



Inequality, Intrastate Conflict and Ethnic Favoritism in Kenya

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Inequality, Intrastate Conflict and Ethnic Favoritism in Kenya

(ケニアにおける不平等、国内紛争及び自民族偏重)

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Abstract

The international community has made substantial improvement on poverty reduction in the past decades, which is largely driven by rapid economic growth. In the current global context of the growth slowdown, further poverty reduction cannot be realized without significant shifts in reducing within-country inequalities. Emerging evidence suggests that within-country inequality is rising, which is founded to be negatively associated with poverty reduction, economic development as well as the stability of a country.

Despite the fact that Kenya is ranked as one of the most unequal countries in East Africa even in the world, inequality has received little attention and discussion both politically and academically before 2004. Extant studies find that there are great within-region and between-region inequalities in Kenya, while they only stop at descriptive statistics without decomposition of inequality measures at the sub-national level.

Inequality has traditionally been concerned with outcomes in the standard of living such as income, education, and health. An alternative perspective is concerned with the inequality of opportunities, such as unequal access to public goods, facilities, and employment opportunity. Whether inequality in outcomes comes from inequality in opportunities has not been explored yet under the Kenyan context as well.

Using the selected indicators on education and access to basic public goods and services, this dissertation first shows that the overall developmental outcomes and inequality measures have been improved in the past decades in Kenya utilizing household survey data from five rounds of the Kenyan Demographic and Health Survey (KDHS).

The results of decomposition of inequality demonstrate that the majority of the inequality is increasingly coming from within-region inequality; between-region inequality has barely improved in the past several decades.

Kenya has experienced quite bloody episodes of ethnic conflict since its independence, and the conflict that raged in the aftermath of the 2007 election in Kenya remains vivid in many people's minds, raising question that whether it is related to the inequality in Kenya.

Using the Uppsala Conflict Data Program Geo-referenced Dataset and exploiting variations in drought conditions across time within a certain district, this dissertation identifies the causal effect of drought on intrastate conflict through a panel data analysis. It also explores a drought-conflict nexus conditional on baseline measurement of social-economic factors and social divisions. The empirical results show that the drought-conflict nexus is conditional, with its strength substantially affected by the baseline measurement of access to unimproved water source and the ownership of land. Comparing the baseline measurement of access to improved water source with that in the 2014 KDHS reveals the fact that between-region inequality is barely improved, and regions with higher inequality have experienced more conflict. Between-region inequality may also enhance the drought-conflict nexus since non-state conflict increases in a certain district when its neighboring districts were hit by drought especially in arid areas. Thus, policy interventions aimed to reduce the within-region as well as between-region inequalities are urgently needed.

One striking feature of the regions in Kenya is that every region has a dominant ethnic group. It is generally believed that the post-independence presidents allocated resources in a way that favored their home regions or their own ethnic groups. While it is not clear whether the better developmental outcomes in certain regions are because the president only favors his own

ethnic group who is concentrated in certain regions or because he favors certain regions as a whole.

Given that education sector occupies the single largest expenditure share of the government account since independence, this dissertation then explores whether inequality in educational outcomes can be attributed to ethnic favoritism, and it goes beyond previous studies (e.g. Kramon and Posner 2016) by showing whether ethnic favoritism operates at the district-level or ethnic dimension utilizing individual-level data derived from five rounds of KDHS as well as population census. The estimated results show that ethnic favoritism operates at the district-level, from both supply-side and demand-side mechanism. The supply-side mechanism of ethnic favoritism implies that inequality in educational outcomes may come from inequality in opportunity through inequality in the provision of basic opportunities (e.g. educational resources). In addition, ethnic favoritism in the job market affects the demand-side mechanism of education, which implies that inequality in employment opportunities affects choice and effort of individuals, and subsequently, affects inequality in educational outcomes.

Following education, road sector is the second largest expenditure item in government expenditure. Thus, this dissertation then focuses on road expenditure and derives district level panel data on road expenditure from Burgess et al. (2015). Utilizing a Difference-in-Differences strategy, this dissertation measures not only the effect of coethnicity with the president but also the effect of democratization on the extent of ethnic favoritism in road expenditure. It confirms that coethnic districts of the president get a disproportionate share of expenditures, which are in line with Burgess et al. (2015). While the advent of the multi-party election in 1992 failed to prevent the president from discriminating other districts since more road expenditure went to districts with higher shares of turnout rates and swing voters. These

results reflect that there is systematic inequality in the provision of basic opportunities like roads as well.

To sum up, the estimated results in Chapter 4 and 5 disclose that coethnic districts of the president have received more resources and opportunities in terms of education and road construction. Thus, inequality in outcomes in Kenya is largely coming from inequality in opportunities, which is deeply driven by the relative political power of different ethnic groups. Then how can we break the links between inequality in outcomes like education and inequality in opportunity? From the supply-side mechanism of education, the development community or the government can provide educational resources in unfavored regions to cut down inequality in opportunity coming from the unequal provision of public goods. From the demand-side mechanism of education, they can implement policies like conditional income transfers to improve the incentive of the households in the non-coethnic district to invest in their children's human capital. Alternatively, the government can provide equal job opportunities to different ethnic groups through introducing civil service examinations to increase their expectations of educational returns. Besides, the government or the development community can help to implement transparency reform in the allocation of public expenditure and in the process of public sector employment to reduce the inequality of opportunities in Kenya.

Chapter 1 Introduction

1.1 Why Inequality Matters?

The international community has made substantial improvement on poverty reduction in the past decades. These achievements in poverty reduction are largely driven by rapid economic growth. Given that poverty reduction is typically realized by higher economic growth and/or inequality reduction, “the World Bank goal of eliminating extreme poverty by 2030 cannot be achieved...without significant shifts in within-country inequalities” (World Bank Group, 2016:69) in the current global context of growth slowdown. The overall global inequality¹ rose gradually until the early 1990s and has declined since then. Inequality between countries has been declined, whereas within-country inequality has risen (World Bank Group, 2016).

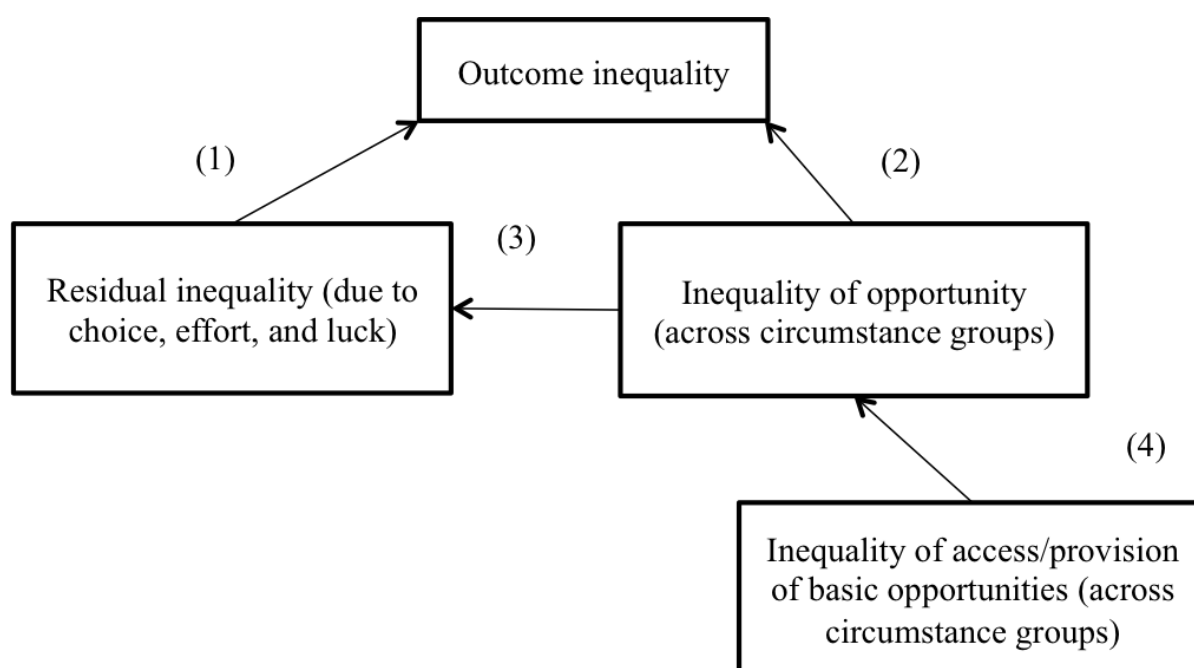
Most of the previous studies focus on within-country inequality since it is the main level at which the policy intervention occurs. There is a growing number of studies, which suggests that inequality has a negative impact not only on poverty reduction (Fosu, 2014), but also on economic development (Cingano, 2014; Ncube, Anyanwu, and Hausken, 2014), and the stability of a country (Bartusevičius, 2014). Thus, this dissertation takes an instrumental perspective on inequality, considering that inequality matters as a means to eradicate poverty as well as to promote sustainable and peaceful development.

Inequality has traditionally been concerned with outcomes in the standard of living such as income, education, and health. An alternative perspective is concerned with the inequality of opportunities, such as unequal access to public goods, facilities, and employment opportunity. On the one hand, unequal

¹ Global inequality is defined as the income inequality among all people in the world regardless of their country of residence (World Bank Group, 2016).

outcomes may affect unequal access to opportunities. For example, higher income can provide people with a better opportunity to secure education and health. On the other hand, unequal opportunities may lead to unequal outcomes, for instance, their predetermined background variables like ethnicity, sex, or location of residence affect their final educational attainment or earnings in the job market. Thus, these two concepts are interdependent so that the direction of causality cannot be identified (UNDP, 2014).

Figure 1 Framework of Outcome Inequality Decomposition



Note: This figure is created by the author based on Barros, Ferreira, Vega, and Chanduvi (2009: 31).

Inequality in opportunity can lead to inequality in outcomes, while the overall inequality in outcomes is not necessarily all coming from inequality in opportunity. Part of the outcome inequality results from effort and choice, which are under the control of the individuals to some extent (see arrow (1) in Figure 1). While, outcome inequality may also arise from differences in circumstances (such as gender, race, ethnicity, birthplace) that the individuals

cannot be accountable for (see arrow (2) in Figure 1) (Barros, Ferreira, Vega, and Chanduvi, 2009). The framework of this dissertation keeps consistent with the egalitarian definition of equality of opportunity from Roemer (1998)², considers “a society has equal opportunities when circumstances are not statistically associated with differences in important life outcomes, nor directly, nor through affecting the choice set people face” (Barros, Ferreira, Vega, and Chanduvi, 2009:33). More specifically, inequality of outcomes is not directly due to inequality of opportunity (arrow 2), or indirectly through affecting the choice and efforts of individuals (through arrow (3) to arrow (1)).

Inequality of opportunity can arise from different sources. This dissertation focuses on inequality of opportunity arising from inequality of access or provision of basic opportunities. Following Barros, Ferreira, Vega, and Chanduvi (2009), basic opportunities denote the set of goods and services that are vitally important for the development of children such as access to education, basic infrastructure, health services etc., which will have a fundamental impact on future outcomes. Therefore, policies should be implemented to provide these basic opportunities universally to ensure that there are no systematic biases in their provision.

1.2 Why Study Inequality under the Kenyan Context?

Despite the fact that “Kenya is ranked among the 10 most unequal countries in the world and the most unequal in East Africa”, inequality has received little attention and discussion both politically and academically (Society for International Development 2004: iii). Thus, there are limited official and academic publications concerning the situation of inequality in Kenya.

² The alternative view on inequality of opportunity is called “meritocratic”, which “requires that people with identical levels of effort and choice enjoy identical outcomes (Barros, Ferreira, Vega, and Chanduvi, 2009: 29).

It is generally agreed that Society for International Development (SID) (2004) in collaboration with the Kenya National Bureau of Statistics (KNBS) provided the first comprehensive analyses of social as well as economic inequalities in Kenya in 2004. Society for International Development (2004) found that inequalities in Kenya were manifested in different forms and aspects, such as in income, employment, and access to basic social services (e.g. education, water, and sanitation) using traditionally standard measures (e.g. Gini Index) with a focus on vertical inequality. More recently, Njonjo (2013) provided the baseline measurement of regional (county-level) inequalities in Kenya and emphasized that there are great within as well as between-region inequalities in monetary (e.g. expenditure) and non-monetary measures (e.g. employment, education, energy, housing, water and sanitation).

However, analyses of these studies stop at descriptive statistics without decomposition of inequality measures at the sub-national level. Additionally, it is not clear whether inequality in these outcomes comes from inequality in opportunity, which is considered to be the aspect that urgently needs policy interventions. Moreover, survey data exploited in these reports came from different household surveys under different sampling frameworks, which cannot be compared over time.

In this dissertation, using Kenya as a case study, I first present the patterns of inequality measured by education and health indicators in Kenya over time in Chapter 2 using the Kenyan Demographic and Health Survey (KDHS). Then I proceed to show the causal effect of drought on conflict, which is founded to be conditional on both between-region and within-region inequalities in Chapter 3. Chapter 4 focuses on primary education outcomes and investigates whether inequality in educational outcomes comes from unequal opportunities due to ethnic favoritism. Chapter 5, subsequently, looks at road construction at the district level, directly explores whether the allocation of government

expenditures are biased towards the coethnic district of the president. At last, Chapter 6 summarizes and provides policy implications.

Chapter 2 Inequality in Kenya over Time

This chapter derives household level data from five rounds of KDHS, conducted in 1993, 1998, 2003, 2008, and 2014. The KDHS was conducted six times between 1989 and 2014; however, this chapter excludes the 1989 KDHS because the household questionnaire in the first round does not include the main variables of interest in terms of accessing to basic services. Both 1993 and 1998 KDHS excluded the northern part of Kenya, which comprised about 4 percent of the national population and oversampled 14 districts in the rural part. The KDHS since 2003 becomes representative both at the national and provincial level.

On measuring the inequality of Kenya over time, this chapter mainly focuses on social-economic indicators instead of income for the following reasons. First, there is no high-quality household income/expenditure survey available to measure income inequality over time. Second, inequality in basic opportunities, especially access to basic goods and services plays a fundamental role in inequality in future outcomes.

Table 1 Selected Social-Economic Variables in Kenya over Time

Year	Education Level (years)		Access to Improved Water (%)		Infant Mortality (deaths)	
	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted
1993	5.089	5.022	44.382	49.693	62	62
1998	6.206	5.959	43.030	43.389	70	74
2003	6.569	6.721	45.346	49.247	72	73
2008	7.243	7.068	63.028	64.271	54	54
2014	7.996	7.053	69.395	64.499	39	37

Note: Author’s calculation is based on KDHS 1993-2014. Sample weights are used when calculating the weighted average of selected indicators. Education level denotes the education of the household head in single years. Access to improved water denotes the probability of accessing to improved drinking water source. Infant mortality denotes the number of deaths per 1000 live births for five-year periods preceding the survey.

Table 1 displays the average of selected social-economic indicators in Kenya over time using the five rounds of KDHS, from which it is obvious that

different indicators demonstrate different patterns. In the past two decades, indicators such as the education level of the household head have been consistently improved, while access to improved water source as well as infant mortality deteriorated in the late 1990s and then improved substantially recently.

Table 2 Inequality Measures of Selected Social-Economic Variable in Kenya Over Time

Year	1993	1998	2003	2008	2014
Gini Index					
Education of Household Head	0.480	0.414	0.406	0.366	0.327
Access to Improved Water	0.556	0.570	0.547	0.370	0.306
Generalized Entropy Index GE (2)					
Education of Household Head	0.365	0.269	0.262	0.213	0.168
Access to Improved Water	0.627	0.662	0.603	0.293	0.221

Note: Author's calculation is based on KDHS 1993-2014. Sample weights are used when calculating the weighted inequality measures of selected indicators.

Inequality measures of these indicators decrease correspondingly as the improvement of its average over time (see Table 2).

As mentioned before, Njonjo (2013) emphasized that there are great within- as well as between-region inequalities. To what extent, does the inequality come from between- or within-region inequality? In order to answer this question, I decompose the inequality measure into within-province and between-province components, and the results are listed in Table 3 and Table 4. A common trend can be identified from Table 3 and Table 4 is that the majority of the inequality in these two indicators comes from within-province inequality, and its contribution rate is increasing over time. Different provinces demonstrate various levels of inequality. For instance, Nairobi is the least unequal region in terms of education of household head, as well as access to improved water sources. At more disaggregated level, namely at the county level, inequality measures exhibit even larger geographical disparities as shown in Figure 2.

Table 3 Inequality Decomposition by Province, Education of Household Head

	2003	2008	2014
Generalized Entropy Index GE (2)			
Education of Household Head	0.262	0.213	0.168
Inequality Decomposition			
Within-Province	0.234	0.186	0.151
Between-Province	0.027	0.027	0.017
Generalized Entropy Index GE (2) by Province			
Nairobi	0.092	0.065	0.051
Central	0.184	0.153	0.110
Coast	0.357	0.257	0.204
Eastern	0.296	0.249	0.198
Nyanza	0.231	0.193	0.149
Rift Valley	0.302	0.207	0.198
Western	0.247	0.191	0.171
North-Eastern	4.899	2.382	2.614

Note: Author's calculation is based on KDHS 2003-2014. The KDHS 2003 was the first survey, which is representative at the national as well as at the provincial level. Thus, this chapter excludes the KDHS conducted before 2003 when decomposing inequality measures by province. Sample weights are used when calculating the weighted inequality measures.

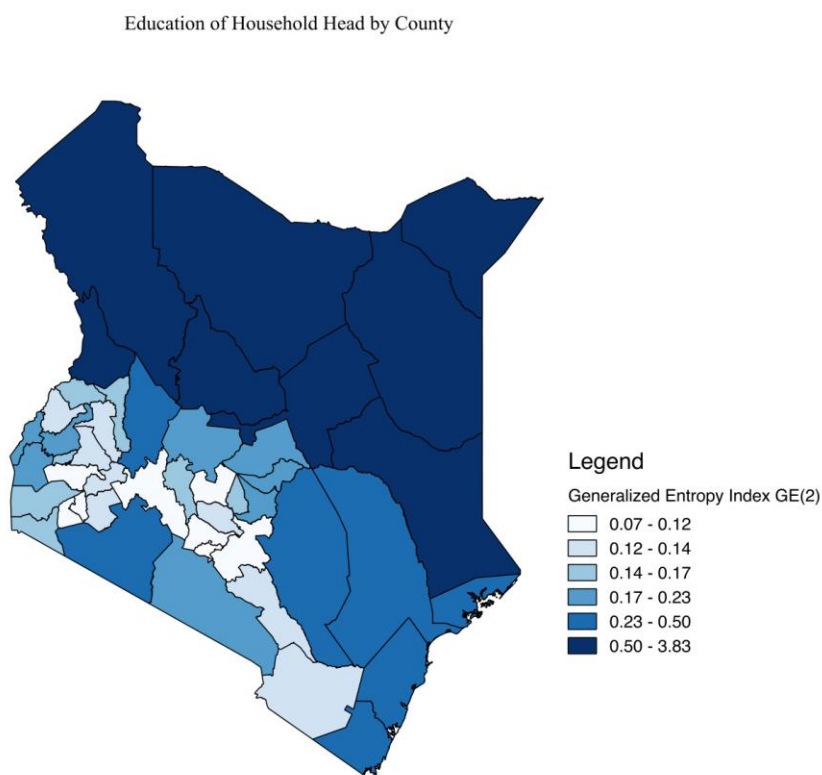
Table 4 Inequality Decomposition by Province, Access to Improved Water

	2003	2008	2014
Generalized Entropy Index GE (2)			
Improved Water	0.603	0.293	0.221
Inequality Decomposition			
Within-Province	0.512	0.273	0.207
Between-Province	0.091	0.020	0.014
Generalized Entropy Index GE (2) by Province			
Nairobi	0.043	0.023	0.046
Central	0.404	0.224	0.127
Coast	0.319	0.272	0.215
Eastern	0.687	0.478	0.383
Nyanza	1.357	0.450	0.291
Rift Valley	0.757	0.370	0.313
Western	1.400	0.174	0.146
North-Eastern	3.866	0.220	0.456

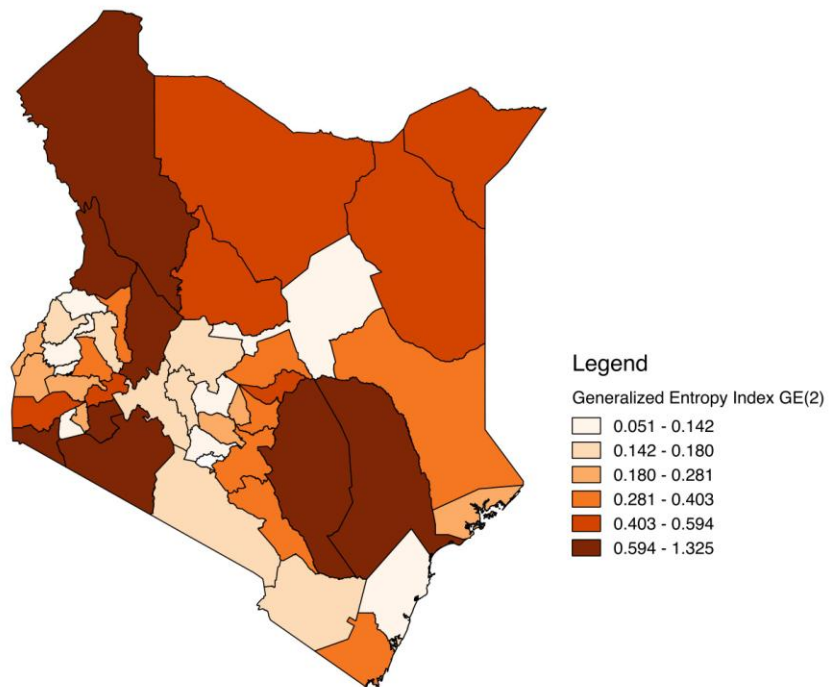
Note: Author's calculation is based on KDHS 2003-2014. Sample weights are used when calculating the weighted inequality measures.

To sum up, using the five rounds of KDHS with a focus on social-economic indicators, this chapter demonstrates that the overall developmental outcomes and inequality measures have been improved over time for all of the selected social-economic indicators in Kenya. The majority of these inequalities comes from within-province inequality, whose contribution ratio is consistently increasing. Different region in Kenya demonstrates different degrees in inequality.

Figure 2 Inequality Measure of Education of Household Head and Access to Improved Water by County, 2014



Access to Improved Water by County



Note: Author's calculation is based on KDHS 2014. Sample weights are used when calculating the weighted inequality measures.

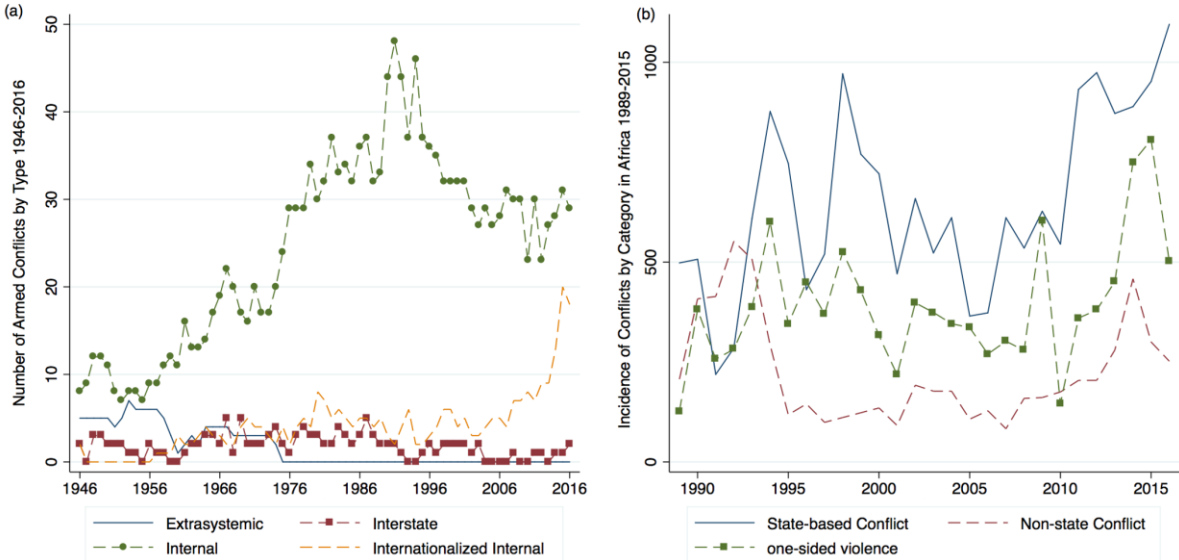
As mentioned earlier that, inequality is founded to have a negative effect on conflict. Even though the 2013 Kenyan election witnessed a peaceful political transition, the conflict that raged in the aftermath of the 2007 election in Kenya remains vivid in many people's minds, raising questions that whether it is related to the inequality in Kenya. However, inequality consistently exists, while conflict breaks out sporadically. If inequality matters for the breakout of the conflict, under what conditions, inequality will breed conflict, and which aspect of inequality matters? This dissertation gives answers to these questions in the following Chapter.

Chapter 3 Drought, Inequality and Intrastate Conflict

3.1 Introduction

The post–Cold War period witnessed a decreasing number of armed conflicts, and most of the conflicts that did arise were within rather than between states using at least 25 conflict-related deaths within a year as the threshold, as shown in Figure 3(a). Even though the number of countries engaging in armed conflict has declined since 1990s (see Figure 3(a)), the number of incidents of conflict, which resulted at least one death has been rising, especially in Africa, the world’s poorest continent (see Figure 3(b)). Africans have suffered not only from state-based conflicts (namely civil war), which indicates rebellion against the government, but also from ones involving other kinds of organized groups such as non-state conflict, which refers to a conflict between two organized but non-government armed groups, and one-sided violence, which is action taken against civilians by the government or a formally organized group (Croicu and Sundberg, 2017).

Figure 3 Number of Conflicts and Incidents of Various Kinds of Armed Conflict

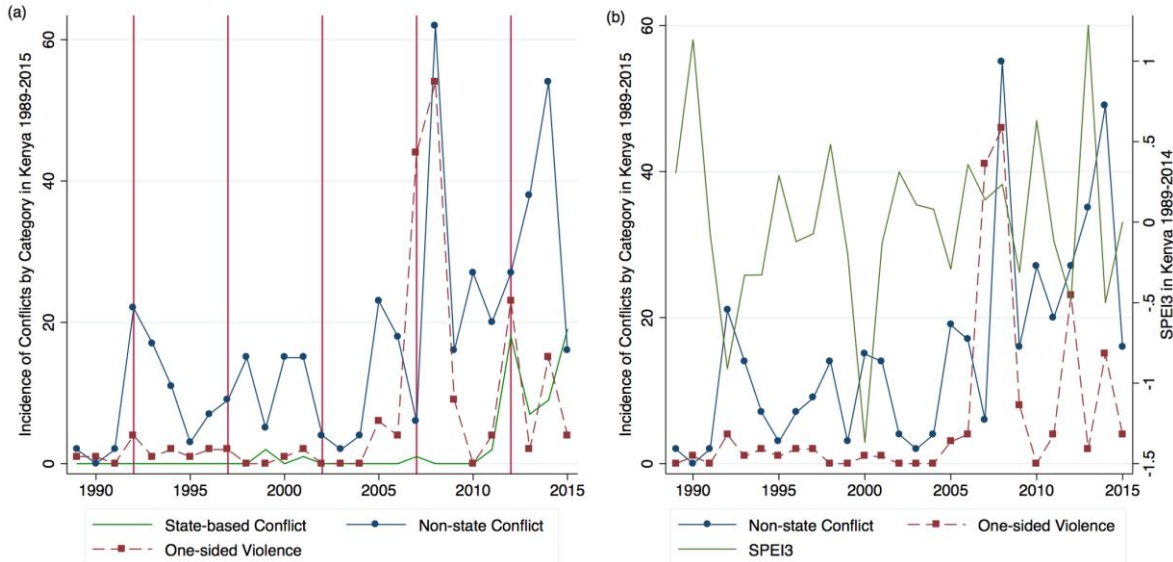


Note: Figure 3(a) is based on the Uppsala Conflict Data Program/Peace Research Institute Oslo (UCDP/PRIO) Armed Conflict Dataset, version 17.1; Figure 3(b) is based on the Uppsala Conflict Data Program Geo-referenced Dataset (UCDP GED), Version 5.0.

According to the codebook of Allansson, Melander, & Themnér, (2017: 9), “Extrasystemic armed conflict occurs between a state and a non-state group outside its own territory...Interstate armed conflict occurs between two or more states...Internal armed conflict occurs between the government of a state and one or more internal opposition group(s) without intervention from other states...Internationalized internal armed conflict occurs between the government of a state and one or more internal opposition group(s) with intervention from other states...”

Although Kenya has experienced quite bloody episodes of ethnic conflict since gaining its independence, it has remained free from large-scale state-based conflict. This feature makes Kenya an unusual case in Africa, where two-thirds of all countries have suffered from civil war since the 1960s (Blattman and Miguel, 2010). This special feature eliminates the possibility that other kinds of intrastate conflict, namely non-state conflict and one-sided violence, were a spillover or legacy from a large-scale civil war. Therefore, the identification of causal mechanisms between other factors and intrastate conflicts becomes easier.

Figure 4 Incidence of Intrastate Conflict, Elections, and Drought in Kenya

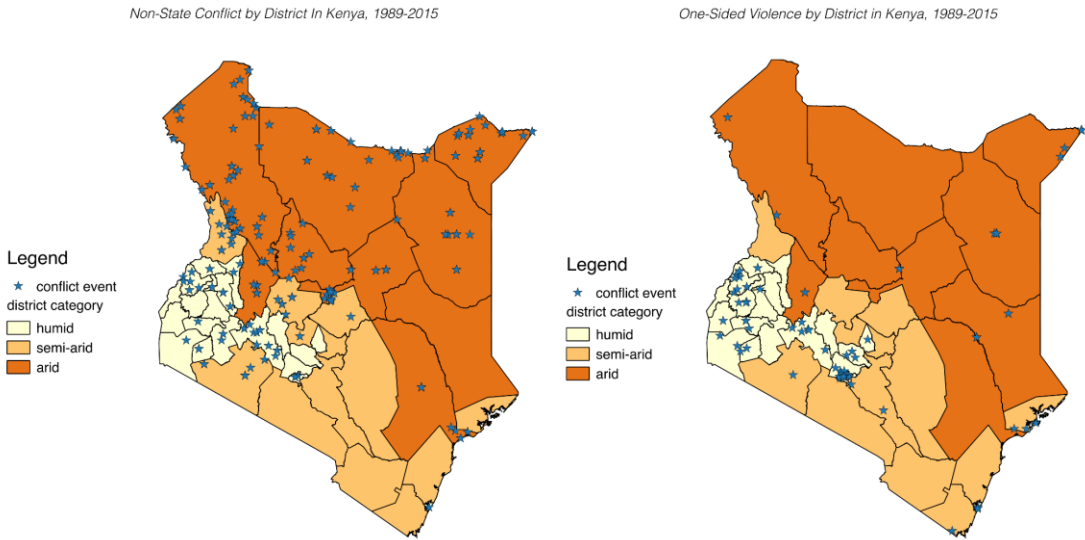


Note: The figure is based on UCDP GED Version 5.0 and the Global Standardized Precipitation-Evapotranspiration Index (SPEI) database. The vertical solid line in Figure 4(a) denotes the years when multi-party elections were held during this period. The positive and negative values of SPEI3 in Figure 4(b) identify wet and dry events in Kenya, and the

absolute value of SPEI3 denotes the intensity of wetness or dryness. The calculation of drought indicator, SPEI3 is described in the methodology section of this chapter.

One common type of conflict in Kenya has been pre- or post-election violence. As Figure 4(a) shows, the peaks in one-sided violence have coincided with election years, whereas the distribution of non-state conflicts has varied over time. Kahl (2006) emphasized that violence around elections is not a purely political matter and that the key issues resulting in conflict may be demographic or environmental in nature, such as growing population density or drought. Additionally, Mkutu (2008) argued that drought is associated with the pastoral violence in Kenya. Figure 4(b) displays the drought indicators, SPEI3 and the incidence of conflict by category in Kenya over time. The positive and negative values of SPEI3 identify the wet and dry events respectively. Drought has coincided with peaks in both non-state conflict and one-sided violence (as in 2000), but this relation has not been consistent over time.

Figure 5 Geographical Distribution of Intrastate Conflict in Kenya, 1989–2015



Note: I created these maps based on UCDP GED Version 5.0.

Conflict in Kenya is heterogeneous not only over time but also with regard to space. Figure 5 describes the geographical distribution of two types of intrastate

conflicts. The non-state conflict has been largely concentrated in Kenya's humid and arid areas, whereas one-sided violence has occurred predominantly in the humid area. How can we explain this heterogeneity of conflict in both time and space? It is an empirical question to understand the factors and conditions, which motivate people to engage in conflicts.

In recent years, an increasing number of studies have examined the security implications of climate change. Evidence thus far indicates that climate change (as operationalized by short-term anomalies in precipitation, temperature, or both) increases the risk of conflict (Burke, Hsiang, and Miguel, 2015). The anticipated rising temperatures and greater unpredictability of rainfall associated with climate change also create a likelihood of more frequent drought and crop failure (Theisen, Holtermann, and Buhaug, 2012), which could breed heightened conflict over scarce resources, especially in countries that rely heavily on rain-fed agriculture such as those in sub-Saharan Africa. According to D'Alessandro et al. (2015), despite the fact that Kenya has achieved high economic growth, agriculture still accounts for more than 25 percent of the GDP and 70 percent of the jobs in rural areas. Therefore, its reliance on smallholder, rain-fed agriculture makes Kenya particularly vulnerable to climate risks.

Drought is considered to be one of the most severe natural hazards in Kenya since although "droughts have always occurred at five or six year intervals, in recent decades they have happened more frequently", which affected almost 70 percent of Kenya's land mass (Owuor 2015:11). Therefore, this chapter focuses on drought and empirically investigates the effect of drought on intrastate conflict.

In the rest of this chapter, I will first review previous literature. Next, I will outline a conceptual framework and hypotheses, along with the methodology

and data used to verify these hypotheses. I will then present the empirical evidence and draw conclusions.

3.2 Literature Review

As noted above, changes in precipitation and/or temperature, widely linked to global climate change, have appeared to increase the risk of various types of conflict, from the interpersonal level to the intergroup level (Burke, Hsiang, and Miguel, 2015). The impact of climate change on human security and development differs by region, but in Africa, climate change has entailed warming and drying trends since the middle of the 20th century (Gan et al., 2016). Therefore, in this literature review, I focus on the effect of drought on conflict in the African context especially in Kenya, since drought-induced crop failure or pasture loss, as well as water shortages, may exacerbate rivalries over resources and may also reduce opportunity cost for laborers, consequently resulting in conflict.

3.2.1 Drought and Intrastate Conflict: Qualitative Studies

Prior qualitative studies have found inconsistent results regarding the effect of drought on the conflict in Kenya. Witsenburg and Adano (2009) documented increasing cooperation during the dry period in the Marsabit district, whereas Ember et al. (2012) described opposite findings in the Turkana district.

If a conflict in a certain district is between local communities, the effect of drought-induced resource scarcity may depend on the severity of drought conditions. However, the conflict in a particular geographic area frequently pits a local community against one in a neighboring district. Case studies showed that residents of the Pokots and Marsabit districts raided bordering villages in Turkana district in an effort to gain control over resources available in Turkana (Pragya, 2012). Thus, increasing conflict in a certain district may result from

the presence of more severe drought in a neighboring district. Under this circumstance, a spatial inconsistency between the drought and the conflict occurs due to the mobility of pastoralists.

The conflict between pastoralists may be driven not only by the scarcity of water and suitable pasture but also by cattle raiding, which has evolved from a customary practice into a more commercially motivated enterprise (Detges, 2014). Previous research showed that conflict increased during the wet period because thick vegetation and abundant water made livestock raiding easier (Raleigh and Kniveton, 2012).

To sum up, the results of qualitative studies show that drought may increase conflict over scarce resources but may also decrease conflict over cattle raiding. The mobility of pastoralists further complicates the effect of drought since the conflict in a certain district may be influenced by drought conditions in its neighboring districts.

3.2.2 Drought and Intrastate Conflict: Quantitative Studies

Both qualitative and quantitative studies have not yet uncovered systematic evidence to verify the proposed drought-conflict nexus.

The most disaggregated unit of study has been at the 0.5-degree³ pixel level. Theisen, Holtermann, and Buhaug (2012) found no direct relation between the drought and the onset of civil war, in general, or even in politically marginalized areas. At the same spatial resolution level, Von Uexkull (2014) failed to find a significant relationship between drought in the previous year and conflict but presented evidence that civil conflict is more likely to break out in areas dominated by rain-fed agriculture.

Using conflict data from the Armed Conflict Location and Event Data Project at the 1-degree pixel level, Harari and La Ferrara (2013) found that

³ One degree at the equator is approximately equal to 110 kilometers.

weather-related shocks during the current year's growing season had no impact on violence against civilians, but that weather-related shocks in the bordering eight cells (more specifically, a circle drawn around the cell's center with a radius of 180 km) significantly increased the incidence of violence. At the country level, Couttenier and Soubeyran (2014) found that in general, the positive link between drought (as measured by the Palmer Drought Severity Index) and the civil war was not robust. Regardless of that, countries with high scores on the ethnic fractionalization index were highly prone to conflict when hit by droughts (Couttenier and Soubeyran, 2014).

One pattern apparent in the seemingly contradictory evidence is that the effect of drought on conflict is not significant in more spatially disaggregated units. A possible explanation for this pattern is that drought-induced conflict does not necessarily break out in the places where drought conditions are the most severe (Detges, 2014). Especially in arid or semi-arid areas, a pastoralist may travel more than 300 kilometers in search of grazing land or water resources (Pragya, 2012), which—when converted to the measure used in previous studies—is equivalent to five adjacent 0.5-degree pixel cells.

Another possible explanation lies in the inconsistency between the method of measuring drought and the potential causal mechanism being tested. Most previous studies in Africa have sought to verify the opportunity cost effect; that is, since almost all African countries depend on rain-fed agriculture, they presume that drought will decrease employment opportunities for rural laborers. However, the approaches taken to measuring drought face three drawbacks.

First, these studies frequently neglect the time scale of drought indicators. For example, agricultural drought⁴, which is dependent on soil moisture has a relatively short time scale; Mckee, Doesken, and Kleist (1993: 2) suggested

⁴ Agricultural drought occurs when there is not enough soil moisture to support average crop production (Carrão et. al 2016).

that a time scale of three months is “typical ... for precipitation deficits to affect” soil moisture. In contrast, both Theisen, Holtermann, and Buhaug (2012) and Von Uexkull (2014) used a measurement method known as SPI6, which is more relevant to hydrologic droughts⁵ (Mckee, Doesken, and Kleist, 1993).

Second, these approaches often neglect the seasonality of rainfall. In most cases, the time unit applied in previous studies is the year, with annual variations used to identify the presence and effects of drought. However, what really matters for agriculture is the seasonal rainfall, especially during the rainy season (Recha et al., 2016). Statistics on average rainfall over a full year may mask a precipitation shortage during the rainy season.

Additionally, most studies use the onset of civil conflict as their outcome variable, whereas drought does not necessarily lead to the conflict against the government. Rather, when confronted by droughts or other resource shortages, individuals and groups are more likely to compete against each other for scarce resources, not to rebel against the government (Hendrix and Salehyan, 2012; Theisen, 2012).

Furthermore, not all households, groups or communities are equally affected by drought. For instance, households with piped water or irrigation systems may be less influenced by rainfall anomalies than those who depend on streams or rivers as their main water source. The effect of drought on conflict may be conditional on the locally social-economic conditions, such as the dependence on rain-fed agriculture or access to water source during drought seasons. In addition, drought may also accentuate social divides, since marginalized groups may be less likely to get government support (Theisen, Holtermann, and Buhaug 2012). Thus, the effect of drought may be conditional on the level of social divisions as well.

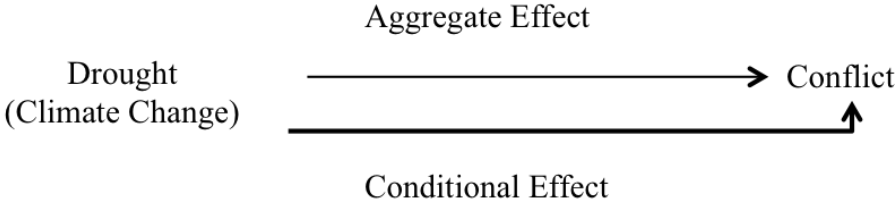
⁵ Hydrological drought occurs when there is below-normal water availability in groundwater or streamflow (Van Loon and Laaha 2015).

3.3 Conceptual Framework and Hypotheses

3.3.1 Conceptual Framework

Based on the findings and weaknesses of previous literature, this chapter is founded on the conceptual framework explained below and shown in Figure 6.

Figure 6 Conceptual Framework for Chapter 3



Source: This figure is created by the author.

In an effort to clarify the drought–conflict nexus as well as to investigate more precisely the potential mechanisms generating conflict in Kenya, this chapter poses two research questions. The first one concerns the aggregate effect of drought examining how on average drought affects intrastate conflict. The second question explores the conditional effects of drought by considering whether greed and grievance enhance the drought–conflict nexus.

3.3.2 Hypotheses

3.3.2.1 the Aggregate Effect of Drought on Conflict

Figure 5 shows that the non-state conflict is concentrated in Kenya’s arid and humid areas, while one-sided violence happened predominantly in humid areas. In arid lands inhabited predominantly by pastoralists, drought results in scarce pasture land and water shortages, forcing people to travel long distances in search of grass and water for their livestock.

Prior qualitative studies show that drought may increase conflict over scarce resources but may also decrease conflict over cattle raiding. Thus, it is difficult to predict the aggregate effect of drought on conflict.

However, considering that the pastoralists are predominantly living in arid areas, and the effect of drought in a certain district may be influenced by drought conditions in the neighboring district, I propose the following hypothesis:

Hypothesis 1: The incidence of non-state conflict increases in a given district in Kenya's arid area when its neighboring districts are hit by drought.

The situation in the humid area is more complex than that in the arid lands since both non-state conflict and one-sided violence are concentrated in these districts. Kenya's humid area relies predominantly on rain-fed agriculture; moreover, this region is inhabited by a large number of landless people who work as wage or squatting laborers (Alila, Kinyanjui, and Wanjohi, 1993).

There are probably two pathways by which drought may affect the conflict in humid areas. First, the conflict may happen because drought induces direct competition over water resources for irrigation or livestock. But alternatively, the opportunity cost effect is likely to arise because drought reduces the job opportunities for landless laborers. In this case, which pathway is more relevant to one-sided violence or to the non-state conflict? Mueller (2008) claimed that under the Moi regime, the government hired landless or unemployed youth to attack citizens before or after elections. Landless people are more likely to be motivated during the drought period due to the lack of job opportunities. Therefore, it is reasonable to expect that one-sided violence is more likely to break out through the opportunity cost channel. Since the effect of drought on

one-sided violence depends on how many landless people inhabit a certain district, its aggregate effect across all districts is again difficult to predict.

As for the non-state conflict, there have been frequent news reports of conflict between farmers and pastoralists during times of drought, because cattle belonging to pastoralists graze on farmers' land.⁶ As a result, the non-state conflict in humid areas may have a similar pattern to that in arid areas, and the aggregate effect of drought on the conflict in humid areas may be unclear.

3.3.2.2 the Conditional Effect of Drought on Conflict

As reviewed in the previous section that, the effect of drought on conflict may be conditional on local social-economic conditions and social divisions. Then what factors are more relevant under the Kenyan context?

Water is, obviously, the resource most directly related to drought. People rely on surface water as the direct drinking water source or use it to feed their cattle or irrigate land or crops. Thus, the effect of drought on the conflict may be affected by how much the district relies on unimproved water sources, regardless of whether the region has an arid or humid climate. We can deduce the following hypothesis:

Hypothesis 2: The effect of drought on the non-state conflict is greater in districts that rely more heavily on unimproved water sources.

⁶ For example, see "As Water Falls Short, Conflict between Herders and Farmers Sharpens," *Reuters*, November 23, 2015, www.reuters.com/article/kenya-climatechange-conflict-idUSL8N13D4G420151123 (accessed on August 2, 2017).

On the other hand, as suggested by Mueller (2008) and Kahl (2006), landless people are more likely to be motivated during the drought period due to the lack of job opportunities. Thus, hypothesis 3 can be generated as follows:

Hypothesis 3: The effect of drought on one-sided violence is greater in districts where more people are landless.

As indicated in previous literature that, countries which are ethnically fractionalized were highly prone to conflict when hit by droughts (Couttenier and Soubeyran, 2014). This chapter also tests whether ethnic diversity enhances the intensity of various conflicts when drought occurs at the district level. Thus, another hypothesis can be derived:

Hypothesis 4: The effect of drought on conflict is greater in districts that are more ethnically fractionalized.

3.4 Methodology and Data

3.4.1 Methodology

Following previous literature, this chapter applies a reduced form of a model that estimates the aggregate effect of drought on the intrastate conflict through various mechanisms (Burke, Hsiang, and Miguel, 2015; Couttenier and Soubeyran, 2014):

$$Conflict_{dt} = a_0 + a_1 Drought_{dt} + \mu_t + s_d + v_{dt} \quad (1a)$$

$$Conflict_{dt} = a_0 + a_1 Drought_{dt} + \mu_t + s_d * t + v_{dt} \quad (1b)$$

where $Conflict_{dt}$ is the incidence of various types of conflict in district d at year t ; μ_t and s_d denote the year fixed effect and district fixed effect, respectively. $Drought_{dt}$ here equals 1 if the drought indicator is one standard deviation below the mean in district d at year t . district-specific time fixed s_d*t is controlled for as a robustness check in equation (1b).

As already noted, the effect of drought on conflict may be conditional on other factors. Considering that the level of social-economic factors and social divisions may be determined simultaneously with the level of conflict, namely the concern of simultaneous bias, Equation (2) tests whether the drought–conflict nexus is conditional on initial measurements of these factors, denoted by X as follows:

$$Conflict_{dt} = b_0 + b_1 Drought_{dt} + b_2 X_d^{baseline} * Drought_{dt} + \mu_t + s_d + v_{dt} \quad (2)$$

3.4.2 Data

3.4.2.1 Intrastate Conflict

For the outcome variable, this chapter derives data on conflict events from the Uppsala Conflict Data Program Georeferenced Event Dataset (UCDP GED), Version 5.0 (Sundberg and Melander, 2013), in which an event is defined as “an incident where armed force was used by an organized actor against another organized actor, or against civilians, resulting in at least one direct death at a specific location and a specific date” (Croicu and Sundberg, 2017:2). The dataset recorded 681 events in three categories of conflict between 1989 and 2015: 59 cases of state-based conflict, 440 non-state conflicts, and 182 incidents of one-sided violence. I dropped 91 events from the dataset, either

because sufficient specificity of location was lacking or because governments of neighboring countries were involved.⁷

Some previous studies have used equally sized pixels, kept constant across time and space, as the basic unit of analysis. However, this method ignores administrative divisions and boundaries, which are important for the building of common identity as well as the organization of collective actions, such as engagement in the intergroup conflict. One concern with using district boundaries after independence, especially in the Kenyan case, is that the growth of numbers of districts in Kenya is influenced by elections, which can also precipitate violence. Therefore, this chapter uses the boundaries at independence, when the whole territory of Kenya was divided into 41 districts, to generate a panel dataset. As a result, the incidence of conflict within the panel dataset was defined as the number of conflict events occurring within a particular district during the period of 1 year.

3.4.2.2 Drought

Studies of drought usually use the Palmer Drought Severity Index (PDSI) or the Standardized Precipitation Index (SPI) (Vicente-Serrano, Beguer á, and López-Moreno, 2010). However, both of these two indices have unsolved shortcomings. The main weakness of the PDSI is that it uses a fixed timescale of between 9 and 12 months. Since drought is a multi-scalar phenomenon that depends on various factors relating to usable water resources, such as soil moisture and groundwater (Mckee, Doesken, and Kleist, 1993), “the time scale over which water deficits accumulate becomes extremely important” (Vicente-

⁷ Twenty events had no information on the specific location where they occurred, and their descriptions contained simply the geographic coordinates associated with the country (latitude 1 degree south, longitude 38 degrees east); the location of 23 events could be identified only at the provincial level; and in 48 events, one of the participants was the government of a neighboring country.

Serrano, Beguer á, and López-Moreno, 2010: 1697). The main criticism of the SPI, on the other hand, is that its calculation is based only on precipitation.

Therefore, in line with Harari and La Ferrara (2013), this chapter applies a recently developed indicator, the Standardized Precipitation Evapotranspiration Index (SPEI), which considers the influence of factors such as precipitation, temperature, wind speed, and the soil's water holding capacity (Vicente-Serrano, Beguer á, and López-Moreno, 2010). Similar to the SPI, the SPEI provides multiple time scales ranging from 1 to 48 months (hereafter SPEI1 to SPEI48). The calculation of the SPEI is based on monthly data and expressed in units of standard deviation from the long-term mean.

Agricultural droughts are closely related to soil moisture, which can be best captured by a short time scale such as 3 months (McKee, Doesken, and Kleist, 1993). In addition, droughts in Kenya are linked to insufficient rainfall during the March–May (long rainy) season (Tierney, Ummenhofer, and deMenocal, 2015). I use average SPEI3 during the long rainy season to define drought conditions. The drought variable is expressed in the binary form as equal to 1 if the average of the SPEI3 from March to May was at least one standard deviation below the mean. Since the framework explained above concerns the impact of drought on conflict not only through agriculture but also due to direct water shortages, a longer timescale of 6 months, namely the SPEI6 averaged over the long rainy season, was also used to define drought.

One concern about using SPEI to define drought is that it may be endogenous since variables used for calculating SPEI is not randomly distributed, such as the water holding capacity of the soil. The soil's water holding capacity may be correlated with economic or political factors, which affect conflict as well. Therefore, cross-sectional studies, which exploit variation in drought conditions in different locations to explain conflict face endogeneity problems. While it is not a problem under a panel data setting like

what will be used in this chapter since fixed effects estimators rely on variations across time to identify the variation in conflict, and the variations across time largely depends on randomly distributed variables such as rainfall and temperature.

3.4.2.3 Ethnic Diversity

The most prevalent method of measuring ethnic diversity is the index of ethno-linguistic fractionalization (ELF), first used by Easterly and Levine (1997) based on the Atlas Narodov Mira to explain the growth tragedy of African countries. This can be expressed by the following equation:

$$ELF = 1 - \sum_i s_i^2 = \sum_i s_i(1 - s_i) \quad (3)$$

where s_i denotes the share of group i in the total population, and it reflects the likelihood of randomly choosing two people who come from different ethnic groups. Even though measuring ethnic diversity using the ELF is straightforward, this tool does not necessarily capture the extent of ethnic divisions within a certain country. For example, according to the calculation of the ELF index by Taylor and Hudson (1972), Tanzania was the most fractionalized country, with 93 per cent to Kenya's 83 per cent. However, Kenya is much more ethnically divided than Tanzania, based on media reports on ethnic conflicts.

One persistently debated issue related to the measurement of ethnic diversity is “whether it is ethnic diversity *per se* or a particular pattern of diversity that is important” (Bleaney and Dimico, 2017: 358), especially when explaining its effect on conflict. For example, Horowitz (1985) contended that conflict is less likely to happen in either highly homogeneous or highly heterogeneous countries. Accordingly, Montalvo and Reynal-Querol (2005) used an

alternative index to measure ethnic diversity, based on the earlier theoretical work of Esteban and Ray (1994). They proposed an index of ethnic polarization, which is calculated by the following equation:

$$RQ = 1 - \sum_i \left(\frac{1/2 - s_i}{1/2} \right)^2 s_i = 4 \sum_i s_i^2 (1 - s_i) \quad (4)$$

where s_i denotes the share of group i in the total population, as in equation (3). This index captures to what extent the distribution of the groups is approximate to a bimodal one (Reynal-Querol, 2002).

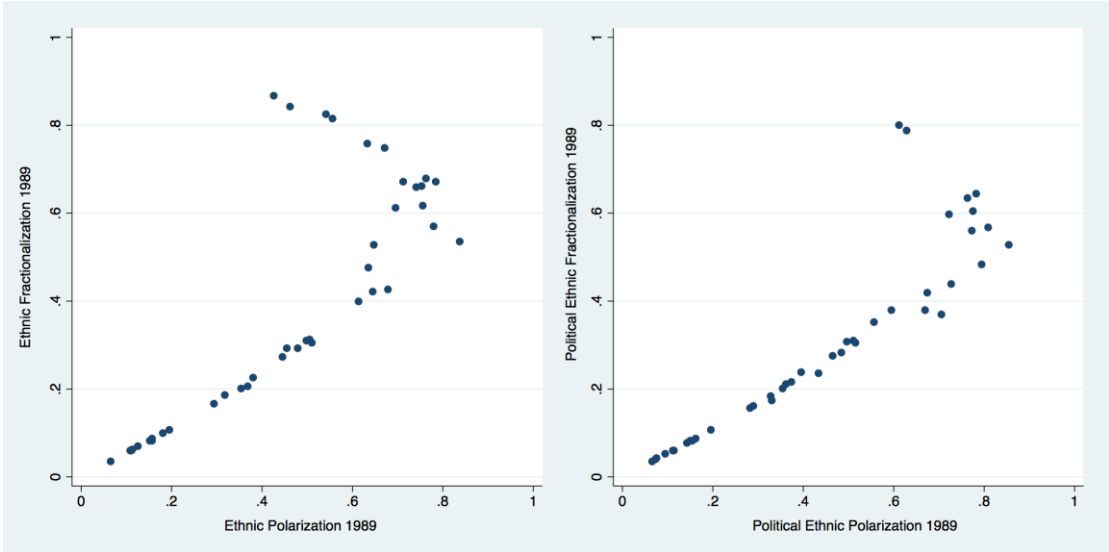
The ELF also failed to capture the political dynamics associated with conflict because not all ethnic groups are relevant in a given situation as organized political actors competing over resources (Posner, 2004; Wimmer, Cederman, and Min, 2009). For this reason, Wimmer, Cederman, and Min (2009) proposed using the Ethnic Power Relation (EPR) dataset instead. They provided evidence that the probability of conflict increases where more ethnic groups are competing for national power.

In almost every previous study, the measurement of ethnic diversity was at the country level. But this approach overlooks the spatial distribution of ethnic groups within the country, a factor that may be more relevant to collective actions such as conflict. It may also provide misleading implications if a country is highly fractionalized overall but highly polarized at the local level; in such a case, perhaps the polarization, not the fractionalization, is the immediate driver of local conflict (Buhaug and Lujala, 2005; Cederman and Gleditsch, 2009).

Therefore, ethnic diversity was measured in this chapter using the following methods. The first one is the ethnic fractionalization index (EF) at the district level based on equation (3). I use detailed census data from 1989 based on a uniform standard to measure ethnic groups, so as to ensure comparability and

also incorporate the spatial distribution of ethnic groups. One problem of measuring ethnic diversity at a disaggregated level is that it may be endogeneous since ethnic composition is always changing because of migration, which may itself be influenced by the conflict. Since the intrastate conflict was virtually nonexistent before the early 1990s in Kenya (Kimenyi and Ndung'u, 2005), using the population census from the initial year can prevent feedback effects from conflicts to ethnic diversity. Therefore, the effect of drought on conflict conditional on ethnic diversity can be interpreted as a causal one. Second, an ethnic polarization index (EP) at the district level was calculated based on equation (4), again using the 1989 census.

Figure 7 Ethnic Fractionalization and Ethnic Polarization by District, 1989



Note: I calculated them based on 1989 Population Census.

Additionally, to capture the political dynamics associated with the conflict, I refer to the Ethnic Power Relations Core dataset (EPR Core) (Vogt et al., 2015). I adjust the population denominator according to the weight of each politically relevant group in each district, following Posner (2004), when calculating politically ethnic fractionalization and polarization indices. Figure 7 shows the relation between these two indices of ethnic fractionalization and polarization.

3.4.2.4 Other Variables

The share of landless households and of households using unimproved water sources during the wet season by district was calculated using data from the Welfare Monitoring Survey (WMS) 1992. Unimproved water sources include rivers, lakes, ponds, dams, unprotected springs, unprotected wells, and others as classified in the 1992 WMS. Descriptive statistics at the district level are reported in Table 5.

Table 5 Summary Statistics of Chapter 3

Variable	Observation	Mean	Std. Dev.	Minimum	Maximum
All Conflict	1,107	0.533	2.128	0	24
State-Based Conflict	1,107	0.015	0.322	0	9
Non-State Conflict	1,107	0.369	1.665	0	24
One-Sided Violence	1,107	0.149	1.129	0	22
Ethnic Fractionalization	1,107	0.395	0.265	0.034	0.865
Ethnic Polarization	1,107	0.473	0.232	0.067	0.840
Political Ethnic Fractionalization	1,107	0.304	0.215	0.034	0.799
Political Ethnic Polarization	1,107	0.451	0.250	0.067	0.857
Temperature	1,107	22.106	3.864	13.229	28.936
Temperature Deviation	1,107	0.015	0.996	-2.391	2.052
Precipitation	1,025	81.853	35.112	10.661	176.974
Precipitation Deviation	1,025	-0.028	0.985	-3.120	4.139
SPEI3 Long Rainy	1,066	0.002	0.690	-1.998	2.046
SPEI3 Drought, Long Rainy	1,107	0.061	0.239	0	1
SPEI6 Long Rainy	1,066	0.126	0.801	-1.70	2.53
SPEI6 Drought, Long Rainy	1,107	0.071	0.258	0	1
SPEI3 Drought, Neighbor	1,107	0.049	0.216	0	1
Share of Unimproved Water	918	0.523	0.229	0.012	0.953
Share of Landless People	918	0.193	0.228	0.008	0.967

3.5 Empirical Results

3.5.1 the Aggregate Effect

I first report the aggregate effect of drought on the incidence of different types of conflicts using equation (1a), with standard errors clustered at the district level. Estimated results are shown in Table 6. Columns (1), (3), and (5) control for both year and district fixed effects; columns (2), (4), and (6) show

estimated results of equation (1b), which additionally control for district linear time trends. The results show that in all the specifications, SPEI3 drought during the rainy season had a significantly negative relation with the non-state conflict, which is consistent with Theisen's (2012) findings for Kenya. With regard to one-sided violence, the relation is positive but not statistically significant at conventional levels.

Table 6 Aggregate Effect of Drought on the Intrastate Conflict, 1989–2015

Outcome Variable	(1) All Conflict	(2)	(3) Non-State Conflict	(4)	(5) One-Sided Violence	(6)
SPEI3 Drought, Long Rainy	-0.455 (0.356)	-0.160 (0.277)	-0.673** (0.250)	-0.376* (0.188)	0.223 (0.211)	0.193 (0.177)
Year Fixed Effect	Y	Y	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y	Y	Y
District Linear Time Trend	N	Y	N	Y	N	Y
Observations	1,107	1,107	1,107	1,107	1,107	1,107
R-squared	0.081	0.257	0.057	0.302	0.073	0.128
Number of Districts	41	41	41	41	41	41

Note: Robust standard errors clustered at the district level are shown in parentheses. *, **, and *** denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively.

As has been shown in Figure 5, the distribution of conflict is spatially heterogeneous, and the non-state conflict is usually concentrated in arid and humid areas. Therefore, Table 7 categorizes the 41 districts into three groups according to their agro-ecological features. It also investigates whether the incidence of conflict is affected by drought conditions in neighboring districts. The presence of drought in neighboring districts is defined by a binary variable, which equals 1 if the value of average SPEI3 is one deviation below the mean.

The estimated results indicate that drought conditions in neighboring districts had a significantly negative effect on the conflict in general as shown

in column (5). However, the estimated coefficients demonstrate positive signs in humid and arid areas, which are not statistically significant. One concern of small number of clusters is that the cluster-robust standard errors may be downwardly biased (Cameron, Gelbach, & Miller, 2008), therefore a wild cluster bootstrap method has been used to calculate standard errors to avoid over-rejection, and the estimated results are demonstrated in Appendix 1, which are consistent with Table 7. It is worth noting that the estimated coefficient of drought in neighboring districts is statistically significant at 12 percent significance level (column (8) of Appendix 1). The drought in neighboring districts was expected to increase the intensity of non-state conflict to about 0.479 events. Considering that the average incidence of non-state conflict was 0.369 events, this effect of drought in neighboring districts is a substantial one, equivalent to an increase of around 30% in the incidence of conflict.

Table 7 Aggregate Effect of Drought on the Non-State Conflict, 1989–2015

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					Non-State Conflict			
	Full sample	Humid	Semi-Arid	Arid	Full sample	Humid	Semi-Arid	Arid
SPEI3 Drought, Long Rainy	-0.673** (0.250)	-0.483 (0.285)	0.008 (0.112)	-0.575 (0.639)	-0.521** (0.249)	-0.623 (0.414)	0.029 (0.104)	-0.796 (0.675)
SPEI3 Drought, Long Rainy in Neighboring District					-0.322* (0.173)	0.312 (0.389)	-0.060 (0.101)	0.479 (0.381)
Year Fixed Effect	Y	Y	Y	Y	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y	Y	Y	Y	Y
R-squared	0.302	0.197	0.113	0.393	0.302	0.198	0.113	0.394
Number of Districts	41	19	13	9	41	19	13	9

Note: Robust standard errors clustered at the district level are shown in parentheses. *, **, and *** denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively.

3.5.2 the Conditional Effect

The evidence thus far suggests that the aggregate effect of drought on conflict depends on the conflict types. I now test whether the drought–conflict nexus is conditional on the baseline measurement of social-economics factors or social divisions.

Table 8 Conditional Effect of Drought on Conflict, Social-Economic Conditions

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Non-State Conflict			One-Sided Violence		
	Full Sample	Humid	ASA	Full Sample	Humid	ASA
SPEI6 Drought, Long Rainy	-0.458** (0.185)	-0.361 (0.286)	-0.459 (0.329)			
Share of Unimproved Water Sources*	0.938** (0.418)	0.299 (0.546)	1.375* (0.735)			
SPEI6 Drought Rainy Season						
SPEI3 Drought Long Rainy				-0.219** (0.105)	-0.102 (0.744)	0.020 (0.019)
Share of Landless People*				2.324*** (0.564)	2.626*** (0.102)	-0.047 (0.078)
SPEI3 Drought Long Rainy						
Year Fixed Effect	Y	Y	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y	Y	Y
District Linear Time Trend	N	N	N	N	N	N
Observations	918	513	405	918	513	405
R-squared	0.119	0.192	0.150	0.152	0.214	0.141
Number of Districts	34	19	15	34	19	15

Note: Robust standard errors clustered at the district level are shown in parentheses. *, **, and *** denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively.

Table 8 tests hypotheses 2 and 3 using equation (2) to determine whether the effect of drought on the non-state conflict or one-sided violence is conditional on the social-economic factors as defined above. Due to data limitations in arid districts, this chapter classifies all 41 districts into two categories: the humid and the arid and semi-arid areas (ASA). Given that agriculture droughts and

hydrological droughts differ with regard to their timescales, SPEI3 and SPEI6, respectively, during the long rainy season were used to define drought.

The estimated results contained in column (1) of Table 8 show that on average, districts are expected to have 0.45 more conflict episodes when hit by drought. Districts where the share of households with unimproved water sources increases 10 per cent during the rainy season, are expected to have 0.1 more conflict episodes, which provide supportive evidence for hypothesis 2. When we distinguish the district by their agro-ecological features, as displayed in columns (2) and (3), the estimated coefficients are only statistically significant in ASA areas.

For one-sided violence, columns (4) and (5) show that the share of landless households significantly influences the effect of drought on the conflict. A 1 percent increase in landless household is expected to increase the incidence of one-sided violence during periods of drought by 0.02 events in humid areas. This is equivalent to an increase of more than 13 per cent, providing supportive evidence for hypothesis 3. These results are robust when the wild cluster bootstrap is used to calculate standard errors as shown in Appendix 2.

Table 9 displays the estimated results with regard to the effect of drought on conflict conditional on various measures of social divisions. Columns (2) and (4) of Table 9 show that both political ethnic fractionalization and political ethnic polarization affects the intensity of non-state conflict in general. This finding verifies the argument that not all ethnic groups are relevant actors competing over resources (Posner, 2004; Wimmer, Cederman, and Min, 2009).

In contrast, ethnic fractionalization and political ethnic fractionalization have a large influence on the relationship between drought and one-sided violence, as shown in columns (5) and (6) of Table 9. That is possibly because one-sided violence has always coincided with election years. And violence

around elections aimed to expulse other ethnic communities from land occupied by the pastoral groups during the pre-colonial period (Kahl 2006).

Table 9 Conditional Effect of Drought on Conflict, Social Divisions

Outcome Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Non-State Conflict				One-Sided Violence			
SPEI3 Drought Long Rainy	-0.716*	-1.088**	-0.893	-1.444***	-0.199	-0.306***	0.210	-0.046
	(0.396)	(0.414)	(0.542)	(0.499)	(0.124)	(0.113)	(0.220)	(0.123)
EF*SPEI3 Drought Long Rainy	0.090				0.894*			
	(0.770)				(0.493)			
Political EF*SPEI3 Drought Long Rainy		1.317*				1.682**		
		(0.773)				(0.722)		
EP*SPEI3 Drought Long Rainy			0.447				0.027	
			(1.149)				(0.274)	
Political EP*SPEI3 Drought Long Rainy				1.736**				0.606
				(0.852)				(0.362)
Constant	0.049	0.049	0.049	0.049	-0.000	-0.000	-0.000	-0.000
	(0.108)	(0.109)	(0.108)	(0.110)	(0.058)	(0.058)	(0.059)	(0.059)
Year Fixed Effect	Y	Y	Y	Y	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y	Y	Y	Y	Y
District Linear Time Trend	N	N	N	N	N	N	N	N
Observations	1,107	1,107	1,107	1,107	1,107	1,107	1,107	1,107
R-squared	0.057	0.060	0.058	0.062	0.076	0.080	0.073	0.074
Number of District	41	41	41	41	41	41	41	41

Note: Robust standard errors clustered at the district level are shown in parentheses. *, **, and *** denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively.

3.6 Conclusions

This chapter conducts a subnational analysis of the effects of drought on various kinds of conflict in Kenya from 1989 to 2015. It exploits the variations in drought conditions across time within a spatial unit to identify the causal effect of drought on intrastate conflict. It takes into account the timing of droughts, which cause severe impacts during the long rainy season, and explores not only the aggregate but also the conditional effects of drought, so as to provide important insights into the potential mechanisms through which a drought–conflict nexus may operate.

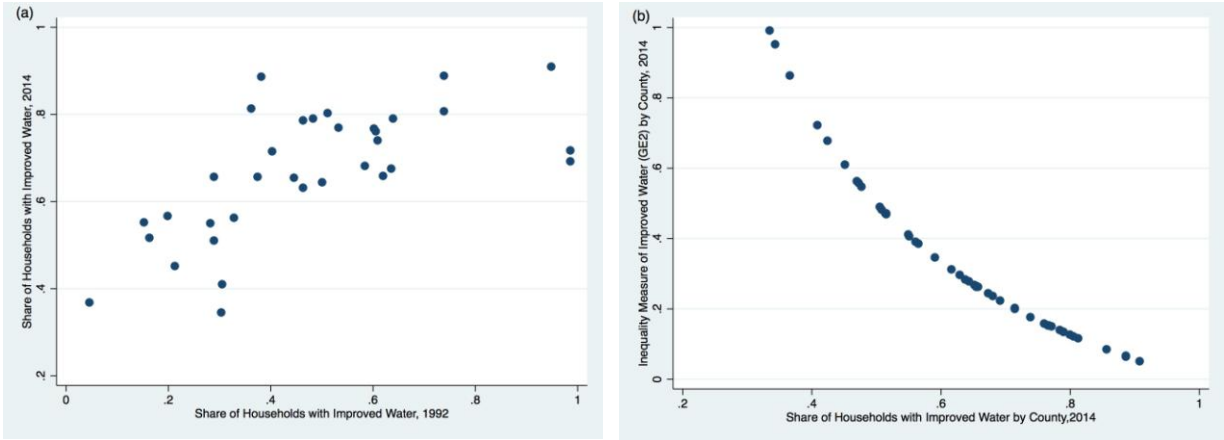
The results confirm that in general, drought has no impact on the intrastate conflict. This finding is in alignment with previous studies that used other measurements of drought (Theisen, Holtermann, and Buhaug, 2012; Von Uexkull, 2014). However, the effect of drought on the conflict varies depending on the type of conflict. Overall, the analysis found that drought actually has a cooling effect on the non-state conflict in Kenya. This result is consistent with previous qualitative and quantitative studies of Kenya (Theisen, 2012; Witsenburg and Adano, 2009). In addition, the analysis reveals a spatial inconsistency between the drought and the conflict, which provide insight into the potential consequences of environmentally related migration.

Although the aggregate effect of drought on the conflict is not robust in general, the findings of this chapter imply that the nexus is conditional, with its strength substantially affected by access to unimproved water source, the ownership of lands and the level of social divisions.

Then how to interpret these results from the perspective of inequality? Because of the concern of endogeneity, this chapter uses baseline data about social economic conditions such as the share of households with unimproved water source by district. How can we relate the baseline situation to the current situation and provide policy implications afterward?

Figure 8 (a) plots the share of households with improved water source by county (district)⁸ in 2014 against that in 1992. It is obvious that the relative share of households with improved water source does not vary that much over time, which discloses that the situation of the district where a higher share of households lacks basic opportunities in terms of improved water source has been slightly improved in the past two decades. In other words, between-region (county) inequality is barely improved since county (district) where the share of households with unimproved water is higher in 1992 is higher as well in 2014 (see Figure 8(a)). Between-region inequality may enhance the drought-conflict nexus since non-state conflict increases in a certain district when its neighboring districts were hit by drought especially in the arid area.

Figure 8 Households with Improved Water Source by County



Note: I created this figure based on DHS 2014 and WMS 1992.

Figure 8(b) shows a downward sloping relationship between inequality in the share of households with the improved water sources and its sample mean, which imply that counties, where a higher share of households uses improved water sources have the lower inequality. The estimated results in Table 8 shows

⁸ The 2010 constitutional amendment changed the administrative units into counties, instead of the provinces and districts that had been used before. The geographic areas of counties are almost identical to district used before.

that conflict is more likely to breakout in districts with a lower share of improved water source during drought season, which implies that in these districts, unequal access to improved water within a certain region also matters for intrastate conflict.

Chapter 4 Ethnic Favoritism in Education⁹

4.1 Introduction

The analysis in Chapter 3 implies that between-region inequality has barely improved in Kenya in the past two decades. One striking feature of regions in Kenya is that every region has one dominant ethnic group.¹⁰ That is because the consciousness of ethnicity in Kenya was originally a geographic one that was first created by the British colonial administration, which divided Kenyan territory into districts according to what was assumed to be different ethnic groups.

After independence, the post-colonial government further reinforced geographic divides by aligning parliamentary constituencies with former ethnic boundaries (Alwy and Schech 2004). Therefore, from the provincial to the district level, Kenyan regions have been seen as ethnically homogenous within each district but heterogeneous across districts, as shown in Table 10. There are more than 40 ethnic groups in Kenya. According to the 1962 population census, the six largest ethnic groups were Kikuyu (19 per cent), Luo (13 per cent), Luhya (13 per cent), Kamba (11 per cent) and Kalenjin (11 per cent), jointly comprising more than half the whole population, and the national proportions of these ethnic groups have kept stable since independence in 1963 (Burgess, Miguel, Jedwab, & Morjaria, 2015). According to Oucho (2002), the post-independence governments allocated resources in a way that allowed the president to favor their home regions or their own ethnic groups. Therefore, between-region inequality displayed earlier may be just demonstration of

⁹ Acknowledgement: This chapter is derived in part from my article published in *Education Economics* on November 02, 2017, available online:

<http://www.tandfonline.com/doi/full/10.1080/09645292.2017.1398310>.

¹⁰ Dominant ethnic group here demotes the largest ethnic group in terms of population share within a certain region such as district and province.

between-ethnicity inequality or vice versa. In other words, it is not clear whether the better developmental outcomes in certain regions are because the president only favors his own ethnic groups or favors certain regions as a whole.

Table 10 Districts and Dominant Ethnic Groups over Time

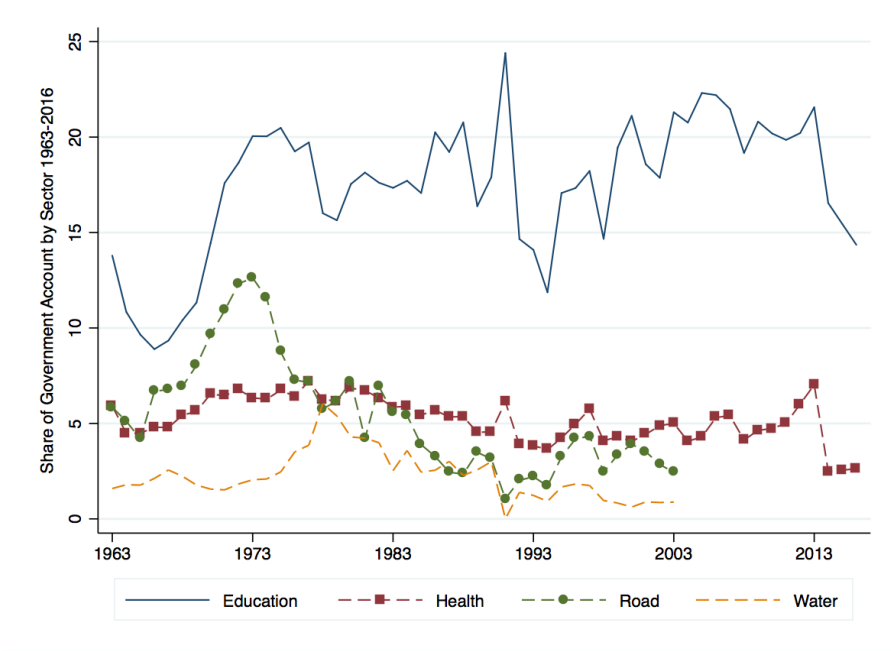
Province	District	1969 census		1979 census		1989 census	
		Ethnicity	Share	Ethnicity	Share	Ethnicity	Share
Central	Kiambu	Kikuyu	94.5	Kikuyu	90.6	Kikuyu	88.0
Central	Kirinyaga	Kikuyu	96.4	Kikuyu	96.9	Kikuyu	97.0
Central	Muranga	Kikuyu	96.2	Kikuyu	95.5	Kikuyu	95.9
Central	Nyandarua	Kikuyu	94.7	Kikuyu	95.1	Kikuyu	95.7
Central	Nyeri	Kikuyu	97.8	Kikuyu	96.8	Kikuyu	96.6
Coast	Kilifi	Mijikenda	91.8	Mijikenda	88.4	Mijikenda	90.3
Coast	Kwale	Mijikenda	83.0	Mijikenda	82.0	Mijikenda	82.6
Coast	Lamu	Bajun	65.7	Bajun	45.8	Bajun	40.4
Coast	Mombasa	Mijikenda	23.9	Mijikenda	25.8	Mijikenda	27.9
Coast	Taita Taveta	Taita	78.5	Taita	75.8	Taita	71.5
Coast	Tana River	Pokomo	57.4	Pokomo	35.2	Pokomo	37.0
Eastern	Embu	Embu	61.0	Embu	62.5	Embu	60.5
Eastern	Isiolo	Boran	52.7	Boran	49.2	Boran	34.2
Eastern	Kitui	Kamba	97.3	Kamba	97.0	Kamba	97.0
Eastern	Machakos	Kamba	97.7	Kamba	96.7	Kamba	97.0
Eastern	Marsabit	Rendille	34.3	Boran	31.6	Boran	28.2
Eastern	Meru	Meru	90.0	Meru	96.5	Meru	89.0
Nairobi	Nairobi	Kikuyu	37.6	Kikuyu	33.4	Kikuyu	32.4
Nyanza	Kisii	Kisii	98.0	Kisii	98.0	Kisii	98.2
Nyanza	Kisumu	Luo	90.7	Luo	89.9	Luo	89.2
Nyanza	Siaya	Luo	96.4	Luo	96.7	Luo	95.8
Nyanza	South Nyanza	Luo	88.7	Luo	79.1	Luo	76.5
Rift Valley	Baringo	Kalenjin	85.0	Kalenjin	84.8	Kalenjin	83.8
Rift Valley	Elgeyo Marakwet	Kalenjin	96.5	Kalenjin	93.4	Kalenjin	91.3
Rift Valley	Kajiado	Masai	68.6	Masai	62.8	Masai	56.6
Rift Valley	Kericho	Kalenjin	81.4	Kalenjin	82.7	Kalenjin	82.7
Rift Valley	Laikipia	Kikuyu	57.5	Kikuyu	64.4	Kikuyu	67.8
Rift Valley	Nakuru	Kikuyu	58.2	Kikuyu	60.8	Kikuyu	59.7
Rift Valley	Nandi	Kalenjin	78.1	Kalenjin	70.7	Kalenjin	73.6
Rift Valley	Narok	Masai	66.5	Masai	56.2	Masai	47.3
Rift Valley	Samburu	Samburu	74.1	Samburu	75.0	Samburu	74.7
Rift Valley	Trans Nzoia	Luhya	47.1	Luhya	49.3	Luhya	52.0
Rift Valley	Turkana	Turkana	98.9	Turkana	96.2	Turkana	94.5
Rift Valley	Uasin Gishu	Kalenjin	53.2	Kalenjin	55.0	Kalenjin	52.6
Rift Valley	West Pokot	Kalenjin	93.4	Kalenjin	88.8	Kalenjin	85.2
Western	Bungoma	Luhya	83.5	Luhya	81.4	Luhya	82.8
Western	Busia	Luhya	65.1	Luhya	59.5	Luhya	61.4
Western	Kakamega	Luhya	95.6	Luhya	94.6	Luhya	94.5
North Eastern	Garissa	Somali	93.0	Somali	81.1	Somali	84.2
North Eastern	Mandera	Gurren	46.1	Gurren	52.6	Gurren	48.9
North Eastern	Wajir	Degodia	43.8	Degodia	49.2	Degodia	51.7

Note: The term “Kalenjin” was first used as an ethnic category in the 1979 census. In the 1969 census, the Kalenjin population share is calculated as the summation of its seven sub-tribes (Tugen, Nandi, Kipsigis, Elgeyo, Marakwet, Pokot, and Sabao) for consistency with the later census. Kenya

has conducted five population census rounds since its independence. The first three census rounds (1969, 1979, and 1989) used the same administrative framework, which included 41 districts, while the 1999 and 2009 censuses included 69 and 158 districts, respectively, due to decentralization. Neither of the last two census rounds provided any detailed information on the ethnic geography of any district.

Figure 9 shows the share of government account expenditure in selected major sectors since independence in Kenya, from which it is obvious that the education sector has been the single largest expenditure item over several decades, whereas expenditure on other sectors, such as health, roads, or water, has undergone little change and has demonstrated a decreasing trend, especially since the 1980s. This reveals that the education sector has been the major priority for the Kenyan government since independence, and policy interventions are likely to have mainly occurred in the education sector during the post-independence period.

Figure 9 Share of Government Account Expenditure by Sector, 1963–2016



Note: This figure is created by the author based on the *Statistical Abstract* 1967–2016. Expenditures on roads and water are not available since 2003.

Therefore, this chapter focuses on the educational outcomes of individuals and explores whether inequality in education exists and whether it comes from inequality in opportunities due to ethnic favoritism, namely the coethnicity with the president.

During the colonial era, formal education in Kenya was introduced and provided by the missionaries. It was racially segregated¹¹ by the colonial government, resulting in severe neglect and lack of educational resources and facilities (e.g. physical schools) for African children when compared with their European-, Asian-, and Arab-descent counterparts (Eshiwani 1990). However, this division was not only between those of different ethnic backgrounds, as ‘even among Africans, ethnic difference was manipulated to keep the various communities apart under the principle of “divide and rule”’ (Eshiwani 1990: 3). As a result, at the time of independence in 1963, significant disparities in primary education existed across different ethnic groups, as shown in Table 11, which are mainly attributable to the geographic location of their respective homelands.¹²

The first post-independence government, led by President Kenyatta, a Kikuyu, made multiple attempts to address the problems facing the education system. In addition to a free education policy, the well-known Ominde Commission, which was set up in 1964, “recommended expansion of educational facilities for those districts and provinces that had been educationally disadvantaged in terms of numbers of schools and enrolments” (Alwy and Schech 2004: 270). The subsequent two governments, headed by President Moi, a Kalenjin, and President Kibaki, a Kikuyu, respectively, also

¹¹ Race here denotes Africans, Asians, Arabs, and Europeans.

¹² President Moi initiated an educational reform that changed the duration of primary schooling from seven to eight years in January 1985.

pledged to provide free primary education to realize the goal of universal primary education for their citizens.

However, their efforts were not equally directed toward the various ethnic groups. As mentioned earlier, the presidents in post-independence Kenya allocated resources in a way that favored their home regions or their own ethnic groups (Oucho 2002). Previous studies have corroborated this assertion by showing how ethnic favoritism has been prevalent in education (Franck and Rainer 2012; Kramon and Posner 2016) and in road construction (Burgess et al., 2015). This phenomenon has also been reflected in public opinion polls (Mwabu et. al 2013) as well as in voting behavior (Bratton and Kimenyi 2008). Therefore, even though the consciousness of ethnicity was constructed by the colonial government, the nature of the disparities between ethnic groups has changed from being one of geographical distinctiveness to one of being materially advantaged or disadvantaged through belonging to certain ethnic groups.

It is worth noting, from the trend shown in Table 11, that one of the politically dominant groups, the Kikuyu, has consistently outperformed other ethnic groups in terms of completed primary schooling years. The Kikuyu had already confirmed their position as well advantaged in primary education prior to independence, and this situation has continued. This can be partly attributed to an early exposure to education, as white settlers during the colonial era were predominantly located in the Kikuyu home territory of Central Province. This enabled the Kikuyu to profit the most from the disproportionate allocation of educational resources by the white settlers (Alwy and Schech 2004). In addition, the educational success of the Kikuyu at the primary school level can be further ascribed to the group's Independent School Movement, which reflected their early recognition of education's importance (Stanfield 2005). By way of contrast, even though the Kalenjin people were extremely disadvantaged

in terms of education at the time of independence among the five largest ethnic groups, they achieved the fastest improvement in primary education especially during the 1970s and 1980s, which corresponds to when President Moi, a Kalenjin, was in power. In the past several decades, primary education has increased in tandem with decreased inequality measurements, notwithstanding that within-group variation explains most of the variation, its contribution share decreased from 95.8 per cent during the colonial era to 88.7 per cent in the 2000s. Correspondingly, an increasing share of the variation in inequality can be explained by the disparity among ethnic groups.

Table 11 Primary Education Attainment and Inequality Measures over Time

	Colonial	1960s	1970s	1980s	1990s	2000s
Years of Primary Schooling						
Kikuyu	4.856	5.777	6.491	7.273	7.488	7.749
Kalenjin	3.335	3.886	5.361	6.703	6.893	7.154
Luo	3.621	4.283	5.611	6.955	7.147	7.393
Kamba	3.820	5.022	5.945	7.005	7.117	7.362
Luhya	4.295	4.616	5.689	6.791	6.847	7.136
Other	3.189	3.606	4.289	5.069	4.990	5.785
Generalized Entropy Index GE (2)						
	0.312	0.228	0.114	0.083	0.087	0.053
Inequality Decomposition						
Within	0.299	0.212	0.102	0.072	0.074	0.047
Between	0.014	0.016	0.012	0.011	0.013	0.007
Generalized Entropy Index GE (2) by Subgroups						
Kikuyu	0.172	0.078	0.023	0.017	0.015	0.005
Kalenjin	0.383	0.293	0.102	0.043	0.041	0.021
Luo	0.351	0.245	0.078	0.027	0.022	0.011
Kamba	0.285	0.139	0.057	0.030	0.027	0.014
Luhya	0.213	0.194	0.078	0.036	0.036	0.018
Other	0.466	0.387	0.268	0.217	0.239	0.131

Note: Author's calculation is based on KDHS 1993-2014. Despite the fact that Kenya gained independence in 1963, the colonial period in this table was until 1959 since the main variable of interest *coethnic* is defined as children who spent most of their primary school years under a coethnic president.

Thus, the question becomes whether the consistent dominance of the Kikuyu and the rapid improvement of the Kalenjin, as well as the increasing contribution of between-group variation in education, can be attributed to

ethnic favoritism. If this were the case, what would explain the variation in inequality measurements coming from within ethnic group variations? This chapter addresses these questions using household data from the Kenya Demographic and Health Survey (KDHS) and official population censuses.

The rest of this chapter is organized as follows. I will first provide a literature review on ethnic favoritism within the African context. Then, I will detail the empirical methodology and data sources. Summaries will be provided after presenting empirical results.

4.2 Literature Review

The concept of ethnic favoritism has been traditionally used to explain the poor economic performance of African countries, such that it is seen as a result of ethnic diversity (Easterly and Levine 1997; Montalvo and Reynal-Querol 2005). One reason why ethnic diversity may hinder economic development is its correlation with the under-provision of public goods (Alesina, Baqir, and Easterly 1999; Alesina et al. 2003; La Porta et al. 1999). Although it is widely accepted that there is a negative relationship between ethnic diversity and public goods provision (Habyarimana et al. 2007), a recent study by Gisselquist (2013) found that ethnic heterogeneity does not necessarily lead to the inadequate provision of public goods, as the relationship between ethnic diversity and public goods provision varies according to the public goods themselves.

One of the main assumptions underpinning the negative association between ethnic diversity and public goods provision is that societies that are polarized due to ethnic diversity are prone to rent-seeking by different ethnic groups and have difficulty agreeing on public goods allocation (e.g. Easterly and Levine 1997; Alesina, Baqir, and Easterly 1999). This assumption is implicitly based on another assumption, namely that different ethnic groups have different

policy preferences. Even though a field experiment by Habyarimana et al. (2007) found that there were no significant ethnic differences in terms of security, drainage maintenance, and garbage collection in Uganda, this result does not rule out potential ethnic differences regarding preferences toward other public goods in different contexts. A systematic analysis by Lieberman and McClendon (2012) confirmed a preference-based explanation for ethnic favoritism, such that coethnics have the same preference for education.

Another line of studies on ethnic favoritism focuses on formal theories of ethnic politics (Franck and Rainer 2012) to explain why political coalitions are based on ethnicity. For example, in Fearon's (1999) model, ethnicity is used as an exclusion criterion to minimize the size of the winning coalition and to maximize the political 'pork' or advantages that the coalition might obtain. The reason why ethnicity can serve as an exclusion criterion is that it cannot be chosen by an individual, unlike an individual's political affiliation (Fearon 1999). More recently, Pador i Miquel (2007: 1270) noted that his model is consistent with a public fund allocation bias under which "the government biases the allocation of resources by restricting access to bureaucratic posts, to the military or even to education to members of selected ethnic groups", such as the Kikuyu and the Kalenjin in Kenya.

Discussions about the potential costs in relation to economic welfare or political instability, as well as the motivations behind ethnic favoritism, are still ongoing. An increasing number of studies have begun to empirically investigate the prevalence and magnitude of ethnic favoritism.

To the best of the author's knowledge, Brockerhoff and Hewett (2000) provided the first cross-country study concerning Africa. They found that large disparities exist in child mortality among ethnic groups, a finding they attribute to the political landscape in countries such as Kenya. More recently, a study by Franck and Rainer (2012) systematically measured the existence and magnitude

of ethnic favoritism in 18 African countries. Their results showed that there is a widespread effect of ethnic favoritism in both primary education and infant mortality. Similar results can also be found in Kramon and Posner (2016) and Burgess et al. (2015), who, respectively, investigated ethnic favoritism in primary education and in road construction in Kenya. In contrast, in Guinea, Kudamatsu (2009) found no evidence of the acting president having favored his own ethnic group in the health sector. One possible explanation for these mixed results can be found in Kramon and Posner's (2013) study, which shows that the manifestation of ethnic favoritism varies markedly depending on the sectors one happens to study.¹³

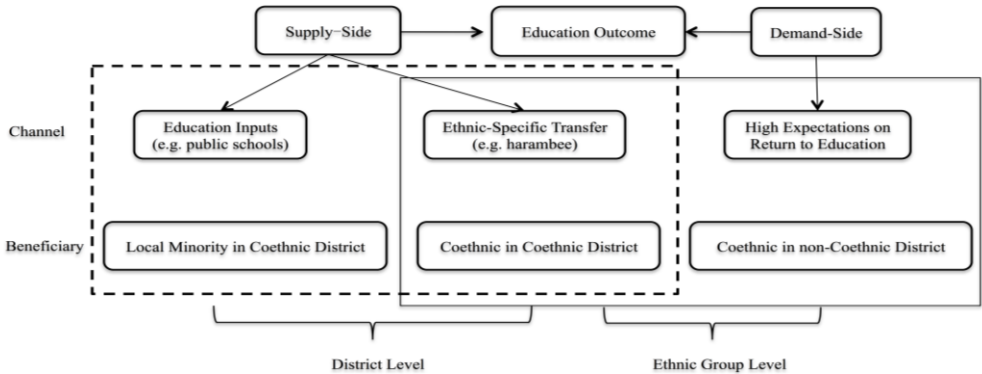
Most previous studies on ethnic favoritism have investigated its prevalence and magnitude without clearly defining it. Only Burgess et al. (2015: 1817) explicitly defined the concept of ethnic favoritism as “a situation where coethnics benefit from patronage and public policy decisions, and thus receive a disproportionate share of public resources when members of their co-ethnic group control the government.” This definition, however, only covers the supply-side mechanism of ethnic favoritism from the perspective of public resources allocation.

Another common drawback of previous studies is that they fail to clarify at which of two levels ethnic favoritism operates; whether it operates: (1) at the ethnic group level, where only coethnics of the sitting president can benefit from ethnically favored policies (e.g. ethnic-specific cash transfers or biased allocation of public sector jobs); or (2) at the district level, where both coethnics of the sitting president and local minorities living in the districts where the dominant ethnic group shares ethnicity with the president benefit

¹³ Kramon and Posner (2013) investigated the manifestation of ethnic favoritism in relation to four outcomes (infant survival, primary school completion, household electrification, and water source) in six African countries (Benin, Kenya, Malawi, Mali, Senegal, and Zambia). They found that patterns and magnitudes varied across different sectors and countries.

from it (e.g. building new schools or hiring more qualified teachers at the district level). Thus, this chapter considers the effect of ethnic favoritism from the supply-side as well as from the viewpoint of demand-side mechanisms and clarifies at which level it operates. A theoretical framework is demonstrated in Figure 10.

Figure 10 Theoretical Framework on How Ethnic Favoritism Operates



Note: This figure is created by the author.

If ethnic favoritism operates at the ethnic group level, then coethnics of the sitting president can enjoy benefits through both supply-side and demand-side channels regardless of whether they live in a coethnic district or not (see the right side of Figure 10). Thus, if this were the case, then we could expect that coethnics of the president, namely the Kikuyu and Kalenjin, would have comparatively smaller within-ethnic group variance in terms of educational attainment. On the other hand, if ethnic favoritism operates at the district level, coethnics of the president living in a non-coethnic district may not receive these benefits, while local minorities in coethnic districts would benefit from the supply-side channel of ethnic favoritism (see the left side of Figure 10). In that latter scenario, for coethnics of the president, within-ethnic group variance may not be necessarily smaller. Inequality decomposition results detailed in Table 11 show that coethnics of President Moi, the Kalenjin people, display the

largest disparity among the five biggest ethnic groups, which supports the hypothesis that ethnic favoritism operates at the district level. However, most of the decrease in overall inequality comes from a decrease in intra-ethnic group variance, especially for the Kalenjin, which provides evidence for the hypothesis that ethnic favoritism may operate at the ethnic group level. Therefore, it is an empirical question to explore at which of these two levels ethnic favoritism operates.

Another problem of previous studies is that inequality in socio-economic outcomes, such as primary educational attainment, already existed when Kenya gained independence in 1963 because of the education policies during the colonial era. Therefore, it is essential to isolate the initial conditions' effect across different ethnic groups in educational attainment when measuring the magnitude of ethnic favoritism.

4.3 Empirical Methodology

This chapter utilizes the following empirical model to investigate the prevalence of ethnic favoritism in Kenyan primary education at the ethnic group level:¹⁴

$$Y_{iept} = \beta_0 + \beta_1 Y_{ep0} + \beta_2 coethnic_{iet} + \theta_e + \delta_t + \lambda_{pe} + \mathbf{X}_i \mathbf{B} + \varepsilon_{iept} \quad (5)$$

where Y_{iept} denotes the primary educational attainment (which is measured by years of primary schooling and a binary variable of primary education completion) of individual i from ethnic group e living in province p who reached primary school age in year t . As mentioned, primary education in

¹⁴ According to the 1993 KDHS final report, there are 43 ethnic groups in Kenya. This study utilizes the self-reported ethnicity of every respondent. For simplicity, ethnicity in this study has been categorized into six categories—Kalenjin, Kamba, Kikuyu, Luo, Luhya, others—based on their comparative population share. The 1993 KDHS final report is available at <http://dhsprogram.com/what-we-do/survey/survey-display-56.cfm>, accessed on 18 April 2016.

Kenya was extended to eight years in 1985; hence, for those who started primary education before 1985, the maximum value of years of primary schooling is seven, after which it is eight. Y_{ep0} expresses the average of primary educational attainment for each ethnic group e in province p , using individuals who obtained most of their primary education before independence as a measure of the initial condition. This approach can also capture the potential effects of parental education and income levels on educational attainment, which influences considerably the education level of subsequent generations, as indicated in previous studies (Lowrance et al., 2008). Table 12 compares the key characteristics of the selected individuals to calculate the initial condition by ethnicity. To compare the magnitude of the estimated coefficient of the main variable of interest $coethnic_{iet}$ to previous studies, this chapter follows Kramon and Posner (2016) and defines this variable as a binary variable that equals one if an individual spent most (more than four years) of their primary education under a coethnic president.

Table 12 Characteristics of Individuals by Ethnicity, Initial Condition

Ethnicity	Birth Year	Female Dummy	Years of Primary Schooling	Primary Completion
Kikuyu	1948.589	0.555	4.856	0.466
Kalenjin	1948.261	0.526	3.335	0.222
Luo	1948.659	0.572	3.621	0.311
Kamba	1948.312	0.576	3.820	0.264
Luhya	1948.389	0.514	4.295	0.350
Others	1948.704	0.524	3.189	0.277

Note: Author's calculation is based on the KDHS 1993-2014. Individuals who spent most of their primary school years before independence are included for calculating the initial condition and the sample means are shown in the table.

While θ_e denotes the ethnicity fixed effect to capture ethnically specific factors (e.g. culture) that may influence educational attainment, δ_t is a dummy variable for each starting year of primary school (cohort) in order to control for time-fixed effects. Additionally, λ_{pe} controls for province-ethnicity level fixed effects, especially supply-side factors such as the availability of primary

schools financed either by missionaries or local communities during the colonial era, and \mathbf{X}_i represents a vector of individual characteristics including dummies of religion, female, and childhood spent in rural areas.

This regression model is used to investigate ethnic favoritism operating at the ethnic group level and tests whether ethnicity alone could determine whether individuals benefited from ethnic favoritism. However, public education is usually provided by administrative units, which were districts before the 2010 Kenyan constitutional amendment. It is also more efficient to provide public goods in districts where the president's coethnics are concentrated.

Kenyan population censuses since independence have shown that every district has one dominant ethnic group. If ethnic favoritism operates at the district level, the local minority may also benefit from ethnic favoritism. To ascertain whether ethnic favoritism operates at the district level, I use the following empirical model:

$$Y_{idt} = \delta_0 + \delta_1 Y_{d0} + \delta_2 coethnic_district_{idt} + \mu_t + \gamma_d + \mathbf{X}_i \mathbf{A} + v_{idt} \quad (6)$$

where Y_{idt} denotes the primary educational attainment of individual i in district d who reached primary school age in year t . In addition, Y_{d0} is the average primary educational attainment for people who spent most of their primary education in district d before independence, as a measure of the initial condition. Table 13 compares the key characteristics of the selected individuals to calculate the initial condition at the district level.

Table 13 Characteristics of Individuals by District, Initial Condition

District	Birth Year	Female	Years of Primary	Primary
Nairobi	1945.920	0.476	5.045	0.625
Kirinyaga	1945.530	0.504	3.559	0.362
Kiambu	1945.423	0.495	4.366	0.468
Nyandaura	1945.473	0.532	3.483	0.319
Nyeri	1945.307	0.494	4.605	0.471
Muranga	1945.267	0.506	3.997	0.385
Mombasa	1945.707	0.449	3.791	0.456
Kwale	1945.307	0.496	0.957	0.092
Kilifi	1945.376	0.520	1.284	0.117
Tana River	1945.647	0.482	1.247	0.103
Lamu	1945.016	0.471	1.141	0.112
Taita Taveta	1945.107	0.528	3.362	0.296
Marsabit	1945.177	0.502	0.392	0.032
Isiolo	1944.536	0.487	0.721	0.062
Embu	1945.588	0.505	3.243	0.320
Machakos	1945.442	0.516	3.508	0.317
Kitui	1945.027	0.525	1.912	0.180
Meru	1945.457	0.489	2.565	0.238
Garissa	1945.692	0.483	0.214	0.021
Wajir	1944.942	0.486	0.184	0.017
Mandera	1945.185	0.466	0.322	0.032
Siaya	1945.158	0.514	3.192	0.297
Kisumu	1945.392	0.470	3.206	0.290
Kisii	1945.501	0.497	3.174	0.315
South Nyanza	1945.218	0.505	2.826	0.245
West Pokot	1945.388	0.524	0.570	0.043
Baringo	1945.548	0.516	1.840	0.158
Nakuru	1945.471	0.498	3.514	0.348
Kericho	1945.484	0.497	2.635	0.250
Turkana	1945.459	0.519	0.217	0.016
Samburu	1945.254	0.534	0.524	0.047
Trans Nzoia	1945.649	0.481	3.040	0.271
Nandi	1945.259	0.509	2.743	0.221
Laikipia	1945.237	0.511	2.693	0.232
Narok	1945.713	0.507	0.979	0.087
Kajiado	1945.801	0.493	1.477	0.154
Elgeyo Marakwet	1945.420	0.505	2.289	0.205
Uasin Gishu	1945.566	0.480	2.892	0.263
Busia	1944.934	0.506	2.664	0.246
Kakamega	1945.292	0.497	3.483	0.315
Bungoma	1945.363	0.500	3.625	0.357

Note: Author's calculation is based on the 1989 census. Individuals who spent most of their primary school years before independence are included for calculating the initial condition and the sample means are shown in the table.

The main variable of interest, *coethnic_district*_{idt}, equals one if individual *i* spent most of their primary school years at district *d*, where the dominant group shared ethnicity with the president in year *t*.¹⁵ I change the threshold of the dominant ethnic groups' population share when defining a *coethnic_district*, to verify whether the magnitude of ethnic favoritism differs. The standard threshold for defining a *coethnic_district* is 30 per cent. I use the thresholds of 50, 70, and 90 per cent to check the magnitude changes of ethnic favoritism.

Table 14 displays the specific population share of a *coethnic_district*. Additionally, μ_t and γ_d denote year and district fixed effects, respectively, while X_i is a vector of individual level controls including dummies for religion, female, local minority and childhood spent in rural areas. A local minority in this chapter equals one for individuals who were non-Kikuyu as well as non-Kalenjin in coethnic districts. An interaction term between local minority and *coethnic_district* has also been included to check whether the effect of being in a *coethnic_district* varies between coethnics and local minorities.

Table 14 Population Shares of Coethnics in Coethnic Districts

Population Share (%)	30-49	50-69	70-89	>90
District Name	Nairobi	Laikipia	Nandi	Kirinyaga
		Nakuru	Baringo	Muranga
		Uasin Gishu	Kericho	Nyandarua
			Kiambu	Nyeri
			West Pokot	Elgeyo Marakwet

Source: Author's calculation is based on 1989 census. When using 30 per cent as the threshold, the variable *coethnic_district* includes all the districts listed above. While when the 50, 70 or 90 per cent thresholds are used, the last three, two or one column is included respectively.

To clarify whether ethnic favoritism operates along the ethnic dimension or at the district level, I include both variables of interest, *coethnic* as well as

¹⁵ The population shares of the dominant ethnic group in every district remained relatively stable in the 1969, 1979, and 1989 censuses, as shown in Table 1. The population share of Kikuyu in Kikuyu-dominant districts ranges from more than 30 per cent to greater than 90 per cent, while the population share of Kalenjin in Kalenjin-dominant districts ranges from more than 50 per cent to more than 90 per cent.

coethnic_district, and controls for ethnic group (θ_e), district (γ_d) and year-fixed effects (μ_t), as well as for individual characteristics (\mathbf{X}_i). Correspondingly, outcome variable Y_{iedt} denotes the primary educational attainment of individual i from ethnic group e in district d who reached primary school age during year t .

$$Y_{iedt} = \alpha_0 + \alpha_1 Y_{id0} + \alpha_2 coethnic_{iet} + \alpha_3 coethnic_district_{idt} + \theta_e + \mu_t + \gamma_d + \mathbf{X}_i \mathbf{A} + \omega_{iedt} \quad (7)$$

While acknowledging the fluidity of ethnic group, the self-report ethnic identity exploited in this chapter is considered to be stable and exogenous at a specific time point. In addition, considering that the timing of the birth year is randomly determined, the causal effect of coethnicity with the president on educational attainment can be identified. In contrast, the variable of interest *coethnic_district* is endogenous since people who highly value education may migrate to coethnic districts and it may affect the educational outcomes of their children as well. As a result, only a correlation between *coethnic_district_{idt}* and educational outcomes can be measured.

4.4 Data

This chapter derives individual-level data from five KDHS rounds, conducted in 1993, 1998, 2003, 2008 and 2014. The KDHS was conducted six times between 1989 and 2014; however, this study excludes the 1989 KDHS because the male samples only include husbands of eligible women in the households interviewed, while surveys since 1993 have covered every eligible man in the households sampled. The total sample size for this period comprised 88,744 individuals, among whom 2,994 individuals spent most of their primary education time in the period before independence, which is used to calculate

the initial conditions of different ethnic groups. Thus, the remaining 85,750 observations are used to measure the magnitude of ethnic favoritism.

Despite the KDHS being a standardized, nationally representative survey, the scope and coverage have differed over the previous 6 survey rounds. The newly available 2014 KDHS was the first county-representative survey in Kenya, while prior surveys had only been representative at the country and provincial level, and cannot therefore be used for county (district) level analysis. Because a 2010 constitutional amendment changed the administrative units into counties, instead of the provinces and districts that had been used before, the 2014 KDHS no longer provides district-level information. In line with the 1989 census data, I recode 47 counties in the 2014 KDHS according to the original 41 district boundaries.¹⁶ The initial condition at the district level is also calculated using the 1989 census with a sample size of 489,290, collected from the Integrated Public Use Microdata Series (IPUMS) - International.¹⁷ Additionally, information concerning the dominant ethnic group in each district was collected from the official report of the population and housing census conducted by the Kenya National Bureau of Statistics.¹⁸

¹⁶ According to Statoids, six new districts had been created by 1989:

“In Eastern province, Makueni district split from Machakos, and Nithi district split from Meru; in Nyanza province, Migori district split from Homa Bay, and Nyamira district split from Kisii; in Rift Valley province, Bomet district split from Kericho; in Western province, Vihiga district split from Kakamega” (<http://www.statoids.com/yke.html>, accessed on April 18, 2016.)

¹⁷ IPUMS - International provides a 5 per cent sample of respondents from the census. The original sample size of the 1989 IPUMS was 1,074,098. This study has limited the sample to respondents aged between 15 and 54 for consistency with the KDHS data.

¹⁸ Kenya National Bureau of Statistics, available at http://www.knbs.or.ke/index.php?option=com_phocadownload&view=category&id=100&Itemid=1176, accessed on 18 April 2016.

4.5 Empirical Results

4.5.1 How does Ethnic Favoritism Operate: Ethnic Dimension or District Level?

I first investigate whether ethnic favoritism operates at the ethnic group level. Considering that standard errors may correlate with each other within the same ethnic group, standard errors are clustered at the ethnic group level in all specifications. Columns (1) and (8) of Table 15 replicate the estimated results of Kramon and Posner (2016), excluding KDHS data collected in 1989, and assume that ethnic favoritism has an immediate effect on primary education. The estimated results in columns (1) and (8) of Table 15 confirm that having a coethnic president during most of a student's primary school years can be expected to increase the length of primary education by around 0.39 years and the probability of completing primary school by around 5 per cent, which is similar to the results, (0.39 years and 4 per cent, respectively), obtained by Kramon and Posner (2016). Column (2) controls for the initial condition by province and ethnicity, and the estimated magnitude indicates that early exposure to education during the colonial era at the ethnic group level did have a significant effect on educational attainment for the following generations. A comparison of coefficients between column (2) and column (3) shows that, after controlling for the province-ethnicity fixed effect, which includes supply-side factors such as the availability of schools during the colonial period, the magnitude of the effect of the initial condition decreases but is still positively significant. This result is consistent with Wantchekon, Klašnja and Novta (2015) who found that there was positive externality arising from education during the colonial era within a region. However, the effect of the initial condition decreases over time as shown in column (4) of Table 15.

The estimated results of column (5), which additionally include 2014 KDHS data, show that as primary education among Kenyan children improved,

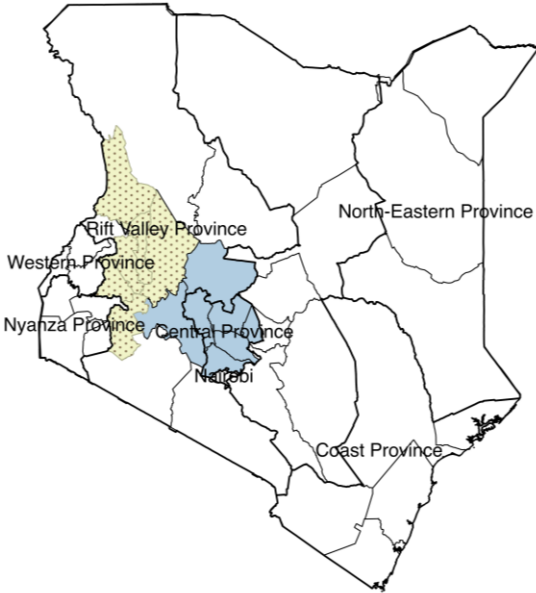
the effects of coethnicity with the president and the initial condition on years of primary schooling sharply decrease and become not significant because of the upper limits inherent in primary education. However, the estimated results in columns (12) - (14), with primary completion as an outcome variable, demonstrate a consistent pattern of the effect of coethnicity with the president over time. Coethnics of the president are expected to be more likely to complete primary education by around 4 per cent.

Even when omitting the initial condition, columns (7) and (14) show a consistent effect of coethnicity with the president, which still increases the probability of completing primary education by 4 per cent after the province-ethnicity fixed effect is taken into consideration. One concern arising from the small number of clusters is that the cluster-robust standard errors may be downwardly biased even after appropriate bias correction (Cameron, Gelbach, & Miller, 2008), therefore a wild cluster bootstrap method has been used to calculate standard errors to avoid over-rejection, and the estimated results are demonstrated in Appendix 3. The results are consistent with Table 15 where only clustered standard errors have been used.

Evidence thus far shows that having a coethnic president during most of a student's primary school years positively influences their educational attainment. Because it is still not clear whether ethnic favoritism operates at the ethnic dimension or at the district level, I estimate models (2) and (3) using KDHS 2014 data. In all the specifications, standard errors are clustered at the district level. As shown in column (6) of Table 16, people living in a district where the majority of citizens share ethnicity with the president are 5 per cent more likely to complete primary education. The average primary completion rate during the colonial era was approximately 25 per cent, and for the whole sample following independence has been approximately 61 per cent. Therefore, sharing ethnicity with the president has a significant effect, which is equivalent

to an 8.2 per cent increase in the likelihood of completing primary education. Moreover, after controlling for various fixed effects, results in columns (7) - (9) provide evidence that ethnic favoritism operates at the district level but not at the ethnic dimension. One concern regarding clustering standard errors at the district level is that the neighboring districts within the same province share the same dominant ethnic group (see Figure 11), which may introduce spatial dependency in error terms; thus, columns (5) and (10) of Table 16 cluster standard errors at the provincial level to correct for spatial correlation. Robustness checks using a wild cluster bootstrap to calculate standard errors are demonstrated in Appendix 3. In line with the results in Table 16, the effect of ethnic favoritism on primary completion has been shown to be robust at the district level regardless of which standard error is used.

Figure 11 Dominant Ethnic Groups by District and Province



Note: This figure is created by the author based on the population share in 1989 census as shown in Table 10. The solid line denotes province boundaries. The dark area demonstrates districts dominated by the Kikuyu (population share of Kikuyu >50 per cent), while the dotted areas denote districts dominated by the Kalenjin (population share of Kalenjin >50 per cent).

Despite Kenyan districts being largely ethnically homogenous, the extent of ethnic homogeneity varies, as shown in Table 10. For example, in Kikuyu-dominant districts, the population share of Kikuyu ranges from more than 30 per cent to more than 90 per cent. If ethnic favoritism functions through a supply-side channel, then, in considering its efficiency, it is reasonable to expect that the magnitude of ethnic favoritism would increase in tandem with the population share of the dominant group. Therefore, I redefine the variable *coethnic_district*, using different thresholds of the dominant ethnic groups' population share, as detailed in Table 14. The estimated results are demonstrated in Table 17. Panel A of Table 17 shows that, in terms of primary schooling, the extent of the effect of ethnic favoritism does not vary significantly due to district homogeneity. While people in a highly homogenous district are more likely to finish primary education, living in districts where more than 90 per cent of people share ethnicity with the president is likely to increase the possibility of completing primary education by around 7 per cent. This result is robust when clustering standard errors at the provincial level, as shown in Appendix 4.

Traditionally, there have been substantial sex differences in educational attainment (Lucas & Mbiti, 2012). The following estimated results in Table 18 indicate that the effect of ethnic favoritism does not statistically vary by gender.

In addition, results in Table 19 also provide evidence that the magnitude of ethnic favoritism is not equal across ethnic groups, and its effect has been stronger under the two Kikuyu presidents. This result is possibly because, compared to the Kikuyu, the Kalenjin are a recently politicized ethnicity and consist of seven Nandi-speaking ethnic groups (Weber, Hiers, and Flesken 2015).¹⁹ Thus, it is likely that the Kalenjin people demonstrate culturally heterogeneous preferences toward education; for example, the preferences of

¹⁹ Detailed information on the composition of the Kalenjin is provided in the note accompanying Table 12.

the pastoral people, the Pokot, may vary from those of other Kalenjin sub-groups as formal schooling is not typically a priority for pastoral people (Narman 1990).

Table 15 Ethnic Favoritism in Primary Education, Ethnic Group Level

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Years of Primary Schooling							Primary Completion						
Initial Condition		0.528** (0.133)	0.193*** (0.042)		0.170** (0.057)				0.548*** (0.047)	0.275* (0.115)		0.262** (0.073)		
Initial Condition * Time Trend				-0.000 (0.002)		-0.003 (0.002)					0.005 (0.003)		0.003** (0.001)	
Coethnic	0.389*** (0.039)	0.406*** (0.038)	0.391*** (0.040)	0.379*** (0.049)	0.200 (0.146)	0.185 (0.147)	0.194 (0.148)	0.045*** (0.003)	0.047*** (0.003)	0.044*** (0.003)	0.052*** (0.006)	0.041*** (0.007)	0.042*** (0.006)	0.040*** (0.007)
Individual Characteristics	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ethnicity Fixed Effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Province*Ethnicity Fixed Effect	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y
Observations	41,852	41,753	41,753	41,753	85,461	85,461	85,750	41,852	41,753	41,753	41,753	85,461	85,461	85,750
R-squared	0.270	0.294	0.322	0.321	0.327	0.327	0.326	0.119	0.139	0.149	0.149	0.154	0.153	0.152

Note: Columns (1) and (8) replicate the estimated results in Kramon and Posner (2016) using KDHS 1993-2008. KDHS 1993–2008 are also used for estimation in columns (2)-(4) and (9)-(11). Columns (5)-(7) and (12)-(14) additionally include KDHS 2014. Standard errors are clustered at the ethnic group level. *, ** and *** denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively.

Table 16 Ethnic Favoritism in Primary Education, District Level

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Years of Primary Schooling					Primary Completion				
Initial Condition	0.303*** (0.065)	0.299*** (0.062)				0.769*** (0.060)	0.780*** (0.056)			
Initial Condition*Time Trend			-0.021*** (0.003)					-0.011** (0.004)		
Coethnic		-0.027 (0.093)	-0.060 (0.085)	-0.027 (0.093)	-0.027 (0.092)		0.014 (0.016)	0.012 (0.016)	0.014 (0.016)	0.014 (0.011)
Coethnic District	0.095 (0.116)	0.115 (0.116)	0.295*** (0.084)	0.115 (0.116)	0.115 (0.151)	0.049*** (0.012)	0.039*** (0.011)	0.050*** (0.011)	0.039*** (0.011)	0.039*** (0.009)
Individual Characteristics	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ethnicity Fixed Effect	N	Y	Y	Y	Y	N	Y	Y	Y	Y
Year Fixed Effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	43,898	43,898	43,898	43,898	43,898	43,898	43,898	43,898	43,898	43,898
R-squared	0.393	0.393	0.402	0.393	0.393	0.208	0.208	0.209	0.208	0.208

Note: KDHS 2014 is used for estimation. Standard errors in columns (1)-(4) and (6)-(9) are clustered at the district level, while at the province level in columns (5) and (10). *, **, and *** denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively.

Table 17 Ethnic Favoritism at the District Level, Thresholds, and Local Minority

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)			
Threshold (per cent)	30	50	70	90	30	50	70	90			
				Years of Primary Schooling				Primary Completion			
Panel A											
Coethnic District	0.095 (0.116)	0.130 (0.119)	0.127 (0.148)	-0.029 (0.197)	0.049*** (0.012)	0.052*** (0.013)	0.055*** (0.016)	0.074*** (0.019)			
Observations	43,898	43,898	43,898	43,898	43,898	43,898	43,898	43,898			
R-squared	0.393	0.393	0.393	0.392	0.208	0.208	0.208	0.208			
Panel B											
Coethnic District	0.109 (0.131)	0.116 (0.133)	0.166 (0.151)	0.011 (0.202)	0.054*** (0.017)	0.055*** (0.018)	0.063*** (0.021)	0.081*** (0.021)			
Local Minority	0.395 (0.357)	0.110 (0.399)	0.526 (0.370)	0.865*** (0.308)	0.088* (0.047)	0.061 (0.050)	0.084 (0.053)	0.129** (0.063)			
Coethnic District*Local Minority	-0.073 (0.223)	0.095 (0.253)	-0.336 (0.201)	-0.640*** (0.217)	-0.026 (0.032)	-0.018 (0.039)	-0.068 (0.051)	-0.128 (0.082)			
Observations	43,898	43,898	43,898	43,898	43,898	43,898	43,898	43,898			
R-squared	0.393	0.393	0.393	0.393	0.208	0.208	0.208	0.208			

Note: KDHS 2014 is used for estimation. Standard errors clustered at the district level are shown in parentheses. *, **, and *** denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively. All the specifications control for ethnicity fixed effect, district fixed effect, year fixed effect, dummies of religion, female as well as childhood in rural areas.

Table 18 Ethnic Favoritism in Primary Education by Gender

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Years of Primary Schooling				Primary Completion			
Coethnic District	0.115 (0.116)	-0.022 (0.155)	0.115 (0.151)	-0.022 (0.183)	0.039*** (0.011)	0.045** (0.018)	0.039*** (0.009)	0.045* (0.020)
Female Dummy		-1.093*** (0.235)		-1.093** (0.360)		-0.171*** (0.025)		-0.171*** (0.034)
Coethnic District*Female Dummy		0.199 (0.164)		0.199 (0.146)		-0.009 (0.024)		-0.009 (0.028)
Observations	43,898	43,898	43,898	43,898	43,898	43,898	43,898	43,898
R-squared	0.393	0.393	0.393	0.393	0.208	0.208	0.208	0.208

Note: KDHS 2014 is used for estimation. Standard errors in columns (1), (2), (5) and (6) are clustered at the district level, while in columns (3), (4), (7) and (8) are clustered at the province level. *, **, and *** denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively. All the specifications control for ethnicity fixed effect, district fixed effect, year fixed effect, dummies of religion, female as well as childhood in rural areas.

Table 19 Ethnic Favoritism in Primary Education by President

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Years of Primary Schooling			Primary Completion		
President	Kenyatta	Moi	Kibaki	Kenyatta	Moi	Kibaki
Panel A						
Coethnic District	0.136* (0.074)	0.021 (0.088)	0.601*** (0.078)	0.029 (0.023)	0.013 (0.011)	0.335*** (0.020)
Observations	4,776	28,528	10,594	4,776	28,528	10,594
R-squared	0.435	0.428	0.268	0.220	0.210	0.227
Panel B						
Coethnic District	0.136 (0.077)	0.021 (0.107)	0.601*** (0.113)	0.029** (0.011)	0.013** (0.005)	0.335*** (0.021)
Observations	4,776	28,528	10,594	4,776	28,528	10,594
R-squared	0.435	0.428	0.268	0.220	0.210	0.227

Note: KDHS 2014 is used for estimation. Standard errors in Panel A are clustered at the district level, while in Panel B are clustered at the province level. *, **, and *** denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively. All the specifications control for ethnicity fixed effect, district fixed effect, year fixed effect, dummies of religion, female, as well as childhood in rural areas.

4.5.2 How does Ethnic Favoritism Function: Supply-Side or Demand-Side Channels?

The evidence demonstrated to this point confirms that ethnic favoritism operates at the district level but not at the ethnic dimension. How exactly does it work? Does it function through supply-side channels or demand-side channels?

Even if ethnic favoritism is operating at the district level, whether the local minority can benefit from ethnic favoritism depends on the mechanism through which it operates. If it functions through supply-side channels, where more resources have been diverted to coethnic districts of the president through building more public schools or hiring more teachers, then local minorities may have a chance to access these resources as well. If it only functions through demand-side channels by increasing the expectation of educational returns, for example through giving a disproportionate share of public jobs to the coethnics

of the president, then the local minority would have less incentive to invest in education. To test whether there is a spillover effect within a coethnic district, and to shed light on the specific mechanisms through which ethnic favoritism operates, Panel B of Table 17 explicitly includes a dummy for a local minority in a *coethnic_district* and an interaction term between it and the variable *coethnic_district*. The positive coefficients of the *local_minority* dummy indicate that living in a *coethnic_district* improves the educational attainment of local minorities. In particular, local minorities in districts where more than 90 per cent of people are coethnics of the president spend almost one more year at school and 12.9 per cent are more likely to complete primary education. This could be because Kikuyu- or Kalenjin-dominant districts obtain more educational inputs when their coethnics are in power, which supports a supply-side mechanism effect.

However, the interaction term between the dummy of *local_minority* and variable *coethnic_district* demonstrates a negatively significant effect in column (4) of the Panel B in Table 17. This result lends support to the effects of demand-side mechanisms since non-coethnic children may have a lower expectation of future educational returns compared with coethnic children. To give a hypothetical example, a Luhya child living in a Kikuyu-dominant district who spent the majority of his or her primary education under a Kikuyu president would stay 0.6 fewer years in primary schooling compared with peers whose ethnicity was Kikuyu.

One possible mechanism for increasing the expectations of educational returns is through the job market, and ethnic favoritism may also take the form of giving a disproportionate share of public jobs to the coethnics of the president, and this may lead to changes in educational outcomes as well. If this were the case, it is reasonable to expect that, with the same education level, age and sex, individuals in a *coethnic_district* would be more likely to get a

public sector job. Unfortunately, the occupation category in the KDHS is not straightforward enough to identify whether an individual has been employed in the public or private sector. Therefore, I use 2009 census data from the Integrated Public Use Microdata Series (IPUMS) - International and an empirical model specified in equation (8) to test the above hypothesis. The total sample size drawn from the 2009 census comprised 3,841,935 individuals, among whom 72,583 individuals (less than 2 per cent) were employed in the public sector.

$$Public_Job^{2009}_{id} = \gamma_0 + \gamma_1 coethnic_district_{idt} + \mu_t + \lambda_d + \mathbf{Z}_i \boldsymbol{\Gamma} + v_{idt} \quad (8)$$

Among all people employed in the public sector, 5 per cent had not completed primary education, 15 per cent of them had completed primary education, and 66 per cent and 13 per cent had completed secondary and university education, respectively. Accordingly, having some primary education is considered to be the minimum threshold for a public sector job, and completing primary education greatly increases the likelihood of obtaining a public sector job. Because the 2009 census data are cross-sectional, it was impossible to identify the age at which individuals began their employment. Given that the lowest age of people in the 2009 census employed in the public sector was 18, I assume that the earliest age for entering the job market was 18 years of age. Correspondingly, the main variable of interest, $coethnic_district_{idt}$, has been constructed to equal 1 if individual i is above 18 years old in year t in district d where the dominant ethnic group shares ethnicity with the president in year t . λ_d denotes the district fixed effect, which controls for the level of development by district. A cohort effect μ_t has been included to control for macroeconomic shocks. \mathbf{Z}_i includes individual characteristics, such as education level, age and sex. The outcome variable $Public_Job^{2009}_{id}$ equals 1 if individual i worked in the public sector in 2009. Because of repeat years,

delayed enrolment and the pursuit of further education, the real age for entering the job market may be higher than 18 years. I change the age threshold in the regression analysis and examine whether the effect of ethnic favoritism varies accordingly.

Table 20 Ethnic Favoritism in Job Market

Outcome Variable	(1)	(2)	(3)	(4)	(5)
Threshold (age \geq)	18	20	22	24	26
Public Job					
Panel A (coethnic share > 50 per cent)					
Coethnic District	0.005** (0.002)	0.004* (0.002)	0.004 (0.002)	0.002 (0.003)	0.001 (0.003)
Observations	3841935	3841935	3841935	3841935	3841935
R-squared	0.109	0.109	0.109	0.109	0.109
Panel B (coethnic share > 70 per cent)					
Coethnic District	0.006*** (0.002)	0.005** (0.002)	0.005** (0.002)	0.003 (0.002)	0.002 (0.003)
Observations	3841935	3841935	3841935	3841935	3841935
R-squared	0.109	0.109	0.109	0.109	0.109
Panel C (coethnic share > 90 per cent)					
Coethnic District	0.005*** (0.002)	0.005** (0.002)	0.005** (0.002)	0.005* (0.002)	0.005 (0.003)
Observations	3841935	3841935	3841935	3841935	3841935
R-squared	0.109	0.109	0.109	0.109	0.109

Note: 2009 Population Census is used for estimation. Standard errors are clustered at the district level. *, **, and *** denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively. All the specifications control for district fixed effect, year fixed effect, age, female dummy, as well as education attainment of individuals. Estimation in this table excludes Nairobi (coethnic share > 30 per cent & < 50 per cent) since it is the capital city of Kenya, whose job market is largely different from other districts.

Table 20 displays the estimated results of the effect of ethnic favoritism on public sector employment. The estimated results in Table 20 show that, given the same age, sex and education level, living in a *coethnic_district* increases the likelihood of obtaining employment in the public sector by approximately 0.5 per cent, especially for people who entered the job market at an early age (between 18-20 years old). Given that less than 2 per cent of the population are

employed in the public sector, this is approximately equivalent to a 40 per cent increase in the likelihood of obtaining a job in the public sector. In addition, in a coethnic district where more than 90 per cent of people share ethnicity with the president, age does not appear significant, since the estimated coefficients are identical in columns (1) - (5) of Panel C in Table 20. This indicates that ethnic favoritism also occurs in the job market, which affects a demand-side mechanism of education, especially in more homogenous coethnic districts.

Estimation to this point has assumed that ethnic favoritism has an immediate effect on primary education. However, time lags may exist from the time that the president took power to the implementation of public policy. For example, if ethnic favoritism operates through a supply-side mechanism in which there is more investment in educational inputs (e.g. school construction and teacher recruitment), then children in coethnic districts who reach primary school age after the coethnic president takes power will access greater educational opportunities. This effect has been termed as a “policy implementation time lag”, and I recode the variable, *coethnic_district*, to interact with one- to three-year lags. Columns (6) - (8) in Panel A of Table 21 generally confirm this pattern that children are more likely to complete primary school after one of their coethnics becomes president, for up to one to three years afterwards.

Table 21 Ethnic Favoritism in Primary Education, Time Lags

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Time Lags	None	1 year	2 years	3 years	None	1 year	2 years	3 years
Panel A Policy Implementation Time Lag								
Coethnic District	0.095 (0.116)	0.109 (0.147)	0.114 (0.130)	0.129 (0.119)	0.049*** (0.012)	0.050*** (0.017)	0.046*** (0.016)	0.053*** (0.014)
Observations	43,898	43,898	43,898	43,898	43,898	43,898	43,898	43,898
R-squared	0.393	0.392	0.392	0.393	0.208	0.208	0.208	0.208
Panel B Primary Start Time Lag								
Coethnic District	0.095 (0.116)	0.104 (0.155)	0.130 (0.161)	0.108 (0.135)	0.049*** (0.012)	0.049*** (0.016)	0.049*** (0.016)	0.045** (0.018)
Observations	43,898	43,898	43,898	43,898	43,898	43,898	43,898	43,898
R-squared	0.393	0.392	0.393	0.392	0.208	0.208	0.208	0.208

Note: KDHS 2014 is used for estimation. Standard errors are clustered at the district level. *, **, and *** denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively. All the specifications control for ethnicity fixed effect, district fixed effect, year fixed effect, dummies of religion, female, as well as childhood in rural areas.

If ethnic favoritism operates through a demand-side mechanism by increasing expectations on educational returns, then it is possible that over-aged children in relation to normal primary schooling age may join or rejoin primary school when a coethnic becomes president. Therefore, this chapter has recoded the variable, *coethnic_district*, by including children who were 7-9 years old (corresponding to 1-3 years lag in Panel B of Table 21) at the year when one of their coethnics became president. The estimated results in columns (6) to (7) indicate that children who were over-aged by one or two years are equivalently likely to complete primary school as other primary school children, which supports a demand-side mechanism in relation to ethnic favoritism.

4.6 Conclusions

Inequality in primary educational achievement has persisted in Kenya since its independence. Previous studies have used ethnic favoritism to explain the between-group inequality. However, this does not explain why the within-group difference is consistently large if ethnic favoritism benefits the coethnics of the president; that is if ethnicity is the only defining factor determining whether a student can benefit from ethnic favoritism or not. This chapter contributes to clarifying how ethnic favoritism operates, which is at the district level and not necessarily along the ethnic dimension.

Using primary education outcomes, this chapter confirms that ethnic favoritism is prevalent in Kenya, which has been shown in previous studies as well; however, the magnitude of the effect of ethnic favoritism on the years spent in primary schooling is decreasing in tandem with the improvement of education levels of Kenyan children. While the consistent result is that having a coethnic president increases the possibility of completing primary school by 4 per cent, this effect is not equal for all coethnics of the sitting president.

Only the coethnics living in coethnic districts benefit from this favoritism, which indicates that ethnic favoritism operates at the district level and also explains why the within-group difference is consistently large. Moreover, the extent of ethnic favoritism varies depending on each district's population share of the president's coethnics. Generally, the magnitude of the effect of ethnic favoritism increases as the population share of the dominant ethnic group increases in terms of the primary school completion rate. This also explains that part of the between-district (county) inequality comes from ethnic favoritism of the president.

Given that ethnic favoritism operates at the district level, does it function through supply-side or demand-side mechanisms? Because data on public expenditure in the education sector at the sub-national level is limited, this chapter could not show direct evidence concerning supply-side mechanisms of ethnic favoritism. Nevertheless, the estimated results in Table 17 imply that ethnic favoritism may function due to a supply-side mechanism since local minorities in the coethnic districts have higher education attainment as well. With regard to a demand-side mechanism, the estimated results in Table 20 provide direct evidence that a demand-side mechanism is related to ethnic favoritism in job markets, which affects educational outcomes through increasing future expectations regarding educational returns.

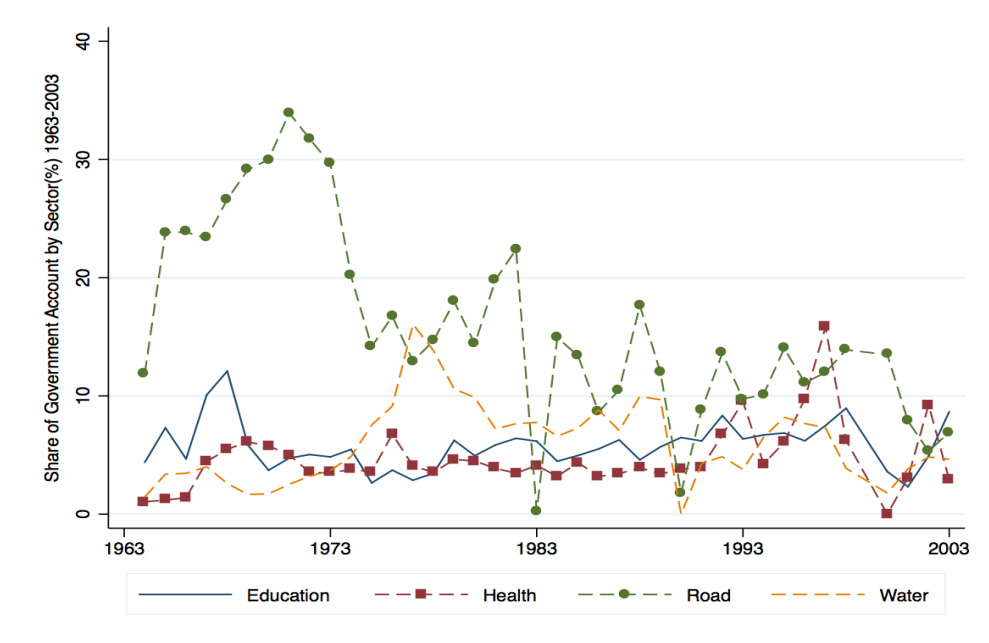
To summarize, the supply-side and demand-side mechanisms of ethnic favoritism imply that both within and between-ethnicity inequality may come from between-region (district) inequality. The location of residence not only determined the unequal access to educational resources but also affected the probability of getting public sector jobs, which jointly affect the educational outcomes.

Chapter 5 Ethnic Favoritism in Road Construction

5.1 Introduction

Developing physical infrastructure is a prerequisite for economic growth and poverty reduction, as it helps to achieve economies of scale through integrating markets, promoting free mobility of resources (such as labor and raw material), creating employment, and boosting investment. On gaining independence, the Government of Kenya started to design and implement policies to promote economic growth and development (Wasike, 2001). Despite public budget limitations, road construction is the single largest expenditure item in the development account for almost 4 decades (see Figure 12), and ranked the second in the government account before the 1980s (see Figure 9 in Chapter 4) in Kenya.

Figure 12 Share of Development Account Expenditure by Sector, 1963–2003



Source: This figure is created by the author based on *Statistical Abstract 1967–2003*. Expenditures on roads and water are not available since 2004.

Different from other public goods (such as education and health), which derive funding from *harambee*²⁰ or the private sector, the network of roads is the principal transport facility provided and maintained by the Government of Kenya (World Bank, 1963). The president plays an important role in the allocation of road budgets since “request for road projects are fed into the Ministry of Public Works by provincial and district commissioners who... are nominated by the president, and then the Office of the President coordinates national decisions with the Ministry of Finance” (Burgess et al. 2015:1826).

The centrally allocated nature of road construction has made it a prime area of political patronage (Burgess et al., 2015). Thus, this chapter focuses on the allocation of road construction expenditure derived from Burgess et al. (2015) covering the period from 1963 to 2011. Specifically, three questions are investigated. First, how prevalent is ethnic favoritism in road construction in Kenya and how heterogeneous is it across different districts and regimes? Second, does democratization mitigate ethnic favoritism in a way that alters the targets of favored allocations? Third, how do multi-party election results shape the allocation of subsequent road expenditures over the following 5 years?

The remainder of this chapter is structured as follows. I first review the extant literature. Then, the data and methodology are presented. Summaries will be provided after presenting empirical results.

5.2 Literature Review

Studies about the provision of public goods and services in developing countries mainly focus on socially constructed identities (e.g., ethnic, linguistic, or religious groups) but not organized interest groups (Golden and

²⁰ *Harambee* is a self-help system, which uses “collective fundraising and voluntary work to build schools, cattle dips, clinics, and dispensaries where the state was unable to provide them” (Hornsby, 2013:138).

Min, 2010). However, distributive politics in more-developed settings usually addresses whether politicians allocate goods to their core or swing voters, namely the core and swing voter debate.

The reason why previous studies on developing countries, especially African countries, “take a theoretically more relaxed view than the swing versus core voter debate” (Golden and Min 2010: 82) is twofold. First, linkages between politicians (or political parties) and voters is patronage-based (Baldwin, 2005; Kitschelt and Wilkinson, 2007) and thus many studies of African countries identify tribalism or ethnicity as an important factor influencing allocations (Bates, 1974). Second, most of African countries did not reintroduce multi-party elections until the 1990s, and even after democratization, voters have tended to vote in alignment with their ethnic identities, which makes coethnics of the president (or their representative party) the beneficiaries of distributive politics.

The extant literature on ethnic favoritism in African countries has revealed that, in general, ethnic favoritism is prevalent (Burgess et al., 2015; Franck and Rainer, 2012; Kramon and Posner, 2016) and its magnitude depends on the specific policy areas one happens to study (Kramon and Posner, 2013). Especially, the seminal paper by Burgess et al. (2015:1820) finds that coethnic districts of the president “receive twice as much expenditure on roads...relative to what would be predicted by their population share” and democratic transitions under the same president did reduce the degree of ethnic favoritism. However, that study overlooked important heterogeneities in ethnic favoritism not least in terms of how the introduction of multi-party election reshapes disproportionate resource allocation targets. If the reason why politicians implement ethnic favoritism is to mobilize political support, it seems that favoring his own ethnic group has proved to be insufficient in the Kenyan

context during the multi-party period since no single ethnic group in Kenya dominates as a proportion of the population. Thus, the question becomes, which districts did the president decide to favor in order to optimize his chances of political survival?

Research and debates on core and swing voters overwhelmingly focus on mature democracies in developed countries, not least because of the long history of democracy and the availability of data in those contexts. The fundamental formal model is due to Dixit and Londregan (1996), based on Cox and McCubbins (1986) and Lindbeck and Weibull (1987), and explores which type of voter receives disproportionate allocations within a single electoral district. It turns out that parties may engage in targeting both core and swing voters. If the parties can deliver transfers to any group in an equally effective manner, they will engage in swing voter targeting; however, if each party can only effectively deliver favors to its supporters, they will choose to favor these core voters (Dixit and Londregan, 1996). Although empirical studies yield mixed results on this debate, the swing voter hypothesis is often supported (Golden and Min, 2010).

One problem facing studies on core and swing voters is that the hypothesis assumes that politicians are willing and able to allocate a disproportionate share of resources as a reward for changing voting preference. If voters have the option of not voting, Nichter (2008) predicts and empirically verifies that parties target core voters in order to increase the turnout rate which he terms as “turnout buying.”

Another problem of the core or swing voter hypothesis is that it concerns individuals while data on resource allocation is usually aggregated to electoral units or above (Golden and Min, 2010). Using the concept of the margin of victory as a minimal definition of core and swing, Vaishnav and Sircar (2010)

contend that the government of Tamil Nadu engaged in “vote rewarding” in the first 2 years, and also targeted “swing” constituencies with small margins.

Empirical evidence for other developing countries is equivocal as well. In Senegal, Caldeira (2012) finds that the government targeted intergovernmental fiscal transfers in swing local governments. However, in Tanzania, Weinstein (2011) provides evidence that the incumbent favors districts with a large margin of victory. Furthermore, many empirical results in developing country contexts “fit neither the core nor the swing hypothesis, nor ... speak to the vote-buying versus turnout buying debate” (Golden and Min, 200: 82). For instance, Baldwin (2005) finds that politicians in Mali distribute jobs to areas where opposition activities are more likely. Similarly, findings by Toha (2009) and Treisman et al. (1996) show that disproportionate allocations go to regions that threatened the stability of regimes in Indonesia and post-Soviet Russia, respectively. These counterintuitive results can also be witnessed in Ghana where intergovernmental transfers, as well as public good allocations, have favored districts which voted for the opposition (André and Mesplé-Soms, 2011; Banful, 2011a, 2011b).

Therefore, this chapter contributes to the literature on distributive politics in the following respects. First, it shows that ethnic favoritism in road expenditure is a heterogeneous phenomenon. Second, it explains political motivations behind the heterogeneity of disproportionate resource allocation.

5.3 Data and Methodology

This chapter derives district-level panel data on road construction in Kenya from Burgess et al. (2015), which includes data on road expenditure covering the 1963–2011 period. Those authors utilized data from multiple sources including the *Development Estimates* of Kenya. Since the Kenyan government

“finances maintenance of trunk roads and secondary roads from its recurrent budget” (World Bank 1963: 8), and the government of Kenya didn’t place more emphasis on road maintenance until the late 1990s (Wasike, 2001), road expenditure used in this chapter is generally for the construction of new roads.

Following Burgess et al. (2015), this study first reports on a descriptive graphical analysis, which normalizes data on district-level road expenditure in per capita and per unit area terms. Clearly, despite their intuitive appeal, visual trends cannot substitute for quantitative analyses. The empirical model of this chapter is as follows:

$$\begin{aligned} Road_Expenditure_{dt} = & \gamma_d + \alpha_t + \delta_1 * coethnic_district_{dt} \\ & + \theta (X_{d1963} * [t-1963]) + \mu_{dt} \end{aligned} \quad (9a)$$

$$\begin{aligned} Road_Expenditure_{dt} = & \gamma_d + \alpha_t + \delta_1 * coethnic_district_{dt} \\ & + s_d * t + \mu_{dt} \end{aligned} \quad (9b)$$

where the outcome variable is the natural logarithm of road expenditure (in constant 2000 US dollars) in district d at year t . In order to measure the magnitude of ethnic favoritism, a dummy variable is employed, termed *coethnic_district*; this takes the value 1 if more than half of the population in district d shares ethnicity with the president at time t following Burgess et al. (2015). It controls for district fixed effects γ_d , year fixed effects α_t , and a vector of baseline variables X_{d1963} to isolate the effect of other factors on road construction. As a robustness check, district specific time trend $s_d * t$ is controlled for instead of baselines controls as specified in equation (9b).

Baseline controls are derived from various sources. Wasike (2001) summarized post-independence road infrastructure policies in Kenya,

emphasizing the strategy of the Kenyan government to develop agriculture especially in regions with high agricultural potential and high production of cash crops. Thus, this chapter controls for areas of land with high and medium potential in 1963; these data were obtained from *Statistical Abstract 1967*. The value of cash crop production in 1965 is also controlled for since it is reasonable to expect that roads are prioritized to be built in agriculturally active areas and districts. In addition, policy initiatives also aimed at reducing transportation costs of agricultural commodities from rural areas to markets in order to draw the entire country into the market economy (Wasike 2001). Therefore, the model specification includes geographic, demographic, and commercial factors in the baseline controls. Geographic factors include a dummy for the Mombasa–Nairobi–Kampala corridor, a dummy for districts bordering Uganda or Tanzania, and the centroid euclidean distance to Nairobi (in kilometers). Demographic factors include district area size and population adjusted for boundary changes made since 1963, which were also obtained from *Statistical Abstract 1967*. Urbanization rate in 1962, total earnings from wage employment in 1966, and the number of wage employment (in thousands) in 1963 are also included as measurements of economic activities, which are all derived from Burgess et al. (2015). The reason baseline controls are used is due to the concern of simultaneous bias.

Even when controlling for the baseline social and economic factors, which may predict the allocation of road expenditure, the variable of interest *coethnic_district* may be endogenous due to omitted variable bias. For instance, due to the coethnic with the president, the *coethnic_district* may receive more expenditure in other sectors (such as education, health), which may result in better developmental outcomes in these districts. As a result, more road expenditure may be allocated to *coethnic_district* because of higher returns to

investment in road sectors. Thus, only a correlation between the *coethnic_district* and road expenditure can be measured when estimating equation (9a) and equation (9b).

Additionally, considering the heterogeneous nature of coethnic districts, I further differentiate this variable into categories as detailed in Table 22. *Coethnic_dominant_district* denotes districts where more than 75 per cent of the people are coethnic with the president. *Coethnic_minor_dominant_district* denotes districts where more than 50 percent but less than 75 per cent of the people are coethnic with the president. The reason why 75% is specified as the threshold for differentiating districts is that the “25 Percent Rule”²¹ of Kenyan elections makes districts where more than 75% of people are coethnic to the president the absolute strongholds of him.

Table 22 Classification of Districts in Kenya

Coethnic Dominant		Coethnic Minor Dominant	
Kikuyu Dominant	Kalenjin Dominant	Kikuyu Minor Dominant	Kalenjin Minor Dominant
Kiambu, Kirinyaga, Muranga, Nyeri, Nyandarua	Elgeyo Marakwet, Baringo, Kericho, West Pokot	Nakuru, Laikipia	Nandi, Uasin Gishu

Note: Refer to Table 10 to observe that the population shares of dominant ethnic groups did not change that much over time. Classification of districts is reasonably consistent over time regardless of which population census is used.

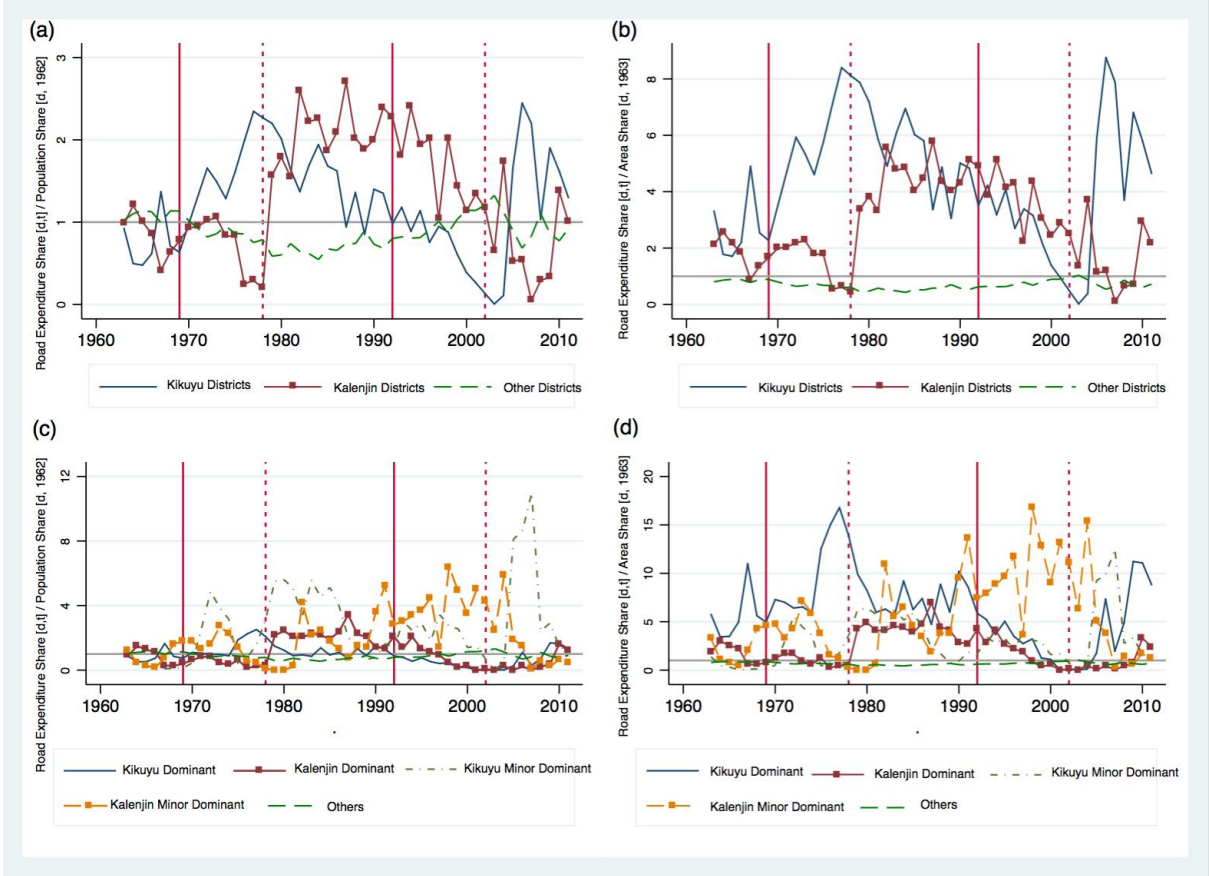
²¹ The “25 per cent rule” demotes that “the winning presidential candidate must secure 25 per cent of the vote in at least five of Kenya’s eight provinces” (Hornsby, 2013:511).

5.4 Results

5.4.1 Graphical Analysis

Different from Burgess et al. (2015) who suggested that districts that share ethnicity with the president have largely benefited from road construction since independence, the descriptive analysis herein shows that using different measures of outcome variables leads to different conclusions about ethnic favoritism.

Figure 13 District-Level Road Expenditure in Kenya, 1963–2011



Note: Figure 13(a) replicates Figure 5 of Burgess et al. (2015) which plots the ratio between the road expenditure share and the population share in 1962 in district d at year t . $Kikuyu_district$, $Kalenjin_district$, and $other_district$ take the value of 1 if more than 50% of the population in district d are Kikuyu, Kalenjin, or other, respectively. The population share in 1962 is adjusted for boundary changes after independence in 1963. Figure 13(b) plots the ratio between the road expenditure share and the area share in 1963 in district d at year t . Figures 13 (c) and (d) replicate (a) and (b), respectively, but further differentiate

districts based on Table 24. The two vertical dashed lines in (a) through (d) show changes from a Kikuyu president to a Kalenjin president in 1978 and from a Kalenjin president to a Kikuyu president in 2002. The two vertical solid lines in (a) through (d) demonstrate regime type changes from a multi-party system to a *de facto* one-party regime in 1969 and from a *de jure* one-party regime to a multi-party system in 1992.

Figure 13(a) replicates Figure 5 of Burgess et al. (2015) which shows that after the death of the first Kikuyu president in 1978, the trend of favoring Kikuyu districts was replaced by an increase in road expenditure in Kalenjin districts. Figure 13(b), which plots the ratio of the road expenditure share to the area share, displays a strikingly different pattern: during the majority of this period, Kikuyu districts received a disproportionate share of road expenditure.

Figures 13(c) and (d) further categorize districts according to their population shares of Kikuyu and Kalenjin as explained in Table 22. Figure 13(c) shows that neither *Kikuyu_dominant_district* nor *Kalenjin_dominant_district* is the largest beneficiary of road expenditure since independence. In contrast, *Kikuyu_minor_dominant_district*, as well as *Kalenjin_minor_dominant_district*, benefited most from road construction before and after the 1990s, respectively.

Figure 13(d) shows that during most of the post-independence era, *Kikuyu_dominant_district* was largely favored in terms of road expenditure. It received more than five times as much money relative to its area share in the country not only under the Kikuyu president but also under the Kalenjin president during the 1980s. Nevertheless, even though the majority of the districts experienced a substantial decrease in road expenditure in the 1990s, *Kalenjin_minor_dominant_district* received more than 10 times as much money relative to its area share.

Notwithstanding the fact that different implications can be drawn from the

temporal trends in Figure 13, one unifying conclusion is that ethnic favoritism in road expenditure is a heterogeneous process and its pattern does not necessarily change toward favoring the new president's coethnic districts or districts where the population share of his coethnics is large. In addition, it seems that the arrival of multi-party elections has had little influence on the magnitude of ethnic favoritism but instead altered targets of favored allocation of resources. Moreover, both Figure 13(c) and Figure 13(d) show that *Kalenjin_minor_dominant_district* largely benefited from road expenditure no matter whether normalization of road expenditures is computed based on the population share or the area share after the reintroduction of multi-party elections in 1992. It is not clear what the motivations are behind this altered target of favored allocation. Thus, the questions of what can better predict the allocation of road expenditure in post-independence Kenya, and how did changes in ethnicity of the president and regime type reshape targets of favored allocations are empirical ones.

5.4.2 Empirical Analysis

For the purpose of quantifying the heterogeneity of ethnic favoritism in road expenditure, this chapter then moves to empirical analysis as explained above. Columns (1) and (2) of Table 23 show the estimated results of equation (9a) controlling for year and district fixed effects as well as baseline controls interacted with linear time trends. The estimated results of equation (9b), which is shown in columns (3) and (4) include district specific time trends instead of the linear time trend of baseline controls, and generate similar estimated results compared to columns (1) and (2).

The estimated results of columns (1) and (3) in Table 23 show that ethnic

favoritism is prevalent in road construction during the post-independence period after isolating the effects of various baseline controls or district-specific time trends. Indeed, on average the *coethnic_district* received more than three times the amount of road expenditures. Although the magnitude of favoritism is heterogeneous among coethnic districts, only *coethnic_dominant_district* where more than 75% of the people are coethnics to the president received around four times as much road expenditure as displayed in columns (2) and (4) of Table 23.

Table 23 Ethnic Favoritism in Road Construction

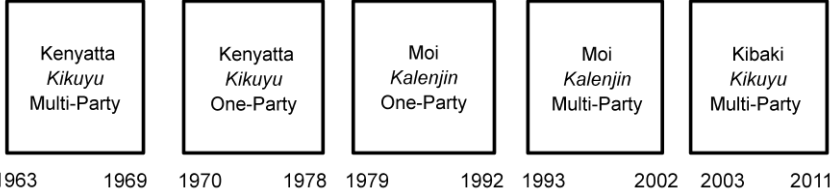
Outcome Variables	(1)	(2)	(3)	(4)
	Ln Road Expenditure			
Coethnic District	2.111** (0.895)		2.008** (0.800)	
Coethnic Dominant		3.107*** (1.075)		2.910*** (0.956)
Coethnic Minor Dominant		-0.100 (0.803)		-0.020 (0.764)
Year Fixed Effect	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y
Baseline Controls*Time Trend	Y	Y	N	N
District Specific Time Trend	N	N	Y	Y
Number of Clusters	41	41	41	41
Observations	2,009	2,009	2,009	2,009
R-squared	0.484	0.489	0.084	0.089

Notes: Robust standard errors clustered at the district level are in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively.

The uniqueness of the Kenyan case is that it not only experienced a shift between one-party and multi-party regimes under the same president but also experienced a shift between presidents from different ethnic groups under the same type of regime as delineated in Figure 14. It is natural to expect that the

pattern of ethnic favoritism would differ under different presidents and regime types, as per what can be observed in Figure 13(c) and (d). Thus, in Table 24, I categorize *coethnic_district* according to the explanation put forward in Table 22. It turns out that neither *Kikuyu_dominant_district* nor *Kalenjin_dominant_district* received more road expenditure (see column (1) of Table 24), and on average, *Kikuyu_minor_dominant_district* as well as *Kalenjin_minor_dominant_district* benefited more in the post-independence period. Indeed, this is consistent with the visualization in Figure 13(c).

Figure 14 Political and Leadership Transitions in Kenya, 1963–2011



Source: I created this figure based on Burgess et al. (2015). The first row in each square denotes the name of the president; the second row denotes the ethnicity of the president; and the last row denotes the regime type. The years specified below the square denote the year of starting and ending of a certain regime type under a certain president.

I further differentiate between regimes; see columns (2)–(6) of Table 24. Therein different regimes demonstrate divergent patterns and these patterns are broadly consistent with Figure 13(c). Under the Kenyatta regime between 1963 and 1978 (see columns (2) and (3)) as well as the Kibaki regime (see column (6)), road expenditure was not biased toward coethnic districts. Even during the one-party period between 1970 and 1978, the estimated coefficients exhibit positive signs but are insignificant at conventional levels. However, after President Moi took office, not only *Kalenjin_dominant_district* but *Kikuyu_minor_dominant_district* were strongly favored between 1979 and 1992.

This pattern changed drastically after the reintroduction of multi-party elections in 1992. Only districts where Kalenjin had minor advantages were favored in the subsequent multi-party period and, again, this is consistent with the visualization in Figure 13(c).

Table 24 Ethnic Favoritism by Regime

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Ln Road Expenditure					
President Ethnicity		Kikuyu	Kikuyu	Kalenjin	Kalenjin	Kikuyu
Period	1963–2011	1963–1969	1970–1978	1979–1992	1993–2002	2003–2011
Kikuyu Dominant District	–1.358*	–0.407	0.981	0.251	–2.577*	–5.582***
	(0.742)	(1.777)	(1.279)	(1.704)	(1.458)	(1.890)
Kikuyu Minor Dominant District	0.845*	–2.282*	0.880	3.179*	–0.071	0.629
	(0.437)	(1.316)	(1.881)	(1.730)	(2.006)	(1.107)
Kalenjin Minor Dominant District	1.971***	0.096	1.565	2.540	4.563***	0.068
	(0.555)	(1.947)	(1.399)	(2.367)	(1.331)	(2.091)
Kalenjin Dominant District	–0.976*	–6.014***	–3.192***	4.484***	0.012	–4.432***
	(0.504)	(1.437)	(1.007)	(1.437)	(1.049)	(0.976)
Year Fixed Effect	Y	Y	Y	Y	Y	Y
District Fixed Effect	N	N	N	N	N	N
Baseline Controls	Y	Y	Y	Y	Y	Y
Observations	2,009	287	369	574	410	369
R-squared	0.444	0.583	0.471	0.593	0.573	0.486

Note: Robust standard errors clustered at the district level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

5.5 Difference-in-Differences Estimates

As explained earlier that the estimated coefficient of $coethnic_district_{dt}$ cannot be interpreted as a causal one due to the concern of omitted variable bias. In order to show that temporal increases in road expenditure are a function of incumbent coethnics rather than other potential confounders, a Difference-in-Differences (DID) strategy is applied through subtracting the effect of ethnicity when a district's coethnic is in power from its effect when their coethnic is not in power.

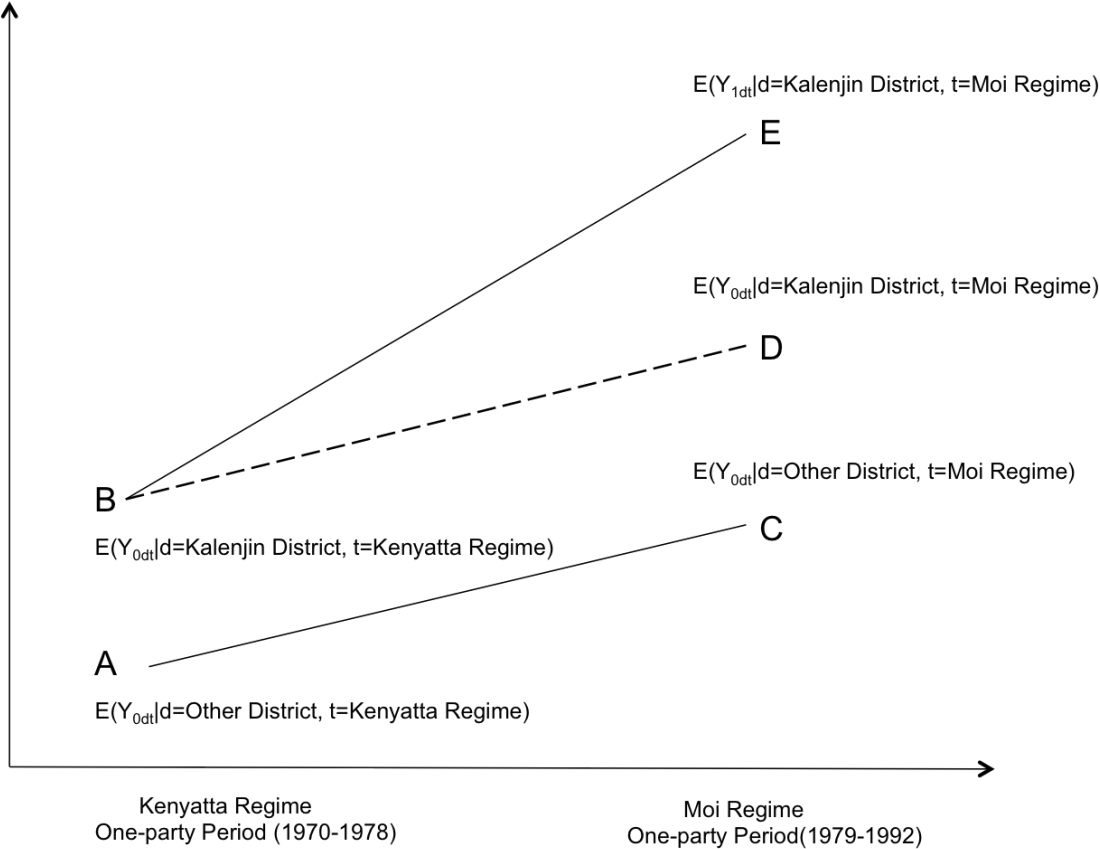
The political history of post-independence Kenya provides three natural experiments that can be used to examine both the effect of regime change on the magnitude of ethnic favoritism as well as the effect of coethnicity with the president as explained previously in Figure 14.

The natural death of President Kenyatta in 1978 makes it possible to measure the effect of coethnic with the president on road expenditure allocation. In order to isolate the potential effect of different regime types, the pre-treatment period only includes the *de facto* one-party period under President Kenyatta from 1970 to 1978 and assumes that constraints on the executive power of the president are constant despite the fact that President Moi becomes more autocratic after the coup in 1982 (Hornsby, 2013). And the post-treatment period includes the one-party period under President Moi from 1979 to 1992. When President Moi was in power, *Kalenjin_district* is categorized as the treatment group, while non-*Kalenjin_district* is the control group. Thus, the DID model can be specified as follows:

$$\begin{aligned} Road_Expenditure_{dt} = & \gamma_d + \alpha_t + \delta_d * t \\ & + \beta_{DID} (Kalenjin_district_d * Moi_regime_one_party_t) + \varepsilon_{dt} \end{aligned} \quad (10)$$

Using the terminology of potential outcomes, let Y_{1dt} denote the road expenditure in district d and period t if it is in the treatment group, namely the *Kalenjin_district*, and let Y_{0dt} be the road expenditure in district d and period t if it is in the control group.

Figure 15 Visualization of the Difference-in-Differences (DID) Strategy



Note: This figure is created by the author.

The key identifying strategy here is that the difference between the counterfactual difference (DB in Figure 15) and the observed difference of control districts (CA in Figure 15) can be fully captured by the district fixed effects and district-specific time trend in the absence of the treatment. In other words, I need to show that, after isolating the effect of district fixed effects, year fixed effects and district-specific time trends, there is no statistical

difference in road expenditure between *Kalenjin_district* and *Other_district* during the one-party period of the Kenyatta regime.

$$\begin{aligned}
 \text{Road_Expenditure}_{dt} = & \gamma_d + \alpha_t + \delta_d * t \\
 & + \beta_1 (\text{Kalenjin_district}_d * \text{Kenyatta_regime_one_party}_t) \\
 & + \beta_2 (\text{Other_district}_d * \text{Kenyatta_regime_one_party}_t) + \varepsilon_{dt}
 \end{aligned} \tag{11}$$

Thus, I estimate equation (11) specified above and the estimated results are shown in Table 25.

Table 25 Verification of Common Trend Assumption, 1963–1978

Outcome Variable	Ln Road Expenditure	
	(1)	(2)
Kalenjin District*Kenya Regime One-party	2.268 (3.117)	
Other District* Kenya Regime One-party	1.891 (1.601)	1.89 (1.602)
Kalenjin Dominant District* Kenya Regime One-party		2.731 (4.395)
Kalenjin Minor Dominant District* Kenya Regime One-party		1.343 (1.614)
Linear Time Trend	Y	Y
Year Fixed Effect	Y	Y
District Specific Time Trend	Y	Y
P-value of F-test: $\beta_1 = \beta_2$	0.899	
Number of Clusters	41	41
Observations	656	656
Adjusted R-squared	0.361	0.361

Note: Robust standard errors clustered at the district level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

The estimated results show that during the one-party period of the Kenyatta regime from 1970 to 1978, after controlling for various fixed effects and time trends, neither *Kalenjin_district* nor *Other_district* received disproportionate

shares of road expenditure. The hypothesis that β_1 equals β_2 cannot be rejected at the conventional significance level.

Then I proceed to show the effect of coethnicity with the president on road expenditure using equation (10) and the estimated results are shown in Table 26.

Table 26 Effect of Coethnicity with the President, 1970–1992

Outcome Variable	Ln Road Expenditure				
	(1)	(2)	(3)	(4)	(5)
Kalenjin District	4.728	5.006			
*Moi Regime One-Party	(3.220)	(3.277)			
Kalenjin Dominant District			8.694***	8.971***	8.971***
* Moi Regime One-Party			(2.950)	(3.009)	(2.997)
Kalenjin Minor Dominant District			-3.202	-2.925	-2.925
* Moi Regime One-Party			(1.929)	(2.005)	(1.997)
Kikuyu Dominant District					0.097
* Moi Regime One-Party					(2.065)
Kikuyu Minor Dominant District					4.612**
* Moi Regime One-Party					(1.800)
Linear Time Trend	Y	Y	Y	Y	Y
Year Fixed Effect	Y	Y	Y	Y	Y
District Specific Time Trend	Y	Y	Y	Y	Y
Number of Clusters	41	41	41	41	41
Observations	943	782	943	782	943
Adjusted R-squared	0.296	0.336	0.313	0.353	0.316

Note: Robust standard errors clustered at the district level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Columns (2) and (4) exclude *Kikuyu_district* in the reference group.

One problem of using all non-Kalenjin districts as the reference group is that, even after controlling for various time trends, road expenditure received by the *Kikuyu_district* may still deviate from common year effects because of ethnic favoritism during the President Kenyatta era compared with other non-Kalenjin districts. As a result, β_{DID} may be upward biased because it may include the

effect of ethnic favoritism during the Kenyatta regime. Therefore, in columns (2) and (4) of Table 26, *Kikuyu_district* is excluded in the reference group in order to measure the magnitude of ethnic favoritism more precisely.

When comparing coefficients in columns (1) and (2),²² it is worth noting that after excluding *Kikuyu_district* in the reference group, the estimated coefficient increased which is contrary to what was predicted earlier. Enlightened by the estimation results in column (4) of Table 24, the only explanation is that the *Kikuyu_minor_dominant_district* may receive a disproportionate share of road expenditure even under the Moi regime. Therefore I include the interaction terms of four categories of districts with the one-party period dummy of the Moi regime. The estimated results in column (5) of Table 26 support this explanation by showing that after Moi took power in 1978, road expenditure received by *Kikuyu_minor_dominant_district* increased more than four times.

$$\begin{aligned}
 \text{Road_Expenditure}_{dt} = & \gamma_d + \alpha_t + \delta_d * t \\
 & + \beta_{DID_regime} (\text{Kalenjin_district}_d * \text{moi_regime_multi_party}_t) + \varepsilon_{dt} \quad (12)
 \end{aligned}$$

Analysis thus far identifies the impact of coethnic with the president on road expenditure, then how about the effect of regime type change? Whether transition into a multi-party regime can help to mitigate the magnitude of ethnic favoritism? In order to answer this question, I estimate equation (12) and the estimated results are shown in Table 27. I also include the interaction

²² Comparing the estimated coefficients in columns (3) and (4) can draw the same conclusion.

terms of four categories of districts with the multi-party period dummy of the Moi regime to check whether regime type change may affect other districts as well.

Table 27 Effect of Reintroduction of Multi-Party Election, 1979–2002

Outcome Variable	Ln Road Expenditure			
	(1)	(2)	(3)	(4)
Period	1979–1997		1979–2002	
Kalenjin District	-2.225		-2.144	
*Moi Regime Multi-Party	(1.682)		(1.596)	
Kalenjin Dominant District		-1.209		-0.885
* Moi Regime Multi-Party		(2.268)		(2.026)
Kalenjin Minor Dominant District		-4.426***		-4.768***
* Moi Regime Multi-Party		(0.735)		(0.690)
Kikuyu Dominant District		-1.149		-0.918
* Moi Regime Multi-Party		(0.981)		(1.067)
Kikuyu Minor Dominant District		1.879**		1.676**
* Moi Regime Multi-Party		[0.745]		(0.700)
Linear Time Trend	Y	Y	Y	Y
Year Fixed Effect	Y	Y	Y	Y
District Specific Time Trend	Y	Y	Y	Y
Number of Clusters	41	41	41	41
Observations	779	779	984	984
Adjusted R-squared	0.439	0.443	0.549	0.551

Note: Robust standard errors clustered at the district level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

A key result of Burgess et al. (2015) is that they found no ethnic favoritism in road spending during the period of democracy in Kenya. However, as will be shown, even though the introduction of a multi-party system did reduce the magnitude of ethnic favoritism in *Kalenjin_district* in general, it did not prevent the president from discriminating other districts since road expenditure received by the *Kikuyu_minor_dominant_district* increased around twice as

much compared with other districts as shown in columns (2) and (4) of Table 27. Similarly, Table 28 demonstrates that road expenditure was biased toward *Kikuyu_dominant_district* again when Kibaki became president in 2002.

Table 28 Effect of Change in President's Ethnicity, 1993–2007

Outcome Variable	Ln Road Expenditure			
	(1)	(2)	(3)	(4)
	1993–2007		1993–2011	
Kikuyu District	2.169		1.672	
*Kibaki Regime Dummy	(1.960)		(1.679)	
Kikuyu Dominant District		2.606*		1.515
*Kibaki Regime Dummy		(1.295)		(1.437)
Kikuyu Minor Dominant District		-0.943		0.026
*Kibaki Regime Dummy		(5.202)		(4.046)
Kalenjin Dominant District		-0.648		-1.506
*Kibaki Regime Dummy		(3.027)		(3.242)
Kalenjin Minor Dominant District		-8.519***		-6.889*
*Kibaki Regime Dummy		(2.661)		(3.683)
Linear Time Trend	Y	Y	Y	Y
Year Fixed Effect	Y	Y	Y	Y
District Specific Time Trend	Y	Y	Y	Y
Number of Clusters	41	41	41	41
Observations	615	615	779	779
Adjusted R-squared	0.491	0.499	0.482	0.486

Note: Robust standard errors clustered at the district level are in parentheses *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

5.6 Political Motivations for Disproportionate Allocation of Road Expenditure

Democratization since 1992 reduces the magnitude of ethnic favoritism to some extent and this decrease in ethnic favoritism may not translate simply to

stronger constraints on the executive power of the president (Burgess et al., 2015), but also from altered targets of favored allocation as indicated in Table 27. Thus, how did the election results shape the allocation of resources in the following 5 years? Using the model specified below, I further explore how election results affected road expenditures.

$$Road_Expenditure_{dt} = \gamma_d + \alpha_t + \varphi_1 * election_result_{dt} + \theta(\mathbf{X}_{d1963} * [t-1963]) + \mu_{dt} \quad (13)$$

Election_result here is measured by various indicators—specifically, approval ratings of the current president, the margin of victory, turnout rate, and the proportion of swing voters in the district. The margin of victory is calculated by the percentage of votes obtained by the incumbent in the last election minus the percentage of votes obtained by the leading opposition party in district *d*. One convenient characteristic of ethnic politics is that “voting in Kenya is primarily along ethnic lines” (Morjaria, 2011: 9) since people usually assume that having a coethnic leader will increase the resources they will get (Posner, 2005). Therefore, it is reasonable to consider the coethnics of the president as core voters and coethnics of his opponents as opponents’ voters as Horowitz (1985:332) indicated that “what is uncertain is not how a voter will vote... all that is uncertain is whether a potential voter will vote”. In addition, following Horowitz (2017), swing voters in this study are defined as voters from ethnic groups without a coethnic leader in the election. Using the 1989 population census, the shares of various voters correspond to their district level population shares.

Considering that official election data and media reports in Kenya are not consistent over various sources (Nohlen, Krennerich, and Thibaut, 1999), this

chapter derives constituency level results for the 1992 election from Throup and Hornsby (1998) and aggregates them at the district level.

Table 29 Electoral Motivation of Road Expenditure Allocation, 1993–1997

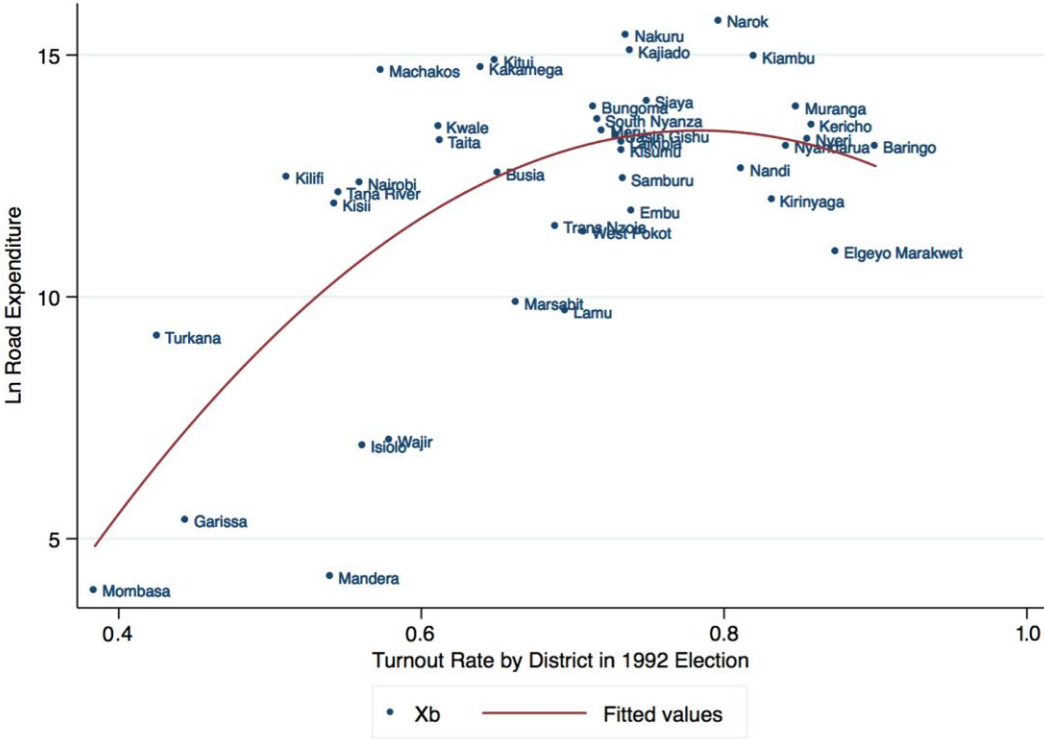
Outcome Variable	(1)	(2)	(3)	(4)	(5)
	Ln Road Expenditure				
Approval Rate	1.910 (3.748)				
Approval Rate ^2	-0.552 (3.282)				
Margin of Victory		0.522 (0.500)			
Margin of Victory ^2		0.052 (0.817)			
Turnout			62.374*** (23.033)		57.334** (23.898)
Turnout^2			-44.072** (16.511)		-44.775*** (16.449)
Swing Voter Share				0.091* (0.050)	0.048 (0.043)
Swing Voter Share^2				-0.001** (0.000)	-0.001 (0.000)
Year Fixed Effect	Y	Y	Y	Y	Y
District Fixed Effect	N	N	N	N	N
Baseline Controls	Y	Y	Y	Y	Y
Observations	205	205	205	205	205
R-squared	0.591	0.589	0.617	0.602	0.631

Note: Robust standard errors clustered at the district level are in parentheses. *, **, and *** demonstrate significance at the 10%, 5%, and 1% levels, respectively.

The election-related results are shown in Table 29, which provides evidence that both the approval rate of the President Moi and the margin of victory fail to predict the allocation of road expenditure but the turnout rate as well as the share of swing voters matter. Column (3) of Table 29 demonstrates that the

association between road expenditure and the turnout rate follows a quadratic pattern, with the peak at around 70% (see Figure 16).

Figure 16 Road Expenditure as a Function of District Turnout Rate



Notes: This figure plots the estimated results of column (3) in Table 31; each dot represents a district.

Kikuyu_minor_dominant_district falls around the peak of the fitted quadratic line; as explained in column (2) of Table 27, this category of districts received the largest share of road expenditure from 1993 to 1997. Notwithstanding the fact that the share of swing voters is no longer significant after controlling for the turnout rate, it did matter for the allocation of road expenditure. Table 30 shows selected descriptive statistics for districts where the turnout rate was around 70 per cent in the 1992 election. A comparison between the average of Panel A and Kalenjin districts reveals that road expenditure is allocated to districts with considerably high approval rates, high turnout rates, and a high

share of swing voters. This provides evidence that a disproportionate allocation of road expenditure may be used as a reward mechanism for mobilizing swing voters. In addition, a comparison of the average of Panel B and Kikuyu district demonstrates that president Moi also targeted districts with a large share of swing voters where the opposition did not have an absolute advantage, which may be mobilized in the future.

5.7 Conclusions

Infrastructure like roads is considered to be one of the most important aspects of basic opportunities since it can help the poor households access to markets, schools, health centers etc.

Empirical findings of this chapter suggest that coethnic districts have benefited from ethnic favoritism in terms of road construction expenditure in post-independence Kenya. However, the magnitude of favoritism is heterogeneous among districts and regime types. In alignment with Burgess et al. (2015), this chapter shows that coethnic districts, especially coethnic dominant districts, were strongly favored when their coethnics were in power during the one-party period, especially for President Moi's tenure. However, this chapter provides further evidence that decreasing ethnic favoritism after the arrival of multi-party elections may result in altered targets. During the 5 years following the 1992 election, President Moi targeted districts with high turnout rates as well as high shares of swing voters, which provides supportive evidence for the swing voter hypothesis.

To summarize, between-region inequality in access to infrastructure is due to ethnic favoritism as well, which is largely driven by the relative political power of different ethnic groups and electoral motivations.

Table 30 Descriptive Statistics on 1992 Election

Province	District	Approval Rate	Turnout Rate	Margin of Victory	Kalenjin Population Share	Swing Voter Share
Panel A						
Rift-valley	Samburu	0.96	0.73	0.92	1.50	95.23
Rift-valley	West Pokot	0.93	0.71	0.89	85.15	10.79
Eastern	Marsabit	0.89	0.66	0.82	0.17	98.70
Rift-valley	Narok	0.81	0.80	0.70	30.41	56.71
Coast	Kwale	0.77	0.61	0.63	0.10	97.69
Coast	Taita	0.67	0.61	0.52	0.16	95.89
Western	Busia	0.65	0.65	0.48	0.50	92.92
Rift-valley	Uasin Gishu	0.66	0.73	0.39	52.63	25.45
Coast	Lamu	0.55	0.70	0.37	0.31	71.30
Rift-valley	Kajiado	0.59	0.74	0.36	0.52	72.59
Eastern	Kitui	0.42	0.65	0.06	0.03	99.53
	District Above	0.72	0.69	0.56	15.59	74.25
	Kalenjin	0.90	0.81	0.83	78.20	12.90
	Kalenjin Dominant	0.95	0.83	0.91	85.73	7.78
Average	Kalenjin Minor Dominant	0.81	0.77	0.66	63.14	23.13

(Continued)

Table 30:(Continued)

Province	District	Approval Rate	Turnout Rate	Margin of Victory	Kalenjin Population Share	Swing Voter Share
Panel B						
Rift-valley	Trans Nzoia	0.34	0.69	-0.10	21.29	66.60
Western	Kakamega	0.41	0.64	-0.11	0.96	95.90
Western	Bungoma	0.23	0.71	-0.24	9.77	87.94
Rift-valley	Nakuru	0.24	0.74	-0.33	14.98	18.11
Eastern	Embu	0.11	0.74	-0.47	0.07	94.17
Rift-valley	Laikipia	0.19	0.73	-0.51	7.25	23.96
Eastern	Meru	0.21	0.72	-0.52	0.05	98.45
Nyanza	South Nyanza	0.09	0.72	-0.80	0.06	23.31
Nyanza	Kisumu	0.04	0.73	-0.89	0.66	9.31
Nyanza	Siaya	0.02	0.75	-0.95	0.08	4.10
	District Above	0.19	0.72	-0.49	5.52	52.19
	Kikuyu	0.08	0.81	-0.68	3.37	9.14
	Kikuyu Dominant	0.02	0.84	-0.78	0.28	4.38
Average	Kikuyu Minor Dominant	0.21	0.73	-0.42	11.12	21.04

Notes: This table includes those districts whose turnout rate was between 60 and 80% in the 1992 election. These districts are divided into two panels: panel A shows districts with a positive margin of victory, whereas panel B shows districts with a negative margin of victory. The average of each panel is calculated separately and then compared with Kalenjin and Kikuyu districts, respectively.

Chapter 6 Summary and Policy Implications

Using selected indicators on education and access to basic public goods and services, this dissertation shows that the overall developmental outcomes as well as inequality measures have been improved in the past several decades in Kenya. The majority of the inequality is increasingly coming from within-region inequality; between-region inequality has barely improved.

Previous studies find that inequality is negatively associated with poverty reduction, economic development as well as the stability of a country. Kenya has experienced quite bloody episodes of ethnic conflict since its independence, and the conflict that raged in the aftermath of the 2007 election in Kenya remains vivid in many people's minds, raising questions that whether it is related to the inequality in Kenya.

Using the Uppsala Conflict Data Program Geo-referenced Dataset, this dissertation identifies the causal effect of drought on intrastate conflict through a panel data analysis. It also explores a drought-conflict nexus conditional on baseline measurement of social-economic factors and social divisions. The empirical results show that the drought-conflict nexus is conditional, with its strength substantially affected by the baseline measurement of access to unimproved water source, the ownership of land and social divisions at the local level. Comparing the baseline measurements of access to improved water source with that in the 2014 KDHS reveals the fact that between-region inequality is barely improved, and regions with higher inequality have experienced more conflict. Between-region inequality may also enhance the drought-conflict nexus since non-state conflict increases in a certain district when its neighboring districts were hit by drought especially in arid area. Thus, policy interventions aimed to reduce the within-region as well as between-region inequalities are urgently needed.

One striking feature of the regions in Kenya is that every region has a dominant ethnic group. The post-independence presidents allocated resources in a way that favored their home regions or their own ethnic groups (Oucho 2002). While it is not clear whether the better developmental outcomes in certain regions are because the president only favors his own ethnic groups who are concentrated in certain regions or because he favors certain regions as a whole.

Thus, given that education sector occupies the single largest expenditure share of the government account since independence, this dissertation then explores whether inequality in educational outcomes can be attributed to ethnic favoritism and whether ethnic favoritism operates at the district level or ethnic dimension. The estimated results in Chapter 4 show that ethnic favoritism operates at the district level, from both supply-side and demand-side mechanism. The supply-side mechanism of ethnic favoritism implies that inequality in educational outcomes may come from inequality in opportunities since coethnic districts are more likely to get educational resources. In addition, ethnic favoritism in the job market affects the demand-side mechanism of education, which implies that inequality in educational outcomes may come from different choice and effort because of inequality in employment opportunities.

Following education, road sector is the second largest expenditure item in government expenditure. Thus, Chapter 5 focuses on road expenditure, finding that coethnic districts of the president get a disproportionate share of expenditures. The advent of the multi-party election failed to prevent the president from discriminating other districts since more road expenditure went to districts with higher shares of turnout rates and swing voters. These results

reflect that there is systematic inequality in the provision of basic opportunities like roads.

Caution is needed when interpreting the results about ethnic favoritism in Chapter 4 and 5, especially the supply-side mechanisms in relation to ethnic favoritism. A disproportionate allocation of resources does not necessarily reflect decision-making of the president. A possible channel connecting the ethnicity of the president and the disproportionate share of resources in his coethnic district could be through the education or public works ministers purposely diverting more resources to coethnic districts of the president to seek the president's favor. This consideration goes beyond the scope of this dissertation and is left for future research to explore.

Based on the evidence displayed above, what kind of policy implications can be generated to further reduce the inequality in Kenya, especially inequality in basic opportunities?

The results in Chapter 3 indicate that between-region inequality in access to improved water may enhance the drought-conflict nexus especially in arid areas; conflict is more likely to break out in areas where more households have no land or are relying on unimproved water source when hit by drought. Thus, the government or the development community can help to improve basic water source through providing rainwater harvesting facilities in arid areas and to provide job opportunities to landless workers through developing labor-intensive industries, which are expected to decrease their motivations and increase their opportunity cost of engaging in conflicts.

Besides, the estimated results in Chapter 4 and 5 disclose that coethnic districts of the president have received more resources and opportunities in terms of education and road construction. Thus, inequality in outcomes in

Kenya is largely coming from inequality in opportunities, which is deeply driven by the relative political power of different ethnic groups.

Then how can we break the links between inequality in outcomes like education and inequality in opportunity? From the supply-side mechanism of education, the development community or the government can provide educational resources in unfavored regions to cut down inequality in opportunity coming from the unequal provision of public goods. From the demand-side mechanism of education, they can implement policies like conditional income transfers to improve the incentive of the households in the non-coethnic district to invest in their children's human capital. Alternatively, the government needs to provide equal job opportunities to different ethnic groups through introducing civil service examinations to increase their expectations of educational returns. Besides, the government or the development community can also help to implement transparency reform in the allocation of public expenditure and in the process of public sector employment to reduce the inequality of opportunities in Kenya.

This dissertation only looks at ethnic favoritism in education and road sectors in Kenya, it is highly likely that a similar phenomenon happens in other sectors as well. It would be interesting to compare the situation of ethnic favoritism in different countries and different sectors under the similar political institution and to explore whether ethnic favoritism happens in other countries as well. If it did happen, in which sector it is most significant and why there are county-level differences in terms of the demonstration of ethnic favoritism.

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Appendix 1 Robustness Checks Using Wild Cluster Bootstrap, Table 7

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Non-State Conflict				Non-State Conflict			
	Full sample	Humid	Semi-Arid	Arid	Full sample	Humid	Semi-Arid	Arid
SPEI3 Drought, Long Rainy	-0.673** (0.015)	-0.483 (0.115)	0.008 (0.900)	-0.575 (0.400)	-0.521** (0.045)	-0.623 (0.270)	0.029 (0.705)	-0.796 (0.325)
SPEI3 Drought, Long Rainy in Neighboring District					-0.322* (0.060)	0.312 (0.545)	-0.060 (0.640)	0.479 (0.120)
Year Fixed Effect	Y	Y	Y	Y	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y	Y	Y	Y	Y
District Linear Time Trend	N	N	N	N	N	N	N	N
R-squared	0.302	0.197	0.113	0.393	0.302	0.198	0.113	0.394
Number of Districts	41	19	13	9	41	19	13	9

Note: This table shows robustness checks of Table 7 using wild cluster bootstrap by Cameron et al. (2008) with 400 replications to calculate standard errors. P-values are shown in parentheses. *, **, and *** respectively denote significance at the 10, 5, and 1 per cent levels.

Appendix 2 Robustness Checks Using Wild Cluster Bootstrap, Table 8

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Non-State Conflict			One-Sided Violence		
	Full Sample	Humid	ASA	Full Sample	Humid	ASA
SPEI6 Drought, Long Rainy	-0.458** (0.035)	-0.361 (0.255)	-0.459 (0.160)			
Share of Unimproved Water Sources*	0.938* (0.055)	0.299 (0.650)	1.375* (0.085)			
SPEI6 Drought Rainy Season						
SPEI3 Drought Long Rainy				-0.219** (0.020)	-0.102 (0.893)	0.020 (0.390)
Share of Landless People*				2.324*** (0.000)	2.626*** (0.000)	-0.047 (0.615)
SPEI3 Drought Long Rainy						
Year Fixed Effect	Y	Y	Y	Y	Y	Y
District Fixed Effect	Y	Y	Y	Y	Y	Y
District Linear Time Trend	N	N	N	N	N	N
Observations	918	513	405	918	513	405
R-squared	0.119	0.192	0.150	0.152	0.214	0.141
Number of Districts	34	19	15	34	19	15

Note: This table shows robustness checks of Table 8 using wild cluster bootstrap by Cameron et al. (2008) with 400 replications to calculate standard errors. P-values are shown in parentheses. *, **, and *** respectively denote significance at the 10, 5, and 1 per cent levels.

Appendix 3 Robustness Checks using Wild Cluster Bootstrap

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Years of Primary Schooling			Primary Completion		
Coethnic	0.194 (0.38)	-0.027 (0.81)	-0.027 (0.73)	0.040*** (0.00)	0.014 (0.37)	0.014 (0.10)
Coethnic District		0.115 (0.30)	0.115 (0.56)		0.039** (0.01)	0.039*** (0.00)
Observations	85,750	43,898	43,898	85,750	43,898	43,898
R-squared	0.326	0.393	0.393	0.152	0.208	0.208

Note: This table shows robustness checks using wild cluster bootstrap by Cameron et al. (2008) with 400 replications to calculate standard errors. P-values are shown in parentheses. Columns (1) and (4) replicate the estimated results of columns (7) and (14) of Table 15; standard errors are clustered at the ethnic group level. Columns (2), (3), (5) and (6) replicate the estimated results of columns (4), (5), (9) and (10) of Table 16; standard errors of columns (2) and (5) are clustered at the district level while in columns (3) and (6), they are clustered at the province level. *, **, and *** respectively denote significance at the 10, 5, and 1 per cent levels.

Appendix 4 Robustness Checks of Table 17

Outcome Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Years of Primary Schooling				Primary Completion			
Threshold (per cent)	30	50	70	90	30	50	70	90
Panel A								
Coethnic District	0.095 (0.177)	0.130 (0.181)	0.127 (0.240)	-0.029 (0.254)	0.049*** (0.004)	0.052*** (0.001)	0.055*** (0.004)	0.074*** (0.020)
Observations	43,898	43,898	43,898	43,898	43,898	43,898	43,898	43,898
R-squared	0.393	0.393	0.393	0.392	0.208	0.208	0.208	0.208
Panel B								
Coethnic District	0.109 (0.163)	0.116 (0.159)	0.166 (0.238)	0.011 (0.266)	0.054*** (0.002)	0.055*** (0.002)	0.063*** (0.004)	0.081** (0.023)
Local Minority	0.395 (0.269)	0.110 (0.306)	0.526 (0.306)	0.865*** (0.171)	0.088* (0.038)	0.061 (0.042)	0.084 (0.053)	0.129** (0.043)
Coethnic District*Local Minority	-0.073 (0.145)	0.095 (0.128)	-0.336*** (0.078)	-0.640** (0.207)	-0.026* (0.013)	-0.018 (0.019)	-0.068*** (0.012)	-0.128 (0.074)
Observations	43,898	43,898	43,898	43,898	43,898	43,898	43,898	43,898
R-squared	0.393	0.393	0.393	0.393	0.208	0.208	0.208	0.208

Note: KDHS 2014 is used for estimation. Standard errors clustered at the province level are shown in parentheses. *, **, and *** denote significance at the 10 per cent level, 5 per cent level, and 1 per cent level, respectively. All the specifications control for ethnicity fixed effect, district fixed effect, year fixed effect, dummies of religion, female as well as childhood in rural areas.

Appendix 5 (a) Summary Statistics, KDHS 1993-2014

Variable Name	Obs.	Mean	Std. Dev.	Min	Max
Survey Year	88,744	2007.363	7.647	1993	2014
Birth Year	88,744	1978.525	12.358	1939	1999
Cohort	88,744	1984.525	12.358	1945	2005
Period	88,744	4.360	1.277	1	6
Province	88,744	4.572	1.893	1	8
Female Dummy	88,744	0.711	0.453	0	1
Catholic Dummy	88,744	0.232	0.422	0	1
Protest Dummy	88,744	0.622	0.485	0	1
Muslim Dummy	88,744	0.113	0.317	0	1
Childhood in Rural	88,744	0.525	0.499	0	1
Primary Completion	88,744	0.579	0.494	0	1
Years of Primary Schooling	88,744	6.108	2.653	0	8
Years of Primary Schooling Initial Condition	88,744	3.763	0.627	3.189	4.856
Primary Completion Initial Condition	88,744	0.316	0.078	0.222	0.466
Kikuyu Dummy	88,744	0.178	0.383	0	1
Kalenjin Dummy	88,744	0.130	0.336	0	1
Ethnicity	88,744	3.933	1.940	1	6
Coethnic	88,744	0.144	0.351	0	1
Kenyatta Regime Dummy	88,744	0.262	0.440	0	1
Moi Regime Dummy	88,744	0.613	0.487	0	1
Kibaki Regime Dummy	88,744	0.125	0.330	0	1

Appendix 5 (b) Summary Statistics, KDHS 2014

Variable Name	Obs.	Mean	Std. Dev.	Min	Max
Survey Year	43,898	2014	0	2014	2014
Birth Year	43,898	1984.726	9.883	1960	1999
Cohort	43,898	1990.726	9.883	1966	2005
Period	35,009	4.707	0.928	3	6
Female Dummy	43,898	0.708	0.455	0	1
Catholic Dummy	43,898	0.204	0.403	0	1
Protest Dummy	43,898	0.639	0.480	0	1
Muslim Dummy	43,898	0.130	0.337	0	1
Childhood in Rural	43,898	0.237	0.425	0	1
Primary Completion	43,898	0.613	0.487	0	1
Years of Primary Schooling	43,898	6.353	2.625	0	8
Years of Primary Schooling Initial Condition	43,898	2.567	1.261	0.184	5.045
Primary Completion Initial Condition	43,898	0.247	0.137	0.016	0.625
Population Share of Dominant Ethnicity	43,898	74.728	21.808	27.910	98.230
Kikuyu District	43,898	0.178	0.382	0	1
Kalenjin District	43,898	0.149	0.356	0	1
Kikuyu Dummy	43,898	0.163	0.369	0	1
Kalenjin Dummy	43,898	0.140	0.347	0	1
Ethnicity	43,898	4.015	1.941	1	6
Coethnic	43,898	0.143	0.350	0	1
Coethnic District	43,898	0.155	0.362	0	1
Coethnic District (share>50)	43,898	0.146	0.353	0	1
Coethnic District (share>70)	43,898	0.115	0.318	0	1
Coethnic District (share>90)	43,898	0.040	0.196	0	1
Local Minority in Coethnic District	43,898	0.078	0.268	0	1
Local Minority in Coethnic District (share>50)	43,898	0.056	0.231	0	1
Local Minority in Coethnic District (share>70)	43,898	0.029	0.168	0	1
Local Minority in Coethnic District (share>90)	43,898	0.006	0.078	0	1
Kenyatta Regime Dummy	43,898	0.109	0.311	0	1
Moi Regime Dummy	43,898	0.650	0.477	0	1
Kibaki Regime Dummy	43,898	0.241	0.428	0	1

Appendix 5 (c) Summary Statistics, 2009 Census

Variable Name	Obs.	Mean	Std. Dev.	Min	Max
Survey Year	3,841,935	2009	0	2009	2009
Birth Year	3,841,935	1986.983	18.303	1914	2009
Age	3,841,935	22.017	18.303	0	95
Female Dummy	3,841,935	0.504	0.500	0	1
Education Attainment	3,841,935	1.639	1.420	0	9
Public Sector Job Dummy	3,841,935	0.019	0.136	0	1
Population Share of Dominant Ethnicity	3,841,935	74.907	22.327	27.910	98.230
Kikuyu District	3,841,935	0.247	0.431	0	1
Kalenjin District	3,841,935	0.118	0.323	0	1
Districtcode	3,841,935	20.543	10.880	1	41
Coethnic District (age>18)	3,841,935	0.184	0.388	0	1
Coethnic District (age>20)	3,841,935	0.191	0.393	0	1
Coethnic District (age>22)	3,841,935	0.197	0.398	0	1
Coethnic District (age>24)	3,841,935	0.205	0.404	0	1
Coethnic District (age>26)	3,841,935	0.210	0.407	0	1
Coethnic District (age>18 & Share>50)	3,841,935	0.136	0.343	0	1
Coethnic District (age>20 & Share>50)	3,841,935	0.138	0.345	0	1
Coethnic District (age>22 & Share>50)	3,841,935	0.141	0.348	0	1
Coethnic District (age>24 & Share>50)	3,841,935	0.144	0.351	0	1
Coethnic District (age>26 & Share>50)	3,841,935	0.146	0.353	0	1
Coethnic District (age>18 & Share>70)	3,841,935	0.094	0.292	0	1
Coethnic District (age>20 & Share>70)	3,841,935	0.096	0.294	0	1
Coethnic District (age>22 & Share>70)	3,841,935	0.097	0.296	0	1
Coethnic District (age>24 & Share>70)	3,841,935	0.099	0.299	0	1
Coethnic District (age>26 & Share>70)	3,841,935	0.100	0.300	0	1
Coethnic District (age>18 & Share>90)	3,841,935	0.047	0.212	0	1
Coethnic District (age>20 & Share>90)	3,841,935	0.049	0.216	0	1
Coethnic District (age>22 & Share>90)	3,841,935	0.050	0.219	0	1
Coethnic District (age>24 & Share>90)	3,841,935	0.053	0.224	0	1
Coethnic District (age>26 & Share>90)	3,841,935	0.054	0.226	0	1