American Economic Review 2015, 105(6): 1817–1851
http://dx.doi.org/10.1257/aer.20131031

The Value of Democracy: Evidence from Road Building in Kenya[†]

By Robin Burgess, Remi Jedwab, Edward Miguel, Ameet Morjaria, and Gerard Padró i Miquel*

Ethnic favoritism is seen as antithetical to 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. Guided by a model, it then examines whether the transition in and out of democracy under the same president constrains or exacerbates ethnic favoritism. Across the post-independence 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 five times the length of paved roads built. This favoritism disappears during periods of democracy. (*JEL* D72, H54, J15, O15, O17, O22, R42)

Ethnic favoritism refers to a situation where coethnics 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

* Burgess: Economics Department, London School of Economics, Houghton Street, London WC2A 2AE, UK (e-mail: r.burgess@lse.ac.uk); Jedwab: Economics Department, George Washington University, 2115 G Street NW, Washington, DC 20052 (e-mail: jedwab@gwu.edu); Miguel: Economics Department, University of California–Berkeley, 530 Evans Hall, Berkeley, CA 94720 (e-mail: emiguel@econ.berkeley.edu); Morjaria: Department of Managerial Economics and Decision Sciences, Kellogg School of Management, Northwestern University, 2001 Sheridan Road, Evanston, IL 60208 (e-mail: ameet.morjaria@gmail.com); Padró i Miquel: Economics Department, London School of Economics, Houghton Street, London WC2A 2AE, UK (e-mail: g.padro@lse.ac.uk). For their helpful comments, we thank Gani Aldashev, Alberto Alesina, Tim Besley, Oriana Bandiera, Bronwen Burgess, Konrad Burchardi, Denis Cogneau, Taryn Dinkelman, Ruben Durante, Eliana La Ferrara, Greg Fischer, Paul Gertler, James Habyarimana, Charles Hornsby, Asim Ijaz Khwaja, Michael Kremer, Guy Michaels, Stelios Michalopoulos, Suresh Naidu, Benjamin Olken, Torsten Persson, Jean-Philippe Platteau, Daniel Posner, Jim Robinson, Gerard Roland, Ryan Sheely, Jim Snyder, Justin Valasek, Ekaterina Zhuravskaya, and seminar audiences at UC Berkeley, CEPR Development Economics Symposium, Gothenberg, Harvard, IGC Africa Growth Conference, International Economic Association Conference, LSE, NBER, NEUDC (MIT), Namur, MIT, Oxford, Princeton, PSE, Royal Economic Society Conference, Stanford, Warwick Public Economics Conference, Warwick/Princeton Political Economy Conference, WGAPE (UCLA), World Bank ABCDE, and WZB Berlin, as well as to four anonymous referees for very helpful suggestions and 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. Morjaria thanks Survey of Kenya and Kenya National Archives for hosting his stay in Nairobi. Padró i Miquel acknowledges financial support from the European Union's Seventh Framework Programme (FP/2007-2013)/ERC Starting Grant Agreement 283837. The views expressed here are those of the authors alone and do not necessarily reflect those of DFID or any of the other organizations acknowledged here. The authors declare that they have no relevant or material financial interests that relate to the research described in this paper.

[†] Go to http://dx.doi.org/10.1257/aer.20131031 to visit the article page for additional materials and author disclosure statement(s).

(Mamdani 1996; Easterly and Levine 1997; Herbst 2000; Posner 2005; Alesina and La Ferrara 2005; Miguel and Gugerty 2005; Michalopoulos and Papaioannou 2011; Alesina, Michalopoulos, and Papaioannou 2012). In fact, the widespread belief among citizens that ethnic favoritism is prevalent can "poison" local political culture and make the phenomenon self-sustaining (Horowitz 1985; Esman 1994; Fearon 1999; Wamwere 2003; Chandra 2004; Padró i Miquel 2007; Caselli and Coleman 2013). According to several of these accounts, ethnic favoritism emerges when weak political institutions are unable to constrain governments from discriminating among citizens. Therefore, to understand the 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 an African country for the post-independence period. Second, we examine whether the transition into and out of 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 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 requires observing what happens with public expenditure when there are switches of the ethnic group in power. 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 needs to observe switches between democracy and autocracy under the same leader, which is 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 the design of colonial-era borders in the period before Kenya's independence in 1963. Each post-independence district was dominated by a single ethnic group, and this pattern remains stable over time. Therefore we can directly assess, using road spending and construction by district, whether or not ethnic groups that shared the ethnicity of the president disproportionately benefited from roads.

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 post-independence period. In addition, we have constructed 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.

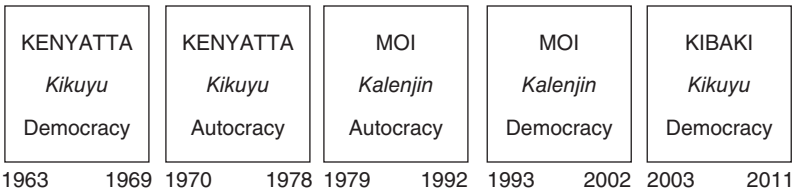

FIGURE 1. POLITICAL AND LEADERSHIP TRANSITIONS, 1963–2011

Notes: This timeline illustrates the history of political transitions and leadership transitions in Kenya. Political transitions are as follows: 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.

Third, roads are the largest single element of public expenditure in Kenya, constituting about 15 percent of total development expenditure over our sample period. This is three times what the Kenyan central government spends on health, education, or water. Roads expenditure is centrally allocated and a highly visible form of public investment and thus a prime area for political patronage. Road building thus represents an attractive setting in which to analyze the extent of ethnic favoritism.

Fourth, the post-independence history of Kenya provides us both with switches in the ethnicity of the president, and switches into and out of democracy under the same president (see Figure 1). During our study period, we observe (i) a transition into autocracy from democracy under the first president of Kenya (Jomo Kenyatta, an ethnic 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 Moi, and (iv) a democratic succession of a Kalenjin president to a Kikuyu president (Mwai Kibaki). These shifts allow us to identify the effect of political transitions on ethnic favoritism holding the identity of the leader constant.

Fifth, as is apparent in Figure 2, democratic change in Kenya mirrors the pattern seen across sub-Saharan Africa. Kenya, like many African countries, was reasonably democratic post-independence in the 1960s, became autocratic in the 1970s and 1980s, and then returned to democracy in the 1990s and 2000s.[1] Our results for Kenya might thus provide insights into broader patterns of African economic and political development. For example, if we find that democracy has value in terms of imposing constraints on the executive (which in turn limits ethnic favoritism), then this might help explain why economic growth has been higher in democratic (1960s, 1990s, 2000s) relative to autocratic (1970s, 1980s) periods. We return to this issue in the conclusion.

[1] Polity is on a -10 to $+10$ scale, with scores below -5 classified as autocratic. To capture transitions between autocracy and imperfect democracy which have characterized Africa's post-independence history, we classify scores of -5 and above as democracies. This involves combining anocracies (i.e., imperfect democracies) and full democracies (which have scores 5 and above) together so that a country is either autocratic (below -5) or democratic (-5 or more) at a given point in time. We use this lower cutoff as the majority of the transitions in Africa (and indeed throughout the developing world) have been from autocracy to imperfect democracy (rather than autocracy to full democracy) and we want to exploit this variation to examine whether it affects ethnic favoritism.

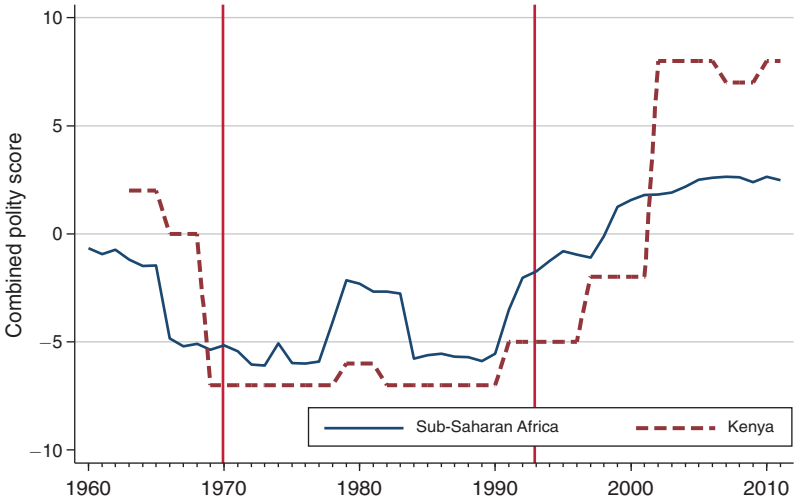

FIGURE 2. EVOLUTION OF POLITICAL REGIMES IN SUB-SAHARAN AFRICA, 1963–2011

Notes: This figure plots the revised combined polity score for Kenya and the population weighted average for the rest of sub-Saharan Africa. Polity IV defines regimes in three categories: autocracies (-10 to -6), anocracies (-5 to $+5$), and democracies ($+6$ to $+10$). Vertical lines indicate regime changes in Kenya: December 1969 is the transition from democracy to autocracy, while December 1992 is the return of democracy. Data sources and construction are described in online Appendix A and Table A2 of online Appendix E.

Our unique setup therefore allows us to assess whether there is ethnic favoritism in roads investment, to quantify the magnitude of this effect, and to estimate the extent to which favoritism is affected by democratization. To help us interpret our results, we set up a model of centralized 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.

We find striking patterns. Across the 1963–2011 period, Kenyan districts that share the ethnicity of the president receive twice as much expenditure on roads and almost five times the length of paved roads built relative to what would be predicted by their population share. This is evidence of an extreme degree of ethnic favoritism. However, these biases are not constant. While in periods of autocracy, coethnic districts receive three times the average expenditure in roads and over five times the length of paved roads, both these biases disappear during periods of democracy. Thus, the political regime is an important determinant of ethnic favoritism. The fact that we find similar results using two independent road datasets—one based on expenditure and the other on road maps—is reassuring.

We construct a counterfactual road network based on the goal of maximizing market potential. There is no evidence of ethnic favoritism in this simulated data, nor is ethnic favoritism affected by the political regime. This indicates that (i) our strong ethnic favoritism results in the actual data series are not being driven by coethnic districts just happening to have high market potential, and (ii) our democracy results are not due to some coincidence between regime transitions and a natural expansion of the road network over time. We also show that if we drop high economic potential

districts (e.g., those in the former White Highlands, around Nairobi, or on major commercial corridors) then our results still hold.

A key insight from our theoretical model is that the ethnic bias parameters that we estimate can be interpreted in terms of regime-specific constraints on executive action. In this light, our empirical findings suggest that even "imperfect" democratic institutions, like those found in Kenya during the 1960s, 1990s, and 2000s, have value by imposing constraints on the executive. Indeed, we show that movements in the regime-specific executive constraint parameter derived from our model (and estimated using our data) closely parallel those in the polity measure of democracy in Figure 2. In the context of the many African countries where presidential power has an ethnic base, democracy thus may translate to lessened favoritism toward coethnics as political leaders are forced to share public goods across the wider population.

Closer examination of recent Kenyan history sheds light on how the re-emergence of democracy in the 1990s changed the nature of constraints on Kenyan leaders and altered the allocation of public resources. Democracy heralded an increase in political choice and participation as well as less repression of popular expression, including by increasingly vocal civil society groups. There was a reduction in press censorship, an explosion of private print and electronic media, and a more active role of parliament and the judiciary in holding political leaders to account (Wrong 2009). These changes meant that the actions of political leaders were under much greater scrutiny, which helps to understand why ethnic favoritism was dramatically reduced during periods of democracy.

Despite its perceived centrality to economic development in Africa, the study of ethnic favoritism in public good allocation using subnational data is a relatively recent phenomena in large part due to the absence of subnational (e.g., district) panel datasets covering the period from independence to the present. Demographic and Health Surveys for Kenya (Kramon and Posner 2014) and from across Africa (Frank and Rainer 2012), which allow researchers to construct schooling and health outcomes over long periods, are generating new insights into whether or not political leaders favor coethnics. Innovative use of satellite data has also enabled researchers to track regional outcomes across leadership and regime transitions (Hodler and Raschky 2014; Morjaria 2014). The literature is thus moving beyond the seminal cross-country analysis of Easterly and Levine (1997). We will turn to a discussion of how our paper complements and contributes to this fast growing literature in the conclusion.

The remainder of the paper is organized as follows. Section I provides a theoretical framework. Section II presents the historical background on roads and politics in Kenya and describes the data. Section III presents the methods and results. Section IV interprets these findings in light of our model and recent Kenyan history. Section V links our paper to the literature on ethnic favoritism, public goods, and economic development in Africa, and concludes.

I. Theoretical Framework

Consider a repeated economy populated by infinitely lived agents that discount the future at rate δ. There is a set 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 π^A. In addition to

the citizens, each group also has an elite that comprises an infinitely countable set of identical potential presidents.

At any point in time, there is a president in power who belongs to either one of these groups, $j \in \{A, B\}$. The president decides on lump-sum taxes τ, common for both groups, and on the amount of public benefits such as schooling, health, civil service jobs, or roads that he provides to each group.[2] Denote by η^{ij} the per capita public benefits expenditure that group i receives when the president belongs to group j. The president only cares about rent extraction, which each period is simply given by

$$\pi^A\left(\tau - \eta^{Aj}\right) + \pi^B\left(\tau - \eta^{Bj}\right).$$

The citizens of group i pay taxes τ and enjoy public benefits η^{ij}, which gives them the following simple instantaneous utility:

$$R\left(\eta^{ij}\right) - \tau,$$

where $R(\cdot)$ is increasing and concave. Note that citizens here do not have any inherent preference for the ethnicity of the president, and only care about the public benefit policies that the president implements.

The president can discriminate across groups in public spending but is limited by institutional and societal constraints. Following Besley and Persson (2010, 2011) we capture these constraints on the executive in a simple way as follows:

$$\eta^{ij} \leq \theta\left(\pi^A \eta^{Aj} + \pi^B \eta^{Bj}\right), \tag{1}$$

where $\theta \in [1, \infty]$ denotes the weakness of constraints on the executive. This formulation states that per capita spending in favor of group i cannot exceed average per capita spending by more than a factor θ. 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 group. At the opposite extreme, $\theta = 1$ implies that no discrimination across groups is possible.

We assume that political institutions are also relatively weak, and therefore the active support of one's coethnics is necessary to stay in power.[3] As in Padró i Miquel (2007), we assume that an acting president who receives the support of his ethnic group stays in power with probability $\overline{\gamma}$. If instead coethnics refuse to support the policies of the president, such policies cannot be implemented and he is ousted from

[2] We assume no tax discrimination for a number of reasons. First, the empirical evidence is mixed on African governments' capacity to effectively discriminate with taxation (Bates 1981; Kasara 2007), so this simplifying assumption is a useful benchmark. Moreover, τ 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. Nothing crucial hinges on this assumption, since Padró i Miquel (2007) obtains similar results in a model with tax discrimination.

[3] To 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.

power. In this case, an open succession follows, and the new president belongs to the same ethnic group as the ousted president with probability $\underline{\gamma}$, for $1 > \overline{\gamma} \geq \underline{\gamma} > 0$.[4]

This simple model features a unique Markov perfect equilibrium (MPE) characterized in the following proposition, which is proven in online Appendix C (the mathematical Appendix).

PROPOSITION 1: *Assume* $\theta < \max\left\{\frac{1}{\pi^A}, \frac{1}{\pi^B}\right\}$. *There is a unique MPE in which*

(*i*) $R'(\eta^{ii}) = R'(\eta^{jj}) = \frac{1}{\theta}$,

(*ii*) (1) *is binding for presidents of both groups*,

(*iii*) *Coethnics are indifferent between supporting and rejecting the president.*

In this model, the optimal level of public benefits spending is such that $R'(\eta) = 1$ for both groups.[5] In contrast, point (i) of the Proposition says that presidents oversupply their group with public benefits and point (ii) says that they only provide the other group as much as they are required by the constraints on the executive. Therefore in this model there definitely is ethnic bias in public good allocation. However, this does not mean that coethnics are much better off, since point (iii) notes that the president pushes his own coethnics down to their reservation level.

To build intuition for this result, first note that the president needs the support of his group at the same time that he wants to raise τ as high as possible in order to maximize rent extraction. But for coethnic support he only needs to ensure that his group is indifferent between being under his rule or being ruled by a president from the other group. Therefore in equilibrium he can impose high taxes on everyone and partly compensate his coethnics with public benefits. This keeps his supporters indifferent since the fact that he is expropriating from them is compensated by the fear that a president from the other group would steal even more, which is true in equilibrium. Meanwhile the other group is stuck with high taxes and little public expenditure. As a result, coethnics fare better than the other group, but both groups fare much worse than under an efficient government that supplies the optimal amount of benefits and does not appropriate rents.

This rent extraction strategy hinges on the ability to discriminate. As constraints on the executive become tighter, the president is forced to provide more benefits to the other group. The more benefits he is forced to provide to the other group (i.e., the smaller θ is), the less he can appropriate and hence the weaker the incentives to

[4] In this simple formulation, the weakness of transition rules can be captured by $\overline{\gamma} - \underline{\gamma}$. 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, there is no personality-dependent incumbency advantage. 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 $\overline{\gamma}$ and $\underline{\gamma}$ could differ across groups, capturing differences in their populations, internal structure, or security of their hold on power. Allowing for this will not change any of the results of interest (see Padró i Miquel 2007).

[5] This is because lump-sum taxes ensure that the marginal cost of public funds is 1.

manipulate public good provision to his advantage. For this reason, ethnic bias is increasing in θ.

This simple framework shows that ethnic favoritism can arise when institutions are weak, even when leaders do not value the welfare of coethnics above that of non-coethnics. It also implies that constraints on the executive are binding, which helps interpret empirical estimates. This is a general illustrative framework and is therefore not specific to any particular public good or country. The reality of Kenyan politics is, of course, more complicated than the model. For instance, while only two ethnic groups have had presidents in post-independence Kenya (Kikuyu and Kalenjin), they and several other ethnic groups were engaged in complicated coalition dynamics throughout the period that we analyze. However, we show in the results section that the bias in road construction is only tied to coethnicity with the president (and to a lesser extent the vice president), and not to coethnicity with other cabinet ministers, suggesting the focus on executive power is appropriate. Similarly, we show that while we observe cabinets including ministers from multiple ethnic groups, we do not observe any evidence that cabinets become more ethnically representative under democracy. These facts suggest that coalition politics are not likely to be the leading driver of ethnic favoritism under democracy or dictatorship. The model also abstracts from electoral politics which undoubtedly changed with the advent of multiparty democracy. As in the case of cabinet formation, we make this simplification because we show that there is no evidence of greater road expenditure targeting "swing voter" districts under democracy.

Therefore our simple model with only two groups and democracy working through constraints on the executive is useful for guiding our empirical analysis. Indeed, in Section IV we explicitly link our empirical findings to the θ parameter in the model and show that our interpretation of the effect of democracy in terms of constraints on the executive is consistent with the recent evolution of Kenyan political institutions.

II. Background and Data

A. *Districts and Ethnicity in Kenya*

Kenya's population comprises a mix of more than 40 ethnic groups. According to the population census conducted immediately prior to independence (1962), Kenya's main ethnic groups were the Kikuyu (18.80 percent), Luo (13.40 percent), Luhya (12.70 percent), Kalenjin (10.80 percent), and Kamba (10.50 percent). The shares of these main ethnic groups have remained stable since then despite the fact that the national population has increased nearly five-fold (see panel A of online Appendix Table A1).

These ethnic groups predate the British but boundaries between them were often not well delineated and centralized political structures based on ethnic lines were largely absent (Sheriff 1985). Authority was typically personal and local, often a function of lineage, age, and wealth and not of ethnic allegiance (Mamdani 1996; Herbst 2000).

This situation changed when the British imposed a provincial administration model in the early twentieth century which divided the country into provinces and

districts. In drawing district borders, the views of local African chiefs and notables were increasingly sought via boundary commissions. As shown in online Appendix Figure A1, district boundaries in 1909 bear little relation to ethnic boundaries at independence. The alignment of interests between the British and local chiefs—both of whom preferred greater district ethnic homogeneity as a means of facilitating governance—however, meant that by 1933 district borders were drawn in a way so that each district typically contained a dominant ethnicity. By independence in 1963, district and ethnic boundaries tightly coincide—38 out of 41 districts in Kenya had a single ethnic group constituting more than 50 percent of the population, and this remains the case up until the present. The only districts that were not dominated by a single ethnic group were Nairobi, Mombasa, and Trans Nzoia.[6]

In our analysis, we use the 1963 district boundaries. Districts in Kenya, in effect, serve as stable ethnic markers thus allowing us to precisely assign expenditures or road length to particular ethnic groups. This in turn enables us to establish whether districts that share the ethnicity of a given president receive more road investment and also to establish whether this bias differs across democratic versus autocratic periods.

B. *Ethnic Politics in Kenya*

African political parties were sanctioned at the Lancaster House Conference in 1960. In May of that year, 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 the first post-independence election of 1963. KANU won the election convincingly and in less than two years, all KADU MPs had joined KANU, resulting in the temporary 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 opposed the perceived growing conservatism and pro-Western orientation of Kenyatta and the KANU leadership. The anti-communist logic of the Cold War, however, meant that the KPU was banned in 1969, ostensibly on national security grounds. This banning institutionalized single-party autocracy and is reflected in a sharp fall in Kenya's polity score (Figure 2).

Kenyatta died unexpectedly of natural causes in 1978 and Moi, the sitting vice president, took power as specified in the constitution. Moi continued in the footsteps of Kenyatta and further consolidated the one-party state. 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. The heads of parastatal enterprises, the military, police, and the security apparatus were rapidly replaced with Moi's Kalenjin loyalists (Widner 1992).

[6]Nairobi and Mombasa were (and are) the two largest cities in Kenya and Trans Nzoia is highly urbanized. Economic opportunities in these agglomerations attracted a diverse group of migrants.

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 (Barkan 1994). The suspension of overseas development assistance from the Paris Group of Donors forced Moi to legalize opposition parties, and 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 multiparty elections.

The return to 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 organizations, and of parliamentary accountability committees, as well as a reduction in blatant 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 polity scores seen in Figure 2. 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, with Mwai Kibaki, an ethnic Kikuyu, becoming president, marking the country's first democratic transition of power. 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, most notably in the 2007 elections.[7]

C. *Road Investment Data in Kenya*

Road building is the single largest development expenditure item in Kenya's Annual Development Budget.[8] Over the period of study (1963–2011), road spending on average represents 15.20 percent of the total central government's development budget, compared to figures of 5.50 percent, 5.70 percent, and 6.50 percent for expenditures in education, health, and water, respectively.

Unlike these other public goods, which derive significant funding from local communities (in the form of *harambee* funding), investments in roads are almost entirely centrally funded and controlled. The expense and visibility of roads projects has implied that the Office of the President exercises strict oversight over road investment decisions. Requests for road projects are fed into the Ministry of Public Works by provincial and district commissioners who are nominated by (and hence loyal to) the president.[9] The Office of the President then coordinates national road funding decisions with the Ministry of Finance.

[7] Exit polls in 2007 suggested that Raila Odinga (an ethnic Luo) had defeated Kibaki but the electoral commission granted Kibaki victory, leading to claims of electoral fraud and widespread and intense ethnic violence.

[8] Kenya's Total Annual Budget in our study period is composed of the Development Budget and Recurrent Expenditure. Unfortunately, Recurrent Expenditure is only reported as national aggregates and thus cannot be used for district-level analysis.

[9] There was disproportionate representation from the president's ethnic group in the share of both provincial and district commissioners in the 1980s (Barkan and Chege 1989).

The limited availability of long-run subnational data on public goods in Kenya (and other African countries) has meant that we have had to devote considerable time and effort in constructing two measures of road investment, one based on expenditure and the other based on maps.[10] The necessary data to construct similar district-year panels for the 1963–2011 period for other public goods such as health and education do not exist for Kenya.[11]

Our main measure of road investment is expenditures on new roads annually by district during 1963–2011, obtained from the development estimates of Kenya (see online Appendix A). These contain road project level data 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 geographic information system (GIS) data to understand the layout of the road project and quantify the relative numbers of kilometers (km) 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.

A convenient feature of roads is that they are easy to observe on the ground. Our second measure of road investment 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 Africa, they are an independent non-governmental source of data on road investment. This data should therefore not be affected by the concern that road spending, as reported by the government, might not be accurately recorded. It is simply a measure of the physical manifestation of paved roads. Digitization of the Michelin maps thus provides 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 that these maps are only published in certain years. In particular, maps were produced for the following years: 1964, 1967, 1969, 1972, 1974, 1979, 1981, 1984, 1987, 1992, and 2002. To construct our GIS dataset, we use a recent GIS layer containing contemporary paved roads and then use the 11 Michelin maps in order to recreate the evolution of the paved road network backward in time. Consistency of paved road legend labels across maps implies that we can create a district-map year panel dataset of the length of paved roads (measured in kilometers) by splicing the historical road maps with the 1963 district boundaries.

To assess what the paved road network might have looked like in the absence of ethnic favoritism, we also construct a counterfactual paved road network for the 1964–2002 period. To do this, we take the 42 urban settlements that existed in Kenya in 1962 and the 7 urban settlements near borders in neighboring countries.[12] There are 1,155 potential bilateral connections between these settlements. We use

[10] See online Appendix A for details on construction of the two road investment data series and online Appendix Table A2 for summary statistics on the main variables.

[11] For public goods other than roads, the main issue is that we cannot disaggregate expenditures by district across the 1963–2011 period.

[12] Towns and cities with populations 2,000 or greater (see online Appendix Figure A6).

the first post-independence Michelin map in 1964 to identify preexisting bilateral connections, and we then rank the remaining settlement pairs according to their market potential, namely, the sum of the populations of the settlement pair divided by Euclidean distance between them (Fujita, Krugman, and Venables 1999). This is a commonly used metric in economic geography and trade, and is also employed by transport planners in deciding where to place roads. We then determine the total kilometers of paved road actually built between 1964 and 1967 and allocate them according to the market potential ranking of settlement pairs. We repeat this process for each map period, until we exhaust the total length of paved roads that were actually constructed in Kenya between 1964 and 2002.[13] Therefore our counterfactual network has the same length of paved roads as the real network. This counterfactual thus tells us where and when paved roads would have been built if a social planner was maximizing market potential, based on information available at independence.

Actual and counterfactual paved road networks are presented in Figure 3 for the map years which coincide with political and leadership transitions—1969, 1979, 1992, and 2002.[14] Panel A portrays the actual paved road series and provides some useful first insights into ethnic favoritism in road construction. Between 1979 and 1992 (the Moi autocracy period), the paved road network visibly expands into Kalenjin districts whereas the road network in Kikuyu districts remains largely frozen. Then between 1992 and 2002 (the Moi democracy period) paved roads expand more evenly across the country including into districts dominated by tribes other than Kalenjins and Kikuyus. Panel B exhibits the counterfactual road series and shows a very different pattern. Roads are less concentrated in Kikuyu and Kalenjin districts and display a more pronounced "hub and spoke" pattern, whereby Nairobi and other major urban centers are connected to a wider range of towns and cities, including many that are in districts that never share the ethnicity of the president. Comparing the counterfactual and actual series we see that there is much more intensive road construction around the coastal port of Mombasa and in the non-Kikuyu and non-Kalenjin hinterlands.

In online Appendix Table A3, we list the top 20 and bottom 20 bilateral road connections based on market potential. Is is clear that the top ranked pairs connect large cities to nearby settlements, many of which are not in Kikuyu or Kalenjin areas. The net result is a counterfactual road network that is much more dispersed across the country and which connects more urban centers. In Figure 3 we see that in 2002, after a decade of democracy, actual and counterfactual road networks resemble one another much more closely relative to the autocratic period 1979 and 1992 maps. Yet despite more equal treatment of different ethnic groups under democracy, non-Kikuyu and non-Kalenjin districts are never fully compensated for the lack of road investment in autocratic periods (see the 2002 maps in Figure 3).

To aid interpretation, for each of our measures of district-level road investment—the annual expenditure series, the actual paved road series, and the counterfactual

[13] To take account of topography, we assume paved roads are constructed along the shortest, unpaved connection existing between settlements in 1964.

[14] In addition to this road length counterfactual, we also construct an analogous road expenditure counterfactual series. In online Appendix Figure A2 we see that the market potential expenditure counterfactual maps for 1969, 1979, 1992, and 2002 look very similar to the market potential paved road counterfactual maps in Figure 3 (refer to online Appendix B for detail on the construction of the counterfactual series).

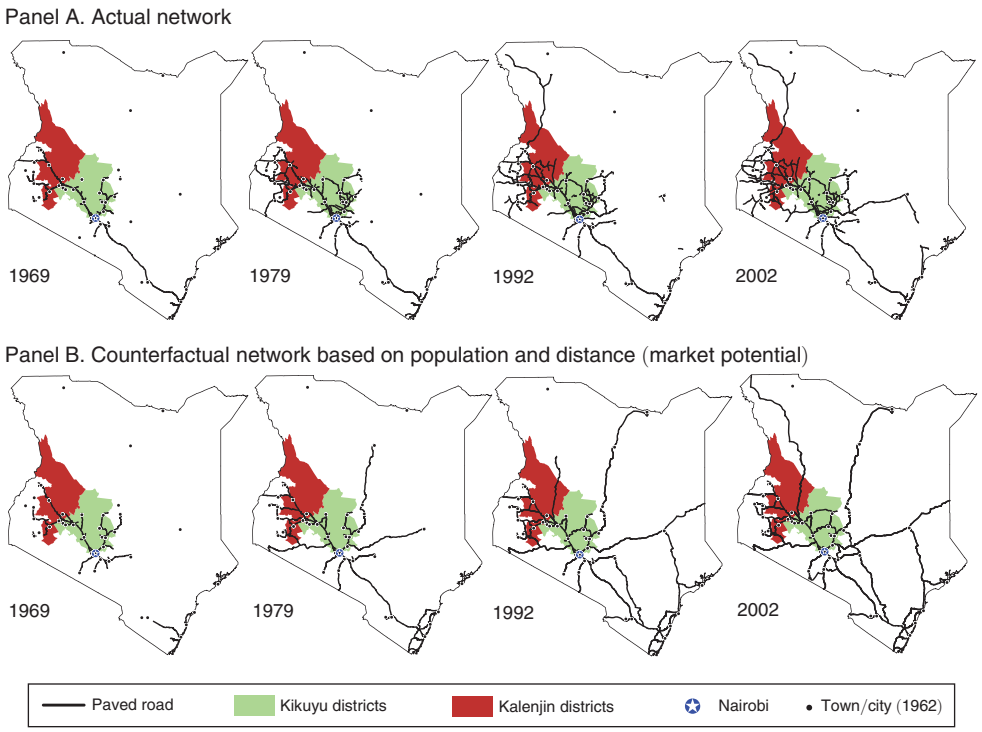

FIGURE 3. EVOLUTION OF KENYA'S PAVED ROAD NETWORK

Notes: These figures illustrate the evolution of Kenya's actual and counterfactual paved road networks for key political and leadership transition years: 1969 (transition from democracy to autocracy), 1979 (from Kenyatta [Kikuyu] to Moi [Kalenjin] in 1978), 1992 (return to democracy), and 2002 (from Moi [Kalenjin] to Kibaki [Kikuyu]). The counterfactual network sequentially paves the unpaved bilateral connections with the highest market potential (based on population and distance). Border towns are not illustrated due to space constraints. Road maps are overlaid on ethnic demographics to illustrate the two presidential coethnic districts, the Kikuyus and Kalenjins. These are seven districts dominated by Kikuyus and six dominated by Kalenjins. Coethnicity (d, t) is defined if ≥ 50 percent of the district's (d) population is coethnic to the president in year t. Data sources and construction are described in online Appendix A and Table A2 of online Appendix E.

paved road series—we normalize the share of national road investment that a district receives relative to the population share of that district. The main outcome variable in our empirical analysis is the share of road expenditure received by a district (out of the total national road development budget that year) divided by the population share of the district in the national population (in 1962).[15] This statistic has a natural interpretation: a value of 1 implies that a district received road spending that is exactly proportional to its population.[16] Values greater than (less than) 1 denote spending that is above (below) the national per capita average. Specifically, a value

[15] If road spending in district d and year t is denoted by EXP_{dt} and district population in 1962 by $POP_{d,1962}$, while total national road spending is EXP_t and national population in 1962 is POP_{1962}, then the main road spending measure can be expressed as:

$$road_{dt} = \frac{\left(\frac{EXP_{dt}}{EXP_t}\right)}{\left(\frac{POP_{d,1962}}{POP_{1962}}\right)} = \frac{\left(\frac{EXP_{dt}}{POP_{d,1962}}\right)}{\left(\frac{EXP_t}{POP_{1962}}\right)}.$$

[16] This empirical benchmark lines up with our theoretical model where the optimal path of public expenditure equalizes expenditures per capita across districts.

of 2 for this measure denotes a district that is receiving twice as much road spending as the national per capita average.

For both the actual and counterfactual paved road series, 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 per capita nationally, as an alternative district road outcome. 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. This data allows us to perform two distinct tests. First, we can examine whether coethnic districts get more road investment relative to their national population share and whether this varies across autocracy and democracy. Second, we assess whether our counterfactual road network, which was built to maximize market potential, shows any evidence of ethnic favoritism both across the 1963–2011 period and within and outside autocratic periods.

III. Methods and Results

A. *Methods*

We seek to estimate the relationship between the ethnicity of the president and public expenditures in districts demographically dominated by his coethnics. In the period under examination, we have Kikuyu presidents (1963–1978 and 2003–2011) and a Kalenjin president (1979–2002). There are 7 districts dominated by Kikuyus and 6 dominated by Kalenjins, 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., $road_{dt}$) varies during 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. This allows us to visually assess whether districts that are coethnic with the president receive a higher share of 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 districts that are dominated by Kikuyus and Kalenjins. Since all Kenyan presidents have been either ethnic Kikuyu or Kalenjin, 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 took place under the same president (Kenyatta), as did the transition from autocracy to democracy in 1992 (Moi).

In the regression approach, our main estimating equation takes the following form:

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

where the dependent variable is the road spending or road construction measure for year t and district d as described above.[17] To capture coethnicity with the president, we use an indicator variable ($coethnic\ district_{dt}$) that takes a value of 1 for districts where at least 50 percent 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 1 during periods of multiparty democracy (1963–1969 and 2003–2011).[18] $\mathbf{X}_{d1963}$ is a vector of baseline demographic, economic, and geographic variables all obtained in the early- to mid-1960s that might affect road spending and construction. We interact these initial conditions with linear time trends $[t - 1963]$ to allow their impact to vary over time. This allows us to control for a wide range of factors that might influence where road spending or road construction takes place. The regression also controls for district fixed effects (γ_d) and year fixed effects (α_t), and standard errors are clustered at the district level.

B. *Graphical Analysis*

The first results are presented in Figure 4. We plot the average $road_{dt}$ measure for districts that are coethnic with the president in year t and those that are not. The solid vertical lines, in 1969 and 1992, capture regime transitions away from democracy and back to 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 (the 1970s and 1980s), the ratio of district share of road expenditures to district share of population is always above 1 for coethnic districts and below 1 for non-coethnic districts, which is strongly indicative of ethnic favoritism. The second is that during periods of democracy (the 1960s, 1990s, and 2000s), the ratio is consistently lower and tends to be near 1 on average for both types of districts, implying little or no favoritism.

Three transitions in Figure 4 are particularly noteworthy. The first is the rapid post-1969 rise of average $road_{dt}$ 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 (when Moi, an ethnic Kalenjin, takes power), 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 $road_{dt}$ measure gradually falls from above 2 to around 1 even though the same president (Moi) is in place. Democracy clearly appears to have value in terms of spreading the single biggest component of Kenyan public development expenditures more evenly across districts.

As noted above, only two ethnic groups, Kikuyus and Kalenjins, produced presidents during the study period. Figure 5 categorizes districts by whether the majority of the district population is Kikuyu, Kalenjin, or from another ethnic group.

[17] 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 410 observations as we use the change in paved road length between map periods.

[18] We define democratic years as those when the constitution of Kenya allowed multiple parties to contest elections.

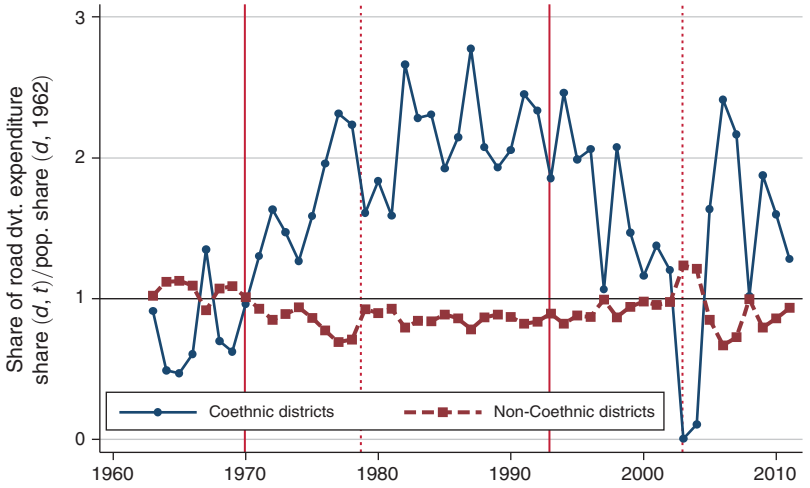

FIGURE 4. ROAD EXPENDITURE IN PRESIDENTIAL COETHNIC AND NON-COETHNIC DISTRICTS, 1963–2011

Notes: This figure plots the ratio between the share of road development expenditure in district d in year t to the share of population in 1962 for district d for coethnic and non-coethnic districts. A district d is defined as coethnic if ≥ 50 percent of the district's population is coethnic to the president in year 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. Data sources and construction are described in online Appendix A and Table A2 of online Appendix E.

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 1978. In fact, there is a striking decline in road expenditure in Kikuyu districts, and a corresponding increase in road expenditure in Kalenjin districts timed exactly after Kenyatta's death in 1978, suggesting that Moi had the authority to rapidly divert road resources to his coethnic districts. This pattern becomes even more pronounced after the failed Kikuyu-led coup attempt in 1982.

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 toward unity. The return of democracy under Moi in 1992 appears to reduce his ability to maintain this high degree of ethnic favoritism, and the Kalenjin district $road_{dt}$ measure drifts back down toward 1 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 that are neither majority Kikuyu nor Kalenjin. As Figure 5 demonstrates, the "other" ethnic districts line has a U-shaped pattern, being close to unity in the 1960s, then falling below unity in the 1970s and 1980s, and rising back toward

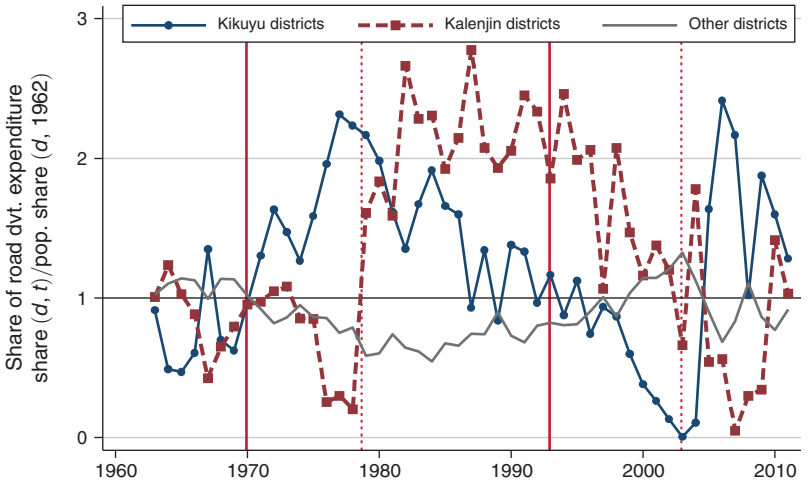

FIGURE 5. ROAD EXPENDITURE IN KIKUYU, KALENJIN, AND OTHER DISTRICTS, 1963–2011

Notes: This figure plots the ratio between the share of road development expenditure in district d in year t to the share of population in 1962 for Kikuyu, Kalenjin, and other ethnic districts. Kikuyu (and in turn Kalenjin and other ethnic) districts are defined as those districts if $\geq$ 50 percent of the district's population is Kikuyu (and in turn Kalenjin and other ethnic). A Kikuyu president is in office during 1963–1978, a Kalenjin president in 1978–2002, and a Kikuyu again in 2002–2011. The vertical lines represent political transitions, while the vertical dotted lines represent leadership transitions as described in the Figure 4 notes. Data sources and construction are described in online Appendix A and Table A2 of online Appendix E.

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.[19]

The fact that all non-Kikuyu and non-Kalenjin ethnic groups (which constitute 70 percent of the population at independence) get road spending allocations well below the national average during every year of Kenya's 23 years of autocratic rule, and at best achieve parity during democratic periods, is strongly indicative of misallocation in road investment.

C. *Regression Analysis*

In Table 1 we move beyond the graphical analysis and employ the regression framework specified above. Column 1 of panel A confirms that there is strong evidence of ethnic favoritism in Kenya over the whole study period. The coefficient estimate of 0.97 in this specification implies that, on average, districts that are coethnic with the president receive roughly double the amount of roads investment relative to their share in the population. Given that roads account for approximately

[19] In online Appendix Figure A3, we break out the Kamba-Luhya-Luo ethnic groups, the three other largest ethnic groups in Kenya, from the numerically smaller groups. Both groupings exhibit the same U-shaped pattern as in Figure 5, suggesting that larger ethnic groups do not have more clout in attracting road investment and that what matters most is being coethnic with the president.

Table 1—Road Expenditure, Ethnicity, and Democratic Changes, 1963–2011

Dependent variable	Share of road development expenditure $[d, t]$ / Population share $[d, 1962]$				
	(1)	(2)	(3)	(4)	(5)
Panel A					
Coethnic district $[d, t]$	0.97***	0.96***	0.96***	1.00***	0.95**
	(0.36)	(0.35)	(0.35)	(0.35)	(0.39)
Panel B					
Coethnic district $[d, t]$	1.57***	1.62***	1.64***	1.72***	1.55***
	(0.49)	(0.49)	(0.49)	(0.49)	(0.51)
Coethnic district $[d, t] \times$ democracy $[t]$	−1.11*	−1.24*	−1.27**	−1.32**	−1.09*
	(0.61)	(0.63)	(0.63)	(0.62)	(0.58)
F-test (p-value)	1.07	0.76	0.73	0.88	1.14
H_0: Coethnic + (coethnic × democracy) = 0	[0.31]	[0.39]	[0.40]	[0.36]	[0.29]
Observations	2,009	2,009	2,009	2,009	2,009
Year and district fixed effects	Yes	Yes	Yes	Yes	Yes
(Population, area, urbanization rate) × trend	No	Yes	Yes	Yes	No
(Earnings, employment, cash crops) × trend	No	No	Yes	Yes	No
(Main highway, border, dist. Nairobi) × trend	No	No	No	Yes	No
District time trends	No	No	No	No	Yes

Notes: Ordinary least squares (OLS) regressions on annual district-year expenditure panel dataset of 41 districts for the period of 1963–2011. Coethnic district $[d, t]$ is a binary indicator equal to 1 if ≥ 50 percent of the district's (d) population is coethnic to the president in year t. Democracy $[t]$ is a binary indicator equal to 1 if year t is a democratic year. Democratic years are identified as those when the constitution of Kenya allows multiple parties to contest elections. The F-test is for the hypothesis that coethnic and non-coethnic districts have equal outcomes under democracy. Columns 2–5 include initial controls interacted with a time trend (1963–2011). These controls are (i) *demographic*: district population (1962), district size (square km), and urbanization rate (1962); (ii) *economic activity*: district formal total earnings (1966), formal employment (1963), and value of cash crop exports (1965); and (iii) *economic geography*: binary indicator equal to 1 if district is on the Mombasa-Nairobi-Kampala corridor, binary indicator equal to 1 if the district borders Uganda or Tanzania, and district centroid euclidean distance to Nairobi (km). Robust standard errors clustered at district level are reported in the parentheses. Data sources and construction are described in online Appendix A and Table A2 of online Appendix E.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

one-sixth of all central government development spending, this represents a highly consequential degree of ethnic bias.

This central result remains robust when we sequentially add a set of factors that might influence road investment patterns. These include 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 corridor, bordering another country, distance to Nairobi—column 4). These controls, which are either time invariant or are measured at the start of the study period, are interacted with linear time trends to allow their effects to grow over time. Our preferred specification is that in column 4, which includes all these controls interacted with time trends. This helps to reassure us that the ethnic favoritism result is not being driven by the influence of these factors. In column 5 we observe that the 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 expenditure 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, an F-test 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 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 θ in our theoretical model toward 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 of Table 1, we see that this second result is again robust to sequentially adding in controls for demography (column 2), economic activity (column 3), and economic geography (column 4), and 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 during periods of democracy. The 1.72 coefficient on $coethnic_{dt}$ in column 4 of panel B implies that there is almost a three-fold increase in road spending in coethnic districts during autocratic periods. This can be seen in Figure 4 where our road favoritism measure rises from around 1 in the 1960s to almost 3 in the 1970s and 1980s and then falls back toward 1 in the post-1992 period. The coefficient estimates of -1.32 on the $(coethnic_{dt} \times democracy_t)$ interaction in column 4 of panel B term captures the elimination of ethnic favoritism during periods of democracy.

In Table 2 we use our second $road_{dt}$ measure, the share of the length of paved roads constructed in a district relative to its population share, and reproduce the specifications in Table 1. In panel A we see that coethnic districts receive between 3–5 times the kilometers of paved roads per capita relative to the national average. This central result is robust when different initial characteristics of districts interacted with time trends are included in the regression (columns 1–4) and when we include district time trends (column 5). In our preferred specification in column 4, the coefficient estimate is 3.71, implying that coethnic districts have almost five times the length of paved roads built. Ethnic favoritism as measured by paved road construction is therefore more than twice as pronounced as that measured by road expenditures. This might be because paved roads are highly visible and signal modernization and progress, and presidents may feel that investing in them may be a more effective means of securing the support of coethnics relative to investing in non-paved roads and earthen tracks.[20]

In panel B of Table 2 we see that the tendency to favor coethnic districts with paved roads is again greatly diminished during periods of democracy. Indeed, across all specifications, we find that the reduction in this bias during democratic periods is such that we cannot reject the hypothesis that ethnic favoritism is absent during periods of democracy. In column 4, the coefficient estimate on $coethnic_{dt}$ is 4.26, implying that in autocratic periods more than five times the length of paved roads are built in coethnic districts relative to the national average. The coefficient estimate on $(coethnic_{dt} \times democracy_t)$ of -2.38 implies that this bias is reduced in democratic

[20] Or indeed relative to other public goods which are less visible to the public.

TABLE 2—ROAD BUILDING, ETHNICITY, AND DEMOCRATIC CHANGES, 1964–2002

Dependent variable	Share of paved road construction $[d, t]$ / Population share $[d, 1962]$				
	(1)	(2)	(3)	(4)	(5)
Panel A					
Coethnic district $[d, t]$	1.91**	1.94*	2.20**	3.71**	3.92*
	(0.94)	(0.99)	(1.09)	(1.69)	(2.20)
Panel B					
Coethnic district $[d, t]$	3.00**	3.03**	3.19**	4.26**	3.28
	(1.23)	(1.26)	(1.33)	(1.74)	(2.21)
Coethnic district $[d, t]$ × democracy $[t]$	−3.55**	−3.61**	−3.45**	−2.38*	−3.27**
	(1.38)	(1.36)	(1.32)	(1.36)	(1.39)
F-test (p-value)	0.44	0.49	0.10	0.98	0.00
H_0: Coethnic + (coethnic × democracy) = 0	[0.51]	[0.49]	[0.75]	[0.33]	[1.00]
Observations	410	410	410	410	410
Year and district fixed effects	Yes	Yes	Yes	Yes	Yes
(Population, area, urbanization rate) × trend	No	Yes	Yes	Yes	No
(Earnings, employment, cash crops) × trend	No	No	Yes	Yes	No
(Main highway, border, dist. Nairobi) × trend	No	No	No	Yes	No
District time trends	No	No	No	No	Yes

Notes: OLS regressions on district-year map panel dataset of 41 districts for the period of 1964–2002. Maps are published in the following years: 1964, 1967, 1969, 1972, 1974, 1979, 1981, 1984, 1987, 1992, and 2002. We measure paved road construction as the difference between the paved length across two map years. Coethnic district $[d, t]$ is a binary indicator equal to 1 if ≥ 50 percent of district's (d) population is coethnic to the president in year, t. Democracy $[t]$ is a binary indicator equal to 1 if year t is a democratic year. Democratic years are identified as those when the constitution of Kenya allows multiple parties to contest elections. The F-test is for the hypothesis that coethnic and non-coethnic districts have equal outcomes under democracy. Columns 2–5 include initial controls interacted with a time trend (1964–2002). Refer to Table 1 notes for description of controls. Robust standard errors clustered at district level are reported in the parentheses. Data sources and construction are described in online Appendix A and Table A2 of online Appendix E.

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

periods, and indeed the F-test (p-value $= 0.33$) confirms that we cannot reject that there was no ethnic favoritism during these periods.

The degree to which results match up using two independently collected datasets 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: (i) there is extensive favoritism toward the president's coethnics in road investment in Kenya, and (ii) this favoritism is largely eliminated during periods of democracy.

In Table 3 we run the same specification as column 4 in Tables 1 and 2 but use our counterfactual paved road data series (see online Appendix B). We construct three counterfactuals, one based on connecting settlement pairs with the largest joint populations (column 1), one based on connecting settlement pairs which are closest together (column 2), and one based on connecting settlement pairs whose market potential is the highest (column 3).[21] The main focus of our analysis is column 3 of Table 3. Consistent with Figure 3 which shows that the counterfactual road network is more dispersed that the actual road network, we find no evidence in

[21] Namely, settlement pairs whose sum of populations divided by the Euclidean distance between them is largest are connected first (see online Appendix B and online Appendix Table A3).

TABLE 3—COUNTERFACTUAL ROAD BUILDING, ETHNICITY, AND DEMOCRATIC CHANGES, 1964–2002

Dependent variable	Share of paved road construction $[d, t]$ / Population share $[d, 1962]$		
Counterfactual ranking	Population (1)	Distance (2)	Population and distance (market potential) (3)
Panel A			
Coethnic district $[d, t]$	0.22	−0.56	0.67
	(0.44)	(1.21)	(1.03)
Panel B			
Coethnic district $[d, t]$	0.20	−0.57	0.34
	(0.52)	(1.14)	(1.08)
Coethnic district $[d, t]$ × democracy $[t]$	0.08	0.05	1.38
	(1.39)	(1.34)	(2.24)
F-test (p-value)	0.05	0.08	0.64
H_0: Coethnic + (coethnic × democracy) = 0	[0.82]	[0.78]	[0.43]
Observations	410	410	410
Year and district fixed effects	Yes	Yes	Yes
Controls × trend	Yes	Yes	Yes

Notes: OLS regressions using counterfactual dataset based on maps for the period of 1964–2002. Maps are published in the following years: 1964, 1967, 1969, 1972, 1974, 1979, 1981, 1984, 1987, 1992, and 2002. The counterfactual dataset sequentially paves the network starting with the unpaved bilateral connections of towns/cities i and j with the highest value of the ranking criteria. We use 42 towns/cities in Kenya and 7 border towns/cities in neighboring countries classified in 1962 with populations of $\geq$ 2,000 habitants. This results in 1,155 $(= 41 \times 41/2 + 42/7)$ bilateral connections across these towns/cities. In column 1, the counterfactual is based on maximizing population (P_{ij}) between two bilateral pairs $(P_i + P_j)$ to obtain the ranking of the connections. In column 2, the counterfactual is based on minimizing distance between two bilateral pairs (D_{ij}) to obtain the ranking of the connections. In column 3, the counterfactual is based on maximizing market potential, incorporating both the population and distance between two town/city pairs, $(P_i + P_j)/D_{ij}$. Coethnic district $[d, t]$ is a binary indicator equal to 1 if $\geq$ 50 percent of district's (d) population is coethnic to the president in year t. Democracy $[t]$ is a binary indicator equal to 1 if year t is a democratic year. Democratic years are identified as those when the constitution of Kenya allows multiple parties to contest elections. The F-test is for the hypothesis that coethnic and non-coethnic districts have equal outcomes under democracy. Columns 1–3 include initial controls interacted with a time trend (1964–2002). Refer to Table 1 notes for description of controls. Robust standard errors clustered at district level are reported in the parentheses. Data sources and construction are described in online Appendix A and Table A2 of online Appendix E.

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

our counterfactual simulation that coethnic districts would have more kilometers of paved road than would be predicted by their population share across the 1964–2002 period (column 3 of panel A of Table 3). This helps dispel worries that our ethnic favoritism result from panel A of Tables 1 and 2 is being driven by the fact that coethnic districts may be receiving more road investment because they had higher market potential.[22] If paved roads had been allocated to maximize market potential, then districts coethnic with the president would not have been favored relative to non-coethnic districts.

In column 3 of panel B in Table 3, we see no evidence of ethnic favoritism in counterfactual paved road construction in either autocratic or democratic periods. This result seems intuitive as our paved road counterfactual is based solely on the

[22] Column 3 of panel A of online Appendix Table A4 shows the same result for the counterfactual road expenditure series.

population of urban settlements at independence and the distance between these urban settlement pairs. Therefore changes between democracy and autocracy (or vice versa) should not affect where paved roads are optimally built. The result is nonetheless important as it also helps to dispel concerns that the northwestern expansion of paved roads from Nairobi initially into Kikuyu districts and then into Kalenjin districts just represented a natural expansion of the paved road network based on market potential, which just happened to coincide with political regime changes. Indeed as Figure 3 illustrates, the natural expansion of the road network based on market potential was toward a road network that was much more dispersed across Kenya and was unaffected by democracy. Column 3 of panel B in Table 3 confirms that this is the case for the counterfactual district-map year paved road panel.[23]

To summarize the results of the counterfactual road construction exercise, if we compare results for actual road expenditure (Table 1), actual paved roads (Table 2), and counterfactual paved roads (Table 3), there is clear evidence (from Tables 1 and 2) that (i) political leaders in Kenya have been skewing road investment toward coethnic districts, and (ii) that democracy has largely eliminated this tendency to favor coethnic districts. The absence of both these effects using counterfactual road construction patterns in Table 3 strongly suggests that ethnic favoritism has led to misallocation in actual road construction relative to the road network that would have been built if Kenyan leaders were trying to maximize market potential.

Economic activity in Kenya is concentrated along the Mombasa-Nairobi-Kampala corridor, with the densest population settlements concentrated in the area to the northwest of Nairobi, much of which has large Kikuyu and Kalenjin populations. As an additional check that our results are not driven by some spurious correlation between coethnicity and economic potential, we drop subsets of districts which credibly could have higher market potential from the analysis and assess whether our main results still hold (see online Appendix Table A5). In column 1 we drop former White Highland settler districts (located predominantly to the northwest of Nairobi) that had been the focus of economic development under British rule, in column 2 we drop Nairobi and adjacent districts, in column 3 we exclude the 15 districts on the Mombasa-Nairobi-Kampala corridor, in column 4 we exclude the 9 districts on Nairobi-Kampala corridor, and in column 5 we exclude the 5 richest districts in 1962. In all cases, the existence of ethnic favoritism (panel A) and its mitigation under democracy (panel B) remains robust. This suggests that the initial concentration of road investment in Kikuyu districts around Nairobi (under Kenyatta), followed by the shift to Kalenjin districts in the northwest (under Moi), and then the spread of road investments into non-coethnic districts after democracy returned in 1992, are not simply driven by roads just tracking economic potential.

It is informative to break down the results into the five leadership periods seen in Figure 1—Kenyatta democracy, Kenyatta autocracy, Moi autocracy, Moi democracy, and 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. For example, we would want to know whether both early (1960s) and later (1990s, 2000s) democracy were effective in mitigating ethnic favoritism. To look at this,

[23] Online Appendix Table A4 runs the same specification for the counterfactual expenditure series and also finds no evidence of ethnic favoritism in either autocratic or democratic periods.

TABLE 4—ROAD EXPENDITURE, ETHNICITY, AND DEMOCRATIC CHANGES: POLITICAL AND LEADERSHIP TRANSITIONS, 1963–2011

Dependent variable	Share of road development expenditure [d, t] / Population share [d, 1962]				
Leader	KENYATTA		MOI		KIBAKI
Regime	Democracy 1963–1969	Autocracy 1970–1978	Autocracy 1979–1992	Democracy 1993–2002	Democracy 2003–2011
	(1)	(2)	(3)	(4)	(5)
Kikuyu district [d, 1962]	−0.44	0.96**	0.66	−0.88	−0.00
	(0.39)	(0.39)	(0.49)	(0.57)	(0.63)
Kalenjin district [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
H_0: Kikuyu district = Kalenjin district	[0.70]	[0.01]	[0.08]	[0.14]	[0.33]
Observations	287	369	574	410	369
Year fixed effects	Yes	Yes	Yes	Yes	Yes
District fixed effects	—	—	—	—	—

Notes: OLS regressions on annual district-year expenditure panel dataset of 41 districts for the period of 1963–2011. Sample size varies in the column depending on duration of regime. Kikuyu (Kalenjin) district [d, 1962] is a binary indicator equal to 1 if $\geq$ 50 percent of district's (d) population is Kikuyu (Kalenjin) according to the 1962 population census. Other ethnic groups are the comparison group. Specifications do *not* include district fixed effects (the binary ethnic indicator variables are time invariant) and set of initial controls (due to limited sample size in each column). The F-test is for the hypothesis that Kikuyu and Kalenjin districts have equal outcomes. Robust standard errors clustered at district level are reported in the parentheses. Data sources and construction are described in online Appendix A and Table A2 of online Appendix E.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

for each of the leadership regimes shown in Figure 1, we regress our road spending favoritism index $road_{dt}$ on indicators that capture whether a district has a majority ($\geq$ 50 percent) Kikuyu or Kalenjin population. The comparison districts are those that do not have either of these attributes. Coefficients from each of these five separate regressions are reported in Table 4. Guided by our model we can use these coefficients to estimate regime-specific measures of constraints on the executive (θ), thus enabling us to examine how these change across regime transitions and with time varying polity scores (see Section IV).

The pattern of the coefficient estimates on the Kikuyu and Kalenjin indicators across periods 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 around 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). The results in Table 4 indicate that there is no evidence of ethnic favoritism in either the early

(1960s) or later (1990s, 2000s) democratic periods. It is during periods of autocracy that presidents blatantly favor coethnic districts in the allocation of road spending.

Online Appendix Tables A6 and A7 supply some additional robustness checks. In columns 1 and 2 of panel B in online Appendix Table A6, we move to a continuous measure of coethnicity based on share of population, and the two main empirical results continue to hold. In columns 3 and 4 of panel A we normalize the road expenditure share by the district's land area share and find that our results are robust to this normalization. In columns 5–8 we replicate this analysis for the paved roads measure. Across both measures we find that our results from column 4 of Tables 1 and 2 are robust to these modifications in variable construction. In online Appendix Table A7 we show that our results are also robust to interacting controls with year fixed effects (column 2), to including an additional control for the number of years a district has been coethnic with the president (column 3), and to correcting for spatial clustering (columns 4 and 5, Conley 1999).

D. *Coalition Politics*

Our focus has been on the impact of being coethnic with the president on road spending and paved road construction within a district, and on whether this changes under democracy. We find 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 interethnic coalition formation. A lessening of ethnic favoritism under democracy, for example, may not be due to changing constraints on the president alone but rather to cabinets becoming more representative, or non-coethnic groups being targeted as a means of securing votes. While a full treatment of these issues is beyond the scope of this paper, and does not feature in our theoretical model, we use our data to explore whether considering coalition politics significantly changes any of our main conclusions.

We assembled a dataset that codes the ethnicity of each cabinet member for each of the 13 central government cabinets between 1963 and 2011 (panel B of online Appendix Table A1). In an exhaustive set of regressions, we tested whether districts that are coethnic with the 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 these effects are zero (not shown). This is further confirmation of the overriding power of presidents relative to other public officials 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 $VP\text{–}coethnic_{dt}$ measure tells us that during autocratic periods, districts receive 2.5 times the average amount of road expenditure relative to their population share: a large effect. The coefficient of -1.44 on $(VP\text{–}coethnic_{dt} \times democracy)$ implies that this ethnic favoritism is nonexistent 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 3.5 times the amount of road expenditure

TABLE 5—ROLE OF THE VICE-PRESIDENT, CABINET COMPOSITION, AND COALITION POLITICS, 1963–2011

Dependent variable	Share of road dvt. expenditure $[d, t]$ / Pop. share $[d, 1962]$		Ethnic share of cabinet $[e, t]$ / Pop. share $[e, 1962]$		Share of road dvt. expenditure $[d, t]$ / Pop. share $[d, 1962]$	
	Table 1, column 4					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Coethnic district $[d, t]$	1.00***	1.40**	0.65***	0.92***	1.40**	1.40**
	(0.35)	(0.58)	(0.17)	(0.08)	(0.58)	(0.58)
VP-Coethnic (district $[d, t]$ *or* group $[e, t]$)		0.54		0.45***	0.54	0.54
		(0.50)		(0.13)	(0.50)	(0.50)
Panel B						
Coethnic (district $[d, t]$ *or* group $[e, t]$)	1.72***	2.60***	0.64***	1.08***	1.70***	1.72***
	(0.49)	(0.71)	(0.13)	(0.31)	(0.50)	(0.49)
Coethnic (district $[d, t]$ *or* group $[e, t]$) × democracy $[t]$	−1.32**	−1.63**	0.02	0.03	−1.28**	−1.32**
	(0.62)	(0.68)	(0.28)	(0.29)	(0.66)	(0.59)
VP-coethnic (district $[d, t]$ *or* group $[e, t]$)		1.46**		0.94**		
		(0.57)		(0.34)		
VP-coethnic (district $[d, t]$ *or* group $[e, t]$) × democracy $[t]$		−1.44**		−0.64		
		(0.61)		(0.38)		
Kamba-Luhya-Luo district $[d, 1962]$ × democracy $[t]$					0.20	
					(0.43)	
Non-coethnic majority < 80 percent $[d, 1962]$ × democracy $[t]$						0.02
						(0.67)
F-test [p-value] H$_0$: Coethnic + (coethnic × democracy) = 0	0.88	2.49	5.87**	216.4***	0.90	1.00
	[0.36]	[0.12]	[0.03]	[0.00]	[0.35]	[0.32]
F-test [p-value] H$_0$: VP-coethnic + (VP-coethnic × democracy) = 0		0.00		2.73		
		[0.98]		[0.12]		
Observations	2,009	2,009	169	169	2,009	2,009
Year and (district *or* group) fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	No	No	Yes	Yes

Notes: Columns 1 and 2 are OLS regressions on annual district-year expenditure panel dataset (41 districts in the period 1963–2011). Columns 3 and 4 are OLS regressions on cabinet-ethnic year post-general elections (in the period 1963–2011), for the 13 main ethnic groups $[e, t]$. Coethnic district $[d, t]$ and democracy $[t]$ are as defined in previous tables. Coethnic group $[e, t]$ is a binary indicator equal to 1 if the president in year t belongs to ethnic group e. VP-coethnic group $[e, t]$ is a binary indicator equal to 1 if the vice-president in year t belongs to ethnic group e. VP-coethnic district $[d, t]$ is a binary indicator equal to 1 if ≥ 50 percent of the district's (d) population is from the ethnic group of the vice-president in year t. Kamba-Luhya-Luo District $[d, 1962]$ is a binary indicator equal to 1 if ≥ 50 percent of the population of district (d) is either from the ethnic group of Kambas (2 districts), Luhyas (3), or Luos (3) according to the 1962 population census. Non-coethnic majority < 80 percent $[d, 1962]$ is a binary indicator equal to 1 if the main ethnic group in district (d) accounts for < 80 percent of its total population, excluding the presidential coethnic groups. The F-tests are for the null hypothesis that presidential/vice-presidential coethnic districts (or groups) and presidential/vice-presidential non-coethnic districts (or groups) have equal outcomes during democracy. Columns 1–2 and 5–6 include the same set of controls as in Table 1 interacted with a time trend. Columns 3 and 4 include ethnic group time trends. Robust standard errors clustered at district (or ethnic group) level are reported in the parentheses. Data sources and construction are described in online Appendix A and Table A2 of online Appendix E.

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

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 is able, to a more limited extent, to skew resource allocation.[24] The fact that both these forms of favoritism disappear

[24] Throughout the post-independence period, the vice president was never of the same ethnicity as the president.

during democratic periods suggest that democracy partially ties the hands of both top executives.

It is often argued that the typical way coalition politics play out in African settings is in cabinet formation. Our dataset on the ethnicity of all cabinet ministers for election years between 1963 and 2011 reveals that Kenyan cabinets have been surprisingly representative, incorporating many ethnic groups beyond that of the president even during periods of autocracy (panel B of online Appendix Table A1). This is in line with what Francois, Rainer, and Trebbi (2015) find for the post-independence cabinets of 15 African countries. When we regress the ethnic cabinet share divided by population ethnic share on an ethnic group indicator (which equals 1 if the group is coethnic with the serving president) we find that the president's group receives 65 percent more cabinet posts (column 3 of panel A of Table 5). This again is in line with Francois, Rainer, and Trebbi (2015), who find that the leader's ethnic group receives a disproportionate share of cabinet posts in the countries they study. However, when we interact the group indicator with $democracy_t$ in panel B, we find no interaction 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 neither of these patterns is significantly affected by democracy.

These patterns are informative in at least two respects. First, there is indeed a propensity for presidents and vice presidents to "stuff" the cabinet with coethnics. Second, this tendency is not checked by the arrival of democracy, which suggests that the relationship between ethnic favoritism and democratization that we estimate is very unlikely to be driven by changes in cabinet composition.

Allocating cabinet positions to ethnic groups that are not coethnic with the president may help reduce the threat of revolution from outsiders and coups from insiders (Francois, Rainer, and Trebbi 2015). However, what our results indicate is that this representation does not translate into enhanced road investment in the districts that share the ethnicity of these non-coethnic ministers. It has primarily been the president who retains the power to allocate public road resources in Kenya, and democracy constrains this power without substantially changing ethnic coalition politics, at least as reflected in cabinet composition.

Another possibility is that presidents may target road investments to districts dominated by large non-coethnic groups when democracy arrives not because they are constrained in their actions, but because this may be an effective means of securing swing votes in competitive elections. In column 5 of Table 5 we see that the coefficient estimate on the Kamba-Luhya-Luo district indicator interacted with democracy is not statistically significant.[25] This implies that districts dominated by these ethnic groups, who are likely to be pivotal in elections, do not receive additional road investments relative to other non-coethnic groups when the country becomes democratic. In column 6 of Table 5 we interact our democracy measure with an indicator for non-coethnic districts where one ethnic group comprises less than 80 percent of the population. When democracy arrives, these relatively

[25] These three large ethnic groups constituted 37 percent of the Kenyan population in 1962 and have occupied a similar share of the population since then (panel A of online Appendix Table A1).

ethnically mixed districts (which may naturally be more competitive politically) do not receive more road investment than less mixed districts. In columns 5 and 6 of online Appendix Table A8, we use the margin of victory (the winner's minus the runner-up's vote share) and a party competition Herfindahl index (both from the 1992 election) interacted with democracy, and we once again find no evidence that districts where political competition was more intense receive more road investment when democracy returns to Kenya after 1992.

IV. Interpretation

The results indicate that our theoretical framework—where two ethnic groups compete to produce presidents, the president makes all public good allocation decisions, and his ability to favor coethnics with public goods is limited by constraints on the executive—represents a useful vehicle for (i) understanding why ethnic favoritism might arise, and (ii) interpreting the coefficients estimated. In this section we first use the model to derive regime-specific estimates of constraints on the executive (θ). This allows us to track changes in constraints across democratic and autocratic periods even for the same leader. We then use material from a wide variety of sources to identify what possible factors underlie changes in θ, focusing on key institutional and political reforms that have taken place since 1992.

Recall that θ 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 impossible. 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. The fact that (1) is binding in equilibrium allows us to derive empirical estimates of θ. Specifically, our estimate β can be expressed in terms of the model as

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

We can thus estimate a specific β for each regime (see Table 4) and translate it into regime-specific θs using the fact that $\theta = 1 + \beta(1 - \pi^{A})$ for each of the five regimes.[26] This enables us to trace the evolution of θ across the five periods shown in Figure 1: Kenyatta democracy, Kenyatta autocracy, Moi autocracy, Moi democracy, and Kibaki democracy. The results are presented in Figure 6. We also include the polity score for Kenya from Figure 2 in this figure.[27]

There is a remarkable correspondence between these two measures over time. The early democratic period in the 1960s was characterized by relative democratic freedoms, and essentially no evidence of ethnic favoritism toward Kenyatta's Kikuyu ethnic group, with the estimated θ near 1. However, there is a sharp increase in θ after 1970, when democracy was abandoned, with θ moving higher toward

[26] The transformation uses the fact that $\eta^{AA} = \theta(\pi^{A}\eta^{AA} + \pi^{B}\eta^{BA})$ and $\eta^{BA} = \frac{\left[\pi^{A}\eta^{AA} + \pi^{B}\eta^{BA}\right] - \pi^{A}\eta^{AA}}{\pi^{B}}$ to generate the expression $\beta = \frac{\theta - 1}{\pi^{B}}$. π^{A} captures the population share of the ethnic group that is coethnic with the serving president. This value varies across periods as the president's ethnicity changes.

[27] Note that the θ score is presented with a reverse axis to facilitate comparison with the polity score.

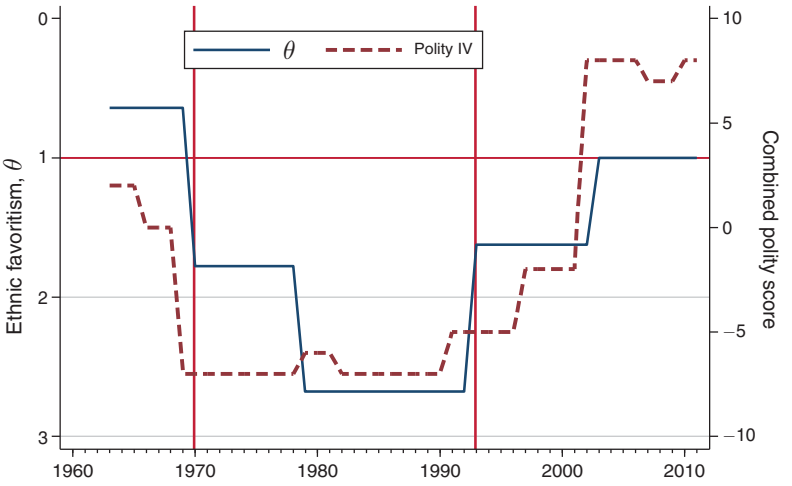

FIGURE 6. ETHNIC FAVORITISM AND POLITICAL REGIMES, 1963–2011

Notes: This figure plots θ, our estimate of ethnic favoritism, and the revised combined polity score for Kenya annually from 1963 to 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. Data sources and construction are described in online Appendix A and Table A2 of online Appendix E.

a value of 2. Polity scores move in tandem, dropping precipitously around 1970, signaling a collapse in democratic freedoms, and staying low until the early 1990s. θ moves even higher during Moi's single-party rule (1979–1992), reaching 2.68, implying that the president's coethnic districts received more than 2.5 times more road funds on average than other groups. However, θ moves back toward 1 when democracy was restored in late 1992 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. Polity scores also rise sharply in the early 1990s, signaling a return to democratic freedoms, and actually, by the 2000s, achieve levels which exceed those seen in the 1960s. Figure 6 thus indicates that, during the autocratic 1970s and 1980s, presidents are less constrained in their ability to skew road spending toward coethnic districts relative to the democratic 1960s, 1990s, and 2000s. The value of democracy lies in its ability to tie the hands of presidents so that they cannot allocate public resources in a discriminatory way.

The comovement of θ and the polity measure of democracy in Figure 6 begs the question of what underlies the changes in θ. Digging into the various components of the polity measure sheds some light into the institutional changes occurring in Kenya during its political transitions. Closer examination of Figure 6 reveals that the combined polity score decreased from 0 to -7 in the transition out of democracy during Kenyatta's leadership. Almost all subcomponents of the score changed at that time: 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 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

participation was eliminated (there was only one candidate for the executive seat). It is little wonder that the president under this autocratic regime felt free to allocate resources largely as he wished.

The reform of the constitution and the return to democracy in 1992 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). This movement from -7 to -2 represents a very significant improvement in fundamental democratic freedoms. After the democratic presidential transition of 2002, other components of the polity score improve and push the overall score sharply higher, to around 8. Our estimated θ matches this path: from post-1992 to 2002, the estimated θ equals 1.62 but this drops to 1.00 after 2002. 1.62 represents a significant increase in constraints on the executive relative to the Moi autocratic years ($\theta = 2.68$) but falls short of the more fully constrained post-2002 setting ($\theta = 1.00$) where ethnic favoritism in road investment has largely disappeared.

We now turn to examining different factors that might underlie these changes in θ. Information on where roads were being built in the press certainly seems to have increased after the arrival of democracy in 1992. In online Appendix Figure A4 we have catalogued the number of stories pertaining to roads during the 1985–2010 period for the two daily independent newspapers with the largest national circulation, the *The Daily Nation* and *The Standard*. Using a team of two Kenyan journalists (who were not informed of our research question) we counted the number of stories relating to roads in each of the daily editions of these two newspapers in 1985–2010. In online Appendix Figure A4 we see that the number of stories referring to roads in *The Daily Nation* jumps abruptly about a year after the arrival of democracy, in December 1992. The same pattern is seen for *The Standard* though the rise occurs slightly earlier, in 1991. The increases in road reporting are not small; pre-1992 the number of road stories in the *The Daily Nation* is around 25 per annum rising to about twice that after 1992. The rise in road reporting in *The Standard* is more moderate, with comparable numbers being 35 and 54. The fact that the pattern is the same for two separate newspapers is reassuring and indicates that newspapers are conveying more information about road investments after democracy.[28] Working out how this information is being utilized is beyond the scope of this paper, but the fact that it is more available is an important change. These developments line up with country-level measures which try to capture the freedom of civil society institutions. A plot of the Freedom House *Freedom of the Press Index*, for example, reveals that press freedom moved from "not free" to "partly free" when the switch to multiparty politics occurred (not shown).

Broadcast media (TV and radio) on the other hand remained more firmly in the government's grip. The two TV stations *Kenya Broadcasting Company* and *Kenya Television Network* initially continued to be subject to state oversight in the post-democratic period.[29] The situation was similar for radio, a major source of information for the rural majority, which saw no independent radio licenses granted

[28] Roads as a share of total development expenditure is similar on either side of 1992 indicating that the large rises we observe are not just a function of increases in road investment after democracy arrives.

[29] All 20 applications to start new TV stations during the period 1985–1995 were rejected.

until 1996. The situation, however, improved dramatically after 1998 when state censorship of broadcast media was abolished, and by 2000 Kenya had 9 private TV stations and 19 radio stations. While state harassment has not totally disappeared, it is undeniable that mass media has become much freer since the early 1990s.

The number of non-governmental organizations (NGOs) also grew rapidly in the 1990s. While Kenyan law does not allow international donors to fund opposition political parties, they did fund governance-focused civil society organizations. Aid was also increasingly channeled through NGOs and by the late 1990s, Kenya had among the highest concentration of NGOs per capita in sub-Saharan Africa. The churches, often in tandem with NGOs, also played a crucial role in the 1990s in giving voice to the need for impartial conduct of elections and voter registration reforms.

A freer press and a stronger civil society, together with Western donor pressure, eventually made Moi realize that he had to accommodate demands for further openness. This brought about three key reforms in 1997: the so-called Inter-Parliamentary Parties Group (IPPG) reforms. The IPPG reforms reduced state internal security powers (e.g., preventive detention) and amended the Public Order, Broadcasting, and Societies Acts.[30] The final years of the Moi regime also saw a rise in the power of parliament, with constitutional amendments that increased its independence from the executive branch.

Institutional reforms which place greater scrutiny on the actions of the president have continued. A new constitution was ratified by voters in 2010 that altered the division of powers between the central government and newly created (and popularly elected) county governments, and consolidated a more independent judiciary. Nowadays, Kenya's increasingly well-informed, educated, and connected population is highly politically engaged. Parliamentary debates are frequently shown on national TV and discussion forums are held to allow for civil society feedback. Misguided public investments and corruption remain widespread but are more regularly brought to light by the press (Wrong 2009).

It is hardly surprising that 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, freer flows of information, a vocal civil society and an independent parliament all severely curtail the ability of the executive to blatantly discriminate between different districts in choosing where to place roads projects. This is succinctly captured in our estimated $\theta = 1.00$ for the post-2002 period.

V. 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 and little political cost. Ethnic favoritism and weak controls on the chief executive thus go hand in

[30] The Public Order Act was amended to remove the need to obtain a license before meetings, replacing it with a need to notify the police. The Broadcasting Act was changed to provide free air-time to all parties and to promote a balanced show of opinions. The Societies Act was amended to require the registrar to respond reasonably to all requests for voter registration within 120 days.

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, mass media, and civil society are 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 public resource allocation in an African country? Second, does the transition into 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 lack of data. Therefore, to address these questions we construct two new data series that directly capture public allocation decisions by the central government, one based on the geographic coding of road project data and the other on 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 or road length 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, central government investments in roads have been subject to a high degree of ethnic favoritism, with districts coethnic to the president receiving three times the average expenditure in roads and five times the length of paved roads during periods of autocracy. In contrast, ethnic groups not linked to the president, which constitute the bulk of the population, receive far fewer roads across the 23-year autocratic period. Second, these biases disappear almost entirely during periods of democracy. This more equal treatment, however, is not enough to overturn the roads deficit that non-coethnic groups accumulated over autocracy.

Our result on the presence of ethnic favoritism is broadly in line with an innovative set of recent papers that use recall data on fertility and the health and schooling outcomes of children in Demographic and Health Surveys to construct panel data on infant mortality and years of schooling that span different presidential regimes. These outcome measures, which reflect the combined human capital investment decisions made by households, communities, and governments, are useful complements to our direct measure of central government road investment. Kramon and Posner (2014) show that Kenyan citizens who are coethnic with the president, education minister, and the health minister are more likely to attend and complete primary and secondary school. Frank and Rainer (2012) use household data for 18 African countries to show that being coethnic with the political leader leads to lower infant mortality and a higher probability of completing primary school.[31]

Our result that democracy mitigates ethnic favoritism also requires wider investigation given that autocracy has been rapidly declining both in Africa and around the world (see Figure 2 and online Appendix Figure A5). Hodler and Raschky (2014) move the literature in this direction, using subnational data from across the world

[31] Individual regressions for their 18 countries reveal positive, significant effects for these outcomes in wide range of countries suggesting that ethnic favoritism is widespread in Africa.

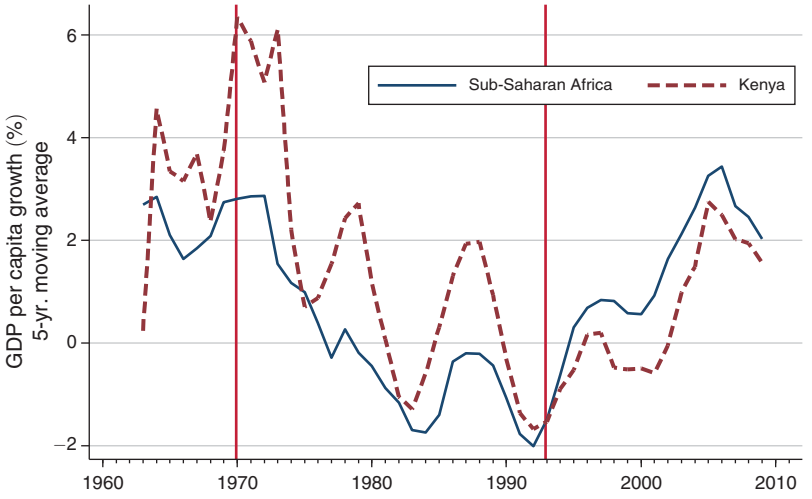

FIGURE 7. EVOLUTION OF GDP PER CAPITA GROWTH IN SUB-SAHARAN AFRICA, 1963–2011

Notes: This figure plots real gross domestic product (GDP) per capita growth (percent) for Kenya and the rest of sub-Saharan Africa (population weighted average). We illustrate a five-year moving average to reduce the year-to-year volatility in growth. 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. Data sources and construction are described in online Appendix A and Table A2 of online Appendix E.

for 1992–2009 to show that the region of birth of the national political leader shows greater night light density shortly after he takes office. This effect is muted during periods of democracy. Indeed, when a country's polity score exceeds 6, birth regions of the political leader are no longer favored, which is in line with our findings for Kenya. The global scope of that paper, plus the fact that light intensity captures the influence of a range of public goods as well as economic development per se, make it an interesting complement to our paper.

Linking our findings to aggregate economic outcomes represents a key priority for future research.[32] Figure 7 and Table 6 represent a first attempt in this direction. In Figure 7 we see that economic growth in Kenya and in Africa as a whole are highest during the democratic periods (the 1960s, 1990s, and 2000s) and falls toward zero during autocratic periods (1970s and 1980s). It is striking in Figure 7 that growth collapses precisely when Kenya becomes autocratic (in 1969) and then rises again when democracy returns (in 1992). Comparing Figure 2 with Figure 7, a similar picture emerges for Africa as a whole. Of course, many factors beyond ethnic favoritism might lie behind these patterns. Yet if we take the oft-cited negative relationship between ethnic favoritism and economic performance seriously, then the reduction of ethnic favoritism during periods of democracy could have contributed to higher economic growth during these periods.[33]

[32] Acemoglu et al. (2014) exploit the fact that transitioning to democracy or autocracy is highly correlated across countries in the same region (see Figure 2) to provide evidence that democracy has a significant positive effect on growth.

[33] A recent literature emphasizes how investments in transportation infrastructure can increase productivity and growth (see Michaels 2008; Donaldson forthcoming; Jedwab and Moradi forthcoming). Our results suggest that

TABLE 6—ECONOMIC GROWTH, ETHNIC DIVERSITY, AND DEMOCRATIC CHANGES ACROSS COUNTRIES, 1960–2010

Dependent variable	Growth of per capita real GDP $[c, t]$			
Sample	World	World	World	Africa
Decades	1960s–1980s	1960s–2000s	1960s–2000s	1960s–2000s
	(1)	(2)	(3)	(4)
Ethnic $[c, 1960]$	−0.017***	−0.006	−0.015*	−0.023**
	(0.006)	(0.005)	(0.008)	(0.011)
Ethnic $[c, 1960]$ × democracy $[c, t]$			0.013	0.036**
			(0.009)	(0.015)
Democracy $[c, t]$			−0.002	−0.018
			(0.005)	(0.012)
F-test $[p$-value$]$			0.10	1.12
H_0: Ethnic + (ethnic × democracy) = 0			[0.76]	[0.30]
Observations	312	528	500	182
Controls	Yes	Yes	Yes	Yes

Notes: OLS regressions on country-decadal panel dataset of 110 countries (c) for the last five decades (t): 1960s, 1970s, 1980s, 1990s, and 2000s. Growth of per capita real GDP $[c, t]$ is the average growth rate of real per capita GDP for country c in decade t. We use Easterly and Levine's (1997)—henceforth, EL97—dataset for the 1960s, 1970s, and 1980s, and extend the data for two additional decades using *Penn World Tables v7.1*. Ethnic $[c, 1960]$ is the index of ethnolinguistic fractionalization of country c in 1960 (EL97). Democracy $[c, t]$ is a binary indicator equal to 1 if country c is not an autocracy in decade t, with autocracy being defined as the average combined polity score for decade t if the threshold defined by Polity IV is < -5. EL97 uses seemingly unrelated regressions; we run OLS regressions with clustered standard errors at the country level, results are robust to the different method. Columns 1–3 include identical controls as in column 1 of Table IV in EL97 ("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," due to a large number of missing observations for Africa (see Barro and Lee 2010)). In column 4, we restrict the sample to only the African countries (38) and run the same specification as in column 3, excluding region fixed effects. The F-test is for the hypothesis that more or less ethnically diverse countries have equal outcomes under democracy. Robust standard errors clustered at country level are reported in the parentheses. Data sources and construction are described in online Appendix A and Table A2 of online Appendix E.

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

In Table 6 we probe this idea further by extending the influential Easterly and Levine (1997) analysis. In column 1, we replicate their key result using cross-country data for the whole world from the 1960s to the 1980s, which shows ethnic fractionalization is negatively associated with economic growth. Column 2 extends the Easterly-Levine dataset to the 2000s. The ethnic diversity-growth relationship is now smaller in magnitude and no longer statistically significant. This is interesting because the 1990s and 2000s were the period when many countries across the world became democratic (see online Appendix Figure A5). 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 relationship Easterly and Levine (1997) uncovered still holds for autocracies, there is no association between ethnic fractionalization and economic growth in democracies. Column 4 shows that if we restrict the sample to Africa, the negative

these resources were misallocated during autocracy, which may help explain why economic growth was depressed during the 1970s and 1980s in Kenya.

ethnic diversity-growth relationship still holds in autocracies but again is eliminated in democracies, thus paralleling our findings for Kenya.

Obviously, these cross-country results cannot necessarily be taken as causal, since democratization may be correlated with other important societal changes and is far from randomly assigned. Nonetheless, we view these patterns as useful for motivating further research. Particularly high on this research agenda is gaining a better theoretical and empirical understanding of how democracy fosters institutional changes which constrain public resource misallocation and underpin economic growth. This is as relevant for Kenya as it is for Myanmar and for the broad range of countries that are moving from autocracy into some form of imperfect democracy.

REFERENCES

Acemoglu, Daron, Suresh Naidu, Pascual Restrepo, and James A. Robinson. 2014. "Democracy Does Cause Growth." National Bureau of Economic Research Working Paper 20004.

Alesina, Alberto, and Eliana La Ferrara. 2005. "Ethnic Diversity and Economic Performance." *Journal of Economic Literature* 43 (3): 762–800.

Alesina, Alberto F., Stelios Michalopoulos, and Elias Papaioannou. 2012. "Ethnic Inequality." National Bureau of Economic Research Working Paper 18512.

Barkan, Joel D. 1994. *Beyond Capitalism vs. Socialism in Kenya and Tanzania*. Boulder, CO: Lynne Rienner Publishers.

Barkan, Joel D., and Michael Chege. 1989. "Decentralising the State: District Focus and the Politics of Reallocation in Kenya." *Journal of Modern African Studies* 27 (3): 431–53.

Barro, Robert J., and Jong-Wha Lee. 2010. "A New Data Set of Educational Attainment in the World, 1950–2010." *Journal of Development Economics* 104 (September): 184–98.

Bates, Robert H. 1981. *Markets and States in Tropical Africa: The Political Basis of Agricultural Policies*. Berkeley, CA: University of California Press.

Besley, Timothy, and Torsten Persson. 2010. "State Capacity, Conflict, and Development." *Econometrica* 78 (1): 1–34.

Besley, Timothy, and Torsten Persson. 2011. "The Logic of Political Violence." *Quarterly Journal of Economics* 126 (3): 1411–45.

Burgess, Robin, Remi Jedwab, Edward Miguel, Ameet Morjaria, and Gerard Padró i Miquel. 2015. "The Value of Democracy: Evidence from Road Building in Kenya: Dataset." *American Economic Review*. http://dx.doi.org/10.1257/aer.20131031.

Caselli, Francesco, and Wilbur John Coleman II. 2013. "On the Theory of Ethnic Conflict." *Journal of the European Economic Association* 11 (S1): 161–92.

Chandra, Kanchan. 2004. *Why Ethnic Parties Succeed: Patronage and Ethnic Headcounts in India*. Cambridge: Cambridge University Press.

Conley, Timothy G. 1999. "GMM Estimation with Cross Sectional Dependence." *Journal of Econometrics* 92 (1): 1–45.

Donaldson, Dave. Forthcoming. "Railroads of the Raj: Estimating the Impact of Transportation." *American Economic Review*.

Easterly, William, and Ross Levine. 1997. "Africa's Growth Tragedy: Policies and Ethnic Divisions." *Quarterly Journal of Economics* 112 (4): 1203–50.

Esman, Milton J. 1994. *Ethnic Politics*. Ithaca, NY: Cornell University Press.

Fearon, James D. 1999. "Why Ethnic Politics and 'Pork' Tend to Go Together." https://web.stanford.edu/group/fearon-research/cgi-bin/wordpress/wp-content/uploads/2013/10/Pork.pdf (accessed July 2014).

Francois, Patrick, Ilia Rainer, and Francesco Trebbi. 2015. "How Is Power Shared in Africa?" *Econometrica* 83 (2): 465–503.

Frank, Raphaël, and Ilia Rainer. 2012. "Does the Leader's Ethnicity Matter? Ethnic Favoritism, Education, and Health in Sub-Saharan Africa." *American Political Science Review* 106 (2): 294–325.

Fujita, Masahisa, Paul Krugman, and Anthony J. Venables. 1999. *The Spatial Economy: Cities, Regions, and International Trade*. Cambridge, MA: MIT Press.

Herbst, Jeffrey. 2000. *States and Power in Africa*: *Comparative Lessons in Authority and Control*. Princeton, NJ: Princeton University Press.

Hodler, Roland, and Paul A. Raschky. 2014. "Regional Favoritism." *Quarterly Journal of Economics* 129 (2): 995–1033.

Horowitz, Donald L. 1985. *Ethnic Groups in Conflict*. Berkeley, CA: University of California Press.

Jedwab, Remi, and Alexander Moradi. Forthcoming. "The Permanent Effects of Transportation Revolutions in Poor Countries: Evidence from Africa." *Review of Economics and Statistics*.

Kasara, Kimuli. 2007. "Tax Me If You Can: Ethnic Geography, Democracy, and the Taxation of Agriculture in Africa." *American Political Science Review* 101 (1): 159–72.

Kramon, Eric, and Daniel N. Posner. 2014. "Ethnic Favoritism in Primary Education in Kenya." http://pluto.mscc.huji.ac.il/~okedar/documents/KramonandPosner.pdf (accessed July 2014).

Mamdani, Mahmood. 1996. *Citizen and Subject: Contemporary Africa and Legacy of Late Colonialism*. Princeton, NJ: Princeton University Press.

Michaels, Guy. 2008. "The Effect of Trade on the Demand for Skill: Evidence from the Interstate Highway System." *Review of Economics and Statistics* 90 (4): 683–701.

Michalopoulos, Stelios, and Elias Papaioannou. 2011. "The Long-Run Effects of the Scramble for Africa." National Bureau of Economic Research Working Paper 17620.

Miguel, Edward, and Mary Kay Gugerty. 2005. "Ethnic Diversity, Social Sanctions, and Public Goods in Kenya." *Journal of Public Economics* 89 (11–12): 2325–68.

Morjaria, Ameet. 2014. "Is Democracy Detrimental for the Environment in Developing Countries? Evidence from Kenya." https://dl.dropboxusercontent.com/u/24297068/amorjaria_forest.pdf (accessed July 2014).

Padró i Miquel, Gerard. 2007. "The Control of Politicians in Divided Societies: The Politics of Fear." *Review of Economic Studies* 74 (4): 1259–74.

Posner, Daniel N. 2005. *Institutions and Ethnic Politics in Africa*. New York: Cambridge University Press.

Sheriff, Abdul. 1985. "Social Formations in Pre-Colonial Kenya." In *Hadith 8: Kenya in the 19th Century*, edited by B. A. Ogot, 1–32. Kisumu, Kenya: Anyange Press.

Wamwere, Koigi Wa. 2003. *Negative Ethnicity: From Bias to Genocide*. New York: Seven Stories Press.

Widner, Jennifer A. 1992. *The Rise of a Party-State in Kenya: From Harambee! to Nyayo!* Berkeley, CA: University of California Press.

Wrong, Michela. 2009. *It's Our Turn to Eat: The Story of a Kenyan Whistle-Blower*. London, UK: Fourth Estate.