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The Paradox of the Isolated Poor

An Empirical View on the Political Economy of Capital City Isolation in Sub-Saharan Africa

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Abstract

Staggering income inequality is one of the major challenges for economic development in Sub-Saharan Africa. Accordingly, understanding the underlying mechanisms that cause and maintain this inequality is key for developing effective policies targeting the economic underperformance and poverty on the continent. In this study, we investigate the implications of capital city isolation in Sub-Saharan African countries by combining micro-level evidence from newly available remote sensing data and geocoded Afrobarometer survey data. Our results consistently indicate that isolation from the capital city has significant adverse implications for both the level and pace of economic development and additionally entails a decreased provision of public goods. However, people in areas farther isolated from the capital city concurrently exhibit a higher level of trust and a better evaluation of the performance of their political leaders. Further analyses reveal that this paradoxical finding − the paradox of the isolated poor − might lie at the very core of the adverse effects of capital city isolation. Indeed, our results suggest that reduced accountability and monitoring of the political elite caused by a decreased availability of information provided through media channels as well as a lower level of democratization, identification with the state and education are the major determinants of the limited economic development in areas isolated from the capital city. We show that our findings are robust with respect to a range of alternative specifications and conduct a number of placebo tests to affirm causal inference. Lastly, we show that, consistent with our theory, the effects are stronger for rural as compared to urban areas.

Keywords: Accountability, Capital City Isolation, Inequality, Nighttime Luminosity, Sub-Saharan Africa, Political Economy of Development
JEL: D70, H41, O10, O40, R10

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For my father Antonio Calogero Provenzano

Contents

1 Introduction

The alarmingly high level of income inequality in Sub-Saharan Africa and its adverse implications for economic development have moved into the focus of economic research on the continent in recent years (International Monetray Fund, 2015; UNDP, 2017). Unfortunately, a lot of the studies investigating inequality on the continent have mainly focused on describing symptoms such as the "high concentration of physical capital, human capital and land (...) in certain groups or regions" (UNDP, 2017: ii) rather than examining their underlying mechanisms. Further, as of today, only a limited number of scholars (see for example Hodler and Raschky (2014) or Addison et al. (2017)) have examined spatial patterns and causes of economic inequality. Yet, most of the articles focus on the 'urban-rural bias', are limited to South Africa and overlook other major drivers of spatial inequality (see for example Lehohla and Shabalala (2014) or Zimbalist (2017)). In this study, we put forward proximity to the capital city as a new dimension of economic inequality in Sub-Saharan Africa and investigate its economic, social and political channels.

The most advanced insights into the political economy of capital city isolation are authored by Campante and Do (2014). For the sample of US states, the authors find that states with capital cities that are relatively farther isolated from their respective population exhibit higher levels of corruption and lower levels of accountability and public goods provision. In the Sub-Saharan African context, the importance of the location of capital cities and their limited (institutional) outreach into the hinterlands were predominantly emphasized by Herbst (2000) and recently empirically investigated by Michalopoulos and Papaioannou (2013). However, the authors left the concrete economic, social and political implications of capital city isolation in Sub-Saharan Africa untouched. There is good reason to believe that due to the low level of infrastructure development regarding transportation and information exchange in the African context, which reinforces geographical distance even more, the implications of capital city isolation in Sub-Saharan Africa are of major importance.

We find strong evidence that the growth and level of economic development as well as public goods provision decrease with distance from the capital. Yet, paradoxically the trust into the national and local political elite and the assessment of their performance increases. In an attempt to resolve the puzzle, our main hypothesis to be analyzed is that capital city isolation decreases accountability through four major channels: information, taxation, identification with the nation and democracy, and education. As a consequence, areas farther away from the capital city are provided with less public goods which ultimately results in a lower level of economic growth

and development in areas isolated from the capital city.

In order to test our hypothesis, investigate the proposed mechanisms and to be able to effectively control for confounding effects, we create a unique dataset with a very fine resolution by collecting and merging gridded remote sensing data from various sources (among others including nighttime luminosity data from National Oceanic and Atmospheric Administration (NOAA) and the US Air Force, as well as population density data from Worldpop). Furthermore, we combine the remote sensing analysis with an analysis of geocoded survey data from the Afrobarometer (2016) to tests the robustness of our results and to get detailed insights into the social and political sphere of the effects. Additionally, in order to ensure that the estimated effects of capital city isolation are in line with our theory and in fact due to the isolation from the political process and not simply driven by remoteness from an economic center within the country, we run a range of placebo tests to show that the effects of isolation from the capital city are indeed different from the isolation from other economic centers within the country.

The remainder of this paper is organized into 7 sections. Firstly, Section 2 reviews the related literature. Secondly, in Section 3, we will outline the theoretical framework and the research hypotheses in detail. Section 4 will establish the empirical strategy and explain the various datasets and variables that are being used. In Section 5, we will present our results from the analysis using remote sensing data. Subsequently, Section 6 contains the results from the analysis using the geocoded Afrobarometer survey data. After that, in Section 7, the limitations of the empirical analysis will be discussed. Last but not least, Section 8 will summarize and discuss the findings and conclude the paper.

2 Related Literature

2.1 Institutions and Development

In recent decades, research on development has been strongly shaped by fundamentally conflicting positions regarding the role and interdependence of social, political and economic factors. Especially the interplay between political institutions and economic outcomes has been at the center of this debate. The previously dominant idea, put forward most notably by Lipset (1959), emphasizing the primacy of economic growth towards democratic development, has been increasingly questioned. Starting with the work of North (1989, 1990), the New Institutionalists proposing the reverse causality have gained substantial influence on the discourse. This de-

velopment was especially driven by gaining strong empirical support from newly available data sources. Bates et al. (2012: 503), for example, show that in Africa, during the second half of the 20th century, (democratic) reforms for "political competition and majority rule" have systematically preceded economic growth rather than the other way around. In addition, Acemoglu et al. (forthcoming: 27) present evidence that democracy increases GDP "by about 20-25% in the 25 years following a democratization". Even though, as pointed out by Chang (2011), the conclusion of unidirectional causality (from political to economic developments) might not be supported by these results, it is clear that it would be a mistake neglecting that "the structure of political institutions influences the performance of economies" (Bates et al., 2013: 519). Therefore, development in Sub-Saharan Africa can only be properly understood when taking into account the specific set and evolution of its political and economic institutions.

2.2 Institutions and Geography

Current research investigating the interplay of institutions and development makes use of the fact that institutions have a geographical extension and boundary and are also shaped by underlying geographical factors. These core characteristics of institutions make a comparative empirical analysis feasible and, therefore, are an invaluable source of insight into the foundations of economic, social and political development. In order to shed further light into the underlying mechanisms through which institutions impact development, researchers have focused on the implications of geographical features such as the disease environment (Acemoglu et al. (2001), Alsan (2015)), ethnic fractionalization (Alesina et al. (2003), Michalopoulos and Papaioannou (2016)), colonial and missionary investments (Cagé and Rueda (2016), Jedwab and Moradi (2016)), endowments (L. Sokoloff and Engerman (2000), Egorov et al. (2009), Dippel et al. (2015)) or (pre-colonial) political centralization (Gennaioli and Rainer (2007), Michalopoulos and Papaioannou (2013)). It became clear that the key characteristics and challenges of the institutional framework across different regions in the world are directly determined by the interplay between historic events and the respective geographical factors[1].

A well-recognized theory on such geographical factors influencing the special evolution of African state formation is authored by Herbst (2000)[2]. According to this theory, low population density is a decisive geographical characteristic in Sub-Saharan Africa that significantly hampered early state formation and centralization (Herbst,

[1]For example, Acemoglu et al. (2001) argue that the colonization strategy (settle vs. exploit) was based on the geographical factor 'disease environment'.

[2]Note that the general idea was mentioned before, see for example Bates (1983) or Iliffe (1995).

2000: 11). Herbst (2000) considers the low population density on the African continent the key leadership challenge and formulates the fundamental obstacle as: "how to broadcast power over sparsely settled land" (Herbst, 2000: 3). Herbst realized that the location of the capital city mattered (ibid.: 155) and that power was hardly extended beyond the capital (ibid.: 17). Yet, like Thies (2009: 631) and others, Herbst (2000) mentions African capitals as a side note and in anecdotes leaving its meaning and underlying mechanisms within African state formation and development undeveloped. Other authors such as Juan et al. (2017) or Michalopoulos and Papaioannou (2014) specifically use the location of the capital cities, but only as a reference point to measure remoteness. Michalopoulos and Papaioannou (2014), for example, investigate to what extent national institutions such as 'rule of law' play a role in the remote hinterlands beyond the capital city. The authors find that "national institutions wield significant explanatory power near the capitals, which rapidly diminishes for regions in the hinterland" (ibid.: 160). In addition, the authors find that "ethnic (as opposed to national) identification becomes stronger for individuals in the hinterland" (ibid.: 205). The authors take this as evidence for "a 'dual' economic-institutional framework with customary rules being dominant in the countryside and colonial-national institutions becoming relevant for regions closer to the capitals" (ibid.: 206). While the authors deliver crucial insights into the geographical outreach of Sub-Saharan African states beyond the capital city, they leave the concrete effects on people in isolated areas (including the underlying mechanisms), such as whether or not there is a general adverse effect on economic performance, public goods provision or the relation between people in isolated areas and their national and local leaders, concealed. Hence, even though the authors recognize that the impact of the capital city on sub-national units is a function of proximity, they miss out a deeper analysis regarding the effects and channels of capital city isolation.

2.3 Capital City Isolation

As recent studies by Campante et al. (2013) and Campante and Do (2014) have shown, there is ample evidence that the location of the capital city matters for the political economy on the national level. For the sample of US states Campante and Do (2014) find that isolated capitals are associated with decreased accountability such as limited media coverage of state politics, lower voter turnout and a decreased number of citizens that are well informed about state politics. Moreover, they discover that isolated capitals bring about increased corruption and a lower provision of public goods such as education or health. In addition, for a worldwide sample, Campante et al. (2013) show that isolated capitals reduce the threat of being overthrown

in a rebellion. Furthermore, the authors find that under autocracy, as opposed to under democracy, isolated capitals are correlated with poor governance. Consequently, it becomes clear that the location of the capital city affects the political economy of the country through various channels. Further, the implications of capital city isolation vary with respect to the political framework (here: democracy vs. autocracy).

3 Theoretical Framework

In this section we develop our main hypothesis and the associated mechanisms that shall be empirically investigated in detail in Section 5 and 6.

Isolation from the capital city − and hence isolation from center of political decision making and administration − translates into the isolation from the political process[3] and decreased accountability. The link between capital city isolation on the one hand, and isolation from the political process and accountability on the other hand is shaped by four major channels:

Firstly, we argue that people farther away from the capital are less informed about the political discourse, laws and projects that are implemented by the government (which is also described by Campante and Do (2014) for US states). This is due to the fact that the media platforms (newspaper, television, radio or internet) that cover state politics are less available and less consumed in areas isolated from the capital city. Additionally, it seems reasonable to assume that this circumstance is reinforced by the fact that the entire social networks in isolated areas tend to be isolated from (critical) information on the political process which limits the subsidiary function of social networks to transmit important information on politics.
Another aspect that limits the level of information that people in isolated areas have comes from the fact that the media and journalists are more concentrated in areas closer to the capital city. This is due to the fact that the capital city offers an increased density of issues worth reporting on. This in turn, reduces the monitoring of political leaders in areas isolated from the capital.
As a result, people in areas isolated from the capital city are less likely to have information on state politics or monitoring of their local political leaders. This is likely to decrease the incentives for politicians to implement policies that are in the interest of people and assign funds for investments in public goods to areas isolated from the capital. Strömberg (2004), for example, provides evidence that during the

[3]In this context, we define the political process as the legislative (the decision making process) and the executive (the implementation of enforcement of laws).

New Deal relief program by the US government during the 1930's, counties with a larger share of radio listeners, ceteris paribus, were given significantly more funds (see Besley and Burgess (2001) and Besley and Burgess (2002) for other evidence from India). Additionally, the reduced monitoring on the local level is likely to increase corruption and the embezzlement of funds (see for example Olken (2007)) that were originally assigned for public goods provision in isolated areas.

The second channel through which capital city isolation affects accountability is taxation. We hypothesize that the ability of the state to collect taxes decreases with the distance to the capital. This is due to the fact that the outreach of the state regarding the implementation of laws is limited by distance from the capital (Michalopoulos and Papaioannou, 2014) and that the increased costs of tax collection are exceeded by potential revenues. However, as for example argued by Adamolekun (2010: 118), there exists a strong link between taxation and accountability as people who are not paying taxes tend to not hold their leaders accountable for what they are doing with the state resources. This calls into question whether or not in cases where the state levies higher taxes on its citizens, the people tend to demand more participation and hold their political leader accountable for how to use the resources. A historically renowned example in favor of the argument would be the 'Boston Tea Party' with their famous slogan "No taxation without representation". Herb (2005) turned the slogan around to "No representation without taxation" in an attempt to explain the limited democracy level in resource rich rentier states. He argues that due to higher revenues from trade with commodities these states depend less on the taxation of its citizens which entails negative repercussions on their level of democracy. McGuirk (2013) finds empirical evidence that political leaders in resource rich countries use a lower level of taxation as a tool in order to decrease the demand for democratic accountability. Recently, this mechanism has also been tested in laboratory experiments in Uganda where it turned out that citizens who are to pay (increased) taxes tend to hold political leaders more accountable for their actions and punish them for misgovernance (Martin, 2016). Furthermore, Martin (2016) argues that it is 'loss aversion' that is the underlying motivation driving this mechanism. In addition, Eubank (2012) shows that for Somaliland the ineligibility for official development assistance (ODA) has augmented the fiscal dependency of the country on taxation regarding the financing of the national household. This circumstance, he argues, has fostered inclusive and accountable political institutions in Somaliland. Asongu (2015) contributed to this strand of research by presenting empirical evidence for this mechanism for the entire African continent.

Thirdly, people isolated from the capital city identify less with the nation (Michalopou-

los and Papaioannou (2014: 205)) and democracy. This is due to the fact that the state is less present in their everyday life given the limited outreach of the state (ibid.). As a result community and ethnicity based social networks play a greater role which also reinforces the role of the traditional leadership system with the chiefs at its center (see for example Ahlerup et al. (2017)). Further, along with the traditional leadership system comes a rather paternalistic attitude that fosters obedience rather than an active and critical civil engagement in public affairs. As a result, people tend to seek solutions within their own community or from their traditional leader rather than monitoring and taking the government into responsibility. However, an active monitoring of the political leaders and officials is critical for the provision of public goods. This argument is supported by the findings of a randomized field experiment where nongovernmental organizations encouraged rural villages in Uganda to hold their healthcare providers accountable for their performance (Björkman and Svensson, 2009). One year after the intervention, the treated communities were much more actively monitoring healthcare services which strongly increased the effort of the health care providers and, for example, resulted in reduced child mortality and increased child weight (ibid.).

A fourth channel that is endogenous − hence outcome and cause of the adverse implications of capital city isolation − is education. First of all, education is a public good and as such provided on a lower level to isolated areas. Furthermore, people who are poorer tend drop out of school earlier to contribute to the household income and consequently get less education. However, less educated people are less informed, get less involved in politics (Campante and Chor, 2012) and identify less with the nation or democracy (Robinson, 2014) which deteriorates accountability even more (see also Glaeser et al. (2004) on how education is fundamental to the development of inclusive institutions). As a result, there are mechanisms that go from a reduced public goods provision or economic performance back to accountability which might reinforce and contribute to the persistence of the effects.[4]

While these channels are presented as separate mechanism, it should be noted that they in fact interact and reinforce each other. Identifying less with the nation and the democracy, for example, is likely to reduce willingness to pay taxes or to bear the cost of collecting and consuming information about national politics. One the other hand, being less exposed to state-level media and information is likely to reduce the identification with the nation and democracy (see also Robinson (2014)). Fur-

[4]There are other reinforcing dynamics that belong to the taxation (information) channel. As isolated areas tend to be poorer, the cost-benefit of collection taxes (entering and supplying the market with news) decreases even further which reduces the incentives to enforce tax duties (provide critical information) even more.

thermore, lower levels of education are associated with decreased civic engagement (Milligan et al., 2004; Helliwell and Putnam, 2007) as it "[decreases] the benefits of political participation and draws relatively [less] people to support democracy" (Glaeser et al., 2007).

Moreover, if it is in fact these channels that reduce accountability, we should observe that the effects of capital city isolation are weaker for urban as compared to rural areas. The reason for this is that the identified channels favor the characteristics of population agglomeration in urban centers. Regarding the information channel, for example, urban areas represent economies of scale regarding media coverage that make it profitable for media companies to cover the market (for example with newspaper) and employ journalists in these cities to investigate and report on local events. While isolated cities still have a relative disadvantage as compared to cities closer to the capital (as they can be supplied directly from the media headquarters in the capital city, which makes them accessible even for smaller companies), they have an advantage regarding similarly isolated but rural locations. Regarding tax enforcement, urban as compared to rural areas feature increased expected revenues for the state. This is a result of the higher income in urban areas with a higher share of employment in the formal sector. In addition, in urban areas the cost of tax collection is much lower as a lot of potential taxpayers are concentrated within a small area which also allows for economies of scale.

To summarize, we have identified four major channels (information, taxation, identification with the nation and democracy, and education) through which capital city isolation might impact accountability and hence public goods provision and economic development. In addition, we hypothesize that the adverse implications of isolation from the capital city should be lower for urban as compared to for rural areas. Further, it lies in the very nature of the phenomenon that those who are discriminated based on these mechanisms are not even aware of their marginalization. Therefore, it might just seem paradoxical that those who are politically neglected have more trust into their political leaders and evaluate their performance better, when in fact it might be at the very core of the problem in the first place.

4 Empirical Strategy and Data

4.1 Overview

This section serves to present the empirical strategy of the study aiming at testing the proposed hypotheses from Section 3.

In this study, we investigate the implications and underlying mechanisms of capital city isolation in Sub-Saharan Africa consisting of 48 countries. However, as the effects of capital city isolation are likely to be fundamentally different in very small (island) states like Cape Verde, Comoros and São Tomé and Príncipe, we exclude these countries from our sample. Furthermore, due to the special geographical feature of being an island state which has important implications for the meaning of distance within the country, we additionally exclude Madagascar. Last but not least, as opposed to the other countries, South Africa has subdivided its three branches of the government to three capital cities (Pretoria as the executive, Bloemfontein as the judicial, and Cape Town as the legislative capital). This circumstance complicates the concept of capital city isolation in South Africa and might have fundamental implications for its meaning. In addition, the fact that South Africa as a settler colony has a fundamentally different set of political institutions (that might have even endogenously led to a subdivision of the political administration into three cities distributed over the country) might additionally alter the effects. Consequently, we exclude South Africa from the sample as well. Thus, we are left with a sample of 43 countries for the remote sensing analysis as is illustrated in Figure 1.

In order to test our hypotheses we employ a multivariate regression analysis using micro-level data. The spatial nature of the question requires us to work with geo-referenced data. As data for economic activity is not available for small geographical units in Sub-Saharan Africa, we proxy economic activity with nighttime luminosity data (as discussed in detail in Section 4.2). In order to examine the proposed channels, we additionally use data from Round 6 of the Afrobarometer survey (see Section 4.4 for more information). In order to control for confounding effects (for example the correlation between isolation from the in most cases coastal capitals and isolation from the coastline which has major implications by itself), we need to control for a rich set of variables. Unfortunately, the inclusion of control variables does not guarantee the clean isolation of unbiased causal effects as there might still be unobservables confounding the results. Therefore, we show that our findings are robust to range of alternative specifications. Moreover, we examine two different datasets to verify that the impact of capital city isolation on economic activity using nighttime lights can also be confirmed using Afrobarometer survey data. Lastly, in many cases distance from the capital means both, distance from the main political but also distance from the main economic center in the country. In order to make sure that it is in fact isolation from the political center that causes the effects, we run placebo tests. The idea is that the capital city should have an impact on the investigated variables that is consistently different from the effects imposed by other

major cities and economic centers within the country (see Section 5.4 for an in-depth discussion of the placebo tests).

4.2 Nighttime Lights and Economic Research

The use of nighttime luminosity data as a proxy for economic activity has grown in importance in recent years. This data is especially useful for places where national accounts data on GDP is of poor quality, as well as for (small) geographical units where administrative data is simply not available. Studies investigating the suitability of nighttime lights as a proxy for GDP use areas with good administrative data and compare estimated with actual GDP or income growth data. Henderson et al. (2012) show that their estimation for income growth on the national level for a set of 30 countries differed by only up to 3.2% from the actual data. Moreover, Hodler and Raschky (2014: 1030) show for sub-national regions across the world that "the relationship between nighttime lights and GDP is linear and thereby similar across regions with different nighttime light intensity and income levels". While this finding might not translate into a similar accuracy on the very fine pixel level, it underlines that the mechanisms that drive the positive relationship between economic activity and nighttime light emissions are generally stable across regions and observational units. This is why, nighttime lights are widely used in microeconometric settings (see for example Michalopoulos and Papaioannou (2014) or Pinkovskiy (2017)).

Consequently, nighttime lights serve as a powerful tool when investigating the implications of capital city isolation. However, in the spirit of a careful analysis I show that the findings are stable with respect to a variety of alternative specifications that seek to address potential shortcomings of nighttime lights.

4.3 Data – Remote Sensing

In order to evaluate the impact of isolation from the capital city on economic activity and growth in Sub-Saharan Africa and to effectively control for confounding effects, we need to collect and merge a wide number of datasets comprising nighttime lights, population density and further geographic control variables. For the purpose of curbing measurement error and distortions resulting from potential inaccuracies between the datasets and facilitating the computational intensity of the analysis, the data grids are aggregated to a resolution of 90×90 arcseconds which is equivalent to approximately 2.7×2.7 kilometers at the equator. For the nightlight grids that have an initial resolution of 30×30 arcseconds this implies that 9 pixels (3×3) of the original resolution constitute a new pixel that is assigned the mean value of its predecessors. The chosen resolution leaves us with around 2.7 million pixels in the

43 countries under scrutiny.

Regarding the coordinate reference system (CRS), we decided to transform the grids from the standard CRS 'WGS 84' that mesures distance in decimal degrees to 'Africa Sinusoidal' (see http://spatialreference.org/ref/esri/africa-sinusoidal/ for more information). This CRS has the advantage to properly map distances in Sub-Saharan Africa while using kilometers as the distance metric.

In the following, we present the various datasets that we collected from different sources and merged into the final dataset for the remote sensing analysis including an URL for download:

Regarding nighttime luminosity data, there are currently two products: the DMSP-OLS (Defense Meteorological Satellite Program − Operational Linescan System) by the U.S. Air Force and the National Oceanic and Atmospheric Administration (NOAA) and the new VIIRS (Visible Infrared Imaging Radiometer Suite) by the Suomi National Polar Partnership between NOAA and NASA. While the VIIRS are considered to be superior to the DMSP-OLS regarding accuracy (Elvidge et al., 2013) and feature annual composites that are available until the year 2017, the grids are unfortunately only available starting in 2012. In contrast, the DMSP-OLS nightlight grids are available since 1992 (until 2013) which makes them more suitable for an analysis investigating economic development over time. Therefore, in this study we use the DMSP-OLS nighttime lights from 1992 to 2013 provided by NOAA (available for download at: https://www.ngdc.noaa.gov/eog/dmsp/downloadV4composites.html#AVSLCFC).

The population grid (30 × 30 arcseconds) for 2015 was obtained from Worldpop (available for download at: http://www.worldpop.org.uk/data/summary/?doi=10.5258/SOTON/WP00004) and contains the (UN-adjusted) total number of inhabitants per pixel.

The agricultural suitability index grid (30×30 arcseconds) represents for each pixel the maximum suitability value for the 16 most relevant crops (Zabel et al., 2014) (available for download at: http://geoportal-glues.ufz.de/stories/globalsuitability.html).

The water surface grid (5 × 5 arcseconds) was obtained from the European Space Agency (ESA) and is available for download at: http://maps.elie.ucl.ac.be/CCI/viewer/index.php.

The land elevation grid (30×30 arcseconds) by the NASA in context of the Shuttle Radar Topography Mission (SRTM) based on the work of Jarvis et al. (2008) is available for download at: http://www.cgiar-csi.org/data/srtm-90m-digital-elevation-database-v4-1.

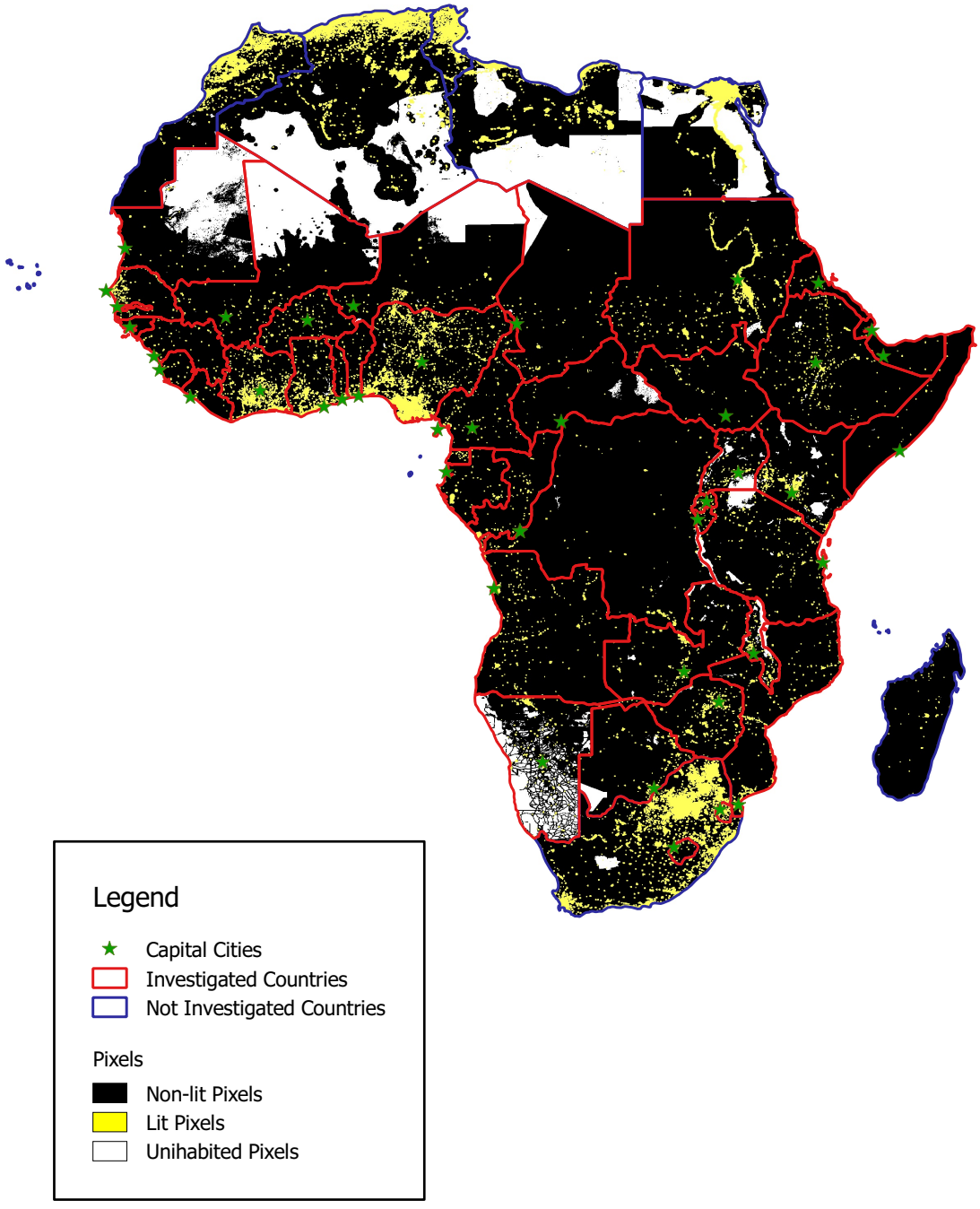
The urban-rural grid for the year 1995 (30×30 arcseconds) by the Center for International Earth Science Information Network at Columbia University based on the work of Balk et al. (2006) is available for download at: http://sedac.ciesin.columbia.edu/data/collection/grump-v1/sets/browse.

The shapefile of cities including their population size was obtained from NaturalEarth available for download at: http://www.naturalearthdata.com/downloads/10m-cultural-vectors/10m-populated-places/. Where the urban population count of a city was missing, this information was complemented with data from various sources including CityPopulation (see here for further information: https://www.citypopulation.de/) and WorldPopulationReview (see here for further information: http://worldpopulationreview.com/).

The country shapes and borders were obtained from NaturalEarth and are available for download at: http://www.naturalearthdata.com/downloads/50m-cultural-vectors/50m-admin-0-countries-2/.

The ethnographic map of Africa based on Murdock (1959) was downloaded from: https://worldmap.harvard.edu/data/geonode:murdock_ea_2010_3.

Figure 1: Lit vs. Non-lit Inhabited Pixels in 2013



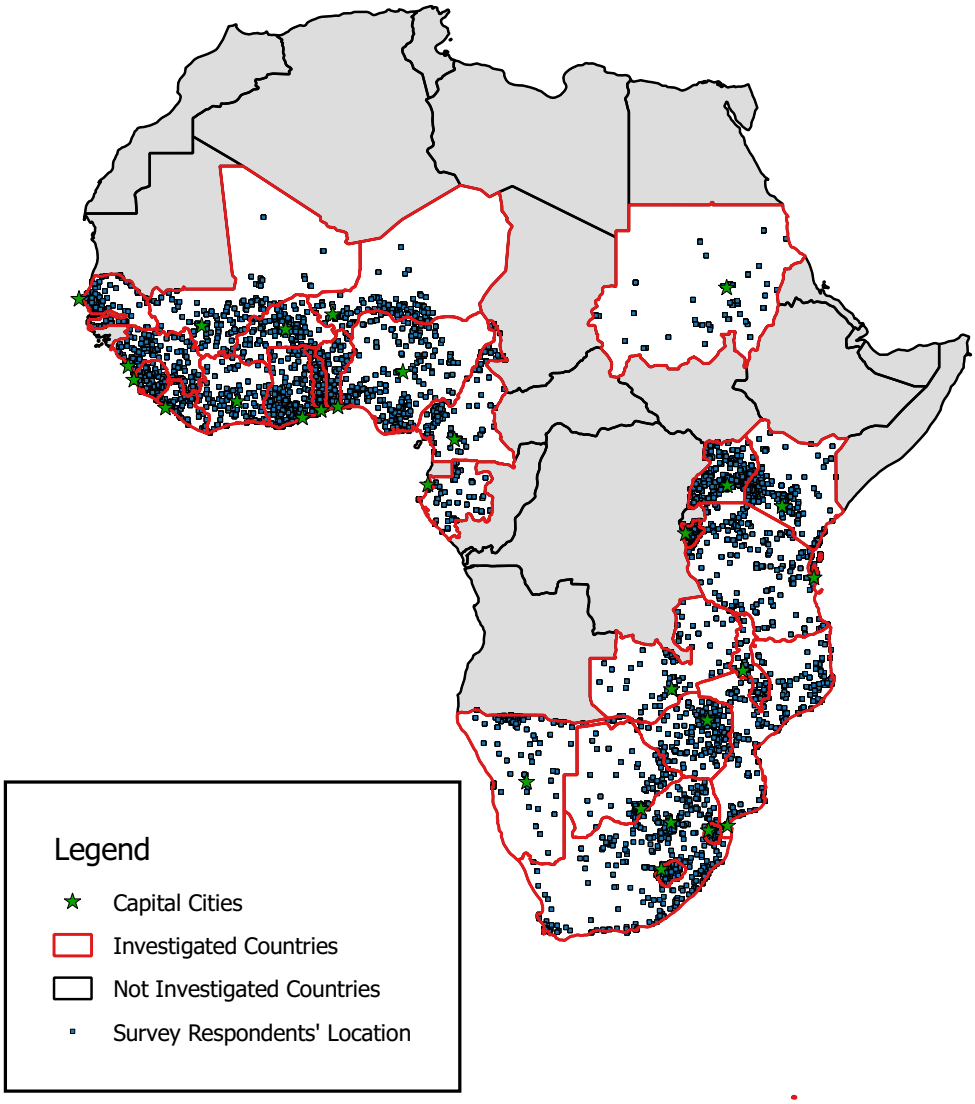
Note: This figure illustrates the lit vs non-lit inhabited pixels (not taking into consideration the differences in the intensity of light between pixels) based on the DMSP-OLS satellite images in 2013 and the UN-adjusted population patterns by Worldpop in 2015. Furthermore, the map indicates the countries under scrutiny as those lying entirely within a red border.

4.4 Data – Afrobarometer

In order to obtain additional evidence on the political, social and economic implications and channels of capital city isolation, in this section we examine Round 6 of the geocoded Afrobarometer survey. The Afrobarometer is a survey founded in the year 1999 to collect data on public attitude and opinion regarding democracy, governance and economic conditions throughout the African continent. A great strength of this survey is that the interviewers record their geographical location when conducting the interview. This additional information allows the use of this survey in geospatial studies taking into consideration the geographical extension of social and economic phenomena. Unfortunately, as of now, we were only granted access to Round 6 of the Afrobarometer. We are currently applying to get access to all rounds of the Afrobarometer in order to extend the analysis and to be able to analyze changes in the patterns over time. Out of the 37 African countries that are covered in Round 6 of the Afrobarometer 27 countries fall into our sample.[5] The remaining 27 countries still represent around 70% of the population of the original sample (consisting of all 43 countries that are investigated in the remote sensing analysis). The coverage of the Afrobarometer is illustrated in Figure 2. All observations are weighted in order to ensure that the sample is representative within a country and that an equal weight is given to each country.

[5]Other countries that are also covered by the Afrobarometer but not part of our sample are North African countries, (small) island states and South Africa.

Figure 2: Afrobarometer (Round 6) – Coverage



Note: This figure illustrates the coverage of Round 6 of the Afrobarometer.

4.5 Variable Description

In the following, we provide a description of all explanatory distance measures included in our models that we have computed ourselves:

Log Distance from the Capital City − The log of the geodesic distance (in km) between the pixel and the capital city[6] in km.

Log Distance from the Coast − The log of the geodesic distance (in km) between the pixel and the coastline.

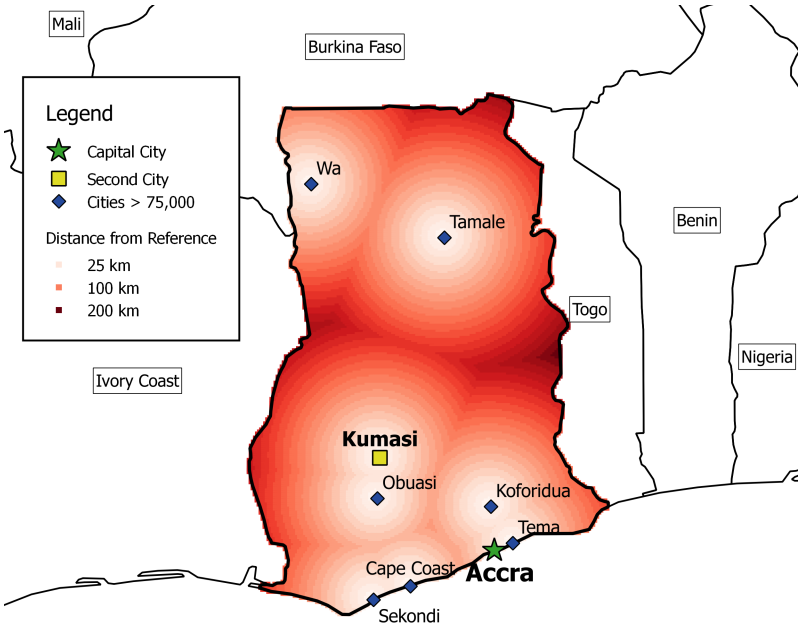
Log Distance from the Clostest City $\geq 75,000$ − The log of the geodesic distance (in km) between the pixel and the closest city (other than the capital to avoid collinearity with the variable of interest) in the same country that has at least 75,000 inhabitants[7] (see Figure 3 for an illustration in the case of Ghana). This variable indicates how far away a pixel is from the next city of a sufficient size and serves as the remoteness control. As, the threshold of 75,000 inhabitants is somewhat arbitrary, in Section 5.3, we show that the findings are robust when taking cities with a population $\geq 50,000$ instead. Furthermore, we relax the assumption of closed borders.

Log Distance from the Second City (sometimes referred to as **Distance 2nd City**) − The log of the geodesic distance (in km) between the pixel and the most populous city (that is not the capital city or within the range of 30km from the capital city and thus basically associated with the capital itself). For cases where the capital city is not the biggest city, we take the largest city instead. However, the coefficient of this variable should be interpreted with caution. In order to get an unbiased result on the impact of remoteness, the second city is comprised as a reference point in the remoteness control variable *Log Distance from the Closest City* $\geq 75,000$. This increases the collinearity and contributes to the fact that *Log Distance from the Second City* tends to turn out insignificant (even if it might actually have an impact). Therefore, in the first models, it is simply considered as a control variable without considering its coefficient. However, in Section 5.4, in order to deliver proper placebo tests with unbiased coefficients for this variable, the second city is excluded as a reference point from the remoteness control variable.

[6]Note that Dodoma has been the designated capital city of Tanzania since 1974. However, as of now, the seat of government including the office of the president and several ministries are still located in the largest city and former capital Dar es Salaam. Therefore, for Tanzania we use Dar es Salaam as the capital city instead of Dodoma.

[7]If there is no city within the country (other than the capital city) that has at least 75,000 inhabitants as is the case in Djibouti, we take the second largest city in that country instead.

Figure 3: Distance from Closest City of at Least 75,000 Inhabitants in Ghana



5 Capital City Isolation from Outer Space

5.1 Extensive Level Analysis

Table 1 presents the building up of the baseline regression model and its control variables. In the main specification the focus lies on economic growth between 1992 and 2013. In order to test if growth was higher in areas closer to the capital, we take all inhabited but non-lit pixels in 1992 and test if the probability of being lit in 2013 is higher when the pixels are closer to the capital city. In other words, figuratively speaking, we investigate if the pattern of light being switched on in grid cells in Sub-Saharan Africa is systematically decreasing with distance to the capital city. The extensive approach (e.g. assigning the value of 1 when a pixels is lit vs. 0 otherwise, instead of the absolute light intensity or its change over time) is common in the literature (see for example Michalopoulos and Papaioannou (2014)). The advantage of the extensive analysis is that we do not require the assumption of linearity between light intensity and GDP for the very fine pixel level. Furthermore, dealing with probability models facilitates the interpretation of the results in this context (as the translation of light intensity into GDP is not straightforward).

Column (1) in Table 1 represents the simple univariate linear probability model with solely *Log Distance from the Capital City* as an explanatory variable. The log-transformation is chosen based on a goodness of fit analysis using the Akaike Information Criterion (AIC). We proceed similarly for the other variables which, with the

Table 1: Capital City Isolation from Outer Space – Extensive Level Analysis (Main Specification)

	Dependent variable: Probability Inhabited Pixel that was Not Lit in 1992 is Lit in 2013							
	OLS							*Probit*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Distance from the Capital City	-0.028^{***}	-0.022^{***}	-0.022^{***}	-0.017^{***}	-0.012^{***}	-0.012^{***}	-0.013^{***}	-0.250^{***}
	(0.006)	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.029)
Number of Inhabitants in Pixel (in 2015)		0.00003^{***}	0.00003^{***}	0.00003^{***}	0.00003^{***}	0.00003^{***}	0.00003^{***}	0.0002^{***}
		(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00004)
Log Distance from the Coast				-0.012^{***}	-0.011^{***}	-0.011^{***}	-0.010^{**}	-0.113^{***}
				(0.004)	(0.004)	(0.004)	(0.004)	(0.036)
Log Distance from the Closest City $\geq 75,000$					-0.015^{***}	-0.016^{***}	-0.017^{***}	-0.286^{***}
					(0.003)	(0.003)	(0.003)	(0.032)
Intercept	0.194^{***}	0.150^{***}	0.158^{***}	0.194^{***}	0.236^{***}	0.225^{***}	0.161^{***}	0.809^{*}
	(0.037)	(0.031)	(0.026)	(0.032)	(0.038)	(0.037)	(0.059)	(0.431)
Country FE	NO	NO	YES	YES	YES	YES	YES	YES
Distance 2nd City	NO	NO	NO	NO	NO	YES	YES	YES
Geography Controls	NO	NO	NO	NO	NO	NO	YES	YES
Observations	2,677,487	2,677,487	2,677,487	2,677,487	2,677,487	2,677,487	2,677,487	2,677,487
R^2	0.018	0.055	0.080	0.082	0.086	0.086	0.087	
Adjusted R^2	0.018	0.055	0.080	0.082	0.086	0.086	0.087	
Log Likelihood								−244,272
AIC								488,647
F Statistic	$49{,}055^{***}$	$78{,}401^{***}$	$5{,}275^{***}$	$5{,}324^{***}$	$5{,}473^{***}$	$5{,}366^{***}$	$5{,}082^{***}$	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Geography Controls include: The average elevation of the pixel, the crop suitability of the pixel and the share of the pixel surface covered with water.

exception of population density, all exhibit a higher fit under the log-transformation. The fact that the log-transformed variable has a better fit has important qualitative implications. It suggests that the magnitude of the effect of being isolated from the capital city decreases with distance from the capital (measured in actual km). The model indicates that on average an increase in the distance from the capital city by one percentage point decreases the probability of the (populated and not lit pixel in 1992) pixel being lit in 2013 by approximately 3 percent. This result is highly significant even when clustering in two dimensions by ethnicity and country. Two-way clusters are necessary to control for intra-national and intra-ethnicity (regional) correlation in (un-)observed characteristics and the spatial correlation of the residuals[8].

However, the result in Column (1) might be driven by the fact that areas farther away from the capital are less densely populated and therefore have a lower probability of being lit. This is why, in Column (2) the *Number of Inhabitants in Pixel (in 2015)* is included as a control variable. This variable is not transformed to the logarithm as based on the AIC the untransformed variable has a better fit.[9] Taking the value for the year 2015 instead of the one from 1992 or the average over the period should not be a source of concern as population patterns evolve extremely stable. As it turns out, the inclusion of population density in fact slightly reduces the magnitude of the effect which suggests that both, population density and night-light emittance, decrease with distance from the capital city. However, the general relationship remains very stable to this assumption. This implies that the distance from the capital has an effect on economic growth that goes beyond population agglomeration patterns as represented by the population density.

In Column (3), country fixed effects are included in order to make sure the findings are not driven by country-specific characteristics such as the overall level of economic development, institutions, preferences, national policies, size as well as the geographical location.

Another omitted variable that might induce bias in the current specification is *Log Distance from the Coast*. In Sub-Saharan Africa capital cities tend to be located at the coast. Therefore, increasing the distance to the capital city also tends to increase the distance to coast which in turn increases trade costs, the adverse long-run effects of slave trade (Nunn and Wantchekon, 2011) and the colonial penetration which might have major implications for economic activity and growth today. In

[8]See (Michalopoulos and Papaioannou, 2014: 168) and (Cameron et al., 2011) for an in-depth discussion of two-way clustering, and (Arai, 2009) for the technical implementation in R.

[9]Whether the variable is included in log or level does not have an impact on the finding of the model.

Column (4), we therefore include *Log Distance from the Coast* as a control variable.

In Column (5), we additionally control for remoteness as defined by the distance to the closest city of at least 75,000 inhabitants within the country. This is necessary as areas farther from the capital city might generally be more remote due to geographic conditions such as belonging to the Sahel region in Norther Mali which have a great impact on the potentials to benefit from trade or economies of scale and hence economic growth.

In Column (6), *Log Distance to the Second City* is included. This variables serves to control for the distance to the second major urban area and economic center within the country. In Section 5.4, we will use this variable in an even stricter setting to test if the impact of distance to the capital city is in fact of a higher magnitude than that of other major cities.

In Column (7), an additional set of geographic control variables is included into the model. The share of the pixel surface that is covered with water is necessary because water access facilitates trade. Additionally, there are very important technical reasons that require the inclusion of this variable. As water reflects light, it increases the blooming and hence, ceteris paribus, the probability that the pixels is lit as well as the light intensity (Michalopoulos and Papaioannou, 2014: 168) which needs to be controlled for.
The crop suitability index serves to ensure that differences in economic development are not driven by increased land suitability for growing major crops that might coincide with proximity to the capital city.
The average elevation in the pixel serves to account for the fact that areas farther from the capital might have a higher elevation, thus constitute a less suited geographical environment for infrastructure, trade and economic development. On the other hand, as Nunn and Puga (2012) show, ruggedness in Sub-Saharan Africa also has positive implications on growth via protecting areas of higher elevation from the adverse long-run effects of the slave trade.

Last but not least, in Column (8) the model specification from Column (7) is run using a Probit model which has one major advantage over the linear probability model: It allows to properly account for the nature of probability models that have a lower and upper bound (at 0 and 1) and therefore cannot exhibit linear effects over the entire interval. The results of the Probit model confirm the findings of the linear probability model in direction, significance and magnitude (as can be seen when considering the average marginal effect (AME) of the model in Column (4) in

Table 2). However, as discussed by Greene (2002), there are concerns about nonlinear models with fixed effects due to the 'incidental parameter problem' which causes inconsistency. Due to the high number of observations per group (country), this is probably less of a concern. Nevertheless, in order to account for this potential shortcoming, we will always present both, the linear probability model and the nonlinear model.

Overall, it can be concluded that, ceteris paribus, areas farther from the capital city exhibited significantly less growth in the period between 1992 and 2013. On average, a one percent increase in the distance to the capital city decreased the probability (of populated pixels that were not lit in 1992) of being lit in 2013 by 1.3%. The significance of this effect becomes especially clear when taking into consideration that only 2.5% of the pixels turned lit within this period i.e. the average probability of turning from non-lit to lit was 2.5%. Moreover, when comparing the effect of *Log Distance from the Capital City* with that of *Log Distance from the Coast*, it turns out that the location of the pixel relative to the capital on average has a higher impact than being isolated from the coast which strongly underlines the importance of distance to the capital city as a predictor for economic activity and determinant of (spatial) inequality.

Table 2 presents the results of the same model structure for the absolute level of economic development in 2013, the growth between 1992 and 2013 (as in Table 1) and the growth between 2000 and 2013. In addition, it features the AME as well as the marginal effect at the mean (MEM) for the Probit models. As can be seen in Column (1) and (2), we also find significant effect on the level of economic development. In addition, we find that the effects for the period between 2000 and 2013 are also highly significant and, consistent with the fact that the time period is shorter, smaller than the ones in Column (3) and (4). It is striking that the ratio between the AME (or MEM) in Column (4) and (6) is astonishingly close to the ratio of the time periods between both columns. This circumstance underlines the robustness of the analysis and indicates that capital city isolation imposes constant effects on economic growth every year.

Figure 5 illustrates the predicted probabilities for Column (1) and (2) (left graph) and Column (3) and (4) (right graph) keeping all variables other than *Log Distance from the Capital City* at their mean. As is suggested by the functional form using log-transformed variables, the effects of capital city isolation are decreasing with distance from the capital city. This effect is even stronger for predictions based on the Probit as compared to the OLS regression models. Yet, it becomes clear that the

Table 2: Capital City Isolation from Outer Space – Extensive Level Analysis (Variations)

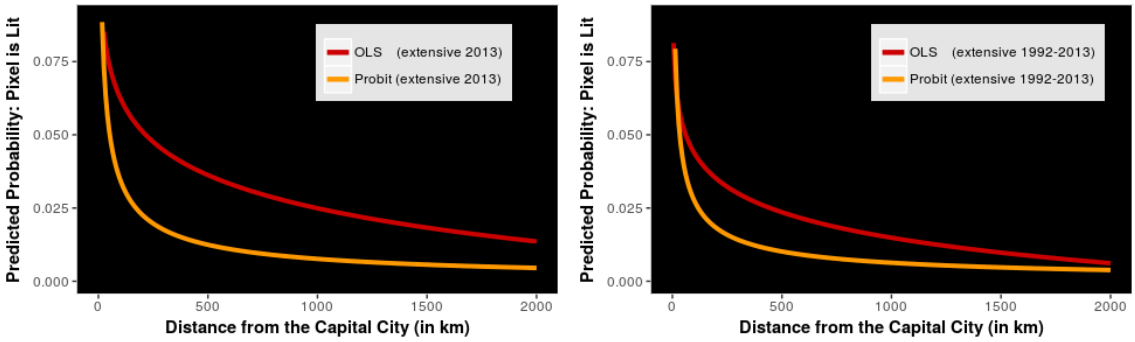
	Dependent variable:					
	Probability Inhabited Pixel is Lit (in 2013)		Probability Inhabited Pixel that is Not Lit in 1992 is Lit in 2013		Probability Inhabited Pixel that is Not Lit in 2000 is Lit in 2013	
	OLS (1)	*Probit* (2)	*OLS* (3)	*Probit* (4)	*OLS* (5)	*Probit* (6)
Log Distance from the Capital City	-0.016^{*}	-0.264^{***}	-0.013^{***}	-0.250^{***}	-0.005^{**}	-0.203^{***}
	(0.009)	(0.049)	(0.003)	(0.029)	(0.002)	(0.035)
Number of Inhabitants in Pixel (in 2015)	0.00001^{***}	0.0003^{***}	0.00003^{***}	0.0002^{***}	0.00003^{***}	0.0002^{***}
	(0.00000)	(0.00003)	(0.00001)	(0.00004)	(0.00001)	(0.00003)
Log Distance from the Coast	-0.026^{*}	-0.189^{***}	-0.010^{**}	-0.113^{***}	-0.006^{**}	-0.103^{***}
	(0.013)	(0.061)	(0.004)	(0.036)	(0.003)	(0.037)
Log Distance from the Closest City $\geq 75,000$	-0.032^{***}	-0.320^{***}	-0.017^{***}	-0.286^{***}	-0.010^{***}	-0.257^{***}
	(0.006)	(0.034)	(0.003)	(0.032)	(0.002)	(0.033)
Intercept	0.272^{***}	1.429^{***}	0.161^{***}	0.809^{*}	0.099^{***}	0.443
	(0.097)	(0.459)	(0.059)	(0.431)	(0.033)	(0.365)
AME of Dist. from Capital		-0.015^{***}		-0.012^{***}		-0.007^{***}
MEM of Dist. from Capital		-0.009^{***}		-0.007^{***}		-0.004^{***}
Country FE	YES	YES	YES	YES	YES	YES
Distance 2nd City	YES	YES	YES	YES	YES	YES
Geography Controls	YES	YES	YES	YES	YES	YES
Observations	2,720,720	2,720,720	2,677,487	2,677,487	2,643,489	2,643,489
Adjusted R^2	0.144		0.087		0.048	
Log Likelihood		$-301,409$		$-244,272$		$-179,962$
AIC		602,920		488,647		360,026
F Statistic	$9,172^{***}$		$5,082^{***}$		$2,658^{***}$	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Geography Controls include: The average elevation of the pixel, the crop suitability of the pixel and the share of the pixel surface covered with water. 'AME' and 'MEM' refer to 'average marginal effect' and 'marginal effect at the mean' of 'Log Distance from the Capital City' respectively.

effects are still of intermediate strength for areas farther isolated from the capital city.

Figure 4: Predicted Probabilities for Nighttime Lights



Note: The left Figure refers to the models in Column (1) and (2) of Table 2 and displays the the predicted probabilities dependent on the distance from the capital city keeping all other covariates at their mean respectively. The Figure to the right refers to the models in Column (3) and (4) of Table 2.

5.2 Intensive Level Analysis

The drawback of the extensive nighttime luminosity analysis is that when evaluating the economic condition it implicitly assigns strong weight to the crossing of the threshold at which areas emit nightlight and which can be detected by satellites (as there is also some degree of economic activity in populated pixels even in the absence of detected nightlights). Additionally, it does not take into consideration the variation in the intensity of light (per capita) between lit pixels. Therefore, it would be interesting to see if the results from Section 5.1 can be confirmed in a intensive level analysis. In order to properly do that, we have to take into account that the comparability of light intensities over a wide range of intensity levels is limited. Therefore, in order to enhance the comparability between the light intensities in our sample, we remove the outliers. This is implemented by taking all values that are unequal to 0 and removing those who are located outside the $\pm 1.5 \times$ the interquartile range (IQR). Moreover, as is illustrated in Figure 5, the frequency of values beyond the level of 20 is very close to zero (with a few local peaks). Hence, excluding outliers does not only make light intensities more comparable but also results in a more regular density distribution which is reassuring that the excluded observations actually represent outliers.

Table 3 presents the results on the intensive level analysis. Column (1) present the OLS-model on the level of light intensity in 2013 that, while the direction of the effects remains the same, cannot confirm the previous results as Log Distance from the Capital City as well as *Log Distance from the Coast* turn out insignificantly

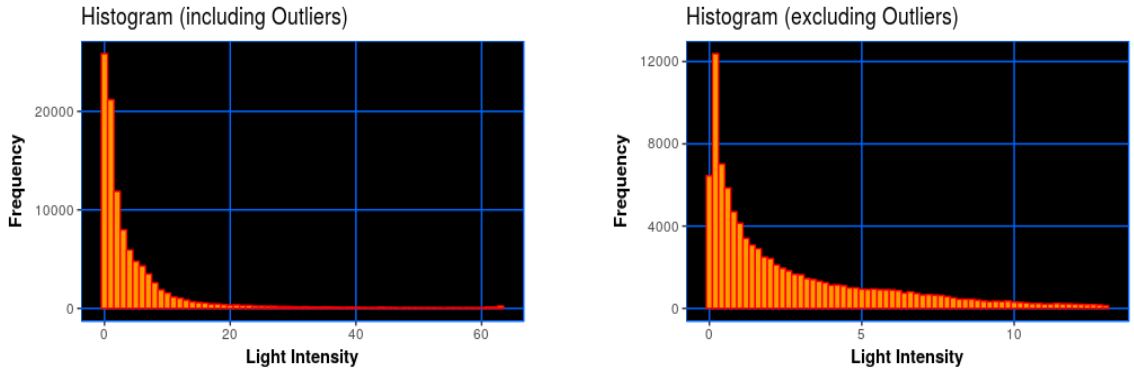
Table 3: Capital City Isolation from Outer Space – Intensive Level Analysis

	Dependent variable:			
	Light Intensity in Inhabited Pixel (in 2013)		Light Intensity in Inhabited Pixel in 2013 minus 1992	Light Intensity in Inhabited Pixel in 2013 minus 2000
	OLS (1)	*Tobit* (2)	*OLS* (3)	*OLS* (4)
Log Distance from the Capital City	−0.024	−1.421***	−0.049***	−0.022***
	(0.040)	(0.284)	(0.012)	(0.008)
Number of Inhabitants in Pixel (in 2015)	0.0002***	0.001***	0.0001***	0.00002***
	(0.00003)	(0.00003)	(0.00001)	(0.00000)
Log Distance from the Coast	−0.091	−1.067***	−0.026*	−0.015
	(0.061)	(0.320)	(0.015)	(0.010)
Log Distance from the Closest City $\geq 75,000$	−0.070***	−1.794***	−0.064***	−0.034***
	(0.016)	(0.161)	(0.013)	(0.007)
Intercept	0.615**	8.428***	0.498**	0.271**
	(0.283)	(2.057)	(0.208)	(0.112)
Country FE	YES	YES	YES	YES
Distance 2nd City	YES	YES	YES	YES
Geography Controls	YES	YES	YES	YES
Observations	2,711,183	2,711,183	2,707,683	2,704,792
Adjusted R^2	0.152		0.079	0.042
F Statistic	9,688***		4,616***	2,348***

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Outliers (defined as ±1.5 IQR of the dependent variable ≠ 0) are excluded. In the Tobit model in Column (2), 2,617,110 observations are left-censored at 0 and 94,073 observations are uncensored. Geography Controls include: The average elevation of the pixel, the crop suitability of the pixel and the share of the pixel surface covered with water.

Figure 5: Outlier Treatment – Intensive Analysis



Note: The left Figure displays the distribution of light-intensities (without non-lit pixels) including outliers. As can be seen, with the exception of some local peaks, there are hardly any observations of light intensities beyond the value of 20. In order to enhance the comparability of light intensities, the outliers are removed for the analysis. The histogram to the right illustrates the distribution excluding outliers.

different from 0. However, once we account for the fact that our data is censored at the lower bound 0 by using a Tobit-model, the results turn out highly significant and in line with the previous findings. The change in the light intensity between 1992 and 2013 (Column (3)) and 2000 and 2013 (Column (4)) that is highly significantly negative additionally supports the findings from the previous subsection. Moreover, it turns out that the ratio of the coefficients of *Log Distance from the Capital City* in Column (3) and (4) is extremely close to the ratio of the coefficients of Column (3) and (5) in Table 2. Moreover, it is very close to the inverse of the time frame between both columns. This not only suggests a stable linear relationship of capital city isolation over time, but also underlines the robustness of the models greatly.

5.3 Robustness

Despite the encouraging results from Section 5.1 and 5.2, there are still a number of structural pitfalls that might lead to these findings even in the absence of effects by isolation from the capital city.

Most importantly, it might be that the area of the capital city itself constitutes a great lit cluster whereas the rest of the country tends to be not lit with equal probability (and independently of its proximity to the capital city). In case the effects of the capital city were sufficiently strong, this circumstance could lead to similar findings and mistakenly give us the impression that distance from the capital city has a continuous impact on economic performance when in fact there is simply a break between the capital city area and the rest of the country. Fortunately, we can directly test for this circumstance by running the same regressions but excluding pixels with a sufficient proximity of 25 km (50 km) to the capital as is implemented

in Column (1)-(4) in Table 4. As it turns out the findings are robust to this potential limitation as both, the coefficients when excluding the area of 25 km as well as 50 km around the capital (which even goes far beyond the metropolitan region) turn out highly significantly negative. Furthermore, the effects tend to decrease the greater the area that is excluded around the capital. The average marginal effect of the Probit model estimation without excluding pixels is -0.012^{***} (see Table 2 Column (4)), -0.009^{***} when excluding with a radius of 25 km (see Tabel 4 Column (2)) and -0.006^{***} when excluding with a radius of 50 km (see Table 4 Column (4)). This finding is perfectly in line with the functional form of the model that suggest a logarithmic relationship, hence decreasing effects, between *Distance from the Capital City* and the *Probability of Inhabited Pixel to be Lit*. Consequently, the impact of isolation from the capital city is not characterized by a break between the capital city and the hinterlands but rather of a steady and continuous nature.

Another important aspect to investigate is whether the adverse effects of isolation from the capital city are driven by the fact that there are less urban areas (which always have a higher propensity to be lit) farther from the capital, or whether we also observe these effects for rural pixels. This is why, in Column (5) and (6), all urban pixels are excluded from the sample. As it turns out, the effects get only slightly smaller and are statistically insignificantly different from the findings in our baseline model (in Table 2 Column (4)). One drawback of this analysis is that the grid for urban and rural pixels is only available for the year 1995 and might therefore be outdated. Yet, this variable still lies within the time period under investigation ($1992-2013$). Furthermore, even if urban areas expanded since then, the vast majority of urban pixels were already urban in 1995 which makes it unlikely that this circumstance might bias the results to such an extent that the coefficients mistakenly happen to be indistinguishable from those of the baseline model. Another concern that is twofold is the endogeneity of cities (which is also why this variable is not included as a covariate). Firstly, the development of cities is endogenous to capital city isolation as some villages in isolated areas might have grown into cities over the years if they were closer to the capital city. Secondly, the grid of urban and rural pixels was created using, among other data sources, nighttime lights. As a result, the variable is also technically endogenous. Therefore, the methodological approach regarding remote sensing is not suitable to separate the effects on cities and rural areas. Yet, we are able to show that the results are not driven by a coincidental concentration of cities in areas closer to the capital. Hence, under these caveats, we can conclude that our results are robust with respect to the exclusion of urban areas.

Another potential pitfall might be that the remoteness control *Log Distance from*

Table 4: Capital City Isolation from Outer Space – Extensive Level Analysis (Sensitivity Tests I)

	Dependent variable: Probability Inhabited Pixel that was Not Lit in 1992 is Lit in 2013					
	Only Pixels $\geq 25km$ from Capital		Only Pixels $\geq 50km$ from Capital		Only Rural Pixels	
	OLS (1)	*Probit* (2)	*OLS* (3)	*Probit* (4)	*OLS* (5)	*Probit* (6)
Log Distance from the Capital City	-0.008^{**} (0.003)	-0.199^{***} (0.034)	-0.002 (0.003)	-0.137^{***} (0.039)	-0.010^{***} (0.003)	-0.242^{***} (0.032)
Number of Inhabitants in Pixel (in 2015)	0.00003^{***} (0.00001)	0.0002^{***} (0.00004)	0.00003^{***} (0.00001)	0.0002^{***} (0.00004)	0.00004^{***} (0.00001)	0.0002^{***} (0.00004)
Log Distance from the Coast	-0.010^{**} (0.004)	-0.120^{***} (0.038)	-0.011^{**} (0.004)	-0.125^{***} (0.038)	-0.009^{**} (0.004)	-0.119^{***} (0.034)
Log Distance from the Closest City $\geq 75,000$	-0.017^{***} (0.003)	-0.292^{***} (0.034)	-0.017^{***} (0.003)	-0.296^{***} (0.034)	-0.014^{***} (0.004)	-0.272^{***} (0.034)
Log Distance from the Second City	0.002 (0.003)	-0.011 (0.039)	0.002 (0.003)	-0.013 (0.038)	0.002 (0.004)	-0.016 (0.045)
Intercept	0.145^{**} (0.057)	0.581 (0.442)	0.120^{**} (0.055)	0.239 (0.461)	0.136^{**} (0.058)	0.722 (0.473)
AME of Dist. from Capital		-0.009^{***}		-0.006^{***}		-0.011^{***}
MEM of Dist. from Capital		-0.005^{***}		-0.004^{***}		-0.006^{***}
Country FE	YES	YES	YES	YES	YES	YES
Distance 2nd City	YES	YES	YES	YES	YES	YES
Geography Controls	YES	YES	YES	YES	YES	YES
Observations	2,673,171	2,673,171	2,652,252	2,652,252	1,696,165	1,696,165
Adjusted R^2	0.084		0.079		0.080	
Log Likelihood		$-240,284$		$-231,821$		$-146,130$
AIC		480,669		463,745		292,362
F Statistic	$4,876^{***}$		$4,577^{***}$		$2,946^{***}$	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Geography Controls include: The average elevation of the pixel, the crop suitability of the pixel and the share of the pixel surface covered with water. 'AME' and 'MEM' refer to 'average marginal effect' and 'marginal effect at the mean' of 'Log Distance from the Capital City' respectively.

Table 5: Capital City Isolation from Outer Space – Extensive Level Analysis (Sensitivity Tests II)

	Dependent variable: Probability Inhabited Pixel that was Not Lit in 1992 is Lit in 2013					
	OLS (1)	*Probit* (2)	*OLS* (3)	*Probit* (4)	*OLS* (5)	*Probit* (6)
Log Distance from the Capital City	-0.012^{***} (0.003)	-0.241^{***} (0.031)	-0.013^{***} (0.003)	-0.250^{***} (0.029)	-0.013^{***} (0.003)	-0.250^{***} (0.030)
Number of Inhabitants in Pixel (in 2015)	0.00003^{***} (0.00001)	0.0002^{***} (0.00004)	0.00003^{***} (0.00001)	0.0002^{***} (0.00004)	0.00003^{***} (0.00001)	0.0002^{***} (0.00004)
Log Distance from the Coast	-0.010^{**} (0.004)	-0.109^{***} (0.033)	-0.010^{**} (0.004)	-0.113^{***} (0.036)	-0.009^{**} (0.004)	-0.102^{***} (0.034)
Log Distance from the Closest City $\geq 75,000$ (w/o 2nd City)	-0.016^{***} (0.003)	-0.281^{***} (0.035)				
Log Open Borders Distance from the Closest City $\geq 75,000$			-0.017^{***} (0.003)	-0.286^{***} (0.032)		
Log Distance from the Closest City $\geq 50,000$					-0.019^{***} (0.003)	-0.332^{***} (0.028)
Intercept	0.181^{***} (0.059)	1.274^{***} (0.442)	0.161^{***} (0.059)	0.809^{*} (0.431)	0.170^{***} (0.059)	0.868^{*} (0.469)
AME of Dist. from Capital		-0.013^{***}		-0.012^{***}		-0.012^{***}
AME of Dist. from 2nd City		-0.005^{***}		-0.001		-0.001
Country FE	YES	YES	YES	YES	YES	YES
Distance 2nd City	YES	YES	YES	YES	YES	YES
Geography Controls	YES	YES	YES	YES	YES	YES
Observations	2,677,487	2,677,487	2,677,487	2,677,487	2,677,487	2,677,487
Adjusted R^2	0.087		0.087		0.089	
AIC		487,777		488,647		483,642
F Statistic	$5,090^{***}$		$5,082^{***}$		$5,208^{***}$	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Geography Controls include: The average elevation of the pixel, the crop suitability of the pixel and the share of the pixel surface covered with water. 'AME' and 'MEM' refer to 'average marginal effect' and 'marginal effect at the mean' of 'Log Distance from the Capital City' respectively.

the Closest City $\geq 75,000$ does not represent actual remoteness very well. The first reason might be that assuming closed borders i.e. only the closest city within the country matters is not appropriate in this context. Therefore, in Column (3) and (4) of Table 5, we allow for open borders and hence the closest city $\geq 75,000$ (irrespective of being within the same country as the pixel itself) serves as remoteness reference points. The results are indistinguishable from those of the baseline model in Column (3) and (4) of Table 2 which indicates the robustness of the model to this potential misspecification.

In Column (5) and (6) of Table 5, the somewhat arbitrary criterion for cities of embracing at least 75,000 inhabitants in order to be eligible to serve as remoteness control reference point is replaced by the criterion of embracing at least 50,000 inhabitants. This sensitivity check serves to ensure that the results are not driven by the choice of the threshold that is always to some extent arbitrary. Again, the results are indistinguishable from those of the baseline model in Table 2 Column (3) and (4) which greatly underlines the robustness of the model specification.

5.4 Placebo Tests

The robustness checks in Section 5.3 are highly encouraging and strongly underline the great role proximity to the capital city plays for economic development in Sub-Saharan Africa. However, it is still ambiguous whether this impact comes from the fact that the capital city is a major city within the country or rather from the fact that capital cities host the government and constitute the political center of the country.
In order to properly investigate this potential pitfall, we will conduct placebo tests. The idea is that under the H_0 (which states that pixels isolated from the capital city have a lower probability to be lit due to the fact that being isolated from the capital city translates into isolation from a major economic center within the country) other major cities within the country should exhibit a similar impact as the capital city itself. In contrast, if this is not the case and the magnitude of the effect of the capital city is larger than that of the second city, under the H_A the key characteristic of the capital city is to be the political center of the country which is decisive for its impact on the economic performance of isolated pixels.

With regard to our baseline model, as noted in Section 5.1, we need to undertake a small change. While, the remoteness control *Log Distance from the Closest City* $\geq 75,000$ comprises the second city in order to actually reflect remoteness (while the capital city is not part of it to avoid collinearity with the variable of interest),

now, we exclude the second city from the remoteness control as well. This ensures that the placebo tests are not distorted by the model structure.

Table 6 contains two kinds of test that serve to test H_0: 1. the Wald Tests and 2. the Likelihood Ratio Test (LRT) (see Section A for explicit formulation of the tests based on Uriel Jiménez (2013: 17-29)). In this context, the Wald test is the most intuitive test as it directly tests for the difference between the two coefficients. Therefore, we could interpret the Wald coefficient as net the effect of isolation from the political and administrative center − in other words − the effect of the isolation of the political process if the political process was not to be hosted in a populated place. However, given that as of today this is not the case in any country, we regard the Wald coefficient more like the reassurance that the capital city has an additional special effect relative to other major cities, but still refer to its original coefficient when talking about the impact of capital city isolation.
The drawback of the Wald test is that the difference might be insignificant due to the fact that the variable associated with the distance from the placebo city (or capital city) exhibits very high standard errors that can simply reflect noise. In contrast, the LRT is more robust to this circumstance and basically focuses on whether the model quality drops significantly when we assume that both coefficients are equal.

In Table 6, the LRT consistently suggests on a very high significance level that the effects of *Log Distance from the Capital City* and *Log Distance from the Closest City* $\geq 75,000$ are different. The Wald Test tends to turn out insignificant for the level of development in 2013 (Column (1) and (2)). Regarding the economic growth in the period 1992−2013, however, both tests are highly significant. Hence, while the explicit placebo tests turn out somewhat supportive of H_A (that the key impact from the capital city comes from the fact that it is the political center of the country) for the level of development in 2013, they are highly supportive of H_A for the growth models in Column (3) and (4).

Table 6: Capital City Isolation from Outer Space − Placebo Tests I (Full Sample)

	Dependent variable:			
	Probability Inhabited Pixel is Lit (in 2013)		Probability Inhabited Pixel that was not Lit in 1992 is Lit in 2013	
	OLS (1)	*Probit* (2)	*OLS* (3)	*Probit* (4)
Log Distance from the Capital City	−0.016*	−0.254***	−0.012***	−0.241***
	(0.009)	(0.049)	(0.003)	(0.031)
Log Distance from the Second City (Placebo)	−0.007	−0.169***	−0.003	−0.124***
	(0.006)	(0.045)	(0.003)	(0.042)
AME of Dist. from Capital		−0.015***		−0.013**
		(0.003)		(0.001)
AME of Dist. from 2nd City		−0.010***		−0.005**
		(0.003)		(0.002)
		Placebo Tests		
Test 1: Wald Test	−.009	−0.085	−0.010**	−0.117**
	(0.013)	(0.075)	(0.005)	(0.075)
Test 2: Likelihood Ratio Test (LRT)	948***	4707***	1603***	777***
Country FE	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES
Observations	2,720,720	2,720,720	2,677,487	2,677,487
Adjusted R^2	0.145		0.087	
AIC		600,368		487,777
F Statistic	9,223***		5,090***	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Geography Controls include: The average elevation of the pixel, the crop suitability of the pixel and the share of the pixel surface covered with water. 'AME' and 'MEM' refer to 'average marginal effect' and 'marginal effect at the mean' of 'Log Distance from the Capital City' respectively.

However, it might be that these findings are still distorted. Foremost, they might be driven by the fact that the capital cities in most cases also happen to be the largest city and most important economic centers within the country. Thus, the results might just reflect a quantitative (that capital cities are larger than the second city) rather than a qualitative (that capital cities are the political and administrative center of the country) difference between the capital city and the second city. In fact, for the 43 countries in our sample, the capital cities have on average 1.2 million inhabitants while the second cities on average only comprise around 520,000 inhabitants. Therefore, in the next step, we reduce the sample to only those countries where the capital city is smaller than the placebo city which leaves us with: Cameroon, Equatorial Guinea, Ivory Coast and Nigeria. In the restricted sample, the capital city on average comprises 450,000 inhabitants and the second city 2.2 million. Hence, in the restricted sample, the second city contains almost 5 times the number of inhabitants as the capital city. Consequently, we exclude the possibility that a potentially larger impact of the capital cities as compared to the second city comes from the fact that capital cities are in general larger and of greater economic importance as the second cities.

As can be seen in Table 7, despite the fact that the capital city now reflects only a fraction of the size of the second city, isolation from the capital city on average translates into a significantly worse economic performance as compared to isolation from the second city (as is indicated by the Wald coefficient and the LRT for all models). However, it should be noted that isolation from the capital city is now insignificant for level of economic development in Column (1) and (2)[10] and the OLS model of growth in Column (3). Nevertheless, in our main specification, the non-linear Probit model of economic growth in the period $1992-2013$ in Column (4), the impact of isolation from the capital city is significantly negative while the impact of isolation from the second city is on average positive and insignificant. Moreover, both, the LRT and Wald test, both deliver statistically significant support that the magnitude of the negative impact of capital city isolation is higher than the effect of isolation of the second city. Therefore, these findings deliver very strong support that, regarding their impact on the spatial patterns of economic development, it is the characteristic of being the political and administrative center of the country that distinguishes the capital city from the second city. Furthermore, the results are strongly reassuring that the effects of isolation from the capital city are causal.

[10]The lower significance of the effects regarding the level of development might be due to the fact that the capital city of Ivory Coast (Nigeria) was relocated from the second city, Abidjan (Lagos), to Yamoussoukro (Abuja) in 1983 (1991) which leaves the difference in the aggregate effects with respect to isolation from both cities over the years somewhat ambiguous.

Table 7: Capital City Isolation from Outer Space − Placebo Tests II (Restricted Sample)

Sample Restricted to Countries where: *Second City* > *Capital City*

	Dependent variable:			
	Probability Inhabited Pixel is Lit (in 2013)		Probability Inhabited Pixel that was not Lit in 1992 is Lit in 2013	
	OLS (1)	*Probit* (2)	*OLS* (3)	*Probit* (4)
Log Distance from the Capital City	−0.007	−0.139	−0.043	−0.254*
	(0.033)	(0.121)	(0.036)	(0.137)
Log Distance from the Second City (Placebo)	0.023	−0.060	0.038	0.030
	(0.042)	(0.101)	(0.032)	(0.090)
AME of Dist. from Capital		-0.023		-0.033**
		(0.020)		(0.017)
AME of Dist. 2nd City		-0.010		0.004
		(0.016)		(0.012)
		Placebo Tests		
Test 1: Wald Test	-0.030	-0.079	-0.081*	-0.284*
	(0.040)	(0.106)	(0.063)	(0.201)
Test 2: Likelihood Ratio Test (LRT)	219***	63***	693***	11***
Country FE	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES
Observations	224,543	224,543	206,811	206,811
Adjusted R^2	0.210		0.114	
AIC		133,140		98,769
F Statistic	5,423***		2,409***	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Geography Controls include: The average elevation of the pixel, the crop suitability of the pixel and the share of the pixel surface covered with water. 'AME' and 'MEM' refer to 'average marginal effect' and 'marginal effect at the mean' of 'Log Distance from the Capital City' respectively. The restricted Sample includes: Cameroon, Equatorial Guinea, Ivory Coast and Nigeria.

6 Afrobarometer

In order to obtain additional evidence on the political, social and economic implications and channels of capital city isolation, in this section, we examine Round 6 of the geocoded Afrobarometer survey.[11]
Similar to Section 5.4, we conduct placebo tests to check if it is the characteristic of being the political center that drives the impact of the capital city (or if other important cities have an impact that is statistically indistinguishable from that of the capital city). Therefore, for each model we conduct a Wald-test and Likelihood Ratio Test (LRT) (in the Appendix we provide further details on how the tests are conducted). In order to ensure that the test results are not distorted, similar to Section 5.4, we exclude the second city as a reference point from the variable *Log Distance from the Closest City* $\geq 75,000$ for all models. In order to control for demographic characteristics of the survey respondents, we include the age and gender of the individual as covariates.

In the following, we will analyze the Afrobarometer data using the same empirical approach as in Section 5 and present the results in thematic groups. Please find a detailed description of the dependent variables and the survey questions they are based on in the Appendix.

6.1 Economic Prosperity and Public Goods

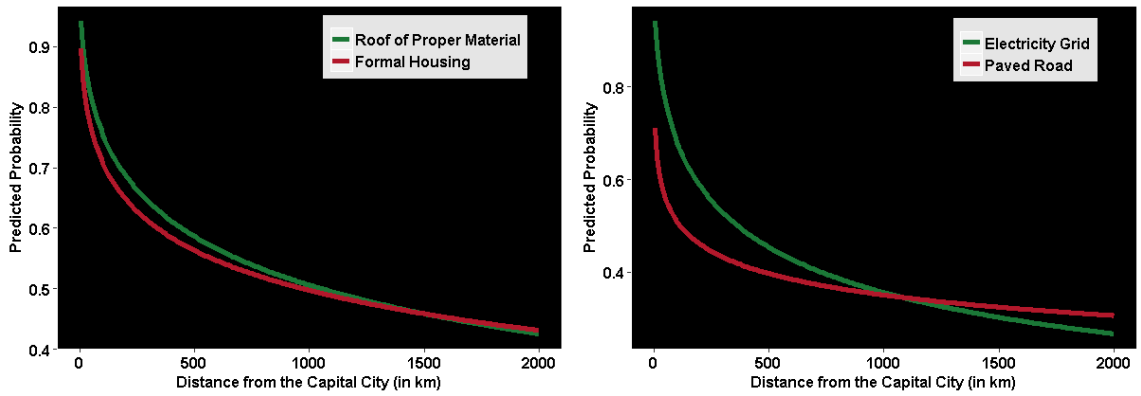
Firstly, we want to examine if we can confirm the findings of decreasing economic activity and prosperity in areas isolated from the capital city. For this purpose, the first group of variables to be analyzed (see Table 8) are all related to the economic condition of individuals (and their households). As can be seen in the table, individuals isolated from the capital city, ceteris paribus, tend to exhibit a decreased attachment to the labor market, live more in traditional houses and temporary shacks rather than formal houses, have a roof construction of inferior material and a less stable access to electricity. Even if housing or roof construction might theoretically simply reflect preferences for a more traditional lifestyle that change with distance from the capital city (for example because tradition plays a greater role in isolated areas), it seems more likely that they also reflect reduced household income and assets. Further, the isolation from the capital city turns out to be a more important determinant of prosperity than the distance to the coastline. The placebo tests indicate a very strong support for the hypothesis that the isolation from the

[11] As of now we were only granted access to Round 6 of the Afrobarometer. We are currently applying to get access to all rounds of the Afrobarometer in order to extend the analysis.

political process by itself matters.

The second group of variables also describe the economic condition but directly refer to public goods provided by the government rather than to the personal property of individuals (see Table 9). People living isolated from the capital city, ceteris paribus, report increased difficulties regarding the access of clean water or medical services such as obtaining the required medicine or medical treatment in a hospital. Furthermore, areas farther isolated from the capital city are less frequently connected to an electricity grid (which might explain the less stable access to electricity of households in Table 8) and have roads that are less frequently paved as compared to areas closer to the capital city. These results also yield very satisfactory results regarding the placebo tests.

Figure 6: Predicted Values: Economic Conditions & Public Goods



Note: These figures display predicted probabilities (keeping all variables other than "Log Distance from the Capital City" at their mean respectively) and refer to the Logit models in Column (4) and (6) in Table 8 (left figure) and Column (6) and (8) in Table 9 (right figure). The left figure display the fitted probability of having a roof of proper quality (made of metal, tin, zinc, tiles, shingles vs. inferior materials such as thatch, grass, plastic sheets, asbestos or multiple materials) and of living in formal housing (as compared to traditional housing or a temporary shack). The figure to the right displays the fitted probability regarding the provision of the public goods: electricity grid and paved roads.

Figure 6, illustrates some of the model predictions of Table 8 and 9. As can be seen in the figure, the effects regarding economic prosperity and public goods provision are not only significant in direction but also extremely strong in magnitude. For example, the predicted probability of being connected to the electricity grid, ceteris paribus (keeping all other covariates at their mean), steadily decreases from over 90% in areas contiguous with the capital city to around 30% in areas 2000 km away from the capital. We obtain similar results regarding the probability of living in formal housing or having roofs made of proper material. The effects on the fitted probability of having paved roads turns out smaller and reaches from over 70% in areas close to the capital to around 30% in areas 2000 km away from the capital. All of these results are highly significant as can be seen in Table 8 and 9. We therefore conclude that the Afrobarometer analysis confirms the findings of Section 5 regarding decreased economic activity and prosperity in areas isolated from the

Table 8: Afrobarometer – Economic Condition I

	Dependent variable:							
	Employment Status		Formal Housing		Roof Quality		Electricity Access	
	OLS (1)	*Poisson* (2)	*OLS* (3)	*Logit* (4)	*OLS* (5)	*Logit* (6)	*OLS* (7)	*Poisson* (8)
Log Distance from the Capital City	−0.060*** (0.013)	−0.047*** (0.010)	−0.061*** (0.012)	−0.420*** (0.067)	−0.056*** (0.012)	−0.521*** (0.087)	−0.310*** (0.058)	−0.125*** (0.032)
Log Distance from the Coast	−0.015 (0.013)	−0.012 (0.011)	−0.014* (0.008)	−0.037 (0.045)	0.008 (0.010)	0.069 (0.065)	−0.064 (0.041)	−0.032 (0.025)
Log Distance from the Closest City $\geq 75,000^{\dagger}$	−0.050*** (0.011)	−0.039*** (0.009)	−0.045*** (0.010)	−0.217*** (0.065)	−0.032*** (0.008)	−0.183*** (0.054)	−0.237*** (0.027)	−0.112*** (0.016)
Log Distance from the Second City (Placebo)	−0.030 (0.019)	−0.025* (0.015)	−0.035*** (0.011)	−0.204*** (0.060)	−0.038*** (0.011)	−0.324*** (0.090)	−0.151*** (0.048)	−0.064** (0.027)
AME Capital Distance		-0.058*** (0.012)		-0.082*** (0.012)		-0.079*** (0.012)		-0.208*** (0.053)
	Placebo Tests: Distance from Capital City vs. Distance from Second City (Placebo)							
Wald Test	-0.03 (0.025)	-0.022 (0.02)	-0.026** (0.014)	-0.216*** (0.086)	-0.018* (0.014)	-0.198* (0.123)	-0.159*** (0.063)	-0.061** (0.029)
LRT	26***	17***	97***	138***	67***	109***	340***	244***
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	40,878	40,878	35,943	35,943	39,084	39,084	40,927	40,927
Adjusted R^2	0.149		0.131		0.267		0.351	
AIC		87,305		30,620		26,884		109,264
F Statistic	225***		170***		446***		693***	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Controls include: The respondent's age and gender. 'AME Capital Distance' refers to the 'average marginal effect' of 'Log Distance from the Capital City'. Log Distance from the Closest City $\geq 75,000^{\dagger}$ does neither contain the capital city nor the second city as a reference point.

Table 9: Afrobarometer – Economic Condition II (Public Goods)

	Dependent variable:							
	Water Access Problem		Medical Service Access Problem		Electricity Grid		Paved Road	
	OLS (1)	*Poisson* (2)	*OLS* (3)	*Poisson* (4)	*OLS* (5)	*Logit* (6)	*OLS* (7)	*Logit* (8)
Log Distance from the Capital City	0.067***	0.062***	0.063***	0.066***	−0.073***	−0.616***	−0.058***	−0.304***
	(0.022)	(0.024)	(0.013)	(0.013)	(0.016)	(0.096)	(0.009)	(0.052)
Log Distance from the Coast	−0.007	−0.014	0.027**	0.007	−0.028***	−0.127*	0.008	0.055
	(0.018)	(0.016)	(0.012)	(0.010)	(0.011)	(0.066)	(0.011)	(0.062)
Log Distance from the Closest City $\geq 75,000^{\dagger}$	0.046**	0.039**	0.038***	0.035***	−0.068***	−0.429***	−0.050***	−0.270***
	(0.021)	(0.018)	(0.014)	(0.012)	(0.009)	(0.056)	(0.014)	(0.082)
Log Distance from the Second City (Placebo)	0.048*	0.040*	0.044*	0.040*	−0.038***	−0.357***	−0.033**	−0.168**
	(0.027)	(0.024)	(0.027)	(0.023)	(0.014)	(0.076)	(0.013)	(0.072)
AME Distance Capital		0.073***		0.079***		-0.1***		-0.054***
		(0.028)		(0.017)		(0.012)		(0.009)
	Placebo Tests: Distance from Capital City vs. Distance from Second City (Placebo)							
Wald Test	0.019	0.022	0.019	0.026	-0.035**	-0.259**	-0.025*	-0.136**
	(0.024)	(0.021)	(0.029)	(0.026)	(0.015)	(0.114)	(0.015)	(0.078)
LRT	7***	15***	7***	15***	232***	143***	113***	108***
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	41,000	41,000	35,823	35,823	39,076	39,076	41,086	41,086
Adjusted R^2	0.078		0.108		0.331		0.262	
AIC		98,429		81,246		27,776		33,532
F Statistic	109***		136***		606***		457***	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Controls include: The respondent's age and gender. 'AME Capital Distance' refers to the 'average marginal effect' of 'Log Distance from the Capital City'. Log Distance from the Closest City $\geq 75,000^{\dagger}$ does neither contain the capital city nor the second city as a reference point.

capital city.[12] Moreover, these findings yield very strong support for the hypothesis that the level of public goods provision (here regarding clean water supply, health care services, roads and electricity grids) decrease with the isolation from the capital city.

6.2 The Role of Political Leaders

Next, we want to take a closer look at how the role of political leaders on the various levels (national government, local government and traditional leader) is affected by isolation from the capital city. Normally, given that areas isolated from the capital city exhibit a decreased economic performance and are provided with less public goods, we would expect the population to mistrust and be averse to their leaders. In order to test for these effects empirically, we examine the level of trust, the perceived corruption, the assessment of the performance and the frequency of contact with leaders on the three levels in Table 10, 11 and 12. From the regression analysis it can be concluded that the level of trust, the assessment of the performance and the frequency of contact to political leaders rise while the belief that the leaders are corrupt decreases with an increasing distance from the capital city. These results are highly significant for all levels (except for frequency of contact with the national government which rises on average but is statistically insignificantly different from zero). For many of the models regarding the national and the local government the variable *Log Distance from the Second City (Placebo)* is insignificant which is a strong indicator that these effects are in fact driven by the fact that the capital city hosts the government. Moreover, the placebo tests that directly test for this yield additional strong support.

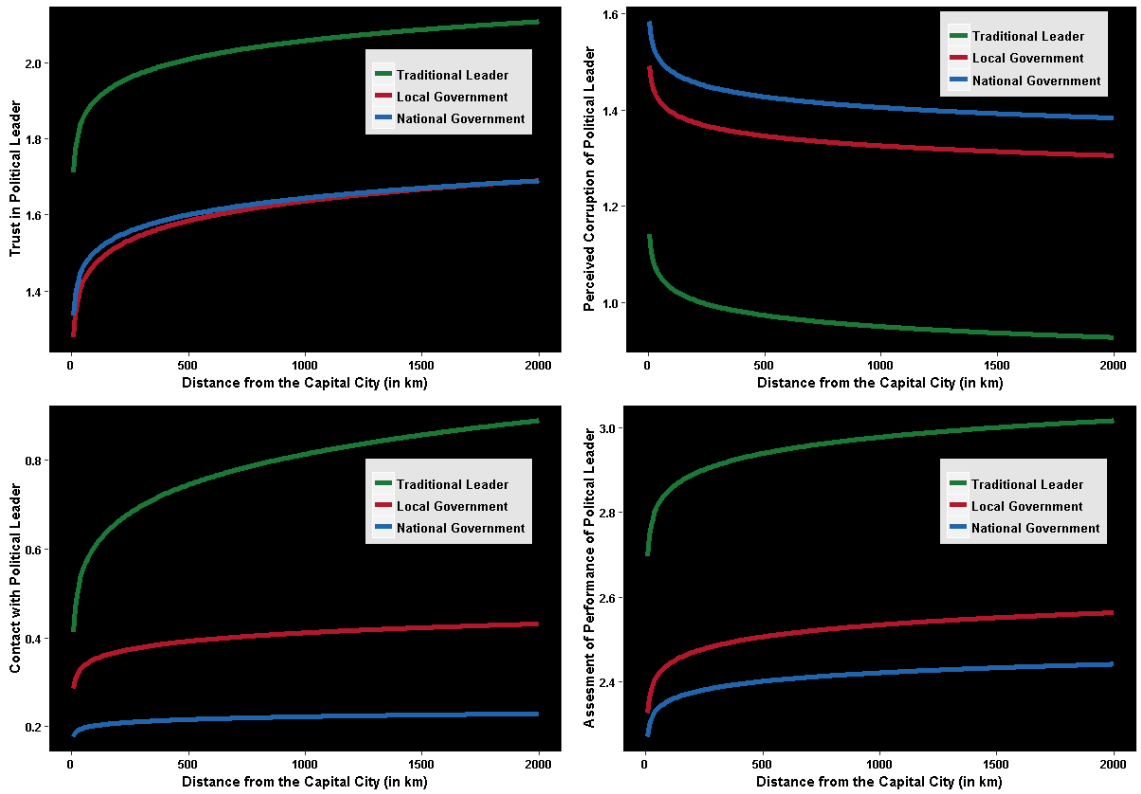
In light of the findings regarding decreased economic welfare and public goods provision, it seems surprising and paradox that people who are farther away from the capital city have higher trust and assess the performance of all political leaders better while believing them to be less corrupt. In fact, they would have very good reason to mistrust their leaders who discriminate against them relative to people who are closer to the capital city. Moreover, it seems very likely that due to the lower level of monitoring (for example by the media), the corruption and misgovernment among political leaders rather increases with isolation to the capital city. Under these circumstance we would expect that people isolated from the capital city would rather turn to the opposition parties. However, people isolated from the capital city tend to evaluate the incumbent government as more capable, for example regarding job creation, and do not see the opposition party as a viable alternative (see Table A1

[12] Unfortunately, this only refers to the level and not the change in economic development as we currently only have access to one round of the Afrobarometer.

in the Appendix). Therefore, we do not interpret these findings as representing actual corruption and performance but rather perceived corruption and performance. Furthermore, we take this result as an indication that due to the lower monitoring and availability of information, people who are isolated from the capital are not aware of how the political elite is actually performing, that they receive less public goods and exhibit a worse economic performance as their fellow countrymen who live closer to the capital city. Consequently, these findings support the argument of decreased monitoring and a lower level of (critical) information about politics among the people that are isolated from the capital city. Additionally, we find that the traditional leader and the local government play a higher role in isolated areas.

In Figure 7, we graph the findings. The magnitude of the predicted effects regarding trust, perceived corruption and performance assessment are similar for political leaders on all three levels and decrease (or increase) by around 0.3 over the interval. Hence, they impose clear (and statistically significant) effects and are intermediate in magnitude. Further, it is interesting to see that the traditional leaders, on average (looking at the level), play the greatest role and seem to be kindly regarded by the people. Moreover, the contact with the traditional leader is increasing the most. This finding gives strong support to the hypothesis that the traditional political system rises in relative importance in areas farther away from the capital city. Moreover, the local government also seems to rise in importance relative to the national government for isolated areas.

Figure 7: Predicted Values: Perception and Role of Political Leaders



Note: These figures illustrate the predicted probabilities (keeping all variables other than "Log Distance from the Capital City" at their mean respectively) and refer to the Poisson models in Table 10, 11 and 12.

Table 10: Afrobarometer – Role of the Traditional Leader

	Dependent variable: Opinions on and Perception of the Traditional Leader (TL)							
	Trust in TL		Performance of TL		Belief TL to be Corrupt		Contact with TL	
	OLS	*Poisson*	*OLS*	*Poisson*	*OLS*	*Poisson*	*OLS*	*Poisson*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Distance from the Capital City	0.063***	0.035***	0.054***	0.020***	−0.038***	−0.034***	0.065***	0.119***
	(0.014)	(0.008)	(0.012)	(0.004)	(0.008)	(0.008)	(0.012)	(0.022)
Log Distance from the Coast	0.045***	0.029***	0.042***	0.015***	−0.006	−0.003	0.040**	0.070***
	(0.016)	(0.009)	(0.010)	(0.004)	(0.011)	(0.010)	(0.016)	(0.020)
Log Distance from the Closest City $\geq 75,000^{\dagger}$	0.043***	0.022***	0.040***	0.014***	−0.024***	−0.022***	0.049***	0.078***
	(0.011)	(0.007)	(0.010)	(0.004)	(0.007)	(0.006)	(0.008)	(0.015)
Log Distance from the Second City (Placebo)	0.044**	0.025***	0.033***	0.012**	−0.030***	−0.027***	0.036**	0.051*
	(0.017)	(0.009)	(0.013)	(0.005)	(0.011)	(0.010)	(0.018)	(0.029)
AME Capital Distance		0.067***		0.054***		-0.037***		0.084***
		(0.015)		(0.012)		(0.008)		(0.015)
	Placebo Tests: Distance from Capital City vs. Distance from Second City (Placebo)							
Wald Test	0.019	0.01	0.021*	0.008*	-0.008	-0.007	0.03**	0.068**
	(0.017)	(0.009)	(0.014)	(0.005)	(0.012)	(0.01)	(0.017)	(0.03)
LRT	12***	4**	14***	3*	3	1	28***	62***
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	39,101	39,101	31,282	31,282	35,211	35,211	40,417	40,417
Adjusted R^2	0.128		0.091		0.099		0.117	
AIC		92,770		77,273		66,496		72,805
F Statistic	180***		102***		122***		168***	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Controls include: The respondent's age and gender. 'AME Capital Distance' refers to the 'average marginal effect' of 'Log Distance from the Capital City'. Log Distance from the Closest City $\geq 75,000^{\dagger}$ does neither contain the capital city nor the second city as a reference point.

Table 11: Afrobarometer − Role of the Local Government Council

	Dependent variable: Opinions on and Perception of the Local Government Council (LGC)							
	Trust in LGC		Performance of LGC		Belief LGC to be Corrupt		Contact with LGC	
	OLS	*Poisson*	*OLS*	*Poisson*	*OLS*	*Poisson*	*OLS*	*Poisson*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Distance from the Capital City	0.067***	0.047***	0.050***	0.021***	−0.038***	−0.027***	0.026***	0.078***
	(0.013)	(0.009)	(0.011)	(0.005)	(0.009)	(0.006)	(0.009)	(0.021)
Log Distance from the Coast	0.024*	0.021**	0.027**	0.012***	0.0001	0.001	0.010	0.020
	(0.013)	(0.010)	(0.011)	(0.005)	(0.009)	(0.006)	(0.008)	(0.018)
Log Distance from the Closest City $\geq 75,000^{\dagger}$	0.027**	0.017*	0.014	0.005	−0.023***	−0.017***	0.009*	0.023
	(0.013)	(0.010)	(0.011)	(0.005)	(0.008)	(0.005)	(0.005)	(0.014)
Log Distance from the Second City (Placebo)	0.031*	0.022*	0.019*	0.008	−0.015	−0.011	0.018**	0.050**
	(0.016)	(0.011)	(0.012)	(0.005)	(0.011)	(0.008)	(0.009)	(0.022)
AME		0.071***		0.047***		-0.037***		0.033***
		(0.014)		(0.01)		(0.008)		(0.009)
	Placebo Tests: Distance from Capital City vs. Distance from Second City (Placebo)							
Wald Test	0.036**	0.025**	0.031**	0.013**	-0.023**	-0.016**	0.008	0.028
	(0.019)	(0.013)	(0.015)	(0.006)	(0.013)	(0.009)	(0.01)	(0.029)
LRT	40***	21***	25***	7***	23***	8***	3*	6**
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	39,291	39,291	27,692	27,692	33,590	33,590	38,510	38,510
Adjusted R^2	0.105		0.085		0.077		0.081	
AIC		88,416		68,066		69,311		52,236
F Statistic	145***		92***		91***		111***	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Controls include: The respondent's age and gender. 'AME Capital Distance' refers to the 'average marginal effect' of 'Log Distance from the Capital City'. Log Distance from the Closest City $\geq 75,000^{\dagger}$ does neither contain the capital city nor the second city as a reference point.

Table 12: Afrobarometer − Role of the National Government

	Dependent variable: Opinions on and Perception of the National Government (NG)							
	Trust in President		Performance of NG		Belief NG to be Corrupt		Contact with NG	
	OLS	*Poisson*	*OLS*	*Poisson*	*OLS*	*Poisson*	*OLS*	*Poisson*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Distance from the Capital City	0.052***	0.030***	0.033***	0.014***	−0.032***	−0.023***	0.007	0.028
	(0.017)	(0.010)	(0.009)	(0.004)	(0.010)	(0.007)	(0.004)	(0.020)
Log Distance from the Coast	0.031	0.022*	0.029***	0.013***	0.007	0.006	0.019***	0.097***
	(0.020)	(0.013)	(0.011)	(0.005)	(0.009)	(0.006)	(0.006)	(0.029)
Log Distance from the Closest City $\geq 75,000^{\dagger}$	0.017	0.008	0.010	0.004	−0.017*	−0.012*	0.008	0.031
	(0.023)	(0.013)	(0.017)	(0.007)	(0.011)	(0.007)	(0.007)	(0.026)
Log Distance from the Second City (Placebo)	0.035	0.021	0.017	0.007	−0.011	−0.008	−0.002	−0.006
	(0.022)	(0.014)	(0.015)	(0.006)	(0.010)	(0.007)	(0.010)	(0.043)
AME Capital Distance		0.053***		0.027***		-0.029***		0.007
		(0.017)		(0.008)		(0.01)		(0.005)
	Placebo Tests: Distance from Capital City vs. Distance from Second City (Placebo)							
Wald Test	0.017	0.009	0.016	0.007	-0.021*	-0.015*	0.009	0.033
	(0.028)	(0.016)	(0.018)	(0.008)	(0.014)	(0.01)	(0.011)	(0.047)
LRT	8***	4*	7***	2	19***	7***	7***	6**
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	40,139	40,139	30,886	30,886	35,117	35,117	40,853	40,853
Adjusted R^2	0.129		0.101		0.101		0.054	
AIC		95,394		74,102		70,891		37,874
F Statistic	186***		117***		124***		74***	

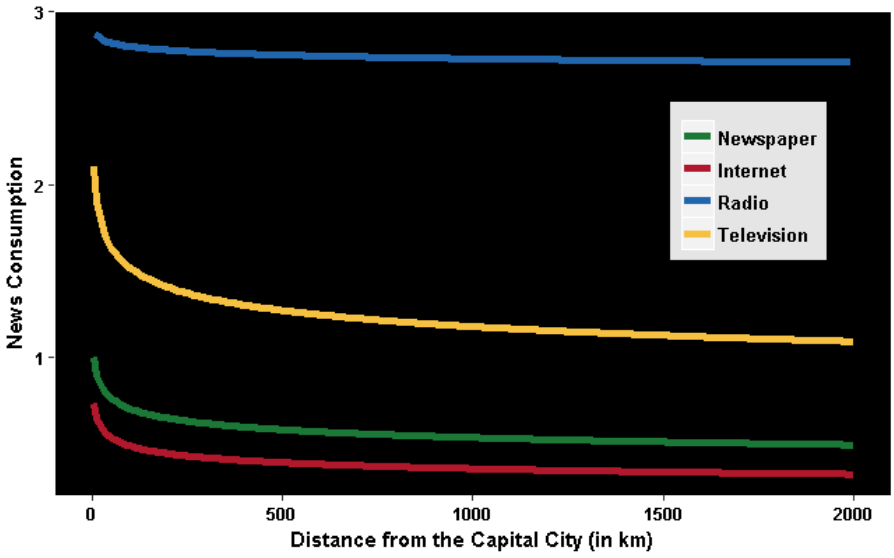
Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Controls include: The respondent's age and gender. 'AME Capital Distance' refers to the 'average marginal effect' of 'Log Distance from the Capital City'. Log Distance from the Closest City $\geq 75,000^{\dagger}$ does neither contain the capital city nor the second city as a reference point.

6.3 News and Information

In the next step, we investigate if the level of information on politics in areas isolated from the capital city is in fact lower as compared to areas closer to the capital city. For this purpose, we analyze statements on the frequency of news consumption through various media channels (newspaper, radio, television and internet). As can be seen in Table 13, people isolated from the capital city tend to consume less news on all media channels. These effects turn out highly significant and the placebo tests are highly supportive for the hypothesis that they are in fact caused by isolation from the political center. It might very well be that the reduced news consumption is caused by the fact that devices for media consumption are less frequently available in isolated areas. This might be a result of reduced household income that do not allow for the purchase of these devices or the establishment of a market of sufficient size in order to make it lucrative for newspaper companies to enter. Unfortunately, this setting does not allow to distinguish between the effects coming from reduced consumption due to the lower media availability or the lower interest in news or politics in general.[13] Yet, whether the important mediator is the availability of the tools to consume media or a lower interest in news on politics does not alter the outcome of a less informed civil society in areas isolated from the capital city.

Figure 8: Predicted Values: News Consumption



Note: These figures illustrate the predicted values (keeping all variables other than "Log Distance from the Capital City" at their mean respectively) and refer to the Poisson models in Table 13.

Figure 8 illustrates the findings regarding news consumption graphically. Obtaining

[13]Campante and Do (2014: 2473) find for US states that people who are farther isolated from the state capital exhibit a lower interest in state level politics while the general interest in politics remains unchanged.

information via radio turns out to be the most important channel of news consumption and seems to be least decreasing (but still highly significantly decreasing) with distance from the capital city. In contrast, newspaper and internet are the least important channels of news consumption and exhibit intermediate reductions with distance from the capital city. News consumption via television is in between the other channels regarding importance but exhibits substantial decreases with isolation of the capital city. Unfortunately, we cannot distinguish to what extent the various media channels report on national, regional or local news or feature a critical investigations of politics. Nevertheless, the analysis of news consumption gives very strong support to the argument that the level of information on politics among the population isolated from the capital city is lower as compared to their counterparts contiguous with the capital.

6.4 Taxation

In order to assess the channel of capital city isolation on accountability via taxation, we take a closer look at various statements on taxation. Firstly, we want to test if people farther isolated from the capital city consider it less the duty of a 'good citizen' to pay taxes. This question has important implications whether or not it is common practice and has a good image to contribute to the fiscal household by paying taxes. Secondly, we examine the extent to which citizens consider it important to monitor the government regarding the spending of the collected taxes. As the findings of Martin (2016) suggest, people that contribute more in taxation have a higher interest in monitoring how the tax money is spent. Moreover, giving a lower importance to the monitoring of the spending of political leaders might indicate a lower awareness that corruption is a serious threat for the implementation of necessary investments into public goods and the development of their region. In order to assess to what extent the government is able to enforce the tax obligations of citizens, we included a question on how easy the respondent considers it to avoid tax duties. Last but not least, in order to assess whether a potentially lower contribution in tax payments is due to the belief that the tax authorities are corrupt and would embezzle the money, we check if people farther isolated from the capital city consider the tax authorities more corrupt than those contiguous with the capital.

The coefficients for all variables related to taxation are highly significant (see Table 14). On average, people in areas isolated from the capital believe less that 'good citizens' should pay taxes, think less that the politicians should be monitored regarding the spending of the tax revenues, find it easier to avoid taxes and think less that the tax officials are corrupt. However, for the variables *Good Citizens Pay*

Table 13: Afrobarometer – News Consumption

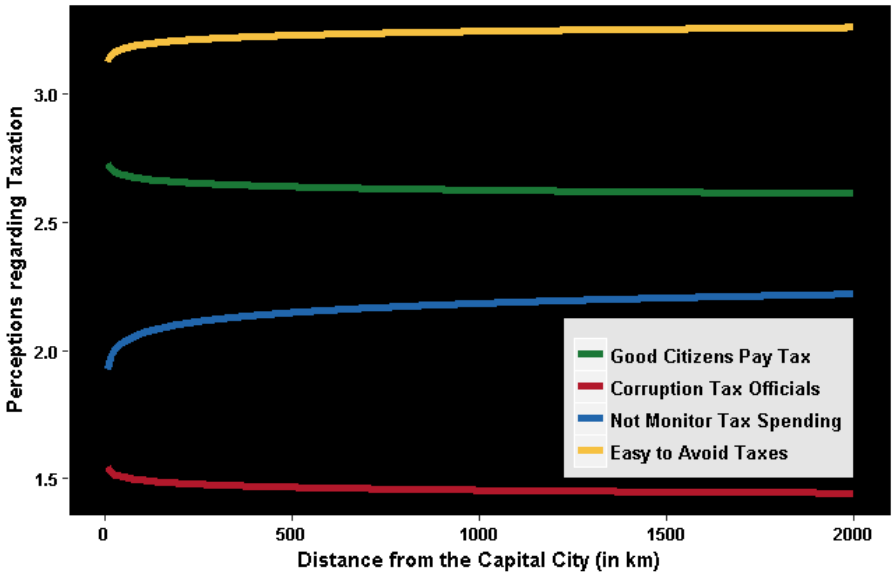
	Dependent variable: News Consumption through different Media Channels							
	News Newspaper		News Radio		News Television		News Internet	
	OLS (1)	*Poisson* (2)	*OLS* (3)	*Poisson* (4)	*OLS* (5)	*Poisson* (6)	*OLS* (7)	*Poisson* (8)
Log Distance from the Capital City	−0.173***	−0.117***	−0.065***	−0.023***	−0.248***	−0.107***	−0.147***	−0.131***
	(0.021)	(0.024)	(0.013)	(0.005)	(0.045)	(0.025)	(0.019)	(0.029)
Log Distance from the Coast	−0.045**	−0.060***	0.028**	0.010**	−0.054	−0.027	−0.064***	−0.079***
	(0.018)	(0.023)	(0.013)	(0.005)	(0.034)	(0.021)	(0.014)	(0.027)
Log Distance from the Closest City $\geq 75,000^{\dagger}$	−0.090***	−0.084***	−0.050***	−0.018***	−0.195***	−0.096***	−0.085***	−0.102***
	(0.019)	(0.018)	(0.012)	(0.004)	(0.022)	(0.013)	(0.014)	(0.015)
Log Distance from the Second City (Placebo)	−0.089***	−0.070***	−0.016	−0.006	−0.154***	−0.068***	−0.094***	−0.098***
	(0.030)	(0.024)	(0.022)	(0.008)	(0.039)	(0.023)	(0.019)	(0.022)
AME Capital Distance		-0.106***		-0.057***		-0.19***		-0.094***
		(0.022)		(0.012)		(0.041)		(0.021)
	Placebo Tests: Distance from Capital City vs. Distance from Second City (Placebo)							
Wald Test	-0.084***	-0.047*	-0.049**	-0.017*	-0.095**	-0.04**	-0.054**	-0.033
	(0.032)	(0.031)	(0.028)	(0.01)	(0.045)	(0.022)	(0.024)	(0.027)
LRT	176***	82***	31***	17***	128***	94***	65***	33***
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	40,879	40,879	35,901	35,901	38,978	38,978	40,360	40,360
Adjusted R^2	0.263		0.079		0.293		0.208	
AIC		77,965		104,914		102,822		72,079
F Statistic	458***		97***		506***		331***	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Controls include: The respondent's age and gender. 'AME Capital Distance' refers to the 'average marginal effect' of 'Log Distance from the Capital City'. Log Distance from the Closest City $\geq 75,000^{\dagger}$ does neither contain the capital city nor the second city as a reference point.

Tax and *Corruption Tax Officials*, based on either of the test, we cannot reject the hypothesis that the effects of isolation from the capital are equal to the effects of isolation from the placebo city. Still, this result tells us that people isolated from the capital city do not tend to have a different belief about the level of corruption of tax officials as their counterparts contiguous with the capital. Yet, they still see a lower need in monitoring them regarding the spending of tax money. However, the decreased need for monitoring does not need to be a result of lower tax contributions (as the finding of Martin (2016) suggest) and can simply be a result of the generally increased trust into the political leaders in these areas (see Section 6.2). Regarding the ease to avoid taxes, the placebo tests are rather ambiguous and tend to not allow to reject the hypothesis that the coefficients are equal. Taking a look at the graphical illustration of the effects in Figure 9 reveals that the effects (even those of monitoring the politicians regarding the spending of the collected taxes) are actually very limited in magnitude and the respective curves basically flat. Consequently, the evidence from Table 14 and Figure 9 shed doubt on the relevance of the taxation channel as a link between capital city isolation and accountability.

Figure 9: Predicted Values: Taxation



Note: These figures illustrate the predicted values (keeping all variables other than "Log Distance from the Capital City" at their mean respectively) and refer to the Poisson models in Table 14.

Table 14: Afrobarometer – Attitude towards Taxation

	Dependent variable: Attitudes and Perception regarding Taxation							
	Good Citizens Pay Tax		Not Monitor Tax Spending		Easy to Avoid Taxes		Corruption Tax Officials	
	OLS (1)	*Poisson* (2)	*OLS* (3)	*Poisson* (4)	*OLS* (5)	*Poisson* (6)	*OLS* (7)	*Poisson* (8)
Log Distance from the Capital City	−0.020***	−0.007***	0.039***	0.020***	0.018**	0.006**	−0.023***	−0.015***
	(0.007)	(0.002)	(0.011)	(0.005)	(0.009)	(0.003)	(0.007)	(0.005)
Log Distance from the Coast	−0.012	−0.004	0.002	0.001	0.010	0.003	0.009	0.007
	(0.008)	(0.003)	(0.013)	(0.007)	(0.010)	(0.003)	(0.008)	(0.005)
Log Distance from the Closest City $\geq 75,000^{\dagger}$	−0.011***	−0.004***	0.007	0.003	−0.009	−0.003	−0.007	−0.005
	(0.003)	(0.001)	(0.011)	(0.005)	(0.009)	(0.003)	(0.009)	(0.006)
Log Distance from the Second City (Placebo)	−0.015	−0.005	0.003	0.001	0.007	0.002	−0.022	−0.015
	(0.010)	(0.004)	(0.016)	(0.008)	(0.014)	(0.005)	(0.015)	(0.009)
AME		-0.019***		0.043***		0.019**		-0.023***
		(0.007)		(0.012)		(0.009)		(0.007)
	Placebo Tests: Distance from Capital City vs. Distance from Second City (Placebo)							
Wald Test	-0.005	-0.002	0.037**	0.018**	0.011	0.003	0	-0.001
	(0.009)	(0.003)	(0.018)	(0.009)	(0.014)	(0.004)	(0.016)	(0.01)
LRT	2	0	32***	14***	5**	1	0	0
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	39,609	39,609	34,491	34,491	32,210	32,210	36,126	36,126
Adjusted R^2	0.049		0.058		0.044		0.073	
AIC		92,203		81,658		79,734		76,447
F Statistic	64***		67***		48***		90***	

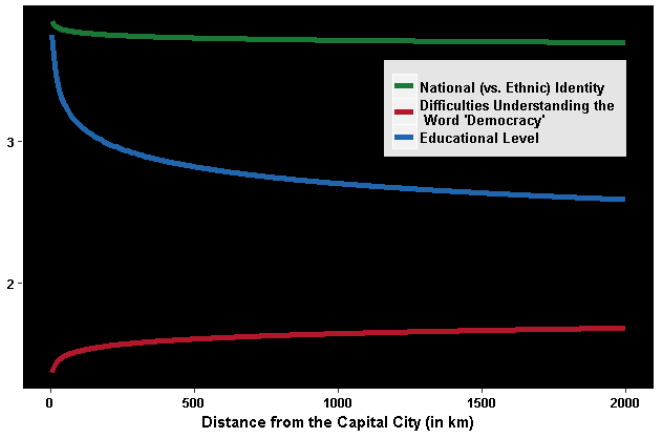
Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Controls include: The respondent's age and gender. 'AME Capital Distance' refers to the 'average marginal effect' of 'Log Distance from the Capital City'. Log Distance from the Closest City $\geq 75,000^{\dagger}$ does neither contain the capital city nor the second city as a reference point.

6.5 Identity, Education and Democratization

In the next step we examine how isolation from the capital city affects the identification with the nation rather than with the ethnicity, democratization and the educational level. These factors are important in this context as they have important implications for the level of participation in the political process. As can be seen in Table 15, in areas farther isolated from the capital city people feel relatively closer to their ethnicity, understand the term 'democracy' less, and if they do understand what is meant they more frequently have a negative first association with it than a positive one. Furthermore, the educational level is lower in areas farther isolated from the capital city. All of these effects are highly significant and the placebo test suggest for all models that these effects are in fact caused by isolation from the seat of government. While the educational level is also an important public good, the outcome of education can not directly be associated with a higher or lower provision of the public good education. This is due to the fact the educational outcome is also dependent upon the take-up rate of education that is offered by the government. In this context, this means that the educational level could simply be lower due to the fact that people in isolated areas tend to face economic hardship and therefore need to drop out of school earlier in order to contribute to the household earnings. Taking a look at the graphical illustration of the effects in Figure 10[14] reveals that the strength of the effect of capital city isolation on identity is rather limited. In contrast, the magnitude of the effect on the understanding of the term 'democracy' is intermediate while it is considerable for education.

Figure 10: Predicted Values: Identity, Democratization and Education



Note: These figures illustrate the predicted values (keeping all variables other than "Log Distance from the Capital City" at their mean respectively) and refer to the Poisson models in Table 15.

[14]We did not include the variable *Democracy Positive* into the figure because it is scaled differently (between 0 and 1) and would have deteriorated the expressiveness of the graph.

Table 15: Afrobarometer − Identity, Democratization & Education

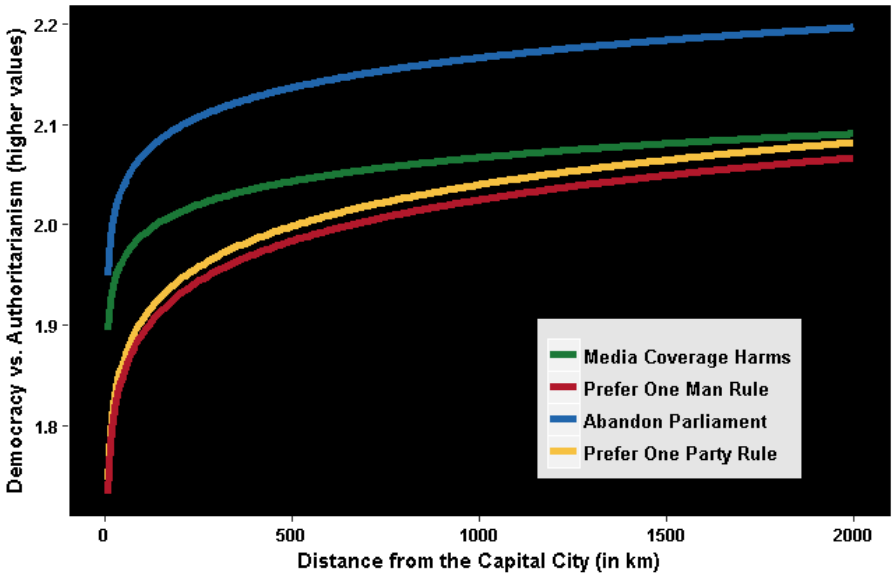
	Dependent variable:							
	National Identity		Knowledge of Term 'Democracy'		Democracy Positive		Educational Level	
	OLS (1)	*Poisson* (2)	*OLS* (3)	*Poisson* (4)	*OLS* (5)	*Logit* (6)	*OLS* (7)	*Poisson* (8)
Log Distance from the Capital City	−0.026**	−0.007**	0.051***	0.035***	−0.018***	−0.141***	−0.234***	−0.059***
	(0.011)	(0.003)	(0.009)	(0.006)	(0.003)	(0.032)	(0.036)	(0.011)
Log Distance from the Coast	−0.012	−0.003	−0.001	0.0002	0.001	0.003	−0.082***	−0.025**
	(0.016)	(0.004)	(0.013)	(0.008)	(0.005)	(0.041)	(0.029)	(0.011)
Log Distance from the Closest City $\geq 75,000^{\dagger}$	0.001	0.0002	0.025***	0.016***	−0.011***	−0.075***	−0.131***	−0.037***
	(0.015)	(0.004)	(0.008)	(0.005)	(0.004)	(0.025)	(0.019)	(0.007)
Log Distance from the Second City (Placebo)	0.031*	0.008*	0.034**	0.022**	−0.009	−0.061	−0.142***	−0.037***
	(0.018)	(0.005)	(0.014)	(0.009)	(0.008)	(0.055)	(0.031)	(0.009)
AME		-0.026**		0.053***		-0.021***		-0.172***
		(0.011)		(0.009)		(0.005)		(0.037)
	Placebo Tests: Distance from Capital City vs. Distance from Second City (Placebo)							
Wald Test	-0.058***	-0.015***	0.018	0.013	-0.01	-0.081	-0.092**	-0.022**
	(0.024)	(0.006)	(0.017)	(0.012)	(0.008)	(0.066)	(0.045)	(0.012)
LRT	78***	20***	16***	5**	22***	24***	84***	53***
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	36,634	36,634	35,711	35,711	39,810	39,810	40,979	40,979
Adjusted R^2	0.068		0.136		0.105		0.319	
AIC		97,538		71,612		26,228		128,049
F Statistic	91***		177***		148***		601***	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Controls include: The respondent's age and gender. 'AME Capital Distance' refers to the 'average marginal effect' of 'Log Distance from the Capital City'. Log Distance from the Closest City $\geq 75,000^{\dagger}$ does neither contain the capital city nor the second city as a reference point.

In order to test if the decreased level of democratization (see Table 15) in areas isolated from the capital reflects a general preference for a rather authoritarian political system, we now analyze the respondents' consent with authoritarian ideas. The results in Table 16 suggest that people who are relatively isolated from the capital city, ceteris paribus, have a relative preference to authoritarianism as compared to their counterparts contiguous with the capital city. For example, they exhibit a higher consent with the statement "Too much reporting on negative events, like government mistakes and corruption, only harms the country." (vs. "The news media should constantly investigate and report on government mistakes and corruption.") (Isbell, 2017). Additionally, they agree more with the proposition to abandon the parliament and give increased power to the president. Moreover, they exhibit a relatively higher support for the abolishment of elections in favor of a one-party or one-man-rule. The coefficients are all highly significant, while in most models, they are insignificant for the placebo city. The placebo tests also support the hypothesis that the effects of isolation from the capital city are stronger than those regarding the isolation from the second city. The graphical illustration in Figure 11 show that all of these effects are similarly strong and of intermediate magnitude.

Figure 11: Predicted Values: Democracy vs. Authoritarianism



Note: These figures illustrate the predicted values (keeping all variables other than "Log Distance from the Capital City" at their mean respectively) and refer to the Poisson models in Table 16.

Table 16: Afrobarometer – Democracy vs. Authoritarianism

	Dependent variable: Attitudes regarding Democracy vs. Authoritarianism							
	Media Coverage Harms		Abandon Parliament		Prefer One Party Rule		Prefer One Man Rule	
	OLS (1)	*Poisson* (2)	*OLS* (3)	*Poisson* (4)	*OLS* (5)	*Poisson* (6)	*OLS* (7)	*Poisson* (8)
Log Distance from the Capital City	0.046**	0.020**	0.049***	0.022***	0.057***	0.030***	0.049***	0.029***
	(0.018)	(0.008)	(0.017)	(0.008)	(0.014)	(0.008)	(0.014)	(0.008)
Log Distance from the Coast	−0.009	−0.003	0.004	0.003	−0.0005	0.001	0.001	0.001
	(0.018)	(0.008)	(0.013)	(0.006)	(0.011)	(0.006)	(0.014)	(0.008)
Log Distance from the Closest City $\geq 75,000^{\dagger}$	0.010	0.004	0.014	0.006	0.017	0.008	0.033**	0.018**
	(0.011)	(0.005)	(0.016)	(0.007)	(0.012)	(0.006)	(0.014)	(0.008)
Log Distance from the Second City (Placebo)	0.014	0.006	0.015	0.007	0.030	0.016	0.026*	0.015*
	(0.023)	(0.010)	(0.019)	(0.009)	(0.019)	(0.010)	(0.015)	(0.009)
AME		0.033**		0.044***		0.061***		0.05***
		(0.014)		(0.017)		(0.016)		(0.014)
	Placebo Tests: Distance from Capital City vs. Distance from Second City (Placebo)							
Wald Test	0.032	0.014	0.034	0.015	0.027*	0.015	0.023	0.014
	(0.029)	(0.013)	(0.026)	(0.012)	(0.02)	(0.011)	(0.021)	(0.013)
LRT	17***	11***	19***	11***	15***	9***	16***	7***
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	40,106	40,106	34,611	34,611	38,309	38,309	38,566	38,566
Adjusted R^2	0.033		0.048		0.069		0.086	
AIC		105,366		87,048		90,743		84,240
F Statistic	44***		56***		90***		119***	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Controls include: The respondent's age and gender. 'AME Capital Distance' refers to the 'average marginal effect' of 'Log Distance from the Capital City'. Log Distance from the Closest City $\geq 75,000^{\dagger}$ does neither contain the capital city nor the second city as a reference point.

6.6 Robustness

In order to test for the robustness of our findings with respect to urban and rural areas, we conduct the regression analysis for a subset of four variables for rural and urban areas areas separately. This serves to ensure that the results are not driven by a potential coincidence of urban respondents that live relatively close to the capital and rural respondents that live isolated from the capital city. Further, as was set out theoretically in Section 3, our analysis of the effects suggests that the effects are stronger for rural as compared to urban areas.

When comparing the results from rural respondents only (Table 17) to those with urban respondents only (Table 18), we realize that the effects are all still highly significant and the placebo tests satisfactory for both. Yet, it also becomes clear that the effects are much stronger for rural as compared to urban areas for all models. However, the tests should be considered with caution. There is no clear indication on how urban and rural areas were categorized as it was up to assessment of the interview to assign the status. Nevertheless, these results support the robustness of our analysis. In addition, the finding of stronger effects for rural areas confirms our theoretical prediction from Section 3 and greatly underlines that we have correctly identified the relevant channels.

7 Limitations

While the findings from Section 5 and 6 strongly support our theoretical hypotheses from Section 3, there are still a number of concerns regarding the empirical analysis that need to be discussed.

First and foremost, while the placebo tests are strongly reassuring, they do not prove causality. Even if it seems unlikely given the robustness of the model with respect to various alternative specifications and placebo tests, there is still the possibility that there are other latent characteristics of the location of the capital city that go beyond hosting the government, population size and economic importance and distinguish the capital city from the second city and drive the results. One approach that might help in this context would be to apply a spatial regression discontinuity framework to exploit some quasi-random variation in the treatment (isolation from the capital city). In this context, the national borders do not represent historically grown “natural” borders, but are rather artificial and imposed from the outside by the colonial powers. Hence, national borders represent an arbitrary cutoff in the treatment intensity that might be instrumented in a regression discontinuity frame-

Table 17: Afrobarometer − Robustness: Rural Respondents Only

	Dependent variable:							
	Electricity Grid		News Newspaper		Not Monitor Tax Spending		Contact Traditional Leader	
	OLS (1)	*Poisson* (2)	*OLS* (3)	*Poisson* (4)	*OLS* (5)	*Poisson* (6)	*OLS* (7)	*Poisson* (8)
Log Distance from the Capital City	−0.061**	−0.096*	−0.126***	−0.103***	0.059**	0.032**	0.045**	0.060**
	(0.026)	(0.049)	(0.028)	(0.038)	(0.026)	(0.013)	(0.020)	(0.029)
Log Distance from the Coast	−0.014	−0.058**	0.009	−0.038	0.010	0.005	0.031	0.036
	(0.015)	(0.029)	(0.018)	(0.029)	(0.013)	(0.007)	(0.023)	(0.027)
Log Distance from the Closest City $\geq 75,000^{\dagger}$	−0.059***	−0.125***	−0.059***	−0.080***	0.005	0.002	0.016	0.022
	(0.012)	(0.029)	(0.019)	(0.024)	(0.019)	(0.009)	(0.019)	(0.025)
Log Distance from the Second City (Placebo)	−0.002	0.023	−0.040	−0.045	−0.012	−0.005	−0.0005	−0.002
	(0.017)	(0.050)	(0.031)	(0.043)	(0.025)	(0.012)	(0.029)	(0.034)
AME		-0.037*		-0.058***		0.067***		0.052**
		(0.019)		(0.021)		(0.026)		(0.026)
	Placebo Tests: Distance from Capital City vs. Distance from Second City (Placebo)							
Wald Test	-0.059**	-0.118*	-0.086**	-0.057	0.07**	0.037**	0.046	0.062
	(0.031)	(0.076)	(0.042)	(0.073)	(0.038)	(0.018)	(0.043)	(0.056)
LRT	209***	45***	68***	17***	37***	17***	16***	21***
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	25,832	25,832	23,461	23,461	23,822	23,822	25,421	25,421
Adjusted R^2	0.337		0.224		0.057		0.107	
AIC		25,082		32,885		56,066		50,972
F Statistic	411***		213***		46***		96***	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Controls include: The respondent's age and gender. 'AME Capital Distance' refers to the 'average marginal effect' of 'Log Distance from the Capital City'. Log Distance from the Closest City $\geq 75,000^{\dagger}$ does neither contain the capital city nor the second city as a reference point.

Table 18: Afrobarometer – Robustness: Urban Respondents Only

	Dependent variable:							
	Electricity Grid		News Newspaper		Not Monitor Tax Spending		Contact Traditional Leader	
	OLS	*Poisson*	*OLS*	*Poisson*	*OLS*	*Poisson*	*OLS*	*Poisson*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Distance from the Capital City	−0.010**	−0.012**	−0.085***	−0.046***	0.027***	0.013***	0.026***	0.060***
	(0.004)	(0.005)	(0.018)	(0.013)	(0.009)	(0.004)	(0.008)	(0.019)
Log Distance from the Coast	−0.014***	−0.016**	−0.059***	−0.042***	−0.016	−0.008	0.041***	0.099***
	(0.005)	(0.006)	(0.017)	(0.012)	(0.012)	(0.006)	(0.012)	(0.021)
Log Distance from the Closest City $\geq 75,000^{\dagger}$	−0.019***	−0.021***	−0.020	−0.010	0.006	0.003	0.028***	0.069***
	(0.005)	(0.006)	(0.015)	(0.011)	(0.008)	(0.004)	(0.008)	(0.018)
Log Distance from the Second City (Placebo)	−0.008	−0.009	−0.024	−0.012	0.009	0.004	0.013	0.021
	(0.006)	(0.006)	(0.018)	(0.010)	(0.017)	(0.008)	(0.012)	(0.031)
AME Capital Distance		-0.011**		-0.069***		0.027***		0.025***
		(0.004)		(0.018)		(0.009)		(0.008)
	Placebo Tests: Distance from Capital City vs. Distance from Second City (Placebo)							
Wald Test	-0.002	-0.003	-0.061**	-0.034**	0.018	0.009	0.013	0.039*
	(0.006)	(0.007)	(0.027)	(0.017)	(0.016)	(0.008)	(0.011)	(0.028)
LRT	1	0	36***	28***	6**	3	5**	10***
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	15,246	15,246	12,302	12,302	13,720	13,720	14,996	14,996
Adjusted R^2	0.238		0.224		0.051		0.101	
AIC		23,241		31,386		32,106		20,612
F Statistic	150***		112***		24***		54***	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Controls include: The respondent's age and gender. 'AME Capital Distance' refers to the 'average marginal effect' of 'Log Distance from the Capital City'. Log Distance from the Closest City $\geq 75,000^{\dagger}$ does neither contain the capital city nor the second city as a reference point.

work (see (Michalopoulos and Papaioannou, 2014: 171) for an in-depth discussion). However, as opposed to Michalopoulos and Papaioannou (2014), Pinkovskiy (2017) or Basten and Betz (2013) who use national borders as an arbitrary regression discontinuity cutoff, simply reducing the sample to the border regions (or partitioned ethnicities in border regions) does not guarantee a valid and causal inference in our context. This is associated to the fact that the distance from the capital city is correlated on both sides of the border.[15] One solution might be to use cross-border observations for partitioned ethnicities and assign the differences in the dependent variable to the differences in distance from the capital while controlling for border fixed effects. However, there are a number of challenges that complicate this analysis. One example is that we cannot choose the same functional form as we do in our ordinary regressions.

In addition to the concern regarding the placebo tests, we might be dealing with sample self selection. It might be that the brightest, most capable and most educated individuals that are born in areas isolated from the capital city systematically move closer to the capital city for employment. This effect, if it was of a sufficient magnitude, could increase the level of human capital in areas closer to the capital and lead to an augmented economic performance. Hence, the differences in economic prosperity could simply be a result of migration patterns rather than of a systematic discrimination against areas isolated from the capital.
This, however, would not explain the reduced public goods provision we find in Section 6.1. Moreover, while it is likely that there are migration flows directed to areas with a more dynamic economy, it is questionable whether these flows would only embrace the most capable and educated citizens. It seems more likely, that people from economically disadvantaged areas with all kinds of educational backgrounds would have incentives to work in a place where the productivity level is larger and where they were given a higher salary. But even if we assume that the migration flows of the most capable outweigh the migration flows of less educated workers, it seems reasonable to assume that these domestic migrants were not only attracted by the capital city but by all economic centers within the country − including the second city. Consequently, if the migration flows were the only pattern causing regional discrepancies with respect to capital city isolation, the effects of isolation from the capital city should be statistically indistinguishable from those of the second city. This, however, is not the case as could be shown using the placebo tests (even when restricting the sample to countries where the second city is much larger

[15]Consider, for example, the border between Ghana and Togo. The distance from the capital along with a rather arid environment, distance to the coast and the share of Muslims increases from South to North. Consequently, observations that are contiguous to the capital do not represent a valid counterfactual for observations farther away from the capital.

and of much greater economic importance than the capital city itself). Furthermore, if the migration flows were in fact only directed towards the capital city and not to the other economic centers within the country as well, then migration should be all about some distinct characteristic of the capital city that is attracting these migration flows. In these cases, however, we would expect the migrants to move directly in the area of the capital city and not simply approaching it. Further, if this was actually the case, then the effects should consist of a break between the area of the capital city and the rest of the country, and the regressions should become insignificant upon the exclusion of the capital city for the remote sensing analysis or all urban respondents for the Afrobarometer analysis. Yet, as could be shown in Section 5.3 and 6.6 respectively, this is not the case. Thus, even if there were migration patterns that reinforce the disadvantage of isolated and poor areas due to brain drain, they are not the effects that drive our results.

Another potential pitfall using nighttime luminosity as a proxy for economic prosperity might come from the fact that the differences in detected nightlights within a country are simply the result of differences in the access to an electricity grid. Further, it might be that electricity grids are concentrated in the capital city and from there they are extended into the hinterlands. If this was the case, then the result of the reduced availability of electricity grids in areas isolated from the capital city would not necessarily reflect the discrimination regarding public goods provision but simply the result of practical reasons (that electricity grids must move from the capital to the other areas). However, it seems very unlikely that this mechanism represents the actual electrification dynamic. Rather, a major determinant of electricity grid access comes from the location relative to a power plant. In addition, another important factor for electrification is the proximity to an urban area of a sufficient size as all other major cities are lit (without the entire area between these cities and the capital city being lit). Therefore, if it was not the proximity to the political center that determined the electrification dynamic, distance from other major cities, including the second city, would be expected to imply similar effects. Consequently, the placebo tests should be insignificant which is not the case. Therefore, the finding of a higher electrification rate in areas closer to the capital city is most likely associated to the fact that the capital hosts the government and favor areas contiguous with the capital city. Additionally, our analysis of economic prosperity based on nighttime lights would only be distorted by (coincidental) mechanisms determining the electric grid availability in the first place, if electrification would not impact economic prosperity. However, it seems more likely that electrification impacts productivity (Lenz et al., 2017: 32) and income (Aevarsdottir et al., 2017: 27).

An additional potential shortcoming of our analysis might be the restriction of countries regarding the analysis of the channels through which capital city isolation impacts accountability. Unfortunately, the Afrobarometer features only 27 of the 43 countries in our sample. It might be that the selection of the 27 countries that are covered by the Afrobarometer is systematically based on characteristics that also shape the underlying mechanisms that link capital city isolation and the level and pace of economic development. Future research should therefore focus on examining country characteristics that shape the mechanisms under scrutiny to shed further light into the issue. Yet, whether or not there are distortions resulting from this sample selection will probably only be fully clarified upon an extended coverage of the Afrobarometer that might occur at some point in the future. As of now, given that the countries covered in the Afrobarometer are representative for a high share of around 70% of the population in our original sample, we do not believe to be dealing with great distortions.

Another aspect that could be argued to distort the results is the use of the geodesic distance rather than the actual distance taking into consideration the road network and quality. Therefore, some of the places that appear to be close to the capital city relative to others places when measuring in geodesic distance might in fact be farther away from the capital city when measuring distance in travel time by car or bus. Therefore, using travel time from a pixel or respondent to the capital city based on 'Google Maps' or 'OpenStreetMap' might be a much more precise measure of the actual distance. However, the big disadvantage is that the travel time is endogenous. This is due to the fact that a potentially better economic performance in areas contiguous with the capital city might be the result of a higher level of public goods provision such as road infrastructure investments which at the same time reduces the travel time to the capital city. Hence, the advantages of having more precise distance measure when using travel time instead of the geodesic distance would most probably come at the cost of inducing endogeneity bias. Therefore, we favor the use of geodesic distance which we assume to be a good and exogenous proxy of the actual distance or travel time.[16]

Lastly, our empirical strategy does not allow to assess the relative importance of the different channels linking capital city isolation with reduced accountability (information, taxation, identification with the nation and democracy, and education) or absolute strength of the effects. The fact that the dependent variables in Section 6 all consist of different levels of consent with statements makes a clear quantitative interpretation very difficult. It might be that seemingly small effects regarding one

[16] A third option might be to instrument the travel time with the geodesic distance.

variable have major implications while similar effects on other variables are meaningless for the mechanisms under scrutiny. Therefore, systematically analyzing the respondents' answers gives us valuable information about the direction of the effects. Yet, the extent to which they contribute to reduced accountability remains unclear.

8 Discussion and Conclusion

Despite the concerns raised in Section 7, we are confident to provide tangible insights into the dynamics and mechanisms of capital city isolation in Sub-Saharan Africa.

Using extensive remote sensing data on the very fine pixel level, we are able to empirically show that isolation from the capital city imposes strong adverse effects on the level and pace of economic development. This finding is novel in the literature and adds to the insights regarding the limited institutional outreach of the state beyond the capital city (Michalopoulos and Papaioannou, 2013). Additional, we contribute to the debate about the causes of the very high levels of economic inequality in the African context by identifying proximity to the capital city as a major dimension of (spatial) inequality. Further, based on the insights from Campante and Do (2014), we put forward and empirically test a theoretical framework that explains the decreased levels of economic performance in areas isolated from the capital city with lower levels of accountability and monitoring of the political elite that subsequently reduce the level of public goods provision. Based on previous contributions to the field of comparative development, we identify and examine four major channels (information, taxation, identification with the nation and democracy, and education) that potentially link capital city isolation with reduced accountability. Using geo-referenced data from the Afrobarometer, we are able to provide strong evidence for reduced levels of public goods provision such as road and electricity grid infrastructures as well as medical services. Furthermore, our analyses indicate that information, identification with the nation and democracy, and education are likely to be the main channels for reduced accountability and the poor economic outcomes in isolated areas while taxation seems to play a minor role. Consequently, the paradox of the isolated poor − the increased trust into the political leaders by those who are isolated from the capital city and discriminated regarding public goods provision − is in fact at the very core of the adverse effects of capital city isolation. Conducting a series of placebo tests underlines that the effects are in fact causal and the result of isolation from the political and administrative center and not simply driven by the isolation from a major city within the country. Most notably, we show that our results are robust with respect to placebo tests on the restricted sample consisting of countries where the capital city does not constitute

the economic center and for which the second city is on average five times as large as the capital. Last but not least, we show that, consistent with our theory, the effects are stronger for rural as compared to urban areas.

Yet, it is still left open which of the four channels (information, taxation, identification with the nation and democracy, and education) is the most important one or if, alternatively, they all equally contribute to reduced accountability. Therefore, future research should investigate the relative importance of the channels that link capital city isolation to accountability. In addition, there might be further mechanisms that have not been examined in this study. One such mechanism might be that the threat of collective action as a tool to hold leaders accountable is diminished in areas isolated from the capital city.[17]

An additional aspect that needs to be examined are the most efficient policy interventions to enhance accountability in areas isolated from the capital. Based on our analysis, subsidies for media coverage and programs to promote democracy, a sense of national affiliation and active civic participation might constitute suitable tools to achieve this goal. However, the effectiveness of these measures might depend upon the level of education in the respective areas which makes it necessary to study the interdependencies between the identified channels in more detail. As these interdependencies are likely to be of a more general nature, it might also be possible to obtain and transfer insights from other settings.

Another important question to analyze are the implications of these micro-level mechanisms for the national institutions such as the level of democracy. This is important as "national institutions [are] affected by local institutions" and "a likely mediating mechanism is individual beliefs and values about the appropriate national political structure" (Giuliano and Nunn, 2013: 86) which, as we have shown, tend to be more authoritarian in areas farther from the capital. Furthermore, it needs to be examined which regional or country characteristics impact the mechanisms of reduced accountability in areas isolated from the capital. One such characteristic, that requires increased attention, are the (political framework) conditions under which the traditional (chieftaincy) leadership system substitutes for the limited state provision of public goods.

[17] See for example Campante et al. (2013) or Pierskalla (2016) who uses this argument in context of the 'urban-rural bias' developed by Lipton (1977) and Bates (1981).

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A Appendix

Placebo Tests – Formulation

Wald Test (Test 1)

$$Y_i = cons + \beta 1 * X1_i + \beta 2 * X2_i + \varphi * Covariates + u_i \tag{1}$$

$$with \quad X1 = \text{ Distance from the Capital} \tag{2}$$

$$and \quad X2 = \text{ Distance from the Placebo} \tag{3}$$

$$\underline{\textbf{Test 1:}} \quad H_0 : \beta 1 \geq \beta 2 \quad \text{against} \quad H_A : \beta 1 < \beta 2 \tag{4}$$

Likelihood Ratio Test (LRT) (Test 2)

Unrestricted Model with Log-Likelihood$_u$ (LLU)

$$Y_i = cons + \beta 1 * X1_i + \beta 2 * X2_i + \varphi * Covariates + u_i \tag{5}$$

Restricted Model with Log-Likelihood$_r$ (LLR)

$$Y_i = cons + \alpha * (X1_i + X2_i) + \varphi * Covariates + u_i \tag{6}$$

$$\underline{\textbf{Test 2:}} \quad \text{Model}_u \text{ vs. Model}_r \text{ using } LRT = 2 * (LLU - LLR) \sim \chi^2 \tag{7}$$

$$\textit{Implicitly:} \quad H_0 : \alpha = \beta 1 = \beta 2 \quad \text{against} \quad H_A : \beta 1 \neq \beta 2 \tag{8}$$

Afrobarometer – Variable Description

In the following, we provide details about the dependent variables (based on the Afrobarometer Codebook for Round 6 provided by Isbell (2017)) that are used in Section 6. The sequence is based on the order of appearance in the paper. Note that respondents who answered 'Do not know', 'Refused to answer' or 'Missing' are excluded from the sample for the respective estimation.

Employment Status

Do you have a job that pays a cash income? If yes, is it full-time or part-time? If no, are you presently looking for a job? Value Labels: 0=No (not looking), 1=No (looking), 2=Yes, part time, 3= Yes, full time.

Formal Housing

In what type of shelter does the respondent live? (Answered by the Interviewer) Value

Labels: 1= Non-traditional / formal house, 0= Traditional house, hut or Temporary structure, shack.

Roof Quality

What was the roof of the respondent's home or shelter made of? (Answered by the Interviewer) Value Labels: 1= Metal, tin or zinc, Tiles, Shingles and 0= Thatch or grass, Plastic sheets, Asbestos, Multiple materials.

Electricity

Do you have an electric connection to your home from the mains? [If yes] How often is the electricity actually available? Value Labels: 0= No mains electric supply or connection to the home, [If yes], 1=Never, 2=Occasionally, 3= About half of the time, 4= Most of the time, 5= All of the time.

Water Access Problem

Over the past year, how often, if ever, have you or anyone in your family: Gone without enough clean water for home use? Value Labels: 0=Never, 1=Just once or twice, 2=Several times, 3=Many times, 4=Always.

Medicine Problem

Over the past year, how often, if ever, have you or anyone in your family: Gone without medicines or medical treatment? Value Labels: 0=Never, 1=Just once or twice, 2=Several times, 3=Many times, 4=Always.

Electricity Grid

Are the following services present in the primary sampling unit/enumeration area: Electricity grid that most houses could access? Value Labels: 0=No, 1=Yes.

Paved Road

Thinking of your journey here: Was the road at the start point in the PSU/EA paved/ tarred/ concrete? Value Labels: 0=No, 1=Yes.

Trust in TL (Traditional Leader):

How much do you trust each of the following, or have you not heard enough about them to say: Traditional leaders. Value Labels: 0=Not at all, 1=Just a little, 2=Somewhat, 3=A lot.

Corruption TL (Traditional Leader):

How many of the following people do you think are involved in corruption, or have you not heard enough about them to say: Traditional Leaders? Value Labels: 0=None, 1=Some of them, 2=Most of them, 3=All of them.

Performance TL (Traditional Leader):

Do you approve or disapprove of the way the following people have performed their jobs over the past twelve months, or have you not heard enough about them to say: Your Traditional Leader? Value Labels: 1=Strongly disapprove, 2=disapprove, 3=Approve, 4=Strongly approve.

Contact TL (Traditional Leader):
During the past year, how often have you contacted any of the following persons about some important problem or to give them your views: Traditional Leaders? Value Labels: 0=Never, 1=Only once, 2=A few times, 3=Often.

Trust LGC (Local Government Council):
How much do you trust each of the following, or have you not heard enough about them to say: Your Metropolitan, Municipal or District Assembly? Value Labels: 0=Not at all, 1=Just a little, 2=Somewhat, 3=A lot.

Corruption LGC (Local Government Council):
How many of the following people do you think are involved in corruption, or have you not heard enough about them to say: Local government councilors? Value Labels: 0=None, 1=Some of them, 2=Most of them, 3=All of them.

Performance LGC (Local Government Council):
Do you approve or disapprove of the way the following people have performed their jobs over the past twelve months, or have you not heard enough about them to say: Your Elected Local Government Councilor? Value Labels: 1=Strongly disapprove, 2=disapprove, 3=Approve, 4=Strongly approve.

Contact LGC (Local Government Council):
During the past year, how often have you contacted any of the following persons about some important problem or to give them your views: A local government councilor? Value Labels: 0=Never, 1=Only once, 2=A few times, 3=Often.

Trust in President:
How much do you trust each of the following, or have you not heard enough about them to say: The President? Value Labels: 0=Not at all, 1=Just a little, 2=Somewhat, 3=A lot.

Performance of NG (National Government):
Do you approve or disapprove of the way the following people have performed their jobs over the past twelve months, or have you not heard enough about them to say: Your Member of Parliament? Value Labels: 1=Strongly disapprove, 2=disapprove, 3=Approve, 4=Strongly approve.

Belief NG to be Corrupt (National Government):
How many of the following people do you think are involved in corruption, or have not you heard enough about them to say: Government Officials? Value Labels: 0=None, 1=Some of them, 2=Most of them, 3=All of them.

Contact with NG (National Government):
During the past year, how often have you contacted any of the following persons about some important problem or to give them your views: An official of a government agency? Value Labels: 0=Never, 1=Only once, 2=A few times, 3=Often.

News Newspaper:
How often do you get news from the following sources: Newspapers? Value Labels: 0=Never, 1=Less than once a month, 2=A few times a month, 3=A few times a week, 4=Every day.

News Radio:
How often do you get news from the following sources: Radio? Value Labels: 0=Never, 1=Less than once a month, 2=A few times a month, 3=A few times a week, 4=Every day.

News Television:
How often do you get news from the following sources: Television? Value Labels: 0=Never, 1=Less than once a month, 2=A few times a month, 3=A few times a week, 4=Every day.

News Internet:
How often do you get news from the following sources: Internet? Value Labels: 0=Never, 1=Less than once a month, 2=A few times a month, 3=A few times a week, 4=Every day.

Good Citizens Pay Tax:
For each of the following actions, please tell me whether you think it is something a good -citizen in a democracy should always do, never do, or do only if they choose: Pay taxes they owe to government. Value Labels: 1=Never do 2=Do only if they choose 3= Always do.

Not Monitor Tax Spending:
Which of the following statements is closest to your view? Statement 1: Parliament should ensure that the President explains to it on a regular basis how his government spends taxpayers' money. Statement 2: The President should be able to devote his full attention to developing the country rather than wasting time justifying his actions. Value Labels: 1=Agree very strongly with Statement 1, 2=Agree with Statement 1, 3=Agree with neither, 4=Agree with Statement 2, 5=Agree very strongly with Statement 2. *Note: The estimation is robust with respect to the exclusion of 'Agree with neither'.*

Ease to Avoid Taxes:
Based on your experience, how easy or difficult is it to obtain the following services from government? Or do you never try and get these services from government: To avoid paying the income or property taxes that you owe to government? Value Labels: 1=Very difficult, 2=Difficult, 3=Easy, 4=Very easy.

Corruption Tax Officials:
How many of the following people do you think are involved in corruption, or have you not heard enough about them to say: Tax Officials (e.g. Ministry of Finance officials or Local Government tax collectors). Value Labels: 0=None, 1=Some of them, 2=Most of them, 3=All of them.

National Identity:
Let us suppose that you had to choose between being a [ENTER NATIONALITY] and

being a [R's Ethnic Group]. Which of the following best expresses your feelings? Value Labels: 1=I feel only (R's ethnic group), 2=I feel more (R's ethnic group) than [ENTER NATIONALITY], 3=I feel equally [ENTER NATIONALITY] and (R's ethnic group), 4=I feel more [ENTER NATIONALITY] than (R's ethnic group), 5=I feel only [ENTER NATIONALITY].

Knowledge of Term 'Democracy':
What, if anything, does "democracy" mean to you? Value Labels: 1= Understood "democracy" in [English/French/Portuguese] 2= Required local language translation 3=Did not understand the word or question, even in local language.

Democracy Positive:
What, if anything, does "democracy": mean to you? First verbatim response. Value Labels: 1= Positive Replies (among others: civil liberties, government by, for, of the people, elections, multiparty competition, peace, unity, power sharing, social and economic development, justice, governance accountability, rule of law, national independence) and 0=Negative Replies (among others: conflict, confusion, corruption, abuse of power, social and economic hardship. *Note: Neutral answers were excluded from the estimation.*

Educational Level:
What is your highest level of education? Value Labels: 0=No formal schooling, 1=Informal schooling only (including Koranic schooling), 2=Some primary schooling, 3=Primary school completed, 4=Intermediate school or Some secondary school / high school, 5=Secondary school / high school completed , 6=Post-secondary qualifications, other than university e.g. a diploma or degree from a polytechnic or college, 7=Some university, 8=University completed, 9=Post-graduate.

Media Coverage Harms:
Which of the following statements is closest to your view? Statement 1: The news media should constantly investigate and report on government mistakes and corruption. Statement 2: Too much reporting on negative events, like government mistakes and corruption, only harms the country. Value Labels: 1=Agree very strongly with Statement 1, 2=Agree with Statement 1, 3=Agree with neither, 4=Agree with Statement 2, 5=Agree very strongly with Statement 2. *Note: The estimation is robust with respect to the exclusion of 'Agree with neither'.*

Abandon Parliament:
Which of the following statements is closest to your view? Statement 1: Members of Parliament represent the people; therefore they should make laws for this country, even if the President does not agree. Statement 2: Since the President represents all of us, he should pass laws without worrying about what Parliament thinks. Value Labels: 1=Agree very strongly with Statement 1, 2=Agree with Statement 1, 3=Agree with neither, 4=Agree with Statement 2, 5=Agree very strongly with Statement 2. *Note: The estimation is robust with respect to the exclusion of 'Agree with neither'.*

Prefer One Party Rule:
There are many ways to govern a country. Would you disapprove or approve of the following alternatives: Only one political party is allowed to stand for election and hold office? Value Labels: 1=Strongly disapprove, 2=Disapprove, 3=Neither approve nor disapprove, 4=Approve, 5=Strongly approve.

Prefer One Man Rule:
There are many ways to govern a country. Would you disapprove or approve of the following alternatives: Elections and Parliament are abolished so that the president can decide everything? Value Labels: 1=Strongly disapprove, 2=Disapprove, 3=Neither approve nor disapprove, 4=Approve, 5=Strongly approve.

Trust in OP (Opposition Party):
How much do you trust each of the following, or have you not heard enough about them to say: Opposition Political Parties? Value Labels: 0=Not at all, 1=Just a little, 2=Somewhat, 3=A lot.

OP (Opposition Party) Silenced:
In your opinion, how often, in this country: Are opposition parties or their supporters silenced by the government? Value Labels: 0=Never, 1=Rarely, 2=Often, 3=Always.

OP (Opposition Party) better in Jobcreation:
Looking at the ruling and opposition political parties in this country, which would you say is most able to address each of the following matters, or have you not heard enough to say? Value Labels: 1=Ruling Party, 2=Opposition party or parties, *Note: Respondents answering 'Neither of them' were excluded from the sample.*

OP (Opposition Party) is viable Alternative:
Please tell me whether you agree or disagree with the following statement: The political opposition in [ENTER COUNTRY] presents a viable alternative vision and plan for the country. Value Labels: 1=Strongly disagree 2=Disagree 3=Neither agree nor disagree, 4=Agree, 5=Strongly Agree.

Table A1: Afrobarometer – Attitude Towards the Political Opposition

	Dependent variable: Attitudes and Perception of the Political Opposition Party (OP)							
	Trust in OP		OP Silenced		OP better in Jobcreation		OP is viable Alternative	
	OLS (1)	*Poisson* (2)	*OLS* (3)	*Poisson* (4)	*OLS* (5)	*Poisson* (6)	*OLS* (7)	*Poisson* (8)
Log Distance from the Capital City	0.019**	0.016**	−0.049***	−0.041***	−0.014***	−0.012***	−0.022	−0.007
	(0.009)	(0.008)	(0.015)	(0.012)	(0.004)	(0.004)	(0.022)	(0.007)
Log Distance from the Coast	0.017*	0.015*	−0.015	−0.008	0.007*	0.006*	0.002	0.001
	(0.010)	(0.008)	(0.012)	(0.010)	(0.004)	(0.003)	(0.017)	(0.006)
Log Distance from the Closest City $\geq 75,000^{\dagger}$	0.009	0.007	−0.014	−0.014	0.007	0.006	0.005	0.002
	(0.011)	(0.009)	(0.013)	(0.010)	(0.004)	(0.004)	(0.019)	(0.006)
Log Distance from the Second City (Placebo)	0.015	0.014	−0.003	−0.002	−0.014**	−0.012**	−0.017	−0.005
	(0.015)	(0.013)	(0.012)	(0.010)	(0.007)	(0.005)	(0.029)	(0.009)
AME Capital Distance		0.02**		-0.045***		-0.026***		-0.021
		(0.01)		(0.015)		(0.007)		(0.022)
	Placebo Tests: Distance from Capital City vs. Distance from Second City (Placebo)							
Wald Test	0.003	0.002	-0.046***	-0.039***	0	0	-0.005	-0.002
	(0.018)	(0.015)	(0.018)	(0.015)	(0.007)	(0.006)	(0.032)	(0.01)
LRT	0	0	52***	34***	0	0	0	0
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls (incl. Intercept)	YES	YES	YES	YES	YES	YES	YES	YES
Observations	37,033	37,033	30,483	30,483	31,745	31,745	34,615	34,615
Adjusted R^2	0.046		0.102		0.150		0.033	
AIC		79,197		62,838		52,968		93,447
F Statistic	61***		112***		187***		40***	

Note: *p<0.1; **p<0.05; ***p<0.01

All standard errors are clustered in two dimensions by country and ethnicity (according to the classification by Murdoch (1959)). Controls include: The respondent's age and gender. 'AME Capital Distance' refers to the 'average marginal effect' of 'Log Distance from the Capital City'. Log Distance from the Closest City $\geq 75,000^{\dagger}$ does neither contain the capital city nor the second city as a reference point.