The Value of Democracy: Evidence from Road Building in Kenya

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July 2013‖

Abstract

Ethnic favoritism is often seen as antithetical to economic development. This paper provides credible quantification of the extent of ethnic favoritism using data on road building in Kenyan districts across the 1963-2011 period. It then examines whether the transition in and out of democracy under the same president constrains or exacerbates ethnic favoritism. We construct a model where political leaders favor coethnics in order to secure their support and maximize rent extraction, under the constraints imposed by different political regimes. Across the 1963 to 2011 period, we find strong evidence of ethnic favoritism: districts that share the ethnicity of the president receive twice as much expenditure on roads and have four times the length of paved roads built. This favoritism disappears during periods of democracy. Democratic change in Kenya mirrors the pattern seen across Sub-Saharan Africa. Our results suggest that democracy has value in imposing constraints on the executive and may be a factor in understanding the recent resurgence of economic growth in Africa.

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‖We would like to thank Gani Aldashev, Tim Besley, Oriana Bandiera, Konrad Burchardi, Denis Cogneau, Ruben Durante, Eliana La Ferrara, Greg Fisher, Paul Gertler, James Habyarimana, Asim Khwaja, Michael Kremer, Guy Michaels, Torsten Persson, Jean-Philippe Platteau, Daniel Posner, Jim Robinson, Gerard Roland, Jim Snyder, Ekaterina Zhuravskaya, and seminar audiences at U.C. Berkeley, CEPR Development Economics Symposium, Harvard, LSE, NEUDC, MIT, Namur University, PSE, Warwick and World Bank ABCDE for very helpful comments. This research was funded by the ESRC-DFID Poverty Alleviation Fund, the DFID funded Institutions for Pro-Poor Growth (iiG) Research Consortium, and the International Growth Centre. The views expressed here are those of the authors alone and do not necessarily reflect those of DFID or the World Bank.
1 Introduction

Ethnic favoritism refers to a situation where co-ethnics benefit from patronage and public policy decisions and thus receive a disproportionate share of public resources when members of their ethnic group control the government. It has been argued by historians, political scientists, and economists that this phenomenon has hampered the economic performance of many countries, particularly in Africa (Bates 1983; Mamdani, 1996; Easterly and Levine 1997; Herbst, 2000; Alesina et al 2003; Alesina and La Ferrara 2005; Posner, 2005; Miguel and Gugerty 2005; Nunn and Wantchekon 2011; Michalopoulus and Papaioannou 2011; Franck and Ranier, 2012; Alesina et al 2012). In fact, the widespread belief among citizens that ethnic favoritism is prevalent can “poison” local political culture and make the phenomenon self-sustaining (see Esman 1994; Fearon 1999, La Porta et al 1999; Wamwere 2003; Chandra 2004; Padró i Miquel 2007; Caselli and Coleman 2013). According to these accounts, ethnic favoritism ultimately emerges because weak political institutions do not constrain the capacity of governments to discriminate among citizens. Therefore, to understand recent political and economic performance of many African countries, it is crucially important to determine to what extent ethnic favoritism is prevalent, and whether the emergence (or in many cases, re-emergence) of democracy has helped mitigate it.

In this paper we make two contributions. First, we quantify the extent of ethnic favoritism in public resource allocation in a representative African country for the post-independence period. Second, we examine whether the transition into and out of multi-party democracy affects the extent of ethnic favoritism.

These issues have been difficult to address so far due to a number of factors. To begin with, it is challenging to determine which ethnic group is getting what share of public expenditure. This problem is particularly acute in Africa where government

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1Easterly and Levine (1997), for example, present econometric evidence evidence that ethnic diversity is negatively associated with economic growth. Mamdani (1996) argues that nation creation by colonists in Africa left tribal allegiances largely intact which, in turn, made countries difficult to govern in the post-colonial world. Herbst (2000) points to improper design of national borders leading to ethnic strife and the inability of African countries to develop the necessary fiscal capacity to support economic development.

2Esman (1994) observes that "when an ethnic group gains control of the state, important economic assets are soon transferred to the members of that community".

3Horowitz’s (1985) voluminous scholarly work highlights that ethnicity is a powerful force in the politics of divided societies in the third world and observes that these have profound effects on the prospects for democracy, economic development and the distribution of public goods.
statistical agencies have been underfunded for decades, where data on the allocation of
government spending is typically patchy at best and where, even when the data does
exist, there is a reluctance to release disaggregated data that could allow the populace
to uncover evidence of ethnic favoritism. Moreover, estimation of ethnic bias require
observing what happens with public expenditure when there are switches of the ethnic
group in power. Again in many African countries this is difficult given the long tenures of
post-independence leaders and the fact that particular ethnic groups have tended to be
dominant for extended periods. Finally, to estimate the impact of institutional changes
such as democratization on ethnic favoritism one would ideally observe switches between
democracy and autocracy under the same leader, which is again far from common.

To address these difficulties we pick an appropriate context: road building across
Kenyan districts. This setting is attractive for a number of reasons. First, there is
dramatic ethnic segregation across districts in Kenya, which is the result of consultation
with local authorities (via boundary commissions and other mechanisms) in the run
up to Kenya’s independence in 1963. Each resulting district was dominated by a single
ethnic group, and this pattern remains stable over time. Therefore we can directly assess,
using road spending or road construction by district, whether or not ethnic groups which
shared the ethnicity of the president were disproportionately benefited.

Second, road expenditure can be directly measured. We have carried out extensive
historical archival work to recover road expenditure data at the project level. This has
enabled us to construct district level panel data on road expenditure for all 41 Kenyan
districts across the entire 1963 to 2011 period. In addition, we have exploited the need of
citizens to know where roads are located to construct a panel of road presence in each of
the 41 Kenyan districts using historical maps. We can therefore cross-check the district
road expenditure data (from the road projects) with the district road construction data
(from the maps). Having this level of detailed data on two independent measures of the
same public good is extremely rare in low-income countries, particularly in sub-Saharan
Africa.\footnote{Morjaria (2012) is the only other paper we are aware of that has access to two independent measures
of the same outcome - government bureaucratic data on forest land allocations and historical independent
satellite imagery of forest coverage.}

Third, roads are the largest single element of public expenditure in Kenya, constit-
tuting about 15% of total expenditure over our sample period. This is three times what
the Kenyan government spends on health, education or water. Roads expenditure is centrally allocated and a highly visible form of public investment and therefore a prime area for political patronage. Therefore, road building represents an ideal setting in which to carry out an analysis of ethnic favoritism.\footnote{There is also a growing literature that shows that expansions in transportation infrastructure, by facilitating trade, may have large impacts on economic performance \citep[see][]{Michaels2008,Donaldson2012,Faber2012}. The pattern of road investment may thus be linked to the pattern of economic growth within a country.}

Fourth, the post-independence history of Kenya provides us both with switches in the ethnicity of the president and switches into and out of multi-party democracy under the same president. During our study period, we observe (i) a transition into autocracy from democracy under the first President of Kenya (Jomo Kenyatta, a Kikuyu), (ii) a transition from a Kikuyu President to a Kalenjin President (Daniel arap Moi) under an autocratic regime (iii) a transition out of autocracy into democracy under the second President, and (iv) a democratic succession of a Kalenjin President to a Kikuyu President (Mwai Kibaki). This layered history of precisely dated ethnic and regime transitions allows us to identify the effect of political transitions on ethnic favoritism holding the identity of the leader constant.

Our somewhat unique set-up therefore allows us to assess whether there is indeed ethnic favoritism in roads investment, to quantify the magnitude of this effects, and to estimate the extent to which favoritism is affected by democratization. To help us interpret our results we set up a model of presidential public resource allocation across districts. The model shows how the degree of ethnic favoritism is determined by the constraints on executive action that characterize different political regimes. Our empirical results can therefore be directly linked to the magnitude of ethnic favoritism and to the constraints on the executive as captured in the model, providing novel quantitative and theoretically grounded evidence on the extent of these phenomena.

What we find is striking. Across the 1963 to 2011 period, we find that on average Kenyan districts that share the ethnicity of the president receive twice as much expenditure on roads than predicted by their population share, and have four times the length of paved roads built. This is unequivocal evidence of an extreme degree of ethnic favoritism, much greater than what is observed in rich countries.\footnote{For instance,\cite{Bickers2000} find a 26\% increase in obligations to Republican districts between the 103rd (Democrat) and 104th (Republican) Congress.} However, these biases are not constant. While in periods of autocracy, co-ethnic districts receive almost three
times the average expenditure in roads, this bias disappears entirely during periods of democracy. Thus, the political regime is an important determinant of ethnic favoritism. We subject these results to several robustness checks and we show that they are obtained both with the project level data and with the historical map data and further with different normalizations and measures of co-ethnicity.

These results suggest that even “imperfect” democratic institutions, like those found in Kenya during the 1960s and since the 1990s, have value imposing constraints on the executive. A key insight from our theoretical model is that these constraints prevent politicians from taking decisions which, though optimal for the leader concerned, run counter to citizens interests and economic efficiency. In the context of the many African countries where presidential power has an ethnic base, this may translate to lessened favoritism towards coethnics during periods of democracy. Democracy thus helps limit “downside” political risk.

Closer examination of the recent history of Kenya sheds light on how the re-emergence of multiparty democracy in the 1990s changed the nature of constraints on Kenyan leaders and altered the allocation of public resources. Multiparty democracy heralded an increase in mass political participation as well a lessening of constraints on popular expression, including by increasingly vocal civil society groups. There was a lessening of press censorship, and an explosion of private print and electronic media. These changes led to far greater scrutiny over the actions of executive authorities in the 1990s, which helps make sense of why ethnic favoritism was radically reduced during periods of multiparty democracy.

Our results also shed some light on the recent history of Sub-Saharan Africa because the democratic and economic trajectory of Kenya since the 1960s is quite representative of wider regional patterns. This is clearly depicted in Figure 1: Kenya, like many African countries, was democratic post-independence in the 1960s, then became autocratic in the 1970s and 1980s, and then returned to democracy in the 1990s. Our results neatly show that democratic change can lead to a reduction in the inefficiencies associated with ethnic favoritism. Given that democratic change in Kenya mirrors the pattern seen across Sub-Saharan Africa, and that ethnic favoritism has long been considered a

\footnote{Indeed, we show in the discussion that the key executive constraint parameter in our model as estimated with our data moves in parallel with measures of constraints on the executive from the Polity IV dataset.}
fundamental reason behind its economic underperformance, our analysis suggests that
democratic change may be a factor in understanding the recent resurgence of African
economic growth (see Miguel 2009, Radelet 2011, Young 2012).

This paper contributes to a small but growing body of studies trying to estimate
the extent of ethnic favoritism. Following on Kudamatsu’s (2012) work, Frank and
Rainer (2012) use the Demographic and Health Surveys to construct retrospective time-
varying ethnic-level measures of educational and health attainment for 18 countries.
They show that the ethnic identity of the president is correlated with higher co-ethnic
attainment in these dimensions. Kramon and Posner (2012) use a similar technique to
focus on the Kenyan case and trace whether the ethnic identity of key ministers matters
for education. Morjaria (2012) examines the link between ethnicity, introduction of
democracy and land allocations in particular forestland in Kenya using satellite imagery
and government land allocation data. Hodler and Raschky (2011) use light images from
satellites to see whether the birth regions of national leaders are favored when they take
power and whether this effect is more muted under democracy versus autocracy. We
advance this literature in several ways. Unlike other developmental expenditures such as
schooling or health, which tend to have substantial components that are locally raised,
road expenditures in Kenya are fully determined by the central government. Thus, to
the best of our knowledge, we are unique among the existing set of studies in that we
use budgetary decision data from a policy fully controlled by a central government,
offering greater clarity in interpretation of results. In addition, we provide a model that
allows for a theoretically grounded interpretation of the coefficient estimates. Finally,
we examine the largest category of expenditure, we measure it in several ways, and we
have generated substantial new historical datasets to do so.

The remainder of the paper is organized as follows. Section 2 provides a theoretical
framework. Section 3 presents the historical background on roads and politics in Kenya
and the data collected. Section 4 presents the empirical strategy and the results. Section
5 discusses these results and interprets them in the light of our model and recent Kenyan
history. Section 6 concludes, linking our results to the broader discussion of the effect
of ethnic fragmentation on growth.
2 Theoretical Framework

Consider a repeated economy populated by infinitely lived agents that discount the future at rate $\delta$. There is a continuum of citizens of size $1$. Citizens belong to one of two ethnic groups, $i \in \{A, B\}$, and the population share of group $A$ is $\pi_A$. These two groups live in two separate districts, and each group also has an infinitely countable set of potential country presidents. At any point in time, one of these presidents is in power and they are all identical except for their ethnic identity. We thus have two types of presidents, $j \in \{A, B\}$. The president in power decides on taxation $\tau$, and on the amount of district-specific public goods to be provided. Denote by $\eta^{ij}$ the amount of expenditure in public goods per capita that group $i$ receives if the president belongs to group $j$.

For simplicity, we assume that the president can only charge a lump-sum tax $\tau$ on all citizens and cannot use taxation to discriminate across groups. The president can direct spending to his preferred district, but is limited by institutional and societal constraints. Following Besley and Persson (2011) we capture these constraints on the executive in a simple way as follows:

$$\eta^{ij} \leq \theta \left( \pi_A \eta^{Aj} + \pi_B \eta^{Bj} \right) \quad (1)$$

where $\theta \in [1, \infty]$ denotes the weakness of constraints on the executive. This formulation ensures that per capita spending in favor of group $i$ cannot exceed average per capita spending by more than a factor $\theta$. If $\theta = \infty$, institutions are so weak that they do not constrain the president in any way and all spending can be targeted to one district. At the opposite extreme, $\theta = 1$ implies that no discrimination across districts can take place.

We assume that electoral institutions are also relatively weak, and the active support of one’s coethnics is necessary to keep power. As in Padró i Miquel (2007), we assume that an acting president that receives the support of his ethnic group has strong

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8We make this assumption for a number of reasons. First, the empirical evidence is mixed on African governments’ capacity to effectively discriminate with taxation (see Bates 1981 and Kasara 2007), so this simplifying assumption is a useful benchmark. Moreover, $\tau$ here includes legal taxes and also indirect ways of extracting rents. The assumption of no tax discrimination is therefore equivalent to assuming that the cost of rent-seeking falls equally on all citizens. For a similar model in which discrimination in taxation is possible, see Padró-i-Miquel (2007).

9To capture a wide variety of political institutions, we do not take a strong stance on what this support means in practice. It can range from ethnic voting for the appropriate candidate to exerting violence in order to deny other ethnic groups the full exercise of their democratic rights.
incumbency advantage and stays in power with probability $\tilde{\gamma}$. In contrast, if the acting president does not receive coethnic support, he loses power with probability 1. In this case, an open succession follows, and the new ruler belongs to the same ethnic group as the ousted president with probability $\gamma_d$, for $1 > \tilde{\gamma} > \gamma > 0$. Since transitions are often weakly institutionalized and may involve coups and violence, we assume that in the period while such a transition is being resolved, the state cannot perform its public spending or taxation functions.\footnote{In this simple formulation, the weakness of electoral rules is captured by $\bar{\gamma} - \gamma$. A large difference captures a system where the personality of the ruler is very important, as would be the case if the ruling clique can easily manipulate the political contest. If this difference is zero, the mapping between group power and electoral power is not mediated by the current ruler. For simplicity and to save on notation, we assume that both ethnic groups are symmetric in political terms. This might, of course, not be true in reality and both $\bar{\gamma}$ and $\gamma$ could differ across groups, capturing differences in their populations, internal structure, or hold on power. Allowing for this will not change any of the results of interest (See Padró i Miquel, 2007).}

We assume that presidents maximize the amount of resources they can extract from being in power. Each period, the amount of resource extraction by a leader of type $j$ is given by
\[
\pi^A (\tau - \eta^A) + \pi^B (\tau - \eta^B),
\]
which, for each group, takes into account the taxes taken in and the expenditures on public goods. Presidents receive zero utility when out of power and, for simplicity, we assume that once they are ousted they cannot come back to power.

The citizens of group $i$ pay taxes $\tau$, and enjoy public expenditure $\eta^i_j$ which gives them the following simple instantaneous utility:
\[
R(\eta^i) - \tau,
\]
where $R(\cdot)$ is increasing and concave and satisfies $R'(0) = \infty$ and $R'(\infty) = 0$.\footnote{Note that this formulation implies that the optimal path of public expenditure equalizes expenditures per capita across both districts.}

Denote by $\omega_t \in \{A, B\}$ a state variable that captures the ethnic type of the president at time $t$.

The timing of the game, given $\omega_t$, is as follows:

1. The president announces the policy vector $P_t = (\tau^{\omega_t}, \eta^{A\omega_t}, \eta^{B\omega_t})$

2. The citizens of group $\omega_t$ decide whether to support the leader, $s_t = 1$ or not $s_t = 0$
3. If $s_t = 1$, $P_t$ is implemented and payoffs are realized. Next period starts with $\omega_{t+1} = \omega_t$ with probability $\bar{\gamma}$. With probability $1 - \bar{\gamma}$ the president loses power and the next president is from the other group.

4. If $s_t = 0$, the leader is immediately ousted and the transition policy vector $P = (0, 0, 0)$ is implemented. After the transition, with probability $\gamma$ the new ruler belongs to the same group as the ousted ruler and hence $\omega_{t+1} = \omega_t$. With probability $1 - \gamma$ the new president belongs to the other group.

We solve for the Markov Perfect Equilibrium (MPE) of the game. Strategies can therefore only be conditioned on the payoff relevant state variables and past play within the stage game. Note that the only payoff-relevant state variable is $\omega_t$.

The following proposition, proven in the appendix, characterizes policy in the unique MPE.

**Proposition 1** Assume $\theta < \max\left\{ \frac{1}{\alpha_a}, \frac{1}{\alpha_B} \right\}$. There is a unique MPE in which

1. (1) is binding for both types of presidents
2. $R'(\eta^{ii}) = R'(\eta^{jj}) = \frac{1}{\bar{\gamma}}$
3. $\eta^{ii} = \eta^{ij} \frac{1 - \theta \pi_i}{\theta \pi_j}$ and $\eta^{jj} = \eta^{ij} \frac{1 - \theta \pi_j}{\theta \pi_i}$

In the unique MPE of the game, the president benefits his own group as much as he can, and he does so in order to be able to increase taxes. Increasing patronage to his group allows him to increase taxes for both groups, and hence the rents he can extract increase. In equilibrium, this logic makes constraint (1) bind. This constraint forces the president to provide public goods to non-coethnics, which reduces his rents. The more patronage he is forced to provide to the other group (i.e., the smaller $\theta$ is), the less he can appropriate and hence the lower the incentives to manipulate public good provision to his advantage. For this reason, the amount of public goods provided to the president’s co-ethnics is increasing in $\theta$.

In the empirical section, we use the fact that (1) is binding in equilibrium to provide empirical estimates of $\theta$ across different regimes in Kenya’s recent political history. There is a direct relationship between our empirical estimates and the constraints on the executive modeled in our framework. For a group A president in power (without loss of
generality), we will estimate

$$\beta = \frac{\eta^{AA} - \eta^{BA}}{\pi A \eta^{AA} + \pi B \eta^{BA}}$$

which can be rewritten as\textsuperscript{12}:

$$\theta = 1 + \beta (1 - \pi^A)$$

3 Background and Data

3.1 Districts and Ethnicity in Kenya

Kenya’s population is comprised of a mix of more than forty ethnic groups. According to the 1962 Population Census, conducted immediately prior to independence, Kenya’s main ethnic group were the Kikuyu (18.8%), Luo (13.4%), Luhya (12.7%) and Kalenjin (10.8%). The shares of these main ethnic groups have remained very stable since then despite the fact that the national population has increased nearly fivefold (see Appendix Table 1, Panel A). Despite the large number of ethnic groups and the fact that the largest group barely comprises one fifth of the population, geographic concentration together with historical bureaucratic tendencies have created an administrative map in which all but three districts are dominated by a single ethnic group. In other words, with the exception of Nairobi, Mombasa and Trans-Nzoia, in all 1962 districts a single ethnic group constituted more than 50% of the population, and this numerical domination has remained stable for the whole 1963-2011 period.

Settlement patterns in pre-colonial Kenya were not rigidly defined by these ethnic groups but instead reflected gradations of shared origin, language (e.g., Bantu, Nilotes and Cushitic) and culture. Indeed, leading up to the British colonial era there were few centralized ethnic political structures in the interior of Kenya. Authority was personal and local, often a function of lineage, age and wealth (for illustrations, see Herbst (2000) and Mamdani (1996)). The region’s new British rulers, however, imposed the provincial administration model, a structure that was used throughout colonies of British Africa. The country was divided into provinces, provinces were in turn divided into districts and districts into divisions, and further into locations and sub-locations. The boundaries of

\textsuperscript{12}The transformation uses the fact that $\eta^{AA} = \theta (\pi^A \eta^{AA} + \pi^B \eta^{BA})$ and $\eta^{BA} = \frac{\pi^A \eta^{AA} + \pi^B \eta^{BA} - \pi^A \theta \eta^{AA}}{\theta - 1}$ to generate the expression $\beta = \frac{\theta - 1}{\pi^A}$.
these localities were based in part on the economic needs of white settlers, but a second important concern was the administration’s understanding of African ethnic groups.

In the early years of the Colony, districts were clearly defined in racial terms. The “White Highlands”, the most suitable land for agriculture, was declared Crown property and reserved for white settlers only, despite their pre-existing African populations. African reserves, on the other hand, were for indigenous Africans. There were restrictive rules on the residential mobility of Africans who were working as hired labor or “squatters” on the land now owned by the whites (land which had previously belonged to them). Further, all Africans had to carry an identification card to travel outside their allotted reserves.

The creation of these administrative units, initially for racial segregation, laid the foundation for ethnic politics in later years. From the early years of the Colony, there was differentiation and targeting of public policies to different districts, which implied differential treatment for the various ethnic groups. As the ethnic dimension became increasingly salient, district borders were redrawn to accommodate the demands of local African chiefs and notables. By 1915, the demarcated African reserves had become hardened boundaries and created largely homogeneous ethnic districts. This process is illustrated in Figure 3 where we show the original 1909 district structure and its evolution towards the final district demarcation at independence in 1963, which comprises ethnically dominated districts. As shown in the 1933 figure, the alignment of district and ethnicity was already practically complete at that point.

In our analysis, we use the 1963 district boundaries, which we take to be the result of the previous half a century of ethnic jockeying within the Colony. Ethnic dominance in these demarcations has not changed appreciably since, and hence we can exploit this structure to examine whether when the ethnic identity of a district matches that of the serving president, the district is favored with higher public expenditures.

### 3.2 Ethnic Politics in Kenya

There was already differentiation and targeting of public policies to different ethnic groups in the colonial period. The Kikuyus had the most prolonged exposure to discriminatory British policies, as large areas of their original homeland was “alienated” to become the “White Highlands” and many were forced into “squatter” status. There was increasing discontent within the Kikuyu group as internal inequalities rose, contrib-
uting to support for the so-called "Mau-Mau" uprising against the Europeans as well as against those Africans who worked closely with the colonial authorities (Anderson 2005).

The Mau-Mau uprising brought with it a state of emergency in Kenya and set the stage for Kenya’s independence. Following the Lancaster House Conference in 1960, the Legislative Council was restructured to allow for an African majority as well as to allow for the legal formation of African political parties. In May 1960, the Kenya Africa National Union (KANU) was formed and led by Jomo Kenyatta (an ethnic Kikuyu). Soon after, driven by the fear of Kikuyu and Luo domination, the Kenya Africa Democratic Union (KADU) was formed. KADU was composed largely by members of numerically smaller ethnic groups, and led by Daniel arap Moi, an ethnic Kalenjin. These parties contested in the first post-independence election of 1963. KANU won the election convincingly and in less than two years KADU MPs had all joined KANU, resulting in the effective end of opposition representation in Parliament.

In the mid-1960s, however, several members of KANU defected to a new left-leaning Luo-led party, the Kenya People’s Union (KPU), which aimed opposed the perceived growing conservatism and pro-Western orientation of Kenyatta and the KANU leadership. However, the anti-communist logic of the Cold War meant that the KPU was banned in 1969, ostensibly on national security grounds. This banning institutionalized the single-party autocracy and it is clearly captured in measures of democratic political institutions such as Polity IV (recall that Polity is on a -10 to +10 scale, with scores below -5 typically considered "autocratic"). As shown in Figure 1, the polity IV score falls from 0 to -7 at this point. The banning of KPU also marked the beginning of unchecked Kikuyu political domination. Appendix Table 1 (Panel B) illustrates the historical representation of the main ethnic groups in the cabinet. The cabinet composition shows that a third of the cabinet was already held by the Kikuyus in the late 1960s, far above their roughly one fifth share of the national population.

Kenyatta died unexpectedly of natural causes in 1978 and Moi (his former Vice-President, and a Kalenjin) took power, as specified in the Constitution. Moi continued in the footsteps of Kenyatta and further consolidated the one-party state. However, following an attempted coup in 1982 led by Kikuyu officers, he switched from a Kikuyu-Kalenjin coalition to an alliance between Kalenjins, Luhyas and numerically smaller groups, similar to the KADU alliance he had once led. Heads of parastatal enterprises,
the military, police and the security apparatus were rapidly replaced with Kalenjins (Widner 1992).

The early 1990s saw an increase in both internal and external pressures for African leaders to introduce democracy, with the end of the Cold War being a catalyst for this change (Barkan 1994). The suspension of overseas development assistance from the Paris Group of Donors forced Moi to legalize opposition parties. Kenya held multiparty elections in 1992 for the first time since the 1960s. However, while Moi had amended the constitution to allow for multiparty competition, in parallel he had also successfully consolidated the strength of the Office of the President. His abuse of the state machinery and widespread vote fraud, together with the inability of the opposition to coordinate on a single candidate, handed Moi victory in both the 1992 and the 1997 multi-party elections.

Despite this electoral fraud and abuse of the newly established democratic political institutions, the return to multi-party democracy is widely accepted to have brought significant changes in the nature of Kenyan politics and civil society. The emergence of a freer press, including private ownership of media, the growth of civil society forums and increasing parliamentary accountability committees, as well as a reduction in human rights abuses by the security apparatus, were all arguably triggered by the emergence of political competition. These trends are not unique to Kenya, as illustrated by the Africa-wide changes in democratic governance in Figure 1. The process put in motion by these civil society changes helped make possible the relatively free national election of 2002, which was won by the opposition for the first time, namely by Mwai Kibaki, an ethnic Kikuyu (under the NARC party), marking the first democratic transition of power in independent Kenya (Posner 2005). Moi himself did not run for President in the 2002 elections, adhering to the constitutional provision barring a third term in office.

Kenya’s emerging democracy has been tested since 2002. The social and political salience of ethnicity in Kenya has not diminished. The 2007 general election was tightly fought between the incumbent Kibaki and Raila Odinga, an ethnic Luo, who was in coalition with leading Kalenjin figures. Leading up to the election, exit polls all pointed to a relatively close but clear Odinga victory, but the electoral results kept Kibaki in power amid credible claims of electoral fraud. This resulted in nearly two months of widespread ethnic violence, with thousands killed and hundreds of thousands displaced from their homes (Gibson and Long 2009).
This brief discussion of recent Kenyan political history shows that, while representative of broader African political trends, the case of Kenya is particularly helpful for our analysis. More specifically, there are two key ingredients that enable us to identify ethnic favoritism and its relationship with multi-party politics. Firstly, the alternation of power (as illustrated in Figure 4) between Kikuyu and Kalenjin leaders over time allows us to test for ethnic favoritism and quantify its magnitude. In practice, we test for favoritism by estimating whether districts that share the president’s ethnicity received more roads investments. Secondly, within each ethnic ruling period there is a switch between autocracy and multiparty democracy, allowing us to test whether the existence of democratic institutions (even if imperfect) constrains or exacerbates ethnic favoritism.

3.3 Roads Investment Data in Kenya

Roads building is the single largest development expenditure item in Kenya’s Annual Development Budget. Over the period of study, 1963-2011, new road development budget on average represents 15.2% of the total budget, compared to figures of 5.5%, 5.7% and 6.5% for new expenditures in education, health and water, respectively. Unlike other forms of development expenditure (e.g., schools and water) that derive in large part from local village funding (called *harambee* funding in Swahili), funding for road expenditure is almost entirely provided by the central government. This allows us to link the distribution of road spending and construction across both space and time to ethnic favoritism in policies determined directly by the central government.

In theory, the decision-process behind road construction is partially bottom-up. The Provincial and District Commissioners are supposed to pass up requests for projects to the Ministry of Public Works.\(^\text{13}\) The Ministry of Public Works handles these requests and prepares a national road building strategy. The Ministry of Finance then oversees and resolves competing claims from the different Ministries and actual road projects are then implemented. However, it is important to note that this process takes place under strict oversight exercised by the Office of the President at all stages. In fact, Provincial Commissioners themselves are nominated by the Office of the President, which guarantees their loyalty by rewarding them with wide-ranging authority in their province.\(^\text{14}\)

\(^\text{13}\)The Ministry of Public Works was in charge of planning and building roads from 1963-1978, in 1979-1988 the road portfolio moved to the Ministry of Transport and Communications, and in 2008-2011 a separate Ministry of Roads was created.

\(^\text{14}\)As a result, in line with cabinet over-representation, there was also disproportionate representation
The state apparatus is thus not only highly centralized but also ethnically biased in the allocation of public resources. Given the high visibility of road projects both in terms of physical infrastructure as well as large financial outlays, it is likely that the president himself took a personal interest in major road projects.

Our main measure of road building is expenditures on new roads annually by district during 1963-2011, obtained from the Kenya National Development budget reports. This is technical data compiled by project engineers that details the expenditure on a comprehensive list of individual road projects on an annual basis (i.e., a paved road from location A to location B through location C, at total cost X). When a road project spans locations in more than one district, we use GIS to understand the layout of the road project and the relative kilometers in each district. We then decompose expenditure across the relevant districts assuming an equal distribution of costs along the construction of the total length of the road.\textsuperscript{15}

A convenient feature of roads is that they are easy to observe on the ground. Our second measure of road investment thus comes from Michelin Maps, which capture the actual physical extent of paved roads. Paved roads account for the majority of road expenditures, and their spread can be reliably tracked across our period. As these maps are made by French engineers in Paris assisted by Michelin offices (mainly gas stations and tire outlets) throughout East Africa, they are an independent non-governmental source of data on road investment. This data should not therefore be affected by the concerns that road spending, as reported by the government, might be subject to various forms of biased reporting, including the possibility that there might be inadequate statistical staff to accurately report expenditures; that there is a tendency to deliberately conceal overspending in coethnic districts, as this is a politically charged issue; and that the

\textsuperscript{15}The information in the immediate post-independence period (1963-1973) is recorded as expenditure on road programs, which are collections of individual road projects. We use various supplementary documents to understand how the total cost of these road programs could be disaggregated between individual road projects and then mapped onto the GIS database for analysis at the district level. These documents are the 5-year Development Plan of Kenya 1964-1970, 1966-1970, 1970-1974 and 1974-1978, and a series of Road Program Operational Reports directly available on the website of the World Bank, which funded many of the road investments, especially during the initial years. For each project we obtained an Operational Report which details out each road program and its costs. Further, road expenditure budgets are reported in East African Pounds before 1967, Kenyan Pounds for the period 1967-1999, and Kenya Shillings for the period 2000 onwards. (Note the Kenyan Pound existed only as a reporting currency and was not in circulation.) We convert these amounts to current USD and use a USD deflator series to obtain amounts in constant 2000 USD.
pattern of spending might not always translate into the construction of actual roads, as leakage might be differential depending on the ethnic ties of a district to the president. Digitization of maps thus provide us with an independent check on whether there is ethnic favoritism in road building and whether such favoritism is affected by democracy.

The limitation of this second source of data is the availability of these maps only in some years and only until 2002, resulting in a smaller sample. In particular, maps were produced for the following years: 1961, 1964, 1967, 1969, 1972, 1974, 1979, 1981, 1984, 1987, 1989, 1992 and 2002. In order to use the Michelin Maps to create a GIS dataset, we initially start with a Global GIS map containing contemporary roads. We then use the various maps to recreate the evolution of roads backwards in time. Due to the consistency of legend labels on paved roads, we are able to create a district-year panel dataset of the length of paved roads by splicing the historical road maps with the district boundaries.

Figure 5 depicts the evolution of the road network across key years in Kenya’s political history. The year 1964 is the first year the Michelin map is available post-independence and shows the colonial interest in connecting the most agriculturally fertile area of Kenya (the White Highland areas) to Nairobi; the maps of 1969-1979 illustrate the Kenyatta period, 1969 being the end of multi-party democracy and the beginning of the single-party state in Kenya. The year 1979 is immediately after the unexpected death of Kenyatta and the beginning of Moi’s (ethnic Kalenjin) single party era. The year 1992 serves to illustrate the end of Moi’s single party era and the beginning of multiparty democracy. Finally, 2002 illustrates the stock of road development at the end of Moi’s multiparty era.

Comparison of the paved road maps for 1979 and 1992 gives a first visual indication of ethnic favoritism. The paved road network in and around the green Kikuyu districts appears largely frozen between these two years. In contrast the network in and around the pink Kalenjin areas expands dramatically. After 1992, in contrast, the expansion in and around the green and pink areas is much more even.

Appendix Table 2 (Panel A) provides summary statistics for both the main outcome of interest (road development expenditure per population share, using project data) and the secondary measure (paved road construction per population share, using maps data). Note that the difference in the number of observations is driven by the different data sources: road expenditure data is available every year between 1963-2011, while the
maps are less frequent.

We normalize the road expenditure measure taking into account population. More specifically, the main outcome variable in the analysis is the share of road expenditure received by a district (out of the total national road spending budget that year) divided by the population share of the district in the national population (in 1962). This summary statistic has a natural interpretation: a value of one implies that a district received road spending that is exactly proportional to its population. Values greater than (less than) one denote spending that is above (below) the national average. Specifically, a value of two for this measure denotes a district that is receiving twice as much road spending as the national per capita average, while a value of 1.3 denotes expenditures 30% above the national per capita average. To be more precise, let road spending in district \(d\) and year \(t\) be denoted by \(\text{EXP}_{dt}\) and district population be \(\text{POP}_{dt}\), while total national road spending is \(\text{EXP}_t\) and national population is \(\text{POP}_t\). The main road spending measure can be expressed as:

\[
\text{road}_{dt} = \frac{\text{EXP}_{dt}}{\text{POP}_{dt}} \times \frac{\text{POP}_t}{\text{EXP}_t}
\]

We construct a parallel measure for paved road construction (in km) per capita by district, using a measure of paved road length per capita in the district divided by average paved road length constructed per capita nationally, as an alternative district road outcome below. This measure has the same interpretation, with one denoting road construction on par with the national average, and values greater than one denoting additional construction.\textsuperscript{16} As a robustness check, we also explore normalizing district road spending by land area.

In relating these measures of road investment to whether districts are co-ethnic with the president (as defined by the district’s population of the president’s ethnic group being above 50%) we control for a number of other factors that may affect the placement of roads. These variables are measured at the district level, including population, area, urbanization rate, formal earnings, formal employment as share of total population, value of cash crops, whether a highway ran through the district, whether the district is a border district, and the distance to Nairobi. All these controls are measured either

\textsuperscript{16}Besides normalizing, this formulation has the advantage of being directly relevant to the model in section 2.
just at independence or soon after, depending on data availability.\footnote{Note that we obtain district population and urbanization rates from the reports of the Population and Housing Census in 1962. District area (sq km) is estimated using GIS tools on the 1963 administrative boundaries. We use the annual Statistical Abstracts of Kenya to reconstruct total district employment (available in 1963) and total district earnings (in 2000 USD, available from 1966) in the formal sector. The Development Plan of Kenya 1964-1970 reports cash crop production (coffee, tea and sisal) at the district level for the year 1964-1965. We then use the 1965 export price in 2000 USD (FAO 2011) to calculate the district total value of cash crop exports in 1965. We use GIS tools to create: (i) an indicator variable whose value is one if any part of the district is on the Mombasa-Nairobi-Kampala corridor, (ii) an indicator variable whose value is one if the district borders Uganda or Tanzania, (iii) a variable capturing the Euclidian distance (in km) from each district centroid to Nairobi.}

4 Method and Results

4.1 Method

We seek to estimate the relationship between the ethnicity of the president and public expenditures in districts demographically dominated by his co-ethnics. In the period under examination, we have Kikuyu presidents (1963-1978 and 2003-2011) and Kalenjin presidents (1979-2002). There are seven Kikuyu dominant districts and six Kalenjin dominant districts, out of 41 in total. We present our results using two approaches, a graphical approach and a regression approach.

In our first approach, we graphically examine how the ratio of a district’s share of road spending or road construction relative to its population share (i.e. \(\text{road}_{dt}\)) varies in the post-independence period. We divide districts in two ways. First by whether or not, in a given year, the majority ethnic group in a district is the same as that of the president, as discussed above. This allows us to visually examine whether or not districts which are coethnic with the president receive a higher share of national spending on roads relative to their share in the national population. We are particularly interested in analyzing whether this bias is more or less pronounced in democratic periods relative to autocratic periods. Second, we examine the evolution of ethnic majority of Kikuyu and Kalenjin districts. Since all Kenyan presidents were either ethnic Kikuyu or Kalenjin during the 1963-2011 study period, this allows us to examine what happens to road spending in districts when they shift in and out of being coethnic with the president. A focus here again is on whether being coethnic during autocratic periods results in districts attracting a higher share of road resources relative to democratic periods. This comparison is of particular interest as the transition from democracy to autocracy in 1969, and from autocracy to democracy in 1992, took place under the same president.
In the regression approach, our main estimating equation takes the following form:

\[
    road_{dt} = \gamma_d + \alpha_t + \beta (coethnic\ district_{dt}) + \delta (coethnic\ district_{dt} \times democracy_t) + \theta (X_{d1963} \times [t - 1963]) + u_{dt}
\]

the dependent variable is the road spending or road construction measure for year \(t\) and district \(d\) as described above. To capture coethnicity with the president, we use an indicator variable \((coethnic\ district_{dt})\) that takes a value of one for districts where at least 50% of the population has the same ethnic affiliation as the serving president. The \(democracy_t\) term is an indicator variable which takes a value of one during periods of multiparty democracy (1963-1969 and 2003-2011, see Figure 4). \(X_{d1963}\) is a vector of baseline demographic, economic and geographic variables all obtained in the early 1960s that might affect road spending and construction. We interact these initial conditions with linear time trends \([t-1963]\) to allow their impact over time to vary across different districts. The regression also controls for district fixed effects \((\gamma_d)\), year fixed effects \((\alpha_t)\) and clustering of standard errors at the district level.

4.2 Results

4.2.1 Graphical Analysis

The first results are presented in Figure 6. We plot our average \(road_{dt}\) measure for districts that are coethnic with the president in year \(t\) and for those that are not. The solid vertical lines, in 1969 and 1992, capture regime transitions away from multiparty democracy and back to multiparty democracy, respectively. The broken vertical lines, in 1979 and 2002, capture presidential transitions. Two interesting patterns are obtained. The first is that during periods of autocracy (basically, the 1970s and 1980s) the ratio of district share of road expenditures to district share of population is always above one for coethnic districts and below one for non-coethnic districts, which is strongly indicative of ethnic favoritism.

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\footnote{For both spending and construction we have 41 districts as defined by the 1963 district boundaries. For spending we have annual data for 49 years and hence our sample is 2009 observations. For paved road construction there are 11 Michelin maps between 1963 and 2002 and hence 451 observations.}

\footnote{While we use 1963 for clarity, several of the baseline variables are available at slightly different points in the early 1960s.}
solid vertical lines, in 1969 and 1992, capture regime transitions away from multiparty democracy and back to multiparty democracy, respectively. The broken vertical lines, in 1979 and 2002, capture presidential transitions. Two interesting patterns emerge. The first is that during periods of autocracy (basically, the 1970s and 1980s) the ratio of district share of road expenditures to district share of population is always above one for coethnic districts and below one for non-coethnic districts, which is strongly indicative of ethnic favoritism.20 The second is that during periods of multiparty democracy (basically, the 1960s, 1990s and 2000s) the ratio is consistently lower and tends to be near one on average for both types of districts, implying little or no favoritism.21

Three transitions in Figure 6 are particularly noteworthy. The first is the rapid post-1969 rise of average $\text{road}_{dt}$ from 1 to above 2. Even with the same president in power (Kenyatta), the switch from democracy to autocracy leads to road spending more than doubling in coethnic districts over the course of a few years. The second is that this favoritism is maintained and intensified after 1979, despite the fact that the set of districts that are coethnic with the president is now completely distinct from those pre-1979. The third is that when democracy returns in 1992 the $\text{road}_{dt}$ measure gradually falls from above 2 to around 1 even though the same president (Moi) is in place. Democracy clearly has value in terms of spreading the single biggest component of public expenditures in Kenya more evenly across areas dominated by different ethnic groups. The stark “1-2-1” pattern we observe in presidential coethnic districts as Kenya enters and then exits autocracy is extremely difficult to square with spending being driven mainly by concerns of economic efficiency alone.

Only two ethnic groups, the Kikuyus and the Kalenjins, produced presidents during the study period. Figure 7 breaks districts down by whether the majority of the district population is Kikuyu, Kalenjin or from another group. Kikuyu districts receive road spending in line with their population share during the early democratic period. Following the banning of opposition political parties in 1969, road spending concentrates in these districts, rising to more than double that predicted by population share. This trend of favoring Kikuyu districts ends when the Kikuyu president (Kenyatta) dies in

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20 Note that the fact that the coethnic line rise to nearly 3 whereas the non-coethnic line falls to only around 0.8 is due to the fact that the bulk of the districts in a given year are not coethnic with the president.

21 For a visualization of this result with the alternative road maps data, please consult Figure 5. For instance, there is practically no road development in Kikuyu areas between 1979 and 1992, while in Kalenjin areas road coverage grows dramatically.
1978. In fact, there is a striking decline in Kikuyu district road funding, and a corresponding increase in Kalenjin road funding timed exactly after Kenyatta’s death in 1978, suggesting that Moi had the authority to rapidly target road resources to his coethnic districts.

The rise in spending on Kalenjin districts is truly meteoric: \(road_{dt}\) rises from around 0.5 pre-1978 to close to 3 post-1978, representing a six-fold increase in relative road spending per capita in these districts. This highly elevated \(road_{dt}\) level is maintained throughout the Moi autocratic period, as the Kikuyu \(road_{dt}\) falls back down towards unity. The return of democracy under Moi in 1992 seems to reduce his ability to maintain this high degree of ethnic favoritism, and the Kalenjin district \(road_{dt}\) measure drifts back down towards unity as democracy gradually strengthens. Diminished favoritism for districts that are coethnic with the president during periods of democracy is also associated with greater spending for the majority of districts in Kenya which are neither majority Kikuyu nor Kalenjin. As Figure 7 demonstrates, the other ethnic districts locus has a “U-shaped” pattern, being close to unity in the 1960s, then falling below unity in the 1970s and 1980s, and rising back towards unity in the 1990s and 2000s. Democracy seems to have a leveling influence in ensuring that Kenyan districts receive roads resources roughly in line with their share of population irrespective of whether or not they share the ethnicity of the president.

4.2.2 Regression Analysis

In Table 1, we move beyond the graphical analysis and employ the regression framework specified above. In Panel A of Table 1, Column 1 confirms that, for our 1963-2011 period as a whole, there is strong evidence of ethnic favoritism in Kenya. A coefficient of 1 in this specification implies that, on average, districts that are coethnic with the president receive double the amount of roads investment relative to their share in the population. Recall that the districts with a majority Kikuyu or Kalenjin population each account for roughly 15% of all Kenyan districts. The coefficient in column 1 implies that, on average, across our period these districts receive roughly 30% of national spending on roads. Given that roads account for 15% of all government spending, this represents a highly consequential degree of ethnic bias.

This central result remains robust when we sequentially add controls for demography (district population, area, urbanization rate – column 2), economic activity (district
total earnings and employment in the formal sector, value of cash crop production for export - column 3), economic geography (being on the main Mombasa-Nairobi-Kampala highway, bordering another country, distance to Nairobi – column 4). These controls, which are either time invariant or are measured at the start of our period, are interacted with linear time trends to allow for initial district differences to evolve over time as a function of these differences. These interactions should control for many of the economic factors that might influence where road investments take place in Kenya. Our preferred specification is Column 4, which contains the full set of interactions, and has a nearly identical coefficient estimate to that in column 1, suggesting that ethnic favoritism in road spending is somewhat orthogonal to the influence of these other factors. In column 5 we observe that the ethnic favoritism result is even robust to including district specific time trends. Regardless of econometric specification, the central result that coethnic districts, on average, receive twice the level of road investment between 1963 and 2011 is highly robust.

We next test if ethnic favoritism is affected by whether a national democratic or autocratic regime is in place. In Panel B of Table 1, column 1 indicates that ethnic favoritism in road spending falls significantly during democratic periods. Indeed the $F$ test at the bottom of the column indicates that there is no significant evidence of ethnic favoritism within periods of democracy in Kenya ($p$-value = 0.31). This is the second main result of the paper. Democracy, involving at a minimum some legal competition between political parties, limits the ability of the president to favor coethnics, in effect forcing him to share public resources more evenly across the population. This is equivalent to a drop in $\theta$ in our theoretical model towards unity. That even imperfect forms of democracy, such as that experienced in Kenya in the 1960s and again post-1992, can reduce ethnic favoritism in this way is a striking finding.

In the remaining columns of Panel B, we see that this second result is robust to sequentially adding in controls for demography (column 2), economic activity (column 3) and economic geography (column 4). The result is also robust to inclusion of district specific time trends (column 5). Across all columns, the $F$-test indicates that we cannot reject the hypothesis that ethnic favoritism in road building is absent in Kenya during periods of democracy. The coefficients on $coethnic_{dt}$ tell us that sharing the ethnicity of the president in autocratic periods raises road favoritism by 157% to 174%. That is, there is a two-and-a-half fold increase of patronage in these districts relative to those
that do not share the ethnicity of the president. This can be seen in Figure 6 where our road favoritism measure rises from around 1 in the 1960s to above 2.5 in the 1970s and 1980s and then falls back towards 1 in the post-1992 period. The coefficient estimates of -1.08 to -1.32 on the \((\text{coethnic}_{dt} \times \text{democracy}_t)\) term captures the near elimination of ethnic favoritism during periods of democracy.

In Table 2 we use our second \(\text{road}_{dt}\) measure – the share of paved roads constructed in a district relative to the population share of that district according to the digitized Michelin maps data. Table 2 reproduces all the specifications in Table 1. In Panel A we see that presidential coethnic districts receive between twice and five times the kilometers of paved roads per capita relative to national average. In our preferred specification in column 4, the coefficient is 3.24, implying that coethnic districts have four times the length of paved roads built. Ethnic favoritism as measured by paved road construction is therefore twice as pronounced as that measured by total expenditure on roads. One reason for this might be that paved roads are a highly visible element of road investment. Political leaders may feel that investing in these visible symbols of progress and modernity may represent a more viable means of securing the support of their coethnics than investing in less visible elements, such as non-paved tracks or in road maintenance. This pattern points to favoritism towards coethnics of an extreme form, and is once again difficult to square with economic efficiency, especially conditional on the wide array of baseline demographic, geographic and economic characteristics that we include.

In Panel B of Table 2 we see that the tendency to favor coethnic districts with paved roads is again radically diminished during periods of democracy. Indeed, across all the specifications, we find that the reduction in this bias during democratic periods is such that we cannot reject the hypothesis that there is no significant difference in the extent to which paved roads are built between coethnic and non-coethnic districts. In column 4 we see that the coefficient on \(\text{coethnic}_{dt}\) is 3.90, implying that in autocratic periods almost five times the length of paved roads are built in coethnic districts relative to the national average. A coefficient on \((\text{coethnic}_{dt} \times \text{democracy}_t)\) of -2.71 implies that this bias is far less pronounced in democratic periods and indeed the \(F\)-test \((p\text{-value} = 0.56)\) confirms that we cannot reflect that there was no ethnic favoritism during these periods. The coefficient estimates are similar in the specification with district time trends (column 5) but standard errors rise somewhat.

The degree to which results match up using two independently collected data sets
on road expenditure (Table 1) and road building (Table 2) is reassuring. It increases our confidence in the robustness of the two key findings of this paper: there is extensive favoritism towards the president’s coethnics in road investment in Kenya, and this favoritism is largely eliminated during periods of democracy.

4.2.3 Robustness

Table 3 checks the robustness of these results to changes in normalization and in measures of co-ethnicity. Columns 1 and 2 of Panel A replicate the key results for road expenditure (from column 4 of Table 1). In columns 1 and 2 of Panel B we move to a continuous measure of co-ethnicity, where we measure the population share of the president’s ethnicity in a district, independent of whether or not this represents the majority ethnicity. The two main results hold when we do this. In columns 3 and 4 of Panel A we normalize the road expenditure share by the district’s area share. It is clear that the two main results are robust to normalizing road expenditure by area share as opposed to population share. In columns 5 through 8, we show that our road building results are robust to using a continuous measure of co-ethnicity and to normalizing by area share. Across all the results in Table 3, we find that there is strong evidence of ethnic favoritism in road spending and building, and we cannot reject the hypothesis that this favoritism is largely eliminated during periods of democracy.

In Appendix Table 3, we carry out a further battery of robustness checks on our main results on road spending. Column 1 replicates the results from our preferred specification in column 4 of Table 1. In column 2, we see that including our baseline controls on demography, economic activity and economic geography interacted with year fixed effects does not significantly affect our results, although coefficient estimates are less precisely estimated. In column 3 we include an additional control for the number of years that a district has been coethnic with the president, to capture the possible persistence of effects of coethnicity on road favoritism. Our results remain robust to the inclusion of this control. In columns 4 and 5 we compute standard errors that are corrected for spatial clustering (Conley, 1999) using 200 kilometer and 400 kilometer thresholds, respectively. Again the pattern of results seen in column 1 remain robust.

It is informative to break down the results into the five leadership periods seen in Figure 4 – Kenyatta democracy, Kenyatta autocracy, Moi autocracy, Moi democracy, Kibaki democracy. This is needed to check whether what we are observing is a general
phenomena, or one related to a particular leadership regime in Kenya. To look at this, we regressed our road spending favoritism index $\text{road}_{dt}$ on indicators which capture whether a district has a majority > 50% Kikuyu or Kalenjin population. The comparison districts are those that do share either of these attributes. The results are reported in Table 4.

The comparison of the coefficients on Kikuyu/Kalenjin indicators across periods of democracy and autocracy when the same Kikuyu or Kalenjin president is in power is telling. During the Kenyatta democracy period (1963-1969), there is no significant difference between the coefficients on the Kikuyu and Kalenjin indicators ($p$-value = 0.70). In the Kenyatta autocracy period (1970-1978) the Kikuyu indicator becomes positive and statistically significant, and the Kikuyu-Kalenjin difference is also statistically significant ($p$-value = 0.01). During the Moi autocracy period (1979-1992), things flip round and now the Kalenjin indicator is positive and statistically significant, the Kikuyu indicator is not and the two are marginally significantly different ($p$-value = 0.08). With the transition back to democracy during the Moi democracy period (1993-2002), both indicators lose statistical significance, as does the difference between the two ($p$-value = 0.14) and this pattern also holds under the Kibaki democracy period (2003-2011, $p$-value = 0.33).

4.2.4 Extension: Coalition Politics

Our focus has been on the impact of being coethnic with the president on road spending and building within a district, and on whether this changes under democracy. This makes sense given the nature of politics in many Sub-Saharan African countries, where presidents traditionally enjoy considerable personal decision-making authority. However, it is possible that other members of the president’s cabinet also influence where road investment takes place. This introduces a set of related but distinct issues pertaining to inter-ethnic coalition formation. While a full treatment of these issues is beyond the scope of this paper, and does not feature in our theoretical model in section 2, we use our data to explore whether considering coalition politics significantly changes main our conclusions.22

We assembled a data set that codes the ethnicity of each cabinet member for each of the thirteen central government cabinets between 1963 and 2011 (see Appendix Table 1). In an exhaustive set of regressions, we tested whether districts that are coethnic with the

22 See Francois, Rainer and Trebbi (2012) for a recent paper on inter-ethnic coalitions in Africa.
public works minister, or with ministers holding the most important cabinet portfolios (e.g., finance, home) receive more road spending but cannot reject the hypothesis that the effect is zero (not shown). This appears to be further confirmation of the overriding power of presidents in post-independence Kenya.

However, in column 2 of Table 5 we show the one exception: we find that districts that are coethnic with the vice president do have road expenditures significantly above the national average. A coefficient of 1.46 on the $VP_{coethnic}$ measure tells us that during autocratic periods, districts receive two and a half times the average amount of road expenditure relative to their population share, a large effect. The coefficient of -1.42 on $(VP_{coethnic} \times democracy)$ implies that this ethnic favoritism is largely non-existent during periods of democracy, as is also confirmed by the $F$-test in column 2. What is also interesting in column 2 is that, during autocratic periods, districts that are coethnic with the president receive three and half times the amount of road expenditure relative to districts that are neither coethnic with the president or vice president. This finding confirms that the president has been the dominant force in allocating road spending, but also shows that the vice president (who throughout the post-independence period was never of the same ethnicity as the president) is able, to a more limited extent, to skew resources towards districts that share his ethnicity. The fact that both these forms of favoritism largely disappear during democratic periods suggest that democracy ties the hands of both top executives, the president and the vice president. In other words, our main results on ethnic favoritism and the leveling effect of democracy are robust to also considering the ethnic group of the vice president. If anything, we are underestimating the extent of ethnic favouritism in the main regressions because the ethnic group of the vice-president in part of the excluded category.

It is often argued that the the typical way coalition politics play out in African politics is in cabinet formation. In columns 3 and 4 of Table 5 we explore this possibility. To do so, we exploit our data set on the ethnicity of all cabinet ministers for election years between 1963 and 2011. The dependent variable is the cabinet share of each ethnic group in year $t$ divided by its population share in 1962. An index higher than one means an ethnic group is receiving more cabinet positions than its national ethnic population share. We then regress this index on a district indicator which equals one if it is coethnic with the serving president, as well as its interaction with the democracy indicator. We include ethnic group and time fixed effects, as well as an ethnic group time
trend. In column 3 of Table 5 we find that the president’s ethnic group receives 64% more cabinet posts relative to what would be predicted by its national population share. Therefore, Kenyan presidents do favor their ethnic group with cabinet positions. When we interact the group indicator with democracy, however, we find no effect, indicating that the propensity to favor coethnics with cabinet positions is not attenuated during periods of democracy. In column 4 we see that the ethnic groups of both the president and vice president are favored with cabinet positions but that once again that neither is affected by democracy. This is informative in two respects. First, there is indeed a propensity for presidents and vice-presidents to “stuff” the cabinet with co-ethnics. Second, this tendency is not checked by the arrival of democracy, which suggests that the road favoritism effects we are estimating are probably not mainly being driven by changes in cabinet composition.

These findings line up well with Francois, Rainer and Trebbi (2012) who find that cabinets in Africa are surprisingly representative of the underlying national population even under autocratic regimes. They argue that allocating key cabinet posts to ethnic groups that are not coethnic with the president may help to reduce the threat of revolutions from outsiders and of coups from insiders. Despite the largesse shown by the president in allocating cabinet posts to ethnic groups other than his own, what our results show is that it has primarily been the president (and to some extent the Vice President, potentially) who retains the power to allocate public roads resources in Kenya, and it is democracy that ultimately constrains that power, rather than any shift toward a more representative cabinet.

4.3 Interpretation

In our model, $\theta$ captures the ability of the executive to discriminate across ethnic groups. If $\theta = 1$ then all ethnic groups receive a public good allocation equal to the average per capita allocation and ethnic favoritism is therefore eliminated. If $\theta = \infty$, then the executive is unconstrained as regards the extent to which public good allocation to his ethnic group can exceed the average allocation. By transforming the different $\beta$ coefficient estimates from Table 4 into the analogous values of $\theta$ from our theoretical model – namely, $\theta = 1 + \beta(1 - \pi^A)$ – we can trace the evolution of $\theta$ across the five periods shown in Figure 4: Kenyatta democracy, Kenyatta autocracy, Moi autocracy,
Moi democracy, and Kibaki democracy. The results from doing this are presented graphically in Figure 8. We also include the Polity IV score for Kenya from Figure 1 in this figure.

There is a remarkable correspondence between these two measures over time. The early multiparty period in the 1960s was characterized by relative democratic freedoms, and essentially no evidence of ethnic favoritism towards President Kenyatta’s Kikuyu ethnic group, with the estimated \( \theta \) near 1. However, there is a sharp increase in \( \theta \) after 1970, when multiparty democracy was abandoned, moving near a value of 2. \( \theta \) moves further during the rule of President Moi’s single-party rule (1979-1992), reaching 2.5, implying that the president’s coethnic districts received a staggering two and half times more road funds on average than other groups. However, \( \theta \) moves back towards 1 when multiparty democracy was restored in late 1991 and ends up nearly equal to 1, indicating that there is effectively no ethnic favoritism in the most recent period, which is the most democratic on record for post-independence Kenya.

The depiction in Figure 8 of the movement of \( \theta \) and the Polity measure of democracy in the same direction begs the natural question of what underlies the changes in \( \theta \). Digging into the various components of the Polity measure (and its effect on triggering other changes in society) can shed some light into the institutional changes occurring in Kenya during its political transitions. Closer examination of Figure 8 reveals that the combined polity score decreased from 0 to -7 in the transition out of multiparty democracy during Kenyatta’s leadership. Almost all sub-components of the score changed as a result: competitiveness and openness of executive recruitment worsened (there was only one party now, whose leader was chosen for life), constraints on the chief executive weakened (the Office of the President could generally bypass parliament), regulation of political participation became restrictive (participation was restricted to life members of the single-party and civil society was heavily repressed) and competitiveness of par-

\[ \text{23} \quad \pi^A \text{ captures the population share of the ethnic group which is coethnic with the serving president. This value varies across periods as the president’s ethnicity changes.} \]

\[ \text{24} \quad \text{Note that the } \theta \text{ score is presented with a reverse axis to facilitate comparison (i.e., the appropriate sign) with the democracy score.} \]

\[ \text{25} \quad \text{The combined polity score is computed by subtracting the polity AUTOC score from the DEMOC score, the resulting scale ranges from } +10 \text{ (strongly democratic) to } -10 \text{ (strongly autocratic). Each of the two components have their sub-components. AUTOC and DEMOC are constructed additively on a eleven-point scale. Further, the individual sub-components are weighted differently depending on being AUTOC or DEMOC and are derived from coding the following 5 sub-components (i) competitiveness of political participation (ii) regulation of participation, (iii) the openness and (iv) competitiveness of executive recruitment and (v) constraints on the chief executive.} \]
ticipation weakened (there was only one candidate for the executive seat). It is little wonder that presidents under this regime felt free to allocate resources largely as they (and potentially their vice presidents) wished.

The repeal of the constitution and the political institutional change of 1991 (when Moi allowed multiparty democracy) led the combined polity score to improve from -7 to -5 and up to -2 in 1997 as parties were allowed to compete and KANU’s tight grip on civil society gradually loosened (this process increased scores on both regulation and competitiveness of political participation). During this period, the Polity score still classifies Kenya as an “anocracy” (a hybrid political regime akin to a limited democracy). It is only after the democratic presidential transition of 2002 that the rest of components in the polity score improve, bringing Kenya to the level of a fully-fledged democracy. Interestingly, our estimated $\theta$ matches this path: from 1992 to 2002, the “anocracy” period according to the Polity score, the estimated $\theta$ equals 1.75, which lies right between the dictatorial years of the single-party Moi regime (with $\theta$ equal to 2.56) and the democratic regime post 2002 that features effectively allows no ethnic favoritism ($\theta$ equal to 1.08). Note that in the main regression we classify this period as multi-party democracy and hence we are, if anything, underestimating the difference between autocracy and democracy.

It is important to note that the development of Kenya’s civil society played a key role in the institutional evolution that began in the early 90s. A simple plot of the Freedom House Freedom of the Press Index reveals that both press freedom and broadcast freedom jumped from “not free” to “partly free” when the switch to multi-party politics occurred (not shown). Indeed, the period since 1990 saw an increase in independent weekly magazines (e.g. Society, Finance, Nairobi Law Monthly and Nairobi Weekly Observer) which all often took anti-government stances. Similarly, in the early 1990s several influential private newspapers, including the The Nation and The Standard, emerged. This active opposition media survived the aggressive reaction of the Moi regime thanks to widespread societal support, as well as Western donor protests against governmental abuse.

Broadcast media on the other hand remained more firmly in the government’s grip. While the Kenya Broadcasting Company was officially semi-autonomous, the Office of the President retained considerable editorial control. Its main competitor, the Kenya Television Network, also suffered from constant interference from the State. Independent
commercial broadcasting did not emerge in Kenya during this early period, as more than 20 TV broadcast applications submitted between 1985-1995 were rejected. The situation was similar for the radio, a major source of information for the rural majority, which saw no independent radio licenses granted until 1996.

The period since 1998, however, saw the government end direct censorship of the media, and by 2000, Kenya had nine private TV stations and 19 radio stations. While state harassment has not totally disappeared (libel cases are common and harassment of journalists and editors still occurs) it is undeniable that the media has become freer since the early 1990s.

Beyond the vital emergence of private media, several other aspects of civil society helped to challenge the executive’s absolute authority. The number of non-governmental organizations (NGO) grew rapidly in the 1990s. While Kenyan law does not allow international donors to fund opposition political parties, they could fund governance-focused civil society organizations (e.g. USAID funded dozens of “pro-democracy” NGOs that in practice had strong pro-opposition leanings). Western bilateral agencies and foundations also increasingly side-stepped the government in terms of resource allocation and distribution, and by the late 1990s, Kenya had the highest concentration of NGOs per capita in Sub-Saharan Africa. Political NGOs courageously influenced and became an alternative route to politics and provided a way to influence state policy and nurture opposition. The churches (often in tandem with NGOs) also played a crucial role in giving voice to the need for impartial conduct of elections and voter registration reforms in the 1990s. Further, when ethnic clashes were reported around the 1992 elections, the Catholic and the National Council of Churches of Kenya were the first to express its strong opposition to Moi’s land policies that contributed to the violence.

A freer press and a stronger civil society, together with Western pressure, made Moi realize that it had to accommodate demands for further openness. This brought about three key reforms in 1997 by the then Attorney General (Amos Wako) known as the IPPG reforms (Inter-Parliamentary Parties Group). These reforms reduced state internal security powers (e.g. preventative detention) and amended the Public Order, Broadcasting, and Societies Acts. The reform package also contained amendments to...

26 Reduced state authority implied an end to preventative detention and sedition laws. The Public Orders Act was amended to remove the need of a license before meetings, replacing it with a need to notify the police (three days before). The Broadcasting Act was also changed to provide free airtime to all parties and to promote a balanced show of opinions. The Societies Act was amended to require the
electoral rules, explicitly classifying falsification of voter registration, destruction, and sale of voting cards, as criminal offenses. The final years of the Moi regime also saw a rise in power of parliament, with constitutional amendments that increased its independence from the executive branch.

All in all, key political institutional changes in the early 1990s set the stage for the emergence of an active civil society and a freer press which became strong proponents of further institutional change that ultimately curtailed the machinery of Moi’s autocratic state and allowed for a push towards a more democratic Kenya. This evolution has continued since Moi stepped down in late 2002. A new constitution was ratified by voters in 2010 which changed the division of powers between the central government and newly created (and popularly elected) county governments, as well as consolidating a more independent judiciary. Nowadays, an increasingly well-informed, educated, and connected population is consistently vocal. Parliamentary debates are increasingly shown on national TV and discussion forums are held to allow for civil society engagement. Misguided public investments and corruption remain widespread but are more regularly bought to light by the investigate press (Wrong 2009).

It is hardly surprising that the practice of ethnic favoritism in public resource allocation is now much more difficult to carry out than in the past. Ethnic divisions have not disappeared, and they remain highly politically salient, as tragically demonstrated in the post-election violence in 2007/2008. However, tight scrutiny from a free press, a vocal civil society and an independent parliament all severely curtail the ability of the executive to blatantly discriminate between different districts in choosing roads projects. This is succinctly captured in our estimated $\theta = 1.08$ for the post-2002 period.

5 Conclusion

For ethnic favoritism to be a viable political strategy the president must be able to manipulate the allocation of public expenditure with few constraints. Ethnic favoritism and weak controls on the chief executive thus go hand in hand. As democracy becomes consolidated in many low-income countries, including many in Sub-Saharan Africa, not only does political competition become better regulated, but the constraints on executive action are also strengthened due to the scrutiny that parliament and civil society are registrar to respond reasonably to all requests for voter registration within 120 days.
able to exercise. In this paper we examine this logic in detail by asking two empirical questions. First, can we detect quantitative evidence of ethnic favoritism in an African country? Second, does the transition in and out of democracy under the same leader exacerbate or constrain this ethnic favoritism?

Though many of Africa’s ills have been blamed on ethnic favoritism, it has been surprisingly difficult to find concrete evidence of this behavior, mostly due to a lack of data. Therefore, to address these questions we construct two new datasets through the geographic coding of road project data and through the innovative use of historical maps. We are helped in this respect by the fact that each Kenyan district is dominated by a particular ethnic group, which allows us to precisely assign expenditures to ethnic groups. In answering the second question, we are helped by the fact that there have been multiple switches of power between leaders of different ethnic groups in Kenya and, within each ethnic regime, switches between democracy and autocracy.

There are two main empirical results. First, road expenditures in Kenya have been subject to a very high degree of ethnic favoritism, with districts co-ethnic to the President receiving up to two and a half times average expenditure per capita and up to four times the average length of paved roads during periods of autocracy. However, this all but disappears in periods of multi-party democracy.

These results might have important implications for understanding the economic resurgence Sub-Saharan Africa has recently experienced. As Figure 2 makes clear, Kenya is not an outlier in terms of the evolution of per capita growth rates: the whole continent has bounced back dramatically from the poor performance of the 1970s and 1980s. In an influential paper, Easterly and Levine (1997) attribute this poor economic performance to the political frictions and economic mismanagement associated with ethnic fractionalization. The extreme ethnic favoritism in roads investment that we document in this paper are a clear illustration of these misguided policies. However, we have also shown that these patterns essentially disappear when political institutions become more democratic and place tighter constraints on executive action. Since other African countries have experienced similar trajectories of democratization, it is reasonable to hypothesize that these political institutional changes might have led to better economic policies, and ultimately faster economic growth, in the region as a whole.

In a speculative but provocative exercise, we next examine whether such institutional changes in ethnically diverse societies might help partially explain Sub-Saharan Africa’s
recent economic turnaround, using cross-country data. Table 6 makes the point that what we observe within Kenya appears to have more general relevance. In column 1 we replicate the key result from Easterly and Levine (1997) using data from the 1960s to the 1980s. More specifically we find, as they established, that ethnic diversity is negatively associated with economic growth. Column 2 extends the Easterly-Levine data set to the 2000s and shows that this relationship is weaker when the whole period is taken into account. In column 3 we test whether the association between ethnic fractionalization and economic growth varies with the presence of democracy. The results are striking: while the negative, statistically significant, relationship still holds for periods of autocracy, there is no association between ethnic fractionalization and economic growth in democracies. Column 4 shows that if we restrict the sample to Africa not only does this continue to be the case but also the interaction between ethnic diversity and democracy becomes positive and statistically significant, eliminating the negative effects of ethnic diversity, thus paralleling our findings for Kenya.

These results are inherently speculative given that democratization is clearly correlated with other important changes and is far from randomly assigned, but we view it as thought-provoking nonetheless, and suggestive of the relevance of our results beyond Kenya. Ethnic divisions appear to contribute to poor economic policies (and consequently contribute to poor economic performance) when political institutions are sufficiently weak that politicians can exploit ethnic fractionalization for their own benefit. Yet, ethnic divisions cease to be a salient problem for economic policy under democracy. In this sense, democracy serves as a form of insurance against downside political risks.

These findings highlight some useful avenues for future research. First, while we find that multi-party democracy dampens ethnic favoritism, it is not clear which particular institutional dimension is most critical for this result. Is this simply a consequence of heightened electoral competition, or are the strong civil society and free press that also took root in Kenya also important? Second, it is important to consider the relevance of the observability of the public good in question for our results. Roads are highly salient and observable investments, and this is relevant in at least two ways. On the one hand, roads are prime targets for favoritism, because it is easy for a politician to point them and take credit for them. On the other hand, it is also easy for opposition parliamentarians, the media and civil society groups to spot blatant imbalances in the allocation of these large infrastructure investments, which might make the allocation of
roads particularly sensitive to democratic reform. The lower degree of observability for some other public investments, such as those in education or health, might lead them to be less responsive to the institutional changes wrought by democratization.

References


Figure 1: Evolution of Political Regimes in Sub-Saharan Africa, 1963-2011

Notes: This figure plots the revised combined polity score for Sub-Saharan Africa (average) and Kenya. Polity IV defines three regime categories: autocracies (-10 to -6), anocracies (-5 to +5) and democracies (+6 to +10). The vertical lines represent regime changes in Kenya: December 1969 is the transition from democracy to autocracy, while December 1992 is the return of democracy. Source: authors’ calculations and Polity IV Project, Political Regime Characteristics and Transitions, 1800-2011. See Web Data Appendix for data sources.

Figure 2: Evolution of GDP per capita growth in Sub-Saharan Africa, 1963-2011

Notes: This figure plots GDP per capita growth (%) for Sub-Saharan Africa (average) and Kenya. We take a 5-year moving average to smooth fluctuations. The vertical lines represent regime changes in Kenya: December 1969 is the transition from democracy to autocracy, while December 1992 is the return of democracy. See Web Data Appendix for data sources.
Figure 3: Evolving District Boundaries and Ethnic Composition in British Kenya

Notes: These figures show the ethnic composition at the district level in British Kenya, using the 1962 Population Census, and the evolution of district boundaries for selected years = [1909, 1933, 1963]. A district $d$ is defined as belonging to ethnic group $e$ if more than 50% of the district population is from ethnic group $e$. There are three districts with no majoritarian group: Nairobi, Mombasa and Trans-Nzoia. The 1963 district boundaries ($N = 41$) are used in all our analysis. Nairobi is the capital city. See Web Data Appendix for data sources.

Figure 4: History Timeline of Political and Leadership Transitions

Notes: This figure shows the history timeline of political transitions and leadership transitions. Political transitions: December 1969 is the transition from democracy to autocracy, while December 1992 is the return of democracy. Leadership transitions: from Kenyatta (Kikuyu) to Moi (Kalenjin) in August 1978, and from Moi (Kalenjin) to Kibaki (Kikuyu) in December 2002.
Notes: These figures show the evolution of Kenya’s paved road network for selected years = [1964, 1969, 1979, 1992, 2002]. The year 1964 is the first year for which we have GIS data after Kenya became independent in December 1963. Years for political transitions: December 1969 is the transition from democracy to autocracy, and December 1992 is the return of democracy. Years for leadership transitions: from Kenyatta (Kikuyu) to Moi (Kalenjin) in August 1978 (we only have maps for 1979), and from Moi (Kalenjin) to Kibaki (Kikuyu) in December 2002. We have no data post 2002. Nairobi is the capital city. All the road maps are layered on top of ethnic demographics - we illustrate the two coethnic areas, the Kikuyu and Kalenjin districts. The coethnic districts are defined as districts whose the ethnicity of the president is more than 50% of the population. See Appendix Table 2 and Web Data Appendix for data sources.
Figure 6: Road Investment in Coethnic and Non-Coethnic Districts, 1963-2011

Notes: This figure plots the ratio of the share of road development expenditure in year $t$ to the share of population in 1962 for coethnic and non-coethnic districts $d$. A district $d$ is defined as coethnic if more than 50% of its population is from the ethnic group of the president at time $t$. The two vertical solid lines represent political transitions: December 1969 is the transition from democracy to autocracy, while December 1992 is the return of democracy. The two vertical dotted lines represent leadership transitions: from Kenyatta (Kikuyu) to Moi (Kalenjin) in August 1978, and from Moi (Kalenjin) to Kibaki (Kikuyu) in December 2002. See Appendix Table 2 and Web Data Appendix for data sources.

Figure 7: Road Investment in Kikuyu, Kalenjin and Other Districts, 1963-2011

Notes: This figure plots the ratio of the share of road development expenditure in year $t$ to the share of population in 1962 for coethnic and non-coethnic districts $d$. Coethnic districts are as defined in figure 6, except we now disaggregate the coethnic districts into the two different leaders in Kenya’s history. The president is Kikuyu during 1963-1978, Kalenjin during 1978-2002 and Kikuyu during 2002-2011. A district is defined as Kikuyu (Kalenjin) if more than 50% of its population is Kikuyu (Kalenjin). The two vertical lines represent political transitions and are defined as in figure 6: December 1969 is the transition to autocracy, while December 1992 is the return of democracy. The two vertical dotted lines represent leadership transitions: from Kenyatta (Kikuyu) to Moi (Kalenjin) in August 1978, and from Moi (Kalenjin) to Kibaki (Kikuyu) in December 2002. See Appendix Table 2 and Web Data Appendix for data sources.
Figure 8: Ethnic Favoritism and Political Regimes in Kenya, 1963-2011

Notes: This figure plots $\theta$, our estimate of ethnic favoritism, and the revised combined polity score for Kenya annually from 1963 to 2011. Source: authors' calculations and Polity IV Project, Political Regime Characteristics and Transitions, 1800-2011. The two vertical solid lines represent political transitions: December 1969 is the transition from democracy to autocracy, while December 1992 is the return of democracy.

Figure A.1: Democratic Change in Sub-Saharan Africa and the World, 1960-2011

Notes: This figure plots the share of democracies (%, population-weighted averages) for Sub-Saharan Africa and the world annually from 1960 to 2011. We define as democratic any country that is not an autocracy in the Polity IV data set, i.e. any country whose combined polity score is strictly inferior to -5. Source: authors' calculations and Polity IV Project, Political Regime Characteristics and Transitions, 1800-2011. See Web Data Appendix for data sources.
Table 1: Road Expenditure, Ethnicity and Democratic Change in Kenya, 1963-2011

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>Share of road development expenditure [d,t] / Population share [d,1962]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Panel A:</td>
<td></td>
</tr>
<tr>
<td>Coethnic District Indicator [d,t]</td>
<td>0.97***</td>
</tr>
<tr>
<td></td>
<td>(0.36)</td>
</tr>
<tr>
<td>Panel B:</td>
<td></td>
</tr>
<tr>
<td>Coethnic District Indicator [d,t]</td>
<td>1.57***</td>
</tr>
<tr>
<td></td>
<td>(0.49)</td>
</tr>
<tr>
<td>Coethnic District Indicator [d,t] x Democracy Indicator [t]</td>
<td>-1.11*</td>
</tr>
<tr>
<td></td>
<td>(0.61)</td>
</tr>
<tr>
<td>F-test</td>
<td>[p-value]</td>
</tr>
<tr>
<td>Coethnic + Coethnic x Democracy = 0</td>
<td>[0.31]</td>
</tr>
<tr>
<td>No. of districts</td>
<td>41</td>
</tr>
<tr>
<td>District and year fixed effects</td>
<td>Y</td>
</tr>
<tr>
<td>(Population, area, urbanization rate) x trend</td>
<td>N</td>
</tr>
<tr>
<td>(Earnings, employment, cash crops) x trend</td>
<td>N</td>
</tr>
<tr>
<td>(Main highway, border, dist.Nairobi) x trend</td>
<td>N</td>
</tr>
<tr>
<td>District time trends</td>
<td>N</td>
</tr>
</tbody>
</table>

Notes: OLS regressions using data on 41 districts annually from 1963 to 2011. Standard errors corrected for clustering at the district level are reported in parentheses; *** denotes significance at 1%, ** at 5%, and * at 1%. Coethnic District Indicator [d,t] is an indicator variable whose value is one if more than 50% of the population of district d is from the ethnic group of the president at time t. Democracy Indicator [t] is an indicator variable whose value is one if year t is a democracy year. The F-test is used to test the null hypothesis of joint equality between a coethnic and a non-coethnic district during democracy. Columns (2)-(4) include controls interacted with a time trend (1963-2011). These controls are: [i] demographic (district population in 1962, district area in sq km, and urbanization rate in 1962). [ii] economic activity (district total earnings in 1966, employment in the formal sector in 1963 and value of cash crop exports in 1965). [iii] economic geography (an indicator variable whose value is one if any part of the district is on the Mombasa-Nairobi-Kampala corridor, an indicator variable whose value is one if the district borders Uganda or Tanzania, and the Euclidean distance in km to Nairobi). See Appendix Table 2 and Web Data Appendix for data sources and construction of variables.
Table 2: Road Building, Ethnicity and Democratic Change in Kenya, 1964-2002

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>Share of paved road construction [d,t] / Population share [d,1962]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
</tbody>
</table>

**Panel A:**

Coethnic District Indicator [d,t]  
1.91**  
(0.94)  
1.94*  
(0.99)  
2.20*  
(1.09)  
3.24*  
(1.72)  
3.96  
(2.38)  

**Panel B:**

Coethnic District Indicator [d,t]  
3.00**  
(1.23)  
3.03**  
(1.26)  
3.19**  
(1.33)  
3.90**  
(1.76)  
3.34  
(2.38)  

Coethnic District Indicator [d,t] x Democracy Indicator [t]  
-3.55**  
(1.38)  
-3.61**  
(1.36)  
-3.45**  
(1.32)  
-2.71*  
(1.46)  
-3.22**  
(1.49)  

F-test [p-value]  
0.44  
0.49  
0.10  
0.34  
0.00  

Coethnic + Coethnic x Democracy = 0  
[0.51]  
[0.49]  
[0.75]  
[0.56]  
[0.97]  

Observations  
410  
410  
410  
410  
410  

No. of districts  
41  
41  
41  
41  
41  

District and year fixed effects  
Y  
Y  
Y  
Y  
Y  

(Population, area, urbanization rate) x trend  
N  
Y  
Y  
Y  
N  

(Earnings, employment, cash crops) x trend  
N  
N  
Y  
Y  
N  

(Main highway, border, dist.Nairobi) x trend  
N  
N  
N  
Y  
N  

District time trends  
N  
N  
N  
N  
Y  

Notes: OLS regressions using maps on 41 districts from 1964 to 2002. The sample is smaller because maps are only available for selected years = [1964, 1967, 1969, 1972, 1974, 1979, 1981, 1984, 1987, 1992, 2002]. Standard errors corrected for clustering at the district level are reported in parentheses; *** denotes significance at 1%, ** at 5%, and * at 1%. Coethnic District Indicator [d,t] is an indicator variable whose value is one if more than 50% of the population of district d is from the ethnic group of the president at time t. Democracy Indicator [t] is an indicator variable whose value is one if year t is a democracy year. The F-test is used to test the null hypothesis of joint equality between a coethnic district and a non-coethnic district during democracy. Columns (2)-(4) include controls interacted with a time trend (1963-2011). These controls are: (i) demographic (district population in 1962, district area in sq km, and urbanization rate in 1962). (ii) economic activity (district total earnings in 1966, employment in the formal sector in 1963 and value of cash crop exports in 1965). (iii) economic geography (an indicator variable whose value is one if any part of the district is on the Mombasa-Nairobi-Kampala corridor, an indicator variable whose value is one if the district borders Uganda or Tanzania, and the Euclidean distance in km to Nairobi). See Appendix Table 2 and Web Data Appendix for data sources and construction of variables.
## Table 3: Robustness Checks for the Main Specifications

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>Share of road dvt expenditure [d,t]</th>
<th>Share of road dvt expenditure [d,t]</th>
<th>Share of paved road construction [d,t]</th>
<th>Share of paved road construction [d,t]</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>Panel A:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coethnic District Indicator [d,t]</td>
<td>1.02*** (0.35)</td>
<td>1.74*** (0.49)</td>
<td>1.84*** (0.90)</td>
<td>3.05*** (0.99)</td>
</tr>
<tr>
<td>x Democracy Indicator [t]</td>
<td>-1.32** (0.63)</td>
<td>-2.22* (1.29)</td>
<td>-2.71* (1.46)</td>
<td>-4.80 (2.93)</td>
</tr>
<tr>
<td>F-test [p-value]</td>
<td>0.90 [0.35]</td>
<td>0.52 [0.48]</td>
<td>0.34 [0.56]</td>
<td>0.11 [0.74]</td>
</tr>
<tr>
<td>Coethnic + Coethnic x Democracy = 0</td>
<td>[0.33]</td>
<td>[0.60]</td>
<td>[0.53]</td>
<td>[0.90]</td>
</tr>
<tr>
<td>Panel B:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coethnic Share [d,t]</td>
<td>1.25*** (0.38)</td>
<td>2.30*** (0.56)</td>
<td>2.34*** (1.00)</td>
<td>4.44*** (1.13)</td>
</tr>
<tr>
<td>x Democracy Indicator [t]</td>
<td>-1.90*** (0.66)</td>
<td>-3.78** (1.45)</td>
<td>-3.20* (1.79)</td>
<td>-5.30 (4.05)</td>
</tr>
<tr>
<td>F-test [p-value]</td>
<td>0.97 [0.33]</td>
<td>0.28 [0.60]</td>
<td>0.40 [0.53]</td>
<td>0.02 [0.90]</td>
</tr>
<tr>
<td>Coethnic + Coethnic x Democracy = 0</td>
<td>[0.39]</td>
<td>[0.60]</td>
<td>[0.53]</td>
<td>[0.90]</td>
</tr>
<tr>
<td>Observations</td>
<td>2009</td>
<td>2009</td>
<td>2009</td>
<td>410</td>
</tr>
</tbody>
</table>

Notes: Columns (1)-(4): OLS regressions using data on 41 districts annually from 1963 to 2011. Columns (5)-(8): OLS regressions using maps on 41 districts from 1963 to 2002. The sample is smaller because maps are only available for selected years = [1964, 1967, 1969, 1972, 1974, 1979, 1981, 1984, 1987, 1992, 2002]. All regressions include district and year fixed effects. Standard errors corrected for clustering at the district level are reported in parentheses; *** denotes significance at 1%, ** at 5%, and * at 10%. Coethnic District Indicator [d,t] is an indicator variable whose value is one if more than 50% of the population of district d is from the ethnic group of the president at time t. Coethnic Share [d,t] is the population share of the ethnic group of the president in district d at time t. Democracy Indicator [t] is an indicator variable whose value is one if year t is a democracy year. The F-test is used to test the null hypothesis of joint equality between a coethnic district and a non-coethnic district during democracy. Columns (1)-(8) include controls interacted with a time trend (1963-2011). These controls are: [i] demographic (district population in 1962, district area in sq km, and urbanization rate in 1962). [ii] economic activity (district total earnings in 1966, employment in the formal sector in 1963 and value of cash crop exports in 1965). [iii] economic geography (an indicator variable whose value is one if any part of the district is on the Mombasa-Nairobi-Kampala corridor, an indicator variable whose value is one if the district borders Uganda or Tanzania, and the Euclidean distance in km to Nairobi). See Appendix Table 2 and Web Data Appendix for data sources and construction of variables.
Table 4: Leadership Change, Democratic Change and Road Expenditure in Kenya, 1963-2011

<table>
<thead>
<tr>
<th>Leader:</th>
<th>KENYATTA</th>
<th>MOI</th>
<th>KIBAKI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regime:</td>
<td>Democracy</td>
<td>Autocracy</td>
<td>Autocracy</td>
</tr>
<tr>
<td>1963-1969</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
</tbody>
</table>

- Kikuyu District Indicator [d,1962] -0.44 0.96** 0.66 -0.88 0.00
  (0.39) (0.39) (0.49) (0.57) (0.63)

- Kalenjin District Indicator [d,1962] -0.57 -0.17 1.88*** 0.70 -0.60
  (0.41) (0.32) (0.66) (1.11) (0.57)

F-test [p-value] 0.15 6.92** 3.13* 2.26 0.99
Kikuyu District - Kalenjin District = 0 [0.70] [0.01] [0.08] [0.14] [0.33]

| Observations | 287 | 369 | 574 | 410 | 369 |
| No. of districts | 41 | 41 | 41 | 41 | 41 |
| Year fixed effects | Y | Y | Y | Y | Y |
| District fixed effects | - | - | - | - | - |

Notes: OLS regressions using data on 41 districts annually from 1963 to 2011. Standard errors corrected for clustering at the district level are reported in parentheses; *** denotes significance at 1%, ** at 5%, and * at 1%. The number of observations depends on the number of years of the regime. Kikuyu (Kalenjin) District Indicator [d,1962] is an indicator variable whose value is one if more than 50% of the population of district d is Kikuyu (Kalenjin) according to the 1962 population census. Non-Kikuyu and non-Kalenjin districts are the omitted group. Unlike previous regressions, we cannot include district fixed effects because Kikuyu (Kalenjin) District Indicator [d,1962] does not vary over time. We cannot include the same controls (or district time trends) as in Table 1 because the number of observations significantly decreases when we restrict our analysis to each interval. The F-test is used to test the null hypothesis of joint equality between a Kikuyu district and a Kalenjin district. See Appendix Table 2 and Web Data Appendix for data sources and construction of variables.
Table 5: Role of the Vice-President and Effects on Cabinet Composition: 1963-2011

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>Share of road dvt expenditure [d,t]</th>
<th>Ethnic share of cabinet [e,t]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pop. share [d,1962]</td>
<td>Pop. share [e,1962]</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Coethnic District [d,t]/Coethnic Group Indicator [e,t]</td>
<td>1.74*** [0.49]</td>
<td>2.62*** [0.71]</td>
</tr>
<tr>
<td>Coethnic District [d,t]/Coethnic Group Indicator [e,t] x Democracy Indicator [t]</td>
<td>-1.32** [0.63]</td>
<td>-1.63** [0.69]</td>
</tr>
<tr>
<td>VP-Coethnic District [d,t] / VP-Coethnic Group Indicator [e,t]</td>
<td>1.46** [0.56]</td>
<td></td>
</tr>
<tr>
<td>VP-Coethnic District [d,t] / VP-Coethnic Group Indicator [e,t] x Democracy Indicator [t]</td>
<td>-1.42** [0.61]</td>
<td></td>
</tr>
<tr>
<td>F-test, Coethnic [p-value]</td>
<td></td>
<td>0.90 [0.35]</td>
</tr>
<tr>
<td>Coethnic + Coethnic x Democracy = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-test, VP-Coethnic [p-value]</td>
<td></td>
<td>0.00</td>
</tr>
<tr>
<td>VP-Coethnic + VP-Coethnic x Democracy = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>2009</td>
<td>2009</td>
</tr>
<tr>
<td>No. of districts/ethnic groups</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>Year fixed effects</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>District/ethnic group fixed effects</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Controls</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

Notes: Columns (1)-(2): OLS regressions using expenditure data on 41 districts annually from 1963 to 2011. Columns (3)-(4): OLS regressions using data on all elections from 1963 to 2011, for 13 groups (twelve African ethnic groups and another category [Asians, Arabs, Non-Kenyans]). The dependent variable is the ratio of the cabinet share of ethnic group e to its population share. Standard errors corrected for clustering at the district/group level are reported in parentheses; *** denotes significance at 1%, ** at 5%, and * at 10%. Coethnic District Indicator [d,t] is an indicator variable whose value is one if more than 50% of the population of district d is from the ethnic group of the president at time t. Coethnic Group Indicator [e,t] is an indicator variable whose value is one if the president at time t belongs to ethnic group e. Democracy Indicator [t] is an indicator variable whose value is one if year t is a multi-party year. VP-Coethnic District Indicator [d,t] is an indicator variable whose value is one if more than 50% of the population of district d is from the ethnic group of the vice-president at time t. VP-Coethnic Group Indicator [e,t] is an indicator variable whose value is one if the vice-president at time t belongs to ethnic group e. The F-tests are used to test the null hypothesis of joint equality between a coethnic district/group and a non-coethnic district/group for the president and the vice-president during a multi-party year. Columns (1)-(2) include the standard controls interacted with a time trend. Columns (3)-(4) include ethnic group time trends. See Appendix Table 2 and Web Data Appendix for data sources and construction of variables.
### Table 6: Economic Growth, Ethnic Diversity and Democratic Change Across Countries: 1960-2010

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample: World</td>
</tr>
<tr>
<td>Sample: World</td>
</tr>
<tr>
<td>Ethnic [c,1960]</td>
</tr>
<tr>
<td>(0.006)</td>
</tr>
<tr>
<td>Ethnic [c,1960] x Democracy [c,d]</td>
</tr>
<tr>
<td>(0.009)</td>
</tr>
<tr>
<td>Democracy [c,d]</td>
</tr>
<tr>
<td>(0.005)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F-test [p-value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnic + Ethnic x Democracy = 0</td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>Number of Countries</td>
</tr>
<tr>
<td>Controls</td>
</tr>
</tbody>
</table>

**Notes:** OLS regressions using GDP data on 110 countries c for five decades d = [1960s, 1970s, 1980s, 1990s, 2000s]. The dependent variable, *Growth of Per Capita Real GDP [c,d]*, is the average growth rate of real per capita GDP for country c in decade d. We use Easterly and Levine’s (1997) - 1960s, 1970s and 1980s data set and extend it using the Penn World Tables v7.1. *Ethnic [c,1960]* is the index of ethnonomic fractionalization of country c in 1960. This variable was obtained from Easterly and Levine (1960), the initial source being Atlas Narodov Mira (1964). *Democracy [c,d]* is an indicator variable whose value is one if country c is not an autocracy in decade d, specifically if the average combined polity score for decade d is strictly less than -5, the threshold defined by Polity IV. Standard errors corrected for clustering at the country level are reported in parentheses; *** denotes significance at 1%, ** at 5%, and * at 1%. Easterly and Levine (1997) use Seemingly Unrelated Regressions, while we run OLS regressions and cluster standard errors at the country level, which produces nearly identical results. Columns (1)-(4) include the same controls as in the column (1) of Table IV of Easterly and Levine (1997) – “Indicator for the 1960s”, “Indicator for the 1970s”, “Indicator for the 1980s”, “Indicator Variable for Sub-Saharan Africa”, “Indicator Variable for Latin America and the Caribbean”, “Log of Initial Income”, “Log of Initial Income) Squared” – with the exception of “Log of Schooling”. We do not include their schooling variable because of the high number of missing observations, especially for Sub-Saharan Africa. In columns (4), we run the same regression as in columns (1)-(3) for Sub-Saharan African countries only. The F-test is used to test the null hypothesis of joint equality between a fractionalized and a non-fractionalized country during democracy. See Web Data Appendix for data sources and construction of variables.
Appendix Table 1: Representation of Ethnic Groups in Population and Cabinet in Kenya, 1962-2011

***Panel A: Population Share (%) of Main Ethnic Groups***

<table>
<thead>
<tr>
<th>Census Year</th>
<th>Kikuyu</th>
<th>Kalenjin</th>
<th>Luo</th>
<th>Luhya</th>
<th>Other</th>
<th>Pop. (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962</td>
<td>18.8</td>
<td>10.8</td>
<td>13.4</td>
<td>12.7</td>
<td>44.3</td>
<td>8.6</td>
</tr>
<tr>
<td>1969</td>
<td>20.1</td>
<td>10.9</td>
<td>13.9</td>
<td>13.3</td>
<td>41.8</td>
<td>11.0</td>
</tr>
<tr>
<td>1979</td>
<td>20.9</td>
<td>10.8</td>
<td>13.2</td>
<td>13.8</td>
<td>41.3</td>
<td>15.3</td>
</tr>
<tr>
<td>1989</td>
<td>20.8</td>
<td>11.5</td>
<td>12.4</td>
<td>14.4</td>
<td>40.9</td>
<td>21.4</td>
</tr>
<tr>
<td>1999</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>28.7</td>
</tr>
<tr>
<td>2003</td>
<td>22.9</td>
<td>10.6</td>
<td>12.0</td>
<td>14.9</td>
<td>39.6</td>
<td>32.0</td>
</tr>
<tr>
<td>2009</td>
<td>17.2</td>
<td>12.9</td>
<td>10.8</td>
<td>13.8</td>
<td>45.3</td>
<td>38.6</td>
</tr>
</tbody>
</table>

***Panel B: Cabinet Share (%) of Main Ethnic Groups***

<table>
<thead>
<tr>
<th>Cabinet Year</th>
<th>Kikuyu</th>
<th>Kalenjin</th>
<th>Luo</th>
<th>Luhya</th>
<th>Other</th>
<th>Cabinet Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td>35.3</td>
<td>0.0</td>
<td>0.0</td>
<td>5.9</td>
<td>35.3</td>
<td>17</td>
</tr>
<tr>
<td>1964</td>
<td>31.6</td>
<td>5.3</td>
<td>5.3</td>
<td>5.3</td>
<td>36.7</td>
<td>19</td>
</tr>
<tr>
<td>1966</td>
<td>27.3</td>
<td>4.6</td>
<td>4.6</td>
<td>9.1</td>
<td>45.4</td>
<td>22</td>
</tr>
<tr>
<td>1969</td>
<td>31.8</td>
<td>9.1</td>
<td>9.1</td>
<td>9.1</td>
<td>40.9</td>
<td>22</td>
</tr>
<tr>
<td>1974</td>
<td>31.8</td>
<td>9.1</td>
<td>9.1</td>
<td>9.1</td>
<td>40.9</td>
<td>22</td>
</tr>
<tr>
<td>1979</td>
<td>29.6</td>
<td>14.8</td>
<td>7.4</td>
<td>11.1</td>
<td>37.1</td>
<td>27</td>
</tr>
<tr>
<td>1983</td>
<td>20.8</td>
<td>16.7</td>
<td>12.5</td>
<td>12.5</td>
<td>37.5</td>
<td>24</td>
</tr>
<tr>
<td>1988</td>
<td>25.0</td>
<td>11.8</td>
<td>14.7</td>
<td>11.8</td>
<td>36.7</td>
<td>34</td>
</tr>
<tr>
<td>1993</td>
<td>6.0</td>
<td>20.0</td>
<td>4.0</td>
<td>16.0</td>
<td>54.0</td>
<td>25</td>
</tr>
<tr>
<td>1998</td>
<td>5.4</td>
<td>25.0</td>
<td>0.0</td>
<td>17.9</td>
<td>51.7</td>
<td>28</td>
</tr>
<tr>
<td>2003</td>
<td>21.2</td>
<td>7.7</td>
<td>15.4</td>
<td>19.2</td>
<td>36.5</td>
<td>26</td>
</tr>
<tr>
<td>2005</td>
<td>22.8</td>
<td>6.1</td>
<td>3.0</td>
<td>24.2</td>
<td>43.9</td>
<td>33</td>
</tr>
<tr>
<td>2008</td>
<td>17.4</td>
<td>13.9</td>
<td>11.6</td>
<td>18.6</td>
<td>38.5</td>
<td>43</td>
</tr>
</tbody>
</table>

Notes: Panel A shows the national share of the main groups for each census. The 1999 population census did not disclose ethnic demographics. We instead use the (non-census year) 2003 *Kenya Demographic and Health Survey* to get a sense of the national ethnic profile. Panel B shows the ethnic profile of the central government cabinet for each year an election was held. The cabinet includes the president, vice-president and ministers with portfolios. In the autocracy era (1970-1992), elections were held for constituency representation in parliament, but candidates run under the same party label (KANU). In the democracy era (1963-1969, 1992-to-date) elections were held for constituency representation in parliament and the presidency. The solid lines in Panel B denote leadership transitions: from Kenyatta (Kikuyu) to Moi (Kalenjin) in August 1978, and from Moi (Kalenjin) to Kibaki (Kikuyu) in December 2002. The dashed lines in Panel B denote democratic regime changes in Kenya: December 1969 is the transition from democracy to autocracy, while December 1992 is the return of democracy. See the Supplementary Data Appendix for more information on data sources and variable construction.
Appendix Table 2: Summary Statistics and Data Sources  
(See Web Appendix for a Full Description of the Variables)

<table>
<thead>
<tr>
<th>Panel A: Dependent Variables</th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Obs</th>
<th>Main Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of Road Expenditure [d,t] / Area Share [d]</td>
<td>3.62</td>
<td>7.81</td>
<td>2009</td>
<td>Same sources as the previous variable; GIS map of districts.</td>
</tr>
<tr>
<td>Share of Paved Road Construction [d,t] / Area Share [d]</td>
<td>2.90</td>
<td>8.30</td>
<td>410</td>
<td>Same sources as the previous variable; GIS map of districts.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B: Main Regressors</th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Obs</th>
<th>Main Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coethnic District Indicator [d,t]</td>
<td>0.16</td>
<td>0.37</td>
<td>2009</td>
<td>Timeline of political changes; Population and Housing Census 1962.</td>
</tr>
<tr>
<td>Democracy Indicator [t]</td>
<td>0.53</td>
<td>0.50</td>
<td>49</td>
<td>Timeline of political changes.</td>
</tr>
<tr>
<td>Coethnic Share Indicator [d,t]</td>
<td>0.12</td>
<td>0.29</td>
<td>2009</td>
<td>Timeline of political changes; Population and Housing Census 1962.</td>
</tr>
<tr>
<td>Kikuyu District Indicator [d,1962]</td>
<td>0.17</td>
<td>0.38</td>
<td>41</td>
<td>Timeline of political changes; Population and Housing Census 1962.</td>
</tr>
<tr>
<td>Kalenjin District Indicator [d,1962]</td>
<td>0.15</td>
<td>0.36</td>
<td>41</td>
<td>Timeline of political changes; Population and Housing Census 1962.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel C: Control Variables</th>
<th>Mean</th>
<th>Std.Dev.</th>
<th>Obs</th>
<th>Main Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area [d], Thousand Sq Km</td>
<td>13.9</td>
<td>17.4</td>
<td>41</td>
<td>GIS map of districts.</td>
</tr>
<tr>
<td>Urbanization Rate [d,1962], %</td>
<td>7.4</td>
<td>20.0</td>
<td>41</td>
<td>Population and Housing Census 1962.</td>
</tr>
<tr>
<td>Total Employment in the Formal Sector [d,1963], Thousands</td>
<td>42.6</td>
<td>77.2</td>
<td>41</td>
<td>Statistical Abstract of Kenya 1963.</td>
</tr>
<tr>
<td>Mombasa-Kampala Indicator [d]</td>
<td>0.27</td>
<td>0.44</td>
<td>41</td>
<td>GIS map of districts.</td>
</tr>
<tr>
<td>Border Indicator [d]</td>
<td>0.27</td>
<td>0.44</td>
<td>41</td>
<td>GIS map of districts.</td>
</tr>
<tr>
<td>Euclidean Distance (km) to Nairobi [d]</td>
<td>268.3</td>
<td>146.1</td>
<td>41</td>
<td>GIS map of districts.</td>
</tr>
</tbody>
</table>

### Appendix Table 3: Additional Robustness Checks for the Main Specifications

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>Share of road expenditure ([d,t]) / Population share ([d,1962])</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Coethnic District Indicator ([d,t])</td>
<td>1.74***</td>
</tr>
<tr>
<td></td>
<td>(0.49)</td>
</tr>
<tr>
<td>Coethnic District Indicator ([d,t]) x Democracy Indicator ([t])</td>
<td>-1.32**</td>
</tr>
<tr>
<td></td>
<td>(0.63)</td>
</tr>
<tr>
<td>F-test ([p-value])</td>
<td>0.90</td>
</tr>
<tr>
<td>Coethnic + Coethnic x Democracy = 0 ([p-value])</td>
<td>[0.35]</td>
</tr>
<tr>
<td>No. of districts</td>
<td>41</td>
</tr>
<tr>
<td>District and year fixed effects</td>
<td>Y</td>
</tr>
<tr>
<td>Baseline controls x trend</td>
<td>Y</td>
</tr>
<tr>
<td>Baseline controls x year fixed effects</td>
<td>N</td>
</tr>
<tr>
<td>Number of years coethnic district</td>
<td>N</td>
</tr>
<tr>
<td>Clustering / Conley standard errors</td>
<td>District</td>
</tr>
</tbody>
</table>

**Notes:** OLS regressions using data on 41 districts annually from 1963 to 2011. Standard errors corrected for clustering at the district level are reported in parentheses; * p<0.10, ** p<0.05, *** p<0.01. **Coethnic District Indicator \([d,t]\)** is an indicator variable whose value is one if more than 50% of the population of district \(d\) is from the ethnic group of the president at time \(t\). **Democracy Indicator \([t]\)** is an indicator variable whose value is one if year \(t\) is a democracy year. Column (1): Main regression. Column (2): We interact the baseline controls with year fixed effects. Column (3): We include the number of years a district has been a coethnic district. Column (4): Standard errors corrected for spatial clustering using a 200 km threshold. Column (5) Standard errors corrected for spatial clustering using a 400 km threshold. We include various baseline controls interacted with a time trend (1963-2011). Demography: district population (1962), area (sq km), urbanization rate (1962). Economic activity: district total earnings (1966) and employment (1963) in the formal sector, value of cash crop exports (1965). Economic geography: indicator variable equal to one if the district is on the main corridor Mombasa-Nairobi-Kampala, indicator variable equal to one if the district borders Uganda or Tanzania, Euclidean distance (km) to Nairobi. Regressions in Columns (1)-(5) do not include district time trends. See Appendix Table 2 and Web Data Appendix for data sources and construction of variables.
Not for Publication: Theory Appendix

Assume that $\theta < \max\{\frac{1}{\pi^A}, \frac{1}{\pi^B}\}$.

Denote by $V^i(j)$ a MPE utility for a citizen of type $i$ starting in a subgame with a president of type $j$.

Proceed by backwards induction. Assume a president of type $i$ announces $P^i = (\tau^i, \eta^{Ai}, \eta^{Bi})$.

For group $i$ to support the policy it must be that

\[ R(\eta^{ii}) - \tau^i + \gamma V^i(i) + (1 - \gamma) V^i(j) \geq \gamma V^i(i) + (1 - \gamma) V^i(j) \]

\[ R(\eta^{ii}) - \tau^i + (\gamma - \eta^{ii}) (V^i(i) - V^i(j)) \geq 0 \]

(2)

The President thus maximizes his instantaneous utility subject to (2) and (1).

\[
\max_{\pi^i, \eta^{ii}, \eta^{ij}} \pi^i (\tau - \eta^{ii}) + \pi^j (\tau - \eta^{ij}) \\
R(\eta^{ii}) - \tau^i + (\gamma - \eta^{ii}) (V^i(i) - V^i(j)) \geq 0 \\
\eta^{ii} \leq \theta (\pi^i \eta^{ii} + \pi^j \eta^{ij}) \\
\eta^{ij} \geq 0
\]

Note that the last constraint cannot bind: if $\eta^{ij} = 0$ then due to (1) we would have $\eta^{ii} \leq \theta \pi^i \eta^{ii}$ which directly contradicts $\theta < \max\{\frac{1}{\pi^A}, \frac{1}{\pi^B}\}$.

The first order conditions of the problem yield ($\lambda$ and $\mu$ as multipliers)

\[
\pi^i + \pi^j - \lambda = 0 \\
-\pi^i + \lambda R'(\eta^{ii}) + \mu (\theta \pi^i - 1) = 0 \\
-\pi^j + \mu \theta \pi^j = 0
\]

This solves to

\[
\lambda = 1 \\
R'(\eta^{ii}) = \frac{1}{\theta} \\
\mu = \frac{1}{\theta}
\]

which means that both constraints are binding. Since this does not depend on $\pi^i$ or $\pi^j$ (the only differences across groups), we have that $R'(\eta^i) \equiv R'(\eta^{ii}) = R'(\eta^{ij}) = \frac{1}{\theta}$.

A.1
Also, since (2) is binding, we have
\[ \eta^{ji} = \eta \frac{1 - \theta \pi^i}{\theta \pi^j} \]
\[ \eta^{ij} = \eta \frac{1 - \theta \pi^j}{\theta \pi^i} \]

So we can now set up the value functions
\[
\begin{align*}
V^i(i) &= R(\eta^*) - \tau^i + \bar{\gamma} V^i(i) + (1 - \bar{\gamma}) V^i(j) \\
V^i(j) &= R(\eta^{ij}) - \tau^i + \bar{\gamma} V^i(i) + (1 - \bar{\gamma}) V^i(j) \\
V^j(j) &= R(\eta^*) - \tau^j + \bar{\gamma} V^j(j) + (1 - \bar{\gamma}) V^j(i) \\
V^j(i) &= R(\eta^{ji}) - \tau^j + \bar{\gamma} V^j(j) + (1 - \bar{\gamma}) V^j(i)
\end{align*}
\]

and in addition we know that the two versions of (1) are binding
\[
\begin{align*}
R(\eta^*) - \tau^i + (\bar{\gamma} - \gamma) (V^i(i) - V^i(j)) &= 0 \\
R(\eta^*) - \tau^j + (\bar{\gamma} - \gamma) (V^j(j) - V^j(i)) &= 0.
\end{align*}
\]

This gives us a linear system of six equations in six unknowns \((V^i(i), V^i(j), V^j(j), V^j(i), \tau^i, \tau^j)\). This has a unique solution, and hence uniqueness of MPE is proven.
Not for Publication: Web Data Appendix

This appendix describes all of the data sources used in the paper. Summary statistics for the variables we construct are reported in Appendix A Table 1.

1. Road Expenditure Data

We construct a district-year road expenditure (in 2000 USD) panel data set annually for the period 1963 to 2011. Total road expenditure is the sum of development expenditure [new investments] and recurrent expenditure [maintenance]. The Annual Development Estimates of Kenya, our main data source, allows us to track only road development expenditure at the district level.\(^{27}\) In particular, Annual Development Estimate list programatically individual road projects (e.g. project Thika Main Road from Thika town to Nyeri town via Limuru town) and their related costs.\(^{28}\) When a road project spans more than one district, we use GIS tools to deconstruct the road network in question and calculate the length of kilometers within each district. Hence, for projects which span across more than one district the expenditure share is distance-weighted. For the period 1963-1973, development estimates for road expenditure are not documented as individual road projects, instead, only large nation-wide road programs are reported (and their costs). To breakdown these aggregate road programs into individual projects and to obtain the district level expenditure, we supplement our data with the Development Plans of Kenya (usually a four year plan) and World Bank project reports.\(^{29}\) This exercise allows us to construct a road expenditure district-year panel data set of 2009 observations (41 districts tracked for 49 years).

2. Road Construction Data

We create a district-year road construction (unbalanced) panel data set using a novel GIS database of the Kenyan road network on regular intervals for 1963-2011. In particular we have road maps for the years: 1964, 1967, 1969, 1972, 1974, 1979, 1981, 1987, 1989, 1992 and 2002. To construct the road network, we use a baseline the latest GIS database containing contemporary roads from Global GIS. We use a series of historical maps to recreate the evolution of the road network in GIS.\(^{30}\) We are only able to consistently track the evolution of the paved roads network. Tracking of non-paved roads (improved, laterite, dirt roads) provides a challenge due to definitional changes in the legends of the maps as well as omissions on several occasions. We

\(^{27}\)Road expenditure is reported in East African Pounds 1963-1966, Kenyan Pounds 1967-1999, and Kenya Shillings 2000 onwards. For consistency we use Officer (2009) and IMF (2011), to convert these amounts to current US$ and further using a US$ deflator series these amounts are constructed in constant 2000 USD.

\(^{28}\)These reports are the Development Estimates of Kenya 1963-2011, Physical Infrastructure Sector MTEF Report of Kenya 2007/2008-2009/2010 and 2009/2010-2011/2012. We further use Recurrent Estimates of Kenya 1963-2011 to make comparisons with aggregate spending on road expenditure to: (i) the total budget, (ii) expenditure in other public goods (education, health and water development) and (iii) the road maintenance budget.

\(^{29}\)The Development Plan of Kenya: 1964-1966, 1966-1970, 1970-1974 and 1974-1978. Most road programs during this era were either fully or partially funded under the IDA program of the World Bank, we collate all the Road Program Operational Reports [available on http://www.worldbank.org/projects, accessed on November 2011]. These Operational Reports contain for each program the individual projects and their respective costs.

use categories in the Michelin map motorways and hard-surfaced roads to define our measure of paved roads. The few Survey of Kenya maps available during the period 1967-1991 are further used as a robustness check to the Michelin series. Two limitations on recent map availability are worth mentioning. Firstly, we use the 2002 Survey of Kenya map to recreate the paved network in 2002. Secondly, no updated road maps are available for the post-2002 period. The latest government survey of the road network was undertaken in 2002 and a more updated inventory was planned in 2010 but this has not surfaced yet in the public domain. Further, commercial mapping agencies have not been able to update their mapping series post-2002 as these agencies use the official survey maps as a baseline. Using GIS we splice the road networks for the respective years with district boundaries to create a paved road construction (km) district-year panel data set of 451 observations (41 districts tracked for 11 years).

3. Ethnic Census

Our primary ethnic demographic data is obtained from the housing and population census of 1962 (Government of Kenya (1965)). The population census of 1962 collected ethnic demographics at the disaggregated level of the sub-location (168), a unit of administration below the district. Using GIS tools to create a post-independence 1963 digital district map we aggregate from the sub-location to district level construct of each district (41) its ethnic demographics. The population census reports 41 ethnic classifications. In line with studies on the political economy of Kenya we aggregate the classifications into 13 ethnic groups. For each district we create a set of 13 dummies equal to 1 if more than 50% of district population is from a certain ethnic group X and 0 otherwise. These district dummies are used to construct the other key variables in the analysis. Coethnic District Indicator $[d,t]$ is a dummy equal to 1 if more than 50% of the district $d$ population is from the ethnic group of the president in year $t$. The evolution of this variable is as follows, the ethnic group of the president is Kikuyu during Kenyatta’s era 1963-1978, Kalenjin during Moi’s era 1979-2002 and Kikuyu again during Kibaki’s tenure 2003-2011. The Democracy Indicator $[t]$ is a dummy equal to 1 if the year $t$ is a democratic year and zero otherwise. The dummy variable takes the value 1 during the period 1963-1969 and 1993-2011 and 0 in the interim periods. The Kikuyu District Indicator $[d,1962]$ (resp. Kalenjin District Indicator $[d,1962]$) is a dummy equal to 1 if more than 50% of the district $d$’s population is Kikuyu (resp. Kalenjin) in the 1962 population and housing census. The Coethnic Group Indicator $[e,t]$ is an indicator variable whose value is 1 if the president at time $t$ belongs to ethnic group $e$ and 0 otherwise. The VP-Coethnic District Indicator $[d,t]$ is an indicator variable whose value is 1 if more than 50% of the population of district $d$ is from the ethnic group of the vice-president at time $t$. The VP-Group Indicator $[e,t]$ is an indicator variable whose value is 1 if the vice-president at time $t$ belongs to ethnic group $e$. In Appendix Table 1 (Panel A) we provide the national population share of the main ethnic groups across modern Kenya. The data tabulated on ethnic composition was collected from housing and population census reports for the years: 1962, 1969, 1979, 1989 and 2009. The 1999 census though collected ethnic de-

31This was revealed in several discussions with archivists at the British Library (London) and Michelin (Paris).
32Kikuyu, Kalenjin, Kamba, Luo, Luhya, Maasai, Coastal, Embu, Kisii, Meru, Somali, Turkana-Samburu and Other (which are Other Africans, Arabs, Asians, Non-Africans).
33Note Kenya’s Development Estimates publications provide expenditures for the year $t$ for the period from July $t−1$ to June $t$. Moi has an influence from 1979 (July 1978-June 1979) and Kibaki has an influence from 2003 (July 2002-June 2003). Similarly, the transition to autocracy in November 1969 is considered from 1970 (July 1969-June 1970) and the transition to democracy took place in December 1992 and is considered from 1993 (July 1992-June 1993).
mographics however these were not released in the public domain. We supplement our sources with Kenya’s DHS for the year 2003. The 2009 census released ethnic shares at the national level.

4. Control Variables: Demographic and Socioeconomic

We use supplementary datasets to construct three sets of control variables at the district level. Firstly, demographic variables: district population and urbanization rates are obtained from the population census of 1962. District area (in kms) is estimated using GIS area calculation of polygons on the digital district boundary created (Survey of Kenya, 1963). Secondly, initial economic activity variables are obtained using the Statistical Abstracts of Kenya to construct total district employment (1963) and total district earnings (1966) in 2000$ in the formal sector. Further, the value of district cash crop exports is constructed at the district level using the Development Plan of Kenya 1964-1970 which provides reports of cash crop production (coffee, tea and sisal) at the district level for the year 1964/65. Thirdly, economic geography variables: GIS tools are used to create an indicator variable which takes the value 1 if the district is on the main highway corridor between Mombasa-Nairobi-Kampala and 0 otherwise, another indicator variable is created which takes on the value 1 if any part of the district borders Tanzania or Uganda, the main two trading partners for the country and a district measure is created of the Euclidean distance between the centroid of the district and Nairobi (the capital).

5. Macroeconomic: Economic Growth, Ethnic Diversity and Democracy

Data on political regimes in Sub-Saharan African countries and Kenya is obtained from the Polity IV Project. We use the variable “Combined Polity Score” which takes values from -10 (hereditary monarchy) to +10 (consolidated democracy). Polity IV categories regimes into autocracies (-10 to -6), anocracies (-5 to +5) and democracies (+6 to +10). The average combined policy score for Sub-Saharan Africa is computed using the individual polity scores and population of each country as weights (obtained from World Bank 2011). GDP per capita growth in Sub-Saharan Africa is obtained using the World Bank (2011). In Table 6 we conduct a similar exercise to Easterly and Levine (1997). We obtain Easterly and Levine’s dataset and append their decadel dataset with two additional decades (1990s and 2000s). We source the same data to expand the variables for the additional two decades. Namely initial income and GDP is obtained from Penn World Tables 7.1. Annual GDP per capita is used to compute the growth of per capita real GDP. The indicator variable democracy [c,d] is a variable whose value is one if country c is not an autocracy in decade d, specifically if the average combined polity score for decade d is strictly less than -5, the threshold defined by Polity IV Project. The variable ethnic [c,1960] is obtained from Easterly and Levine (1997) and is the ethnolinguistic fractionalization of country c.

6. Cabinet Composition

We construct data on the ethnicity and position of all cabinet members between 1963 and 2011 (13 cabinets). This allows us to track the evolution of each ethnic group’s representation in the politics of Kenya. Several data sources are used to compile the data which contains the name

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34 The data is reported in Kenyan Shillings, using Officer (2009) and IMF (2011), we convert these amounts to current US$ and deflate them to get constant 2000$.


36 Available on http://williameasterly.org/academic-work
and position of each cabinet member (president, vice-president, prime minister from 2008, and ministers) between 1963 and 2011. These publications are: *The National Assembly: List of Members*, *Organization of the Government of Kenya*, and *Encyclopedia of Sub-Saharan Africa: Kenya*. While the ethnicity of prominent cabinet members is well-known, the information for the less prominent politicians is obtained in several ways. We use secondary sources: (i) the *Weekly Review* magazine in the Moi period would often list out the cabinet and ethnicity of cabinet members, (ii) the descriptive work done by various political scientists on Kenyan politicians, especially Hornsby (1985) and Ahluwalia (1996), and (iii) the direct help of several journalists from top dailies in Kenya. Collating these sources allows us to calculate the share of each ethnic group in the cabinet. Appendix Table 1 (Panel B) tabulates the evolution of the ethnic share across the political history of Kenya.

**References for Data Appendix**


