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from the 2007 Elections in Kenya

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When does ethnic diversity lead to violence? Evidence from the 2007 elections in Kenya

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Abstract

Exploiting a district level data set on the 2007/8 post-election violence in Kenya, this paper investigates why polarization between ethnic groups results in violent conflict in some cases, but not in others. After the announcement of highly controversial election results in December 2007, ethnic-based violence erupted in many parts of Kenya. Violence occurred more often and with greater intensity in areas characterized by a high level of polarization between the Kikuyu ethnic group and other ethnic communities. At the same time, in several districts with a very high level of Kikuyu-non-Kikuyu polarization, only few and sporadic incidences of violence occurred. The paper attempts to explain why in areas with similar levels of ethnic polarization, a flawed election process produced so different reactions. Results suggest that the main triggers of ethnic violence were poverty, unemployment among young males, and deteriorating public services. On the other hand, there is little evidence that clashes resulted from land inequality, land pressure or political competition.

Keywords: Conflict, ethnicity, poverty, unemployment, public services, Kenya

JEL-codes: D74, H4, J6, O55

1. Introduction¹

Twenty six years after the publication of Donald Horowitz' seminal book, "Ethnic Groups in Conflict", ethnic violence remains a central issues on the international agenda, as exemplified by recent events in Kyrgyzstan, Darfur, Cote d'Ivoire and elsewhere. Yet at the same time the observation made by Fearon and Laitin (1996), that most ethnic groups, most of the time live in peace with each other, remains valid. This paper exploits a data set in on the incidence and intensity of violence following the 2007/8 elections in Kenya to investigate why tensions between ethnic groups sometimes, but not always, lead to violent conflict.

Following the announcement of highly controversial election results in Kenya on December 30th, 2007, intense fighting broke out in many different parts of the country. The violence followed a clear ethnic pattern, as it mostly pitted members of the Kikuyu tribe against members of different tribes from Western and Coastal Kenya.² The key observation made in this paper is that, while the bulk of violence occurred in areas that were polarized between Kikuyus and non-Kikuyus, other areas with a very similar ethnic composition experienced little or no violence. In other words, similar levels of ethnic polarization led to violence in some areas but not, or to a much lesser extent, in others. The paper exploits a district level data set to investigate why this variation in levels of violence occurred. Results show that ethnic violence was triggered by poverty, unemployment among young males, and decrease in access to essential, public services (in particular, access to piped water). Somewhat surprisingly, we find little evidence that ethnic clashes were triggered by land inequality, land pressure or political competition

Although the conflict in Kenya should not be classified as a "civil war", the paper is nevertheless related to the large literature on cross-country differences in the onset and duration of civil war, summarized in Collier and Hoeffler (2007) and Blattman and Miguel (2010). The effects of ethnic diversity have been studied intensely in this literature. Collier and Hoeffler (1998) and Fearon and Laitin (2003) used the ethnolinguistic fractionalization (ELF) index and found no robust, monotonous relationship between ethnic diversity and the incidence and duration of civil war (Collier and Hoeffler report an inverse-U shaped relationship). On the other hand, Montalvo and Reynal-Querol

¹ We are grateful for very useful comments and other inputs from Anne Christensen, Jørgen Elklit, Markus Goldstein, Jane Kabubo-Mariara, Kawawa Masumba Kilango, Samuel Kipruto and Johan Mistiaen. We thank the Kenya National Bureau of Statistics for generously providing access to household survey data. All remaining errors are our own.

² In East Africa, the word "tribe" is typically used instead of "ethnic group" and is not derogatory.

(2005) argued that conflict is not driven by *fractionalization* (the coexistence of many, relatively small groups) but rather by *polarization* (the coexistence of a few groups of similar size) and found a significant, positive effect of polarization on the probability of a country experiencing civil war. In contrast with these studies, the present paper does not ask whether but *when* ethnic diversity leads to violent conflict. In this regard it resembles Sambanis (2001) who also investigated the specific drivers of ethnic-, as opposed to “revolutionary” or other types of wars.

The paper contributes to the small, but growing group of studies that exploit intra-country variation in civil conflict to conduct quantitative analyses of the determinants of war and civil strife (Deininger 2003, Mancini 2008, Barron, Kaiser and Pradhan 2009, Murshed and Gates 2005, Do and Iyer 2010, Hattalebak 2010). The paper most closely related to ours is the contribution by Dercon and Gutierrez-Romero (2010), who exploit a household level data set to investigate the triggers of the 2007/8 post-election violence in Kenya. They find that households who experienced land disputes before the election, live in places where “gangs connected to politics” are active, or reside in urban areas, are more likely to report being exposed to the post-election violence than others. The present study, conducted at the district level, complements Dercon and Gutierrez-Romero’s paper, both because studies at different levels of aggregation each have distinct advantages, and because the variables included in the analyses are quite different. For example, Dercon and Gutierrez-Romero use a different measure of ethnic diversity than we do and do not include measures of unemployment and public service provision, both key variables in this study. The key question asked here, why did Kikuyu-non-Kikuyu ethnic polarization lead to much more violence in some areas than in others, is not asked by Dercon and Gutierrez-Romero.

The paper is organized as follows: Section 2 presents background information about ethnic and political violence in Kenya and about the 2007 elections, the post-election violence and its aftermath. Section 3 discusses theory and presents hypotheses to be tested. Section 4 describes the data set and section 5 shows descriptive statistics and discusses the estimation strategy. Section 6 presents regression results. The robustness of main results to the influence of outliers, spill-over effects between neighboring districts, choice of regression estimator and other factors are explored. Section 7 concludes.

2. Background

2.1 Ethnicity and political violence in Kenya

Compared with its neighbors to the East, North and West (Somalia, Ethiopia, Sudan and Uganda), Kenya has been an oasis of calm for most of its independent history. However, ethnic and political violence was never completely absent. During colonial times, Kikuyus from central Kenya waged the famous Mau-Mau rebellion against British rule (1952-1959). The rebellion was to a large extent motivated by the desire to regain land confiscated for European settlement. It led to the internment of more than 100,000 Kikuyus and other native Kenyans in camps, the nature of which was compared by Elkins (2005) to the Gulags of Josef Stalin.

From Independence in 1963, Kenyan politics was dominated by the influence of ethnicity. Edward Miguel (2004) has compared the nation-building efforts of Tanzania's Founding Father, Julius Nyerere, with the lack of such efforts by Jomo Kenyatta, the first president of Kenya. For example, Nyerere promoted Swahili as a national language in Tanzania, while vernacular languages have retained a much stronger role in Kenya. Also, school curricula have been employed to emphasize national identity to a much larger extent in Tanzania than in Kenya.

At the same time, Kenya is so ethnically fragmented that inter-ethnic coalition building is always a necessary component of a strategy to secure a stable power base. The most numerous ethnic group, the Kikuyus, comprise only about 17 percent of the population. Other important groups include the Luo and the Kisii, mainly inhabiting Nyanza province on the brinks of Lake Victoria (see Figure 1); the Luhya, who are most numerous in Western province; the Kalenjin, Maasai, Turkana and Samburu, who regard different parts of Rift Valley province as their "ancestral homelands"; The Meru and Embu who share important characteristics with the Kikuyu and inhabit the central parts of Eastern province; the Kamba who dominate the Southern parts of Eastern province; and the Mijikenda who are numerous in coastal areas (See Ng'ang'a 2006 for detailed descriptions of each group).

The three presidents of independent Kenya, Jomo Kenyatta, Daniel Arap Moi and Mwai Kibaki, have based their power on shifting, ethnic alliances. Up to 1991, Kenya was de-facto a one-party state, ruled by the Kenya African National Union (KANU). The most important instances of political violence during this period were the assassinations of leading opposition figures such as Pio Gama Pinto, Tom Mboya, Robert Ouko and J.M. Kariuki. In 1969, an significant episode of ethno-political fighting occurred when Kenyatta supporters clashed with supporters of Luo leader Jaramogi Oginga Odinga in Kisumu, a town in Western Kenya, resulting in 11 fatalities and many injuries. In 1991, under heavy pressure from external donors, President Moi grudgingly agreed to introduce multi-

party democracy. This, in combination with Moi's fragile power base, consisting primarily of the Kalenjin and other Rift Valley communities, arguably led to the rise of ethno-political violence in the 1990s. In the run-ups to the 1992 and 1997 elections, groups loyal to President Moi, especially in the Rift Valley, systematically used violence to prevent likely opposition voters from casting their ballots (Kimenyi and Ndung'u 2005). In practical terms, the likelihood of voting for the opposition was to a large extent determined by ethnicity and consequently the victims of violence were mostly Kikuyus and members of other groups who have migrated to the Rift Valley in the decades prior to and after Independence.

In 2002, Mwai Kibaki, a Kikuyu, formed a coalition spanning a broad range of groups, including Kikuyus, Luos, Luhyas and others, organized in the National Rainbow Coalition (NARC) party. Moi was not running. Instead, Uhuru Kenyatta, another Kikuyu and son of Jomo Kenyatta, was at the top of the KANU ticket. Kibaki campaigned on a platform of anti-corruption and reform and won in a landslide.

2.2 The 2007 elections

After the 2002 election, the multi-ethnic coalition behind Kibaki and the NARC movement disintegrated. Kibaki was perceived by some to be reverting to the bad old ways of Kenyan politics by relying heavily on his powerbase of Kikuyu, Meru and Embu support (see e.g. Mueller 2008, Wrong 2009).³ A new political force emerged, namely the Orange Democratic Movement (ODM), headed by Raila Odinga, a Luo and son of Jaramogi Oginga Odinga. The ODM gathered prominent leaders from the Luhya, Kalenjin, Maasai and other communities. In response, Kibaki formed a new party, the Party of National Unity (PNU). In the run-up to the 2007 elections, both ODM and PNU subtly appealed to ethnic identity and ethnic prejudice. Opinion polls taken before elections reveal strong correlations between ethnicity and voting intentions (Kimenyi and Gutierrez-Romero 2008).

However, in comparison with the episodes in 1992 and 1997, there was relatively little political violence before the 2007 elections. Voting proceeded in a largely peaceful manner on December 27th. Election results were released gradually. The first results showed a strong lead for Odinga in the race for president. As more results arrived however, the lead narrowed, and when the final results were announced on December 30th they showed a narrow win for the incumbent, Mwai Kibaki. Hours after the announcement of this highly controversial outcome, Kibaki was sworn in as President in a ceremony witnessed only by a few political backers and not broadcast on television. In

³ In particular, Kibaki reneged on a "Memorandum of Understanding" he had signed with coalition partners. The memorandum was widely perceived as implying that Luo Leader Raila Odinga was to be nominated for a newly established post of Prime Minister.

a press conference on January 1st, 2008, chairman of the Election Committee, Samuel Kivuitu, acknowledged that irregularities had occurred and, stunningly, admitted that he did not know for sure who had actually won the election.

2.3 The post election violence

Immediately after the announcement of the Presidential election results, violence erupted almost simultaneously in a number of different locations. In Nairobi, Mombasa, Kisumu and other urban centers, angry mobs took to the streets. The police reacted to these activities with fierce use of force and killed a large number of persons, especially in Kisumu town. In the multi-ethnic slums of Nairobi, ethnic-based fighting erupted and more than a 100 persons were killed. In rural areas and towns of the Rift Valley and other provinces, militias were organized to attack the settlements of ethnic groups perceived as rivals. Most violence was of a “low-tech” nature, conducted mostly with machetes (known in East Africa as “pangas”), clubs, bows and arrows. Only the police made significant use of firearms.

Between 300,000 and 600,000 persons were displaced as a result of the post-election violence. More than 1,100 persons were killed. By the definition applied by some studies (more than 1,000 battle deaths per year) this arguably places the conflict in the “civil war” category. However, the conflict fails to meet several of the more stringent, and more reasonable, criteria for civil wars established by Sambanis (2004). For example, Sambanis requires that “the parties are politically and militarily organized, and they have publicly stated political objectives” (p. 829). This was not the case in Kenya. Therefore, we do not refer to the post-election violence as a civil war. Nevertheless, comparisons between the results presented here and those from studies of the incidence and severity of civil wars remain highly relevant.

2.4 Settlement and aftermath

Throughout the conflict, the international community focused intensely on the violence in Kenya. A United Nations peace mission headed by former UN secretary general, Kofi Annan, backed by the influential community of aid donors, agitated for putting a halt to the violence and attempted to promote negotiations between government- and opposition leaders. In early March 2008, these efforts finally bore fruit, as the parties reached an agreement to form a coalition government. Kibaki retained the Presidency but a new post of Prime Minister was invented and this office was taken by Odinga. The number of ministers and vice-ministers was expanded significantly and seats shared between candidates from both sides. After this, the violence abated.

The settlement also called for inquiries into, respectively, election irregularities and post-election violence (see below), and for land- and constitutional reform. The call for constitutional reform has now been answered. In a 2010 referendum, Kenyans adopted a new constitution, which, among other things, is intended to strengthen local government and impose constraints on the hitherto extremely powerful presidency. Time will tell whether these measures are sufficient to prevent future recurrence of large-scale ethnic and political violence.

The sections below describe various aspects of the post-election violence in more detail. For more extensive accounts of the violence and its background, see for example Waki (2008) and the 2008 special issue of the *Journal of Eastern African Studies* (e.g. the articles therein by Cheeseman, and by Mueller).

3. Potential determinants of post-election violence

3.1 Greed and grievance

One powerful, conceptual framework for understanding the determinants of violent, civil conflict was advanced by Collier and Hoeffler (1998, 2004). They argue that violent conflicts may either result from “grievances”, for example related to economic inequality, discrimination, or political exclusion, or from the “greed” of opportunistic, political entrepreneurs, who organize violence if this provides the shortest way to power and wealth. In cross-country analyses of the onset and duration of civil wars, Collier and Hoeffler find that factors most obviously related to greed are more robustly correlated with the incidence of civil war than factors most obviously related to grievance. They conclude that the opportunity to finance and conduct a successful rebellion is the most important factor determining whether or not a country experiences civil war. Similar conclusions are reached by Fearon and Laitin (2003).

We exploit the greed-or-grievance conceptual framework, but apply a somewhat different perspective than Collier and Hoeffler. In particular, Collier and Hoeffler regard ethnic fractionalization as a factor “most obviously related to grievances”, and consider it as a potential determinant of civil wars, alongside other potential factors. In the Kenyan case, we conclude that ethnic polarization between certain groups was obviously a key factor determining the severity of the 2007-8 conflict. The task we set ourselves is to determine why the effect of ethnic polarization was much more devastating in some areas than in others. The paper searches for the factors facilitating the outbreak of ethnic conflict. These factors are grouped according to the greed/grievance dichotomy.

3.2 Grievances

Two major, potential sources of group grievance in Kenya are a) land issues, and b) struggles over access to state expenditure. As a predominantly agricultural economy with a rapidly expanding population, the pressure on agricultural land resources in Kenya is severe. Furthermore, the history of land relations since colonial times has given rise to strong inter-ethnic tensions related to land, especially in the Rift Valley. In pre-colonial times, the Rift Valley was primarily populated by Maasai, Kalenjin and other, smaller communities. During British rule, large areas were expropriated for European settlement. They were included in the so-called “White Highlands”, which covered large parts of what is now Rift Valley and Central provinces. Around the time of Independence, the bulk of the White Highlands shifted back into Kenyan hands. However, many buyers of land and beneficiaries of government operated settlement schemes, such as the Million Acre Scheme, were from communities not indigenous to the Rift Valley. A large number of these outsiders were Kikuyus. First, through their closer association with the British colonialists, the Kikuyu were more comfortable with modern, capitalist modes of economic activity, such as commercial land transactions, than the people of the Rift Valley were. Second, the Kikuyu wielded dominant political and economic power at the center in Nairobi. As touched upon in section 2, the Kikuyu community had suffered bitterly as a result of the crack-down on the Mau-Mau rebellion during colonial the era. This generated a feeling of entitlement to compensation in the minds of some Kikuyus, such as the former Mau-Mau fighters. Third, many Kikuyus had worked in the Rift Valley as staff on the European farms. Around the time of Independence, some farms were simply given, or sold cheaply, from the European farmer to his most trusted African employee. Hence, Kikuyus and other immigrants in the Rift Valley generally believe that their families have obtained land through legitimate means. Among the communities that consider themselves natives of the area, on the other hand, an important view has been that the settlers were trading in “stolen goods”, since the British had originally paid no compensation for occupying the White Highlands. Stolen goods, of course, should be returned to their rightful owners (see e.g. Leo 1984, Kanyinga 2009).

Grievances related to land are proxied in this study by two variables. First, a measure of land inequality is introduced (see below for data sources). The gini coefficient of agricultural land holdings among households in rural areas is used. A drawback of this measure is that no information is included about “horizontal inequalities”, that is, the correlation between land holdings and ethnic background (Stewart 2002). Presumably, land inequality is a more potent source of conflict if, for example, the largest farms are owned disproportionately by ethnic “outsiders”. Such data is not

available since individual level data on ethnicity is not included in the survey that collected data on land. Second, a measure of rural population density is used.

Important grievances are also related to the distribution of public expenditure. Citizens depend on the government for the provision of a number of essential, public goods, such as water, sanitation, electricity, roads, schools, clinics and hospitals. The limited financial resources of the government mean that coverage for all these goods is far from universal. Qualitative as well as quantitative evidence suggests that the distribution of government spending is determined to a large extent by ethno-political factors (e.g. Burgess et al. 2009). We assume that frustration is more likely to result from absolute or relative *decline* in access to public goods than from low *levels* of service provision. Absolute levels of service standards represent the cumulated effect of public investment decisions over many years. On the other hand, the change in access to services experienced over recent years is directly linked to the policies of current and recent governments. Even if a group has lower access to public goods than other groups, it is unlikely to react aggressively to this state of affairs if it is currently experiencing rapid increase in access. Conversely, a decline in access to electricity, water or other goods is likely to engender disappointment and frustration, even if local levels of access remain relatively high, compared with other areas. Hence, one potential source of grievance is the relative decline of public goods provision. Our measure of grievances related to the distribution of public expenditure is the increase (positive or negative) in the share of households with access to piped water into their dwelling between 1997 and 2005. Piped water is an essential good, the provision of which depends crucially on the public provision of infrastructure. Also, measures of access to water services are more readily comparable between the household surveys available than measures of access to, say, electricity, schooling, roads or clinics.

3.3 Greed

Ethnic polarization may explode into violence because of grievances over land or public resources, especially when the allocation of land and public goods is perceived to take place according to unfair, ethnic criteria. However, ethnic tensions may also be a tool in the hands of opportunistic, political entrepreneurs. Polarization may only have turned violent because local political leaders, or leaders of criminal gangs, saw the post-election period as an opportunity to reach certain targets by means of violence. The Waki Commission collected evidence suggesting that politicians, including members of parliament as well as ministers, played a part in organizing and arming militias. There is even evidence that some perpetrators of violence were paid a piece rate fee for each hut they burned down (Waki 2008, p. 87). Also, it is well established that the Mungiki criminal network played a very active part in organizing violence in Nakuru, Naivasha town and elsewhere. Other criminal

gangs also played a role, at least in the slums of Nairobi. Of course, politicians and even gangsters may simply have responded to demand from local populations, and this demand may be rooted in the grievances discussed above. Alternatively, however, political and criminal leaders may have had more self-centered motives. A politician may wish to engage in ethnic cleansing in order to drive out groups traditionally backing political opponents. He or she may also wish to drive certain groups off the land, in order to make way for occupation by supporters. Land may be used as a patronage good. Criminal leaders may have taken the opportunity to increase their areas of control, for example within slums. They may also have been able to exploit episodes of violence to recruit new members. An important factor determining the political- or criminal leader's desire to organize a campaign of violence is the availability and cost of "labor" resources to be deployed in the campaign. Based on this line of reasoning, we use a measure of unemployment among young males (the most likely militia members) as a proxy for "greed". Second, since the bulk of potential, greedy entrepreneurs who may have organized violence are politicians, we use a measure of political competition, measured as the absolute difference in votes for Kibaki and for Odinga in the presidential election, relative to the total number of votes for both candidates in the district. The idea is that the incentive for electorally motivated ethnic cleansing is higher in areas where elections are close.

In addition to the above mentioned factors, which we have tentatively grouped as "greed"- and "grievance" factors, we also include a measure of poverty. Studies of the determinants of civil conflict typically find that per capita income is correlated with conflict. Poverty may be a source of grievances. On the other hand, poverty also improves the recruitment possibilities for political entrepreneurs, and may reduce the local state's ability to respond to violence, because poverty is typically associated with a low potential for taxation.

4. Data

4.1 *Fatalities related to post-election violence*

The intensity of ethno-political violence is measured in this paper by the per capita number of fatalities related to the post election violence in each district. We exploit the data collected by the Commission of Inquiry into Post Election Violence (CIPEV), better known as the Waki Commission, named after its chairman, Justice Philip N. Waki. The Waki Commission was established as part of the international-brokered agreement that ended the stand-off between government and opposition in March 2008. It was charged with investigating the extent and causes of the post-election violence. The commission collected evidence on post-election violence from hospitals,

doctors, the Ministry of Medical services and the police. It traveled around the country and interviewed hundreds of witness. The commission concludes that 1,133 deaths resulted from the post-election violence. Confidence in this estimate is strengthened by two facts. First, the Commission is perceived to have worked independently of government interference. Although its chairman is Kenyan, the two other members were foreigners (a New Zealander and a Congolese). The work and report of the commission was followed intensely by local media as well international observers. Some of the recommendations made by the Commission were highly inconvenient for some members of government. In particular, the Commission advocated that a tribunal was established in order to prosecute those bearing main responsibility for the violence. It included with its final report a sealed list of a number of individuals against whom it had collected evidence of such activities. If the tribunal was not established by a set date, this list would be forwarded to the International Criminal Court in the Hague. In fact, the tribunal was never established and the list has indeed been sent to the ICC, which is preparing cases against, among others, William Ruto, a Kalenjin leader and former Minister, and Uhuru Kenyatta. Second, an independent inquiry based on detailed tracking of media reports finds a number of fatalities of roughly the same magnitude, namely 1,128 (Dercon and Gutierrez-Romero 2010).

Since districts vary considerably in terms of population size, the number of fatalities related to post election violence is normalized by district population. Population data is taken from the 2008 Statistical Abstract of Kenya (Kenya National Bureau of Statistics 2008). Estimated numbers for the year 2007 are used.

4.2 Ethnicity data

Due to the highly sensitive nature of issues related to ethnicity in Kenya, data on ethnic composition are generally not published. The most recently available, pre-2008 data on ethnic composition at the district level is from 1989 Census. This is the data used here. As a result of migration and differential population growth rates, ethnic composition is likely to have undergone some change between 1989 and 2007. However, since ethnic mix is generally quite stable over time, it is reasonable to view the 1989 data as a good approximation of the status in 2007. An additional source of error is generated

by the fact that some districts were split up between 1989 and 2007. It is assumed that new districts inherited the same characteristics as the district they were originally a part of.⁴

4.3 Data from household surveys

Several important district characteristics are measured with use of data from the 2005 Kenya Integrated Household Budget Survey (KIHBS). This survey was conducted by the National Bureau of Statistics in collaboration with the World Bank and other external donors. A total of 13,158 households (housing 66,725 individuals) were interviewed. This gives an average of 191 households (967 individuals) per district. This data is used to compute district-level estimates of a number of variables.

First, the KIHBS data provides estimates of poverty. The consumption measure and poverty lines calculated by the World Bank and reported in the 2008 Kenya Poverty and Inequality Assessment Report (World Bank 2008) are used. Poverty lines were defined according to standard criteria, based on nutritional- and a limited set of non-food requirements.

Secondly, the KIHBS data is exploited to generate measures of unemployment among young males as well as among the general workforce. The workforce is defined as all individual between 15 and 64 who are not recorded in the survey as retired, home makers, full time students, incapacitated or too sick to work. Among these the unemployed are defined as those “seeking work”, as well as those reported to be “doing nothing”. This is somewhat broader than the definition of unemployment typically used in developed countries, since in this context typically only those who seek work, but cannot find it, are defined as unemployed. In a context of widespread poverty and absence of unemployment benefits it is unlikely that healthy, working age individuals voluntarily remain without a source of income. When individuals are reported to be “doing nothing” rather than “seeking work” it is more likely to result from very low prospects of actually finding a job than from a lack of desire to work. Male youth unemployment is defined as unemployment among males in the workforce aged 15 to 30.

Thirdly, the survey data is used to create a measure of land inequality. In particular, the Gini coefficient of agricultural land holdings among rural households in each district is calculated. A

⁴ The 2009 Census also collected data on ethnicity. However, since an important motivation behind the 2007/8 post-election violence was ethnic cleansing, measures of ethnic mix based on 2009 data is clearly endogenous in a model explaining the post-election violence.

weakness of this measure is the failure to take the quality of agricultural land into account. Land fertility varies widely across Kenya. However, most of this variation is arguably between- rather than within districts, which reduces the importance of this source of error.

Finally, a variable measuring the share of the population with access to piped water in their dwelling (“private” piped water) is calculated from both the 2005 KIHBS and from a previous survey, the 1997 Welfare Measurement Survey, which is also a national coverage survey, collected by the National Bureau of Statistics. Based on these two data sets, the percentage change in access to private, piped water between 1997 and 2005 is calculated.

4.4 Election data

Data on the results of the 2007 elections were downloaded from the web site of the Electoral Commission of Kenya, ECK (the ECK has since been dissolved and its website shut down. The data is available on request from the authors). We aggregate data from the electoral constituency level to the district level and create a measure of political competition by calculating the absolute difference between vote shares for President Mwai Kibaki and opposition leader Raila Odinga. Clearly, these data are not entirely reliable. Indeed, as described above, a main trigger of the violence was the perception that they are not. The Kriegler Commission, which investigated the process of the 2007 elections, concluded that irregularities were observed in several constituencies. Most cheating seems to have taken place in the “heartlands” of each of the main contenders, Kibaki and Odinga. Hence, the elections probably tend to underestimate the true extent of political competition, especially in areas where one of the candidates dominated. Neither the Kriegler Commission nor other bodies have attempted to produce a “corrected” list of election results.

5. Descriptive statistics and estimation strategy

Figure 2 shows that the violence was concentrated in the South Western part of Kenya, and in Nairobi and Mombasa. When trying to understand the causes of post-election violence, it is interesting to compare districts experiencing violence with those that did not. However, we believe that the most relevant type of comparison is between the violence-struck districts and other districts in the same part of the country. Indeed, the areas in the far North and East of Kenya differ from the areas in the South-West along a large number of dimensions, including ecology, ethnicity, religion

and livelihood strategies. Also, the presence of the state in several of these districts is very limited. Therefore, although violence frequently occurs in these areas, for example in the form of cattle raids (Mkutu 2006), the incentives for fighting over election results are quite limited. Therefore, our preferred estimation sample includes only the districts where killings occurred, and the districts bordering these. Furthermore, since some of the hypotheses tested in the analysis relate to the effects of land pressure and land inequality, it is natural to focus on mostly rural districts. Therefore, the predominantly urban districts of Nairobi, Mombasa and Kisumu are excluded in most analyses. In robustness tests, all districts with available data are included.

The determinants of post election violence are investigated in this paper with the use of regression analysis. One standard assumption behind regression analysis is the independence of individual observations. This assumption does not strictly hold in the present context. Spill-over effects between districts played a role. We nevertheless continue. First, the assumption of independent observations almost never holds completely in macro- or meso-level datasets. For example, the cross-country data sets used to investigate the causes of civil war are in many cases characterized by spill-over effects from conflict in one country to conflict in another.

Second, the fatalities in the post election data set are for all we know *not* dependent in the strong sense of having been centrally planned and coordinated. There has been much debate about whether the violence was “spontaneous” or “planned”. A great deal of evidence, for example in the Waki report, indicates that politicians and elders did in many cases play a very active role in organizing militias. However, no evidence indicates that leaders organized violence outside their “own” areas. Hence, violence was generally organized by different groups in different districts. Also, violence erupted in most districts very quickly after the announcement of presidential election results on December 30th. Only a few killings had taken place before this date. Hence, violence did not in general spread gradually from one district to another. It erupted almost simultaneously in several different locations. While the districts affected by post-election violence are contiguous, with the exception of Mombasa, see Figure 2, the intensity of conflict varied widely within this area. This variation is not readily explained by geographical proximity. The three districts with the highest number of killings (Nairobi, Nakuru, Uasin Gishu) do not border each other. Third, the main potential effect of spill over between districts is autocorrelation in the regression residuals. In linear regressions, autocorrelation affects statistical inference, but not point estimates. Our preferred strategy for dealing with spill over effects is to introduce province fixed effects (province dummies). Most spill over seems to have occurred within provinces (for example, the killings in Nakuru and Naivasha towns were to an important extent reactions to killings elsewhere in the Rift Valley). Fixed

effects capture the province-wide rise in violence, which occurred as a result of spill over. Furthermore, in one robustness test we also allow errors to be correlated across districts neighboring each other, using the so-called “spatial error model”. A “spatial lag model” is also estimated. In this model, violence in district i is assumed to depend on average levels of violence in neighboring districts (Anselin 1988).

One factor which exacerbated the negative consequences of the violence, but facilitates statistical analysis, is the fact that the intensity and extent of the post-election violence caught most Kenyans completely by surprise. As described above, there is a history of ethno-political violence in Kenya, especially in the Rift Valley. However, on previous occasions most violence had occurred before rather than after elections. Also, the intensity of violence experienced in 2007/8 was unprecedented. If, on the other hand, the violence had been widely anticipated, then this would give rise to endogeneity problems in the statistical analysis. For example, anticipated conflict may lead to lower investment and therefore to higher poverty and unemployment. In this sense, there might be a reverse, causal link from conflict to poverty and unemployment. Since the conflict was unanticipated by most people, these problems are in fact likely to be of minor importance.

5.1 Ethnic polarization

As mentioned above, many quantitative studies of ethnicity and violent conflict have used the *ethno-linguistic fractionalization* index (ELF) as the key measure of ethnic diversity (e.g. Colier and Hoeffler 1998, Fearon and Laitin 2003). Reynal-Querol (2002) devised the “RQ” index to capture polarization, as opposed to fractionalization.⁵ Measures such as these are highly useful for studying, for example, the overall picture of civil conflicts across countries or across long stretches of time. However, when the purpose is to study a specific episode of conflict, such as the 2007/8 post election violence in Kenya, then these measures ignore important information by treating all divisions between groups as equally important. In fact, in most specific conflicts, some fault lines are much more salient than others. In the present case, the context led to a strong emphasis on the distinction between the Kikuyu group on the one hand, and most other ethnic groups on the other.

⁵ The ELF index is defined as $1 - \sum_i s_i^2$, where s_i is the share of ethnic group i the total population. The RQ

index is defined as $1 - \sum_i \left(\frac{1/2 - s_i}{1/2} \right)^2 s_i$. The RQ index was the measure of polarization used in Montalvo and Reynal-Querol 2005.

As described above, the Kikuyu are the most numerous ethnic group in Kenya and by most measures also the most economically successful. Kikuyus have migrated out of their “ancestral” area to a higher extent than most other groups and have mostly been economically successful where they have settled. Two of the three Presidents in independent Kenya have been Kikuyus. Finally, the 2007 Presidential election was perceived by many to have been stolen by the incumbent, Kikuyu president, Mwai Kibaki. On this background, most of the post election violence was a result of fighting between Kikuyus and other groups. In many places, Kikuyus were attacked by members of other groups, mostly from Western Kenya. In other cases, for example in Nakuru, Naivasha and Kiambu, Kikuyus mounted attacks on members of these groups. To be sure, this is not the full picture. Non-Kikuyu settlers in the Rift Valley, for example from the Kisii and Luhya communities, were in a number of cases victims of attacks by Kalenjin militias. On the Coast, Kambas and other upland communities were targeted along with Kikuyus. Still, the tension between Kikuyus and non-Kikuyus was much more important than other antagonistic relations. For this reason, the measure of ethnic polarization applied in this study is an indicator taking the value one if the share of Kikuyus in the district population is larger than five and lower than 95 percent, and zero otherwise. Hence, the variable indicates that the district has a Kikuyu population of non-trivial size, coexisting with a non-Kikuyu population of non-trivial size. Conceptually, the measure is more closely related to Reynal-Querol’s polarization index than to the ELF, although in practice the correlation with the ELF index is .50, while the correlation with the RQ index is only .46.

Figure 3 shows that the intensity of violence was indeed magnitudes higher in areas with Kikuyu population shares between 5 and 95 percent than in areas with very few Kikuyus and in the Kikuyu heartland districts in Central Province, where Kikuyus comprise more than 95 percent of the population.

Now, the key observation made in this paper is that although violence was on average much more intense in areas with Kikuyu-non-Kikuyu polarization, there were a number of areas where Kikuyus co-existed with other groups and fatalities did *not* occur. The Kikuyu share is between 5 and 95 in a total of 17 districts in Kenya. In nine of these districts, no fatalities were reported as a result of post-election violence. Five of these nine districts border districts where killings did occur (Baringo, Laikipia, Kajiado, Trans Mara and Thika). In all of these, Kikuyus lived side by side with sizeable groups of Kalenjin, Luo or Luhya, all communities which heavily favored the ODM in the elections and with which much fighting occurred in other districts. Among the districts where killings did take place, there is huge variation in the intensity of violence, even among districts with Kikuyu shares between 5 and 95. Therefore, as discussed in the introduction, the key question we ask is:

why did polarization between Kikuyus and non-Kikuyus explode into violence in some districts and not, or to a much smaller extent, in others?

Table 1 presents summary statistics on the variables used in regression analyses below. Table A1 in the appendix presents the entire data set used. The tables reveal very significant variation on all the variables used. A main concern is the influence of outliers, particularly on the dependent variables. Killings per capita were significantly higher in the districts of Uasin Gishu and, to a smaller extent, Nakuru than in other districts. We address the issue of influential observations in the discussion of regression results below.

Table 2 presents the matrix of bivariate correlations between the main variables used. The variable Kikuyu595 takes the value one if the share of Kikuyus in the population is more than five- and less than 95 percent. The first column shows that the per capita number of killings during the post-election violence was significantly correlated with Kikuyu-non-Kikuyu polarization, male youth unemployment and land inequality. Correlations with the remaining variables are far from significant. In particular, the correlation between poverty and intensity of violence is insignificant, and the point estimate is negative. This contrasts with findings from cross-country studies of civil wars, which typically find a strong correlation between income per capita and the intensity of conflict (e.g. Collier and Hoeffler 1998, 2004, Fearon and Laitin 2003, Miguel, Satyanath and Sergenti 2004). Do and Iyer's study of the Maoist insurgency in Nepal also finds that poorer districts were more exposed to violent conflict than others (Do and Iyer 2010). The reason behind the result is partly to be found in the significant, negative correlation between poverty and Kikuyu-non-Kikuyu polarization ($r=-.356$, $p=.01$). Kikuyus have tended to migrate into areas with good economic opportunities and therefore polarization is systematically higher in more affluent areas. The results presented below reveal that *among* districts with Kikuyu-non-Kikuyu polarization, poorer districts did indeed experience more violence.

6. Regression results

Table 3 presents multiple regressions explaining the number of killings committed per 100,000 population. Explanatory variables include the measures included in Table 2. Since the main purpose of the analyses is to investigate why ethnic polarization had a stronger effect on violence in some districts than in others, a key element in the empirical strategy is to introduce interactions between polarization and the potential drivers of ethnic violence. Interactions between Kikuyu595 and the

other explanatory variables are therefore included. In addition, province dummies are introduced. The simultaneous inclusion of several interactions between Kikuyu595 and other variables gives rise to concerns about multicollinearity. Therefore, the maximum Variance Inflation Factor (VIF) is presented for each regression.⁶ As a rule of thumb, VIFs above 10 are often taken as indications of excessive multicollinearity (Neter et. al. 1989).

In the first regression, the maximum VIF is 8.4, not far below the rule-of-thumb threshold of 10. At the same time, many variables are insignificant. In subsequent regressions, therefore, insignificant variables are gradually removed from the model. The explanatory power of the model remains high in all regressions, with an R-squared of .86 in the last regression (adjusted R-squared = .81). The VIF gradually drops and reaches the value of 3.9 in the last regression.

In all regressions in the table, three of the interactions with Kikuyu595 are significant at the 1 percent level, namely those with poverty, male youth unemployment and change in access to private, piped water. None of the other three interaction terms (with population density, land inequality and political competition) are significant. The main effect of Kikuyu595 is significant in three models, while none of the other main effects are significant. These results indicate that ethnic violence is triggered by poverty, unemployment among young men, and decline in access to essential services provided by the state. On the other hand, the hypotheses that land inequality, population pressure and political competition were important conditioning factors behind the post-election violence are not supported.

Table 4 tests the robustness of the estimated effects of poverty, youth unemployment and change in access to piped water. All regressions in this table are essentially permutations of regression 4 in Table 3. First, as indicated above, the dependent variable, killings per capita, is quite skewed. Therefore, the potential effect of outliers on estimated coefficients is an important concern. Table A1 reveals that the intensity of violence in the district of Uasin Gishu (27 killings pr 100,000 inhabitants) was almost twice as high as in the district with the second-highest intensity of violence (Nakuru, with 16 killings per 100,000 inhabitants). To check whether results are driven by Uasin Gishu, this district is removed in the first regression in Table 4. In the second regression, Nakuru district, where the highest total number of killings occurred, is also removed. In the third regression, the urban districts of Nairobi, Mombasa and Kisumu are included in the estimation sample. This is

⁶ The VIF for variable x_i is defined as $1 / (1 - R_i^2)$, where R_i^2 is the R-squared from a regression of x_i on the other explanatory variables.

arguably meaningful, since the variables intended to measure grievances related to agricultural land, population density and land inequality, are not included in this model. To check whether results are an artifact of the choice to reduce the estimation sample to only districts with post-election violence and the districts neighboring these, the fourth regression includes all district in Kenya with available data.

Since the dependent variable, killings per capita, is truncated at zero, a tobit model may be viewed as more appropriate than Ordinary Least Squares (OLS). Because OLS is more robust than tobit to alternative assumptions about the distribution of regression errors, our preferred estimator is OLS. However, regression 5 in table 4 presents results from applying a tobit estimator.

As mentioned above, it seems likely that violence in some cases spilled over from one district to neighboring areas. Regressions 6 and 7 take account of this possibility by presenting results from, respectively, a spatial error- and a spatial lag model (Anselin 1988). In the spatial error model, errors are allowed to be correlated across districts neighboring each other. In the spatial lag model, the level of violence in district i is assumed to depend on the average level of violence in neighboring districts.⁷ These models are estimated by maximum likelihood.

The Waki report distinguishes between killings by gunshot and other killings, and assumes that killings were done by the police if and only if they happened by gunshot. The killings committed by the police were arguably not directly motivated by a strategy of ethnic cleansing. Rather, much police violence resulted from the brutal and clumsy attempt of the police force to control the reactions of frustrated opposition supporters to the announcement of election results. In contrast, most of the killings by non-police perpetrators in rural areas and in the slums of Nairobi were the results of deliberate attempts at ethnic cleansing. From this perspective, the killings committed by civilians were ethnically motivated in a stronger sense than the killings committed by the police. As we are searching for the determinants of ethnic violence, it might therefore make sense to focus only on killings committed by civilians. This is done in regression 7, where the dependent variable is the per capital number of killings *committed by civilians* (i.e. by non-police perpetrators).

⁷ In the weights matrix applied in these analyses, all districts neighboring district i have the weight $1/n_i$, where n_i is the number of districts neighboring district i . All other weights are zero. Hence, as is conventional, the weights for each observation sum to 1.

Finally, regressions 2 and 3 dealt with the potential problems of high outliers by excluding extreme observations. An alternative method for reducing the influence of outliers is to use a binary indicator of violence as the dependent variable. This strategy is implemented in regression 8, where the regressand is a dummy variable taking the value 1 if a district experienced at least 10 killings as a result of post-election violence and zero otherwise.

In all these regressions, the three interactions between Kikuyu595 and, respectively, poverty, male youth unemployment and change in access to private, piped water remain statistically significant, in most cases at the one percent level. Therefore, the estimated effects of these variables appear not to be artifacts of sample selection, influential outliers, spatial effects or choice of estimator. The explanatory power of the models is in most cases somewhat lower than in Table 3, but remains quite high (R-sq = .59 or above).

6.1 Areas with Kikuyu-non-Kikuyu polarization

In the analyses presented above, hypotheses about triggers of ethnic violence were tested by means of interactions terms between the measure of ethnic polarization (Kikuyu595) and other variables. An alternative and perhaps more simple method is to restrict the sample to districts with Kikuyu-non-Kikuyu polarization and ask what accounts for variation in levels of violence among these districts. This is the approach taken in Table 5, which is based only on districts with Kikuyu shares between five and 95. The first regression in this table includes the same six, explanatory variables as the ones interacted with Kikuyu595 in the first regression in Table 3, namely poverty, male youth unemployment, change in access to piped water, rural population density, land inequality and political competition. Tables 3 and 4 include province dummies. In the sample with only Kikuyu-non-Kikuyu polarized districts, however, only Rift Valley province contributes with more than two districts. For this reason, and to save on scarce degrees of freedom, only an indicator for being in the Rift Valley is included. Again, only districts with post-election violence and the districts bordering these are included. In most analyses, Nairobi and Mombasa are excluded (Kisumu is not included in the sample because it has less than five percent Kikuyus).

As in Table 3, insignificant variables are gradually removed in regressions 2, 3 and 4. The result is that, as in Tables 3 and 4, poverty, male youth unemployment and change in access to private, piped water emerge as the most important determinants of violence. The robustness of this finding is tested in regressions 5 to 7. In regression 5, Uasin Gishu district is removed. In regression 6,

Nakuru district as well as Uasin Gishu are excluded. In regression 7, Nairobi and Mombasa are included. The removal of the high-violence districts of Nakuru and Uasin Gishu does not affect the qualitative findings, although t-statics and explanatory power are somewhat reduced. The inclusion of Nairobi and Mombasa leads to a drop in the coefficient on poverty, which is now insignificant. Nairobi and Mombasa had higher than expected levels of violence, given their relatively low levels of poverty. A closer look at the variation in violence within these cities, however, does provide support for the view that poverty drives violence. In both Nairobi and Mombasa, violence was much more intense in poor slum areas than in more prosperous neighborhoods (Waki 2008, chap. 5). The explanatory power of the model is high, with adjusted R-squared values ranging from .67 in regression 7 to .90 in regression 3.

The last regression explores the effects of unemployment in more detail. We have assumed that unemployment among young men is a particularly potent driver of violence because unemployed young males are an excellent recruitment base for “greedy” entrepreneurs of violence. However, unemployment is also a potential source of frustration, or “grievances”. If violence is driven by the grievances of the general population, overall unemployment should be equally important as unemployment specifically among young men. On the other hand, if violence is driven by the ease of organizing a violent campaign, unemployment among young men would be particularly important. Regression 8 includes overall unemployment and male youth unemployment simultaneously. The two variables are highly correlated ($r = .89$) and so their effects are difficult to distinguish. Nevertheless, the results are interesting. The effect of overall unemployment is completely insignificant and the point estimate is negative. Male youth unemployment, on the other hand, retains a high, positive coefficient, which is almost significant ($t = 1.77, p=.135$). Given the small sample size and the high correlation between the two unemployment variables, the fact that male youth unemployment (and also poverty) fall just short of being significant in regression 8 is not surprising. What deserves attention is the fact that male youth unemployment completely dominates overall unemployment. This supports the view that unemployment among young men is a particularly potent source of violence. It also gives some support to the view that the ethnic violence was driven by the “greed” of political entrepreneurs rather than the grievances of the general public.

7. Conclusion

As is the case with many conflicts in Africa and elsewhere, the 2007/8 post-election violence was widely perceived as the result of long-standing ethnic antagonisms (e.g. New York Times 2007). The results presented here show that this view is highly simplistic. The outbreak of post-election violence was triggered by the *combined* effect of ethnic polarization, a flawed election process and economic forces such as poverty, male youth unemployment and lack of access to public services.

Following the influential conceptual framework outlined by Collier and Hoeffler, these economic factors were tentatively viewed as proxies for “grievances” (access to piped water), “greed” (male youth unemployment), or both (poverty). Therefore, the results indicate that grievances of the general public and the greed of powerful individuals both contributed to generating violent conflict in Kenya.

In contrast with some qualitative accounts of the post-election violence, we find little evidence that land inequality, land pressure or political competition were decisive factors behind the outbreak of conflict. Future research should investigate whether the insignificant effects of land inequality is driven by the failure to measure “horizontal inequalities”, that is, inequalities in land ownership between different ethnic groups (Stewart 2002).

The findings have interesting policy implications. The fact that the drivers of ethnic conflict appear to be economic in nature suggest that perhaps the most effective means to avoiding ethnic conflict is not to address the issue of ethnicity directly, for example through nation-building policies or decentralization to local governments of ethnically homogeneous areas (the latter option has been hotly debated on Kenya under the heading of “majimbo”, or federalism). A focus on standard aspects of economic development, such as poverty, unemployment and public services, might be more effective.

Africa’s disappointing growth performance is sometimes explained as a result of ethnic fragmentation (Easterly and Levine 1997). This explanation may well be descriptively valid, but the results presented indicate that it is not valid as an excuse for the leaders of a country with poor economic performance: A benevolent government does not face a trade-off between pursuing ethnic peace and economic development – strategies that bring about development also facilitate peace.

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Table 1 Descriptive statistics

	Mean	Std. Dev.
PEV killings	24.1	54.7
PEV killings committed by civilians	15.5	46.2
Population ('000)	614	462
Kikuyu (percent)	18.0	32.2
Poor (percent)	46.6	13.8
Male youth unemployment (percent)	16.0	12.1
Rural population density (rural pop./sq.km)	314	242
Political competition*	0.63	0.32
Gini, land ownership	0.55	0.09
Share with access to private, piped water,	14.5	15.7
Change in share with access to private, piped	3.1	12.8

N = 47. * Political competition is defined as $|\text{votes for Kibaki} - \text{votes for Odinga}| / (\text{votes for Kibaki} + \text{votes for Odinga})$.

Table 2 Correlation matrix

	Killings committed by civilians per 100,000 inhabitants	Killings committed by civilians per 100,000 inhabitants	Kikuyu595	Poverty rate	Male youth unemploy- ment	Population density	Political competition	Gini, land
Killings committed by civilians per 100,000 inhabitants	0.917 (0.000)							
Kikuyu595	0.383 (0.008)	0.444 (0.002)						
Poverty rate	-0.078 (0.604)	-0.088 (0.558)	-0.356 (0.014)					
Male youth unemployment	0.265 (0.072)	0.277 (0.060)	0.248 (0.093)	-0.089 (0.552)				
Rural population density	0.025 (0.870)	-0.171 (0.261)	-0.347 (0.020)	-0.080 (0.604)	0.095 (0.533)			
Political competition	-0.122 (0.414)	-0.145 (0.332)	-0.275 (0.061)	-0.187 (0.207)	-0.318 (0.030)	-0.301 (0.040)		
Gini, land	0.298 (0.047)	0.244 (0.106)	0.383 (0.009)	-0.335 (0.025)	0.195 (0.200)	-0.083 (0.589)	-0.075 (0.624)	
Change in share with private, piped water	0.034 (0.818)	0.009 (0.951)	0.103 (0.493)	-0.239 (0.106)	-0.132 (0.378)	-0.007 (0.963)	0.195 (0.190)	0.234 (0.122)

N = 47, except for pairs including the land ownership gini rural population density, where Nairobi and Mombasa districts are excluded. Only districts with PEV killings, and the districts bordering these districts, are included. p-values in parentheses.

Table 3 Determinants of post-election violence

	<i>Dependent variable: Killings per 100,000 inhabitants</i>			
Kikuyu595	3.375 (1.48)	4.120* (2.01)	4.165*** (3.12)	4.244*** (3.29)
Kikuyu595*poverty rate	33.176*** (3.73)	29.947*** (3.85)	32.050*** (4.65)	31.187*** (4.68)
Kikuyu595*male youth unemployment	67.986*** (6.65)	67.150*** (6.96)	67.788*** (7.74)	68.776*** (7.85)
Kikuyu595*change in share with private piped water	-50.015*** (5.43)	-51.072*** (5.76)	-51.254*** (6.68)	-50.713*** (6.58)
Kikuyu595*political competition	-2.751 (0.52)	-5.432 (1.33)	-4.107 (1.12)	
Kikuyu595*rural population density	-0.003 (0.45)	-0.002 (0.26)		
Kikuyu595*land gini	12.597 (0.77)			
Poverty rate	-4.116 (0.66)	-4.274 (0.70)	-6.494 (1.23)	-7.922 (1.68)
Male youth unemployment	4.668 (0.91)	4.617 (1.00)	4.548 (1.00)	4.573 (1.01)
Change in share with access to private, piped water	4.977 (1.00)	4.802 (1.01)	4.54 (1.01)	2.434 (0.57)
Political competition	0.522 (0.23)	0.507 (0.24)	-0.672 (0.39)	
Rural population density	0.002 (0.91)	0.002 (0.97)		
Gini of agricultural land	-0.148 (0.02)			
Province dummies	Yes	Yes	Yes	Yes
Observations	44	44	44	44
R-squared	0.88	0.87	0.87	0.86
Maximum VIF	8.4	7.9	5.7	3.9

OLS regressions. Absolute value of t statistics in brackets. Only districts with PEV killings, and the districts bordering these districts, are included. Nairobi, Mombasa and Kisumu are excluded. The variables interacted with Kikuyu595 are entered as deviations from means.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4 Robustness tests

	<i>Dependent variable:</i>									
	Killings per 100,000 inhabitants							Killings committed by civilians per 100,000 inhabitants		More than 10 killings = 1
	OLS	OLS	OLS	OLS	Tobit	Spatial regression	Spatial regression	OLS	OLS	
Kikuyu595	4.077*** (3.07)	3.411** (2.74)	2.488 (1.28)	2.722* (1.93)	3.306 (1.63)	4.221*** (4.11)	4.052*** (3.76)	3.193** (2.72)	0.242 (1.17)	
Kikuyu595*poverty rate	29.865*** (4.24)	25.949*** (3.91)	23.398** (2.32)	17.301** (2.06)	30.761*** (2.78)	30.669*** (6.12)	30.854*** (5.60)	21.624*** (3.56)	2.243** (2.11)	
Kikuyu595*male youth unempl.	63.707*** (5.37)	49.370*** (4.04)	44.664*** (3.84)	35.709*** (3.70)	79.349*** (5.62)	69.620*** (9.71)	68.307*** (9.44)	60.631*** (7.60)	2.497* (1.79)	
Kikuyu595*change in share with private piped water	-47.721*** (5.26)	-44.431*** (5.28)	-44.152*** (3.73)	-28.151*** (3.17)	-65.037*** (5.37)	-46.079*** (7.11)	-51.654*** (8.06)	-33.685*** (4.80)	-3.530*** (2.87)	
Poverty rate	-7.632 (1.59)	-6.343 (1.43)	-1.172 (0.17)	-4.257 (0.93)	-8.267 (1.13)	-10.289*** (2.73)	-7.543* (1.93)	-6.028 (1.40)	-1.716** (2.27)	
Male youth unemployment	4.592 (1.00)	4.678 (1.11)	12.065* (1.79)	7.445 (1.43)	9.052 (1.40)	4.13 (1.23)	5.67 (1.46)	0.554 (0.13)	0.054 (0.07)	
Change in share with private, piped water	2.706 (0.62)	3.911 (0.98)	4.604 (0.69)	1.223 (0.33)	3.733 (0.64)	2.704 (0.79)	3.32 (0.92)	-2.079 (0.53)	0.418 (0.61)	
Lambda						-0.585** (2.19)				
Gamma							0.149 (1.15)			
Province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Robustness check	Uasin Gishu excluded	Uasin Gishu and Nakuru excluded	Nairobi, Mombasa and Kisumu included	All districts included	Tobit model	Spatial error model	Spatial lag model	Dependent variable is killings committed by civilians only	Dependent variable is dummy for more than 10 killings	
Observations	43	42	47	64	44	44	44	44	44	
R-squared	0.73	0.67	0.67	0.59				0.82	0.50	

Absolute value of t statistics in brackets. Only districts with PEV killings, and the districts bordering these districts, are included, except in regression 4, where all districts with available data are included. Nairobi, Mombasa and Kisumu are also excluded, except in regression 3 and 4. The variables interacted with Kikuyu595 are entered as deviations from means.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5 Determinants of post-election violence - only districts with kikuyu-non-kikuyu polarization

	<i>Dependent variable: Killings per 100,000 inhabitants</i>							
Poverty rate	17.088 (1.31)	15.019 (1.58)	17.785* (2.53)	20.103** (2.64)	19.785* (2.32)	18.171* (2.35)	11.151 (0.88)	18.383 (1.26)
Male youth unemployment	66.501** (4.96)	65.857*** (5.68)	66.094*** (6.20)	74.466*** (7.32)	72.510*** (4.44)	59.311** (3.46)	56.977*** (3.61)	80.799 (1.77)
Overall unemployment								-14.257 (0.14)
Change in share with access to private, piped water	-41.173** (3.64)	-41.646** (4.24)	-41.598*** (4.60)	-48.414*** (5.55)	-47.165** (3.86)	-42.792** (3.76)	-33.353** (2.41)	-46.115* (2.46)
Rural population per sq. km.	0.016 (1.16)	0.017 (1.49)	0.015 (1.54)					
Political competition	4.169 (0.51)	3.065 (0.49)						
Gini of agricultural land	6.314 (0.28)							
Rift Valley	16.92 (1.87)	17.411* (2.23)	14.631** (3.00)	8.221** (2.91)	8.075* (2.51)	6.565* (2.15)	9.931** (2.41)	8.873 (1.61)
Constant	-33.719 (1.71)	-28.904** (3.29)	-25.705*** (4.78)	-19.626*** (4.85)	-19.161** (3.64)	-15.933** (3.07)	-15.081** (2.31)	-19.215** (3.64)
Sample modification					Uasin Gishu excluded	Uasin Gishu and Nakuru excluded	Nairobi and Mombasa included	
Observations	11	11	11	11	10	9	13	11
Adjusted R-squared	0.85	0.88	0.90	0.88	0.72	0.67	0.57	0.85

Absolute value of t statistics in brackets. Only districts with PEV killings, and the districts bordering these districts, are included. Nairobi and Mombasa are excluded, except in regression 7.

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 1 Provinces and districts of Kenya

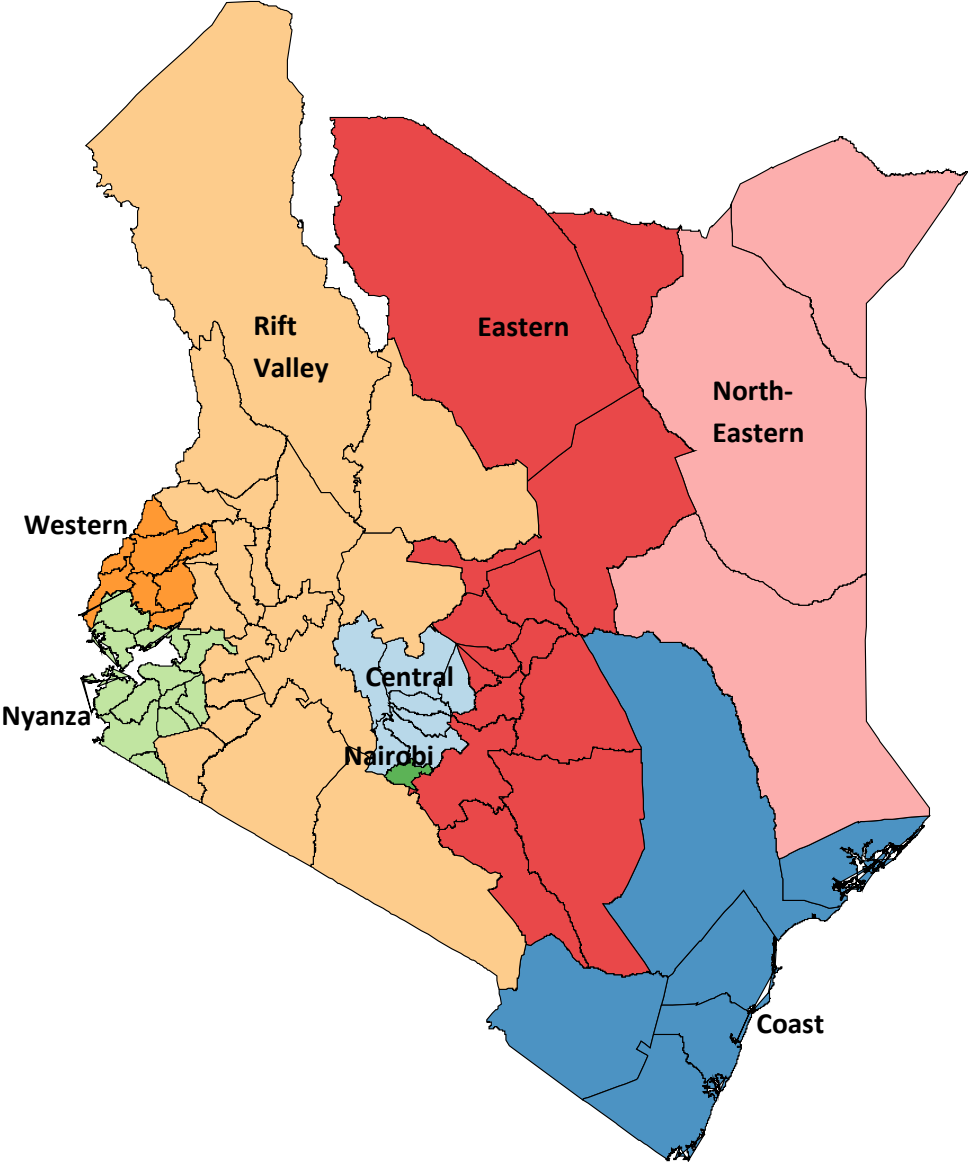


Figure 2 Geographical distribution of post-election violence

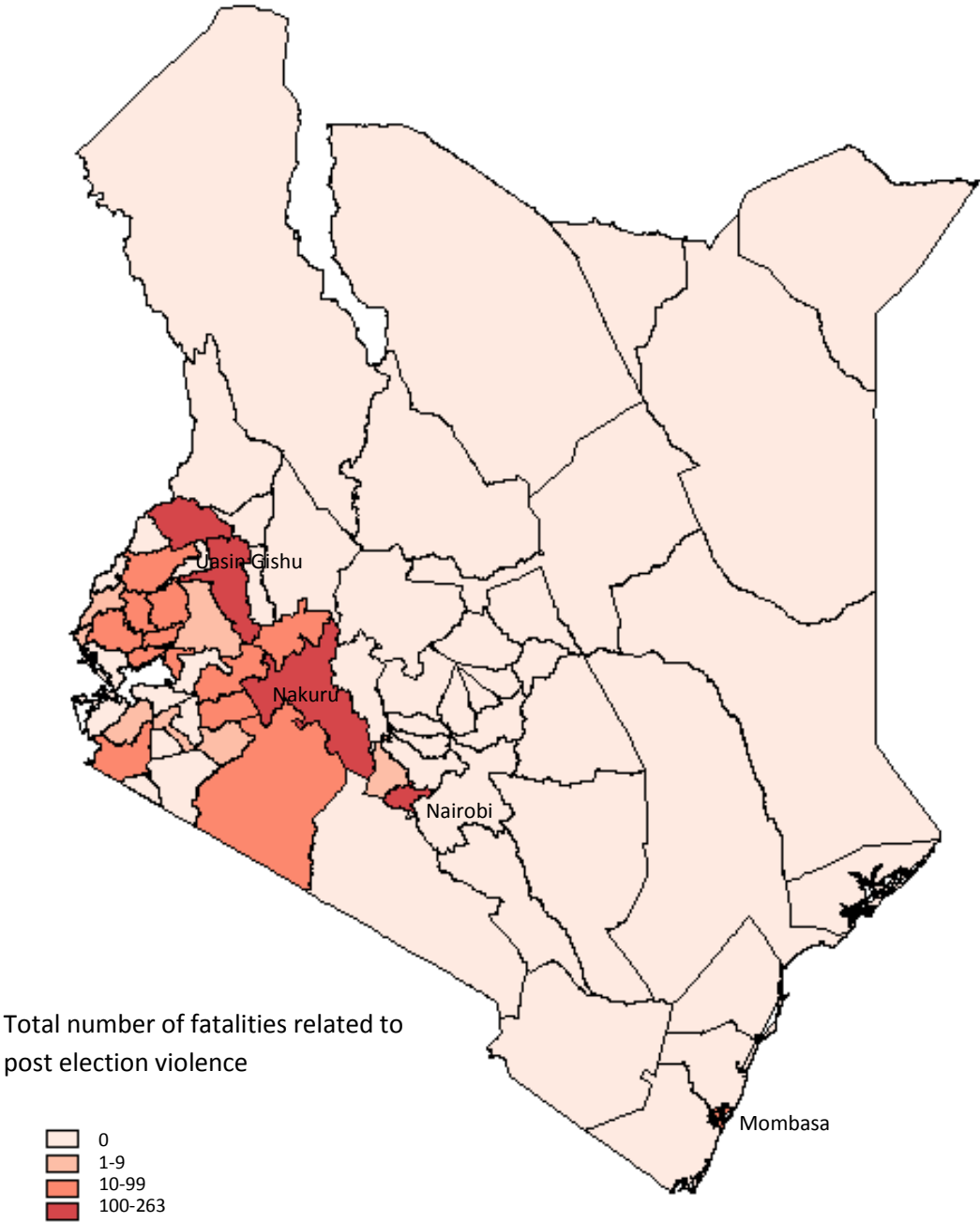
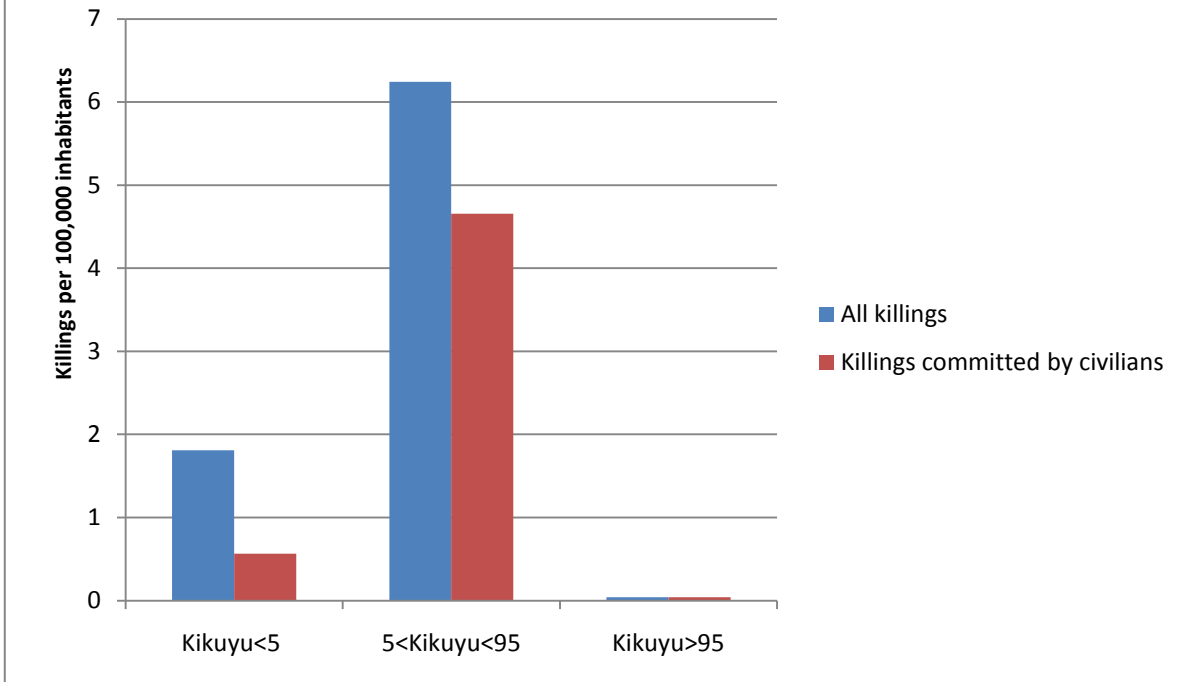


Figure 3 Kikuyu population shares and post-election violence



N = 47. The term “committed by civilians” indicates that killings were not committed by the police.

Table A1 Data

District	Killings		Population, '000	Share Kikuyu	Poverty rate	Male youth unemploy- ment	Rural	Political competition	Agricultural land gini	Change in share with private, piped water (percent)
	PEV related killings	committed by civilians					population density (rural pop./sq.km.)			
Nakuru	263	234	1,602.2	59.7	41.8	28.2	156	31.6	0.64	10.6
Uasin Gishu	230	202	836.8	16.9	44.6	35.3	179	56.1	0.63	-6.8
Nairobi	125	102	3,034.4	32.4	22.2	27.0	.	4.1	.	17.1
Trans Nzoia	104	27	771.0	9.6	50.0	16.2	290	8.7	0.75	-7.9
Kisumu	81	17	620.6	0.8	43.8	14.7	204	96.2	0.47	1.5
Kericho	65	28	630.0	3.6	42.3	10.2	271	77.3	0.66	39.1
Kakamega	31	5	792.4	0.8	53.6	39.8	519	41.3	0.55	-8.9
Bungoma	28	14	1,149.0	1.1	50.9	8.5	501	32.4	0.46	-8.8
Mombasa	27	23	871.7	6.3	37.5	38.8	.	41.8	.	-3.2
Migori	26	2	636.9	0.1	41.7	20.0	286	96.5	0.55	0.5
Bureti	24	12	423.1	3.6	33.0	2.1	436	91.3	0.74	39.1
Koibatek	23	16	188.1	7.2	56.9	20.1	66	63.3	0.49	8.2
Narok	19	18	488.9	11.3	26.3	3.8	32	47.7	0.69	-18.1
Vihiga	18	3	655.9	0.8	41.6	17.6	1,102	60.8	0.66	1.4
Butere Mumias	12	1	625.1	0.8	52.0	26.3	605	68.9	0.72	-8.9
Siaya	10	1	593.4	0.1	40.2	6.2	375	99.2	0.40	4.7
Bomet	9	7	517.1	3.6	58.2	3.3	272	92.8	0.48	-16.0
Kisii	9	5	609.7	0.1	52.8	25.9	897	2.5	0.46	-7.7
Busia	9	1	484.2	0.7	69.5	14.0	403	55.9	0.55	1.0
Nandi	7	6	780.4	1.7	47.3	2.4	257	78.7	0.61	3.8
Homa Bay	7	1	359.3	0.1	42.9	36.4	270	99.8	0.52	3.8
Kiambu	4	1	911.3	88.0	21.4	20.6	655	94.0	0.62	5.8
Nyandarua	1	1	587.8	95.7	49.8	3.9	159	98.8	0.45	-9.6
Suba	1	1	190.5	0.1	51.0	17.3	169	99.2	0.59	0.5
Baringo	0	0	357.3	7.2	59.4	1.2	39	73.5	0.62	8.2
Bondo	0	0	294.0	0.1	25.6	8.8	280	98.2	0.46	4.7
Gucha	0	0	571.6	0.1	67.1	8.9	849	7.2	0.40	-7.7
Kajiado	0	0	545.3	23.8	12.1	25.5	21	12.2	0.77	21.1
Keiyo	0	0	197.5	3.0	45.1	3.7	134	89.4	0.54	39.1
Kilifi	0	0	710.2	0.7	65.7	21.5	127	42.7	0.47	10.4
Kuria	0	0	201.4	0.1	57.6	3.2	312	9.6	0.41	0.5
Kwale	0	0	645.7	1.1	72.9	32.4	68	23.4	0.57	-0.3
Laikipia	0	0	432.5	67.8	48.1	24.3	39	71.1	0.51	25.2
Lugari	0	0	281.7	0.8	48.0	48.3	396	26.3	0.61	-8.9
Machakos	0	0	1,137.2	1.2	57.0	28.1	167	53.9	0.49	-2.6
Maragwa	0	0	473.9	95.9	31.0	14.2	524	98.6	0.52	-1.6
Marakwet	0	0	189.0	3.0	66.1	6.9	118	81.7	0.53	10.5
Mt .Elgon	0	0	176.1	1.1	58.9	8.4	179	54.9	0.48	-8.8
Muranga	0	0	428.3	95.9	27.9	13.7	446	98.3	0.54	-1.6
Nyamira	0	0	615.2	0.1	46.3	4.6	656	14.5	0.50	-6.1
Nyando	0	0	370.2	0.8	47.5	9.8	281	99.0	0.56	1.5
Nyeri	0	0	806.5	96.6	32.4	3.5	212	98.4	0.44	7.3
Rachuonyo	0	0	381.1	0.1	40.0	7.5	392	99.6	0.61	0.5
Teso	0	0	237.7	0.7	58.7	9.9	385	78.9	0.46	1.0
Thika	0	0	788.3	88.0	33.4	25.4	296	89.3	0.56	5.8
Trans Mara	0	0	225.7	11.3	50.3	4.2	77	45.1	0.50	1.7
West Pokot	0	0	413.7	2.7	68.7	0.0	44	75.6	0.62	4.9

Only districts with PEV killings, and the districts bordering these districts, are included.