Our Turn To Eat: The Political Economy of Roads in Kenya*

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Abstract

By reducing trade costs and promoting economic specialization across regions, transportation infrastructure is a determining factor of growth. Yet, developing countries are characterized by infrastructure underdevelopment, the general lack of funding being often mentioned as the main reason for it. Then, even when such investments are realized, the welfare gains associated to them might be captured by political elites that are strong enough to influence their allocation across space. We study this issue by investigating the political economy of road placement in Kenya, an African country where politicians are said to favour individuals from their region of origin or who share their ethnicity. Combining district-level panel data on road building with historical data on the ethnicity and district of birth of political leaders, we show that presidents disproportionately invest in their district of birth and those regions where their ethnicity is dominant. It also seems that the second most powerful ethnic group in the cabinet and the district of birth of the public works minister receive more paved roads. In the end, a large share of road investments over the period can be explained by political appointments, which denotes massive and well-entrenched ethno-favoritism in Kenyan politics.

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1 Introduction

By reducing trade costs and promoting economic specialization across space, transportation infrastructure is said to be a determining factor of growth. This fact has been emphasized by public policy reports (World Bank 1994, World Bank 2009), cross-country macroeconomic studies (Canning, Fay and Perotti 1994, Radelet and Sachs 1998, Limao and Venables 2001) and empirical microeconomic works (Michaels 2008, Donaldson 2009, Atack et al 2009, Banerjee, Duflo and Qian 2009).[1] As infrastructure projects are extremely costly and since benefits can take time to materialize, developing countries might lack the financial and organizational capacity to make such investments, thus constraining their future growth. The lack of infrastructure is often mentioned as one of the main reasons of African underdevelopment (Buys, Deichmann and Wheeler 2006, Ndulu 2006, Ayogu 2007).

Besides, when infrastructure projects are indeed realized in developing countries, political economy factors might lead specific groups or members of the population to capture the welfare gains associated to them. First, grand infrastructure projects are subject to high corruption risks (Tanzi and Davoodi 1998, Kenny 2006, Transparency International 2008).[2] Second, the placement of infrastructure projects itself can be influenced so as to disproportionately favor specific regions (Finan 2005, Cadot, Roller and Stephan 2006, Bates 2008). It is often argued that African leaders use public expenditure to support individuals from their region of origin or who share their ethnicity (Miguel and Zaidi 2003, Moser 2008, Franck and Rainer 2009). In the long run, ethno-favoritism can lead to high regional inequalities and political instability, with long-term consequences being as dramatic as ethnic riots or civil conflicts (Easterly and Levine 1997, Montalvo and Reynal-Querol 2005).

This paper examines the political economy of road placement in Kenya. Using repeated road maps which extend from pre-independence to the modern period, we are able to reconstruct both quantitative and qualitative road data at the district level for the period 1961-1992. We also create a political data set with the district of birth and ethnicity of the presidents and the other cabinet members for the same period. Lastly, we use census data to map ethnic groups across Kenyan districts. This enables us to test whether there were sharp changes in the

[1] There is a growing literature on the microeconometric effects of other significant infrastructure projects, whether electrification (Dinkelman 2007), dams (Duflo and Pande 2005) or mobile phone towers (Jensen 2007).

[2] It is argued that politicians prefer to rebuild deteriorated roads rather than maintain them, although the latter is more cost-effective in the end (World Bank 1988). Maintenance does not offer as many corruption opportunities as road construction.

placement of roads across ethnic and administrative boundaries when the ethnicity and region of birth of the leaders changed. Thus, the road network in the British period will act as a benchmark as it will arguably be less motivated by patronage considerations. Subsequent political transitions in the post-independence era will also contribute to the identification strategy.

Our results suggest that: (a) the president uses his unconstrained powers to massively distort national road building in favor of those districts where his ethnicity is well-represented (an additional 10.44 km of paved roads per district every three years). The President's district of birth receives an additional 46.33 km of paved roads every three years; (b) the second largest ethnic group in the cabinet seems to receive an additional 11.85 km of paved roads per district every three years; (c) the public works ministry is a strategic position for road investments as the district of birth of the public works minister obtains an additional 8.53 km of paved roads every three years. We discuss and give possible historical explanations for these findings.

The rest of the paper is organized as follows. Section 2 motivates our empirical analysis by providing it with a conceptual framework inspired by the political economy literature. Section 3 presents a brief overview of Kenyan politics and its road system, and section 4 describes our data and explains the identification strategy. Section 5 shows and discusses the results, while section 6 concludes.

2 Ethnicity and Public Spending

2.1 Patronage versus Vote-Buying

The patronage hypothesis stipulates that elected politicians target public spending so as to reward their loyal backers.[3] Those are usually co-ethnics in the African context (Bates 1983; Bratton and Van de Walle 1997; Posner 2005).[4] Politicians could do so for many reasons: (a) "ethnic altruism": leaders intrinsically maximize their utility by increasing the one of their co-ethnics (Becker 1957, Habyarimana et al 2007); (b) "ethnic reciprocity": leaders could not become leaders without the initial support of powerful members (the "big men") of their own community,

[3]See Levitt and Snyder 1995 for patronage effects in the U.S., and Miguel and Zaidi 2003 for patronage effects in Ghana.

[4]According to Fearon (1999), when coalitions form to capture political "pork", "there is a strong incentive to limit the size of the winning coalition in order not to dilute each winner's share of the spoils". Coalitions are thus looking for the most excluding device, defined as a trait that permits an easy identification of the winners and the losers. Ethnicity is such a device.

who ask to be retributed for their initial investments[5]; (c) "our turn to eat" game (Posner 2005; Bratton and Kimenyi 2008; Kimenyi and Romero 2008, Wrong 2009)[6]; knowing that the previous leaders disproportionately favored their own people, current leaders find it "fair" to do the same for their own people. They also know that their tenure might be temporary and that the next leaders will do the same when their turn comes, which reinforces them in spending more now. By doing so, they encourage the next leaders to act correspondingly, and so on. All successive leaders become the main actors of an "our turn to eat" game, which is a bad equilibrium unlikely to be broken. The issue is who the first mover was and why he adopted ethnic and not nation-building policies.

The vote-buying hypothesis consists of politicians targeting (or committing to target) public spending so as to maximize their probability of being elected. When politicians use public expenditure to be re-elected, vote-buying is labelled as incumbency effect.[7] The class of "core-supporter" models argues that it is more efficient to target one's own people (Cox and Mc Cubbins 1986; Dixit and Londregan 1996). As co-ethnics may intrinsically value the fact of having a co-ethnic in office, their vote is "cheaper" to obtain. Besides, the leader might be relatively more efficient in targeting co-ethnics, as he knows well how to satisfy their needs. The class of "swing-voter" models argues that it is more efficient to target pivotal voters (Lindbeck and Weibull 1987; Dixit and Londregan 1996; Groseclose and Snyder 1996). In our case, those are the other ethnic groups. The leader can also adopt a mixed policy where he supports both his own people and carefully selected coalition members.[8]

Both patronage and vote-buying effects could lead to ethno-favoritism, where the dominant ethnic group in the government redistributes state resources (public investments, civil servant positions) towards its own members.[9] If coalitions have

[5]In a similar spirit, Habyarimana et al 2007 exploits games from experimental economics in an urban slum of Kampala and shows that the main reason why people favour co-ethnics is in-group reciprocity norms.

[6]Posner 2005, Bratton and Kimenyi 2008, and Kimenyi and Romero 2008 consider a different mechanism than ours, in a set-up with democracy: people would like to put aside their ethnicity when voting, but they anticipate that members of the other ethnic groups do vote according to their ethnicity. They are afraid of being deprived of public investments and end up voting for co-ethnics.

[7]See Levitt and Snyder 1997 and Ansolabehere and Snyder 2003 for incumbency effects in the U.S., and Schady 1999 for incumbency effects in Peru.

[8]Moser 2008 finds both patronage and vote-buying effects on basic infrastructure project in Madagascar.

[9]Using data from 18 African countries, Franck and Rainer 2009 shows how those people who share the ethnicity of the national leader benefit from increased primary education and decreased child mortality. On the contrary, Kasara 2007 finds that cash crop farmers who share the ethnicity of the national leader are more heavily taxed.

to be formed to win, swing voters will be included in this redistribution process. Then, most models consider a set-up with democratic elections. The same reasoning applies in a single-party autocracy, considering party "top men" instead of voters. First, the head of the party-state disproportionately favors his own people by allocating them key cabinet positions. Second, as he is constantly facing the threat of being evicted by a coalition within the party, he seeks the support of the other tribes. In that case, he rewards the "top men" of those groups by appointing them as ministers.

2.2 The Distorsionary Impact of Ethno-Favoritism

The next question is to what extent this "ethnic redistribution" can be seen as a distortion. For that, we must compare it with the following benchmark, where the government could invest in roads for two motives: efficiency and equity.[10] First, it could maximize growth by selecting those road projects with the higher marginal return. We expect more road building in districts that are dense and urbanized and/or specialized in profitable sectors. We also expect more road building in districts in-between regions with distinct endowments, thus reinforcing the spatial division of labor. The fruits of increased regional specialization can then be shared amongst citizens. Second, it could reduce spatial inequality by developing poor regions. Those investments are distortive, but this "redistribution" may not be "excessive" if it corresponds to the values of the society (assuming for instance a Rawlsian social planner).

Clearly, both motives appear contradictory and road building policies in both developed and developing countries often reflect the tension between those two. But ethnic redistribution which can be explained neither by efficiency nor by poverty reduction is "excessive".[11] In our econometric framework, we will give preference to regressions trying to control for the district-level characteristics that could explain road building programs either in terms of efficiency or equity.

[10]Moser 2008 also contrasts social welfare maximization with patronage and vote-buying. In the first scenario, the social planner would equalize the weighted sum of marginal benefits across districts. As the Malagasy government's stated objective was poverty reduction, she considers the Foster-Greer-Thorbecke class of estimators as the benefit function.

[11]In particular, ethnic redistribution can fuel the "our turn to eat" game, thus undermining nation-building and encouraging civil conflicts. This is best illustrated by the ethnic riots of the 2007-2008 presidential elections in Kenya, where the Luo and Kalenjin opponents accused the Kikuyu-led governement of only serving the interests of the Kikuyu areas.

3 Background on Kenya

3.1 Political History 1961-1992

The general elections of May 1963, few months before the official announcement of independence, leads to the victory of KANU (Kenyan African National Union) versus KADU (Kenyan African Democratic Union). While the former is dominated by the two most economically successful ethnic groups at that time, the Kikuyus and the Luos, the latter is a large coalition representing all the more minor ethnic groups (including noticeably the Kalenjins). At the end of 1964, KADU decides to merge with KANU, permitting the end of multi-party politics and the establishment of single-party autocracy, which will last till 1992.
With a single party, Kenyatta, the Kikuyu prime minister, manages to change the constitution so that Kenya can become a republic. He then becomes president and suppresses the function of prime minister. Odinga Odinga, a Luo, is appointed as vice-president (but evicted as soon as 1966). This signals the rise of the Kenyatta State. Progressively, through repeated constitutional reforms, he legally enforces monopartism, largely extends the powers of the president and massively centralizes the Kenyan administration. At the dawn of the 1970s, he is the supreme leader of the Kenyan state, appointing faithful Kikuyu ministers and district commissioners which carry out his will. The Kikuyus represent 20.9% of the population in 1979 but their share in the government is 30% throughout the 1970s (see table 1). But, as the Kenyan population consists of many small groups, he cannot rule without conceding some important positions to his coalition members. Especially, the Luos have always been the second most powerful group in the cabinet, although they are losing representativity over the period to the profit of the Kalenjins, whose main leader Daniel Arap Moi becomes vice-president in 1967.[12] In the late 1970s, Kenyatta is getting older and is said to have lost control over most of his Kikuyu ministers, all originating from the same district, Kiambu, and therefore labeled as the "Kiambu mafia". Aware that the death of Kenyatta would signify the loss of power in favor of Moi, they create an association, GEMA (standing for Gikuyu, Embu, Meru, Association), which attempts to change the constitution so that the vice-president cannot become president if the president happens to die.
The death of Kenyatta in 1978 surprises them all, and no one can prevent Moi from becoming president, especially as he is even backed by some prominent Kikuyu members of KANU. Moi, as a member of a group representing only 10.8% of the population, has no choice to govern but to reward his Kikuyu supporters and ex-

[12]The Luos' cabinet share decreases from 24% in 1963 to 13% by 1974, while the Kalenjins' cabinet share increases from 0% to 9% over the same period (see table 1).

tend his cabinet to include members of each ethnicity present in the country: the cabinet size increases from 27 in 1979 to 34 in 1988 (see table 1). This decentralization of power is actually only apparent, as he quickly becomes as powerful and authoritarian as Kenyatta, then favoring his own people in terms of public spending. In 1992, facing pressure by international donors now keen on fighting corruption, he has to accept multi-party elections, which he nevertheless wins as opposition remains divided along tribal lines.

3.2 Parliamentary Elections and The Cabinet

A brief discussion of the electoral system under one-party rule is necessary. The period of interest, 1961-1992, was characterized by a Westminster-style electoral system. The country was divided into single-member constituencies in which all adults could register to vote and candidates could stand in any constituency. But, as only one party was authorized, political competition had to take place at the constituency level through the KANU primaries. Then, as in any one-party system, the President was chosen by the Central Committee of the ruling party. This designation was then submitted to the yes-or-no vote of voters during presidential elections where no independent presidential candidate was allowed to stand up. In other words, the executive seat was never contestable and never challenged.
The president is further assisted by the cabinet. He directly appoints the other cabinet members, basically the vice-president and the ministers, as well as the assistant ministers and the permanent secretaries. In fact, section 23 of the constitution indicates that "the executive authority of the government of Kenya shall vest in the president and subject to this Constitution may be exercised by him either directly or through officers subordinate to him." Thus, ministers merely executed orders delegated to them from the president. Elections, which took place approximately every 4 years (1964, 1966, 1969, 1974, 1979, 1983 and 1988), were occasions for the president to modify his cabinet following his own political designs.

3.3 The Road Network in Kenya

In 1992, the total length of Kenya's roads was 22132 km, 25.9% of which were paved and 26.10% of which were improved. By comparison, the total length of Kenya's network was 11544 km in 1961, with a much lower share of paved roads, 7%, and a lower share of improved roads, 15%. The post-independence has therefore been marked by considerable investments in paved roads, as 4885 km of them were constructed over the period. Figure 1 depicts the evolution of the total length of paved roads over the period, as well as their share in the whole network. Figure 2 shows the share of road development expenditure in the total development expenditure of

Kenya and confirms that road building is costly, as the average share over the period 1965-1999 is 15.20%. Then, most of the roads of the network are concentrated in the south, as the lack of rainfall in the north limits agricultural productivity and human settlement. Furthermore, the south did benefit from original investments in its transport system by the British colonizer. In 1901, the *Uganda Railway* was constructed from Mombasa to exploit the economics resources of Uganda. The railway also permitted Kenya to become a settler colony as British settlers would capture the most fertile land of both the now Central Province and Rift Valley to grow tea or coffee for exports. Feeder roads were then built to connect the farms with the railway network. Besides, additional roads were built to connect the main region and towns of the country so as to permit the administration of the territory. In the early days of independence, the new government followed the Swynnerton Plan of 1954 as a blueprint to modernization. The development of roads was seen as an important policy to develop cash crop production, tourism and help rural settlements. In the 1960s, the government emphasized upgrading the principal arteries of the trunk road system. This was followed by improvements of the primary road network through selective bitumenization of heavily used segments within the settler areas. In the 1970s, emphasis shifted towards the construction of feeder and minor roads. In the 1980s, the Government continued to implement rural-oriented road investments through the Minor Roads Programme. However, during this period primary and secondary roads had started to deteriorate due to a general lack of maintenance.

Road management during the colonial period was under the Public Works Department established in 1896. The Road Branch of the department was responsible for developing and managing the national road network whilst the Local Authorities of the native reserves were responsible for urban and rural roads in their jurisdiction. In 1956, the PWD became a fully-fledged Ministry of Works, and in 1963, it was renamed to Ministry of Works, Communications and Power. The Roads Branch in 1966 was then fully promoted to a Department of the Ministry. By the late 1960s, all the rural roads were transferred from the County Councils to the Road Department. Between 1979 and 1988, the Department was renamed Roads & Aerodromes Department and resided within the Ministry of Transport & Communications (MOTC). Nevertheless, the Ministry of Works (MOW) remained the decision-maker and operator of road construction. In 1988, the road department was moved back to the Ministry of Works (MOW). The MOTC remained in charge with the transport sector policy while the latter (MOW) was in charge of development, maintenance and rehabilitation of all classified roads in Kenya.

4 Empirical Methodology

4.1 Data

To study the effects of various political economy factors on road building in Kenya, we combine three types of data at the district level over the period 1961-1992: on road building, on the district of birth and ethnicity of leaders, and on various socioeconomic and demographic characteristics of districts.[13] Since we use the 1961 district boundaries (there were 41 districts at that time) and considering that we have road data for only 12 years, our sample consists of 492 district-year observations.

Our first type of data consists of road quality and quantity data for each of the 41 districts for the following 12 years: 1961, 1964, 1967, 1969, 1972, 1974, 1979, 1981, 1984, 1987, 1989, 1992. For each district-year, we have at our disposal the total length in kilometers of three types of roads: paved, improved and tracks. Improved roads are usually laterite roads, while tracks are earthen or dirt roads of small width. Both are liable to be impracticable in bad weather. Figure 3 displays the visual evolution of the road network for those years. Besides, within the category of paved roads, we know the total length in kilometers of those roads with only one lane, two lanes or four lanes. We can therefore reconstruct the total length in kilometers of paved lanes, thus taking into account improvements within the category of paved roads (the multiplication of such lanes is a road investment per se). Lastly, using World Bank estimates of construction costs (in 2007K$) for our three types of roads (Alexeeva, Padam and Queiroz 2008), we are able to recalculate the total value of the whole road network. In the end, for each district-year, we obtain three outcomes that can be complimentarily used in our analysis: (i) the total length in kilometers of tracks, improved and paved roads, (ii) the total length in kilometers of paved lanes, and (iii) the total value in 2007K$ of the whole road network.

Our second type of data includes the district of birth and ethnicity of all the cabinet members of Kenya between 1961 and 1992: the president, the vice-president and the ministers. We have this data for the main election years (1964, 1966, 1969, 1974, 1979, 1983 and 1988), and in-between for the key cabinet positions. We then construct for each district-year four political economy variables that we use in our regressions: (i) the share of the president's ethnicity in the district in the previous period; (ii) the share of the second most powerful ethnic group in the cabinet in the district in the previous period; (iii) a dummy equal to one if the district was the district of birth of the president in the previous period and 0 otherwise; and

[13] Details on data construction are available in the Data Appendix.

(iv) a dummy equal to one if the district was the district of birth of the public works minister in the previous period and 0 otherwise.
Lastly, using the decadal Population and Housing Censuses and the Annual Statistical Abstracts from the Kenya Central Bureau of Statistics, as well as miscellaneous GIS sources, we are able to reconstruct a range of socioeconomic and demographic variables at the district level for various years: the population, a dummy variable for containing a city, the urbanization rate, the per capita earnings, the employment rate in the formal sector, the primary education completion rate, a dummy variable for being located on the Mombasa-Kampala international road and two dummy variables for respectively bordering Uganda and Tanzania.

4.2 Main Specification

The main hypothesis we wish to test is whether politicians favor their "own" region in terms of road investments, whereby "own" is defined as ethnic proximity or place of birth. We have two predictions. First, those districts whose main ethnic group is highly represented in the cabinet (the ethnic group of the president or the second most powerful ethnic group in the cabinet) will experience more road building. Second, those districts that are the place of birth of key cabinet members (president, minister of public works) will experience more road building. Our baseline method is to run panel data regressions for districts d and years t of the following form:

$$L_{d,t} = \alpha_d + \beta_t + \varepsilon L_{d,t-1} + \delta P_{d,t-1} + \phi_t X_d + u_{d,t} \quad (1)$$

where α_d and β_t are district and year fixed effects and X_d is a vector of baseline demographic, economic and geographic variables that we might expect to affect the total length of paved roads of district d at time t ($L_{d,t}$), controlling for the past total length of paved roads of district d at time t-1 ($L_{d,t-1}$). Since controlling variables X_d are included in the fixed effect α_d, we allow their effect t to vary with time. $P_{d,t-1}$ are our political economy variables of interest at time t-1: the share of the president's ethnic group in the district, the share of the nearest coalition member's ethnicity in the district, a dummy for being the district of birth of the president and a dummy for being the district of birth of the public works minister. Lastly, $u_{d,t}$ are individual disturbances that are clustered at the district level. We have 41 districts and 12 time periods, hence 492 observations. When we include a lag of the dependant variable ($L_{d,t-1}$), we drop one round and thus obtain 451 observations.

4.3 Econometric Discussion

Our model encompasses a sum of natural experiments, where we look within the same district at the effect of variations from not being to becoming a powerful district (as its most represented ethnicity happens to become dominant in the cabinet and/or because it contains the birthplace of the new president / minister of public works). In a difference-in-difference spirit, the treatment corresponds to "becoming powerful" and one can question its exogeneity. There are possible omitted variables that could cause increases in both power and road investments. A first solution is to assume the exogeneity of the treatment. For instance, most of the public works ministers came from various ethnic minorities, e.g. the Tavetas or the Kisiis, and it is not clear why one ethnic minority in particular was selected. Then, within the set of districts where those minorities were dominant, it is even less clear why a politician born in district X was selected instead of one born in the neighboring district Y. Lastly, those ministers were awarded the ministry of public works but they could have been awarded any other ministry.
A second solution is to assume the exogeneity of the timing of the treatment. Kenyatta died in 1978 but he could have died earlier or later. If he had died later, it is possible that GEMA would have managed to change the constitution, thus forbidding Moi from becoming president. Therefore, we expect no pre-treatment trend (and even no post-treatment trend) in road investments. This is verified in most of our cases of political variations. Figure 4 shows the evolution of the total length of paved roads for various ethnic groupings of districts. The Kikuyu districts receive more paved roads before Kenyatta's death, and less after. The Kalenjin districts receive few paved roads during Kenyaatta's presidency, and more paved roads during Moi's presidency. Lastly, the Luos receive more roads when they were the allies of the Kikuyus before Kenyatta's death. Figure 5 does the same for four selected districts, and confirms the no pre-/post-treatment trend for the district of birth of the two presidents and two ministers of public works.
A third solution is to control for the observable components of these omitted biases by including as much controls as possible. Culprits of factors entailing both more power and more roads are population growth, urbanization and economic activity. In fact, adopting a conditional strategy improves our results for the following reason. Each treatment effect contained in the vector of coefficients δ is the dynamic difference between road investments in treated and control districts. If road investments are respectively $\triangle_{treated}$ and $\triangle_{control}$ in treated and control districts, the treatment effect is $\triangle_{treated} - \triangle_{control}$. Considering that few districts belong to the treatment group, all the factors that raise $\triangle_{control}$ downward biases our treatment effect. As a result, a conditional strategy (including controls for those factors) is superior to an unconditional strategy, as it will "reveal" the true treatment ef-

fect. Our range of controlling variables must then be extended beyond population growth, urbanization and economic activity. Physical geography and economic geography factors have been identified and their list is given in the data section and described in the data appendix. When we include more controlling variables, we indeed observe higher and more significant coefficients, thus validating this intuition.[14]
In the end, we will give preference to those regressions including socioeconomic, demographic and geographic controls as it allows us to identify the "excessive" redistribution (see section 2.2), control for observable omitted biases and downplay the downward biases due to our small number of treated districts. We will then systematically omit those controls as a robustness check: as coefficients are rather unchanged (but also less significant), we are confident that our estimates are valid.

5 Results

5.1 Main Results

In table 2, we run the baseline model (see equation (1) on page 11), alternatively considering the length of paved roads (column (1)), the length of paved and improved roads (column (2)), the length of all the roads (column (3)), the length of paved lanes (column (4)) and the total value of the network (column (5)). Results with controls are reported in panel A, while those without controls are reported in panel B. All those regressions include a lag of the dependent variable.
Results in panel A of Column (1) indicate the high and significant effects of: (i) having a high share of the president's ethnic group (an additional 10.44 km per district every three year), (ii) having a high share of the second most powerful ethnic group in the cabinet (an additional 11.85 km per district every three year), (iii) being the district of birth of the president (an additional 46.33 km of paved roads every three year), and (iv) being the district of birth of the minister of public works (an additional 8.53 km of paved roads every three year). Results in panel B are much less significant, but coefficients are quite unaltered, except for the effect of the share of the nearest coalition member's ethnicity in the district.
Those results must be compared with the fact that the district average length of paved roads increased from 21 kms in 1961 again 140 kms in 1992, thus an increase of 119 kms. For example, considering there are 11 periods, each district with a high share of the president's ethnicity receives an additional 10.44*11 = 114.84 kms of paved roads over the whole period. We then calculate the contribution of

[14]Likewise, including only one variable of interest leads to a downward bias, due to the contemporaneous effects of the three other variables of interest. They must be included altogether.

each effect to the total variation of paved roads between 1961 and 1992 (+ 4886 kms). We find that the president's ethnicity, nearest coalition member's ethnic group and president's district of birth effects each contribute around 10.5% of the total variation, while the minister of public works effect contributes to only 1.9%. Altogether, those four effects, which we can qualify as "excessive redistribution", account for one third of the total variation of paved roads between 1961 and 1992. Estimates in column (2) show that the president's district of birth also receives more improved roads (as the coefficient increases between columns (1) and (2), this means the coefficient for the regression on the sole improved roads must be even higher). Then, we do not find any effect in column (3), which indicates that our four political economy variables only affect paved and improved roads. Lastly, regression estimates using the total length of paved lanes (column (4)) and the total value of roads (column (5)) as outcomes are consistent with the results of column (1). The effect for the district of birth of the public works minister is not significant anymore, but the coefficient remains quite high.

5.2 Robustness checks

In table 3, we retain our baseline regression on paved roads (see column (1) of table 2) and see how results are altered when performing some robustness checks. Column (1) reproduces those results. In column (2), we present the regression results excluding Nairobi and Mombasa districts. In column (3), we include a time-varying effect for various ethnic fractionalization indices.[15]. In column (4), we show the results when including year dummies interacted with district area, so as to control for the non-uniformity in district boundaries. In column (5), we use the squared version of the share of the president's and nearest coalition member's ethnicity in the district, so as to capture potential non-linear effects. Results including the change in the total length of paved roads at the province level (excluding the district of the observation) are reproduced in column (6). Doing so, we hope to capture for more general drivers of road building at the province level. In column (7), we include one more lag of the dependent variable, in order to control for the pre-treatment trend. Lastly, in column (8), we use the 1962

[15]We refer to the literature that argues that ethnic heterogeneity leads to less public goods over time (Alesina and La Ferrara 2005, Miguel and Gugerty 2005). As two of our four political economy variables are based on the share of various ethnic groups at the district level, they could be correlated with ethnic diversity, thus contaminating our analysis. For each district, we use our ethnic data at the district level to calculate both the polarization index RQ and the ethnolinguistic fractionalization index ELF, two distinct indices presented in Alesina and La Ferrara 2005. We then interact those with year dummies to control for this possible channel. As our results hold, we are confident that we are capturing a different story that the ethnic heterogeneity and public goods story.

district populations (in thousands) as regression weights. Panel A presents the results with controls, while panel B presents those without. If we focus on panel A, results appear quite robust, as the coefficients are quite stable and significance still high for most regressions. In table 4, we replicate the same exercise, this time considering the baseline regression with the total value of roads as an outcome (see column (5) of table 2). Again, results are quite consistent with our first estimates. In table 5, we retain our baseline regression on paved roads (see column (1) of table 2) and see how results are altered when performing some specification checks. Column (1) reproduces those results. In column (2), we present those results when we use a Blundell-Bond system GMM model where we instrument the lag of the dependant variable ($L_{d,t-1}$) with lags of the differences in the same variable (Blundell and Bond 1998, Roodman 2006). As we run a panel data model with fixed effects and a lag of the dependent variable, we mechanically create a "dynamic panel bias" on this variable and this may bias the other coefficients (Nickell 1981). In column (3), we take the log of total length in paved roads (for both the dependent variable and its lag in the RHS). In column (4), we show those results when we take as an outcome the change in the total length of paved roads and include no lag of the dependent variable (it is a convenient way to circumvent the dynamic panel bias). Results with road density (total length of roads / population) are displayed in column (5), the problem with this regression being that population is endogenous (with regard to our political economy variables). This makes us wonder to what extent we can trust those estimates. Panel A presents our estimates with controls, while panel B shows them without controls. The share of the president's ethnicity in the district effect is robust across specifications. The effect for the nearest coalition member is also robust across specifications, except for the Arellano-Bond model: the coefficient decreases and is not significant anymore. The district of birth effects are then robust in three of the five specifications. In the end, although we cannot be definitively certain about the validity of our four effects, we are quite confident that we are really capturing positive and sizeable effects. Table 6 replicates the same exercise for the total value of roads. Again, our four effects are not significant across the five specifications, but their coefficients usually remain quite high.

Lastly, we study whether our results are robust to atypical observations. First, some districts with less than 20 kilometers of paved roads have experienced dramatic investments from one period to another. Second, two districts have experienced a collapse in their stock of paved roads. Certainly, Michelin has decided to downgrade those due to increasing deterioration (e.g., potholes). Third, we could wonder whether our results are not driven by observations with a high length of paved roads. To answer those issues, we run our main regression (see column (1) of

table 2) but alternatively excluding those observations experiencing a huge investment or a dramatic collapse, and we trim our sample using the 400, 300 and even 200 km cut-offs of paved roads in the previous period. Results hold (not shown, but available upon request).

5.3 Discussion of the Results

Results suggest that a large share of road building over the period is explained by political economy factors, especially the fact that politicians favor their "own" people, "own" being defined in terms of ethnic proximity or geographical proximity regarding birth. The president, by appointing ministers of his tribe or controlling them, diverts public expenditure towards those districts where his tribe is well-represented, with an additional effect in his own district of birth. This confirms the presidentialism of the regime, where the president concentrates a large share of the power in his own hand. By comparison, Franck and Rainer 2009 shows that being a co-ethnic of the president in Kenya increases the probability of having some primary education by 13.6%, female literacy by 6.5% and male literacy by 10.2%. No effect is found for infant mortality. Ethno-favouritism can therefore be felt across more than one dimension, roads and education being two of them.[16]
Yet, in the Kenyan context of high ethnic diversity, we wonder whether the president could be so powerful without getting the support of few "top men" from the other ethnic groups. In other terms, do we find excessive road building in those districts where the ethnicity of the nearest coalition member is well-represented, thus infirming the "winner takes all" hypothesis? Results suggest a high effect for the second ethnic group in the cabinet. This story is well-documented in the case of Moi: in the late 1970s, while GEMA was trying to change the constitution so as to prevent him from becoming president, he had to get the support of factious Kikuyus.[17] But this is much less documented in the case of Kenyatta: while Luos were the best allies of Kikuyus in the first post-independence years, it is often said that Luos were marginalized after.[18] However, this view has been contradicted by Morrison 2007 who tests whether Luos did relatively "lose" across

[16]Theoretically, politicians prefer excludable goods that can be finely targeted, i.e. cash transfers or employment over public goods, and within the class of public goods, school and health facilities over roads (Cox and McCubbins 1986, Finan 2005). However, as ethnic groups are highly spatially concentrated in Kenya, roads are "targetable" and that is why we find large effects.

[17]The share of Kikuyus decreased from 30% in 1979 to 21 % in 1983, but the same share did actually re-increased to 26 % in 1988 (table 1).

[18]This is true to a certain extent as the share of Luo cabinet members did decrease from 24% in 1963 to 13% in 1974 (table 1). Besides, Odinga Odinga was quickly evicted from the ruling party, and Tom Mboya, another prominent Luo leader, was assassinated in 1970.

several dimensions (cabinet positions, administrative and academic jobs, educational attainment, child mortality, etc.) over the 1964-1978 period. Actually, if the Luos were "losing" compared to Kenyatta's Kikuyus and several more minor groups, it should be noted that it was quite reasonable given the "primacy" of Luos before independence and the fact that they were still "gaining" compared to the other groups. Our own cabinet data suggest that the Luos did remain the main coalition member of the Kikuyus.
Lastly, we are unable to disentangle patronage and vote-buying effects. Nevertheless, we would like to discuss one of the patronage effect, the "our turn to eat" game. The bad equilibrium cannot happen without a first mover who favors its own people. After the construction of the railway in 1901, there were increasing flows of British settlers in Kenya. They would capture the most fertile land, thus encroaching upon the territories of the 41 African tribes. The Kikuyus and Rift Valley tribes would particularly suffer from White land-grabbing. Furthermore, the African tribes could not compete with White farmers, who owned a monopoly over the culture of cash crops. Dispossessed, many Kenyans would then become wage laborers and provide cheap labor for White farmers. So as to strengthen this profitable situation, the country was progressively subdivided in native reserves where each ethnic group was legally "confined" (Berman 1990). The other benefit of this measure was to break any interethnic cooperation which could jeopardize the domination of the British Crown. This context of decreasing land supply for African tribes, associated to increasing population levels in overcrowded native reserves, led the various ethnic groups to increasingly view "their communities as mini-nations in fierce competition with one another" (Wrong 2009). At independence, instead of reversing the land-grabbing process initiated by the British, Kenyatta and his Kikuyu ministers sought to perpetuate the system but to their own profits this time, consolidating the "our turn to eat" game. In the end, even if interethnic dissensions existed well before British colonization, it seems that ethnic competition was clearly emphasized during colonization, to become well-entrenched after independence.

6 Conclusion

Using unique data on road building and changes in political leaders in 1961-1992 Kenya, we find that leaders disproportionately favor their "own" people in terms of road building. We find strong presidential effects, as those districts where the president's ethnic group is well-represented receive more paved roads, while the president's own district of birth gets even more paved roads plus more improved roads. The Kenyan context of high fractionalization seems to force the president

to seek alliances with other ethnic groups and thus reward them with more paved roads. We can show that this "swing voters" effect does even happen in a single-party autocracy, as the president must play down any eviction threat by getting the support of several "top men" from other ethnic groups. We also find that the public works ministry is a key position in terms of road building as the district of birth of the public works minister obtains more paved roads.

In the end, a significant part of the investments in paved and improved roads over the period were driven by "ethnic redistribution". We explain that ethnic redistribution could be motivated by both patronage and vote-buying effects, and we emphasize, although without being able to prove it, that British colonization did reinforce ethno-favoritism, initiating an "our turn to eat" game. Then, as ethno-favoritism feeds interethnic resentment and interethnic resentment feeds political instability (e.g., ethno-nationalism), we consider that foreign donors should be more attentive to this issue when funding infrastructure projects in developing countries.

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Figure 1: Evolution of the Total Length of Paved Roads (in Kms) and Their Percentage Share in the Whole Network, 1961-1992.

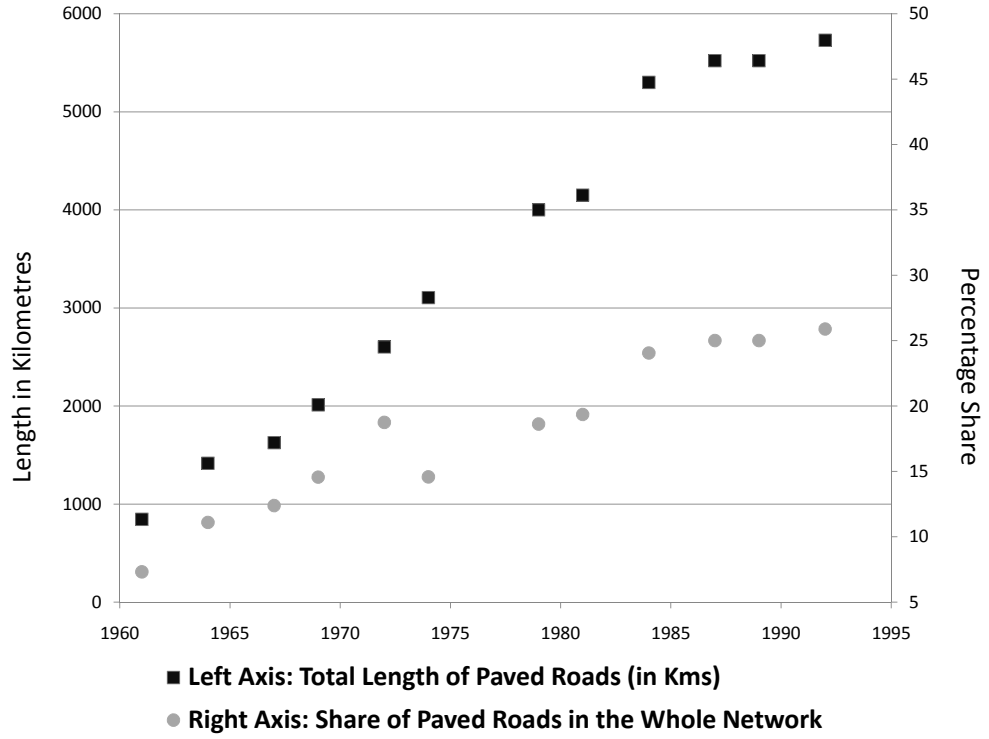
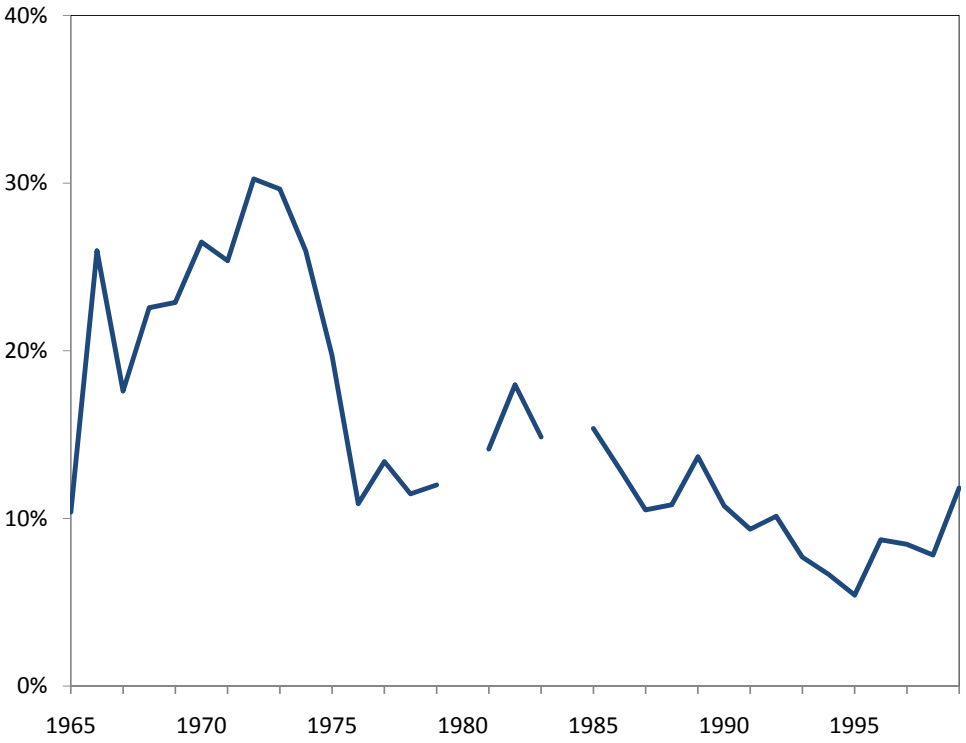


Table 1: Cabinet Share (%) of the Six Main Ethnic Groups, 1963-1992.

Year	Kikuyu	Luhya	Luo	Kamba	Kalenjin	Kisii	Other	Cabinet Size
1963	35	6	24	6	0	6	24	17
1964	32	5	21	11	5	5	21	19
1966	30	9	13	9	4	9	26	23
1969	30	9	13	9	9	9	22	23
1974	30	9	13	9	9	9	22	23
1979	30	11	11	7	15	7	19	27
1983	21	13	13	8	17	4	25	24
1988	26	12	15	12	12	6	18	34

Notes: Year refers to parliamentary elections. The six main groups are defined as the six most numerous groups in the Kenyan population. Here is the distribution given by the 1979 Population and Housing Census: Kikuyus 20.9%, Luhyas 13.8%, Luos 12.8%, Kambas 11.3%, Kalenjins 10.8%, Kisiis 6.2% and others 24.3%.

Figure 2: Road Development Expenditure as % of Actual Development Expenditure, 1965-1999.



Notes: This figure plots the share of road development expenditure as a percentage of total development expenditure. This excludes recurrent expenditure. Source: authors' calculations and *Development Estimates for the Republic of Kenya* (1965-1999). Years 1980 and 1984 are missing. The average share of road expenditure over the period is 15.20%.

Figure 3: Evolution of the Network, 1961-1992: Paved Roads in Thick Black, Improved Roads in Black and Tracks in Grey.

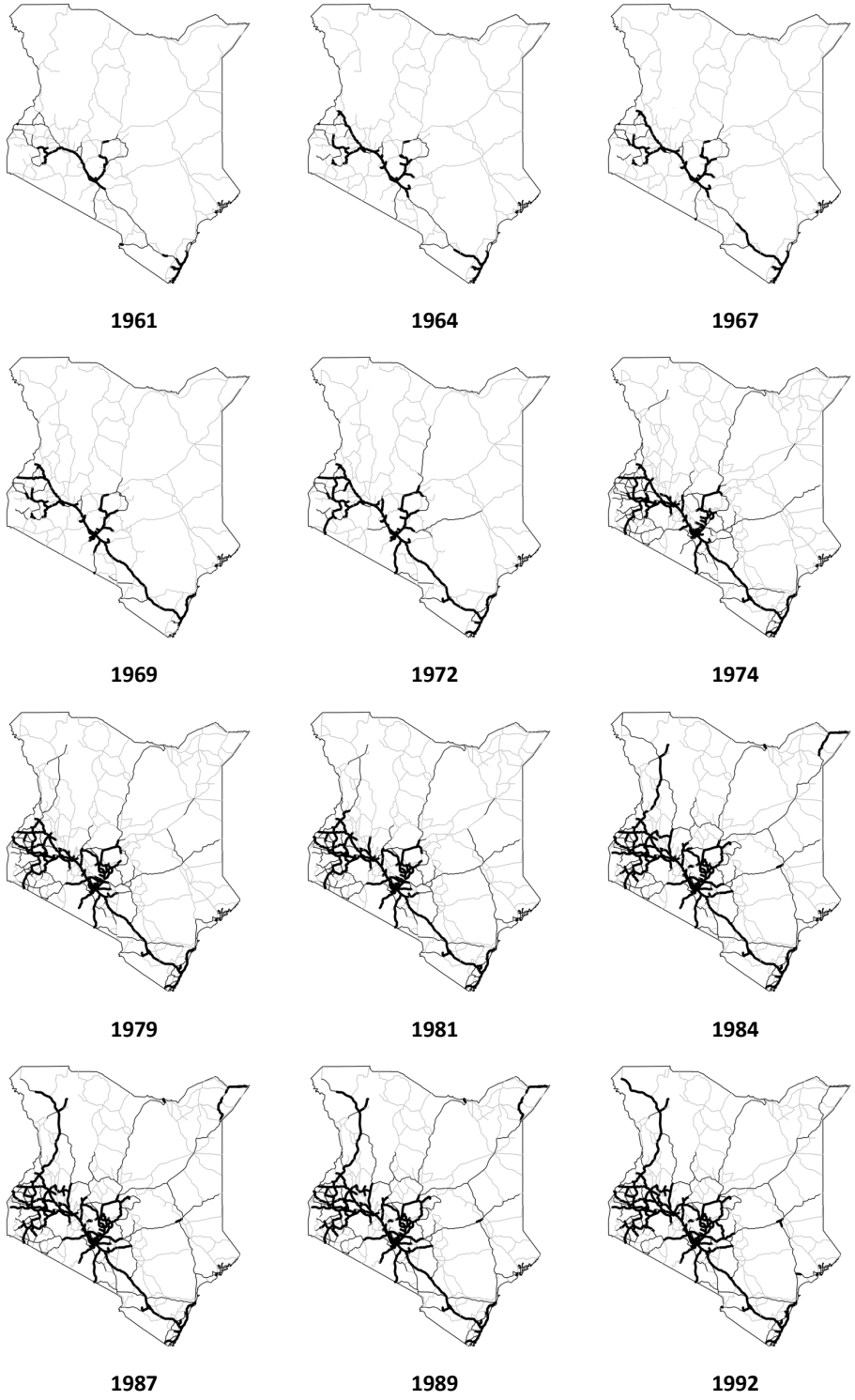
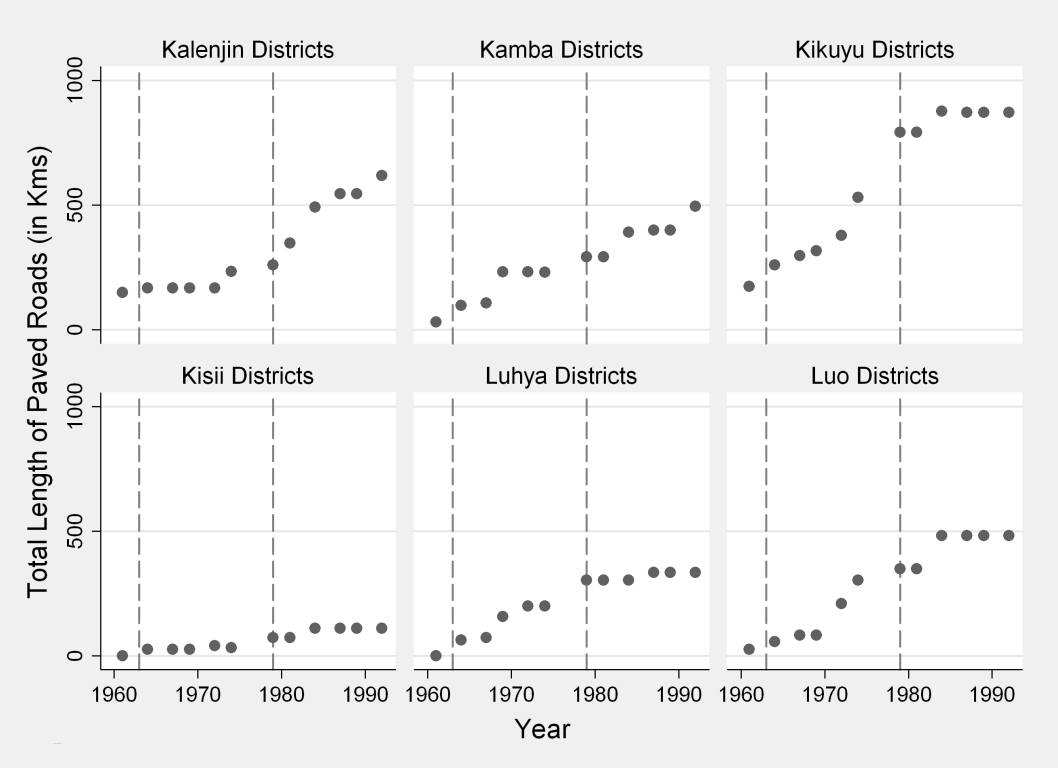
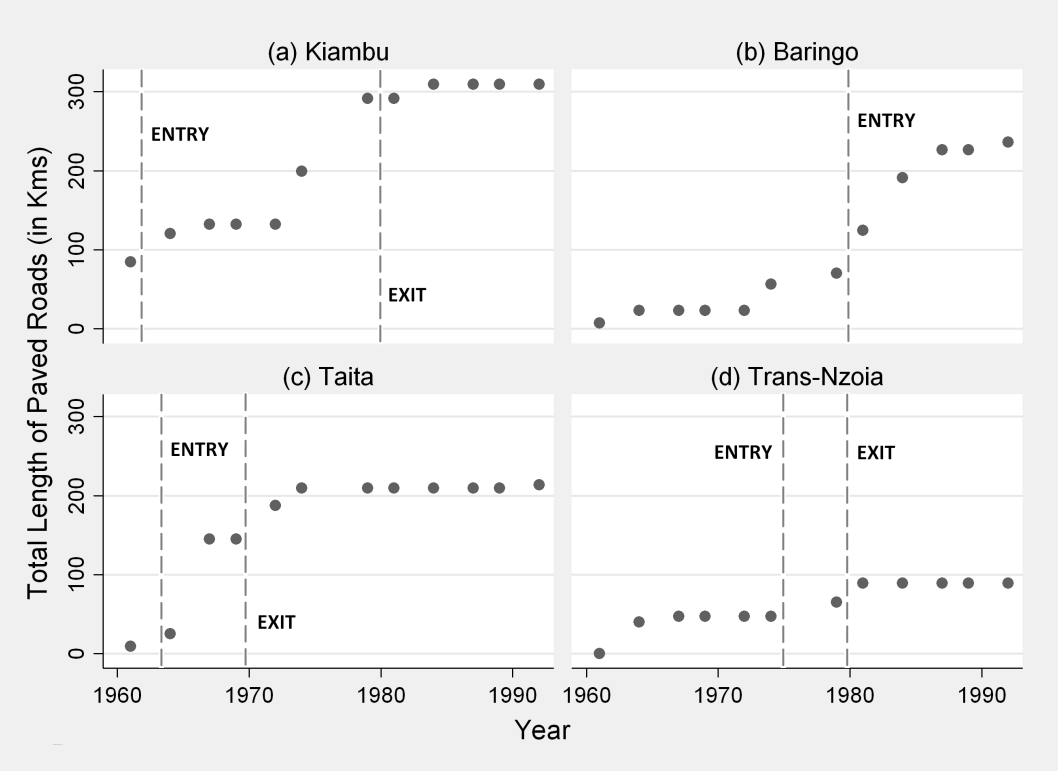


Figure 4: Evolution of the Total Length of Paved Roads (in Kms) for Selected Ethnic Groupings of Districts, 1961-1992.



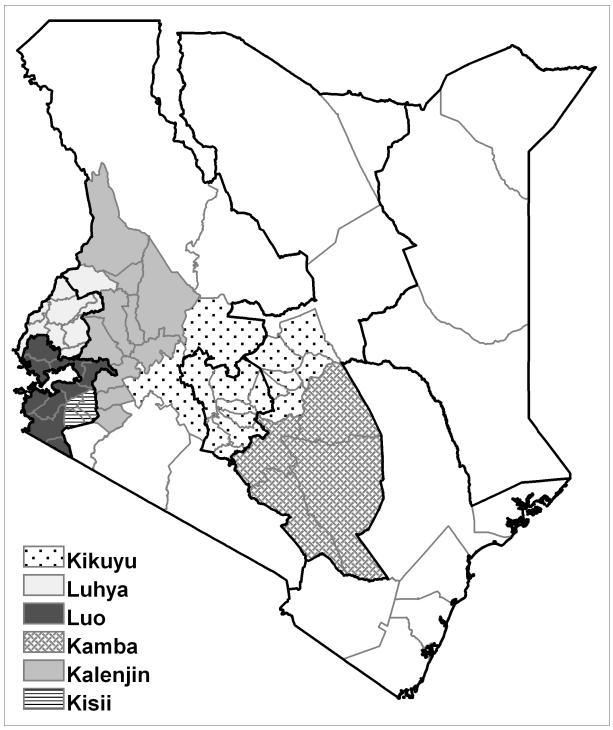
Note: A district is classified as district X if the ethnic group X represents at least 75% of its population. On a total of 41 districts, we have four Kalenjin districts, two Kamba districts, five Kikuyu districts, one Kisii districts, two Luhya districts and three Luo districts. The reference lines correspond to years 1963 and 1979, respectively Kenya's independence year and Moi's definitive succession year to Kenyatta.

Figure 5: Evolution of the Total Length of Paved Roads (in Kms) for Four Selected Districts (Two Districts of Birth of the President and Two Districts of Birth of the Minister of Public Works), 1961-1992.



Note: (a) Kiambu is Kenyatta's district of birth. Kenyatta was president from 1964 to 1978, hence the specific reference lines; (b) Baringo is Moi's district of birth. Moi was president from 1978, hence the specific reference lines; (c) Taita was the district of birth of the public works' minister between 1964 and 1969, hence the specific reference lines; (d) Trans-Nzoia was the district of birth of the public works' minister between 1975 and 1979, hence the specific reference lines.

Figure 6: Ethnic Groups that Participated in a Cabinet between 1961 and 1992.



Reading: this map reports for each district the main ethnic group, provided that it participated in a cabinet.

Table 2: Ethnicity and District of Birth of Leaders and Road Investments

	Dependent Variable: Total Length (in kms) of				Dep.Var.: Total Value (2007K$)
	Paved Roads	*Paved Roads + Improved Roads*	*All Roads*	*Lanes of Paved Roads*	*Value*
	(1)	(2)	(3)	(4)	(5)
PANEL A: All the Controls					
Share of the President's Ethnic Group in the District	10.44**	7.31	-3.44	18.82*	3,925**
	[4.86]	[10.85]	[8.45]	[11.07]	[1,922]
Share of the Nearest Coalition Member's Ethnicity in the District	11.85**	13.95	-8.71	35.05***	4,410**
	[4.88]	[9.64]	[9.62]	[10.63]	[1,949]
District of Birth of the President	46.33***	69.11***	-9.08	96.93***	17,556***
	[9.50]	[14.90]	[19.49]	[14.49]	[2,933]
District of Birth of the Public Works Minister	8.53*	-4.27	-7.5	14.02	2743
	[4.41]	[7.03]	[8.79]	[12.57]	[1,645]
Dependant Variable $_{t-1}$	0.78***	0.78***	0.71***	0.80***	0.81***
	[0.08]	[0.03]	[0.06]	[0.08]	[0.07]
District FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
Observations	451	451	451	451	451
R-squared	0.85	0.89	0.9	0.87	0.89
PANEL B: No Controls					
Share of the President's Ethnic Group in the District	7.81	6.72	-4.32	12.22	2926
	[4.96]	[8.31]	[4.12]	[11.02]	[1,784]
Share of the Nearest Coalition Member's Ethnicity in the District	1.88	7.2	-1.29	13.15	962
	[4.37]	[7.79]	[4.34]	[10.42]	[1,478]
District of Birth of the President	15.10*	37.89***	2.95	15.24	6,982**
	[8.73]	[10.08]	[6.29]	[34.20]	[3,078]
District of Birth of the Public Works Minister	9.27	-6.29	-7.3	16.94	2858
	[6.04]	[7.26]	[7.64]	[15.16]	[2,314]
Dependant Variable $_{t-1}$	0.80***	0.81***	0.73***	0.82***	0.81***
	[0.07]	[0.02]	[0.05]	[0.06]	[0.07]
District FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
Observations	451	451	451	451	451
R-squared	0.81	0.87	0.86	0.83	0.87

Notes: Robust standard errors clustered at the district level in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Our basic method is to run panel data regressions for districts d and years t of the following form:

$$L_{dt} = \alpha_d + \beta_t + \xi L_{dt-1} + \delta P_{dt-1} + \phi_t X_d + u_{dt}$$

where α_d and β_t are district and year fixed effects and X_d is a vector of baseline demographic, economic and geographic variables that we might expect to affect the total length in kilometres of roads (L_{dt}), controlling for the previous road stock (L_{dt-1}). Since controlling variables X_d are included in the fixed effect α_d, we allow their effect ϕ_t to vary with time. P_{dt-1} are our political economy variables of interest at time t-1: the share of the president's ethnic group in the district, the share of the nearest coalition member's ethnicity in the district, a dummy for being the district of birth of the president and a dummy for being the district of birth of the public works minister. We have 41 districts and 12 time periods, thus 492 observations. When we include a lag of the dependant variable, we drop one round and thus obtain 451 observations.

In column (1), we consider the total length in kilometres of paved roads. In column (2), we take as the dependent variable the total length of both paved and improved roads. In column (3), we take as the dependent variable the total length of all the roads (paved + improved + tracks). In column (4), given that we know the number of lanes of each paved road, we can calculate the total length of paved lanes (length of the paved road * number of lanes) and use it as the dependent variable (thus taking into account changes within the category of paved roads). In column (5), we consider the total value (in 2007K$) of the road network.

The president's ethnic group is Kikuyu for t = [1964, 1979] and Kalenjin for t = [1981, 1992]. The nearest coalition member's ethnic group in the cabinet is Luo for t = [1964, 1979] and Kikuyu for t = [1979, 1992]. The president's district of birth is "Thika" for t = [1964, 1979] and "Baringo" for t = [1981, 1992]. The district of birth of the public works minister is "Taita" for t = [1964, 1969], "Kisii" for t = [1971, 1974],"Trans-Nzoia" for t = 1979,"Machakos" for t = [1981, 1984], "Kiambu" for t = 1987, and "Kericho" for t = [1989, 1992]. Dependant Variable $_{t-1}$ is the lag of the dependant variable.

Additional controls in panel A regressions include baseline controls interacted with time trend or time dummies. Our set encompasses three subsets: (i) population variables: 1962 population, a dummy for having a city in 1962 (a locality with more than 5000 inhabitants) and 1962 urbanization rate, all interacted with time dummies, (ii) economic activity variables: 1961 per capita earnings, 1961 employment rate in the formal sector and 1961 primary education completion rate, all interacted with time dummies, and (iii) economic geography variables: a dummy valuing 1 if the district is on the Mombasa-Kampala international road and 0 otherwise and a dummy variables valuing 1 if the district is respectively bordering Uganda and Tanzania and 0 otherwise, all interacted with a time trend.

Table 3: Ethnicity and District of Birth of Leaders and Investments in Paved Roads, Robustness Checks

	Dependent Variable: Total Length (in kms) of Paved Roads							
	Baseline	*w/o Nairobi & Mombasa*	*+ Time Dummies * Ethnic Diversity Indices*	*+ Time Dummies * District Area*	*Squared Version of Ethnic Shares*	*+ Provincial Change in Paved Roads*	*+ Second Lag of the Dep. Var.*	*Population-Weighted*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PANEL A: All the Controls								
Share of the President's Ethnic Group in the District	10.44**	10.05*	14.53*	13.12**	12.01**	8.77*	9.08	8.59
	[4.86]	[5.14]	[7.48]	[5.35]	[5.23]	[4.83]	[5.99]	[6.26]
Share of the Nearest Coalition Member's Ethnicity in the District	11.85**	12.13**	11.68**	13.98**	13.77**	11.21**	11.48**	11.91**
	[4.88]	[5.25]	[5.67]	[5.82]	[6.15]	[4.79]	[4.68]	[5.83]
District of Birth of the President	46.33***	45.86***	38.47***	50.48***	45.29***	45.67***	47.89***	46.96***
	[9.50]	[9.61]	[9.46]	[12.48]	[8.98]	[9.84]	[11.05]	[8.03]
District of Birth of the Public Works Minister	8.53*	8.11**	8.06	8.33*	8.32*	9.40*	12.43	4.92
	[4.41]	[3.92]	[5.73]	[4.17]	[4.41]	[4.88]	[8.00]	[4.82]
Dependant Variable $_{t-1}$	0.78***	0.79***	0.76***	0.78***	0.79***	0.79***	0.76***	0.76***
	[0.08]	[0.08]	[0.07]	[0.06]	[0.08]	[0.08]	[0.12]	[0.07]
Dependant Variable $_{province, t}$ - Dependant Variable $_{province, t-1}$						0.02		
						[0.01]		
Dependant Variable $_{t-2}$							-0.01	
							[0.06]	
District FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	451	429	451	451	451	451	410	451
R-squared	0.85	0.85	0.86	0.86	0.85	0.85	0.83	0.92
PANEL B: No Controls								
Share of the President's Ethnic Group in the District	7.81	7.13	11.25*	7.64	8.58	6.12	8.95*	6.53
	[4.96]	[5.02]	[6.50]	[5.27]	[5.41]	[5.31]	[5.12]	[6.28]
Share of the Nearest Coalition Member's Ethnicity in the District	1.88	1.33	2.18	3.2	2.85	0.88	3.25	2.61
	[4.37]	[4.35]	[4.66]	[4.91]	[5.24]	[4.53]	[4.46]	[4.20]
District of Birth of the President	15.10*	15.27*	13.27	14.33	15.17*	14.24	14.93	2.79
	[8.73]	[8.65]	[8.46]	[9.66]	[8.57]	[9.12]	[9.55]	[5.54]
District of Birth of the Public Works Minister	9.27	9.26	6.43	10.87*	9.29	10.41*	12.46	2.41
	[6.04]	[6.18]	[6.43]	[6.31]	[6.07]	[5.91]	[9.44]	[2.86]
Dependant Variable $_{t-1}$	0.80***	0.79***	0.77***	0.80***	0.80***	0.80***	0.81***	0.76***
	[0.07]	[0.07]	[0.06]	[0.07]	[0.07]	[0.07]	[0.14]	[0.06]
Dependant Variable $_{province, t}$ - Dependant Variable $_{province, t-1}$						0.02		
						[0.01]		
Dependant Variable $_{t-2}$							-0.04	
							[0.10]	
District FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	451	429	451	451	451	451	410	451
R-squared	0.81	0.81	0.82	0.82	0.81	0.81	0.78	0.87

Notes: Robust standard errors clustered at the district level in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Our basic method is to run panel data regressions for districts d and years t of the following form:

$$L_{dt} = \alpha_d + \beta_t + \xi L_{dt-1} + \delta P_{dt-1} + \phi_t X_d + u_{dt}$$

where α_d and β_t are district and year fixed effects and X_d is a vector of baseline demographic, economic and geographic variables that we might expect to affect the total length in kilometres of roads (L_{dt}), controlling for the previous road stock (L_{dt-1}). Since controlling variables X_d are included in the fixed effect α_d, we allow their effect ϕ_t to vary with time. P_{dt-1} are our political economy variables of interest at time t-1: the share of the president's ethnic group in the district, the share of the nearest coalition member's ethnicity in the district, a dummy for being the district of birth of the president and a dummy for being the district of birth of the public works minister. We have 41 districts and 12 time periods, thus 492 observations. When we include a lag of the dependant variable, we drop one round and thus obtain 451 observations.

Columns: (1) baseline regression with all the controls, (2) excluding Nairobi and Mombasa districts, (3) including the interaction of time dummies and RQ and ELF (see Alesina and La Ferrara 2005), (4) including the interaction of time dummies and the district area in squared kilometers, (5) using the squared version of "Share of the President's Ethnic Group in the District" and "Share of the Nearest Coalition Member's Ethnicity in the District", (6) including the change in the total length of paved roads at the province level (excluding district "d" itself), (7) including one more lag of the dependent variable, and (8) using the 1962 dsitrict population (in thousands) as regression weights.

The president's ethnic group is Kikuyu for t = [1964, 1979] and Kalenjin for t = [1981, 1992]. The nearest coalition member's ethnic group in the cabinet is Luo for t = [1964, 1979] and Kikuyu for t = [1979, 1992]. The president's district of birth is "Thika" for t = [1964, 1979] and "Baringo" for t = [1981, 1992]. The district of birth of the public works minister is "Taita" for t = [1964, 1969], "Kisii" for t = [1971, 1974],"Trans-Nzoia" for t = 1979,"Machakos" for t = [1981, 1984], "Kiambu" for t = 1987, and "Kericho" for t = [1989, 1992]. Dependant Variable$_{t-1}$ is the lag of the dependant variable.

Additional controls in panel A regressions include baseline controls interacted with time trend or time dummies. Our set encompasses three subsets: (i) population variables: 1962 population, a dummy for having a city in 1962 (a locality with more than 5000 inhabitants) and 1962 urbanization rate, all interacted with time dummies, (ii) economic activity variables: 1961 per capita earnings, 1961 employment rate in the formal sector and 1961 primary education completion rate, all interacted with time dummies, and (iii) economic geography variables: a dummy valuing 1 if the district is on the Mombasa-Kampala international road and 0 otherwise and a dummy variables valuing 1 if the district is respectively bordering Uganda and Tanzania and 0 otherwise, all interacted with a time trend.

Table 4: Ethnicity and District of Birth of Leaders and Road Investments in Value, Robustness Checks

	Dependent Variable: Total Value (in 2007 K$)							
	Baseline	*w/o Nairobi & Mombasa*	*+ Time Dummies * Ethnic Diversity Indices*	*+ Time Dummies * District Area*	*Squared Version of Ethnic Shares*	*+ Provincial Change in Paved Roads*	*+ Second Lag of the Dep. Var.*	*Population-Weighted*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PANEL A: All the Controls								
Share of the President's Ethnic Group in the District	3,925**	3,771*	5,263*	4,860**	4,577**	3,635*	3389	3552
	[1,922]	[2,004]	[2,800]	[2,036]	[2,099]	[1,911]	[2,201]	[2,256]
Share of the Nearest Coalition Member's Ethnicity in the District	4,410**	4,538**	4,311*	5,265**	5,161**	4,241**	4,280**	4,841**
	[1,949]	[2,062]	[2,252]	[2,182]	[2,479]	[1,921]	[1,919]	[2,092]
District of Birth of the President	17,556***	17,459***	14,753***	19,710***	17,157***	17,615***	18,158***	16,805***
	[2,933]	[2,917]	[3,308]	[4,177]	[2,807]	[3,015]	[3,221]	[2,271]
District of Birth of the Public Works Minister	2743	2531	2516	2423	2645	3184	4201	1565
	[1,647]	[1,525]	[2,087]	[1,620]	[1,650]	[1,926]	[2,943]	[1,812]
Dependant Variable $_{t-1}$	0.81***	0.81***	0.79***	0.81***	0.81***	0.77***	0.79***	0.80***
	[0.07]	[0.07]	[0.07]	[0.08]	[0.07]	[0.10]	[0.05]	[0.06]
Dependant Variable $_{province, t}$ - Dependant Variable $_{province, t-1}$						-0.02		
						[0.03]		
Dependant Variable $_{t-2}$							0.01	
							[0.05]	
District FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	451	429	451	451	451	451	410	451
R-squared	0.89	0.89	0.9	0.9	0.89	0.89	0.88	0.94
PANEL B: No Controls								
Share of the President's Ethnic Group in the District	2926	2634	4,090*	2802	3,332*	2,639.00	3,204*	2,972.00
	[1,784]	[1,832]	[2,364]	[1,838]	[1,907]	[1,825]	[1,851]	[2,280]
Share of the Nearest Coalition Member's Ethnicity in the District	962	742	1018	1521	1441	723	1386	1528
	[1,476]	[1,485]	[1,644]	[1,652]	[1,751]	[1,503]	[1,529]	[1,527]
District of Birth of the President	6,982**	7,049**	6,311**	6,652*	6,954**	6,865**	6,908*	2488
	[3,078]	[3,096]	[2,993]	[3,630]	[3,003]	[3,203]	[3,426]	[2,221]
District of Birth of the Public Works Minister	2,858.00	2,874.00	2,033.00	3,365.00	2846	3,350.00	3,999.00	645.00
	[2,314]	[2,374]	[2,480]	[2,381]	[2,328]	[2,315]	[3,367]	[1,043]
Dependant Variable $_{t-1}$	0.81***	0.81***	0.79***	0.81***	0.81***	0.83***	0.81***	0.79***
	[0.07]	[0.07]	[0.07]	[0.07]	[0.07]	[0.12]	[0.06]	[0.06]
Dependant Variable $_{province, t}$ - Dependant Variable $_{province, t-1}$						-0.01		
						[0.02]		
Dependant Variable $_{t-2}$							-0.04	
							[0.09]	
District FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	451	429	451	451	451	451	410	451
R-squared	0.87	0.87	0.87	0.87	0.87	0.87	0.85	0.9

Notes: Robust standard errors clustered at the district level in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Our basic method is to run panel data regressions for districts d and years t of the following form:

$$V_{dt} = \alpha_d + \beta_t + \xi V_{dt-1} + \delta P_{dt-1} + \phi_t X_d + u_{dt}$$

where α_d and β_t are district and year fixed effects and X_d is a vector of baseline demographic, economic and geographic variables that we might expect to affect the total value (in 2007K$) of the road network ($V_{dt}$), controlling for the previous road network value (V_{dt-1}). Since controlling variables X_d are included in the fixed effect α_d, we allow their effect ϕ_t to vary with time. P_{dt-1} are our political economy variables of interest at time t-1: the share of the president's ethnic group in the district, the share of the nearest coalition member's ethnicity in the district, a dummy for being the district of birth of the president and a dummy for being the district of birth of the public works minister. We have 41 districts and 12 time periods, thus 492 observations. When we include a lag of the dependant variable, we drop one round and thus obtain 451 observations.

Columns: (1) baseline regression with all the controls, (2) excluding Nairobi and Mombasa districts, (3) including the interaction of time dummies and RQ and ELF (see Alesina and La Ferrara 2005), (4) including the interaction of time dummies and the district area in squared kilometers, (5) using the squared version of "Share of the President's Ethnic Group in the District" and "Share of the Nearest Coalition Member's Ethnicity in the District", (6) including the change in the total length of paved roads at the province level (excluding district "d" itself), (7) including one more lag of the dependent variable, and (8) using the 1962 dsitrict population (in thousands) as regression weights.

The president's ethnic group is Kikuyu for t = [1964, 1979] and Kalenjin for t = [1981, 1992]. The nearest coalition member's ethnic group in the cabinet is Luo for t = [1964, 1979] and Kikuyu for t = [1979, 1992]. The president's district of birth is "Thika" for t = [1964, 1979] and "Baringo" for t = [1981, 1992]. The district of birth of the public works minister is "Taita" for t = [1964, 1969], "Kisii" for t = [1971, 1974],"Trans-Nzoia" for t = 1979,"Machakos" for t = [1981, 1984], "Kiambu" for t = 1987, and "Kericho" for t = [1989, 1992]. Dependant Variable$_{t-1}$ is the lag of the dependant variable.

Additional controls in panel A regressions include baseline controls interacted with time trend or time dummies. Our set encompasses three subsets: (i) population variables: 1962 population, a dummy for having a city in 1962 (a locality with more than 5000 inhabitants) and 1962 urbanization rate, all interacted with time dummies, (ii) economic activity variables: 1961 per capita earnings, 1961 employment rate in the formal sector and 1961 primary education completion rate, all interacted with time dummies, and (iii) economic geography variables: a dummy valuing 1 if the district is on the Mombasa-Kampala international road and 0 otherwise and a dummy variables valuing 1 if the district is respectively bordering Uganda and Tanzania and 0 otherwise, all interacted with a time trend.

Table 5: Ethnicity and District of Birth of Leaders and Investments in Paved Roads, Specification Checks

	Dependent Variable: Total Length (in Kms) of Paved Roads		Dep.Var.: Log of Total Length of Paved Roads (in Kms)	Dep.Var.: Change in the Total Length of Paved Roads (in Kms)	Dep.Var.: Density of Paved Roads (Total Length in Kms / Population in Thousands)
	Baseline	*Arellano-Bond*	*Log*	*Change*	*Density*
	(1)	(2)	(3)	(4)	(5)
PANEL A: All the Controls					
Share of the President's Ethnic Group in the District	10.44**	7.47**	0.76**	11.69**	0.09**
	[4.86]	[3.31]	[0.29]	[4.41]	[0.03]
Share of the Nearest Coalition Member's Ethnicity in the District	11.85**	3.97	0.56***	8.24**	0.08***
	[4.88]	[3.96]	[0.21]	[3.95]	[0.02]
District of Birth of the President	46.33***	8.37	0.23	15.43**	0.20***
	[9.50]	[10.28]	[0.32]	[7.62]	[0.05]
District of Birth of the Public Works Minister	8.53*	16.90***	0.12	18.57**	0.02
	[4.41]	[4.79]	[0.17]	[7.28]	[0.03]
Dependant Variable t-1	0.78***	0.99***	0.54***		0.66***
	[0.08]	[0.07]	[0.06]		[0.07]
District FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
Observations	451	451	451	492	451
R-squared	0.85		0.77	0.31	0.65
PANEL B: No Controls					
Share of the President's Ethnic Group in the District	7.81	8.58**	0.48	10.24**	0.04
	[4.96]	[3.61]	[0.31]	[4.57]	[0.03]
Share of the Nearest Coalition Member's Ethnicity in the District	1.88	-0.25	0.1	0.71	0
	[4.37]	[5.22]	[0.21]	[4.43]	[0.02]
District of Birth of the President	15.10*	15.93***	-0.14	17.03***	0.06
	[8.73]	[3.44]	[0.20]	[4.00]	[0.03]
District of Birth of the Public Works Minister	9.27	15.55*	-0.03	13.64	0.06
	[6.04]	[9.44]	[0.29]	[10.47]	[0.07]
Dependant Variable t-1	0.80***	1.01***	0.61***		0.69***
	[0.07]	[0.06]	[0.05]		[0.08]
District FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
Observations	451	451	451	492	451
R-squared	0.81		0.69	0.12	0.54

Notes: Robust standard errors clustered at the district level in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Our baseline method in column (1) is to run panel data regressions for districts d and years t of the following form:

$$L_{dt} = \alpha_d + \beta_t + \xi L_{dt-1} + \delta P_{dt-1} + \phi_t X_d + u_{dt}$$

where α_d and β_t are district and year fixed effects and X_d is a vector of baseline demographic, economic and geographic variables that we might expect to affect the total value of the road network (in 2007K$) of roads ($V_{dt}$), controlling for the previous road network value (L_{dt-1}). Since controlling variables X_d are included in the fixed effect α_d, we allow their effect ϕ_t to vary with time. P_{dt-1} are our political economy variables of interest at time t-1: the share of the president's ethnic group in the district, the share of the nearest coalition member's ethnicity in the district, a dummy for being the district of birth of the president and a dummy for being the district of birth of the public works minister. We have 41 districts and 12 time periods, thus 492 observations. When we include a lag of the dependant variable, we drop one round and thus obtain 451 observations.

In column (2), as the baseline model can be subject to a dynamic panel bias (Nickel 1981), we test an Arellano-Bond model where we instrument the lag of the dependent variable with the second and third lags of its difference. In column (3), we take the log of both the dependant variable in the LHS and its lag in the RHS. In column (4), we consider the change in the total length in kilometres of roads ($L_{dt} - L_{dt-1}$) in the LHS, thus dropping L_{dt-1} in the RHS. In column (5), we take the density of roads in the LHS and its lag in the RHS, density being defined as total length in kilometres of roads / population in thousands.

The president's ethnic group is Kikuyu for t = [1964, 1979] and Kalenjin for t = [1981, 1992]. The nearest coalition member's ethnic group in the cabinet is Luo for t = [1964, 1979] and Kikuyu for t = [1979, 1992]. The president's district of birth is "Thika" for t = [1964, 1979] and "Baringo" for t = [1981, 1992]. The district of birth of the public works minister is "Taita" for t = [1964, 1969], "Kisii" for t = [1971, 1974],"Trans-Nzoia" for t = 1979,"Machakos" for t = [1981, 1984], "Kiambu" for t = 1987, and "Kericho" for t = [1989, 1992]. Dependant Variable $_{t-1}$ is the lag of the dependant variable.

Additional controls in panel A regressions include baseline controls interacted with time trend or time dummies. Our set encompasses three subsets: (i) population variables: 1962 population, a dummy for having a city in 1962 (a locality with more than 5000 inhabitants) and 1962 urbanization rate, all interacted with time dummies, (ii) economic activity variables: 1961 per capita earnings, 1961 employment rate in the formal sector and 1961 primary education completion rate, all interacted with time dummies, and (iii) economic geography variables: a dummy valuing 1 if the district is on the Mombasa-Kampala international road and 0 otherwise and a dummy variables valuing 1 if the district is respectively bordering Uganda and Tanzania and 0 otherwise, all interacted with a time trend.

Table 6: Ethnicity and District of Birth of Leaders and Road Investments in Value, Specification Checks

	Dependent Variable: Total Value (in 2007K$ms) of the Road Network		Dep.Var.: Log of Total Value of the Road Network (in 2007K$)	Dep.Var.: Change in the Total Value of the Road Network (in 2007K$)	Dep.Var.: Density of Value (Total Value in 2007K$ / Population in Thousands)
	Baseline	*Arellano-Bond*	*Log*	*Change*	*Density*
	(1)	(2)	(3)	(4)	(5)
PANEL A: All the Controls					
Share of the President's Ethnic Group in the District	3,925**	2,366*	0.29***	4,996***	33.08**
	[1,922]	[1,280]	[0.10]	[1,825]	[14.49]
Share of the Nearest Coalition Member's Ethnicity in the District	4,410**	1135	0.20**	3,922**	26.33***
	[1,949]	[1,392]	[0.08]	[1,636]	[9.43]
District of Birth of the President	17,556***	4658	0.21	9,242***	86.15***
	[2,933]	[3,425]	[0.12]	[2,690]	[24.97]
District of Birth of the Public Works Minister	2743	5,541***	-0.01	4660	3.87
	[1,647]	[1,888]	[0.06]	[2,772]	[14.42]
Dependant Variable $_{t-1}$	0.81***	1.01***	0.55***		0.69***
	[0.07]	[0.05]	[0.05]		[0.06]
District FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
Observations	451	451	451	451	451
R-squared	0.89		0.9	0.36	0.7
PANEL B: No Controls					
Share of the President's Ethnic Group in the District	2926	2,161*	0.15	4,100**	12.91
	[1,784]	[1,185]	[0.10]	[1,671]	[11.06]
Share of the Nearest Coalition Member's Ethnicity in the District	962	-122	0.06	1162	0.26
	[1,476]	[1,528]	[0.07]	[1,578]	[8.20]
District of Birth of the President	6,982**	7,495***	0.08	7,722***	24.93*
	[3,078]	[1,196]	[0.07]	[1,359]	[14.78]
District of Birth of the Public Works Minister	2858	5200	0.03	4203	25.22
	[2,314]	[3,405]	[0.11]	[4,015]	[26.23]
Dependant Variable $_{t-1}$	0.81***	1.00***	0.67***		0.73***
	[0.07]	[0.05]	[0.04]		[0.07]
District FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
Observations	451	451	451	451	451
R-squared	0.87		0.88	0.18	0.59

Notes: Robust standard errors clustered at the district level in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Our baseline method in column (1) is to run panel data regressions for districts d and years t of the following form:

$L_{dt} = \alpha_d + \beta_t + \xi L_{dt-1} + \delta P_{dt-1} + \phi_t X_d + u_{dt}$

where α_d and β_t are district and year fixed effects and X_d is a vector of baseline demographic, economic and geographic variables that we might expect to affect the total value of the road network (in 2007K$) of roads ($V_{dt}$), controlling for the previous road network value (L_{dt-1}). Since controlling variables X_d are included in the fixed effect α_d, we allow their effect ϕ_t to vary with time. P_{dt-1} are our political economy variables of interest at time t-1: the share of the president's ethnic group in the district, the share of the nearest coalition member's ethnicity in the district, a dummy for being the district of birth of the president and a dummy for being the district of birth of the public works minister. We have 41 districts and 12 time periods, thus 492 observations. When we include a lag of the dependant variable, we drop one round and thus obtain 451 observations.

In column (2), as the baseline model can be subject to a dynamic panel bias (Nickel 1981), we test an Arellano-Bond model where we instrument the lag of the dependent variable with the second and third lags of its difference. In column (3), we take the log of both the dependant variable in the LHS and its lag in the RHS. In column (4), we consider the change in the total network value ($V_{dt} - V_{dt-1}$) in the LHS, thus dropping V_{dt-1} in the RHS. In column (5), we take the density of the road network value in the LHS and its lag in the RHS, density being defined as road network value (in 2007K$) / population in thousands.

The president's ethnic group is Kikuyu for t = [1964, 1979] and Kalenjin for t = [1981, 1992]. The nearest coalition member's ethnic group in the cabinet is Luo for t = [1964, 1979] and Kikuyu for t = [1979, 1992]. The president's district of birth is "Thika" for t = [1964, 1979] and "Baringo" for t = [1981, 1992]. The district of birth of the public works minister is "Taita" for t = [1964, 1969], "Kisii" for t = [1971, 1974],"Trans-Nzoia" for t = 1979,"Machakos" for t = [1981, 1984], "Kiambu" for t = 1987, and "Kericho" for t = [1989, 1992]. Dependant Variable $_{t-1}$ is the lag of the dependant variable.

Additional controls in panel A regressions include baseline controls interacted with time trend or time dummies. Our set encompasses three subsets: (i) population variables: 1962 population, a dummy for having a city in 1962 (a locality with more than 5000 inhabitants) and 1962 urbanization rate, all interacted with time dummies, (ii) economic activity variables: 1961 per capita earnings, 1961 employment rate in the formal sector and 1961 primary education completion rate, all interacted with time dummies, and (iii) economic geography variables: a dummy valuing 1 if the district is on the Mombasa-Kampala international road and 0 otherwise and a dummy variables valuing 1 if the district is respectively bordering Uganda and Tanzania and 0 otherwise, all interacted with a time trend.

Data Appendix

Road Data

Historical data on road building in developing countries is rare and difficult to obtain from the specialized institutions there. We are able to side-step these issues by creating a road data set from the *Michelin Motoring Map Series* 746 (and its predecessor Series 155). Michelin ˍ one of the world's largest tyre company ˍ has been producing maps for the African continent since the early days of the 20th century. The first map for *Central And Southern Africa* was published in 1961. On average, Michelin has updated their maps every two years. These maps have been uniform in terms of scale (1: 4,000,000), size (they are all large A0 sheets), map projection and legend.

Discussions with Michelin's headquarters reveal that they received information from the relevant institutions in developing countries until the early 1990s, and that they would then verify this information with the company's network of local tyre sellers (who would themselves obtain information from truck drivers) and letters received from travelers. After this period, many governments stopped collaborating, either due to a lack of will or a lack of funding. This fact is confirmed by the post-1992 Michelin maps that we have obtained. They show no change in the road network over the whole period, even if the Ministry of Public Works (2006) indicates that the last decade has seen both a growth and an upgrade to the network. Our period of study being 1961-1992, our sample is not affected by this decreasing quality of the maps.

In total, we have access to 12 maps for the following years: 1961, 1964, 1967, 1969, 1972, 1974, 1979, 1981, 1984, 1987, 1989 and 1992. The legend being quite consistent, each map reports the quality of each road using the following classification: *motorways*, *hard-surfaced roads*, *improved roads*, *partially improved roads*, *earth roads*, *recognized or marked tracks* and *unmarked tracks*. Besides, for *hard-surfaced roads*, the number of lanes is also indicated (*single lane* and *double lane or wider*). Those paper maps were then digitized and standardized to create a unique GIS file allowing us to track the evolution of the network. We then reaggregated the various qualities in 3 main categories: paved (*motorways*, *hard-surfaced roads*), improved (*improved / partially improved roads*) and tracks (*earth roads*, *recognized or marked tracks* and *unmarked tracks*).[19]. For the specific category of paved roads, we then created three subcategories: paved roads with four lanes (*motorways*), paved roads with two lanes (*hard-surfaced road, double lane or wider*), and paved roads with one lane (*hard-surfaced road, single lane*).[20]

We then superposed a map of the 1961 district boundaries (41 districts) on the road network map, and extracted for each district-year the total length in kilometer of each category (paved roads, improved roads, tracks) and subcategory (paved roads with 4

[19] Canning (1998) reports both his and World Bank's estimates of the national length of paved roads for the whole period 1950-1995 for most developing countries. We compare our own constructed series with those two for Kenya, and find very high correlation coefficients, respectively 0.986 for his estimates and 0.962 for World Bank's estimates.

[20] Using Google Earth, we could verify that *motorways* had four lanes, while *hard-surfaced roads, double lane or wider* consisted mainly of roads with two lanes.

lanes, 2 lanes or 1 lane) of quality. Figure 6, contained at the end of this appendix, exhibits this process for the 1961 paper map. In our regression framework, we mostly use the total length of paved roads. We also use the information on subcategories of paved roads to reconstruct for each district-year the total length of paved lanes, which we calculate as 4 * total length of paved roads with 4 lanes + 2 * total length of paved roads with 2 lanes + 1 * total length of paved roads with 1 lane. This will allow us to better take into account changes within the category of paved roads. Lastly, using estimated construction costs per kilometer for tracks, improved and paved roads, we calculate the value of the whole network for each district-year. Those construction costs are estimated from a survey on 22 road projects funded by the World Bank in Africa after 2000 (Alexeeva, Padam and Queiroz 2008). They are respectively estimated at 20, 66 and 400 thousands of 2007$ per kilometer of tracks, improved and paved roads. The advantage of such methodology is that we consider tracks, improved and paved roads altogether. The drawback is that we do not know whether this cost structure can be extended to all the projects that took place in Kenya between 1961 and 1992. In the end, for each district-year, we obtain three outcomes that can be complimentarily used in our analysis: (i) the total length in kilometers of tracks, improved and paved roads, (ii) the total length in kilometers of paved lanes, and (iii) the total value in 2007K$ of the whole road network.

Political Data

The construction of our political data set comprised several steps. First, from the Kenya Office of the President, we got for each election year (1964, 1966, 1969, 1974, 1979, 1983 and 1988) the list called the *Organization of The Government of The Republic of Kenya*, which was circulated as a *Presidential Circular*. Those lists report all the Ministers and their portfolios. Second, from the records of the Kenya Parliamentary Library, we learnt the district of birth of each cabinet member over the period. Third, while the ethnicity of some prominent cabinet members is well-known, the information for the less prominent politicians is obtained in several ways. We first seek to use third-party sources: (i) the *Weekly Review* magazine in the Moi period, which was highly critical of the government and would often list out the cabinet and ethnicity of cabinet members, (ii) the descriptive works done by various political scientists on Kenyan politicians, especially Hornsby (1995) and Ahluwalia (1996), and (iii) the direct help of several journalists from top dailies in Kenya. In the end, we are also able to capture cabinet shuffles between elections for key cabinet positions.
We then construct for each district-year four political economy variables that we use in our regressions. Our first variable is the share of the president's ethnicity in the district in the previous period (Kikuyu for years = [1964, 1979], Kalenjin for years = [1981, 1992]). Our second variable is share of the second most powerful ethnic group's ethnicity in the district in the previous period (Luo for years = [1964, 1979], Kikuyu for years = [1981, 1992]). Our third variable is a dummy equal to 1 if the district was the district of birth of the president in the previous period and 0 otherwise: this dummy is equal to

1 for Kiambu, Kenyatta's district of birth, for years = [1964, 1979], and Baringo, Moi's district of birth, for years = [1981, 1992]. Our last variable is a dummy equal to one if the district was the district of birth of the public works minister in the previous period and 0 otherwise: this dummy is equal to 1 for Taita for years = [1964, 1969], Kisii for years = [1971, 1974], Trans-Nzoia for year = 1979, Machakos for years = [1981, 1984], Kiambu for year = 1987, and Kericho for years = [1989, 1992].

Other Data

We use the reports of the decadal *Population and Housing Censuses* (1962, 1969, 1979 and 1989) to reconstruct a range of socioeconomic and demographic variables at the district level for those years. Again, we use the 1961 district boundaries to remain consistent with our first two data sets. First, from the 1979 census, we obtain the share of each of the 41 ethnical groups existing in Kenya for each of the 41 districts at that time (the 1979 district boundaries are similar to those in 1961). We could not find district-level ethnic information before or after 1979. Except in Nairobi and Mombasa districts where the two cities attracted people from the rest of the country, interregional migration is likely to be low and we can therefore assume the stability of ethnic shares across periods. Second, we have the population of each district. Third, we create a dummy variable equal to 1 if the district contains a "city", which we arbitrarily define as a locality with more than 5000 inhabitants (the 1962 Census uses the same threshold), and 0 otherwise. Third, using this same definition of cities, we calculate the urbanization rate of each district. Fourth, this time using the *IPUMS 10% sample Census Microdata* from the 1989 census, we calculate a retrospective district-level primary completion rate for each of our sample years (1961, 1964, 1967, 1969, 1972, 1974, 1979, 1981, 1984, 1987, 1989). For each district-year, we can estimate the completion rate of primary education amongst those born in that district and aged between 18 and 30 that year. This measure is supposed to capture general investments in education. From the *Annual Statistical Abstracts* published by the Kenya Central Bureau of Statistics, we then obtain a range of statistics available for each district-year over the period: the per capita earnings and the employment rate in the formal sector (two complimentary measures of economic activity). Lastly, we use GIS to create a dummy variable equal to 1 if the district is located on the international road between Mombasa and Kampala and 0 otherwise. We also create two dummy variables which are respectively equal to 1 if the district is respectively bordering Uganda and Tanzania and 0 otherwise.

(a) Michelin Paper Map in 1961

(b) Digital Vector Map in 1961

(c) Digital Vector Map in 1961 with District Boundaries

Figure 7: Illustrated Example of the Road Data Creation.