

Measuring the Effect of Education Policy on Ethnic Inclusion in Kenya: Use of Natural Experiment and Regression Discontinuity Design

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Abstract

What are the effects of education policies, particularly a language policy requiring a common language of instruction, on promoting ethnic diversity and inclusion when ethnicity is politically salient? This study focuses on Kenya, a highly ethnically diverse society in sub-Saharan Africa where ethnicity remains politically salient, to examine the causal effects of language policy on promoting ethnic inclusion and diversity. Kenya is an important example as it underwent an education reform in 1985 (a change to the 8-4-4 system) and is also currently undergoing additional educational reform. This paper uses Kenya's education reform in 1985 as a natural experiment and identifies the causal effects of a common language of instruction under the 8-4-4 system on diversity and inclusion by applying a Regression-Discontinuity (RD) design to an original dataset collected through a survey targeting randomly selected Kenyan citizens in Nairobi age 18 and above. The RD analyses do not find evidence of the ethnic inclusion effect of the 8-4-4 system but rather divisive effects for people who lived in Nairobi most of their lives.

Keywords: Regression Discontinuity, Natural Experiment, Language Policy, Ethnicity, Kenya

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1 Introduction

In Kenya, ethnicity has been highly salient both politically and socially. Ethnic competition and ethnic-based political violence still prevail. After post-election ethnic violence in 2007-2008, the Kenyan government established the National Cohesion and Integration Commission to promote a peaceful and inclusive society. While the Commission has condemned many ethnic discrimination practices and hate crimes and hosted many cultural events and programs to promote ethnic cohesion, their effectiveness in promoting ethnic inclusiveness remains unclear. In addition, Kenya's new constitution that came into effect in 2010 includes key Articles designed to promote cohesion and integration across different ethnic groups and to protect the rights for marginalized populations including ethnic minorities (Kramon and Posner, 2011). Although their effectiveness remains unclear, these government initiatives designed to promote ethnic cohesion and inclusiveness indicate that promoting ethnic inclusiveness remains a critical issue in Kenya.

Arguably, education policy is a more fundamental policy tool to promote cohesion and ethnic inclusivity since it determines curriculum, language of instruction, and national identity and pride (Bucholtz and Hall, 2005; Githiora, 2008; Njeng'ere, 2014). In many post-independent African countries, education policy and school curriculum were used for national, cohesive identity building due to a close connection between education and identity (Githiora, 2008; Ojiambo and Otiato, 2009; Njeng'ere, 2014). Despite its potential importance, the effects of Kenya's education policy on promoting cohesion and inclusion across different ethnic groups have not been closely examined.

This paper aims to fill this gap by examining the effects of education policies on promoting diversity and inclusion in Kenya where ethnicity is highly diverse and politically salient. To address this question, I use Kenya's education reform that was implemented in 1985, the 8-4-4 education reform, as a natural experiment and apply regression discontinuity (RD) analyses to the original survey data collected in Kenya in June 2018. The pre-8-4-4 education policy, which was a 7-4-2-3 system, focused on the nation-building processes to address the post-colonial challenges in Kenya, while the primary purpose of the education reform to the 8-4-4 system was to provide students with practical and employable skills. One crucial aspect of the reform, however, was a change in the language of instruction for the first three years of primary education. In the 8-4-4 system, students were taught in their local vernacular language for the first three years, Standard 1 through Standard 3 (Ojiambo and Otiato, 2009; Wanjohi, 2011).

The RD analyses focused on Kenyan adult citizens in Nairobi who became eligible to begin their primary education under the 8-4-4 system when it was first

implemented in 1985 and those who began just before the new system was implemented. The RD analyses do not provide evidence of the ethnic inclusion effect of the 8-4-4 system based on differences in probabilities of developing an ethnic bias. Instead, the result suggests that there was an ethnically divisive effect of the 8-4-4 system for people who have lived in Nairobi most of their lives.

Education reform is a very timely issue in Kenya as indicated by another education reform recently implemented to replace the 8-4-4 system. Therefore, examining the effectiveness of each education policy will contribute to implementing the policy wisely. Furthermore, the effectiveness of education policies on ethnic inclusion and national cohesion is also timely and vital as the government of Kenya is currently making a significant effort in promoting national cohesion and mitigating ethnic tensions through many policy initiatives such as the National Cohesion and Integration Commission.

2 Kenya's Education Policy Reforms: Background and Previous Studies

2.1 Kenya's Education Reforms And Transition to the 8-4-4 System

Since independence, Kenya has undergone several educational reforms. The first educational reform in 1964 led to the education system called the "7-4-2-3" system that consisted of seven years of primary education (Standard 1 through Standard 7), four years of lower secondary education (Form 1 through Form 4), two years of upper secondary education (Form 5 and Form 6), and three years of university education. This system existed between 1965 and 1985. The second educational reform led to the 8-4-4 system replacing the 7-4-2-3 system in 1985. It consisted of eight years of primary education (Standard 1 through Standard 8), four years of secondary education (Form 1 through Form 4) and four years of university education (Wanjohi, 2011). The most recent educational reform took place in 2017, although still not completely implemented. This system called the "2-6-6-3" system aims to provide two years of pre-school education, six years each of primary and secondary education and three years of university education.

The key objective of the first educational reform that led to the 7-4-4 system was two-fold: first, it sought a balance between bringing "an African character to the education system of Kenya" to distinguish it from the one under the colonial rule and to achieve "modernization" through education. Second, it focused on promoting "national unity" through education (Anderson, 1965, p. 205). The Ominde

Commission Report that laid out the plans of the 7-4-4 system, for example, stated that “education must bring about national unity as opposed to its earlier segregating character” (Anderson, 1965, p. 203). Ironically, the Committee proposed to adopt English as the primary language of instruction in primary schools, citing popular, public demands as the reason for such a decision: it stated “English is accepted as the medium of education in primary schools.” As much as the independent government distinguished itself from the colonial government, the colonial influence continued.

In contrast, the motivation that led to the next educational reform and to the new system, the 8-4-4 system, was a rather practical one: to improve curriculum to provide students with more employable skills and training. Although the primary goal of the reform was to improve curriculum to teach students more employable skills, the curriculum change from the 7-4-2-3 system to 8-4-4 system involved much more than teaching employable skills. There was also a change in the language of instruction. In contrast to the 7-4-4 system where the primary language of instruction was English, students from Standard 1 through 3 were supposed to start their formal education with their ethnic vernacular language under the 8-4-4 system, at least in principle. In practice, however, younger students enrolled in Standard 1 through Standard 3 were taught in English, Swahili, and their local mother tongue as languages of instruction (Glewwe, Kremer, and Moulin, 2009, p.114). After Standard 3, the main language of instruction included only English and Swahili. Swahili was a “compulsory and examinable subject” for primary and secondary education under the 8-4-4 education system (Timammy and Oduor, 2010). That is, making the local ethnic language the primary language of instruction from Standard 1 through 3 and English or Swahili the medium of education from Standard 4 onward was one crucial element of the reform.

2.2 Impacts of the 7-4-2-3 and 8-4-4 Systems on Ethnic Inclusion and Division

Some post-colonial governments were successful in nation-building processes while others were not. For example, two neighboring countries in sub-Saharan Africa, Tanzania and Kenya, were similar in terms of their ethnic diversity but differed significantly in their nation-building efforts and outcomes after their independence (Miguel and Gugerty, 2005). While Tanzanians found national identity and unity very important, Kenya experienced several episodes of ethnic tensions and conflicts including post-election violence in 2008. Miguel and Gugerty (2005) attributed in part the difference in ethnic division between the two countries to differences in education policy. Evidence for Kenya’s unsuccessful education policy that might have led to ethnic tensions is also found in Kramon and Posner (2016).

It is clear that education policy and education reform can be used as fundamental tools that promote cohesion and ethnic inclusion as they influence national identity and pride through curriculum and language of instruction. That is probably why many post-independent African countries used school curriculum and education policies for national, cohesive identity building, recognizing a close connection between education and identity. Despite the significance of their impact, the rigorous impact analyses of various education policies on ethnic inclusion and cohesion are still rare. Studies on the impacts of education system instead focus on educational outcomes such as test score, graduation rates, drop-out rates, literacy rates and enrollment and employment outcomes as these can be more direct outcomes that are easily measurable.

Identifying the causal effects of different education systems on promoting a sense of ethnic inclusion at an older age is indeed challenging as there are so many measured and unmeasured factors that determine both education reforms and a sense of ethnic inclusion and openness to other ethnic groups. For example, age is an important potential confounder: it determines what type of education students would receive such as pre or post-education reform and it can also determine a sense of ethnic inclusion and unity as younger people tend to more highly value diversity and inclusion or vice versa.

Due to various challenges, little is known of the effects of Kenya's education systems, whether the 7-4-2-3 or 8-4-4 systems, on promoting ethnic inclusion and diversity. In general, the Kenyan government was not very successful in using education policy for its post-national identity-building efforts (Miguel and Gugerty, 2005) Dissatisfaction with the post-colonial education system of the 7-4-2-3 system led to the transition to the 8-4-4 system, and various criticisms regarding the 8-4-4 system led to another education reform in Kenya in 2017. The main criticism regarding the 7-4-2-3 system was the lack of practical training and skills that can provide students with employment opportunities after graduation. Rather, this system was viewed as too academically oriented providing test-based education. The 8-4-4 education system that replaced the 7-4-2-3 system has not been considered very successful in improving employment, either. Despite its original purpose of providing employable skills to students, the curriculum and its implementation, in practice, were not seen as effective in teaching students employable skills.

Despite many challenges, we can try to infer the influence of each education system and its channel by focusing on the language aspect of each policy. On the one hand, under the 7-4-2-3 system, the colonial language, English, was used as a primary language of instruction rather than an indigenous language. Considering that colonial rule left Kenya with the salience of ethnic divisions, the continuous use of the colonial language could carry-over the ethnic division people experienced

during the colonial period.

On the other hand, an important element of the 8-4-4 system which promoted the use of local ethnic languages as the primary language of instruction for the first three years of primary education, may have ethnically divisive consequences at an older age. First, the use of vernacular language may have reinforced differences across ethnic groups instead of promoting a nationally coherent identity as language and identity are closely connected. Second, using a local vernacular language at school may create a barrier for a student from a different ethnic group from enrolling in a school where the language of instruction is a different local vernacular language. Third, even if they are enrolled, this language barrier may prevent students from different ethnic groups from interacting freely. Fourth, less interaction amongst students from different ethnic groups at a younger age may lead them to develop strong ethnic identities and to see others from different ethnic groups as “out-group” members rather than “in-group” members.

We can also expect that the consequences of the use of vernacular language are not likely to be uniform across different neighborhoods. For example, in places like Nairobi, it would be extremely challenging to use a single ethnic language other than Swahili due to the ethnic diversity of the region. Although ethnic Kikuyu consists of the largest population in Kenya and more so in the central region including Nairobi, adopting Kikuyu as a primary language of instruction in primary education can lead to challenges and frustration of students and parents from other ethnic groups. In ethnically homogeneous areas, however, the use of ethnic language can lead to higher satisfaction by students and parents as it can help younger students better comprehend the subject matter. It may not, however, be useful in building national identity or cohesion across ethnic groups.

The potential consequences of the 7-4-2-3 and 8-4-4 systems on ethnic inclusion and cohesion are not clear. Hence, I turn to empirical tests to examine the causal effects of two education systems on ethnic inclusion and cohesion across different ethnic groups.

3 Regression Discontinuity Design of Kenya’s Education Reform And Ethnic Inclusion

A regression discontinuity (RD) design allows us to minimize the potential endogeneity problem by identifying discontinuities at the point where treatment applies (Hahn, Petra and Klaauw, 2001; Imbens and Lemieux, 2008; Lee, 2008; Lee and Lemieux, 2010). Regression Discontinuity (RD) analyses have been widely used in examining the effects of education reforms and policies. However, the outcomes of

interests have focused on student achievement and educational outcomes such as dropout rates (Guryan, 2001; Jacob and Lefgren 2004; Ou, 2010) and health outcomes such as mortality rates (Silles, 2009; Albouy and Lequien, 2009; Lindeboom, Llena-Nozal and van Der Klaauw, 2009). Other studies have examined the impact of education policy on cognitive abilities at an older age (Banks and Mazzonna, 2012) and crime (Machin, Marie and Vujić, 2011) using the RD analyses. However, the impact of education policy on important social and political outcomes such as nation-building, identity and social and ethnic inclusion has not been actively examined through applying RD approaches. This paper fills this gap by utilizing Kenya's education reform implemented in 1985 as a natural experiment and applying the RD approach to examine the ethnic inclusion effect of education policies in Kenya.

Kenyan children begin their formal education at the age of six, and the new academic year begins in January. As the 8-4-4 system was implemented in 1985, the first Standard 1 education under the new 8-4-4 system would have begun in January 1986, the start of the first academic year since the new system was implemented. The first cohort who began their Standard 1 education under the 8-4-4 system, therefore, would be the ones who were six years old as of January 1986 including those who just turned six. They are the ones who were born between January 1979 and January 1980. Those who were born in and after January 1979 started Standard 1 under the new 8-4-4 system and used Swahili, English and their ethnic mother tongue as languages of instruction. During the first three years of primary education, Standard 1 through Standard 3, in particular, children were supposed to be taught in their local languages to help their comprehension of subject matters. On the other hand, those who were born prior to January 1979, started their Standard 1 under the 7-4-2-3 system, learning their first school curriculum in English as they started Standard 1.

Therefore, I use January 1979 as the cutoff birth month. I use survey respondent's age measured in months from January 1979 as an assignment variable. Then, I can estimate the LATE of using ethnic language as opposed to English as the main language of instruction on ethnic inclusion by comparing the sense of ethnic inclusion and openness of two groups of respondents: those who were born slightly before January 1979 and those who were born in or slightly after January 1979. Although these two groups are almost identical in terms of their age, the first group would have started their primary school under the 7-4-2-3 system while the second group started their primary school under the 8-4-4 system as they just turned six in January 1986. These two groups would have experienced different languages of instruction, English vs. ethnic language, as they began Standard 1. By focusing only on those who were born almost around the same time but started primary education under two different systems using different languages of instruction, we

may consider the two groups are as if randomly assigned into these two systems. If two groups are as if randomly assigned, the difference in outcomes such as openness and inclusivity toward other ethnic groups can be attributable to the difference in the main language of instruction.

As in Card, Dobkin and Maestas (2009), the following reduced form RD model will be estimated:

$$y_i = f(A_i, \alpha) + PostJan1979_i\beta + \epsilon_i$$

where y_i is a binary variable indicating that the respondent's priority goes to one's ethnic interests rather than the national interests¹, A_i , the assignment variable, indicates the respondent's age measured in months from the cutoff point, January 1979, $PostJan1979$, the treatment indicator, indicates whether the respondent was born after January 1979, and ϵ_i is an error term. $f()$ indicates a flexible polynomial function with a parameter vector α that is continuous at the cutoff (Card, Dobkin and Maestas, 2009.) In estimation, I estimate the following models: (a) the basic linear model with the treatment indicator and assignment variable without an interaction, (b) a varying slope model that adds an interaction between the treatment indicator and assignment variable, (c) a quadratic polynomial in the assignment variable fully interacted with the treatment indicator, and (d) a cubic polynomial in the assignment variable also fully interacted with the treatment indicator.

I make the following key assumption of an RD model (Lee, 2008; Card, Dobkin and Maestas, 2009)

$$E[\epsilon_i | -\delta < A_i < 0] = E[\epsilon_i | 0 < A_i < \delta]$$

when δ is sufficiently small. This assumption indicates that we can treat assignment either below or above the cutoff "as if" random.

4 Data

The data was collected through a survey in Nairobi targeting 1400 randomly selected Kenyans residing in Nairobi age 18 and older. I used a random stratified sampling strategy and used Nairobi's polling stations for 2017 general elections as sampling points. Thirteen Kenyan surveyors used a random-walk method to select households, starting from a randomly chosen polling station as a starting point. The data collection took place June 6 through June 21, 2018. The survey instruments

¹This variable is based on the answer to the question "Which of these statements best describes your view?" There are two options from which respondents can choose: one statement says "Political leaders should always consider the needs of all tribes in Kenya" and the other statement says "Because of how politics works in Kenya, political leaders should take care of their own tribes first." If the respondent agrees with the later statement, y_i is coded as 1 and 0, otherwise.

included a set of questions on the year and month born, education level, year of primary school started, ethnicity and ethnic inclusivity questions. Approximately 1300 respondents completed the survey. The sample to be used in the analysis consists of 1100 observations that include respondents who have completed primary education as the main interest of this study is to examine the impact of having primary education under two different education systems on one's ethnic preference.

5 Results

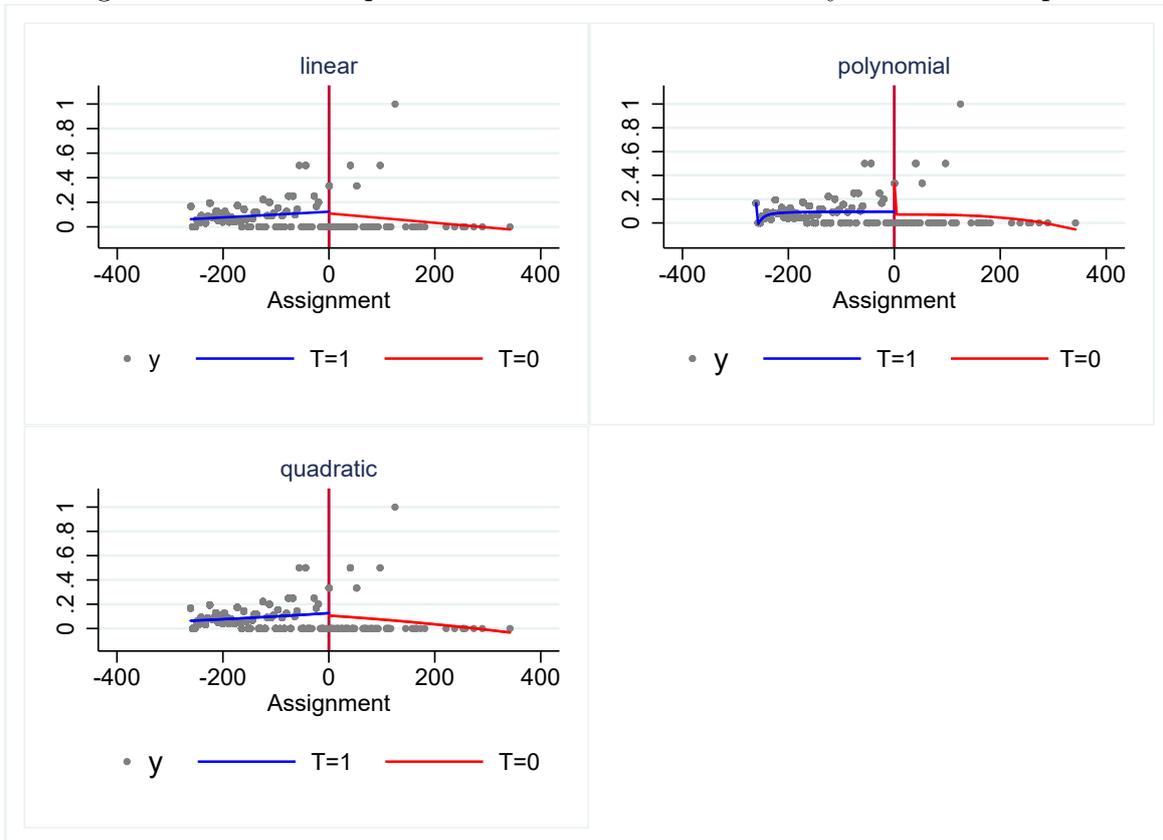
To visually detect whether there is a jump in the probability of preferring ethnic over national interests at the point of discontinuity and also whether there is any nonlinearity, I first constructed bin plots using a linear, quadratic and fractional polynomial models. Figure 1 shows the bin plot created using the full sample of 1100 respondents. The horizontal axis shows age measured in months from January 1979, the 8-4-4 system cutoff birth month. Those who were born in January 1979 and later would have enrolled in the primary school under the 8-4-4 system. The data is binned in groups of 4 months and therefore each data point indicates the proportion of respondents whose ages are within the four-month range who prefer a politician addressing ethnic interests first. The bin plot seems to suggest that the slope of the assignment variable may vary between those who started primary education under the 8-4-4 and 7-4-2-3 systems. However, the jump at the discontinuity did not seem large enough.

Having recognized that the impact of using an ethnic language as the medium of education during one's first three years of primary education may not be uniform across different neighborhoods, I divided the sample into two sub-samples based on the ethnic diversity of where respondents grew up. The first sample, called the Nairobi sample, only includes the respondents who indicated that they lived in Nairobi most of their lives. The second sample, the non-Nairobi sample, on the other hand, only includes the respondents who have lived outside of Nairobi most of their lives but recently moved to Nairobi.

Focusing only on the sample of those who lived in Nairobi most of their lives, the jump becomes clearer in all linear, quadratic and fractional polynomial models. This change is reflected in Figure 2. Looking at the observations around those who were born in January of 1979 provides us an interesting observation: for those who lived in Nairobi most of their lives, the 8-4-4-4 education policy led to an increase in ethnic bias. Figure 3, on the other hand, provides bin plots based only on the observations of respondents who lived outside of Nairobi most of their lives and moved to Nairobi later in their lives. For those who lived outside Nairobi most of their lives, the jump at the discontinuity suggested a decrease in ethnic bias as a result of the 8-4-4 policy.

Figures 1-3, therefore, suggest that there may be heterogeneous effects of the 8-4-4 system on ethnic bias depending on where respondents lived most of their lives.

Figure 1: Binned Graph of Ethnic Bias and the 8-4-4 System: All Sample

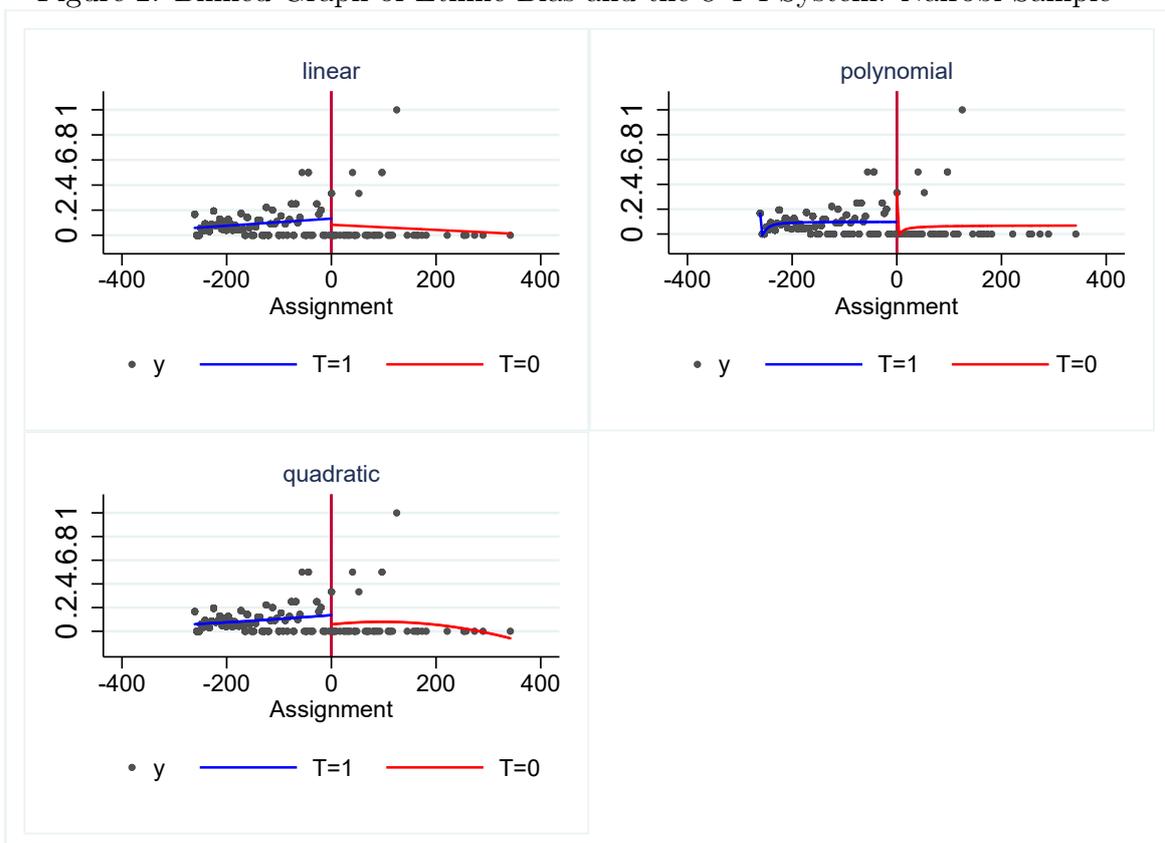


Note. The assignment variable is the respondent's age measured in months from the cutoff point, January 1979; the children who are below the cutoff began Standard 1 under the new 8-4-4 system, while those above the cutoff under the old 7-4-2-3 system.

To examine whether there is a clustering on one side of the cutoff, I also created a histogram of the assignment variable in Figure 4 in Appendix. As Kenya's population is very young due to rapid population growth, the histogram shows a strongly skewed population distribution. However, the distribution is relatively smooth around the cutoff. Also, the birth of people who first became eligible for the 8-4-4 system in 1986 was prior to when the discussion of the education reform began, which is estimated to be 1981. An endogenous sorting or self-selecting into one side of the cutoff, therefore, is highly unlikely.

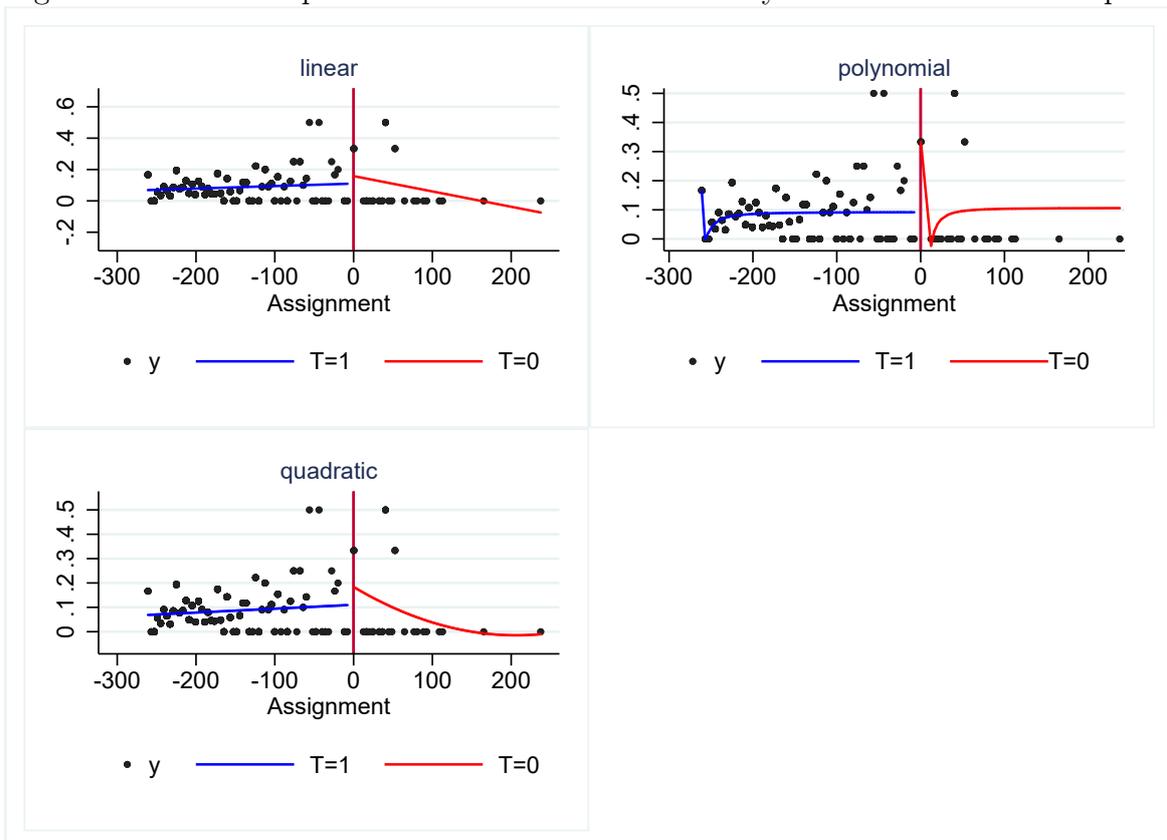
Having discussed the potential clustering of the assignment variable and the jump of outcome variable at the cutoff, I now turn to the RD regression results. Table 1 shows the RD analysis results for the basic and varying slopes RD models for the full sample, the Nairobi sample, and the non-Nairobi sample. The coefficient on the variable, T , the indicator for those who were born after January 1979 and were eligible to begin their Standard 1 education under the 8-4-4 system when they turned six, was positive and statistically significant at the 95% significance level only in the

Figure 2: Binned Graph of Ethnic Bias and the 8-4-4 System: Nairobi Sample



Note. The assignment variable is the respondent's age measured in months from the cutoff point, January 1979; the children who are below the cutoff began Standard 1 under the new 8-4-4 system, while those above the cutoff under the old 7-4-2-3 system.

Figure 3: Binned Graph of Ethnic Bias and the 8-4-4 System: Non-Nairobi Sample



Note. The assignment variable is the respondent's age measured in months from the cutoff point, January 1979; the children who are below the cutoff began Standard 1 under the new 8-4-4 system, while those above the cutoff under the old 7-4-2-3 system.

basic model using the Nairobi sample. The coefficient on T was not statistically significant in any of the varying slope models that include the interaction between T and the assignment variable.

The basic RD model for the Nairobi sample suggests that starting Standard 1 education under the 8-4-4 education "increased" the probability of having an ethnic bias as opposed to those starting Standard 1 under the old 7-4-2-3 system by 12 percentage point when the respondents were exposed only to Nairobi most of their lives. I discuss possible explanations in the following discussion section.

Table 1: RD Analysis of the 8-4-4 System and the Probability of Having Ethnic Bias

Variable	All		Nairobi		Else	
	(1)	(2)	(1)	(2)	(1)	(2)
T	0.037 (0.046)	0.004 (0.051)	0.119** (0.060)	0.086 (0.066)	-0.075 (0.072)	-0.119 (0.085)
Assignment	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.001 (0.001)
T \times Assignment		0.001 (0.000)		0.001 (0.000)		0.001 (0.001)
Constant	0.070** (0.032)	0.117** (0.044)	0.023 (0.040)	0.071 (0.056)	0.139** (0.052)	0.191** (0.074)
N	1100	1100	574	574	526	526
Adj. R^2	-0.001	0.001	0.004	0.005	-0.001	-0.002

Notes. Standard errors in parenthesis; ** indicate significance at $p < 0.05$, two-tailed; Dependent variable is an indicator for the respondent's priority to go to one's ethnic interests rather than national interests; The assignment variable is the respondent's age measured in months from the cutoff point, January 1979.

6 Discussion

6.1 Mechanisms

In the previous section, the RD analysis results suggested that among those who have lived in Nairobi most of their lives, starting primary education in the 8-4-4 system increased the probability of having an ethnic bias at an older age compared to the case if they started their primary education under the 7-4-2-3 system. What explains this result? Again, the 8-4-4 system required learning "Swahili" as a compulsory subject and students were taught in their local ethnic language during the first three years of education. By contrast, the medium of education under the 7-4-2-3 system was English and there was no compulsory subject requirement for Swahili.

One possible channel can be a probing effect: although Swahili is a co-official language together with English and now the national language in Kenya, it also is an ethnic language spoken by a very small ethnic group in Kenya. Compared to the 7-4-2-3 system under which students were taught in English only and did not have to learn Swahili as a compulsory subject, having a compulsory learning requirement of Swahili, an indigenous language, may have brought people to an attention that Kenya indeed has many ethnic and indigenous languages, making ethnic differences more obvious than before.

Another channel is the political effect: the policy reform of transitioning Kenya's education system into the 8-4-4 system was proposed and implemented under the president Daniel Arap Moi, an ethnic Kalenjin. The 8-4-4 reform has often been viewed as being motivated by political interests rather than being driven by actual educational needs (Ojiambo, 2009; Wycliffe, Samson, and Ayuya, 2013). Kramon and Posner (2016) found a robust association between having a co-ethnic president and educational attainment outcome for students from the president's ethnic group. Providing better education opportunities to the president's co-ethnics is not likely to promote ethnic inclusion but division. If people residing in Nairobi, predominantly Kikuyu, attributed their dissatisfaction with the policy reform to the poor performance of the president Moi, a Kalenjin, the reform may have resulted in making the ethnic division politically salient.

6.2 Adjusting the Window

Although the coefficients for the 8-4-4 system in the non-Nairobi sample were negative and the graphical illustration showed clear discontinuities in the probability of having an ethnic bias at the cutoff, these negative coefficients were statistically insignificant. In addition, the positive coefficient for the 8-4-4 system in the Nairobi sample was statistically significant at the 95% confidence level only in the basic model but not in the varying slope model. This statistical insignificance may have resulted from the fact that there were few observations around the cutoff when the assignment variable was measured in months away from the cutoff. To check whether this is, in fact, the case, I re-estimated all four models of the flexible polynomial function of the assignment variable using a different measure of assignment variable. Instead of measuring months away from the cutoff, I used the age measured in quarters away from the cutoff, January 1, 1979, in these additional RD analyses.

Table 2 in Appendix provides the RD estimation results using this measure of age. The coefficients and statistical significance of the treatment indicators in all four model specifications were almost identical to those when the assignment variable was measured in months away from the cutoff. Starting one's Standard 1 education

under the 8-4-4 system increases the probability of developing ethnic bias by 12 percentage point in comparison to starting Standard 1 under the 7-4-2-3 system if the respondents lived in Nairobi most of their lives.

6.3 RD Diagnostics

The estimates of the treatment indicator in RD models are valid as long as only the dependent variable jumps at the cutoff. If, on the other hand, other variables jump at the cutoff, we may be worried about endogenous sorting where people self-select into one side of the cutoff. For example, if people expect that the new education policy to be implemented soon while they do not find the new policy desirable, they may decide to self-select into the current policy. By contrast, if people prefer the new education policy, they may delay starting their education until the new policy is implemented. As mentioned earlier, this type of self-selection into one side of the cutoff is highly unlikely as the first cohort of the 8-4-4 system was born much earlier than when the discussion of the potential transition to the 8-4-4 reform began.

There may be other possibilities of endogenous sorting, however, where there are other variables that jump at the cutoff, making the error term to jump at the cutoff and therefore the dependent variable. Moving to a different neighborhood of different ethnic composition can be such an example. Although a geographical move does not change the eligibility for starting primary education, it can influence the respondents' sense of ethnic inclusion and diversity. If the move was motivated by knowing the benefits of using a certain ethnic language as the medium of instruction, the move correlates with both the educational reform as well as the outcome of interests, possibly invalidating the estimates of our treatment indicator.

To address this concern, I now turn to examine the profiles of ethnic characteristics of the respondents' neighborhoods and the primary school they attended, and the respondents' interactions with others from different ethnic groups to test for discontinuities at the cutoff. Table 3 provides the RD regression results using the following dependent variables: *Primary* is a binary indicator for the ethnic dominance of the respondent's ethnic group in the primary school that the respondent attended. *interact* is an ordered, categorical variable ranging from 1 to 17, measuring how early the respondent started interacting with people from other ethnic groups. The smaller the number is, the earlier the respondent began interacting with people of other ethnic groups. *Neighborhood* is a binary indicator for the ethnic dominance of the respondent's ethnic group in the respondent's neighborhood. The table only provides the coefficient estimates and their standard errors for the treatment indicator, omitting the estimates for the assignment variable and its interaction terms with the treatment indicator. For all these ethnic characteristic

variables, no evidence on discontinuities was found at the cutoff.

7 Conclusions

This paper has addressed the following question: what are the effects of education policies, particularly language policies, on promoting ethnic diversity and inclusion when ethnicity is politically salient? This paper has focused on Kenya, a highly ethnically diverse society in sub-Saharan Africa where ethnicity remains politically salient, which has also undergone several educational reforms since its independence. In particular, this paper has used the reform implemented in 1985, a transition to an 8-4-4 system, as a natural experiment to examine the causal effects of the 8-4-4 system on promoting ethnic inclusion and diversity.

To identify the causal effects of using one's ethnic language as the main language of instruction in primary education on ethnic inclusion and diversity, it has used a regression discontinuity (RD) design on data collected through an original survey targeting randomly selected Kenyan citizens in Nairobi age 18 and above. As Kenya's academic year starts in January and that Kenyans' formal education begins at the age of six, there were discontinuities in treatment assignment based on the following rule: whether children turned six by January of 1986 when the first academic year under the 8-4-4 system began. Utilizing this policy reform as a natural experiment and the discontinuity in the rule-based treatment assignment, I used the birth month of those who just turned six in January 1986, namely January of 1979, as the cutoff. I have used age measured in months away from this cutoff as an assignment variable. Essentially, the RD analyses compared the differences in probabilities that students would have an ethnic bias at an older age between the two groups: those who merely became eligible to begin their primary education under the 8-4-4 system in January 1986 and those who began slightly before the new system was implemented.

No evidence was found that the 8-4-4 system, which required Swahili as a compulsory subject and the use of local vernacular language as a language of instruction for the first three years of primary education, had a positive effect of promoting a sense of ethnic inclusion and diversity. Rather, potentially divisive effects were found: when focusing only on people who lived in Nairobi most of their lives, positive and significant RD estimates of the treatment indicator were found, suggesting that the 8-4-4 education system increased the probability of those who lived in Nairobi most of their lives to develop an ethnic bias. The results were robust to adjusting the window size and including for control variables.

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APPENDIX

Figure 4: Histogram of Assignment Variable for RD Analysis

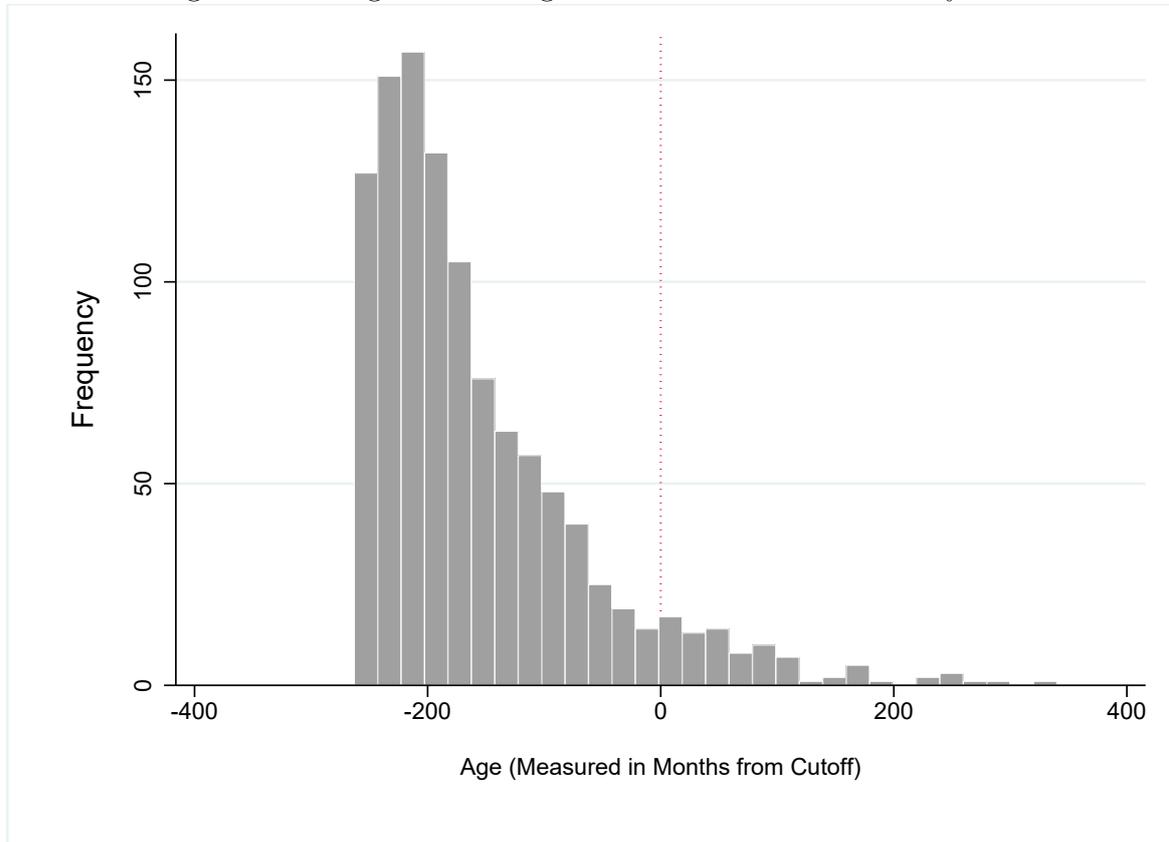


Table 2: RD Analysis of the 8-4-4 System and the Probability of Having Ethnic Bias: Age Measured in Quarters

Variable	All		Nairobi		Else	
	(1)	(2)	(1)	(2)	(1)	(2)
T	0.037 (0.046)	0.003 (0.051)	0.119** (0.060)	0.086 (0.066)	-0.076 (0.072)	-0.122 (0.086)
Assignment	0.000 (0.000)	-0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.003 (0.003)
T \times Assignment		0.002 (0.001)		0.002 (0.001)		0.003 (0.003)
constant	0.070 (0.032)	0.118 (0.044)	0.023 (0.040)	0.071 (0.056)	0.139 (0.052)	0.193 (0.075)
N	1100	1100	574	574	526	526
Adj. R^2	-0.001	0.001	0.004	0.005	-0.001	-0.001

Notes. Standard errors in parenthesis; ** indicate significance at $p < 0.05$, two-tailed; Dependent variable is an indicator for the respondent's priority to go to one's ethnic interests rather than national interests; The assignment variable is the respondent's age measured in quarters from the cutoff point, January 1 1979.

Table 3: RD Diagnostics for the 8-4-4 System and Ethnic Diversity

Variable	Primary (1)	Interaction (1)	Neighborhood (1)
T	0.136 (0.081)	0.616 (0.715)	-0.015 (0.082)
N	1100	1062	1100
Adj. R^2	0.008	0.000	0.001
Variable	Primary (2)	Interaction (2)	Neighborhood (2)
T	0.084 (0.089)	0.474 (0.791)	0.038 *0.091)
N	1100	1062	1100
Adj. R^2	0.008	0.000	0.001

Notes. Standard errors in parenthesis; ** indicate significance at $p < 0.05$, two-tailed; Models with (1) are estimated in the basic model and the models with (2) are estimated in the varying slope model; the estimates for the assignment variable and interaction terms are omitted.