionnaires; the household, women and men. For the purpose of this analysis, I use information provided in the household questionnaires. In this questionnaire, basic demographic information is collected on the characteristics of each person listed (usual members or or visitors who stayed in the household the night before the survey), including his or her age, sex, marital status, education, and relationship to the head of the household. The household questionnaire also includes questions on children education as well as information on the characteristics of the household's dwelling unit, such as source of water, type of toilet facilities, materials used for the floor of the dwelling unit, ownership of various durable goods and wealth index.

For the question on children education, the interviewers ask if the child is currently attending school or not. This solves the problem of non-attrition associated with the district level data. I restrict the sample to children between the ages of 6 to 24 years because these are the ones that I have information on their current attendance status, and the official age for attending primary school is 6. This leaves a final sample size of 49817. However due to missing responses on some variables, subsequent analyses may deviate from this base sample. The NER and GER in this section shall be referred to as Net Attendance Rates (NAR) and Gross Attendance Rates (GAR).[15]

1.4.1 Overall Impacts of The Policies

To evaluate the overall effect of the policies, I estimate the following equation using observations of children's attendance status as well as their background characteristics from the repeated cross sectional data set.

$$Y_i = \beta_0 + \sum_{\tau=1}^{T} \beta_{2\tau}\delta_{i\tau} + \phi X_i + \mu_s + \epsilon_i \tag{1.3}$$

where Y_i takes value 1 if child i is enrolled in school (Basic, Primary or JHS, depending on the equation) at the corresponding time. $\delta_{i\tau}$ takes value 1 if child i is observed at time τ and 0 otherwise. X_i is a vector of individual and household characteristics such as gender, type of residence, household wealth, age of household head, sex of household head and relationship to household head [16]. μ_s is regional fixed effect and ϵ_i is an independently and identically distributed error term. The coefficients of interests are the β_s.

The above equation gives the estimates for the NAR. The calculation for the GAR is shown in the appendix.

[15] NAR and GAR are the same as NER and GER. The former are used in survey data analysis.

[16] I do not control for education of parents which is an important factor of enrollment. This is because DHS reports that for only children less than age 17. Controlling for that does not change the results significantly but only decreases the sample size.

1.4.2 Results

Table 1.1 here

In table 1.1, I show the estimates of the β_s for Basic in general, then Primary and JHS. In column 1, I present the enrollment rates for the base year, 2003. Overall, 48% of children who are of Basic school age were enrolled in 2003, with 61% of Primary school age children and 24% of JHS age children enrolled. On average, the policies have brought about a surge in NAR by about 10% at the Basic level, Primary by 10% and JHS by 8%. GAR in Primary and JHS on average increased by 8% and 12% respectively. Splitting the effects for different years, NAR in 2008 increased by 13% in Primary and 8% in JHS. In 2014, NAR was 8% higher in Primary and JHS than in 2003. This shows a decline in the rate at which children are enrolling in Primary school. For JHS, this has increased a little bit over time which could be explained by more children now being able to progress into JHS after that have completed Primary.

The GAR in 2003 was 97% for Primary and 55% for JHS. The results show GAR increased at all levels in 2008, especially at JHS but this decreased drastically in 2014; while GAR increased by 13% in Primary and 16% in JHS in 2008, the GAR in 2014 was about 7% higher in JHS than 2003 with no effect in Primary.

Comparing the GAR and the NAR in each year, the GAR in 2008 was greater than NAR in JHS, indicating that over-aged participation increased in reference to 2003 while in primary, they are not different from each other. However in 2014, whiles NAR in primary is greater than GAR, GAR is still greater in JHS which shows a decrease in over-aged participation in Primary and an increase in JHS in reference to 2003. Thus over-age participation has decreased in Primary over the years, but still remain a feature of participation in JHS. The lower GAR could be explained by either these children are dropping out of school, or children are enrolling at the correct age. In section 5, I look at over-age participation into more details to better understand how the policies have affected it.

1.4.3 Differential impacts for different individuals

To analyze how the policies have affected individuals with different characteristics, I estimate this equation;

$$Y_i = \beta_0 + \beta_1 D_i + \sum_{\tau=1}^{T} \beta_{2\tau}\delta_{i\tau} + \sum_{\tau=1}^{T} \beta_{3\tau}(\delta_{i\tau} * D_i) + \phi X_i + \mu_s + \epsilon_i \tag{1.4}$$

where Y_i takes value 1 if child i is enrolled in school (Basic, Primary or JHS, depending on the equation) at the corresponding time. $\delta_{i\tau}$ takes value 1 if child i is observed at time τ and 0 otherwise. D_i is a dummy that equals 1 depending on child i's background characteristics and 0 otherwise. X_i is a vector of individual and household characteristics such as gender, type of residence, household wealth, age of household head, sex of household head and relationship to household head. μ_s is regional fixed effect and ϵ_i is an independently and identically distributed error term. The different elements of the coefficient vector $\beta_0 + \beta_1$ and $\beta_0 + \beta_1 + \beta_2 + \beta_3$ provide estimate of the impact of the policies on the probability of attendance for $\delta \neq 0$ in 2003 and the after-policies years (2008 and 2014) respectively. For $\delta = 0$, this will be given by β_0 and $\beta_0 + \beta_2$ for 2003 and the after-years respectively. The difference between the year before and the year after will give a measure of how the policies have affected the probability of attending school which is given by β_2 for $\delta = 0$ and $\beta_2 + \beta_3$ for $\delta = 1$. It is these differences that I represent in table 1.2 with an extra column showing the levels in attendance rates in 2003. The results are discussed below.

1.4.4 Results

Table 1.2 here

i) Differential impact by wealth

The main aim for introducing the capitation grant was to remove every financial barrier in accessing education especially for the poor. We observe from table 2 that, while 61% of the rich were enrolled in Basic school, only 38% of the poor were en-

rolled in 2003, while 73% of the rich were enrolled in Primary, that of the poor was only 50%. In JHS, rich were almost 3% more likely to be enrolled than the poor. However. the implementation of the policies led to an increase of about 11% (13% in 2008 and 9% in 2014) for the poor and about 9% (10% in 2008 and 7% in 2014) for the rich, which hints at the possibility that financial constraint was indeed a problem to the poor. Splitting these effects for Primary and JHS, as more poor children were enrolled than the rich in Primary(13% against 8%), the reverse is in JHS (6% against 10%) on average. The rate of increase has decreased for both the poor and rich in 2014 for Primary school but increased only for the rich in JHS while that of the poor has decreased.

ii) Differential impact by place of residence

In 2003, 57% and 43% of the children living in urban and rural were enrolled in Basic school respectively. Urban children were more than twice likely to be enrolled in JHS than rural children (35% for urban and 16% for rural). 69% of urban and 56% of the rural were enrolled in Primary. The policies increased the probability of attending school for children in rural areas by 10% and that of the urban by 9% on average in Basic school. For Primary, NAR has since increased by 12% for rural and 9% for urban, decreasing the pre-existing gap at the Primary level. However, the gap has widened in JHS as NAR for the urban has increased by 9% and that for the poor by 7%. For Primary, the increments in 2008 are higher than in 2014, however, for JHS, the increment in 2014 is higher for the rural children.

iii) Differential impact by gender

Prior to the implementation of the policies, gender disparity was not a major issue at the Basic level though slightly more boys were enrolled than girls in Primary school, and more girls than boys in JHS. The policies brought an increment of about 12% for girls and 9% for boys in Primary school, and 6% for girls and 9% for boys in JHS closing the little disparities that existed.

iii) Differential impact by region

As it has already been pointed out, the probability of attending school in the northern region is dependent on a complex mix of factors and the fact that a child has no access to school is not an opportunity denied. This is reflected in the enrollment rates in 2003. Overall, in Basic school, 33% of children of Basic school age in the north were enrolled in school against 52% in the south. At the Primary level, the enrollment rates were 44% and 66% respectively. The gap even widens in JHS as we can infer from the table that in 2003, less than a third of the children attending JHS in the south were doing so in the north. However, the policies have led to a decrease in these gaps. At the Basic level, the NAR for the south increased by 8% and doubled for the north in 2008. While the increment fell for those in south in 2014, it increased for the north, and was five times that of the south. Disaggregating these effects, the increment in NAR at the Primary level for the north was thrice the number for the south. As the rate of increment has increased over the years for the north, its not so for the south. For JHS, the average increment was 7% for the south and 12% for the north. While the increment remained constant for the south in 2008 and 2014, it increased for the north by about 3%. These suggest that gap that existed between the north and the south has narrowed up with the implementation of the policies.

1.4.5 Robustness check

Using 2008 and 2014 as post implementation years do not rule out the fact that any increment in enrollment could be due to a time trend. To check this problem, I merge the DHS data with MICS data from UNICEF, which provides data for 2006. These two repeated cross sectional data sets are very similar in the variables they collect. I merge MICS 2006 with DHS 2003, 2008 and 2014 and perform the analysis with this combined dataset. The results are shown in table 1.3 for NAR and GAR.

Table 1.3 here

We can infer from the table that NAR at the Basic level increased by 13% in 2006. When we split the effects for Primary and JHS, NAR increased by 13% and 12% respectively. However the increments were smaller in 2008 and 2014 which buttresses the fact that the results are not driven by time trend. if it were so, they should have increased in the subsequent years too. For GAR, it increased by 8% for Primary and

13% for JHS in 2006. This increment shot up in 2008 but decreased in 2014 for both levels. These mitigate the problem that the results are not time driven.

1.5 Educational Participation and Attainment by Cohorts

In this section, I examine educational participation and the number of years of education by cohorts before and after the policies. Doing this will help to understand if children are now entering school at the right age and has a potential of understanding the effect of over-age on participation and drop out. As previous results have shown, over-aged children took advantage of the policies and enrolled in 2008, however, the GAR went down in 2014 and was very substantial for Primary. Estimates of the impacts also suggest that the change in NAR was greater than the change in GAR for Primary in 2014. A higher change in NAR than GAR indicates that over-age participation has decreased. As mentioned earlier, this could mean that they either drop out of school or children now enroll at the official age. If the policies have brought about a decrease in drop out, then it should be reflected in the number of years of education of same age cohorts before and after the policies.

Figure 1.15 here

In Figure 1.15, I show the participation of over-age population for both Primary and JHS in all the survey years. For Primary, the number of children who were not enrolled has decreased in 2008 and 2014 indicating that drop-outs took advantage and enrolled. Also the number of over-age participants in Primary has decreased overtime as already discussed before. We can also see that the number of children that have completed Primary increased in 2008, from 53% in 2003 to 60% and to 64% in 2014. This shows that the policies managed to get more of these children complete their Primary education. For JHS, the number of children who were more than 14 years and were not enrolled in school has decreased, even though those of 2008 and 2014 are not different from each other. More of these children enrolled in 2008 at Primary and JHS and this decreased in 2014. Also the number of these children who have completed JHS increased from 40% to 44% in 2008 and 46% in 2014.

1.6 Conclusion

The introduction of the educational policies in 2004 and 2005 in Ghana were aimed at creating equity in access to basic education. This paper evaluates the impacts of these policies on enrollment rates at the Basic school level. I carry out the analysis using two data sources; district level data and individual level data. In both analyses, I look at the total as well as the differential effects of the policies, since the polices might have affected districts and individuals differently due to heterogeneity among them.

Estimates from both data indicate an evidence of a large and discontinuous increase in enrollment rates after the implementations of the policies. While the district data suggests that on average, the increments have stayed around the same number over the years, the individual level data suggests a decrease over time. Estimates from the district level data suggest an increase that is about twice higher than that found with the individual data. This difference can be explained by the fact that the district level data does not reflect the attrition during the academic year. Also there is an incentive for schools to over-report the enrollment figures since the amount of money received is dependent on the number of children enrolled.

Though the policies have increased enrollment rates across all categories of people and districts and show no evidence of gender disparity, both data reveal that enrollments for children with less privileged socioeconomic backgrounds have not increased fast enough to catch up with those from affluent backgrounds. This indicates that inequality in access still remains so much emphasis should be put on the poor. One of the ways to do this is to revise how the capitation grant is distributed, by giving more to poorer districts. The government could also make it a cash transfer to households, or ensure a faster delivery and accountability of funds to schools which will avoid the over reporting of enrollment rates by schools.

Even though more children are enrolling at the right age, over-age participation still remains a problem especially at the JHS level and are more of a characteristic of the poor. Enrollments in JHS are still very low especially NER, as more than half of children aged 12-14 years who are supposed to be in JHS are not enrolled. While progression to JHS has improved, comparing it to that of Primary, it is still very

low. Achieving a universal Basic education would require that children enroll at the right age. This calls for public awareness on the benefits of enrolling at the correct age which by so doing could reduce school dropouts.

Chapter 2

Early Marriage and Conflict: Evidence from Biafran War in Nigeria

2.1 Introduction

Despite the laws against it, early marriage remains widespread. Globally, approximately 15 million girls get married every year before they reach 18 years. In developing countries, 1 in 3 girls is married before she turns 18 years, and 1 in 9 before the age of 15 years (UNICEF, 2016).[1] Early marriage constitutes a violation of the Universal Declaration of Human Rights. It has significant negative impacts, not only on married girls and their children, but also on a wide range of development outcomes. For instance, early marriage decreases the educational attainment of married girls (Delprato *et al.*, 2015; Field & Ambrus, 2008); this limits their economic opportunities and empowerment, and thereby trap them in a cycle of poverty (Parsons *et al.*, 2015). It also exposes them to other forms of risk: early married girls are at a higher risk of sexual, physical and psychological violence (Erulkar, 2013); in addition to early child bearing and high fertility, they face a higher risk of maternal mortality (Women's Refuge Commission, 2016); the spousal age gap and their involvement in polygamous marriages also pose significant STD risk factors, such as HIV (Clark, 2004); the children of these girls are at greater risk of perinatal infant mortality and

[1] Early marriage also affects boys, but to a lesser degree than girls: 82% of early married children in 2014 were girls and 12% were boys (UNICEF, 2014).

morbidity (WHO, 2013). These negative impacts explain why early marriage has entered the international and country-specific agendas for development: its eradication is seen as a necessary step to achieving the UN Sustainable Development Goals (SDGs) by 2030 (UNICEF, 2016).

In this paper, I study how exposure to conflict can lead to early marriage. Defining early marriage as marriage before age 16 years, I exploit variation across ethnicity and cohort to study the effect of the Nigerian Civil War, known as the Biafran War, on early marriage of exposed women. The Biafra war is well suited for the analysis in this paper because the war was mainly concentrated in the region of Biafra, hence, the direct exposure was restricted to the ethnic groups located in this region. Using retrospective variation across cohorts, the use of current geographical location to identify exposure to conflict could be misleading due to migration. However, ethnicity mitigates this potential concern since a person's ethnicity does not change even if she migrates. Thus, I use the differential evolution of early marriage across cohorts and ethnic groups as my main source of variation in the analysis.

Biafra was a secessionist region in the southeastern part of Nigeria, dominated by the Igbo people. In May 1967, the Biafrans declared their independence; consequently, the government sought to counter this secession, and that led to a civil war. The war lasted for a period of two and half years (6 July 1967 - 15 January 1970), with a large number of casualties: in addition to about 100,000 military fatalities that were recorded, the severe starvation, which was used as the main weapon of war, led to the death of over one million Biafrans (Nwoko, 2014). Many Biafran women and girls were also sexually abused during this period (Obikeze & Mere, 1985).

Using data from the Nigeria Demographic and Health Survey, I compare the evolution of early marriage of exposed and non-exposed women using a difference-in-difference analysis to identify the effect of conflict on early marriage. The estimated result shows that Biafran women exposed to the war at ages 10 to 15 years were on average, 6% more likely to be married before age 16 years than their peers who were not exposed. This result is robust to many alternative specifications. Additional placebo analyses discard that it is driven by alternative time-varying omitted variables that create spurious correlation.

Aside being deeply embedded in socio-cultural and religious traditions in many developing countries, there are other factors that have been documented to exacerbate the prevalence of early marriage. For instance, gender roles and gender inequality perpetuate this practice (Girls Not Brides, 2015); studies have shown that women with little or no education are more likely to be married earlier (Ikamari, 2005; Bates *et al.*, 2007); the prestige attached to virginity and chastity, and consequent control of the sexuality of girls can also fuel this practice (Khanna *et al.*, 2013); early marriage is perceived to reduce family dishonour brought by premarital sex and pregnancies (Lee-Rife *et al.*, 2012); girls from poorer backgrounds are also more likely to marry earlier as families on low income may see it as a survival strategy (Mathur *et al.*, 2003). During humanitarian crises, these factors can interact, making the practice a more complicated phenomenon to curb. Armed conflicts trigger economic difficulties, weaken social institutions, and increase sexual violence and assaults targeting women and girls (Buvinic *et al.*, 2012). Families may use early marriage as a coping mechanism against economic hardships, and to ensure the safety of daughters against all forms of physical and sexual assaults which may lead to family dishonour. The breakdown of educational facilities and social networks during such crises also increase girls' vulnerability to be married earlier. Regardless of the channel of impact, my findings suggest that conflict could compel individuals to resort to traditions and practices that can have a long run impact on their welfare.

This paper contributes to the literature by quantifying the effect of conflict on early marriage of exposed women. According to Girls Not Brides (2016), nine out of the top ten countries with the highest rates of early marriage are considered as fragile (affected by natural disaters and/or conflicts), ultimately hinting on a potential correlation between fragility and early marriage. However, evidence in this area is surprisingly scarce, leading to a gap in informed policy interventions. To the best of my knowledge, there are only two papers that study early marriage in the context of fragility, and these studies focus on natural disasters: Corno & Voena (2016) and Corno *et al.* (2016) use bride price custom to explain the impact of rainfall on age at

marriage.[2] Yet, there is no such study on conflict.[3] This paper, therefore, bridges this gap by quantifying the degree to which conflict can trigger early marriage.

More broadly, this paper is related to other strands of literature. It is related to the literature that looks at the impacts of conflict on the marriage market (Shemyakina *et al.*, 2009; Jayaraman *et al.*, 2009; Schindler & Verpoorten, 2013; Saing & Kazianga, 2017). Some studies in this literature study the impact of conflict on age at first marriage. These studies generally find evidence that armed conflicts increase the age at first marriage for exposed women, which might seem to contradict my findings.[4] These contradicting findings could be explained by the fact that conflicts may have differential impacts across the age spectrum: age at first marriage could increase for adult women while the incidence of early marriage could increase for younger women. These differential impact can be attributed to changes in traditional gender roles and responsibilities as a result of breakdown of kinship due to death and forced displacement during conflict. While adult women may be inducted into political and civic participation, and take the roles of family heads, leading to a delay in their marriage, families may see the marriage of girls as a way of reducing their the economic burdens (Jayaraman *et al.*, 2009; El Jack *et al.*, 2003; Commission, 2016). Moreover, a decrease in the sex ratio may crowd out the marriage opportunities for older women and leave a higher proportion of them unmarried since younger brides who also enter the marriage market may be preferred by potential grooms (Shemyakina *et al.*, 2009).

This paper also contributes to the large literature on how households respond to economic shocks. While idiosyncratic shocks can be insured within the community through informal insurance arrangements between its members, economic shocks cannot (Dercon *et al.*, 2002). Households, therefore, have to rely on other coping strategies such as migration, consumption smoothing and off-farm employment. Yet,

[2] Corno & Voena (2016) find that girls hit by a negative rainfall shock in their teenage ages have a higher probability of being married before the age of 18 years. Corno *et al.* (2016) find a positive effect of drought on early marriage in Africa and a negative effect in India. They argue that this differential impact can be explained by the difference in the direction of marriage payment traditions in these two regions: bride price in Africa and dowry in India.

[3] A working paper version of Valente (2013) includes some results on both educational attainment and early marriage of women who were exposed to the Nepalese conflict during primary school age. However, the analysis of early marriage is not included in the published version.

[4] An exception is Saing & Kazianga (2017) who find a decline in age at first marriage for girls who were exposed to the US bombings in Cambodia when they were ages of 7 to 12.

these strategies are often limited and not able to successfully overcome the vulnerability in consumption. Moreover, if economic shocks occur periodically, then households may devise ex-ante strategies that could help them smooth consumption over time, but such arrangements may not be accessible for unexpected shocks such as armed conflicts (Shemyakina *et al.*, 2009). The inability to cope during these times can have long term effect on their wellbeing such as their health and education (Rose, 1999; Jacoby & Skoufias, 1997). This paper suggests that households can also alter the timing of marriage to cope with economic shocks, which can have long run consequences on their welfare.

This paper also adds another dimension to the literature on gender roles and conflict. Most of the previous studies in this literature often focus exlusively on sexual and gender based violence (see, for example, La Mattina *et al.* (2014); Cohen & Nordås (2014); Østby *et al.* (2016)). This paper shows that the marriage decisions of girls can also be affected by conflict.

Finally, this paper is related to the studies on the impact of the Biafran War on exposed individuals. Akresh *et al.* (2012) looks at the impact of the war on the stature of exposed individuals; the author finds that individuals exposed to the war between birth and adolescence exhibit reduced adult stature, with largest impacts in adolescence. This paper shows that the marital decisions of these adolescent girls were also affected.

The remainder of the paper is organized as follows: In the next section, I explain the channels through which conflict can trigger early marriage. Section 2.3 gives a background context of Nigeria, including the Biafran war. In section 2.4, I talk about the methodology used, including the data and the empirical strategy. Results are presented in section 2.5, and finally the conclusion follows in section 2.6.

2.2 The theoretical link between Early Marriage and Conflict

The effects of conflict on the exposed population could be very detrimental: forced displacement and migration, disruption of markets, infrastructure destruction and

damage, and death of household members can lead to losses in assets and income (Buvinic *et al.*, 2012). In some instances, such as the Syrian war, the main weapon of war is starvation, leading to malnutrition and death of many civilians. Households may, therefore, devise several strategies to cope with these economic hardships; one of such is to alter marriage decisions. On one hand, early marriage may be seen as a means of acquiring wealth through the payment of dowries and bride price in order to smooth consumption.[5] In addition, getting a girl married reduces the family's burdens as the responsibilities of taking care of her are shifted to her husband. On the other hand, fewer economic opportunities and tight labour markets may make marriage costlier, hence marriage may be delayed till the recovery of the economy (Palloni *et al.*, 1996). However, studies have shown that while this is an option only available for wealthier families, poorer households could hasten the marriage of their girls to reduce the number of people to feed (Caldwell *et al.*, 1986).

Sexual violence and other forms of gender-based violence have become common features of violent conflicts, which are intended to achieve political and military objectives (Buvinic *et al.*, 2012). Rape and abductions of women and girls are used as weapons of war to intimidate, panic and displace populations. Some of these abductions sometimes lead to forced marriages as found in Iraq and Syria (UNFPA, 2015). Parents may therefore use early marriage as a way to protect their daughters from such violence and threats, whether perceived or real. Moreover, in traditional societies, given the value of virgin brides by potential marriage partners, early marriage could be used to avoid unwanted premarital sex and pregnancies which cause family shame and dishonor.

Conflict also decreases access to education: direct youth enrollment in the military, limited mobility, destruction of educational infrastructures and increased poverty may affect school attendance during conflicts (Justino, 2011; Shemyakina, 2006; Chamarbagwala & Morán, 2011). Some studies have also documented significant gender differentials, especially for girls (Shemyakina, 2011; Valente, 2013). Parents may turn to marriage as the second best alternative of securing the future of their daughters when they are deprived of education. As a matter of fact, girls with no or little education are more likely to marry earlier than those who graduate from

[5]Bride price is the transfer of wealth from the groom's family to the bride's family whiles dowry is the opposite.

secondary school or higher (Ikamari, 2005; Bates *et al.*, 2007; Carmichael, 2011).

Conflicts decrease the sex ratio, which ultimately leads to marriage market squeeze (Brainerd, 2007; Abramitzky *et al.*, 2011; Schindler & Verpoorten, 2013). During conflicts, the population of men decreases as they are more likely to be killed or forced to join military forces (Buvinic *et al.*, 2012); consequently decreasing the number of potential suitors for women in the marriage market. Such a decrease may force many women to take the roles of family heads, leading to a change in the family practices and marriage arrangements in the society. On one hand, these could lead to a delay in the age of entry to marriage (Jayaraman *et al.*, 2009). On the other hand, the decrease in sex ratio can lead to a rise in polygamous marriages as widowed and unmarried women turn to other married men for support.[6] In addition, the age of marriage can decrease in the sense that, more younger brides may enter the marriage market in order to capitalize their youth. This may crowd out older women as the younger ones may be preferable by potential grooms (Shemyakina *et al.*, 2009).

2.3 Nigeria Context

Nigeria is an important country to study the effect of conflict on early marriage since it is still experiencing the Boko Haram Insurgency. It is the most populous country in Sub-Saharan Africa, with more than 300 ethnic groups: the 3 major ethnic groups are the Hausas and the Fulanis (29%) occupying the northern part; the Yorubas (21%) in the southwestern part; and the Igbos (19%) found mainly in the southeastern part.

2.3.1 Marriage in Nigeria

Marriage is regarded as an important social, traditional and religious custom which gives an individual respect and status in the Nigerian society (George *et al.*, 2014). Besides, marriage is seen as more of a social contract made to ensure the continua-

[6] According to official figures, polygamous relationships accounted for 30% of Syrian marriages registered in Damascus in 2015, up from just 5 5% in 2010.

tion of family lines. There are 3 types of marriages in Nigeria; traditional marriage, religious marriage and civil marriage. A Nigerian couple can decide to take part in one or all of them, depending on their culture and wealth. Religious marriages, usually Christian or Muslim, are conducted according to the norms of the respective religious teachings, and take place in a church or mosque, while civil marriage takes place in a government registry office. As far as traditional marriage is concerned, marriage ceremonies are very diverse as different ethnic customs come into play. However, in general, they all start with the introduction ceremony which is a formal meeting between the two families involved. After the two families have been acquainted with each other, and the consent of the bride's family is given, customary tradition follows. This involves the payment of the bride price and the engagement ceremony.[7] Though traditional arranged marriages are becoming less common, parents do have a say in the choice of spouse. Families mostly prefer marriage from the same ethnicity or belief. The Nigerian civil law does not recognize polygamy - a marriage of one man to two or more wives. However, 12 out of the 36 states do practise it; all 12 are found in the north and are governed by the sharia law. Men tend to marry later than women: according to the 2013 Nigeria Demographic and Health Survey (NDHS), the median age at first marriage for men was 27 years as compared to 18 years for women. The delay in marriage for men could be explained by the fact that they bear the cost of marriage ceremonies, hence will prefer to wait till they have accumulated enough money for these expenses.

Even though data shows a 9% decline in the prevalence of early marriage since 2003, the practice is still widespread in Nigeria (Girls Not Brides, 2016). As at the time of the analysis in this paper, there was no minimum age of marriage. The Child Rights Act passed in 2003 sets the minimum age of marriage at 18 years-old, however, only 23 of Nigeria's 36 states have taken concrete steps to implement the minimum age of marriage. According to UNICEF (2016), Nigeria is the 13th country with the highest rate of early marriage in the world: 43% of women aged 20-24 years are married before the age of 18 years and 17% by the age of 15 years. The predominance of early marriage varies from one region to another; concentrated in the North West, where about 76% of women are married before 18 years, as com-

[7] The bride price can take the form of money, cattle, wine, foodstuffs or other valuable items depending on the tradition of the ethnic group.

pared to 10% in the South East. Early marriage is deeply rooted in strong social and religious traditions, especially among the Hausas and Fulanis in the northwest (Fayokun, 2015). Early marriage in Nigeria is also exacerbated by poverty and poor educational attainments. The abduction of girls by the Boko Haram insurgency also resulted in forced marriages (Segun & Muscati, 2014).

2.3.2 The Biafran War

Biafra was a secessionist region in the southeastern part of Nigeria, predominantly occupied by the Igbo ethnic group. Other minor ethnic groups in this region included the Efik, Ibibio, Annang, Ejagham, Eket, Ibeno, Ibibio, Ijaw, and Ogoja. Its secession from Nigeria led to the Biafran War from 6 July 1967 to 15 January 1970.

After the independence in 1960, Nigeria was divided into three regions which were formed along tribal lines. These regions were the Northern, mainly occupied by the Hausas and the Fulanis; the South West, mainly Yorubas; and the South East, majority being Igbos. These three groups had different political systems, which created some tensions among them. In 1966, there was a military coup, led by Major Chukwuma Nzeogwu, an Igbo, which resulted in the assassination of the northern leaders. Consequently, there was a counter coup by the Northerners in July of that same year, which led to the deaths of about ten thousand Igbos and other Biafrans living in the north, including the then new head of state, Major Gen Johnson Aguiyi-Ironsi. This made many Biafrans living outside Biafra to flee to Biafra for refuge.[8] This ethnic tension, amidst the persecution of the Ibgos and the lost of control over the discovery of oil in the Niger Delta in the southeast, made the Igbos, led by Chukwuemeka Ojukwu, declare the independence of the Republic of Biafra on 30 May 1967. The federal government, immediately, placed an embargo on all shipping to and from Biafra and soon extended the blockade to oil. Afterwards, the government launched a police action to reclaim the region and this led to the start of the war in July 1967. The blockade of food supply led to severe famine in Biafra, leading to widespread malnutrition and devastation among adults and children (Miller, 1970). The war received one of the highest humanitarian interventions in history. However, relief

[8]It is estimated that Biafra received 1.5 million refugees once the war started (Aall *et al.*, 1970).

efforts were very limited as the amount of food provided was not sufficient to meet the demands of victims (Aall *et al.*, 1970).[9] The war ended in 15 January 1970, after the Biafrans surrendered to the Nigerian government.

Over the two and half years of the war, there were a large number of casualties: in addition to about 100,000 overall military fatalities that were recorded, about 1 to 3 million Biafra civilians died from starvation.[10] Women and children in the region also experienced several forms of physical, emotional and sexual violence. The federal military men categorically targeted women, and teenage girls and boys. The first tactic the military men used against women and adolescent girls living in the communities where they camped was sexual abuse. In some cases, these girls were moved to primary school compounds where they were brutally abused and raped. Girls returning from the market, streams, and farms were waylaid and assaulted, and shot when they refused (Obikeze & Mere, 1985). Some of the abductions of girls and women resulted in forced marriages. Insecurity from the fighting also brought about a halt in school activities, leading to the close down of schools (Uchendu, 2007a).

2.4 Methodology

2.4.1 Data

To examine the effect of conflict on early marriage, I use the Nigeria Demographic and Health Surveys (NDHS) in 1990 and 2003.[11] The NDHS is a national representative repeated cross sectional data conducted by the U.S. Agency for International Development (USAID), to provide demographic and health information. In all households, women aged 15-49 years and men aged 15-59 years were eligible to participate in individual interviews. For the purpose of this study, I use observations

[9] Initially, no relief agency was allowed in Biafra, till late 1968, when the first international relief operations were launched.

[10] The daily death rate was estimated to be about 200 to 300; 70% of those who died were children (Nwoko, 2014).

[11] These are respectively the first and third surveys carried out in Nigeria. The second was in 1999, however, it is not publicly available.

from individual interviews with eligible women born between 1950 and 1970. The main variable of interest is the age at first marriage: in all the surveys, women were asked to give the day, month and year of marriage so I am able to identify whether a woman got married early or not. To identify individual's exposure to the war, I need information on her ethnicity. However, the 1990 survey does not provide information on ethnicity. Therefore, I use respondent's language to determine her ethnicity.[12]

Insert Figure 2.1

Figure 2.1 shows the sample distribution of age at first marriage. The age at first marriage is concentrated between 10 and 26 years. The most common age of marriage in the sample is 15 years which shows the high prevalence of early marriage in Nigeria. Since a very small proportion of women married before age 10 (less than 1%), through out the paper, I will assume that the start of early marriage is 10 years.

Insert Table 2.1

Table 2.1 shows some characteristics of women in the sample based on whether they got married early or not (before 16 years or not). All the statistics are consistent with the literature. Early married women are more likely to have no education or less likely to be educated (Delprato *et al.*, 2015). They were also less likely to be working at the time of the survey. Early married women are less likely to give birth before marriage, which supports the argument for the use of early marriage an an opportunity to avoid premarital pregnancies in traditional societies (Khanna *et al.*, 2013). They are also on average more likely to have more children than those who marry after 16, highlighting high fertility rates among early married women (Raj *et al.*, 2009). Among the three major ethnic groups (Hausa, Yoruba, and Igbo), early marriage is more prevalent among the Hausas, which is explained by religious differences among them. Early married women are more likely to be married to older men who are at least twice their age, more likely to be in polygamous marriages and more likely to be first wives. Their husbands are also less likely to be educated. In consistent with the literature, they are more likely to be living in rural areas and more likely to be poor (Otoo-Oyortey & Pobi, 2003; Mathur *et al.*, 2003).

[12]According to sociolinguists, language can be used to identify individual's ethnicity (Shah, 2015).

2.4.2 Empirical Strategy

The main identification strategy relies on the use of birth year and ethnicity to identify woman's exposure to the war. I exploit the timing of the war, together with the fact that the war was mainly concentrated in the southeastern region (Biafra), hence, the direct exposure was restricted to the ethnic groups located in this region. The Biafra region was populated by the Igbo and other minority ethnic groups (Efik, Ibibio, Annag, Ejagham, Eket, Ibeno, Ibibio, Ijaw, Adoni and Ogoja), henceforth, I shall refer to these ethnic groups as the Biafra ethnic group. I perform difference-in-difference analysis using ethnicity and birth cohort to identify the treatment and control groups. Some previous studies estimating the impact of conflict on various outcomes measure variation in conflict intensity using geographical unit. This measure could have some limitations when using retrospective analysis across cohorts since current geographical location can be sensitive to migration. War could displace people, and in patrilocal societies such as Nigeria, marriage is often accompanied by migration to the husband's place. Without having migration history, war exposure could be classified incorrectly. The use of ethnicity rather than geographical units mitigates some of these potential concerns since a person's ethnicity does not change even if she migrates.

The treatment group consists of women who were born from 1952 to 1959 (10-15 years old during the period of the war) and from the Biafran ethnic group as defined above.[13] The control group consists of two subgroups; those who were of the same age as the treatment group during the war but from an ethnic group outside Biafra, and women who were born from 1960 to 1969 (10-15 years old in 1975 to 1979).[14]

I hypothesize differential impact of the war for girls who were exposed to the war below the age of 16 years and those of the same age bracket but were not exposed either during the period of war or afterwards: the early marriage decision of the for-

[13] Since the war ended in mid-January of 1970, I only consider 1967 to 1969 as my war years. In one specification, I added 1970 and the results reduce by 2%, yet significant. Results are available upon request.

[14] These cohorts were either not born or too young to be married at the time of war.

mer should increase whiles that of the latter should not be affected.[15] To analyze the impact of war on early marriage, I estimate the following equation:

$$Y_i = \beta_0 + \beta_1 \mathbb{1}\{ethnicity_i = B\} * \mathbb{1}\{cohort_i = C\} + \phi X_i + \gamma_{r(i)} + \theta_{e(i)} + \lambda_{t(i)} + \delta_s + \epsilon_i \quad (2.1)$$

The outcome variable, Y_i equals 1 if woman i, living in region r, belonging to ethnicity e, and born in year t got married before 16 years, and 0 otherwise. The independent variable of interest, $\mathbb{1}\{ethnicity_i = B\} * \mathbb{1}\{cohort_i = C\}$ is an indicator for if a woman's ethnicity is biafra and belongs to the war cohorts (10-15 years in 1967-69). X_i is a vector of woman characteristics such as education, religion and place of residence. γ_r, θ_e, λ_t and δ_s are regional, ethnicity, year of birth and survey rounds fixed effects. Education level is endogenously determined by marriage since early married girls are more likely to drop out of school to perform marital duties. I control for this endogeneity by using compulsory education of nine years as a measure of education level. Assuming that education begins at the age of 6 years and there is no repetition, then, by the time the girl gets to the age of 16 years, this education level should have been completed.[16] The coefficient of interest is β_1 as it measures the full impact of the war for the exposed ethnicity for a given cohort. The equation is estimated by OLS and standard errors are clustered at the ethnicity level.

2.5 Results

Insert Table 2.2

The results from equation 1 are shown in Table 2.2. In all even-numbered columns, I control for ethnicity time trend to capture differences between ethnic groups across time. The main results are presented in columns 1 and 2. The estimated coefficient (War Cohort * Biafra) indicates that girls who were of the Biafran ethnicity and lived during the period of war were 6% more likely to be married before the age of 16 years

[15] The conventional difference-in-difference analysis measures time periods as before and after treatment, however, the dataset used in this paper is not retrospective enough for comparison between those who were below 16 years during the war and those before the war.

[16] Similar approach was used in Shemyakina *et al.* (2009)

than their age mates who were not exposed to the war. In column 2, when I control for ethnicity time trend, the result increases to 10%. Even though the war was concentrated in the Biafran region, the main ethnic groups involved were the Biafrans and the ethnic groups found in the north (Hausas and Fulanis). To ensure that the results are not driven by any particular ethnic group, I split the Non-Biafran ethnic groups into ethnic groups found in the North and those found in the West.[17] Then, I re-estimate equation 1, using ethnic groups in the north and in the west as ethnic groups in the control group in separate estimations. Results are shown in columns 3 to 6. In all columns, the results are fairly similar to the baseline results, indicating that the findings are not driven by any particular ethnic group. The signs of the controls are consistent with literature even though some are not statistically significant. These results are consistent with the hypothesis that, in times of conflict, early marriage prevalence goes up.

Placebo tests - Impact of the conflict on early marriage in the absence of the conflict.

The difference-in-difference estimation is only plausible under the assumption that in the absence of conflict, the unobserved differences between treatment and control groups are constant over time. It is impossible to test if unoberved time-varying omitted factors are correlated with treatment, however, one can test whether there are differences in time-varying observables correlated with future conflict before the start of the conflict. I also do placebo on ethnic groups that were not directly exposed to the war with the assumption that their marital decisions should not be affected.

(a) Impact of the conflict on non-exposed cohorts

Here, I test the validity of the assumption of the difference-in-difference estimator. The data used in this paper is not retrospective enough to test the differences in pre-conflict trend, so what I do is post-conflict trend. If the results truly reflect the relationship between early marriage and conflict, then there should not be any difference in early marriage between non-exposed cohorts from the biafran ethnicities

[17] During and after Nigeria independence in 1960, the country was divided into 3 regions, namely, the Northern, Western and Eastern Regions.

and other ethnicities. I re-estimate equation 1 for several cohorts specifications in a moving window defined by years. More specifically, I estimate the following equation

$$Y_i = \beta_0 + \beta_{1c}\mathbb{1}\{ethnicity_i = B\} * \mathbb{1}\{cohort_i = C_{[1967+c-1969+c]}\} + \phi X_i + \gamma_{r(i)} + \theta_{e(i)} + \lambda_{t(i)} + \delta_{s(i)} + \epsilon_i \tag{2.2}$$

where Y_i and $\mathbb{1}\{ethnicity_i = B\}$ are defined as in equation 1. $\mathbb{1}\{cohort_i = C_{[1967+c-1969+c]}\}$ equals 1 if a woman was 10-15 years during the period of $[1967+c$ to $1969+c]$ and 0 if 10-15 years in $[1975+c$ to $1979+c]$ for $c = 0, 1, ..., 5$ years. Thus if $c = 0$, then the cohort specification is the same as in the original estimation. I plot the estimates for each specification in Figure 2.2(c). The graph shows that as we move away from the war years, the effect of the conflict decreases and becomes statistically insignificant, showing that results are not driven by time varying omitted factors.

(b) Impact of the conflict on non-exposed ethnic groups

In this subsection, I test the hypothesis that the war should not have any effect on the early marriage decisions of ethnic groups that lived outside the Biafra region since they were not directly affected. I, therefore, drop the main war-exposed ehnic group (the Biafrans) from the sample and re-define new treatment and control ethnic groups. The new treatment ethnic groups comprise of all ethnic groups found in the west as they were not largely involved in the war, and the new control ethnic groups are the Hausas and the Fulanis found in the North.[18] The definition of exposed and non-exposed cohorts remain the same as in the main regression. I re-estimate equation 1 and the results are shown in table 2.3. The results show that the coefficient on the difference-in-difference term is not significant, which indicates that the war did not have any effect on non-exposed ethnic groups.

[18] Akresh *et al.* (2012) uses similar approach on the analysis of the impact of the same conflict on the health of exposed children.

Robustness Checks

(a) Alternative specifications of control cohorts

I show that the results are not driven by the choice of the control cohorts, by defining different control cohorts specifications. In the first specification I do, I keep the treatment cohorts as in the main results (10-15 in 1967-69) and change the control cohorts in a moving window defined by years, whiles maintaining the same distance as the initial control cohorts (10-15 in 1975-79). The results are plotted in figure 2.2(a). In the second specification, I still keep the treatment cohorts, but define new control cohorts with the same window gap as the treatment cohort and again keep moving the window. Results are shown in figure 2.2(b). In both figures, the results are fairly the same as the main results, implying that the results are not driven by the choice of the control group.

2.6 Conclusion

In this paper, I provide an empirical evidence of the impact of conflict on early marriage. I explore variation given by the Biafran War in Nigeria to identify woman's exposure to war. Comparing the evolution of early marriage across time and ethnic groups, I find that women who were exposed to the Biafran conflict at ages 10 to 15 years were on average, 6% more likely to get married before they turned 16 years than those who were not exposed to the war. This finding is informative for policy makers who aim at reducing the rate of early marriage in developing countries: it provides an evidence that conflict can indeed exacerbate the prevalence of early marriage. This suggests that much attention should be paid to conflict-affected regions: Interventions should be designed in such a way that safety risks, educational disruption, and limits to economic opportunity that combine to make early marriage a feasible option for families struggling to survive in times of conflict are tackled. Breakdown of institutions may make enforcement of early marriage laws unfeasible, however, post-conflict interventions such as empowering affected girls through edu-

cation and vocational training could reduce the welfare lose of this harmful practice. It also highlights the interdependence between economic crises and cultural norms: households may resort to harmful cultural traditions that can have a long term impact on their welfare just to cope with the economic hardships they face. Therefore, the prevailing social norms of the society should not be overlooked during economic crises.

There are several possible channels through which the Biafran war could have affected the incidence of early marriage. Identifying the channel of impact is beyond the scope of the paper, however, some of the possible reasons could be: 1) the use of early marriage as a survival strategy due to the severe famine imposed by the war in the region of Biafra (Uchendu, 2007a). 2) the use of early marriage as a protective mechanism against the rampant sexual violence in the region as a result of the war (Uchendu, 2007b). Further exploration in this area could provide useful insights for designing effective policies to eradicate early marriage.

Chapter 3

The Impact of Conflict on the age at first marriage in Sub-Saharan Africa

3.1 Introduction

Age at marriage is a major concern in Sub-Saharan Africa due to the impacts it has on its population dynamics. Age at first marriage is an important determinant of the high fertility levels in this region.[1] Variation in the age at marriage helps explain differences in fertility across the population: while the high fertility level is a characteristic of early married women as a result of early child birth, delayed age at marriage reduces about one-sixth to one-third of the fall in the regional fertility(Hertrich, 2017; Harwood-Lejeune, 2001; Shapiro & Gebreselassie, 2014). With regards to health, the age at marriage is an important contributing factor to high mortality and sexually transmitted diseases (STDs) in this region: women who marry early have a higher risk of infant and maternal mortality due to complications during pregnancies and birth than those who marry at a later age (LeGrand & Barbieri, 2002; Guilbert *et al.*, 2013; Delprato & Akyeampong, 2017). The age at marriage can be stable for a very long time, however, it can be influenced by sudden changes in the social, economic and political structure of a society. Marriage in Sub-Saharan Africa, which is nearly universal, was some decades ago characterized to be early. Though

[1] Sub-Saharan Africa has the world's highest fertility level: 5.1 children per woman compared too 2.2 in Latin America and Asia (United Nations, 2015).

early marriage is still predominant in this region, some studies have shown a trend towards delays in the onset of marriage in some countries (Garenne, 2004; Mensch *et al.*, 2005; Shapiro & Gebreselassie, 2014). While most studies attribute the increase in age at marriage in this region to increase in education, urbanization and woman empowerment, the age at first marriage can also be responsive to economic crisis (Ikamari, 2005).

In this paper, I provide another evidence of how economic crisis alter the marriage decisions of women in Sub-Saharan Africa. Using variation in temporal and locational exposure in the intensity of conflict experienced during the marriageable years of women, I estimate a discrete-time hazard model to examine the impact of conflict on the age at which women enter their first marriage. The impact of conflict on the hazard of marriage is identified from within-location variation in conflict and marriage outcomes, which the random timing of conflicts play a role. Estimated result shows different impacts across the age spectrum: conflict increases the hazard into marriage at the ages of 18 to 21 years, with no effect on the other age subpopulation.

The impact of conflict on marriage decisions is an empirical question and the effect can go in both direction, depending on the age bracket that is analyzed. While some studies show an increase in the age at first marriage in conflict affected regions, there are other evidences for decrease in the age at first marriage in the regions.[2] This contradictory evidence may be explained by the fact that different roles played by different age groups during conflict crises affect differential marital decisions across the age groups. While older women may postpone their marriage, the marriage of younger women could increase.

Conflict leads to forced displacements, deaths of households members especially men and loss of assets and income, creating economic hardships on households. On one hand, the incidence of early marriage can go up: if families see marriage as a way of providing their young girls with higher safety and less exposure to sexual abuse, then the rate of early marriage can go. Households may also see early marriage as a means of reducing the economic hardship on them through a reduction in their responsibilities and resources they would acquire from the groom's family. On the

[2]Neal *et al.* (2016) gives an overview on the literature for both arguments.

other hand, older women may enter into political and civic participation, or take the roles of family heads, leading to a delay in their marriage. Moreover, the decrease in the sex ratio may also decrease the chances of older women of getting husbands as the available men may prefer younger brides than older women. Nevertheless, there are some few studies in some countries that have shown a decrease in the incidence of early marriage during conflict and they cite adverse material and economic conditions and high cost of marriage as reasons for this decrease.(Woldemicael, 2008; Saxena *et al.*, 2004; Khawaja *et al.*, 2009)

This paper contributes to the literature that examines the impact of armed conflict on the age at first marriage (Shemyakina *et al.*, 2009; Jayaraman *et al.*, 2009; Schindler & Verpoorten, 2013; Shemyakina, 2013; Saing & Kazianga, 2017). These studies either find a decrease or an increase in the age at first marriage during conflict. These contradicting conclusions stem from the fact while some of these studies do not disentangle the effects for different age groups, others carry out the analysis for a sub-population. However, as already mentioned, the impact of conflict on the age at marriage is dependent on the age-group that is analyzed. Therefore, to better understand this empirical question requires an analysis on different age groups. This paper fills in this gap by looking at these differential impacts across the age spectrum.

More broadly, this paper fits into the literature that examines the determinants of age at first marriage in Sub-Saharan Africa (Garenne, 2004; Palamuleni, 2011). While most of these studies attribute the change in the age at first marriage in this region to education and modernization, this study also shows age at marriage is also susceptible to economic crises such as conflict.

This paper also adds another dimension to the literature on gender roles and conflict. Most of the previous studies in this literature often focus exlusively on sexual and gender based violence (see, for example, La Mattina *et al.* (2014); Cohen & Nordås (2014); Østby *et al.* (2016)). This paper shows that conflict can also have an impact on the marriage decisions of exposed women.

The remainder of the paper is organized as follows: in the next section I present the datasets used for the analysis and how they are matched. In section 3.3, I talk about the empirical strategy used and results are presented in section 3.4. Finally,

section 3.5 concludes.

3.2 Data

To examine the impact of armed conflict on age at marriage in Sub-Saharan Africa, I use datasets from the Demographic and Health Surveys (DHS), UCDP Georeferenced Event Dataset and GADM. Below, I provide details on each dataset.

3.2.1 Marriage Data

The marriage data used for the analysis in this paper comes from the Demographic and Health Surveys (DHS) for Sub-Saharan African countries from 1989 to 2016. The DHS are nationally-representative households surveys that provide data on demographics, health and nutrition. I use surveys where Geographical Positioning System (GPS) data and conflict data are available. The GPS data gives the geographical coordinates of each DHS cluster (groupings of households in a neighborhood) in the sample. This results in 68 surveys across 27 countries, representing about 55% of the countries in this region.

The main variable of interest is a woman's age at first marriage, which is collected retrospectively across all surveys. In the individual sample, woman aged 15-49 years are asked to report their current marital status, as well as the month and year they were first married or started cohabiting with a partner. I drop the small number of women who married before the age of 10 years and assume that the decision at first marriage is taken at the age of 10 years. This leaves a final sample size of 566,103 women born from 1960 and 2000.

Insert Table 3.1

Table 3.1 shows some key characteristics of the women in the main sample according to whether they were married before the age of 16 or not. The summary statistics are in line with previous works in that early married women are less likely to be educated, less likely to be working at the time of survey, less likely to give birth before

marriage, more likely to give birth early, have higher fertility and mortality rates; They are more likely to be married to older men, with higher spousal age gap than those who do not marry early, more likely to be first wives which also increases their chances of being involved in polygamous marriages, and more likely to be married to men with less education; Early married women are more likely to be residing in rural areas, poorer and also less likely to take part in decision making in their households (Delprato *et al.*, 2017; Khanna *et al.*, 2013; Jensen & Thornton, 2003).

Insert Figure 3.1

Figure 3.1 shows the sample distribution of age at first marriage for the main sample. It can be inferred from the figure that early marriage rate is very low till ages 13 or 14 years, which is in line with the findings that girls are considered to be marriageable on the onset of puberty which usually occurs in the early teenage years (Field & Ambrus, 2008). The figure also shows a higher proportion of women are married between the ages of 14 years and 20 years, with most women getting married at ages 15 to 17 years, implying the high prevalence of early marriage in Sub-Saharan Africa.

3.2.2 Conflict Data

The aim of this paper is to measure the extent to which exposure to armed conflict leads to hazard into marriage. Therefore, the conflict data used comes from the Uppsala Conflict Data Program (UCDP) which is the world's main provider of data on organized violence and the oldest ongoing data collection project for civil war. I use the Geo-referenced Event Dataset version (GED) of the UCDP. The UCDP GED provides data on conflict events from 1989 to date. A conflict event is defined as an incident where armed force was by an organized actor against another organized actor, or civilians, resulting in at least one direct death at a specific location and a specific date. For each conflict event, the number of associated casualties, the type of violence (state-based, nonstate-based, or one-sided), the goegraphical cordinates of its location are provided. In the typical conflict literature, exposure to conflict is often determined by conflict intensity as measured by the number of conflict events or casualties occuring at a particular location (see for example Besley & Persson

(2008); Brückner & Ciccone (2010)) . Using this standard approach, I aggregate these variables at the smallest administrative unit of a country for each conflict year using the matching method described below.

3.2.3 Matching of datasets

This paper combines data from the UCDP with the DHS data set. Conflict intensity is measured at the smallest administrative unit of a country. I obtain shapefiles for these administrative units from the Database of Global Administrative Areas (GADM). I then assign each DHS cluster to its administrative unit in QGIS using the DHS GPS data. I also aggregate the conflict data at the administrative units using their geospatial coordinates in QGIS. The linked administrative units to the DHS cluster are then matched with the DHS individual data using the cluster number in stata. The resulting file is then matched with the conflict data using the names of the administrative units in stata.

3.3 Empirical Strategy

Following the approach used by Corno *et al.* (2016) to estimate the impact of weather shocks on early marriage, I analyze the impact of conflict on the onset of marriage by estimating a discrete-time hazard model. In this model, assuming that t_0 is the age at which a woman is first at risk of getting married, and t_m is the age at which she is first married, then the duration of interest is the time between t_0 and t_m. In this paper, I assume that t_0 is age 10 since it is the minimum age by which the number of women in the sample reporting the age at first married cannot be neglected.

First, I convert the data to person-year format by observing a woman each year in which she is at risk of getting married until she is married, after which she exits the sample. Thus ever-married women exit the analysis when they enter their first marriage and for women who were never married at the time of the survey, the data are censored at the time of the interview. By doing so, each woman would contribute to $(t_m - t_0 + 1)$ observations to the sample. In each observation, each time-

invariant covariate is repeated each year and the time-varying covariate such as conflict intensity is updated each year. More specifically, using this person-year data, I estimate the following equation:

$$M_{i,l,t} = \alpha(t) + \beta_1 X_{l,t} + \beta_2 Z_i + \gamma_{l(i)} + \lambda_{t(i)} + \delta_{s(i)} + \epsilon_{i,l,t} \tag{3.1}$$

The dependent variable $M_{i,l,t}$ is a dummy that equals 1 in the year in which the woman is first married and 0 otherwise. $\alpha(t)$ is the baseline hazard into marriage. The $X_{l,t}$ indicates the intensity of conflict at location l at time t, and Z_i are time-invariant characteristics such as the religion, education and place of residence of the woman. γ_l, λ_t and δ_s are location, year of birth and survey rounds fixed effects. Education level is likely to be determined by marriage or conflict, hence I define education as an indicator for whether a woman has ever attended school or not. This decision is likely to be made prior to the time the woman enters the marriage market, and would also be exogenous to the conflict events occurring at her marriageable years. Standard errors are clustered at the location level to allow for correlation in the error terms across individuals living in the same location. The inclusion of the location fixed effect implies that the impact of conflict on age at first marriage hazard is identified from the within-location variation in conflict and marriage outcomes. The key identifying assumption comes from the exogenous variation in the intensity of conflict.

For the key assumption in this analysis to hold, there should be no spurious relationship between conflict events and marriage outcomes. Thus, the results should not be driven by omitted variables that are correlated with conflict events and also affect marriage outcomes. One way to test this is to examine the impact of future conflict event on marriage hazard - if the altering of marriage decisions is solely driven by conflict shocks but not any correlation between conflict events and time-invariant characteristics of the location, then future conflict events should not have any impact on marriage outcomes now.

Another threat to the identification is the problem posed by migration when analyzing any impact of conflict or doing any marriage analysis. I only have information on where a woman currently lives, and not where she lived during her marriageable years. This implies that using the current place of residence to identify a woman's

exposure to conflict at her marriageable years can bias the results. Women might have moved after marriage. In patrilocal societies which is typical of Sub-Sahara Africa, marriage is often accompanied by migration to the husband's place, which means that a woman's current place of residence might not be same as where she grew up if the husband is from another place. Moreover conflict in itself enhances migration. If a large number of women live far away from the place they lived during their marriageable years, then the results would only be biased towards 0. The DHS data provides information on how long a woman has been living in her current place of residence in some surveys. In this sub sample, about 55% of women reported to have been staying at their current place of residence since birth. Thus the potential problem of migration is minimal.

3.4 Results

Insert figure 3.2

Figure 3.2 shows the estimates of the impact of conflict on the hazard into marriage at different ages. The results show that conflict increases the hazard into marriage at the ages of 18 to 21 years with no effect on the incidence of early marriage (except at the age of 14 years) and no effect for older women.

3.5 Conclusion

This paper examines the impact of armed conflict on woman's age at first marriage in Sub-Saharan Africa. Using variations in the intensity of conflict experienced during the marriageable years of a woman, I estimate the hazard into marriage for different age population.

The analysis indicates that conflict increases the hazard into marriage for women of ages 18 to 21 years but no effect for the other age population. This result supports the hypothesis that the impact of conflict on entry into marriage can go in both direction for different sub-populations. It is possible that marriage for these age group

increased due to the law in many Sub-Saharan Africa countries against early marriage that set the minimum age of marriage to be 18 years. Another possible reason for the delay in the age at marriage for older women could be due to their take of traditional roles such as household heads and political and civic to due shortage of men during the time of conflicts. Marriage could have also been delayed for some of the sub-population due to the fact that marriage is costly during conflict crises.

This study on Sub-Saharan Africa is of policy relevance. Sub-Saharan Africa is the region with the highest fertility rate in the world, of which age at first marriage is a major contributing factor. This study, therefore, suggests that delaying marriage by few years may lead to a decrease in the total fertility rates which will ultimately lead to a decrease in the high mortality rates in this region.

Bibliography

2015. Girls not Brides: The Global Partnership to End Child Marriage. **3**, 15.

Aall, Cato, *et al.* 1970. Relief, nutrition and health problems in the Nigerian/Biafran war. *Journal of tropical Pediatrics*, **16**(2), 70–90.

Abramitzky, Ran, Delavande, Adeline, & Vasconcelos, Luis. 2011. Marrying up: the role of sex ratio in assortative matching. *American Economic Journal: Applied Economics*, **3**(3), 124–157.

Adu-Agyem, Joe, & Osei-Poku, Patrick. 2012. Quality Education in Ghana: The Way forward. *International Journal of Innovative Research and Development*, **1**(9), 164–177.

Akresh, Richard, Bhalotra, Sonia, Leone, Marinella, & Osili, Una Okonkwo. 2012. War and stature: growing up during the Nigerian Civil War. *The American Economic Review*, **102**(3), 273–277.

Akyeampong, K. 2011. (Re) assessing the impact of school capitation grants on educational access in Ghana. *Consortium for Educational Access, Transitions and Equity, Research Monograph*, **7**(1).

Ampratwum, Edward, & Armah-Attoh, Daniel. 2010. Tracking capitation grant in public primary schools in Ghana. *Ghana Center for Democratic Development. Briefing Paper*, **10**(1), 1–8.

Bates, Lisa M, Maselko, Joanna, & Schuler, Sidney Ruth. 2007. Women's education and the timing of marriage and childbearing in the next generation: evidence from rural Bangladesh. *Studies in Family Planning*, 101–112.

Besley, Timothy, & Persson, Torsten. 2008. Wars and state capacity. *Journal of the European Economic Association*, **6**(2-3), 522–530.

Bold, Tessa, Kimenyi, Mwangi, Mwabu, Germano, Sandefur, Justin, *et al.* 2010. Does abolishing fees reduce school quality? Evidence from Kenya. *Centre for the Study of African Economics (CSAE) Working Paper WPS/2011-04*.

Brainerd, Elizabeth. 2007. *Uncounted Costs of World War II: The Effects of Changing Sex Ratios on Marriage and Fertility of Russian Women*. National Council for Eurasian and East European Research.

Brückner, Markus, & Ciccone, Antonio. 2010. International commodity prices, growth and the outbreak of civil war in Sub-Saharan Africa. *The Economic Journal*, **120**(544), 519–534.

Buvinic, Mayra, Gupta, Monica Das, Casabonne, Ursula, & Verwimp, Philip. 2012. Violent conflict and gender inequality: An overview. *The World Bank Research Observer*, lks011.

Caldwell, John C, Reddy, PH, & Caldwell, Pat. 1986. Periodic high risk as a cause of fertility decline in a changing rural environment: Survival strategies in the 1980-1983 South Indian drought. *Economic Development and Cultural Change*, **34**(4), 677–701.

Carmichael, Sarah. 2011. Marriage and power: Age at first marriage and spousal age gap in lesser developed countries. *The History of the Family*, **16**(4), 416–436.

Chamarbagwala, Rubiana, & Morán, Hilcías E. 2011. The human capital consequences of civil war: Evidence from Guatemala. *Journal of Development Economics*, **94**(1), 41–61.

Clark, Shelley. 2004. Early marriage and HIV risks in sub-Saharan Africa. *Studies in family planning*, **35**(3), 149–160.

Cohen, Dara Kay, & Nordås, Ragnhild. 2014. Sexual violence in armed conflict: Introducing the SVAC dataset, 1989–2009. *Journal of Peace Research*, **51**(3), 418–428.

Commission, National Development Planning, *et al.* 2014. 2014 citizens' assessment report on the capitation grant scheme.

Commission, Women's Refuge. 2016. A girl no more: The changing norms of child marriage in conflict.

Corno, Lucia, & Voena, Alessandra. 2016. Selling daughters: age of marriage, income shocks and bride price tradition. *IFS Working Paper W16/08*.

Corno, Lucia, Hildebrandt, Nicole, & Voena, Alessandra. 2016. *Weather Shocks, Age of Marriage and the Direction of Marriage Payments*. Tech. rept. Working Paper, Dipartimento di Economia e Finanza (DISCE), Università Cattolica del Sacro Cuore.

Deininger, Klaus. 2003. Does cost of schooling affect enrollment by the poor? Universal primary education in Uganda. *Economics of Education review*, **22**(3), 291–305.

Delprato, Marcos, & Akyeampong, Kwame. 2017. The Effect of Early Marriage Timing on Women's and Children's Health in Sub-Saharan Africa and Southwest Asia. *Annals of global health*, **83**(3-4), 557–567.

Delprato, Marcos, Akyeampong, Kwame, Sabates, Ricardo, & Hernandez-Fernandez, Jimena. 2015. On the impact of early marriage on schooling outcomes in Sub-Saharan Africa and South West Asia. *International Journal of Educational Development*, **44**, 42–55.

Delprato, Marcos, Akyeampong, Kwame, & Dunne, Máiréad. 2017. Intergenerational education effects of early marriage in Sub-Saharan Africa. *World Development*, **91**, 173–192.

Dennis, Caroline, & Stahley, Katie. 2012. Universal primary education in Tanzania: The role of school expenses and opportunity costs. *Evans School Review*, **2**(1), 47–65.

Dercon, Stefan, *et al.* 2002. Income risk, coping strategies, and safety nets. *The World Bank Research Observer*, **17**(2), 141–166.

El Jack, Amani, *et al.* 2003. *Gender and armed conflict: Overview report*. BRIDGE, Institute of Development Studies, University of Sussex Brighton, UK.

Erulkar, Annabel. 2013. Early marriage, marital relations and intimate partner violence in Ethiopia. *International Perspectives on Sexual and Reproductive Health*, 6–13.

Fayokun, Kayode Olatunbosunx. 2015. Legality of Child Marriage in Nigeria and Inhibitions Against Realisation of Education Rights. *US-China L. Rev.*, **12**, 812.

Field, Erica, & Ambrus, Attila. 2008. Early marriage, age of menarche, and female schooling attainment in Bangladesh. *Journal of political Economy*, **116**(5), 881–930.

Garenne, Michel. 2004. Age at marriage and modernisation in sub-Saharan Africa. *Southern African Journal of Demography*, 59–79.

George, Ime N, Ukpong, David E, & Imah, Eme E. 2014. Cultural Diversity of Marriage Sustainability in Nigeria: Strenghts and Challenges. *Sociology and Anthropology*, **2**(1), 7–14.

Gleditsch, Nils Petter, Wallensteen, Peter, Eriksson, Mikael, Sollenberg, Margareta, & Strand, Håvard. 2002. Armed conflict 1946-2001: A new dataset. *Journal of peace research*, **39**(5), 615–637.

Guilbert, Nathalie, *et al.* 2013. Early marriage, women empowerment and child mortality: Married too young to be a "good mother". *JEL Code: J12, J13, I14*.

Harwood-Lejeune, Audrey. 2001. Rising age at marriage and fertility in Southern and Eastern Africa. *European Journal of Population/Revue Européenne de Démographie*, **17**(3), 261–280.

Hashim, Iman M. 2005. Exploring the linkages between children's independent migration and education: Evidence from Ghana. *Sussex Centre for Migration Research, working paper*, **12**.

Hawke, Angela. 2015. Fixing the Broken Promise of Education for All: Findings from the Global Initiative on Out-of-School Children. *UNICEF*.

Hertrich, Véronique. 2017. Trends in Age at Marriage and the Onset of Fertility Transition in sub-Saharan Africa. *Population and Development Review*, **43**(S1), 112–137.

Ikamari, Lawrence DE. 2005. The effect of education on the timing of marriage in Kenya. *Demographic research*, **12**, 1–28.

Jacoby, Hanan G, & Skoufias, Emmanuel. 1997. Risk, financial markets, and human capital in a developing country. *The Review of Economic Studies*, **64**(3), 311–335.

Jayaraman, Anuja, Gebreselassie, Tesfayi, & Chandrasekhar, S. 2009. Effect of conflict on age at marriage and age at first birth in Rwanda. *Population Research and Policy Review*, **28**(5), 551.

Jensen, Robert, & Thornton, Rebecca. 2003. Early female marriage in the developing world. *Gender & Development*, **11**(2), 9–19.

Justino, Patricia. 2011. How does violent conflict impact on individual educational outcomes? The evidence so far. *background paper for the Education For All Global Monitoring Report*.

Kadzamira, Esme, & Rose, Pauline. 2003. Can free primary education meet the needs of the poor?: evidence from Malawi. *International journal of educational development*, **23**(5), 501–516.

Khanna, Tina, Verma, Ravi, Weiss, Ellen, Glinski, Allison M, Weiss, Ellen, Shetty, Adithi, *et al.* 2013. Child marriage in South Asia: Realities, responses and the way forward.

Khawaja, Marwan, Assaf, Shireen, & Jarallah, Yara. 2009. The transition to lower fertility in the West Bank and Gaza Strip: evidence from recent surveys. *Journal of Population Research*, **26**(2), 153–174.

La Mattina, Giulia, *et al.* 2014. *Civil conflict, sex ratio and intimate partner violence in Rwanda*. Tech. rept.

Lavy, Victor. 1996. School supply constraints and children's educational outcomes in rural Ghana. *Journal of Development Economics*, **51**(2), 291–314.

Lee-Rife, Susan, Malhotra, Anju, Warner, Ann, & Glinski, Allison McGonagle. 2012. What works to prevent child marriage: a review of the evidence. *Studies in family planning*, **43**(4), 287–303.

LeGrand, Thomas K, & Barbieri, Magali. 2002. The possible effects of child survival on women's ages at first union and childbirth in sub-Saharan Africa. *European Journal of Population/Revue Européenne de Démographie*, **18**(4), 361–386.

Lucas, Adrienne M, & Mbiti, Isaac M. 2012a. Access, sorting, and achievement: the short-run effects of free primary education in Kenya. *American Economic Journal: Applied Economics*, 226–253.

Lucas, Adrienne M, & Mbiti, Isaac M. 2012b. Does free primary education narrow gender differences in schooling? Evidence from Kenya. *Journal of African Economies*, ejs021.

Mathur, Sanyukta, Greene, Margaret, & Malhotra, Anju. 2003. Too young to wed: the lives, rights and health of young married girls.

Mensch, Barbara S, Singh, Susheela, & Casterline, John B. 2005. Trends in the timing of first marriage among men and women in the developing world. *The changing transitions to adulthood in developing countries: Selected studies*, 118–71.

Miller, J Paul. 1970. Medical relief in the Nigerian civil war. *The Lancet*, **295**(7660), 1330–1334.

Murphy, Elaine, & Dara, Carr. 2007. Powerful Partners: Adolescent Girl's Education and Delayed Childbearing. *Population Reference Bureau*.

Neal, Sarah, Stone, Nicole, & Ingham, Roger. 2016. The impact of armed conflict on adolescent transitions: a systematic review of quantitative research on age of sexual debut, first marriage and first birth in young women under the age of 20 years. *BMC public health*, **16**(1), 225.

Nishimura, Mikiko, Yamano, Takashi, & Sasaoka, Yuichi. 2008. Impacts of the universal primary education policy on educational attainment and private costs in rural Uganda. *international Journal of Educational development*, **28**(2), 161–175.

Nwoko, Kenneth Chukwuemeka. 2014. Our Agony, Their Victory: The Impact of the Nigerian Civil War on the Women and Children of Biafra. *Women, Identities and Culture*, **1**(1), 19–24.

Obikeze, Dan S, & Mere, Ada A. 1985. *Children and the Nigerian Civil War: A Study of the Rehabilitation Programme for war-displaced children*. University of Nigeria Press.

Osei, Robert Darko, Owusu, Gertrude Adobea, Asem, Freda E, & Afutu-Kotey, Robert Lawrence. 2009. Effects of capitation grant on education outcomes in Ghana. *Accra, Institute of Social and Economic Research*.

Osei-Fosu, AK. 2011. Evaluating the impact of the capitation grant and the school feeding programme on enrollment, attendance and retention in schools: The case of Weweso circuit. *Journal of Science and Technology (Ghana)*, **31**(1).

Østby, Gudrun, *et al.* 2016. Violence Begets Violence: Armed conflict and domestic sexual violence in Sub-Saharan Africa. *In: Workshop on Sexual Violence and Armed Conflict: New Research Frontiers held at the Harvard Kennedy School, Harvard University*, vol. 2.

Otoo-Oyortey, Naana, & Pobi, Sonita. 2003. Early Marriage and Poverty: Exploring links and key policy issues. *Gender & Development*, **11**(2), 42–51.

Palamuleni, Martin E. 2011. Socioeconomic determinants of age at marriage in Malawi. *International Journal of Sociology and Anthropology*, **3**(7), 224.

Palloni, Alberto, Hill, Kenneth, & Aguirre, Guido Pinto. 1996. Economic swings and demographic changes in the history of Latin America. *Population studies*, **50**(1), 105–132.

Parsons, Jennifer, Edmeades, Jeffrey, Kes, Aslihan, Petroni, Suzanne, Sexton, Maggie, & Wodon, Quentin. 2015. Economic impacts of child marriage: A review of the literature. *The Review of Faith & International Affairs*, **13**(3), 12–22.

Raj, Anita, Saggurti, Niranjan, Balaiah, Donta, & Silverman, Jay G. 2009. Prevalence of child marriage and its effect on fertility and fertility-control outcomes

of young women in India: a cross-sectional, observational study. *The Lancet*, **373**(9678), 1883–1889.

Rose, Elaina. 1999. Consumption smoothing and excess female mortality in rural India. *Review of Economics and statistics*, **81**(1), 41–49.

Saing, Chan Hang, & Kazianga, Harounan. 2017. The Long-Term Impact of US Bombing on Education, Earning, Health, Fertility and Marriage in Cambodia.

Saxena, Prem C, Kulczycki, Andrzej, & Jurdi, Rozzet. 2004. Nuptiality transition and marriage squeeze in Lebanon: Consequences of sixteen years of civil war. *Journal of Comparative Family Studies*, 241–258.

Schindler, Kati, & Verpoorten, Marijke. 2013. Armed conflict, sex ratio and marital outcomes: Evidence from Rwanda. *Unpublished manuscript*.

Segun, Mausi, & Muscati, Samer. 2014. 'Those terrible weeks in their camp': Boko Haram violence against women and girls in Northeast Nigeria.

Shah, Sheena. 2015. The role of language and culture in ethnic identity maintenance: The case of the Gujarati community in South Africa. *Languages in Africa: Multilingualism, Language Policy, and Education*, 110.

Shapiro, David, & Gebreselassie, Tesfayi. 2014. Marriage in sub-Saharan Africa: Trends, determinants, and consequences. *Population Research and Policy Review*, **33**(2), 229–255.

Shemyakina, Olga. 2006. *The Effect of Armed Conflict on Investment in Schooling: Results from Tajikistan*. Tech. rept. HiCN Working Paper 12. Sussex: University of Sussex.

Shemyakina, Olga. 2011. The effect of armed conflict on accumulation of schooling: Results from Tajikistan. *Journal of Development Economics*, **95**(2), 186–200.

Shemyakina, Olga. 2013. Patterns in female age at first marriage and Tajik armed conflict. *European Journal of Population/Revue européenne de Démographie*, **29**(3), 303–343.

Shemyakina, Olga, *et al.* 2009. The marriage market and Tajik armed conflict. *Households in Conflict Network,(66)*.

Uchendu, Egodi. 2007a. Recollections of childhood experiences during the Nigerian civil war. *Africa*, **77**(03), 393–418.

Uchendu, Egodi. 2007b. *Women and conflict in the Nigerian civil war*. Africa World Press Trenton, NJ.

Uduku, Ola. 2011. School building design for feeding programmes and community outreach: Insights from Ghana and South Africa. *International Journal of Educational Development*, **31**(1), 59–66.

UNFPA. 2012. Marrying Too Young: End child marriage. *New York: United Nations Population Fund*.

UNICEF. 2016. *The state of the world's children 2016*. Tech. rept.

Valente, Christine. 2013. Education and civil conflict in Nepal. *The World Bank Economic Review*, **28**(2), 354–383.

Woldemicael, Gebremariam. 2008. Recent fertility decline in Eritrea: Is it a conflict-led transition. *Demographic Research*, **18**(2), 27–58.

Yendaw, Elijah, & Dayour, Frederick. 2014. Effect of the National School Feeding Programme on Pupils' Enrolment, Attendance and Retention: A Case Study of Nyoglo of the Savelugu-Nantong Municipality, Ghana.

Tables and Figures for Chapter 1

Figure 1.1: Number of Schools

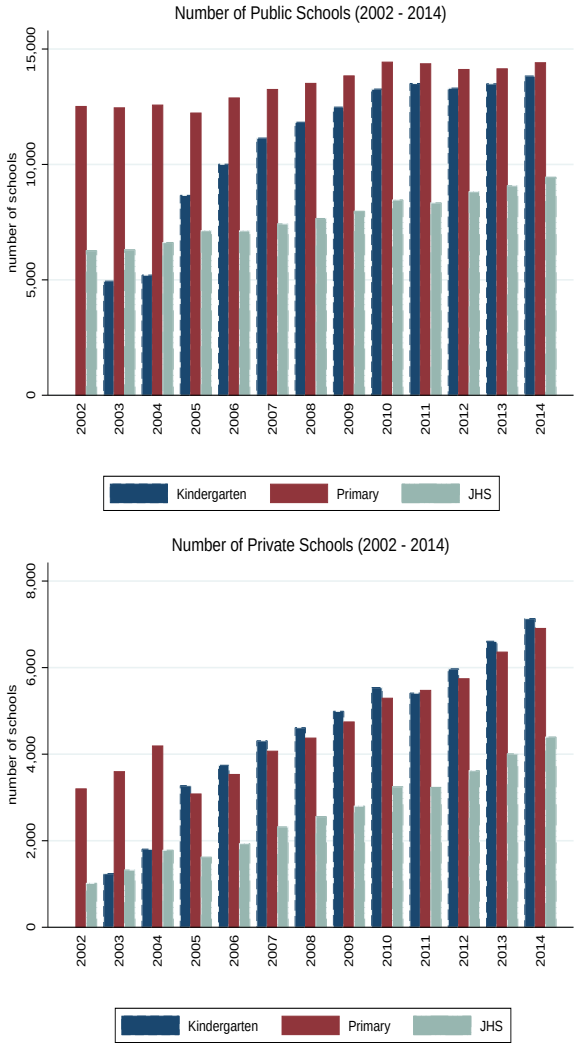
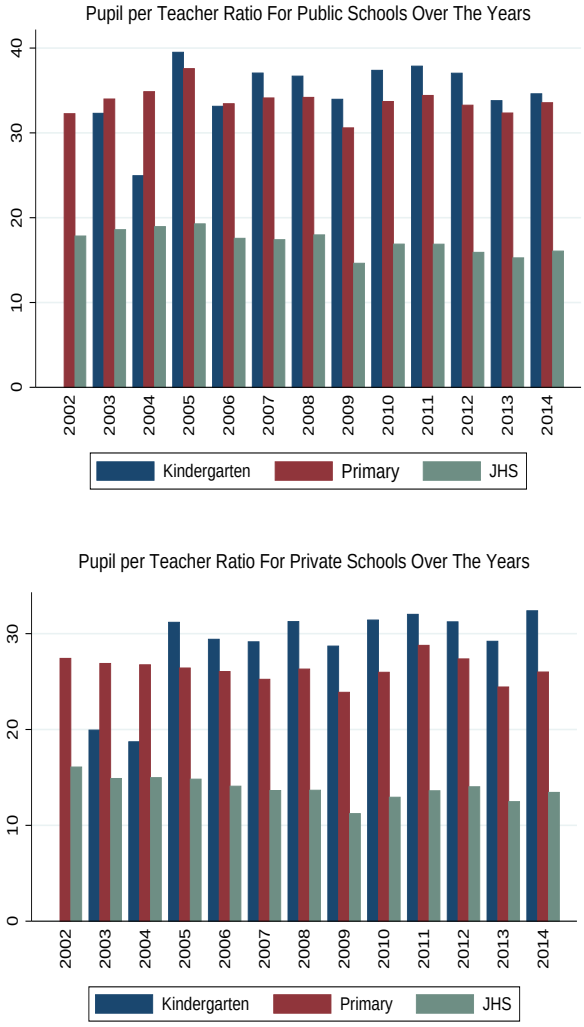
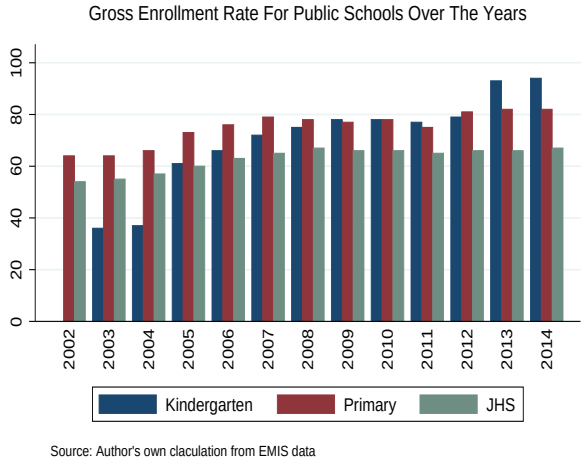


Figure 1.2: Pupil Per Teacher Ratio

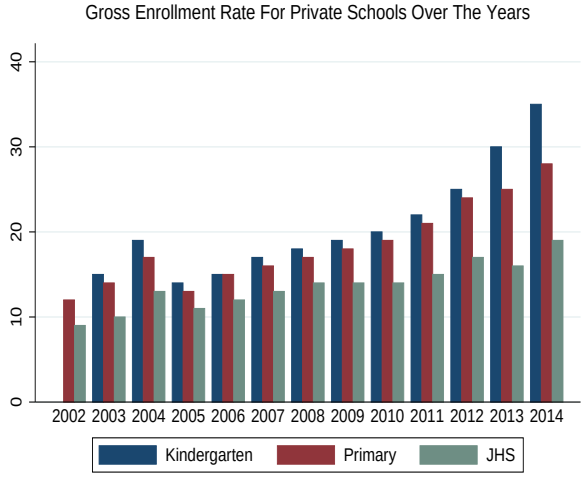


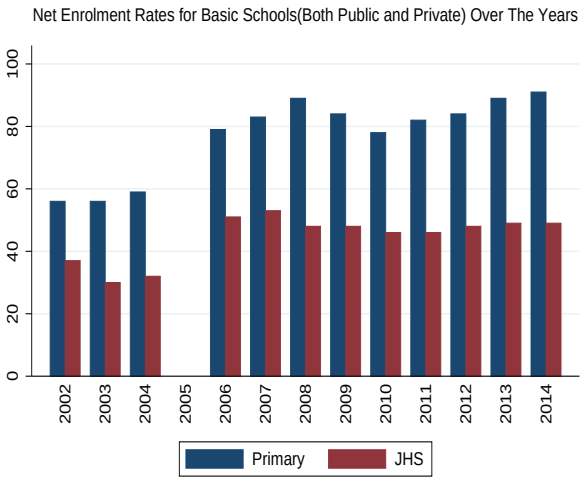
Source: Author's own calculations from EMIS data, Ghana.

Figure 1.3: Enrollment Rates



Source: Author's own claculation from EMIS data





Source: Author's own calculations from EMIS data, Ghana.

Figure 1.4: Overall Effects of The Educational Policies on NER

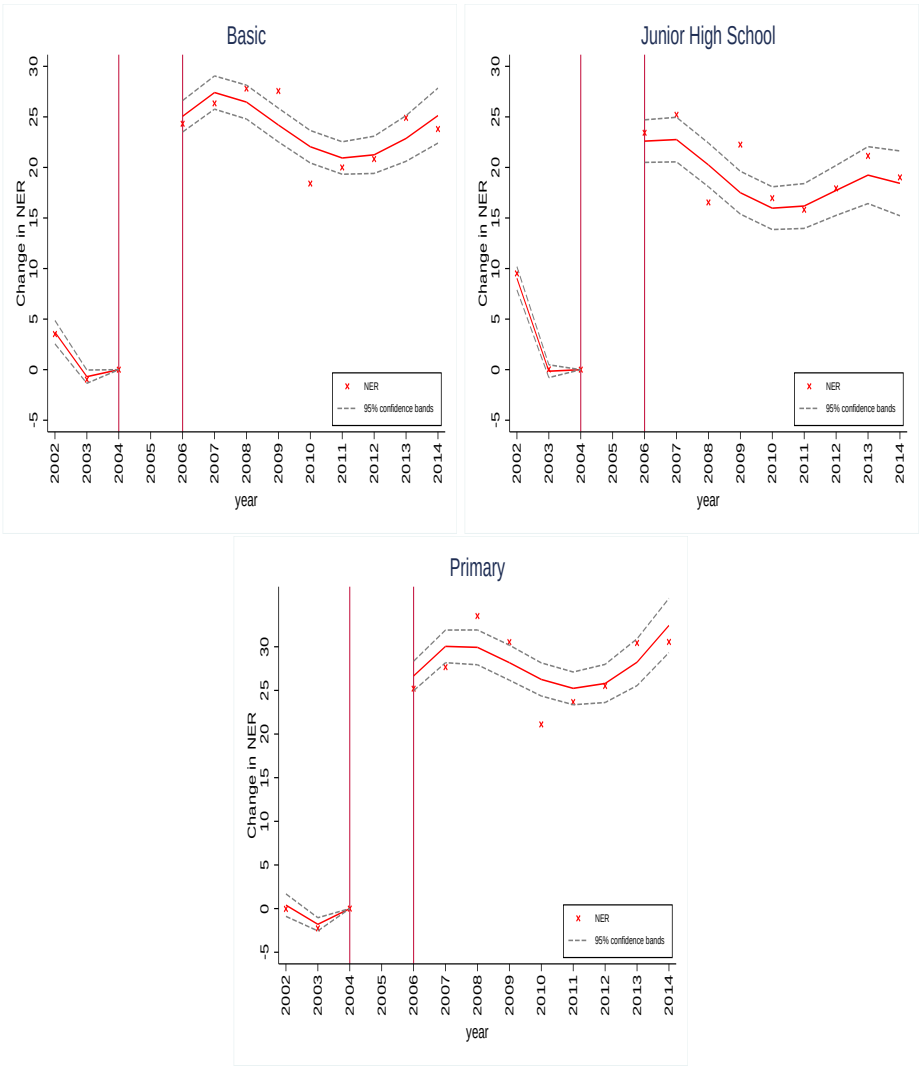
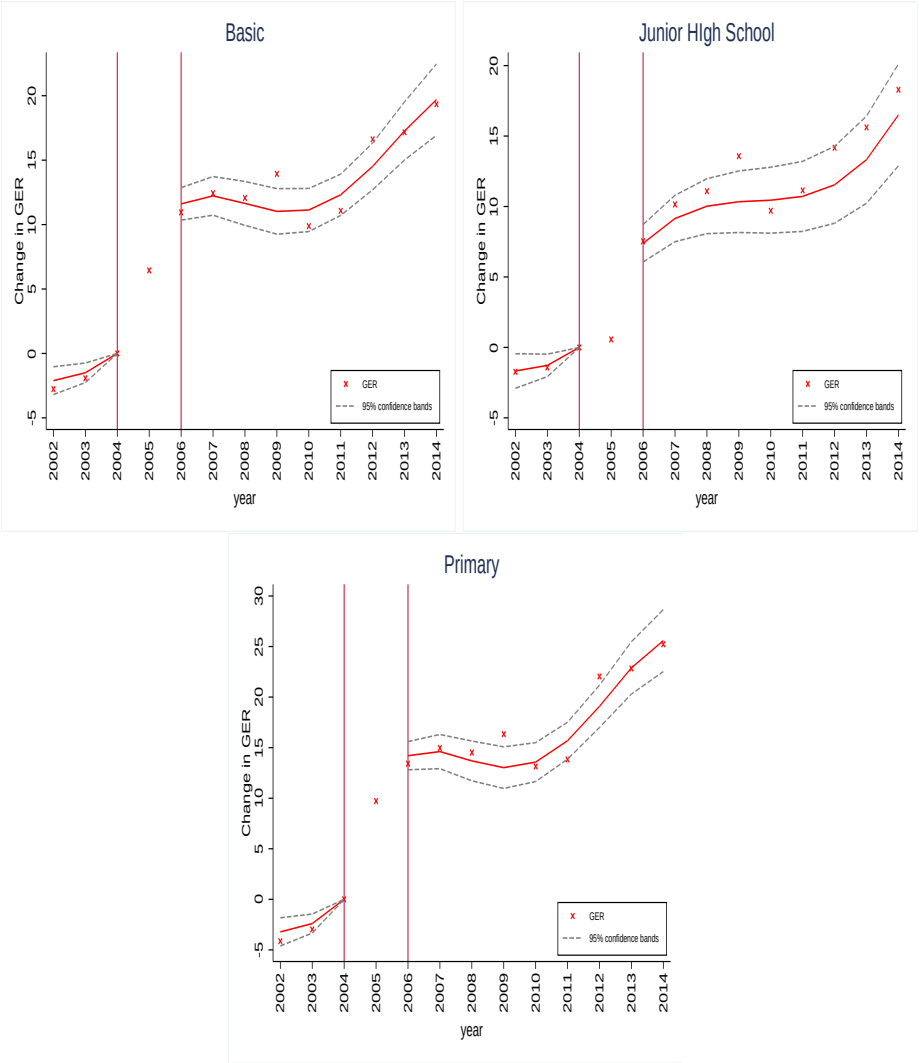


Figure 1.5: Overall Effects of The Educational Policies on GER



Note: In figure 4, there are no estimates for 2005 because there are no observations. The estimates in 2005 are significant at 0.1%. In the above figures, I plot the betas of the regression of eqn(2), controlling for average distance to school, number of schools per child, textbooks per pupil, teachers per pupil, seats per pupil and trained teachers per pupil. The lines passing through the estimates are polynomial regressions of enrollment rates on time trend dummies with same controls. The vertical lines represent the periods of the policies. 2004 is the base cartegory.

Figure 1.6: Effects of The Policies on GER for Private and Public Schools

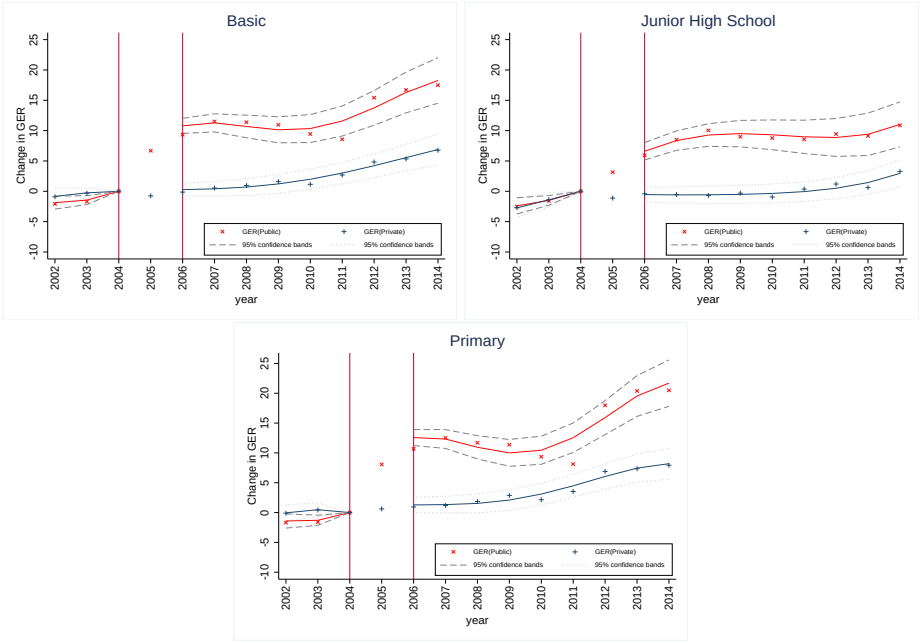


Figure 1.7: Effects of The Policies on NER by Gender

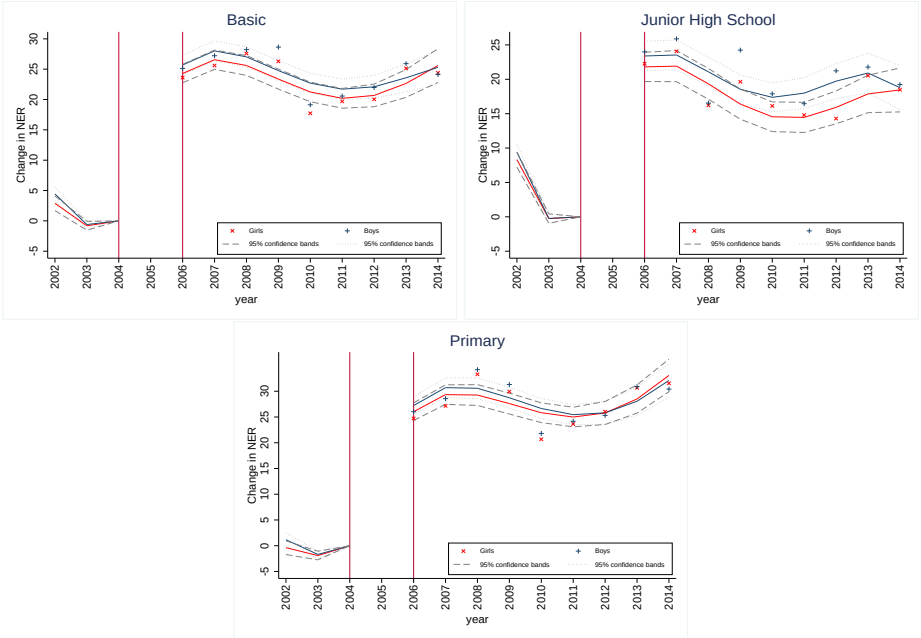
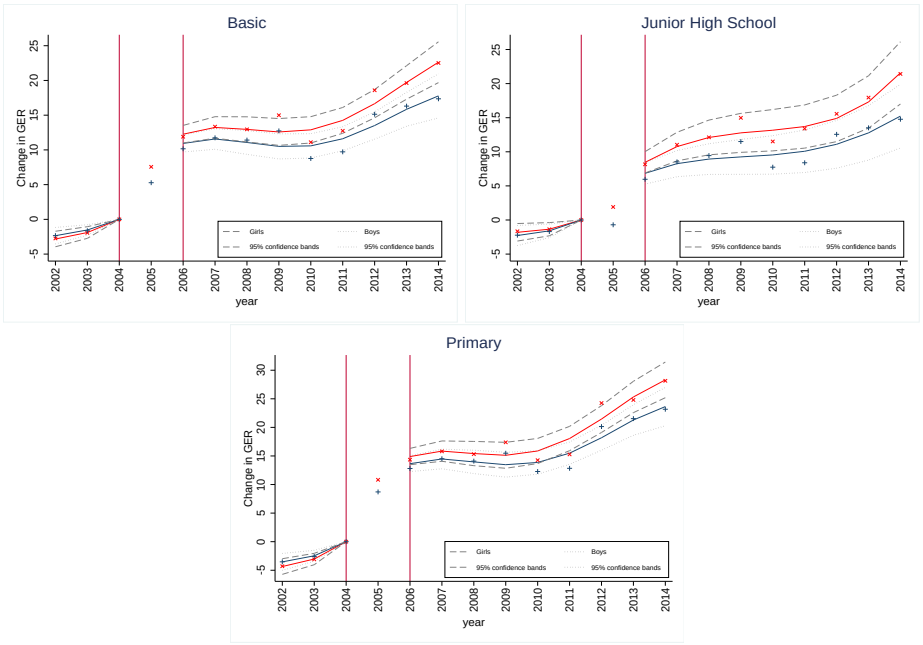


Figure 1.8: Effects of The Policies on GER by Gender



Note: There are no estimates for 2005 for NER because there are no observations. The estimates in 2005 are significant at 0.1%. In the above figures, I plot the betas of the regression of eqn(2), controlling for average distance to school, number of schools per child, textbooks per pupil, teachers per pupil, seats per pupil and trained teachers per pupil. The lines passing through the estimates are polynomial regressions of enrollment rates on time trend dummies with same controls. The vertical lines represent the periods of the policies. 2004 is the base cartegory.

Figure 1.9: Effects of The Policies on NER by Deprivation

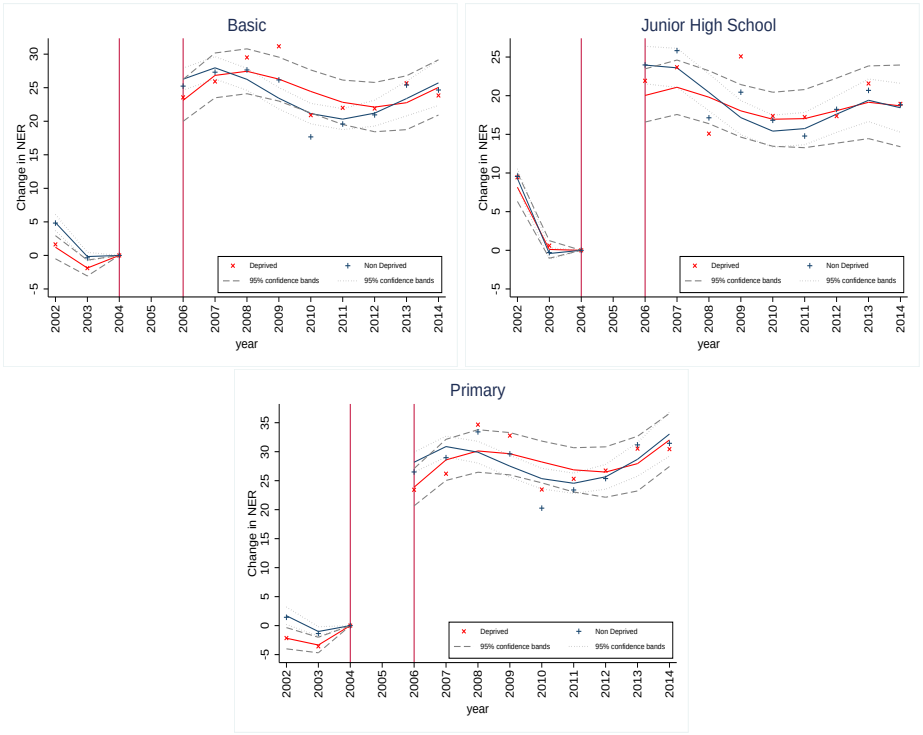


Figure 1.10: Effects of The Policies on GER by Deprivation

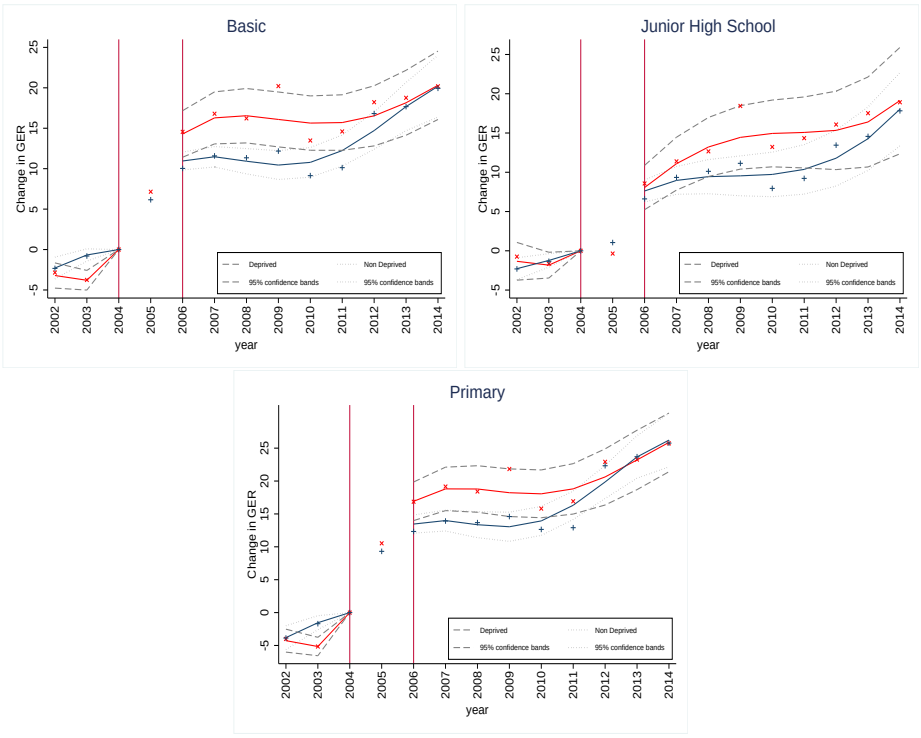
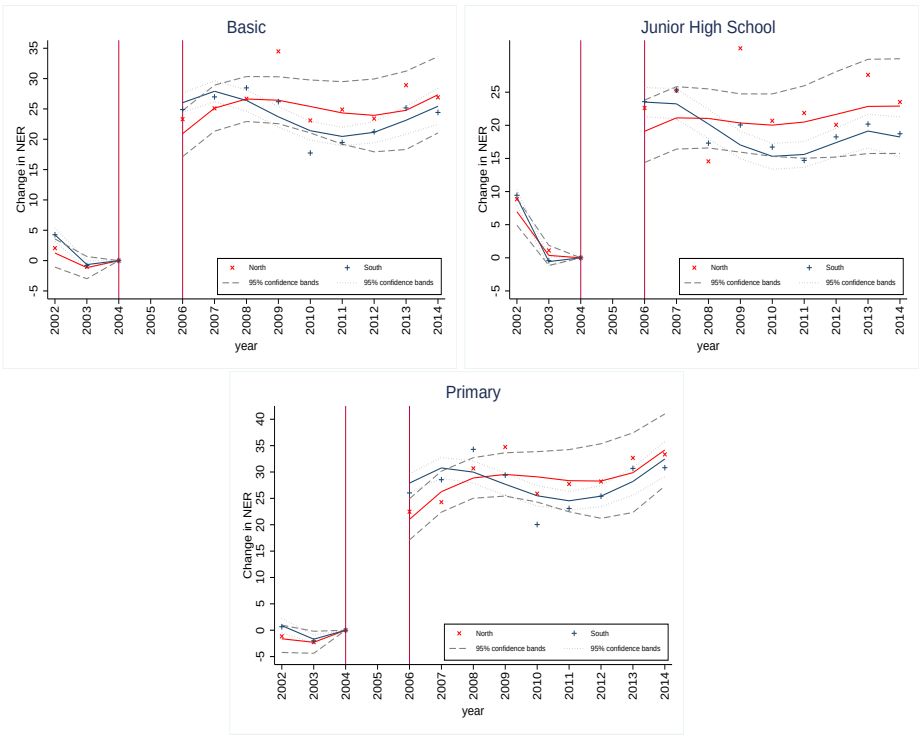


Figure 1.11: Effects of The Policies on NER; North and South



Note: There are no estimates for 2005 for NER because there are no observations. The estimates in 2005 are significant at 0.1%. In the above figures, I plot the betas of the regression of eqn(2), controlling for average distance to school, number of schools per child, textbooks per pupil, teachers per pupil, seats per pupil and trained teachers per pupil. The lines passing through the estimates are polynomial regressions of enrollment rates on time trend dummies with same controls. The vertical lines represent the periods of the policies. 2004 is the base cartegory.

Figure 1.12: Effects of The Policies on GER; North and South

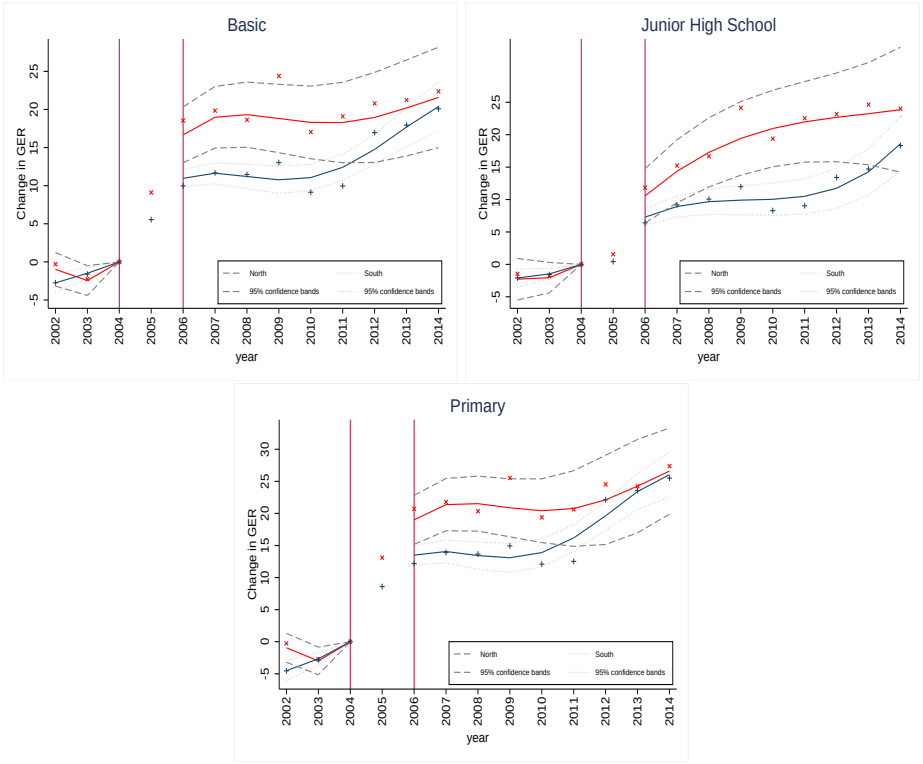


Figure 1.13: Effects of The Policies on NER; Rural and Urban

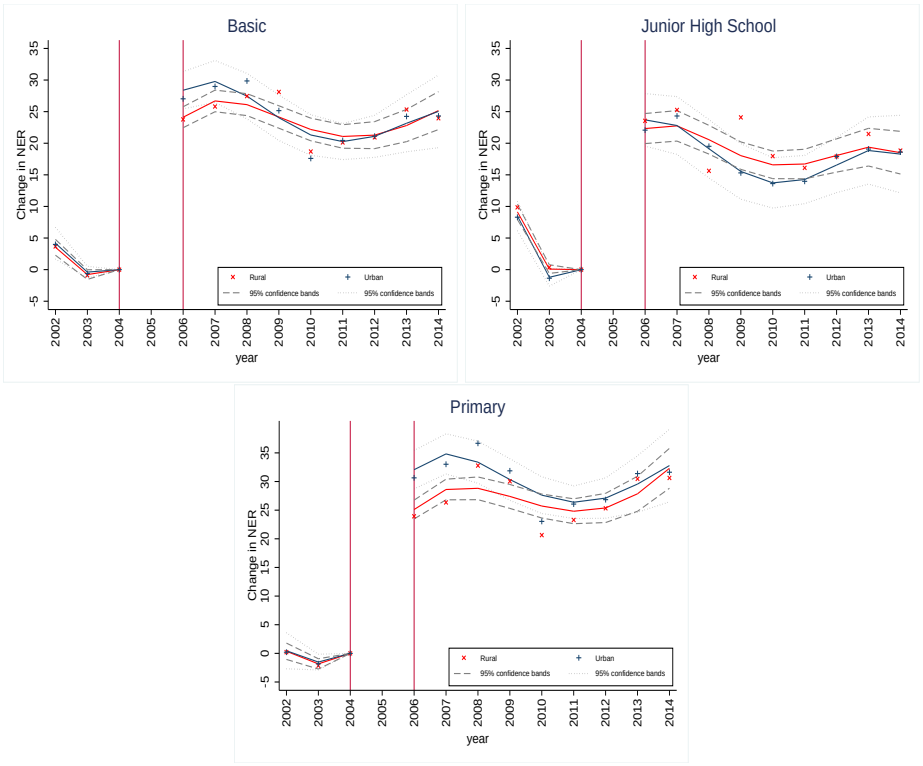
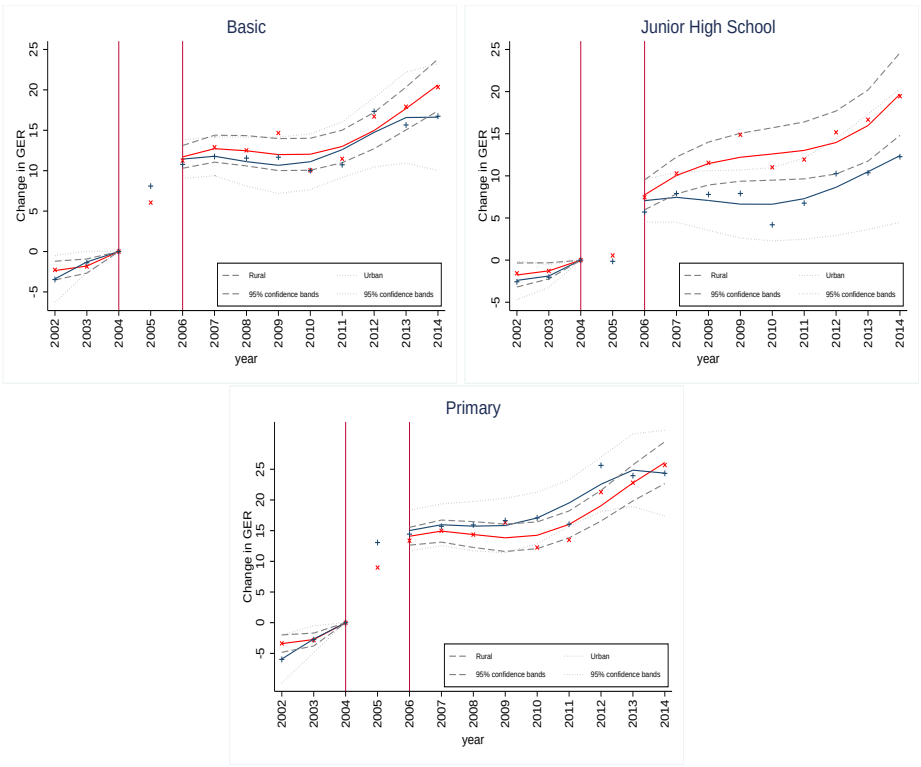


Figure 1.14: Effects of The Policies on GER; Rural and Urban



Note: There are no estimates for 2005 for NER because there are no observations. The estimates in 2005 are significant at 0.1%. In the above figures, I plot the betas of the regression of eqn(2), controlling for average distance to school, number of schools per child, textbooks per pupil, teachers per pupil, seats per pupil and trained teachers per pupil. The lines passing through the estimates are polynomial regressions of enrollment rates on time trend dummies with same controls. The vertical lines represent the periods of the policies. 2004 is the base cartegory.

Figure 1.15: Participation of OverAged Population

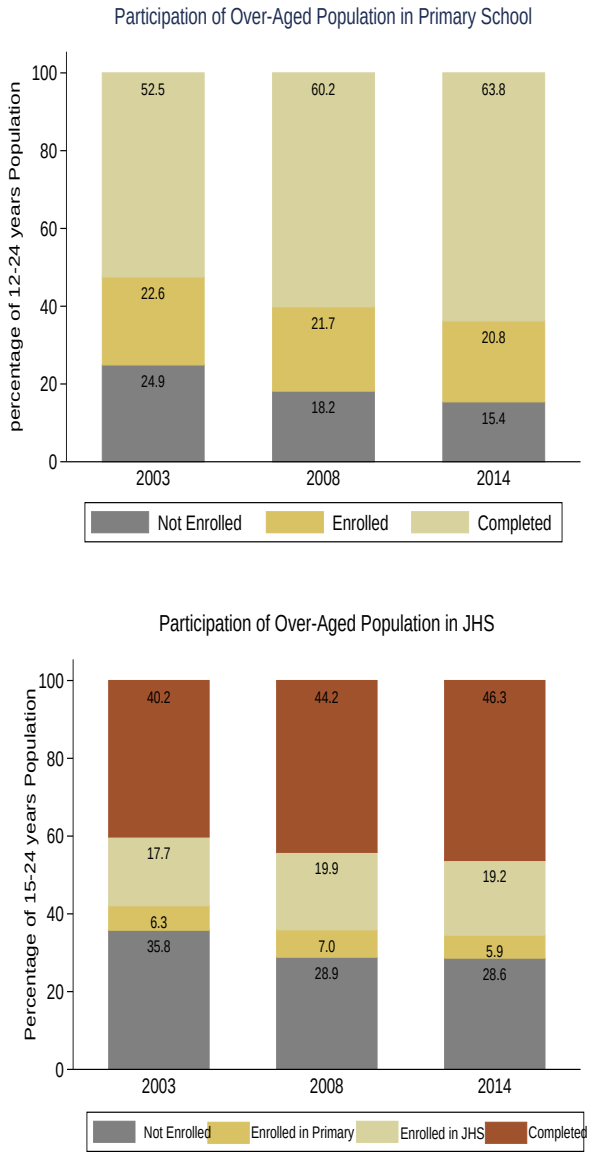


Figure 1.16: Enrollment By Age and Level Before and After The Policies

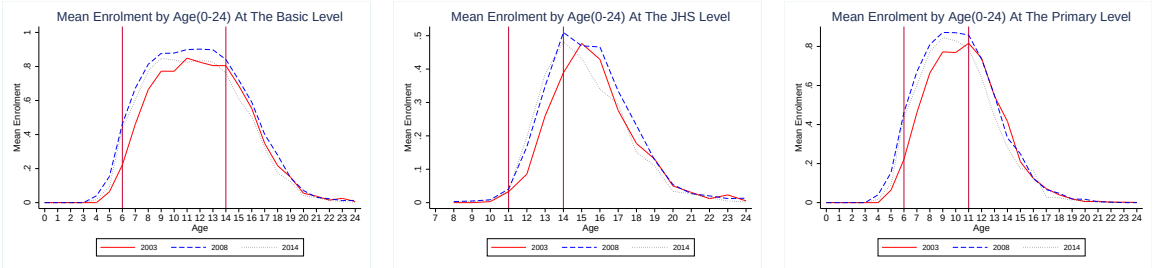


Table 1.1: The Overall Effects of The Policies on Enrollment Rates In Basic Schools

	(1)	(2)	(3)	(4)
	2003	2008	2014	Post
BASIC				
NAR	0.481***	0.115***	0.079***	0.097***
	(0.010)	(0.012)	(0.015)	(0.012)
N		35541		
PRIMARY				
NAR	0.610***	0.130***	0.077***	0.104***
	(0.012)	(0.015)	(0.019)	(0.014)
GAR	0.968***	0.131***	0.030	0.084***
	(0.018)	(0.022)	(0.027)	(0.021)
N(NAR)		23977		
N(GAR)		82692		
JHS				
NAR	0.239***	0.076***	0.078***	0.077***
	(0.013)	(0.015)	(0.016)	(0.013)
GAR	0.547***	0.157***	0.073***	0.121***
	(0.022)	(0.026)	(0.026)	(0.023)
N(NAR)		11564		
N(GAR)		82692		

Note: This table presents the results for the overall effects at the individual level as represented in equation 3. Column 1 shows the levels of enrollment rates in 2003 which is the base year. Columns 2 and 3 shows the increment in 2008 and 2014 respectively and column 4 shows the overall effect after 2003. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1.2: Heterogeneous Effects of The Policies on NAR In Basic Schools.

BACKGROUND	BASIC				PRIMARY				JHS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	2003	2008	2014	Post	2003	2008	2014	Post	2003	2008	2014	Post
Wealth												
Poor	0.377***	0.130***	0.092***	0.111***	0.501***	0.156***	0.112***	0.134***	0.108***	0.066***	0.056***	0.061***
	(0.014)	(0.019)	(0.023)	(0.018)	(0.019)	(0.024)	(0.029)	(0.023)	(0.012)	(0.018)	(0.018)	(0.015)
Middle	0.499***	0.108***	0.063**	0.087***	0.648***	0.121	0.047***	0.085***	0.224***	0.057	0.069	0.063***
	(0.018)	(0.023)	(0.028)	(0.023)	(0.021)	(0.025)	(0.031)	(0.025)	(0.025)	(0.033)	(0.036)	(0.030)
Rich	0.606***	0.100***	0.071***	0.085***	0.732***	0.101*	0.048**	0.075***	0.388***	0.098***	0.110***	0.104***
	(0.013)	(0.017)	(0.021)	(0.016)	(0.015)	(0.019)	(0.030)	(0.019)	(0.021)	(0.028)	(0.031)	(0.026)
Type of Residence												
Rural	0.433***	0.117***	0.085***	0.102***	0.563***	0.138***	0.091***	0.116***	0.160***	0.062***	0.074***	0.068***
	(0.013)	(0.016)	(0.022)	(0.016)	(0.017)	(0.020)	(0.026)	(0.019)	(0.025)	(0.017)	(0.020)	(0.015)
Urban	0.565***	0.112***	0.071***	0.090***	0.692***	0.116***	0.057**	0.085***	0.350***	0.096***	0.085***	0.090***
	(0.017)	(0.019)	(0.022)	(0.018)	(0.019)	(0.022)	(0.026)	(0.021)	(0.027)	(0.026)	(0.027)	(0.023)

Continued on next page

Continued Heterogeneous Effects of The Policies on NAR In Basic Schools.

BACKGROUND	**BASIC**				**PRIMARY**				**JHS**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	2003	2008	2014	Post	2003	2008	2014	Post	2003	2008	2014	Post
Gender												
Boys	0.482 ***	0.117 ***	0.079 ***	098***	0.618 ***	0.119 ***	0.068 ***	0.094***	0.220 ***	0.094 ***	0.092***	0.093***
	(0.013)	(0.015)	(0.018)	(0.014)	(0.015)	(0.017)	(0.020)	(0.016)	(0.017)	(0.019)	(0.021)	(0.017)
Girls	0.485 ***	0.113 ***	0.078 ***	0.096***	0.602***	0.143 ***	0.087 ***	0.115***	0.260 ***	0.057 ***	0.063 ***	0.060***
	(0.012)	(0.014)	(0.018)	(0.014)	(0.015)	(0.017)	(0.021)	(0.016)	(0.017)	(0.020)	(0.022)	(0.019)
Region												
South	0.524***	0.104***	0.047**	0.075***	0.660***	0.116***	0.029***	0.072***	0.275***	0.068***	0.068***	0.068***
	(0.023)	(0.013)	(0.018)	(0.013)	(0.015)	(0.015)	(0.022)	(0.016)	(0.015)	(0.018)	(0.019)	(0.015)
North	0.334***	0.150***	0.207***	0.176***	0.441***	0.179***	0.257***	0.215***	0.084***	0.103***	0.134***	0.118***
	(0.021)	(0.031)	(0.030)	(0.026)	(0.029)	(0.041)	(0.039)	(0.035)	(0.015)	(0.022)	(0.024)	(0.019)
N	**35541**				**23977**				**11564**			

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: All the values under the columns labeled 2003 are the initial NAR in 2003, the base year. Columns 2 through 4 are the estimates for Basic, 6 to 8 for Primary and 10 to 12 for JHS.

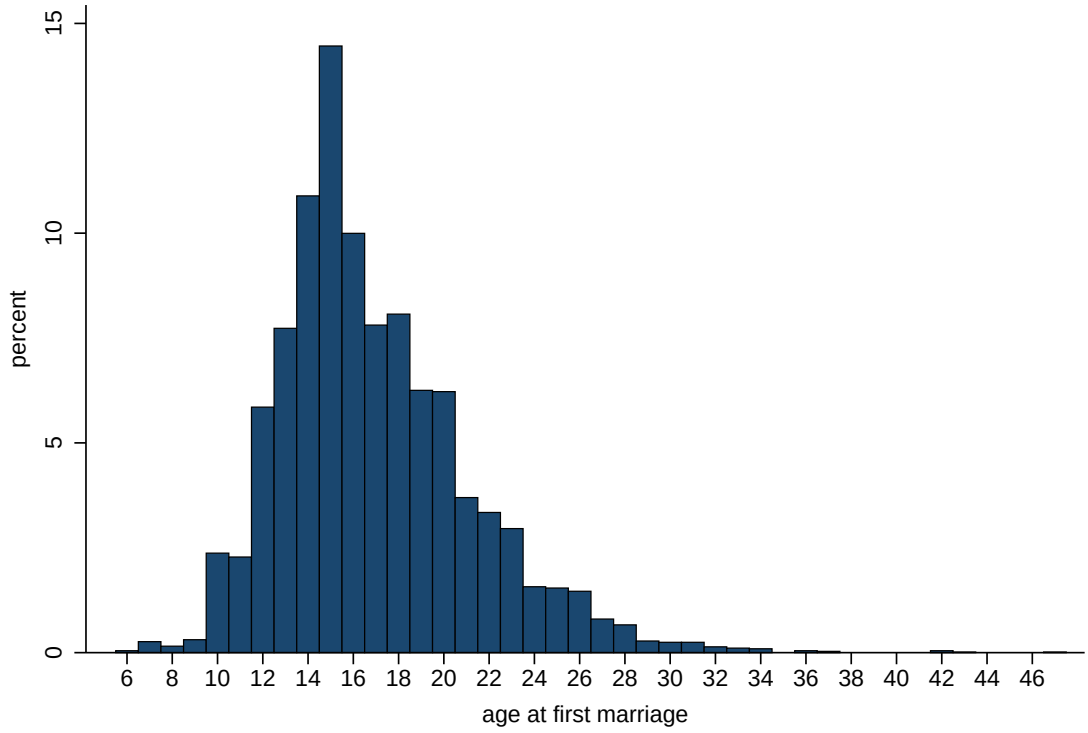
Table 1.3: The Overall Effects of The Policies on Enrollment Rates In Basic Schools from MICS and DHS.

	(1)	(2)	(3)	(4)
	2003	2006	2008	2014
BASIC				
NAR	0.481***	0.132***	0.118***	0.083***
	(0.010)	(0.015)	(0.012)	(0.015)
N		36061		
PRIMARY				
NAR	0.610***	0.127***	0.132***	0.082***
	(0.012)	(0.018)	(0.015)	(0.019)
GAR	0.968***	0.077***	0.152***	0.031***
	(0.018)	(0.026)	(0.023)	(0.027)
N (NAR)		24336		
N (GAR)		85394		
JHS				
NAR	0.239***	0.118***	0.081***	0.079***
	(0.013)	(0.017)	(0.014)	(0.016)
GAR	0.547***	0.125***	0.175***	0.083**
	(0.022)	(0.030)	(0.026)	(0.027)
N(NAR)		11725		
N(GAR)		85394		

Note: This table presents the results for the overall effects at the individual level using both DHS and MICS data sets. Column 1 shows the levels of enrollment rates in 2003 which is the base year. Columns 2 and 4 shows the increment in 2006, 2008 and 2014 respectively. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Tables and Figures for Chapter 2

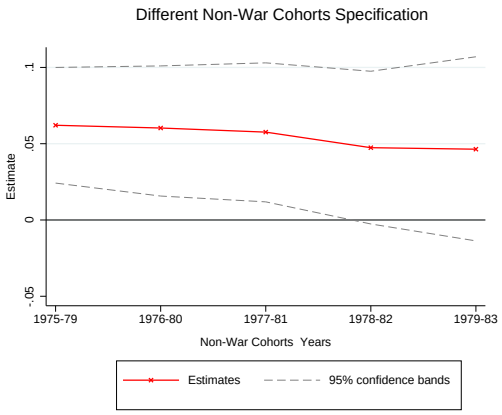
Figure 2.1: The sample distribution of Age at First Marriage



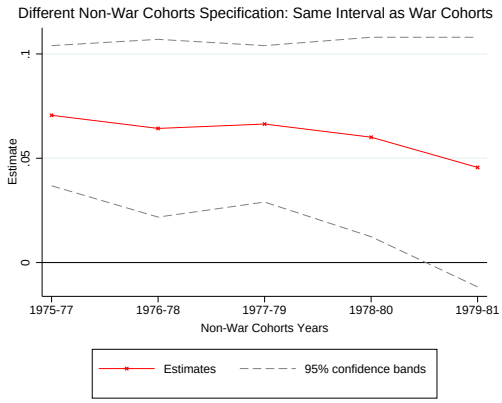
Source:1990 and 2003 Nigeria DHS survey. The sample is ever married women born btween 1950 and 1970

Figure 2.2: Impact of Conflict on Early Marriage for Different Cohorts

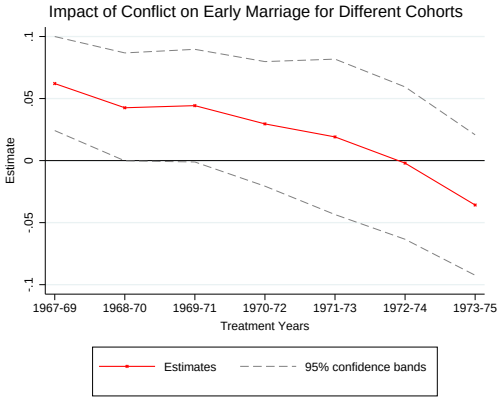
(a)



(b)



(c)



Note: Figure 2 plots the estimates of the effect of conflict on early marriage for different cohorts. In all the panels, the first point is the estimate of the main results in the paper. The subsequent points are the estimates as a result of moving either the control cohorts or both the control and the treatment cohorts. In panels (a) and (b), I keep the treatment cohorts(10 - 15 in 1967-69) and keep moving the control cohorts as depicted on the horizontal axes. In panel (c), I keep moving the treatment cohorts as shown on the horizontal axis whiles also moving the corresponding control cohorts. For example the control cohorts for treatment cohorts 1967-69 will be 1975-79, that of 1968-70 will be 1976-80, and so on. The exposed and non exposed ethnicities are defined as in the main regression and same controls are used.

Table 2.1: Summary Characteristics of Ever Married Women by Age of Marriage

	Married before 16 (1)	Married at 16 or after (2)	Difference (1)-(2)
Individual			
Level of Education (%)			
No education	81.5	47.6	33.9***
Primary	15.2	29.6	-14.***
Secondary	2.6	18.6	-16.0***
Higher	0.7	4.2	-3.5***
Average years of education	1.1	4.0	-2.9***
Working (%)	62.7	77.8	-15.1***
Mean age at first birth	16.6	20.4	-3.9***
Birth before marriage	4.6	11.8	-7.2***
Average number of children ever born	5.1	4.1	1.0***
Average number of children alive	3.8	3.4	0.4***
Major Ethncity (%)			
Hausa	50.3	12.6	37.7***
Yoruba	3.0	23.2	-21.4***
Igbo	7.7	19.1	-11.4***
Union			
Mean Partner's age	47.7	46.0	1.7***
Mean age gap	15.6	14.1	1.5***
Average years of partner's education	2.2	5.0	-2.8***
Polygamous marriage (%)	48.1	38.5	9.6***
First wife (%)	45.7	34.1	11.6***
Household			
Residence (%)	80.9	68.0	12.9***
Wealth			
Poor	54.7	31.5	23.2***
Middle	20.6	18.2	2.4
Rich	24.7	50.4	-25.7***
N	3429	4820	

Source: Autor's own calculation from 1990 and 2003 Nigerial DHS survey. The sample is ever married women born between 1950 and 1970

Table 2.2: Impact of Conflict on Early Marriage

	Biafran vrs Non Biafran		**Biafran vrs North**		**Biafran vrs Others**	
	(1)	(2)	(3)	(4)	(5)	(6)
War Cohort * Biafran	0.062**	0.108**	0.062**	0.109**	0.061**	0.105*
	(0.019)	(0.041)	(0.018)	(0.036)	(0.025)	(0.056)
Education	-0.161***	-0.160***	-0.391***	-0.212***	-0.144***	-0.142***
	(0.036)	(0.036)	(0.053)	(0.046)	(0.029)	(0.030)
Religion						
Protestant	-0.034	-0.035	-0.387***	0.393***	-0.004	- 0.006
	(0.052)	(0.053)	(0.056)	(0.055)	(0.034)	(0.034)
Catholic	-0.022	-0.025	-0.426***	-0.391***	0.009	0.006
	(0.051)	(0.052)	(0.069)	(0.056)	(0.034)	(0.035)
Traditional	-0.065	-0.062	-0.387***	-0.426***	-0.019	- 0.015
	(0.071)	(0.073)	(0.049)	(0.070)	(0.061)	(0.064)
None	-0.063	-0.068	-0.387***	-0.392***	-0.023	-0.029
	(0.067)	(0.067)	(0.049)	(0.048)	(0.049)	(0.047)
Rural	0.005	0.005	0.001	-0.002	0.024	0.025
	(0.018)	(0.018)	(0.028)	(0.028)	(0.021)	(0.020)
Region Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year of Birth Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Ethnicity Time Trends	No	Yes	No	Yes	No	Yes
N	6285	6285	3740	3740	4052	4052

Note: Table 2 shows the impact of conflict on the probability of getting married before 16. In columns (1) and (2), the analysis is between biafran and all other ethnic groups, in (3) and (4), it is between biafran and north ethnicities (huasas/fulanis) and in columns (5) and (6), it is between biafran and other ethnicities other than hausas and fulanis. Exposed cohorts is a dummy that takes value 1 if 10-15 years in 1967 -1969 and 0 if 10 -15 in 1975-1978. Biafran takes value 1 when individual belongs to igbo ethnicity or any other ethnicity in biafran region. Education equals 1 if individual has completed 9 years of education. Omitted category for religion is Islam. Standard errors are clustered at the ethnicity level. * significant at 10%; ** significant at 5%; *** significant at 1%.

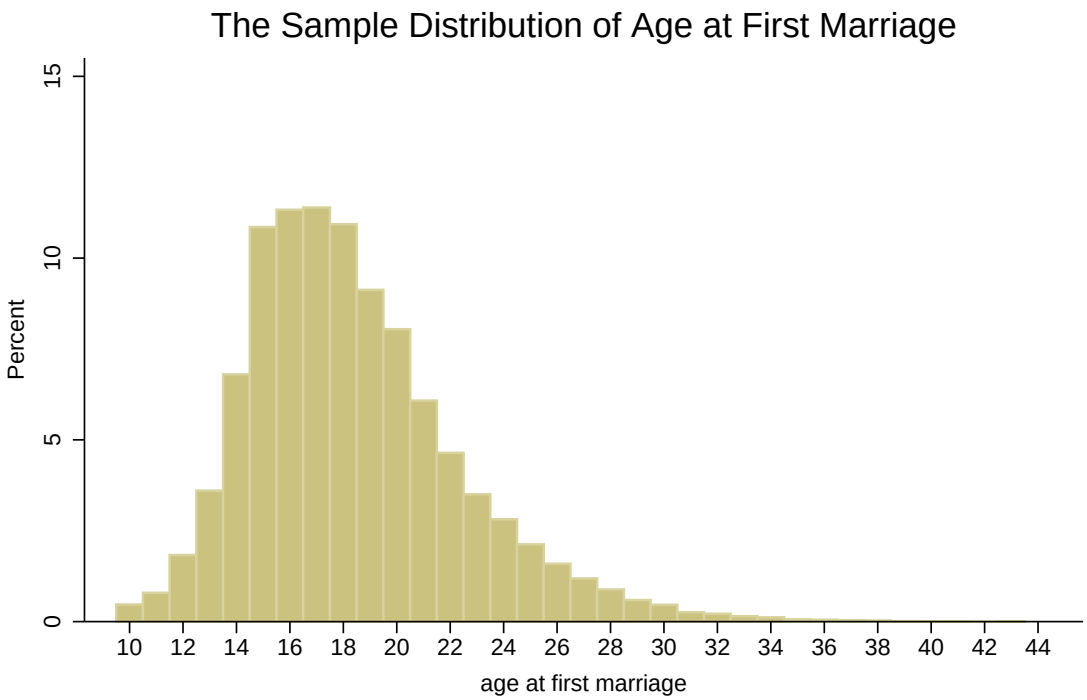
Table 2.3: Impact of Conflict on Early Marriage for Non Biafrans

	(1)	(2)
War Cohort * West	-0.004	-0.008
	(0.021)	(0.047)
Education	-0.151***	-0.148***
	(0.052)	(0.051)
Religion		
Protestant	-0.030	-0.032
	(0.049)	(0.050)
Catholic	0.014	0.010
	(0.043)	(0.043)
Traditional	-0.071	-0.062
	(0.096)	(0.105)
None	-0.136	-0.143
	(0.124)	(0.118)
Residence	-0.010	-0.006
	(0.016)	(0.017)
Year of Birth Fixed Effect	Yes	Yes
Ethnicity Fixed Effect	Yes	Yes
Regional Fixed Effect	Yes	Yes
Ethnicity time trend	No	Yes
N	4645	4645

Note: Table 3 shows the placebo test on ethnicities that were not directly affected by the war. War Cohort is a dummy that takes value 1 if 10-15 years in 1967-1969 and 0 if 10-15 years in 1975-1978. West takes value 1 if individual belongs to an ethnicity in the western region. Standard errors are clustered at the ethnicity level. * significant at 10%; ** significant at 5%; *** significant at 1%

Tables and Figures for Chapter 3

Figure 3.1



Source: DHS for Sub-Saharan Africa (1989 - 2016).
The sample is ever married women born btween 1971 and 2002

Figure 3.2

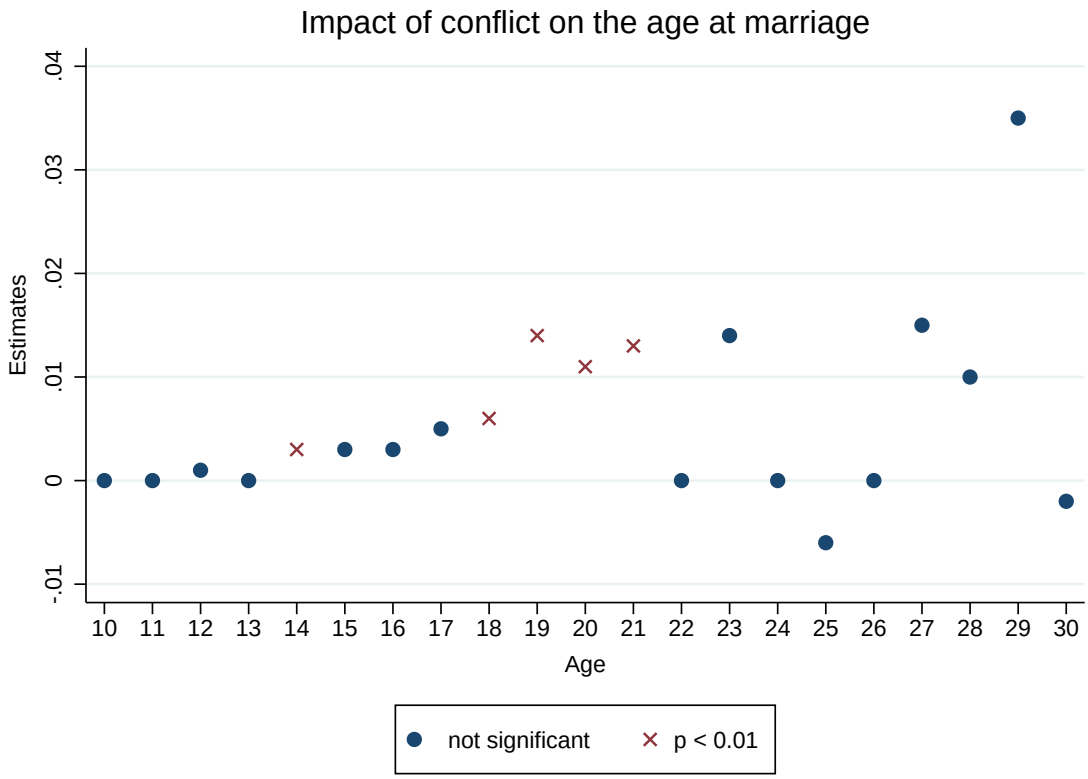

Impact of conflict on the age at marriage
Estimates
-.01
0
.01
.02
.03
.04
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
Age
not significant
p < 0.01

Table 3.1: Summary Characteristics of Ever Married Women by Age of Marriage

	Married before 16 (1)	Married at 16 or after (2)	Difference (1)-(2)
Individual			
Level of Education (%)			
No education	64.1	32.1	32.0***
Primary	26.7	36.2	-9.5***
Secondary	8.9	27.3	-18.4***
Higher	0.4	4.5	-4.1***
Average years of education	2.0	5.2	-3.2***
Working (%)	57.0	61.8	-4.8***
Mean age at first birth	15.9	19.9	-4.0***
Birth before marriage	3.4	18.3	-14.9***
Average number of children ever born	3.4	2.7	0.8***
Average number of children alive	2.9	2.4	0.5***
Average number of children dead	0.6	0.3	0.3***
Union			
Mean Partner's age	36.4	35.4	1.0***
Mean age gap	11.0	8.3	2.8***
Average years of partner's education	3.4	6.4	-2.9***
First Wife	43.1	33.9	9.2***
Polygamous marriage (%)	30.4	18.7	11.7***
Household			
Residence (%)	77.7	63.3	14.4***
Wealth			
Poor	52.3	36.1	16.1***
Middle	20.0	19.3	0.07
Rich	27.7	44.6	-16.9***
Decision Making			
Say in Decision Making (%)	15.6	25.7	10.1***

Note: A woman is said to have a say in decision making if she takes part in the decision on how money earned by her or husband is spent, her own health care, large household purchases, visitation to family members, food to be cooked daily and refusal of sex.
Source: Autor's own calculation from DHS data for Sub-Saharan Africa COuntries from 1989 to 2016. The sample is ever married women born between 1971 and 2002

Appendix A Chapter 1

The relationship between NER and GER

The NER measures the percentage of the official age population of a particular grade that are enrolled in that grade.

Mathematically,

$$\text{NER (NAR)} = \frac{\text{Number of the official grade age children enrolled}}{\text{Official grade age population}} \times 100$$

The GER(GAR) on the other hand measures the total enrollment irrespective of age, expressed as a percentage of the official age population. That is,

$$\text{GER (GAR)} = \frac{\text{total enrollment in a grade}}{\text{Official grade age population}} \times 100$$

From the above definitions, the GER is the sum of the NER and the percentage of those children in that grade who fall outside the official grade age. This means the GER can exceed 100%. Let ϕ represent the percentage of the official age grade population who are fall outside the official grade age but are enrolled in that grade. Then

$$\text{GER} = \text{NER} + \phi$$

Assuming that population growth is constant over time, then

$$\triangle \text{ GER} = \triangle \text{ NER} + \triangle\phi$$

where $\triangle\phi \lessgtr 0$.

The Ghanaian education system is characterized by overage participants, that is, children who enter a particular grade at a later age. Therefore the $\triangle\phi$ gives a mea-

sure on the trend of overage participation over time.

$$\text{Overage participation is} \begin{cases} \text{increasing}, & \text{if } \triangle\phi > 0 \\ \text{decreasing}, & \text{if } \triangle\phi < 0 \\ \text{zero}, & \text{if } \triangle\phi = 0 \end{cases}$$

To achieve universal basic education requires that $\triangle\phi = 0$