# Essays on socio-political factors and economic development

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# Abstract

Contemporary development outcomes in sub-Saharan Africa vary not only between, but also within countries. These differences today cannot be fully understood without taking ethnicity, and the interrelated effect of ethnic-specific and colonial institutions into account. In this thesis, we study the effect of these socio-political factors on important sub-national development outcomes such as access to public goods, education and women political participation.

In Chapter 2 of the thesis, we examine whether coethnicity with the president affects public infrastructure provision in South Africa. Using municipal-level data for 52 district municipalities from 1996 to 2016, we find that municipalities coethnic to the president are associated with higher water and electricity infrastructure provision relative to non-coethnic municipalities. By controlling for variables that proxy for institutions and taking election periods and term limits into consideration, we show that our findings are not driven by political motives. The findings of ethnic favouritism also remain robust to different specifications of coethnicity thresholds and lag structures. The research contributes to the debate on redistributive politics in Africa.

In Chapter 3, we show that present-day education outcomes in Africa cannot be independently attributed to colonial or pre-colonial ethnic institutions. It is instead the complementarity or contention between these two institutions that result in education outcomes we observe today. Using geolocated Demographic and Health Surveys' (DHS) literacy outcomes for Cameroon, Côte d'Ivoire, Ghana, and Nigeria, we find that British rule is positively associated with literacy in fragmented ethnic regions. The positive effect of British rule, that is often reported in the literature, is mitigated in centralised ethnic regions where British rule was more indirect, potentially opposed and less salient relative to ethnic-specific institutions. This paper contributes to debates on colonial and pre-colonial ethnic influences on development, moving beyond country-level analysis.

In Chapter 4, we study whether present-day contemporary women political participation in sub-Saharan Africa can be linked to the transatlantic and Indian Ocean slave trades and the consequent gender ratio imbalances, in the context of pre-existing gender norms determined by kinship structures. Using geolocated individual-level data for 28 sub-Saharan African countries from the latest Afrobarometer surveys, and ethnic region kinship and slave trade data, we find that a woman's ethnic region exposure to the transatlantic slave trade is associated with an increase in her likelihood to vote, however, only in non-patrilineal societies. This effect is mitigated in patrilineal societies, where women likely have less decision-making power based on lineage. We contribute to the literature on the contemporary sub-national effects of the slave trades and the historical causes of gender gaps in political participation.

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# Chapter 1

# Introduction

Ethnicity and its complexity are central in explaining sub-national development differences between and within countries. Ethnicity and ethnic identities are salient in Africa given that it signifies traditional loyalties and connections amongst people. According to this viewpoint, ethnicity and how an individual identifies as part of an ethnic group is central to whom a person is. Another viewpoint is that ethnicity or ethnic group membership is functional and allows for mobilisation, cooperation and alliances (Eifert, Miguel, & Posner, 2010).[1] Countries with more ethnic groups either benefit from the variety of skills that lead to higher productivity or are disadvantaged as salient ethnic divisions may give rise to competition rather than collaboration (Alesina & La Ferrara, 2005; Cheeseman, 2018). Studies have linked ethnic diversity with political instability, rent seeking behaviour, lower social trust, and increased conflict (Alesina, Baqir, & Easterly, 1999; Alesina, Devleeschauwer, Easterly, & Kurlat, 2003; Alesina & Zhuravskaaya, 2011; Collier & Hoeffler, 1998; Easterly & Levine, 1997). A further consideration resulting from ethnic diversity is favouritism and bias, which have been associated with developmental and welfare effects, such as inequality in the distribution of public goods (Ahlerup & Isaksson, 2015; Burgess, Jedwab, Miguel, Morjaria, & Padro i Miquel, 2015; Franck & Rainer, 2012; Kramon & Posner, 2016).

[1] Fearon (2003) discusses seven features by which an ethnic group can be defined. First, group membership is primarily determined according to descent and recognised by ethnic members and non-members. Second, members are cognisant of their membership to the ethnic group. Third, ethnic group members share distinctive and differentiating cultural characteristics, such as language, customs and religion. Fourth, a large majority of ethnic group members value these cultural characteristics. Fifth, the ethnic group has a homeland, or recalls one. Sixth, the ethnic group has a shared history. Seventh, the group can be considered as separate or autonomous from a theoretical viewpoint.

Moreover, ethnic-specific institutional traits have also been associated with long-run development outcomes (Herbst, 2000). For instance, pre-colonial ethnic centralisation, which is the hierarchical political complexity of an ethnic group, is associated with contemporary development characteristics and increased public goods provision, including schooling (Gennaioli & Rainer, 2007; Michalopoulos & Papaioannou, 2013). Other ethnic institutions, such as kinship structures that determine how lineage is traced, influence gender roles and norms, shaping how women are viewed and valued within societies (Lowes, 2020a). Although these ethnic institutions existed prior to colonialism and the *scramble for Africa*, their effects on societies persist.

Similarly, variation in development outcomes have been attributed to European influences, such as colonial rule and the preceding external slave trades (Acemogu, Johnson, & Robinson, 2001; Angeles, 2007; Easterly & Levine, 2016; Nunn, 2008). British colonial rule and increased missionary activity, for example, are associated with favourable education outcomes in sub-Saharan Africa (Brown, 2000; Cogneau & Moradi, 2014; Jedwab, Meier zu Selhausen, & Moradi, 2021). The temporary male-to-female gender ratio imbalance resulting from the transatlantic slave trade has been associated with increased prevalence of present-day polygyny and higher HIV infection rates amongst women, as well as higher women employment in Africa (Bertocchi & Dimico, 2019; Dalton & Leung, 2014; Teso, 2019). Given that these institutions and pre-colonial ethnic institutions coexisted in Africa for many years, we propose that it is the complementarity or contention between ethnic-specific institutional characteristics and colonial institutions that affect contemporary outcomes.

In this thesis, we consider the effect of ethnic favouritism, and the interrelated effect of ethnic and colonial institutions on sub-national development outcomes in sub-Saharan Africa. We study the effect of these socio-political factors on public infrastructure provision, education and women political participation, respectively, as these variables are determinants of economic growth and key considerations in the study of sub-Saharan Africa's delayed economic development in relation to other global regions (Easterly & Levine, 1997).

## 1.1 Ethnic Favouritism

Ethnic favouritism occurs when members of the same ethnicity as political and government leaders benefit from patronage and other public or political decisions, and is determined by the leader's ability to allocate public funds (Burgess et al., 2015). Favouritism does not occur as a result of spill over effects, but because of conscious spending targeted toward ministers' and presidents' ethnic groups (Kramon & Posner, 2016). This bias often involves negative economic effects, which are important concerns for an ethnically diverse

and developing democracy such as South Africa (Amodio & Chiovelli, 2017; Franck & Rainer, 2012; Ilorah, 2009).

Whilst Hodler and Raschky (2014) state that favouritism occurs predominantly in countries with poorly educated citizens and weak political institutions, De Luca, Hodler, Raschky, and Valsecchi (2018) find that ethnic favouritism is a worldwide occurrence, not limited to autocracies, and poor or African countries. Across the world, including South Africa, birth regions of current political leaders experience more intense nighttime light density relative to regions unrelated to current political leaders (De Luca et al., 2018; Hodler & Raschky, 2014).

In sub-Saharan African countries, including South Africa, populations coethnic to the president and those residing in the president's region of origin are less likely to be treated unfairly by the government (Ahlerup & Isaksson, 2015). In Kenya, Burgess et al. (2015) find ethnic favouritism in central government road building. Similarly, coethnicity with the Kenyan president during school-age years can be linked to higher levels of education (Kramon & Posner, 2016). In South Africa, citizens of the Zulu ethnic group have a higher likelihood of being employed in the agricultural sector and in municipalities where the Inkatha Freedom Party (IFP), which was originally a Zulu political party, has the majority vote (Amodio & Chiovelli, 2017). Additionally, Ravetti, Sarr, Munene, and Swanson (2019) find that ethnicity contributes to polarisation and discrimination amongst mine workers by the majority ethnic group, Zulu, directed towards other ethnic groups. Other South African studies have focussed on voter behaviour and elections (see for example De Kadt and Lieberman (2017); Kroth (2014); Kroth, Larcinese, and Wehner (2016); Obikili (2019)).

In the paper, presented in Chapter 2, we argue that ethnic favouritism occurs through coethnicity with the president, who has the ability to influence public infrastructure provision through the appointment of government leaders (Calland, 2013). Specifically, we ask: Does coethnicity with the president affect public infrastructure provision?

### 1.1.1 Contribution

This paper contributes to the literature in three respects. Our study builds on a recent body of work focusing on ethnic favouritism in Africa (Ahlerup & Isaksson, 2015; Burgess et al., 2015; Dreher et al., 2019; Franck & Rainer, 2012; Kasara, 2007; Kramon & Posner, 2013, 2016). It additionally builds on findings of ethnic favouritism in the labour market and amongst mine workers in South Africa (Amodio & Chiovelli, 2017;

Ravetti et al., 2019).

Secondly, we construct a new data set from various municipal-level sources including the recently published and unexplored Municipal Barometer Databank (South African Local Government Association, 2020) and test different hypotheses to ensure that our results are robust and informative. By controlling for election periods, term limits, and variables that proxy for institutions, we expand on research that focus on political motives in South African infrastructure provision (De Kadt & Lieberman, 2017; Kroth, 2014; Kroth et al., 2016).

Thirdly, contrary to conventional wisdom which suggests that favouritism in South Africa is based on race alone, we observe that (ethnic) favouritism is also present within the Black South African population itself. That is, being in municipalities where the majority are coethnic to the president matters for water and electricity infrastructure provision. Our results raise the importance that the governing party should uphold its constitution (ANC, 2012), in which it is stated that

> The ANC shall, in its composition and functioning, be democratic, non-racial and non-sexist and combat any form of racial, tribalistic or ethnic exclusivism or chauvinism.

## 1.2 Colonial Rule and Pre-Colonial Ethnic Centralisation

Contemporary education outcomes in sub-Saharan Africa have been attributed to colonial rule, with British rule being considered more favourable than French (Benavot & Riddle, 1988; Bolt & Bezemer, 2009; Brown, 2000; Garnier & Schafer, 2006; Grier, 1999). Whilst the British educational system was decentralised with missionaries also having considerable influence, the French system was more rigid. For example, the French system enforced the French language on elementary school level, whereas the British taught in local dialects and only introduced English later.

Importantly, however, Frankema (2012) and Meier zu Selhausen (2019) note that we cannot understand the variation in human capital if we do not consider the role of African agency, which is the way in which native African citizens exercise influence within society and the economy. Pre-colonial ethnic centralisation, which is measured by the jurisdictional hierarchy levels beyond local community as captured by Murdock (1967), is a way to measure the extent of African agency within ethnic regions. Ethnic centralisation, i.e. chiefly hierarchy, captures the political complexity of ethnic regions, which is a good indication of institutional

advancement.

Research has related pre-colonial ethnic centralisation to increased socioeconomic outcomes and provision of public goods such as infrastructure, health and education (Angeles & Elizalde, 2017; Gennaioli & Rainer, 2007). Gennaioli and Rainer (2007) ascribe this positive relationship to the increased accountability of local chiefs to higher-level traditional authorities. Ethnic centralisation, however, has also been associated with a decrease in the norms of rule in the Kuba Kingdom (Lowes, Nunn, Robinson, & Weigel, 2017). Similarly, centralisation may be inversely related to education in the instance that it gives rise to organised resistance (Frankema, 2012). For example, in Nigeria, the British provided or withheld public goods based on whether ethnic leaders cooperated with colonial powers or not (Archibong, 2019). Additionally, in regions where local citizens were hostile towards European settlements, colonial investments were lower (Huillery, 2011; Ricart-Huguet, 2021).

Against this backdrop, our research question asks: What is the interrelated effect of colonial and pre-colonial ethnic institutions on present-day literacy? We propose that it is the complementarity or contention between these institutions that explain differences in contemporary education outcomes. The purpose of this paper is therefore to analyse the effect of colonial and pre-colonial ethnic institutions along with their interaction on contemporary literacy outcomes. This paper is presented in Chapter 3.

### 1.2.1 Contribution

Our study contributes to the literature in three ways. Firstly, it adds to the literature that examines the effect of historical institutions on contemporary development outcomes. The paper expands on research relating contemporary economic outcomes to colonial as well as pre-colonial ethnic institutions, moving beyond country-level analysis (Angeles & Elizalde, 2017; Bandyopadhyay & Green, 2016; Gennaioli & Rainer, 2007; Lowes et al., 2017; Michalopoulos & Papaioannou, 2013).

Secondly, our research provides insights regarding variation in education outcomes amongst and within former colonies (Bolt & Bezemer, 2009; Cogneau & Moradi, 2014; Dupraz, 2019; Frankema, 2012; Huillery, 2009). Our data shows that in former British colonies, contemporary literacy is higher in fragmented relative to centralised ethnic regions. Contrary, in former French colonies, literacy is higher in centralised relative to fragmented ethnic regions.

Finally, we contribute to the recent and limited literature that acknowledges the relationship between colonialists and ethnic indigenous societies (Archibong, 2019; Cappelen & Sorens, 2018; De Haas & Frankema, 2018; Huillery, 2011; Müller-Crepon, 2020). Our study makes a noteworthy contribution by evaluating the interrelated effect of colonial rule and ethnic centralisation with a specific focus on contemporary education, which has been strongly associated with economic growth, development, quality of institutions and political participation (Acemoglu, Gallego, & Robinson, 2014; Barro, 2001; Glaeser, Ponzetto, & Shleifer, 2007; Lipset, 1959).

## 1.3 Kinship Structures and the Slave Trades

Literature has linked the slave trades to underdevelopment in Africa (Nunn, 2008). Specifically, regions that experienced higher intensity of slave trades today have lower levels of trust between and within ethnic groups, increased contemporary civil conflict and violence, as well as ethnic diversity (Besley & Reynal-Querol, 2014; Boxell, Dalton, & Leung, 2019; Fenske & Zurimendi, 2017; Green, 2013; Nunn & Wantchekon, 2011; Whatley & Gillezeau, 2011).

An important channel through which the slave trades affect contemporary development outcomes, is the temporary change in the male-to-female gender ratio of regions. The transatlantic slave trade decreased the gender ratio as more men than women were exported from Western, West-Central and Eastern Africa to work in European colony plantations in the Americas. The Indian Ocean slave trade increased the gender ratio as more women than men were exported from Eastern Africa to work as domestic servants, entertainers and concubines in the Middle East and India, as well as plantation islands in the Indian Ocean (Campbell, 2003; Lovejoy, 2011; Manning, 1990).

Although the change in the gender ratio is not necessarily persistent, the impact on society and gender dynamics is. The temporary gender ratio imbalance resulting from the transatlantic slave trade is for example associated with increased prevalence of present-day polygyny in Africa (Bertocchi, 2016; Dalton & Leung, 2014; Fenske, 2015). Such changes in marital composition and institutions entail further socio-economic consequences such as higher HIV infection rates amongst women, infidelity and child mortality (Bertocchi & Dimico, 2019). Recent literature also links the temporary women-biased gender ratio during the transatlantic slave trade to higher contemporary women labour force participation (Teso, 2019).

It is, however, important to take into account that the slave trades took place in ethnic regions that already had certain gender dynamics based on kinship structures that determine how lineage and inheritance are traced. These structures ultimately influence gender norms that entail varying cultural, social, economic and political implications for women in sub-Saharan Africa (Lowes, 2020a, 2020b; Robinson & Gottlieb, 2019; Tène, 2021). We should therefore not study the impact of the slave trades on gender outcomes, such as political participation, without taking pre-existing gender dynamics and culturally defined roles into account.

Following from this, in Chapter 4 we ask: Can we associate the slave trades and the temporary gender ratio imbalances to increased or decreased women political participation in sub-Saharan Africa? We apply this hypothesis in the context of kinship structures that played an important role in shaping gender norms and therefore gender outcomes, even prior to the slave trades and colonialism. The purpose of this paper is therefore to analyse the effect of these institutions along with their interaction on contemporary women political participation.

### 1.3.1 Contribution

Our study makes three contributions to the literature. Firstly, the paper expands the growing literature on the long-run impact of historical institutions and events, such as kinship structures and the slave trades, on contemporary development in Africa (Besley & Reynal-Querol, 2014; Boxell et al., 2019; Fenske & Zurimendi, 2017; Green, 2013; Lowes, 2020a, 2020b; Nunn & Wantchekon, 2011; Whatley & Gillezeau, 2011). As noted by Voth (2021), this falls into the category of examining the roots of beliefs and attitudes guided by connections between historical and present-day outcomes.

Secondly, by studying the interaction between the slave trades and pre-existing kinship structures, we address a gap in the literature regarding the interrelated effect of historical institutions. Michalopoulos and Papaioannou (2020) highlight that literature has neglected to consider the interrelationship between the slave trades and pre-colonial traits.

Finally, the paper contributes to the literature regarding gender norms and causes of gender gaps in political participation (Alesina, Giuliano, & Nunn, 2013; Arriola & Johnson, 2014; Isaksson, 2014; Isaksson, Kotsadam, & Nerman, 2014; Marien, Hooghe, & Quintelier, 2010; Ndlovu & Mutale, 2013; Robinson & Gottlieb, 2019). Determining historical effects on contemporary inequality in political participation is essential in addressing socio-economic challenges faced by women in Africa (Hessami & da Fonseca, 2020). Our study

and findings speak to Targets 5.1 and 5.5 of the Sustainable Development Goals (SDGs) that set out to end discrimination and improve opportunities for and participation of women in the political arena (United Nations, 2020).

# Chapter 2

# Public Infrastructure Provision and Ethnic Favouritism: Evidence from South Africa[1]

*Does coethnicity with the president affect public infrastructure provision? Whilst previous literature has studied the effects of ethnic favouritism in Africa in general, there has been limited empirical evidence on ethnic favouritism in public infrastructure provision in South Africa specifically. Using municipal-level data for 52 district municipalities from 1996 to 2016, the post-apartheid democratic period, we report evidence of ethnic favouritism in water and electricity infrastructure provision. The results are robust to political considerations and different specifications of coethnicity thresholds. Our results suggest that in order to minimise ethnic favouritism, politically independent institutions should oversee and be involved in the allocation of funding and provision of infrastructure.*

[1]We acknowledge contributions by Manoel Bittencourt. We thank seminar audiences at Centre for the Study of African Economies (CSAE) Conference in Oxford 2019, Comparative Economic Development Studies (CEDS) Workshop in Pretoria 2018, Economic Research Southern Africa (ERSA) Structural Constraints on the Economy, Growth and Political Economy' Workshop in Johannesburg 2019, Economic Society of South Africa (ESSA) Conference in Johannesburg 2019, University of Pretoria Brown Bag Seminar 2019 and University of Witwatersrand Seminar 2019 for comments. We also acknowledge comments received from Heike Joebges at CEDS Workshop, Marcello Pérez-Alvarez at CSAE Conference, James Robinson at ESSA Conference, and anonymous referees. A previous version of this paper is an ERSA Working Paper, No. 787, available for download from `https://www.econrsa.org/publications/working-papers/public-infrastructure-provision-and-ethnic-favouritism-evidence-south`.

## 2.1 Introduction

Ethnic diversity has been cited as one of the key determinants in explaining poor economic growth. Studies have associated ethnic diversity with political instability, rent seeking behaviour, lower social trust, and increased conflict amongst citizens (Alesina et al., 1999, 2003; Alesina & Zhuravskaaya, 2011; Easterly & Levine, 1997). Importantly, ethnic diversity is also associated with favouritism and prejudice. Ethnic favouritism, which occurs when members of the same ethnicity as political leaders benefit from patronage and other public or political decisions, may be one of the channels through which ethnic diversity undermines public goods provision (Burgess et al., 2015; Habyarimana, Humphreys, Posner, & Weinstein, 2007; Lee, 2018).

Inequality in public resource allocation arising from ethnic favouritism has far-reaching development and welfare implications, particularly in developing countries such as those in Africa. For example, citizens coethnic to the president are associated with higher health and education outcomes relative to non-coethnic citizens (Franck & Rainer, 2012). Then again, ethnic favouritism does not necessarily result in positive outcomes for coethnic members. Farmers in Africa who are coethnic to political leaders face higher taxes relative to non-coethnic farmers (Kasara, 2007).[2]

We examine the effects of ethnic favouritism on welfare distribution, with our focus on the provision of public goods in South Africa. South Africa is an ethnically diverse and fragmented country, with a history of discrimination based on race. Although there has been effort to redress historical inequalities caused by the apartheid regime (1948 to 1994), income and wealth inequality amongst South Africans remain high (Sulla & Zikhali, 2018). Moreover, inequality in access to basic public goods such as water and electricity is still high. Access to water is a public health measure that is correlated with growth and development (Weil, 2007). Likewise, electricity is widely considered as a measure of sub-national economic growth and development (Henderson, Storeygard, & Weil, 2012; Michalopoulos & Papaioannou, 2013). It is therefore essential to determine the prevalence of ethnic favouritism in a young democracy such as South Africa, as the strategic targeting of government resources for personal underlying agendas is detrimental to growth and development.

Specifically, we ask the question: Does coethnicity with the president affect public water and electricity in-

[2]She argues that this may be indicative of the power a political leader has over those of the same ethnicity or that favouritism occurs through unmeasured forms. Even in this setting, there exists an association between coethnicity with the president and economic outcomes.

frastructure provision? We argue that ethnic favouritism occurs through coethnicity with the president, who has the ability to influence public infrastructure provision through the appointment of government leaders (Calland, 2013). We construct a disaggregated municipal-level panel data set from various sources, including the recently published and unexplored Municipal Barometer Databank (South African Local Government Association, 2020). Our data set covers 52 district municipalities over the 1996 to 2016 period. We find that municipalities coethnic to the president are associated with higher water and electricity infrastructure provision relative to non-coethnic municipalities. We control for time and municipal fixed effects, and additionally take infrastructure persistence into account with a lagged dependent variable specification.

Apart from constructing a new data set, running a number of specifications and testing for different hypotheses to ensure that our results are robust and informative, our study contributes to the literature in a couple of ways. Firstly, contrary to conventional wisdom which suggests that favouritism in South Africa is based on race alone, we observe that (ethnic) favouritism is also present within the Black South African population itself. That is, being in municipalities where the majority are coethnic to the president matters for water and electricity infrastructure.

Our second contribution relates to the rationale behind the observed ethnic favouritism. Borrowing from ethnic politics models, we determine that ethnic favouritism does not occur on the basis of gaining electoral support. By controlling for variables that proxy for institutions and taking election periods and term limits into consideration, we show that our findings are not driven by political motives.

Finally, this paper contributes to empirical research on ethnic favouritism in Africa. Amongst populations in sub-Saharan Africa, including South Africa, citizens that are coethnic to the president and those residing in the president's region of origin are less likely to be treated unfairly by the government according to Afrobarometer survey data (Ahlerup & Isaksson, 2015). Ethnic favouritism has also been associated with improved primary education outcomes and lower infant mortality amongst political leader coethnics (in sub-Saharan African countries, excluding South Africa) (Franck & Rainer, 2012).

In Kenya specifically, coethnicity with the president during school-age years is linked to higher levels of education (Kramon & Posner, 2016; Li, 2018). In addition, Burgess et al. (2015) find ethnic favouritism in Kenyan central government road building and investment between the Kikuyu and Kalenjin ethnic groups. During periods of autocracy, regions coethnic to the president receive five times the length of paved roads and

twice as much expenditure. This favouritism, however, is attenuated during periods of democracy.[3] Contrary to these findings, our study indicates that in South Africa the positive association between coethnicity and infrastructure provision remains robust even when controlling for democratic maturity. Unlike in Kenya, South African political parties are not ethnically aligned, which may explain our finding.

Focusing on South Africa, Amodio and Chiovelli (2017) use local municipal election results for 2000 and 2001 Census data from Statistics South Africa (Stats SA) and observe ethnic favouritism in the local labour market and agricultural sector. Their findings indicate that citizens of the Zulu ethnic group have a higher likelihood of being employed in the agricultural sector and in municipalities where the Inkatha Freedom Party (IFP) has the majority vote. Conducting a lab experiment amongst coal mine workers in South Africa, Ravetti et al. (2019) find that in contrast to trade union membership which fosters solidarity, ethnicity contributes to polarisation and discrimination by the Zulu majority group towards other minority ethnic group members.

Other South African studies focus on elections and voter behaviour. De Kadt and Lieberman (2017) look at national and local elections and find a negative relationship between service delivery and support for the governing party. As service delivery improves, the vote share to the governing party decreases. Using 1996 and 2001 Census data, Kroth et al. (2016) show that the enfranchisement of voters after the end of apartheid contribute to increased electrification in these municipalities. Using 1994 election data, Obikili (2019) finds that lower electoral competition is associated with higher provision of electricity infrastructure provision, as the governing party face fewer restrictions from opposition parties and therefore has more autonomy to implement policies. Nevertheless, electoral competition can also bring about targeting of intergovernmental transfers to provinces close to election periods as the grant system can be used to strategically allocate funding (Kroth, 2014). Our analysis takes into account these various political considerations, which do not invalidate our finding of ethnic favouritism.

Our study raises important considerations for a young democracy. Firstly, government finances and departments should be independent of political considerations. Secondly, there is need for an independent technical body to monitor and take part in the decision-making process and allocation of funding. The above calls for the governing party, which since 1994 has been led by presidents from different ethnicities, to ensure the fair distribution of public resources to all South Africans. Democracy is a work in progress that requires constant institutional development (Khemani, 2007).

[3]In contrast, Berge et al. (2020) use lab games to measure individual biases in Kenya and do not find evidence of ethnic favouritism.

The rest of the paper is organised as follows. In the next section, we provide a background on South Africa and discuss the potential rationales behind ethnic favouritism, borrowing from ethnic politics models. Section 2.3 describes the data and methodology. Section 2.4 presents the main empirical results and Section 2.5 additional robustness checks. The last section concludes and discusses potential policy implications.

## 2.2 Background

### 2.2.1 Presidents and Ethnicity in South Africa

South Africa is a parliamentary representative country with a proportional representation voting system. The political party that wins the election and has more than 50 per cent of seats in Parliament is the governing party. Presidency is then awarded to the leader of the winning political party. Although South Africa does not follow a presidential system, citizens implicitly vote for the president as political parties determine leaders prior to national elections.

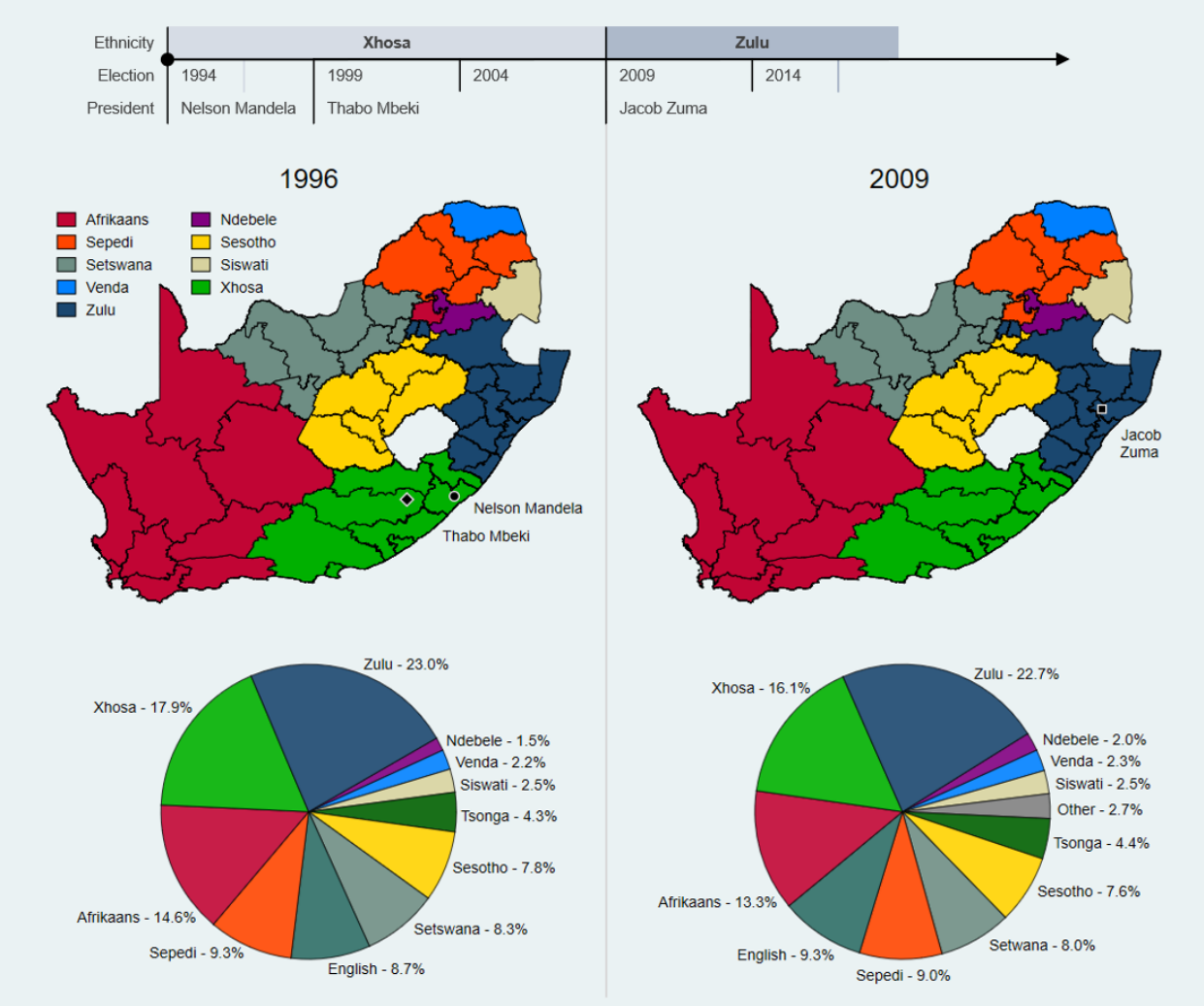
Since the end of apartheid in 1994 to 2016, South Africa's governing party, the African National Congress (ANC), was led by presidents from two different ethnic groups. Nelson Mandela, South Africa's first democratic president and Thabo Mbeki are Xhosa. Jacob Zuma is a Zulu. The tenure and ethnicity of each president is illustrated in Figure 2.1.[4] The figure also presents the ethnicity of the majority of the population within municipalities in 1996, the start of our ethnolinguistic data and South Africa's democracy under the Xhosa regime, relative to 2009, the start of the Zulu regime. The Eastern Cape, birthplace of Nelson Mandela and Thabo Mbeki, comprise majority Xhosa population. KwaZulu-Natal, the birthplace of Jacob Zuma, and some parts of Mpumalanga and Gauteng are majority Zulu. In addition, we illustrate the population shares of ethnic groups in the country. As South Africa reports population demographics according to race, we use home language to derive ethnic affiliation.

Figure 2.1 points out three considerations. Firstly, nine of the eleven official languages represent the majority of the population within municipalities, demonstrative of South Africa's ethnic diversity. The two major ethnic groupings in South Africa are the Nguni, comprising Ndebele, Swazi, Xhosa and Zulu; and the Sotho, which includes Northern Sotho (referred to as Pedi), Southern Sotho and Tswana. Other ethnic groupings are the Tsonga and Venda. Of these, Xhosa and Zulu are the largest ethnic groups, representing approximately

[4]Kgalema Motlanthe was interim president between September 2008 and May 2009. We do not account for his presidency in our study as it was for a negligible period of time.

17 and 22 per cent respectively of the population over the 1996 to 2016 period. The European and Indian populations in South Africa have members that speak mainly English and Afrikaans (Mesthrie, 2002).

Figure 2.1: South African Presidents and Ethnolinguistic Composition




*Note:* Figure time-line shows the tenure and ethnicity of the presidents included in our analysis. Maps show the ethnicity of municipalities according to the home language spoken by the majority of the population within municipalities (at the start of the respective ethnic regimes and our data, 1996 and 2009) and birth municipalities of presidents. Pie charts indicate the population share of ethnic groups in the country. Source: Own illustrations based on South African Local Government Association (2020).

Secondly, the population shares of ethnic groups according to home language, as represented in the pie charts, do not change substantially between 1996 and 2009. Xhosa and Zulu remain in majority. Furthermore, with the exception of the City of Tshwane, where the majority changed from Afrikaans in 1996 to Sesotho in 2009, migration has not taken place to such an extent that the ethnic classification of municipalities changed. This motivates the notion that the president is able to distinguish coethnic municipalities from non-coethnic municipalities.

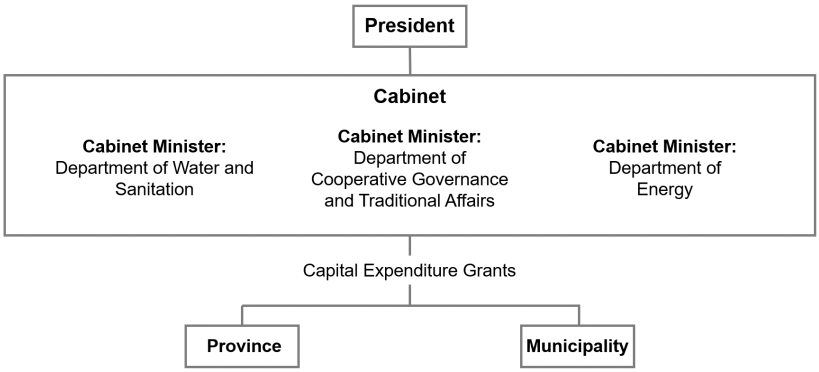
Thirdly, except for some metropolitan municipalities, coethnic populations tend to group together, which relates to the contributing role of ethnic segregation in the strategic allocation of resources to coethnic members. For example, ethnic segregation in Malawi brings about ethnic favouritism in that members of Parliament increase and target public goods provision in segregated regions where coethnic populations are more clearly identified (Ejdemyr, Kramon, & Robinson, 2018).

In South Africa, the president has the power to assemble the government by appointing the deputy president, the minister and deputy ministers that form the cabinet (Parliament of the Republic of South Africa, 2018). The ethnic composition of the cabinet during President Thabo Mbeki's term was approximately 38 per cent Xhosa and 15 per cent Zulu, whilst during President Jacob Zuma's term, the ethnic composition of the cabinet shifted to approximately 28 per cent Zulu and 17 per cent Xhosa ministers (Calland, 2013). The change in leadership ethnicity therefore also led to a change in the ethnic mix of the cabinet. As such, it is probable for coethnic cabinet members to share the president's interests in favouring coethnic municipalities through the strategic expenditure on public infrastructure.

Municipal capital expenditure is mainly funded through conditional grants, which are essentially determined by the government's strategic development priorities as set out by development directives (African National Congress, 1994; National Planning Commission, 2012). These priorities are determined by the governing party. These grants are managed by national departments headed by the respective cabinet ministers that the president appoints and assigns functions to (Minister of Finance, 2018; Oosthuizen & Thornhill, 2017). For instance, if a municipality requires funding to improve infrastructure related to basic service provision, the municipality submits a business plan to the Department of Cooperative Governance and Traditional Affairs (CoGTA), the national transferring department for the Municipal Infrastructure Grant. CoGTA then transfers funding to the municipality, depending on the conditions (Minister of Finance, 2018). Other grants targeted towards municipal infrastructure include the Water Services Infrastructure Grant and the Regional Infrastructure Grant managed by the Department of Water and Sanitation, and the Integrated National Electrification Program Grant managed by the Department of Energy (Minister of Finance, 2018).

Figure 2.2 depicts the relationship between the president, the cabinet and public infrastructure provision to provinces and municipalities. Given the link between the president and the cabinet ministers that head the national departments, the possibility of strategic allocation of resources based on coethnicity becomes apparent.

Figure 2.2: President and Cabinet




*Note:* Organogram for illustration of relationship between president, cabinet ministers and allocation of grants by national departments to municipalities. Source: Own example based on Minister of Finance (2018) and Oosthuizen and Thornhill (2017).

Other role players in water infrastructure include water services authorities, which in many areas are the district municipality. These authorities are also tasked with the responsibility to provide water infrastructure under the guidance of the Department of Water and Sanitation, headed by a cabinet minister (Republic of South Africa, 1997). For example, Rand Water (established in 1903), distributes water from purification plants that pump bulk water through a series of pump stations and distribution pipeline of 3 500 kilometres to 60 reservoirs. This water authority provides potable water to an area of 18 000 square kilometres that covers Gauteng, parts of the Free State, North West and Mpumalanga. Rand Water obtains its water supply from the Lesotho Highlands to augment water from the Vaal Dam (Rand Water, 2021).

Considering electricity infrastructure provision since 1994, South Africa's state-owned electricity provider, Eskom, also undertook electrification projects, particularly in rural and former homeland regions, where municipalities did not have capacity to do so (Dinkelman, 2011). Although Eskom is not a national department, this state-owned enterprise is also subject to political pressures given that it is under the directive of the Department of Public Enterprises and the Department of Energy. Furthermore, appointments of the CEO and Eskom Board are directed by the cabinet. In addition, as Eskom was implicitly subject to pressures from the governing party, Kroth et al. (2016) points out that electrification projects through Eskom could have been allocated strategically according to the governing party's direction. Jaglin and Dubresson (2016) also remark on the neo-patrimonial control within the functioning of Eskom as the governing party and elites

often use state-owned enterprises for personal underlying agendas.[5]

Funding for infrastructure is also allocated to municipalities based on the equitable share formula that takes into account various socioeconomic and demographic factors, and municipalities' own income generation (Minister of Finance, 2018). Kroth (2014) highlights that the formula is also susceptible to manipulation. Each year, the division of revenue according to the equitable share formula is subject to formula and data revisions, determined by the cabinet, designed by the president.

Although, government financial and fiscal matters are overseen by the Fiscal and Financial Committee (FFC), this independent body can only make recommendations to the government, which are not necessarily adhered to (Kroth, 2014; Wehner, 2000).

### 2.2.2 Ethnic Politics

Our analysis aims to determine whether there is evidence of ethnic favouritism in water and electricity infrastructure provision. We demonstrate the potential rationale or incentive to engage in such distributive politics by borrowing from ethnic politics models.

The first model is based on ethnic altruism, the social and psychological incentives gained from favouring coethnic citizens (Ejdemyr et al., 2018). The president wants to provide public goods to coethnic citizens and receives utility from the well-being of his/her own ethnic group (Franck & Rainer, 2012). This form of altruistic bias towards coethnic members may result from the president attributing positive features to his/her own ethnic group such as valuing coethnic welfare relatively more than that of other groups, or out of concern for social disapproval when coethnic members are not given preference (Franck & Rainer, 2012; Lee, 2018).

Based on the history of segregation during apartheid, democratic presidents can choose to benefit coethnic citizens as a way of correcting the injustice of the previous regime for altruistic reasons. A positive and significant association between coethnicity and infrastructure provision therefore suggests that a Xhosa or Zulu president wishes to improve access to water and electricity for coethnic citizens due to personal reasons of ethnic altruism.

[5]Studying neo-patrimonialism within the ANC, Lodge (2014) highlights the increase in neo-patrimonial behaviour by leaders and attributes neo-patrimonial forces in the post-Apartheid ANC to, amongst other factors, the historical establishment of the ANC.

The second model is based on the mutual exchange of support (Franck & Rainer, 2012). The model assumes that the president is ultimately a politician that strategically distributes public goods to retain majority votes and therefore seats in Parliament. In exchange, coethnic citizens only support the president based on the distribution of resources to their advantage (Cox & Mccubbins, 1986). The president can also efficiently provide public goods to gain votes if he/she is familiar with coethnic citizens' demands and preferences (Dixit & Londregan, 1996).

As Zulu and Xhosa ethnicities represent the largest and second largest of the ethnic groups, strategically distributing water and electricity infrastructure to municipalities may suggest efforts to gain electoral support by favouring coethnic municipalities. Given that these coethnic municipalities were also neglected with respect to infrastructure during the apartheid regime, the citizens would pledge to support the president in return for improved infrastructure provision.

We test whether political motives affect the association between coethnicity and infrastructure provision by additionally considering election periods and term limits. Whilst Kroth et al. (2016) find that ANC key constituency municipalities experienced higher electricity infrastructure as supplied by Eskom, De Kadt and Lieberman (2017), on the other hand, find that increased water infrastructure provision in municipalities, managed by either the governing or opposition parties, did not lead to increased votes for the governing party.

The third model is also related to gaining electoral support, however in this case, citizens (voters) derive utility simply from having a president that is coethnic. That is, the citizens that are coethnic to the president will support him/her irrespective of the provision of public goods. As such, the president has more incentive to allocate resources to non-coethnic municipalities, since the coethnic group psychologically benefits from having the president in power (Franck & Rainer, 2012). The president can choose to strategically distribute public goods to target swing voters rather than members who already support him/her in any event (Kroth et al., 2016; Lindbeck & Weibull, 1987). For this model to be feasible, we would therefore not expect to observe a positive and significant association between coethnic municipalities and public infrastructure provision.

## 2.3 Data and Method

Water infrastructure is the percentage of households that have access to water at or above the Reconstruction and Development Program (RDP) level, $rdpwater_{it}$. The RDP level is the prescribed minimum standard of water supply to households, which is a tap that provides potable water within 200 meters of the household (Department of Water and Sanitation, 2015). The RDP was set in place in 1994 and prioritises access to water and sanitation (Department of Water Affairs and Forestry, 2004). Data on access to water is obtained from the Department of Water and Sanitation, National Water Services Knowledge System. The Department of Water and Sanitation provides data sourced from Stats SA's Census (Department of Water and Sanitation, 2020).

As a second dependent variable of interest, we use average nighttime light density as a proxy for electricity infrastructure ($nlight_{it}$). We follow Michalopoulos and Papaioannou (2013) and Hodler and Raschky (2014) and take the natural logarithm of $nlight_{it}$ plus 0.01 in order to account for possible observations that have no reported nighttime light. Nighttime light density data is used to capture all man-made light including household and commercial lights, street lights and light emitted by schools, health care facilities, recreational and other public infrastructures. We prefer this measure of electricity infrastructure as the percentage share of households with access to electricity will not capture light emitted by infrastructure in public spaces.

Nighttime light density data is captured by the United States Air Force Defense Meteorological Satellite Program (DMSP) satellites that circle the earth fourteen times per day. Nighttime light density data is then processed by the National Oceanic and Atmospheric Administration (NOAA) National Geophysical Data Centre (NGDC) to remove strong sources of natural light such as forest fires, auroral activity, late sunsets and the bright half of the lunar cycle to produce observations of man-made outdoor and some indoor use of light. Values range from zero (no light) to 63 (rich and dense light) (Henderson et al., 2012). Data is available from 1992 to 2013 and obtained from AidData according to GADM 2.8 demarcation (Goodman, BenYishay, & Runfola, 2016).

We choose water and electricity as the outcome variables for three reasons. Firstly, during apartheid, coethnic groups together with other non-white South Africans were denied this basic infrastructure. As such, the RDP and National Electrification Program was central in the ANC's election strategy for the 1994 elections (Kroth et al., 2016). Access to drinking water and electricity also features prominently in the governing party's current development plan, the National Development Plan (NDP), which aims to address

basic infrastructure challenges that contribute to poverty and inequality (Fourie, 2008; National Planning Commission, 2012).

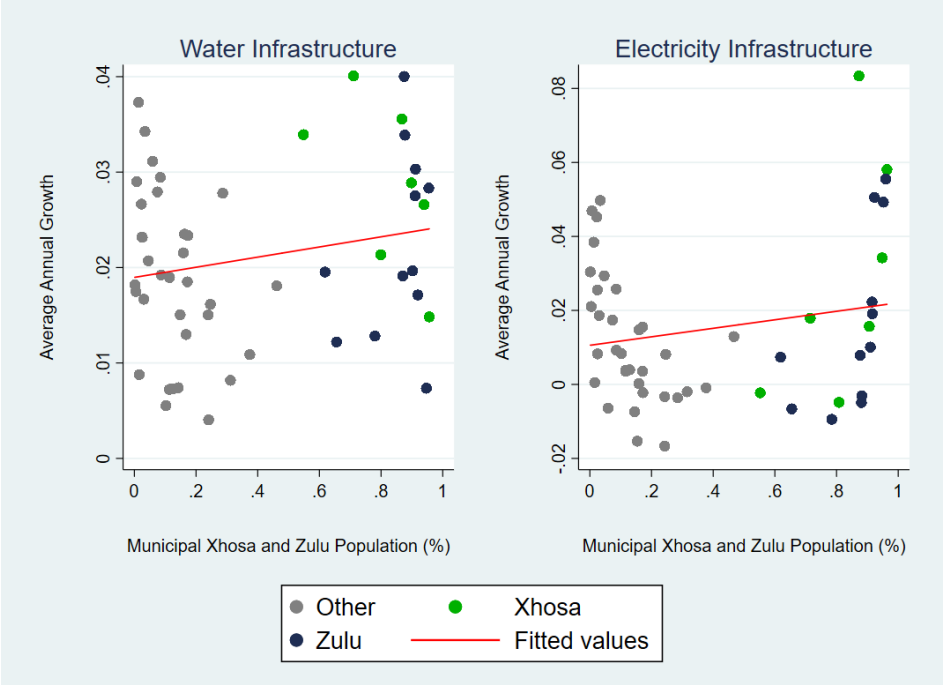
Secondly, as noted by Kramon and Posner (2013), the outcome variables studied determine the findings of ethnic favouritism in distributive politics. Although water and electricity infrastructure provision are functions of municipalities, different Departments are responsible for the financing and allocation of these infrastructures. For example, the Departments of Water and Sanitation as well as CoGTA are responsible for capital expenditure grant allocations for water infrastructure to municipalities. Lastly, these outcome variables also provide us with data covering three presidents' terms.

We construct a disaggregated municipal-level panel data set covering all 52 municipalities (44 district and 8 metropolitan municipalities) over 21 years from these various sources, including the recently published and unexplored Municipal Barometer Databank (South African Local Government Association, 2020). The Municipal Barometer, initiated by the South African Local Government Association (SALGA) in 2011, provides statistics on a municipal level with the objective to assist municipalities with planning and oversight. Municipal Barometer updates and provides data sourced from Stats SA's Census data, National Treasury and Quantec sources and data is available from 1996 to 2016.

Figure 2.3 depicts average annual growth in water and electricity infrastructure by municipality and the share of population within the municipality that are Xhosa and Zulu, therefore coethnic to the presidents in our sample. We colour code municipalities by whether 50 per cent or more of the population within the municipality is Xhosa or Zulu (coethnic) during the period that the president of the same ethnic group was in power, or other (non-coethnic). We observe a positive correlation between public infrastructure provision and the share of population that are Xhosa and Zulu.

The coethnicity variable, $coethnic(50\%)_{it-1}$, is a binary variable equal to 1 if more than 50 per cent of the municipality's population is coethnic to the president in time $t-1$, 0 otherwise. Influenced by Burgess et al. (2015) and Hodler and Raschky (2014) we use a lagged coethnicity measure as there are likely delays between the president or government's decision to allocate funds and the actual provision of infrastructure. For example, over the 1996 to 2009 period the $coethnic(50\%)_{it-1}$ variable is equal to 1 for municipalities where more than 50 per cent of the population is classified as Xhosa (i.e. coethnic to Nelson Mandela and Thabo Mbeki). Over the 2010 to 2016 period, $coethnic(50\%)_{it-1}$ is equal to 1 for municipalities where more

Figure 2.3: Growth in Public Infrastructure and Municipal Share of Coethnic Population




*Note:* Figure shows correlation between average annual growth in water and electricity infrastructure and the share of population that are Xhosa and Zulu by municipality. Source: Based on South African Local Government Association (2020), Goodman et al. (2016) and Department of Water and Sanitation (2020) data.

than 50 per cent of the population is classified as Zulu (i.e. coethnic to Jacob Zuma).

Additional control variables include political competition ($polcomp_{ie}$), the employment rate ($employment_{it}$), population density ($popdens_{it}$), growth in urban settlements relative to rural settlements ($urbanrural_{it}$) and the gross value added share of government expenditure ($gvagovt_{it}$). The chosen control variables were influenced by Burgess et al. (2015) to control for institutional, demographic and economic factors. The control variables additionally account for economic and demographic factors considered in the Division of Revenue Act according to which municipalities receive transfers from national government based on the equitable share formula (Minister of Finance, 2018).

Political competition measures the quality of institutions, i.e. democracy. This variable captures the quality of the South African democracy by looking at the winning margins, which is the difference between the vote share of the winning political party and the runner-up in the national parliamentary elections, on a municipal level. For ease of interpretation, we construct $polcomp_{ie}$ as one minus the winning margin. A

large variable therefore corresponds to high levels of political competition and vice-versa.[6]

Municipalities with higher political competition can be considered as more democratic with increased freedom to vote for other political parties without fear of retribution or punishment. Besley, Persson, and Sturm (2010) associate higher levels of political competition with economic growth and increased infrastructure expenditure by the government. On the other hand, Franck and Rainer (2012) and Kramon and Posner (2016) find no substantial effect of political institutions on ethnic favouritism. We expect a positive association with this measure of the quality of institutions with infrastructure provision.

The employment rate is the employed population divided by the working age population. Employment accounts for household income and wealth that affects access to and use of infrastructure, as well as the level of economic activity in a municipality. Employed households earning an income are more likely to afford housing with piped water above the RDP's minimum requirement level and electricity. Additionally, higher employment within a municipality entails higher government collection of rates, which may be allocated towards infrastructure improvements. We expect employment to be positively associated with public infrastructure provision.

The population density variable is the total population divided by the square kilometre area of the municipality. Gonschorek, Schulze, and Sjahrir (2018) associate more densely populated regions with lower per capita grants due to economy of scale effects. Increased population density, however, necessitates maintenance and upgrades to public infrastructure, which are often inadequate to sustain increased pressures. This variable therefore captures the pressure than an increase in the population places on public infrastructure, which would have to be financed by grants. Alternatively, population density can be considered as a proxy for development and economic prosperity (Acemoglu, Johnson, & Robinson, 2002). Municipalities with higher population density are therefore more prosperous, with less need for government financed infrastructure provision. We expect a negative association between population density and public infrastructure provision.

The growth in the number of urban settlements (cities, towns, suburbs, townships and other informal settlements adjacent to urban settlements) relative to rural settlements (tribal and farming areas) in each municipality partially represents a certain level of development and the subsequent urbanisation that takes place within municipalities. We expect a positive association between growth in urban relative to rural

[6]The first democratic election 1994 results are obtained from Election Resources.org (Manuel Álvarez-Rivera, 2016) and 1999 to 2014 results from the Electoral Commission of South Africa (IEC) (Electoral Commission of South Africa, 2017).

settlements and public infrastructure provision, as urban settlements closer to developed business areas are expected to have higher initial infrastructure.

The gross value added share of government expenditure measures the role of government in a municipality's economic activity. We expect a positive association between government expenditure and public infrastructure provision.

These indicators are obtained from the Municipal Barometer Databank (South African Local Government Association, 2020) and the Department of Water and Sanitation (2020). As per the Legislative Framework Governing Municipal Performance Measurement (South African Local Government Association, 2017), potable water supply systems are classified as a district municipal function. Similarly, bulk supply of electricity including the supply, transmission, distribution and where relevant, the generation thereof, is within the district municipality's power and function (Republic of South Africa, 1996). Furthermore, aggregation on a district municipal level is unaffected by the high number of changes in the demarcation of local municipalities since 1994.

Summary statistics are provided in Table 2.1. Summary statistics indicate heterogeneity across the variables in the sample. The mean level of access to water is relatively high at approximately 76.9 per cent of households across municipalities having access to water at or above the RDP level over the study period, whilst average nighttime light density is relatively low with high variation.

Table 2.1: Summary Statistics

| **Variable** | **N** | **Mean** | **Std. Dev.** | **Min.** | **Max.** |
|---|---|---|---|---|---|
| $rdpwater_{it}$ | 1,040 | 4.297 | 0.325 | 3.026 | 4.605 |
| $nlight_{it}$ | 936 | 0.619 | 1.533 | -2.624 | 4.044 |
| $coethnic(50\%)_{it}$ | 1,092 | 0.167 | 0.373 | 0 | 1 |
| $polcomp_{ie}$ | 1,092 | 0.483 | 0.247 | 0.037 | 0.997 |
| $employment_{it}$ | 1,092 | -1.139 | 0.385 | -2.281 | -0.498 |
| $popdens_{it}$ | 1,092 | 3.850 | 1.682 | -0.160 | 8.028 |
| $urbanrural_{it}$ | 984 | -1.433 | 2.647 | -6.444 | 4.106 |
| $gvagovt_{it}$ | 1,092 | 2.836 | 0.456 | 1.798 | 3.737 |

*Note:* $coethnic(50\%)_{it-1}$ is a binary variable. $rdpwater_{it}$, $nlight_{it}$, $employment_{it}$, $popdens_{it}$, $urbanrural_{it}$ and $gvagovt_{it}$ are logged variables. $polcomp_{ie}$ variable is an indice.

Based on the dimension of the data of 52 municipalities and 21 years, we use a fixed effects model. Although we regard coethnicity of a municipality as exogenous given that South Africa is a parliamentary representative democracy, fixed effects address potential bias resulting from statistical endogeneity by demeaning the data.

Fixed effects further reduce the possibility of omitted variable bias by accounting for unobserved individual heterogeneity. This method therefore takes into consideration differences in initial infrastructure levels between municipalities that may cause different rates of provision. By including municipal fixed effects ($\alpha_i$) we control for time-invariant factors specific to municipalities. Year fixed effects ($\delta_t$) address aggregate trends that are omitted from the model specification and cross-sectional dependence.[7] To account for persistence in infrastructure, we additionally estimate a lagged dependent variable specification. Standard errors are clustered at municipality level.

The main empirical specification is

$$infrastructure_{it} = \beta_1 coethnic(50\%)_{it-1} + \beta_2 X_{it} + \alpha_i + \delta_t + u_{it} \tag{2.1}$$

where $infrastructure_{it}$ is $rdpwater_{it}$ or $nlight_{it}$, and $coethnic(50\%)_{it-1}$ captures coethnicity of a municipality. The variable $X_{it}$ represents control variables as discussed and $u_{it}$ is an error term. The coefficient estimate of interest is $\beta_1$. In the baseline analysis, a positive and statistically significant coefficient estimate suggests that coethnic municipalities are associated with higher public infrastructure provision relative to non-coethnic municipalities.

## 2.4 Results

### 2.4.1 Ethnic Favouritism

In Table 2.2 Panel A, water infrastructure based on household access to water at or above RDP level, $rdpwater_{it}$, is the dependent variable. The coefficient estimate of 0.087 in column 6 indicates that coethnic municipalities are associated with 8.7 per cent higher water infrastructure provision relative to non-coethnic municipalities. In column 7 we include a lagged dependent variable, $rdpwater_{it-1}$, to account for persistence in infrastructure. The coethnic coefficient estimate remains positive and significant, supporting our results reported in column 6 that municipalities coethnic to the president are associated with higher water infrastructure provision relative to non-coethnic municipalities. The preferred specifications are columns 6 and 7 with all control variables included.

[7] The Hausman (1978) test and the Mundlak (1978) approach indicate the presence of time-invariant unobservables related to the independent variables. The Wald test results indicate the necessary inclusion of time effects (Judge, Griffiths, Hill, Lütkepohl, & Lee, 1985).

Table 2.2: Coethnic (50%) Results

| | | | | *Panel A* | | | |
|---|---|---|---|---|---|---|---|
| | | | | Dependent Variable: $rdpwater_{it}$ | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| $coethnic(50\%)_{it-1}$ | 0.057 | 0.062* | 0.090** | 0.093** | 0.088** | 0.087** | 0.031* |
| | (0.039) | (0.035) | (0.038) | (0.039) | (0.038) | (0.038) | (0.017) |
| $polcomp_{ie}$ | | 0.052 | 0.045 | 0.060 | 0.060 | 0.057 | 0.006 |
| | | (0.098) | (0.085) | (0.080) | (0.073) | (0.072) | (0.029) |
| $employment_{it}$ | | | 0.910*** | 0.822*** | 0.821*** | 0.827*** | 0.076* |
| | | | (0.132) | (0.112) | (0.113) | (0.115) | (0.041) |
| $popdens_{it}$ | | | | -0.506*** | -0.552*** | -0.540*** | -0.081** |
| | | | | (0.100) | (0.097) | (0.103) | (0.033) |
| $urbanrural_{it}$ | | | | | 0.027 | 0.027* | 0.005 |
| | | | | | (0.016) | (0.016) | (0.005) |
| $gvagovt_{it}$ | | | | | | 0.051 | 0.112** |
| | | | | | | (0.087) | (0.047) |
| $rdpwater_{it-1}$ | | | | | | | 0.825*** |
| | | | | | | | (0.026) |
| Observations | 1,040 | 1,040 | 1,040 | 1,040 | 984 | 984 | 888 |
| R-squared | 0.616 | 0.617 | 0.698 | 0.719 | 0.732 | 0.732 | 0.908 |
| Number of municipalities | 52 | 52 | 52 | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | | | | *Panel B* | | | |
| | | | | Dependent Variable: $nlight_{it}$ | | | |
| | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| $coethnic(50\%)_{it-1}$ | 0.012 | 0.032 | 0.060* | 0.060* | 0.062** | 0.063** | 0.034* |
| | (0.045) | (0.040) | (0.031) | (0.031) | (0.030) | (0.030) | (0.019) |
| $polcomp_{ie}$ | | 0.309*** | 0.277*** | 0.278*** | 0.298*** | 0.300*** | 0.143*** |
| | | (0.058) | (0.044) | (0.045) | (0.045) | (0.045) | (0.035) |
| $employment_{it}$ | | | 1.043*** | 1.024*** | 1.037*** | 1.030*** | 0.386*** |
| | | | (0.143) | (0.142) | (0.149) | (0.151) | (0.093) |
| $popdens_{it}$ | | | | -0.129 | -0.111 | -0.131 | -0.022 |
| | | | | (0.180) | (0.184) | (0.184) | (0.107) |
| $urbanrural_{it}$ | | | | | -0.001 | -0.003 | -0.012 |
| | | | | | (0.014) | (0.015) | (0.007) |
| $gvagovt_{it}$ | | | | | | -0.059 | -0.015 |
| | | | | | | (0.082) | (0.060) |
| $nlight_{it-1}$ | | | | | | | 0.509*** |
| | | | | | | | (0.045) |
| Observations | 936 | 936 | 936 | 936 | 828 | 828 | 780 |
| R-squared | 0.133 | 0.194 | 0.356 | 0.358 | 0.371 | 0.371 | 0.506 |
| Number of municipalities | 52 | 52 | 52 | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FE Yes | Yes | Yes | Yes | Yes | Yes | Yes | |

*Note:* $coethnic(50\%)_{it-1}$ is a binary variable equal to 1 if 50 per cent or more of the municipality's population is coethnic to the president in time $t-1$, 0 otherwise. We acknowledge that estimates in column 7 and 14 may suffer from the Nickell bias, and we additionally run the Bruno (2005) consistent estimator. Bias corrected LSDV $coethnic(50\%)_{it-1}$ coefficients are similar to dynamic specification results in columns 7 (0.030) and 14 (0.028).
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2.2 Panel B reports estimates with respect to electricity infrastructure, $nlight_{it}$. Coefficient estimates from column 13 suggest that coethnic municipalities are associated with 6.3 per cent higher electricity infrastructure provision relative to non-coethnic municipalities. Again, results remain robust to the inclusion of a lagged dependent variable in column 14, $nlight_{it-1}$ and control variables.

The inclusion of the control variables do not attenuate the positive association between public infrastructure provision and coethnic municipalities, and the coefficient signs are in line with our expectations. Political competition is not statistically significant with respect to water infrastructure, but positive and significantly associated with electricity infrastructure provision in Panel B. This is in line with Besley et al. (2010) who finds evidence of increased infrastructure expenditure with increased political competition. As expected, employment is positively associated with water and electricity infrastructure provision as jobs created by business and government affect household income and wealth that in turn determine ability to access adequate infrastructure. Population density is negatively associated with infrastructure provision. Increased infrastructure provision does not necessarily occur when populations increase within regions due to lower per capita grant allocations (Gonschorek et al., 2018). We observe that the control for growth in urban settlements relative to rural settlements is statistically significant and positive in column 6. When regions develop and subsequent urbanisation takes place, households benefit from increased water infrastructure. The gross value added share of government is positively associated with water infrastructure provision in the lagged dependent variable specification (column 7) and shows the importance of economic activity generated by the government in the local economy.

To summarise, the positive association between coethnicity and public infrastructure indicates that during the period in which the coethnic president was in power, citizens in Xhosa and/or Zulu municipalities experienced improved access to water and electricity relative to other non-coethnic municipalities.

### 2.4.2 Democracy and Elections

To further explore the potential influence of democracy as in Burgess et al. (2015), we control for democratic maturity by including a variable that counts the number of years since democracy started in 1994, $democraticyear_t$. Results are reported in Table 2.3. The more time that passes since South Africa's first democratic elections, the more mature South Africa's democracy becomes. Results remain robust to the inclusion of democratic maturity as a control variable and does not affect the association between the provision of infrastructure and coethnicity of a municipality.

Table 2.3: Democratic Maturity Results

| | Dependent Variable: | | | |
|---|---|---|---|---|
| | $rdpwater_{it}$ | | $nlight_{it}$ | |
| | (1) | (2) | (3) | (4) |
| $coethnic(50\%)_{it-1}$ | 0.087** | 0.031* | 0.063** | 0.034* |
| | (0.038) | (0.017) | (0.030) | (0.019) |
| $democraticyear_t$ | 0.021*** | 0.002*** | -0.003 | 0.002 |
| | (0.002) | (0.001) | (0.002) | (0.002) |
| $rdpwater_{it-1}$ | | 0.825*** | | |
| | | (0.026) | | |
| $nlight_{it-1}$ | | | | 0.509*** |
| | | | | (0.045) |
| Control variables | Yes | Yes | Yes | Yes |
| Observations | 984 | 888 | 828 | 780 |
| R-squared | 0.732 | 0.908 | 0.371 | 0.506 |
| Number of municipalities | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes |

*Note:* $coethnic(50\%)_{it-1}$ is a binary variable equal to 1 if 50 per cent or more of the municipality's population is coethnic to the president in time $t-1$, 0 otherwise. $democraticyear_t$ counts the number of years since democracy started in 1994. Control variables include political competition, employment, population density, growth in urban settlements relative to rural settlements and the gross value added share of government expenditure.
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In order to shed light on the potential reasoning for ethnic favouritism that occurs even as South Africa's democracy matures, we account for the influence of elections. If ethnic favouritism is motivated by the mutual exchange of support as discussed in Section 2.2.2, we would expect the strategic provision of public infrastructure to firstly, change around election periods and secondly, to occur only when re-election is possible (De Luca et al., 2018; Gonschorek et al., 2018; Posner & Young, 2018). To test whether elections bring about ethnic favouritism, we create three binary variables to capture the year prior to elections $Election_{t-1}$, the year during elections $Election_t$ and after the elections $Election_{t+1}$. We interact these variables with $coethnic(50\%)_{it-1}$ and present results in Table 2.4.

Overall, coethnic municipalities are associated with higher provision of infrastructure relative to non-coethnic municipalities and the main coethnic coefficient estimates remains in line with that reported in Table 2.2. With respect to water infrastructure (columns 1 and 2), the association between coethnicity and water infrastructure provision is not different prior, during or after elections. These findings suggest that provision of infrastructure is not politically motivated and suggest the ethnic altruism hypothesis. Although electricity infrastructure results, as reported in column 3, indicate relatively lower provision prior to elections (2.6 per cent relative to non-coethnic municipalities) and higher provision after elections, our finding of overall ethnic

favouritism is not driven by election periods.

Table 2.4: Coethnic (50%) and Elections Results

| | Dependent Variable: | | | |
|---|---|---|---|---|
| | $rdpwater_{it}$ | | $nlight_{it}$ | |
| | (1) | (2) | (3) | (4) |
| $coethnic(50\%)_{it-1}$ | 0.079** | 0.035 | 0.071** | 0.032 |
| | (0.039) | (0.024) | (0.031) | (0.019) |
| $coethnic(50\%)_{it-1} * Election_{t-1}$ | 0.009 | -0.011 | -0.097*** | -0.068*** |
| | (0.013) | (0.009) | (0.028) | (0.022) |
| $coethnic(50\%)_{it-1} * Election_{t}$ | 0.027 | -0.018 | 0.000 | 0.023 |
| | (0.018) | (0.011) | (0.021) | (0.024) |
| $coethnic(50\%)_{it-1} * Election_{t+1}$ | 0.007 | 0.006 | 0.057*** | 0.066** |
| | (0.020) | (0.020) | (0.019) | (0.030) |
| $rdpwater_{it-1}$ | | 0.826*** | | |
| | | (0.026) | | |
| $nlight_{it-1}$ | | | | 0.504*** |
| | | | | (0.043) |
| Control variables | Yes | Yes | Yes | Yes |
| Observations | 984 | 888 | 828 | 780 |
| R-squared | 0.732 | 0.909 | 0.386 | 0.517 |
| Number of municipalities | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes |

*Note:* $coethnic(50\%)_{it-1}$ is a binary variable equal to 1 if 50 per cent or more of the municipality's population is coethnic to the president in time $t-1$, 0 otherwise. $Election_{t-1}$ is a binary variable for the year prior to elections, $Election_t$ the year during elections, and $Election_{t+1}$ the year after the elections. Control variables include political competition, employment, population density, growth in urban settlements relative to rural settlements and the gross value added share of government expenditure. Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

To test whether ethnic favouritism occurs only during periods of re-election, we split our sample into periods in which re-election is possible (first term) and not (second term) and estimate $coethnic(50\%)_{it-1}$ in Table 2.5. The South African Constitution provides that presidents are only allowed to run for two election terms. Posner and Young (2018) discuss the importance of term limits as a measure to control the power of political leaders in African democracies. Re-election periods in our study are from 1999 to 2004 and 2009 to 2014.[8]

With respect to water infrastructure, the positive and significant ethnic favouritism finding persist whether the president is in the first or second term of rule. Once more, these results suggest that ethnic favouritism relating to water infrastructure is based on the first model, and not influenced by political considerations. Findings by De Kadt and Lieberman (2017) support these results in that increased water infrastructure provision in governing and opposition party managed municipalities do not lead to increased votes for the

[8]Nelson Mandela announced early on during his term that he would not run for a second term.

governing party. Comparing ethnic favouritism between the two term periods for electricity infrastructure, results remain positive, but are only statistically significant for the re-election period.

Table 2.5: Term Limit Results

| | Dependent Variable: | | | |
|---|---|---|---|---|
| | $rdpwater_{it}$ | | $nlight_{it}$ | |
| | Re-election | No re-election | Re-election | No re-election |
| | (1) | (2) | (3) | (4) |
| $coethnic(50\%)_{it}$ | 0.065* | 0.090** | 0.074** | 0.022 |
| | (0.033) | (0.040) | (0.036) | (0.038) |
| Control variables | Yes | Yes | Yes | Yes |
| Observations | 348 | 636 | 348 | 480 |
| R-squared | 0.714 | 0.757 | 0.275 | 0.464 |
| Number of municipalities | 52 | 52 | 52 | 48 |
| Time FE | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes |

*Note:* $coethnic(50\%)_{it-1}$ is a binary variable equal to 1 if 50 per cent or more of the municipality's population is coethnic to the president in time $t-1$, 0 otherwise. Control variables include political competition, employment, population density, growth in urban settlements relative to rural settlements and the gross value added share of government expenditure. Due to the split sample, we do not estimate a lagged dependent variable specification.
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

### 2.4.3 Presidential Terms

We conduct a regime analysis to study the association between coethnicity and public infrastructure provision over the different presidential terms. We specify a fixed effects model that includes interacted binary variables that control for the three respective presidential terms and the ethnicity of municipalities. To account for the ethnicity of municipalities ($ethnic_{it}$), we construct two binary variables. The variable $xhosa_{it}$ is a binary variable equal to 1 if 50 per cent or more of the municipality's population is classified as Xhosa, 0 otherwise. The variable $zulu_{it}$ is equal to 1 if 50 per cent or more of the municipality's population is classified as Zulu, 0 otherwise. This specification allows us to evaluate Xhosa and Zulu municipalities relative to all other municipalities.

We then construct three $term_t$ binary variables. The variable $mandelaterm_t$ is a binary variable equal to 1 over the 1996 to 1998 period, 0 otherwise. The variable $mbekiterm_t$ is a binary variable equal to 1 over the 1999 to 2008 period, 0 otherwise. The variable $zumaterm_t$ is a binary variable equal to 1 over the 2009 to 2016 period, 0 otherwise. We include time ($\delta_t$) and municipal fixed effects ($\alpha_i$) as in Equation 2.1.

The specification is

$$infrastructure_{it} = \beta_1 ethnic_{it} * term_t + \beta_2 X_{it} + \alpha_i + \delta_t + u_{it} \tag{2.2}$$

where $infrastructure_{it}$ is either $rdpwater_{it}$ or $nlight_{it}$. $X_{it}$ represents control variables as discussed and $u_{it}$ is an error term. The coefficient estimate of interest is $\beta_1$. A positive and significant coefficient therefore suggests an association between coethnicity and infrastructure provision during the president's term under consideration.

Table 2.6: Presidential Term Results

| | Dependent Variable: | | | | | |
|---|---|---|---|---|---|---|
| | $rdpwater_{it}$ | | | $nlight_{it}$ | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $xhosa_{it} * mandelaterm_t$ | -0.097** | | | -0.072 | | |
| | (0.037) | | | (0.080) | | |
| $xhosa_{it} * mbekiterm_t$ | | 0.152*** | | | 0.159*** | |
| | | (0.046) | | | (0.033) | |
| $zulu_{it} * zumaterm_t$ | | | 0.081** | | | 0.021 |
| | | | (0.035) | | | (0.036) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 984 | 984 | 984 | 828 | 828 | 828 |
| R-squared | 0.720 | 0.733 | 0.724 | 0.363 | 0.394 | 0.360 |
| Number of municipalities | 52 | 52 | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $xhosa_{it}$ ($zulu_{it}$) is a binary variable equal to 1 if 50 per cent or more of the municipality's population is classified as Xhosa (Zulu), 0 otherwise. The three $term_t$ variables are binary variables equal to 1 for the years in which the respective presidents were in power, 0 otherwise. Control variables include political competition, employment, population density, growth in urban settlements relative to rural settlements and the gross value added share of government expenditure.
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2.6 reports presidential term results. The negative and significant $xhosa * mandelaterm_{it}$ coefficient estimate in column 1 suggest that during the Mandela term, Xhosa municipalities are associated with lower water infrastructure provision relative to non-coethnic municipalities. This interesting negative association can potentially be attributed to several factors, which may have required the Mandela administration to address water infrastructure across all provinces. For example, firstly, apart from the Eastern Cape, which constitutes majority Xhosa municipalities, other provinces also faced low levels of access to water infrastructure at the start of the Mandela term. Below 50 percent of households in KwaZulu-Natal, Limpopo and the Eastern Cape had access to water in 1996 relative to approximately 69 percent of households in

other provinces (Department of Water and Sanitation, 2020). Secondly, the Lowveld region that covers the Mpumalanga province experienced severe droughts during 1994 to 1995 (Mason, 1996). Lastly, the Mandela term of five years (three years in our data set) is a comparatively short presidential term, which may not have addressed shortages in water infrastructure within Xhosa municipalities relative to municipalities in these other provinces. Baseline results reported in Section 2.4.1 are therefore driven by coethnic municipalities being associated with higher water infrastructure provision during the Mbeki and Zuma term.

The positive and significant $xhosa_{it} * mbekiterm_t$ estimate in columns 2 and 5 suggests that during the Mbeki term, Xhosa municipalities are associated with higher water and electricity infrastructure provision relative to other municipalities. The $zulu_{it} * zumaterm_t$ coefficient estimate in column 3 indicates that Zulu municipalities are associated with 8.1 per cent higher water infrastructure provision during the Zuma term. Yet, with respect to electricity infrastructure, results are positive but not statistically significant. This can be attributed to electricity infrastructure data that is only available up to 2013.

We test our results by evaluating infrastructure provision in Zulu municipalities over the Xhosa leadership term (1996 to 1999 and 2000 to 2008), and Xhosa municipalities over the Zulu leadership term (2009 to 2016) in Appendix A2.4. As expected, results are either negative or not statistically significant, indicating that Zulu municipalities are not associated with higher water or electricity infrastructure provision over the Xhosa leadership term. Similarly, Xhosa municipalities are not associated with higher infrastructure provision over the Zulu leadership term.

The introduction of Provincial and Municipal Infrastructure Grants under the Municipal Systems Act of 2000 (Department of Planning Monitoring and Evaluation, 2014) possibly explains the positive association between coethnicity and public infrastructure during the Mbeki and Zuma terms. Government delivers most social infrastructure through conditional grants, as discussed in Section 2.2.2. The implementation of such a funding mechanism may thus have provided room for strategic allocation of resources via cabinet ministers that head national transferring departments of grants to benefit coethnic citizens.

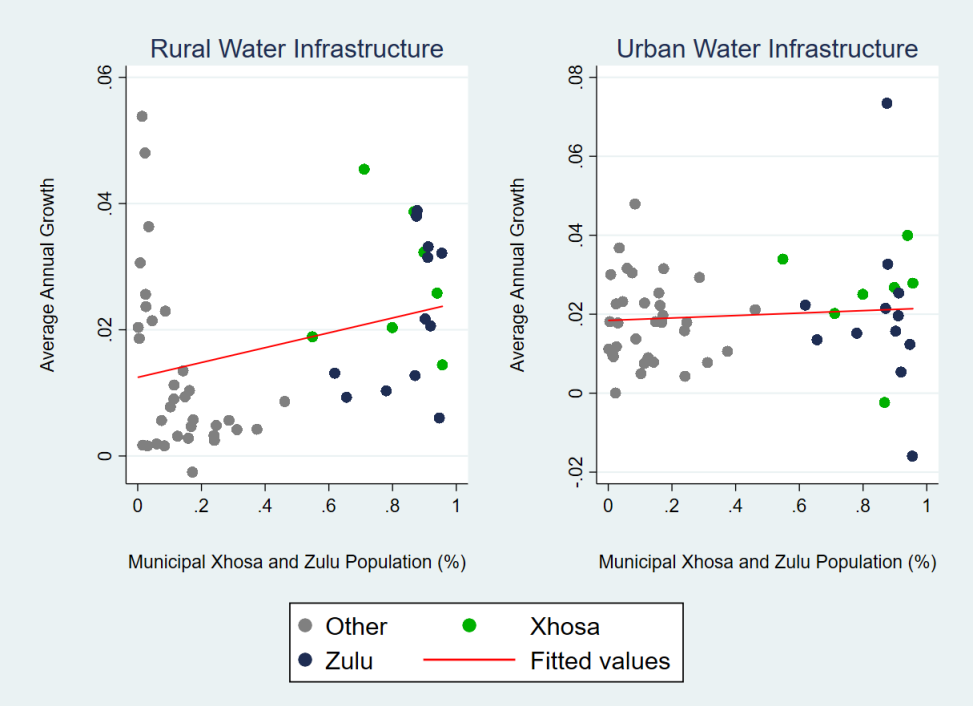
Prior to the implementation of this funding mechanism, we do not find evidence of ethnic favouritism in public infrastructure. There is need for additional analysis in this regard. Future research could study conditional grants allocated to municipalities to uncover patterns in transfers by national departments during the different presidential terms since the introduction.

## 2.5 Robustness Checks

### 2.5.1 Ethnic Favouritism in Rural and Urban Households

As rural areas were neglected during the apartheid regime and given that South Africa's democratic presidents come from rural areas, we use data on rural and urban household access to water to estimate Equation 2.1 for these, respectively. Figure 2.4 depicts average annual growth in rural and urban water infrastructure by municipality and the share of population within the municipality that are Xhosa and Zulu, therefore coethnic to the presidents in our sample. We colour code municipalities by whether 50 per cent or more of the population within the municipality is Xhosa or Zulu (coethnic) during the period that the president of the same ethnic group was in power, or Other (non-coethnic). As in Figure 2.3, we observe a positive correlation, however, with respect to rural water infrastructure provision the magnitude of the relationship is greater.

Figure 2.4: Growth in Rural and Urban Water Infrastructure and Municipal Share of Coethnic Population




*Note:* Figure shows correlation between average annual growth in rural and urban water infrastructure and the share of population that are Xhosa and Zulu by municipality. Source: Based on South African Local Government Association (2020) and Department of Water and Sanitation (2020) data.

Irrespective of ethnicity, we expect rural households to start from a lower initial base of water infrastruc-

ture and therefore be associated with higher provision of water infrastructure across all municipalities. Our results, however, indicate that rural households in coethnic municipalities are associated with higher water infrastructure provision relative to rural households in non-coethnic municipalities. In Table 2.7, the dependent variables are access to water infrastructure by rural households, $rdpwater\ (rural)_{it}$ (columns 1 and 2) and urban households, $rdpwater\ (urban)_{it}$ (columns 3 and 4).

Our results in columns 1 and 2 indicate that there is a difference in water infrastructure provision to rural households in coethnic municipalities and those in non-coethnic municipalities. Findings suggest that rural households in Xhosa and/or Zulu municipalities are associated with higher water infrastructure provision relative to rural households in non-coethnic municipalities. In the case of urban water infrastructure, results are not statistically significant and we do not find an association between coethnicity and provision of water infrastructure. We expect households that are located in close proximity to economically active urban areas to have improved access to infrastructure from the outset relative to rural households in tribal and farming areas.

Table 2.7: Coethnic (50%) Rural and Urban Water Infrastructure Results

| | Dependent Variable: | | | |
|---|---|---|---|---|
| | $rdpwater(rural)_{it}$ | | $rdpwater(urban)_{it}$ | |
| | (1) | (2) | (3) | (4) |
| $coethnic(50\%)_{it-1}$ | 0.094** | 0.028* | 0.010 | 0.008 |
| | (0.041) | (0.017) | (0.047) | (0.017) |
| $rdpwater(rural)_{it-1}$ | | 0.867*** | | |
| | | (0.021) | | |
| $rdpwater(urban)_{it-1}$ | | | | 0.776*** |
| | | | | (0.043) |
| Control variables | Yes | Yes | Yes | Yes |
| Observations | 984 | 884 | 984 | 888 |
| R-squared | 0.700 | 0.919 | 0.594 | 0.835 |
| Number of municipalities | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes |

*Note:* $coethnic(50\%)_{it-1}$ is a binary variable equal to 1 if 50 per cent or more of the municipality's population is coethnic to the president in time $t-1$, 0 otherwise. Control variables include political competition, employment, population density, growth in urban settlements relative to rural settlements and the gross value added share of government expenditure.
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

### 2.5.2 Alternative Coethnic Thresholds

We specify different thresholds to check the robustness of our results in the presence of ethnic heterogeneity or homogeneity within municipalities. Results are reported in Table 2.8. First, the variable $coethnic(min)_{it-1}$ is a binary variable equal to 1 if the minority ethnic group in a municipality is coethnic to the president in time $t-1$, 0 otherwise. This variable is not subject to a threshold and captures whether the population that is the smallest share within a municipality is coethnic to the president or not. For example, if the minority of a municipality's population is classified as Xhosa, the municipality will be coethnic to the presidents during the 1996 to 2008 period.

Second, to account for more ethnic fractionalised municipalities, we specify $coethnic(maj)_{it-1}$. This variable is equal to 1 if the majority (no percentage threshold) of a municipality's population is coethnic to the president, 0 otherwise. The $coethnic(maj)_{it-1}$ classification includes municipalities that are ethnically fractionalised, which are excluded in the $coethnic(50\%)_{it-1}$ classification. For example, in this specification the City of Johannesburg is classified as a Zulu municipality in 2016, therefore classified as coethnic to the president during that time period. However, because the Zulu population representing the majority is only equal to 22.7 per cent of the total municipal population, the City of Johannesburg is classified as non-coethnic in our baseline specification. Setting aside the strict 50 per cent threshold allows us to study the effect of coethnicity with the president in ethnically fractionalised municipalities and hence equal to 0 in the $coethnic(50\%)_{it-1}$ specification.[9]

Third, to evaluate ethnic favouritism in ethnically homogeneous municipalities we increase the coethnic classification threshold to 70 per cent and 90 per cent respectively (Li, 2018). The variable $coethnic(70\%)_{it-1}$ is a binary variable equal to 1 if 70 per cent or more of the municipality's population is coethnic to the president in time $t-1$, 0 otherwise. The variable $coethnic(90\%)_{it-1}$ is a binary variable equal to 1 if 90 per cent or more of the municipality's population is coethnic to the president in time $t-1$, 0 otherwise.

As expected, coefficient estimates based on the minority, $coethnic(min)_{it-1}$, are not statistically significant for either water (Table 2.8 columns 1 and 2) or electricity infrastructure (columns 9 and 10). Municipalities where the minority of the population are either Xhosa or Zulu are not associated with higher infrastructure provision during the period that the coethnic president is in power. As the well-being of the presidents'

[9] Additionally, our results are robust to the inclusion of ethnic fractionalisation as a control variable. Results are reported in Appendix A2.6.

coethnic members are perceived to be unaffected, presidents will not derive utility by providing public infrastructure to municipalities where only the minority of the population is coethnic.

Table 2.8: Coethnic Threshold Results

| | *Panel A* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Dependent Variable: $rdpwater_{it}$ | | | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $coethnic(min)_{it-1}$ | -0.016 | -0.011 | | | | | | |
| | (0.018) | (0.008) | | | | | | |
| $coethnic(maj)_{it-1}$ | | | 0.079** | 0.030* | | | | |
| | | | (0.034) | (0.015) | | | | |
| $coethnic(70\%)_{it-1}$ | | | | | 0.125*** | 0.043** | | |
| | | | | | (0.040) | (0.020) | | |
| $coethnic(90\%)_{it-1}$ | | | | | | | 0.086 | 0.031 |
| | | | | | | | (0.073) | (0.034) |
| $rdpwater_{it-1}$ | | 0.839*** | | 0.825*** | | 0.814*** | | 0.835*** |
| | | (0.026) | | (0.026) | | (0.027) | | (0.027) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 984 | 888 | 984 | 888 | 984 | 888 | 984 | 888 |
| R-squared | 0.717 | 0.906 | 0.731 | 0.909 | 0.743 | 0.909 | 0.722 | 0.907 |
| Number of municipalities | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | *Panel B* | | | | | | | |
| | Dependent Variable: $nlight_{it}$ | | | | | | | |
| | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) |
| $coethnic(min)_{it-1}$ | 0.009 | 0.000 | | | | | | |
| | (0.058) | (0.020) | | | | | | |
| $coethnic(maj)_{it-1}$ | | | 0.022 | 0.008 | | | | |
| | | | (0.034) | (0.021) | | | | |
| $coethnic(70\%)_{it-1}$ | | | | | 0.074*** | 0.040** | | |
| | | | | | (0.026) | (0.018) | | |
| $coethnic(90\%)_{it-1}$ | | | | | | | 0.139*** | 0.095*** |
| | | | | | | | (0.041) | (0.035) |
| $nlight_{it-1}$ | | 0.518*** | | 0.517*** | | 0.508*** | | 0.504*** |
| | | (0.040) | | (0.042) | | (0.044) | | (0.047) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 828 | 780 | 828 | 780 | 828 | 780 | 828 | 780 |
| R-squared | 0.360 | 0.502 | 0.361 | 0.502 | 0.374 | 0.506 | 0.379 | 0.511 |
| Number of municipalities | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* Respectively $coethnic(min)_{it-1}$, $coethnic(maj)_{it-1}$, $coethnic(70\%)_{it-1}$ and $coethnic(90\%)_{it-1}$ are binary variables equal to 1 if the ethnic group representing the smallest share (minority), largest share (majority), 70 per cent and 90 per cent or more of the municipality's population is coethnic to the president in time $t-1$, 0 otherwise. Control variables include political competition, employment, population density, growth in urban settlements relative to rural settlements and the gross value added share of government expenditure.
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Analysing ethnic favouritism according to the majority of the municipality's population, $coethnic(maj)_{it-1}$, results support water infrastructure findings in Table 2.2. Equivalent to the baseline estimates, column 3 estimates suggests that coethnic municipalities are associated with 7.9 per cent higher water infrastructure provision relative to non-coethnic municipalities. As the threshold is increased to 70 per cent (columns 5 and 6), the size of the coefficient estimate increases and remains statistically significant.

The association between coethnicity and electricity infrastructure provision specifically holds in homogeneous coethnic municipalities, as results in columns 13 to 16 suggest. The size of $coethnic(70)_{it-1}$ and $coethnic(90)_{it-1}$ coefficient estimates increase, with column 15 results suggesting that coethnic municipalities are associated with 13.9 per cent higher provision of electricity infrastructure relative to non-coethnic municipalities. Table 2.8 findings indicate that favouritism in electricity infrastructure occurs when ethnic groups are clearly segregated, a determining factor of resource allocation as discussed by Ejdemyr et al. (2018).

### 2.5.3 President's Birth Region

Political leaders also favour birth regions through aid allocation and budget decisions. Collecting data on Chinese development projects and birth regions of political leaders from 2000 to 2012, Dreher et al. (2019) find that Chinese foreign aid is prone to be strategically allocated to the birth provinces of political leaders in Africa, including South Africa. Strategic allocation of resources also occurs within international organisations. Gehring and Schneider (2018) demonstrate that European Union Commissioners for Agriculture allocate budget shares in favour of their countries of origin.

We test whether the home town municipality of the president is a potential outlier by including a control binary variable, $president\ municipality_{it}$, which is equal to 1 if the municipality is the home town of the president, and 0 otherwise.[10] Findings suggest that presidents' municipalities are not significantly associated with higher water or electricity infrastructure provision and coethnic municipality coefficient estimates remain similar to our baseline analysis. In our study, favouritism is therefore based on coethnicity rather than geography, which would be classified as regional favouritism (Hodler & Raschky, 2014).

[10]Home town (birth) district municipalities: Nelson Mandela was born in present-day OR Tambo district municipality, Eastern Cape; Thabo Mbeki in present-day Chris Hani, Eastern Cape; and Jacob Zuma in present-day King Cetshwayo, KwaZulu-Natal.

Table 2.9: Regional Favouritism Results

| | Dependent Variable: | | | |
|---|---|---|---|---|
| | $rdpwater_{it}$ | | $nlight_{it}$ | |
| | (1) | (2) | (3) | (4) |
| $coethnic(50\%)_{it-1}$ | 0.092** | 0.033* | 0.071** | 0.037* |
| | (0.041) | (0.019) | (0.029) | (0.019) |
| $president\ municipality_{it}$ | -0.050 | -0.016 | -0.087 | -0.028 |
| | (0.038) | (0.018) | (0.078) | (0.042) |
| $rdpwater_{it-1}$ | | 0.824*** | | |
| | | (0.027) | | |
| $nlight_{it-1}$ | | | | 0.507*** |
| | | | | (0.045) |
| Control variables | Yes | Yes | Yes | Yes |
| Observations | 984 | 888 | 828 | 780 |
| R-squared | 0.733 | 0.909 | 0.375 | 0.506 |
| Number of municipalities | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes |

*Note:* $coethnic(50\%)_{it-1}$ is a binary variable equal to 1 if 50 per cent or more of the municipality's population is coethnic to the president in time $t-1$, 0 otherwise. $president\ municipality_{it}$ is a binary variable equal to 1 if the municipality is the home town of the president, 0 otherwise. Control variables include political competition, employment, population density, growth in urban settlements relative to rural settlements and the gross value added share of government expenditure.
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

## 2.6 Concluding Remarks

We use district municipal-level data over the 1996 to 2016 period to study ethnic favouritism in public infrastructure provision in South Africa. Results suggest that there is an association between coethnicity with the president and relative higher water and electricity infrastructure provision. Our findings are only suggestive and call for future research. To confidently draw conclusions and determine the channel of ethnic favouritism, an in-depth analysis of infrastructure financing and grant allocation is necessary.

Nevertheless, this study contributes to the debate on redistributive politics in Africa and highlights the need for policy interventions to achieve Sustainable Development Goal 16, which sets out to ensure responsive, inclusive, participatory and representative decision-making at all levels. The current administrative government, headed by recently elected President Cyril Ramaphosa, who is Venda, need to identify and address weaknesses in the infrastructure funding mechanism that have allowed biased distribution of resources up until now.

Although the allocation of national funding is overseen by the FFC, recommendations by this independent body are often disregarded by government (Kroth, 2014; Wehner, 2000). To ensure fair and equitable infrastructure provision, resource allocations should not be solely determined by the government, of which members are ethnically tied to and appointed by the president (Calland, 2013), but by a technical governmental institution which is as independent as possible from personal and political considerations. The Constitution should therefore allow for a more technical and objective body, to not only oversee, but actively participate in the division of revenue, implementation of development priorities, and the allocation and transfer of funds for basic infrastructure (Khemani, 2007).

# A2 Appendix

## A2.1 Extended Control Data

As an additional robustness check, we extend ethnic and control data to 1992 and 1994, the first data points for electricity and water infrastructure respectively. Results are presented in Table A2.1. Estimates from this exercise provide equivalent coefficient estimates and support baseline findings in Table 2.2. Coethnic municipalities are associated with 8.1 and 6.2 per cent higher water and electricity infrastructure provision relative to non-coethnic municipalities.

Table A2.1: Coethnic (50%) Extended Control Data Results

| | Dependent Variable: | | | |
|---|---|---|---|---|
| | $rdpwater_{it}$ | | $nlight_{it}$ | |
| | (1) | (2) | (3) | (4) |
| $coethnic(50\%)_{it-1}$ | 0.081** | 0.033** | 0.062** | 0.032** |
| | (0.034) | (0.016) | (0.027) | (0.013) |
| $rdpwater_{it-1}$ | | 0.843*** | | |
| | | (0.026) | | |
| $nlight_{it-1}$ | | | | 0.596*** |
| | | | | (0.038) |
| Control variables | Yes | Yes | Yes | Yes |
| Observations | 1,080 | 984 | 977 | 972 |
| R-squared | 0.766 | 0.930 | 0.549 | 0.729 |
| Number of municipalities | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes |

*Note:* $coethnic(50\%)_{it-1}$ is a binary variable equal to 1 if 50 per cent or more of the municipality's population is coethnic to the President in time $t-1$, 0 otherwise. Control variables include political competition, employment, population density, growth in urban settlements relative to rural settlements and the gross value added share of government expenditure.
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

## A2.2 Different Lag Structures

We consider different lag structures of the baseline specification. Table A2.2 Panel A reports results for water and Panel B for electricity infrastructure. Water infrastructure seems to be much more persistent, as we can also see from the lagged dependent variable specifications in Table 2.2. Even when considering longer lags, coethnic municipalities are associated with higher provision of water infrastructure. Due to the ethnic composition of municipalities not changing over the study period, as depicted in Figure 2.1, this is not surprising. On the other hand, electricity infrastructure is not as persistent and the association between

coethnicity and higher electricity infrastructure provision is short-lived. Overall, results support our findings in Table 2.2.

Table A2.2: Lag Structure Results

| | *Panel A* Dependent Variable: $rdpwater_{it}$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $coethnic(50\%)_{it-2}$ | 0.103** | 0.036 | | | | | | |
| | (0.050) | (0.022) | | | | | | |
| $coethnic(50\%)_{it-3}$ | | | 0.082* | 0.017** | | | | |
| | | | (0.042) | (0.008) | | | | |
| $coethnic(50\%)_{it-4}$ | | | | | 0.081** | 0.032*** | | |
| | | | | | (0.036) | (0.011) | | |
| $coethnic(50\%)_{it-5}$ | | | | | | | 0.099*** | 0.037*** |
| | | | | | | | (0.034) | (0.010) |
| $rdpwater_{it-1}$ | | 0.820*** | | 0.829*** | | 0.825*** | | 0.824*** |
| | | (0.030) | | (0.028) | | (0.029) | | (0.029) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 984 | 888 | 984 | 888 | 984 | 888 | 936 | 888 |
| R-squared | 0.736 | 0.909 | 0.730 | 0.907 | 0.729 | 0.908 | 0.705 | 0.909 |
| Number of municipalities | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | *Panel B* Dependent Variable: $nlight_{it}$ | | | | | | | |
| | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) |
| $coethnic(50\%)_{it-2}$ | 0.047* | 0.013 | | | | | | |
| | (0.027) | (0.016) | | | | | | |
| $coethnic(50\%)_{it-3}$ | | | 0.036 | 0.015 | | | | |
| | | | (0.032) | (0.032) | | | | |
| $coethnic(50\%)_{it-4}$ | | | | | 0.016 | -0.003 | | |
| | | | | | (0.041) | (0.032) | | |
| $coethnic(50\%)_{it-5}$ | | | | | | | 0.023 | 0.020 |
| | | | | | | | (0.050) | (0.027) |
| $nlight_{it-1}$ | | 0.515*** | | 0.516*** | | 0.519*** | | 0.518*** |
| | | (0.042) | | (0.040) | | (0.040) | | (0.040) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 828 | 780 | 828 | 780 | 828 | 780 | 780 | 780 |
| R-squared | 0.365 | 0.502 | 0.363 | 0.502 | 0.360 | 0.502 | 0.331 | 0.502 |
| Number of municipalities | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $coethnic(50\%)_{it-2}$, $coethnic(50\%)_{it-3}$, $coethnic(50\%)_{it-4}$, $coethnic(50\%)_{it-5}$ are binary variables equal to 1 if 50 per cent or more of the municipality's population is coethnic to the President in time $t-2$, $t-3$, $t-4$, $t-5$, 0 otherwise. Control variables include political competition, employment, population density, growth in urban settlements relative to rural settlements and the gross value added share of government expenditure.
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

## A2.3 Data Aggregate over Election Periods

To ensure that our specification accurately controls for the effect of political competition in national elections, we aggregate our data in five-year intervals according to elections and rerun our estimation. Results reported in Table A2.3 support baseline findings from Table 2.2.

Table A2.3: Five Year Average (Election Period) Results

| | *Panel A* Dependent Variable: $rdpwater_{ie}$ | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $coethnic(50\%)_{ie}$ | 0.097** | 0.101*** | 0.105*** | 0.099*** | 0.091*** | 0.091*** |
| | (0.037) | (0.033) | (0.032) | (0.032) | (0.029) | (0.029) |
| $polcomp_{ie}$ | | 0.065 | 0.043 | 0.054 | 0.069 | 0.070 |
| | | (0.092) | (0.083) | (0.080) | (0.069) | (0.068) |
| $employment_{ie}$ | | | 0.818*** | 0.745*** | 0.753*** | 0.750*** |
| | | | (0.123) | (0.107) | (0.112) | (0.113) |
| $popdens_{ie}$ | | | | -0.404*** | -0.445*** | -0.450*** |
| | | | | (0.104) | (0.098) | (0.104) |
| $urbanrural_{ie}$ | | | | | 0.035* | 0.034* |
| | | | | | (0.020) | (0.020) |
| $gvagovt_{ie}$ | | | | | | -0.021 |
| | | | | | | (0.075) |
| Observations | 260 | 260 | 260 | 260 | 248 | 248 |
| R-squared | 0.699 | 0.701 | 0.776 | 0.791 | 0.803 | 0.803 |
| Number of municipalities | 52 | 52 | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes | Yes | Yes |
| | *Panel B* Dependent Variable: $nlight_{ie}$ | | | | | |
| | (7) | (8) | (9) | (10) | (11) | (12) |
| $coethnic(50)_{ie}$ | 0.080** | 0.086*** | 0.082*** | 0.079*** | 0.079*** | 0.079*** |
| | (0.037) | (0.026) | (0.029) | (0.029) | (0.029) | (0.029) |
| $polcomp_{ie}$ | | 0.398*** | 0.331*** | 0.332*** | 0.353*** | 0.354*** |
| | | (0.072) | (0.057) | (0.058) | (0.061) | (0.061) |
| $employment_{ie}$ | | | 1.327*** | 1.307*** | 1.329*** | 1.327*** |
| | | | (0.180) | (0.176) | (0.178) | (0.181) |
| $popdens_{ie}$ | | | | -0.150 | -0.150 | -0.156 |
| | | | | (0.197) | (0.197) | (0.204) |
| $urbanrural_{ie}$ | | | | | 0.022 | 0.022 |
| | | | | | (0.022) | (0.023) |
| $gvagovt_{ie}$ | | | | | | -0.015 |
| | | | | | | (0.102) |
| Observations | 208 | 208 | 208 | 208 | 196 | 196 |
| R-squared | 0.194 | 0.314 | 0.596 | 0.599 | 0.616 | 0.616 |
| Number of municipalities | 52 | 52 | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $coethnic(50\%)_{ie}$ is a binary variable equal to 1 if 50 per cent or more of the municipality's population is coethnic to the President in the election period, 0 otherwise.
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

## A2.4 President Term Analysis Check

We analyse infrastructure provision in Zulu municipalities over the Xhosa leadership term (1996 to 1999 and 2000 to 2008), and Xhosa municipalities over the Zulu leadership term (2009 to 2016). Results indicate that Zulu municipalities are not associated with higher infrastructure provision over the Xhosa leadership term. Similarly, Xhosa municipalities are not associated with higher infrastructure provision over the Zulu leadership term.

Table A2.4: Presidential Term Results Check

| | Dependent Variable: | | | | | |
|---|---|---|---|---|---|---|
| | $rdpwater_{it}$ | | | $nlight_{it}$ | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $zulu_{it} * mandelaterm_t$ | -0.090** | | | 0.031 | | |
| | (0.037) | | | (0.036) | | |
| $zulu_{it} * mbekiterm_t$ | | -0.025 | | | -0.036 | |
| | | (0.027) | | | (0.029) | |
| $xhosa_{it} * zumaterm_t$ | | | -0.132** | | | -0.174*** |
| | | | (0.061) | | | (0.046) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 984 | 984 | 984 | 828 | 828 | 828 |
| R-squared | 0.722 | 0.718 | 0.727 | 0.361 | 0.362 | 0.388 |
| Number of municipalities | 52 | 52 | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $xhosa_{it}$ ($zulu_{it}$) is a binary variable equal to 1 if 50 per cent or more of the municipality's population is classified as Xhosa (Zulu), 0 otherwise. The three $term_t$ variables are binary variables equal to 1 for the years in which the respective Presidents were in power, 0 otherwise. Control variables include political competition, employment, population density, growth in urban settlements relative to rural settlements and the gross value added share of government expenditure.
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

## A2.5 Rural and Urban Water Coethnic Threshold Analysis

Table A2.5 reports results with respect to rural and urban household water infrastructure provision using the alternative coethnic threshold specifications. Rural water infrastructure again justifies results reported in Table 2.8 Panel A.

Table A2.5: Rural and Urban Water Infrastructure Threshold Results

| | *Panel A* Dependent Variable: $rdpwater(rural)_{it}$ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $coethnic(min)_{it-1}$ | -0.017 | -0.014* | | | | | | |
| | (0.024) | (0.008) | | | | | | |
| $coethnic(maj)_{it-1}$ | | | 0.085** | 0.027* | | | | |
| | | | (0.037) | (0.015) | | | | |
| $coethnic(70\%)_{it-1}$ | | | | | 0.142*** | 0.039* | | |
| | | | | | (0.044) | (0.020) | | |
| $coethnic(90\%)_{it-1}$ | | | | | | | 0.091 | 0.024 |
| | | | | | | | (0.084) | (0.035) |
| $rdpwater(rural)_{it-1}$ | | 0.879*** | | 0.867*** | | 0.857*** | | 0.876*** |
| | | (0.018) | | (0.021) | | (0.023) | | (0.020) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 984 | 884 | 984 | 884 | 984 | 884 | 984 | 884 |
| R-squared | 0.683 | 0.917 | 0.699 | 0.919 | 0.714 | 0.919 | 0.688 | 0.918 |
| Number of municipalities | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | *Panel B* Dependent Variable: $rdpwater(urban)_{it}$ | | | | | | | |
| | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) |
| $coethnic(min)_{it-1}$ | -0.055 | -0.018 | | | | | | |
| | (0.048) | (0.019) | | | | | | |
| $coethnic(maj)_{it-1}$ | | | 0.010 | 0.009 | | | | |
| | | | (0.040) | (0.015) | | | | |
| $coethnic(70\%)_{it-1}$ | | | | | 0.023 | 0.010 | | |
| | | | | | (0.051) | (0.021) | | |
| $coethnic(90\%)_{it-1}$ | | | | | | | -0.090 | -0.021 |
| | | | | | | | (0.083) | (0.031) |
| $rdpwater(urban)_{it-1}$ | | 0.775*** | | 0.776*** | | 0.775*** | | 0.772*** |
| | | (0.042) | | (0.043) | | (0.044) | | (0.037) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 984 | 888 | 984 | 888 | 984 | 888 | 984 | 888 |
| R-squared | 0.595 | 0.835 | 0.594 | 0.835 | 0.595 | 0.835 | 0.602 | 0.835 |
| Number of municipalities | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* Respectively $coethnic(min)_{it-1}$, $coethnic(maj)_{it-1}$, $coethnic(70\%)_{it-1}$ and $coethnic(90\%)_{it-1}$ are binary variables equal to 1 if the ethnic group representing the smallest share (minority), largest share (majority), 70 per cent and 90 per cent or more of the municipality's population is coethnic to the President in time $t-1$, 0 otherwise. Control variables include political competition, employment, population density, growth in urban settlements relative to rural settlements and the gross value added share of government expenditure.
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

## A2.6 Ethnic Fractionalisation

As an additional robustness test to account for the degree of ethnic fractionalisation, we control for ethnic fractionalisation, $fractionalisation_{it}$, as a control variable in Table A2.6. We calculate the standard ethnic fractionalisation index (ELF) for municipalities as one minus the Herfindahl Index of ethnic group shares. This index provides the probability that two randomly selected citizens in a municipality belong to different ethnic groups (Alesina et al., 2003). On average, there is a 45 per cent probability that two individuals in a South African municipality are from two different ethnic groups. Our results are robust to the inclusion of ethnic fractionalisation as a control variable.

Table A2.6: Ethnic Fractionalisation Results

| | Dependent Variable: | | | |
|---|---|---|---|---|
| | $rdpwater_{it}$ | | $nlight_{it}$ | |
| | (1) | (2) | (3) | (4) |
| $coethnic(50\%)_{it-1}$ | 0.094** | 0.030* | 0.077** | 0.045** |
| | (0.039) | (0.017) | (0.029) | (0.019) |
| $fractionalisation_{it}$ | 0.667* | -0.139 | 1.635*** | 0.953*** |
| | (0.361) | (0.114) | (0.365) | (0.241) |
| $rdpwater_{it-1}$ | | 0.828*** | | |
| | | (0.027) | | |
| $nlight_{it-1}$ | | | | 0.477*** |
| | | | | (0.046) |
| Control variables | Yes | Yes | Yes | Yes |
| Observations | 984 | 888 | 828 | 780 |
| R-squared | 0.736 | 0.909 | 0.407 | 0.517 |
| Number of municipalities | 52 | 52 | 52 | 52 |
| Time FE | Yes | Yes | Yes | Yes |
| Municipality FE | Yes | Yes | Yes | Yes |

*Note:* $coethnic(50\%)_{it-1}$ is a binary variable equal to 1 if 50 per cent or more of the municipality's population is coethnic to the President in time $t-1$, 0 otherwise. $fractionalisation_{it}$ is the probability that two randomly selected citizens in a municipality belong to different ethnic groups. Control variables include political competition, employment, population density, growth in urban settlements relative to rural settlements and the gross value added share of government expenditure.
Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

# Chapter 3

# The Effect of Colonial and Pre-Colonial Ethnic Institutions on Contemporary Education in Africa[1]

*Contrary to previous findings, this paper argues that present-day education outcomes in Africa cannot be independently attributed to colonial or pre-colonial ethnic institutions. It is instead the complementarity or contention between colonial and pre-colonial institutions that result in education outcomes we observe today. Using geolocated DHS literacy outcomes for Cameroon, Côte d'Ivoire, Ghana, and Nigeria, our findings suggest that the positive effect of British rule on contemporary literacy is diminished in centralised ethnic regions, where British rule was indirect, potentially opposed and less salient relative to ethnic-specific institutions. This paper contributes to debates on colonial and pre-colonial ethnic influences on African development, moving beyond country-level analysis.*

[1]We thank seminar audiences at Economic Society of South Africa (ESSA) Conference in Johannesburg 2019, Economic Development and Well-being Research Group (EDWRG) Online Seminar 2020, Economic History Association (EHA) Online Conference 2020, Economic History Society (EHS) Online Conference 2021, Working Group in African Political Economy (WGAPE) Annual Meeting in Cape Town 2019 and Online 2020 for helpful comments. We acknowledge comments received from Brian Dillon and Daniel Posner at WGAPE Annual Meetings, Johan Fourie at ESSA Conference, and anonymous referees. A previous version of this paper is an ERSA Working Paper, No. 850, available for download from `http://www.econrsa.org/publications/working-papers/effect-colonial-and-pre-colonial-institutions-contemporary-education`.

## 3.1 Introduction

A growing literature examines the effects of historical institutions on contemporary development in Africa. Variation in present-day education outcomes have specifically been attributed to colonial rule, with British rule being considered more favourable (Benavot & Riddle, 1988; Brown, 2000; Garnier & Schafer, 2006; Grier, 1999). Similarly, pre-colonial ethnic-specific institutional traits have been associated with contemporary development characteristics and increased public goods provision, including schooling (Angeles & Elizalde, 2017; Archibong, 2019; Gennaioli & Rainer, 2007; Michalopoulos & Papaioannou, 2013, 2014; Michalopoulos, Putterman, & Weil, 2019).

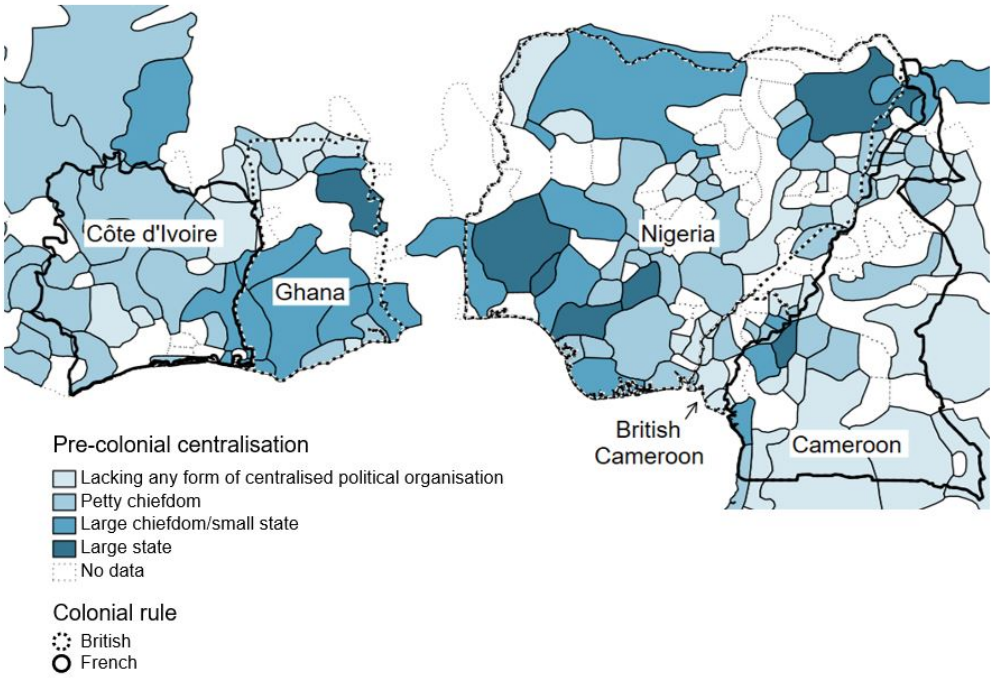
Given that colonial and pre-colonial ethnic institutions coexisted in Africa, studying the economic effects of these two institutions in isolation may lead to distorted results. We propose that it is the complementarity or contention between colonial institutions 'inherited' by countries and pre-existing ethnic institutions that can explain differences in contemporary education outcomes. Understanding the interdependence between colonial rule and pre-colonial ethnic institutions is essential as their effects still determine outcomes even today (Brown, 2000; Cogneau & Moradi, 2014; Frankema, 2012; Gennaioli & Rainer, 2007). Therefore, the objective of the study is to analyse the effect of these institutions along with their interaction on contemporary literacy.

Studying the effect on literacy is worthwhile, considering that whilst sub-Saharan Africa only constitute 17 per cent of the world's population, a quarter of the global illiterate population resides within this region (United Nations, 2019). Furthermore, education outcomes are associated with economic growth, development, quality of institutions and political participation (Acemoglu et al., 2014; Barro, 2001; Glaeser et al., 2007; Lipset, 1959; Wantchekon, Klašnja, & Novta, 2015). Literacy not only improves the individual's economic prospects, but also that of society by increasing the human capital necessary for a well-functioning, productive and growing economy. Literacy is therefore a suitable point of departure to address the various development challenges faced by African countries.

Using geolocated literacy data from the Demographic and Health Surveys (DHS) (ICF, 2017), our analysis focuses on four countries in Western and Western-Central Africa; Cameroon, Côte d'Ivoire, Ghana, and Nigeria. These countries provide a compelling case for our study: firstly, bordering countries were subject to different colonial institutions as illustrated in Figure 3.1. Ghana was colonised by the British in 1874 and borders Côte d'Ivoire, declared a French colony in 1842. Nigeria is a former British colony (1901) bordering

Cameroon that was first colonised by Germany in 1884, known as German Kamerun. Following World War I in 1916, Kamerun was divided between British and French territories. In 1961 after independence, British Cameroon regions were allocated between Cameroon and Nigeria, with Southern regions voting to join present-day Cameroon and the Northern regions voting to join Nigeria.[2] Secondly, artificial borders imposed by colonialists split ethnic groups along the borders such that the same ethnic groups were exposed to different colonial institutions (Alesina & Zhuravskaaya, 2011; Michalopoulos & Papaioannou, 2016). For instance, the Assini ethnic group is split by the Ghana-Côte d'Ivoire border and was therefore subject to French rule in Côte d'Ivoire and British rule in Ghana. Finally, there is variation in ethnic institutions within and between countries.

Figure 3.1: Pre-colonial Ethnic Centralisation




*Note:* Map illustrates colonial rule borders, pre-colonial ethnic region boundaries and the ethnic region level of centralisation. Ethnic regions lacking any form of centralised political organisation and petty chiefdoms are classified as fragmented ethnic regions. Large chiefdoms and states are classified as centralised ethnic regions (Gennaioli & Rainer, 2007). Source: Based on Murdock (1959), Murdock (1967) and GADM (2018).

To measure pre-colonial ethnic institutions we consider the degree of political centralisation, i.e. chiefly hierarchy and political complexity of ethnic regions (Gennaioli & Rainer, 2007). Figure 3.1 also illustrates pre-colonial ethnic region boundaries and jurisdictional hierarchy levels beyond local community. Ethnic regions lacking political organisation and petty chiefdoms are classified as fragmented ethnic regions, whilst

[2]In 1957, Ghana was the first country in sub-Saharan Africa to gain independence, followed by Nigeria, Côte d'Ivoire and Cameroon in 1960.

larger chiefdoms and states that are more politically complex are classified as centralised ethnic regions (Gennaioli & Rainer, 2007). Côte d'Ivoire is characterised by majority petty chiefdoms, whilst the level of centralisation in Nigeria vary considerably between ethnic regions. We obtain ethnic institution data from George Peter Murdock's Ethnographic Atlas (Murdock, 1959, 1967).

Table 3.1 provides literacy rates amongst individuals from fragmented and centralised ethnic regions within the respective former colonies. In former British colonies, contemporary literacy is higher in fragmented relative to centralised ethnic regions. By contrast, in former French colonies, literacy is higher in centralised relative to fragmented ethnic regions. The aim of our study is therefore to analyse whether this variation can be explained by the interrelatedness between colonial and pre-colonial institutions. As pointed out by Frankema (2012) and De Haas and Frankema (2018), we cannot understand the variation in education if we do not consider the role of African agency, which is the way in which native African citizens exercise influence within society and the economy.

Table 3.1: Literacy Rates (%) by Colonial Rule and Ethnic Centralisation

| | *British* | | *French* | |
|---|---|---|---|---|
| | Fragmented | Centralised | Fragmented | Centralised |
| Able to read parts | 9.5 | 8.5 | 8.4 | 7.7 |
| Able to read whole sentence | 61.8 | 50.4 | 51.5 | 72.3 |
| Cannot read | 28.7 | 41.1 | 40.1 | 20.0 |

*Note:* Table provides literacy rates of surveyed individuals from fragmented and centralised ethnic regions within the respective former colonies. Regions forming part of British colonial rule include Ghana, Nigeria and British Cameroon. Regions forming part of French colonial rule include Cameroon and Côte d'Ivoire. Source: Literacy data from ICF (2017).

Our findings suggest that British colonial rule and pre-colonial ethnic centralisation have heterogeneous effects on contemporary education depending on the interaction between these two institutions. British rule is positively associated with literacy, however, only in fragmented ethnic regions. In centralised ethnic regions this positive effect of British rule - often reported in literature - is mitigated. In politically complex ethnic regions with established hierarchies and political reach, indirect British rule was potentially opposed and less salient.

Our study contributes to the literature in the following respects. Firstly, it adds to insights regarding variation in education outcomes amongst former colonies, which have been attributed to the political, administrative and educational approaches implemented by colonial rulers (Bolt & Bezemer, 2009; Cogneau & Moradi, 2014; Dupraz, 2019; Frankema, 2012; Huillery, 2009). Secondly, our paper expands the literature relating

contemporary economic outcomes to pre-colonial ethnic institutions moving beyond country-level analysis (Angeles & Elizalde, 2017; Bandyopadhyay & Green, 2016; Gennaioli & Rainer, 2007; Lowes et al., 2017; Michalopoulos & Papaioannou, 2013, 2014, 2016; Platas, 2018). Yet, studies neglect to take into account the interrelated effect of colonial rule and pre-existing indigenous institutions. Therefore, thirdly and most importantly, we contribute to the recent and limited literature that acknowledges the relationship between colonialists and ethnic indigenous societies (Archibong, 2019; De Haas & Frankema, 2018; Huillery, 2011; Müller-Crepon, 2020).

The rest of the paper is organised as follows. In Section 3.2, we provide background on colonial and pre-colonial ethnic institutions and discuss our conceptual framework. Section 3.3 describes the data and methodology used. Section 3.4 presents the main empirical results and Section 3.5 additional analysis results. The last section provides concluding remarks.

## 3.2 Background

> Institutions are the humanly devised constraints that structure political, economic and social interaction. They consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct), and formal rules (constitutions, laws, property rights).
>
> - North (1991)

The focus of this study is the interaction between two institutions, colonial rule and pre-colonial ethnic centralisation. Colonial rule is the enforcement of British or French institutions, such as the implementation of different law and education policies. Our measure of pre-colonial ethnic region centralisation can be viewed as an index of indigenous institutional advancement that existed prior to colonialism. Present-day structures of societies were affected by the hostility or collaboration between foreign colonial and existing traditional systems, influencing development trajectories intentionally and unintentionally.

### 3.2.1 Colonial Institutions

Initial colonialism by the British took place due to commercial motivations. As trading companies entered into African territories, the British would follow with the purpose of overseeing the administrative economy (Moradi, 2008). The French, on the other hand, envisioned African territories as part of the empire and

moved into African regions with this in mind (Clignet & Foster, 1964; Cogneau & Moradi, 2014). Whilst the British employed a decentralised approach taking into consideration traditional institutions, the French were more rigid and centralised. This was also true in their education systems.

Brown (2000) and Feldmann (2016) provide concise comparisons of British and French institutions with respect to education systems. The British customised education approaches to the characteristics of different societies, whilst the French were less flexible in this regard and established a uniform education system. For example, the French enforced the French language on elementary school level. By contrast, in British colonies, education took place in local dialects and English was introduced later. In British colonies, education was mostly provided by Christian missionary schools and other private voluntary organisations. Although these organisations were subsidised by the British government, they had a high level of autonomy and often employed African teachers. In French colonies, government was the leading education provider, and private and missionary schools had to follow strict national curriculums and employed teachers from France and other European countries (Clignet & Foster, 1964; Dupraz, 2019; Feldmann, 2016; Garnier & Schafer, 2006; Gifford & Weiskel, 1971; White, 1996). Furthermore, although school enrolment was higher in British than in French colonies, students were more likely to repeat grades if their progress was unsatisfactory (Benavot & Riddle, 1988; Dupraz, 2019).

Studies have argued that these differences in colonial rule are responsible for present-day education outcomes (Benavot & Riddle, 1988; Bolt & Bezemer, 2009; Brown, 2000; Garnier & Schafer, 2006; Grier, 1999; White, 1996).[3] Focusing on French and British territories in the partitioning of German Togoland, today Ghana and Togo, Cogneau and Moradi (2014) use data on recruits to the Ghana colonial army and conduct a border discontinuity analysis to study differences in literacy and religion at the borders. Findings show the positive effects of increased education spending and missionary support by the British in the Southern regions of Togo and Trans-Volta Togoland, however, in the North results are weak and do not show noteworthy differences. Cogneau and Moradi (2014) furthermore emphasise the persistence of colonial effects in education outcomes.

In Cameroon, Dupraz (2019) uses historical and present-day Census microdata and finds that British rule is

[3]Colonial rule is also associated with other contemporary development outcomes. Angeles (2007) finds that colonialism is a determining factor of income inequality observed today. In areas where the percentage of European settlers were higher (yet still in minority), inequality increased due to exclusion of owning resources. Easterly and Levine (2016) find that countries with larger European settlements during the colonial period have higher contemporary economic development relative to countries with smaller European settlements. Anderson (2018) finds a strong association between colonial institutions and present-day HIV rates amongst females. Common law colonies are associated with weaker female marital property rights and therefore suffer from higher HIV rates.

associated with higher levels of schooling until the 1950's, where after French rule is associated with higher education outcomes during the 1960's and 1970's. Later cohorts, however, again indicate the favourable effect of the British education system. Effects are explained by higher expenditure on public schools and increased missionary activity in British colonies, and later colonial period increased investments by the French.

We argue that differences in present-day education outcomes are not only as a result of differences in colonial rule, but rather due to the relationship between the respective colonialists and native leaders from ethnic regions. The British employed traditional authorities as representatives and mediators for social and economic change. Essentially, native chiefs had to become British government agents. This approach may have presented challenges in the introduction of formal education. Although the British attempted to minimise political interference by emphasising economic diffusion (Clignet & Foster, 1964), this approach influenced the mechanisms of the respective institutions. Through indirect rule, the British utilised and cooperated with traditional chiefs to enforce institutions, but also accommodating the ethnic and traditional institutions that were already in place (Garnier & Schafer, 2006; Lugard, 1929). In contrast, the French renounced local ethnic leaders of their roles and created new administrative units that negated traditional ethnic boundaries and systems. This form of direct rule had little regard for existing ethnic institutions. Assignment of chiefs to administrative units depended on their allegiance to the French government and education (Bolt & Bezemer, 2009; Crowder, 1964).

Research by Gerring, Ziblatt, van Gorp, and Arévalo (2011), Acemoglu, Chaves, Osafo-Kwaako, and Robinson (2016) and more recently, Müller-Crepon (2020) suggest that colonial rule differed within colonies. Müller-Crepon (2020) finds that the British adopted indirect rule in centralised ethnic regions, and direct rule in fragmented ethnic regions. In centralised ethnic regions, budgets for native administration were larger, however, colonial rulers were less involved. In fragmented ethnic regions, the British increased administration and were less reliant on ethnic region authorities. In line with previous accounts, Müller-Crepon (2020) finds that the French had a more direct and assimilative approach with little regard for pre-colonial ethnic centralisation.

We acknowledge potential endogeneity. For example, the British tended to colonise more affluent regions with higher missionary presence, which indirectly could lead to improved results (Cogneau, 2003; Frankema, 2012). In addition, recent research by Ricart-Huguet (2021) indicate that investment in education within British and French colonies was unequal and associated with pre-colonial coastal trade centre locations. Although,

Ricart-Huguet (2021) does not find colonial investments to be higher in centralised ethnic regions, future research needs to examine the interrelated effect of colonial investments and pre-colonial ethnic centralisation.

### 3.2.2 Pre-Colonial Ethnic Centralisation

Ethnically centralised regions with established ethnic institutions and political authority are associated with higher public goods provision due to increased accountability and coordination by local chiefs, which affected the ability to implement modernisation programmes (Gennaioli & Rainer, 2007). Using the example of Uganda, Gennaioli and Rainer (2007) explains that in centralised ethnic regions, the British government incorporated and acknowledged the existing hierarchy of leaders. However, in fragmented regions, local chiefs were selected by the colonial government and had to report to the 'distant' Colonial Administration. In the latter case, it proved difficult for the colonial government to manage and coordinate with dispersed leaders whom often acted in self-interest. By contrast, in centralised ethnic regions the colonial government was able to encourage the introduction and implementation of colonial influences, including formal education policies, as leaders were subject to political authority and were held accountable.[4]

In line with findings by Gennaioli and Rainer (2007), Michalopoulos and Papaioannou (2013) relate pre-colonial ethnic centralisation to present-day regional development in Africa using nighttime light data. In centralised ethnic regions where local ethnic leaders and citizens were likely more involved, increased engagement in policy implementation is expected, affecting regional economic growth and the supply of schooling (Michalopoulos & Papaioannou, 2013). Similarly, in Latin America, pre-colonial ethnic centralisation is also associated with improved socioeconomic outcomes, including education. Pre-colonial politically complex regions were able to organise their societies and defend their own interests to national colonial and post-colonial governments (Angeles & Elizalde, 2017).

Ethnic centralisation, however, does not necessarily foster cooperation. Centralised ethnic regions could have also engaged in organised resistance against colonial rule, as posited by Frankema (2012). For example, Huillery (2011) and McAlexander and Ricart-Huguet (2021) show that in French West Africa colonial investments were lower in regions where local citizens were hostile towards European settlement. Regions less hostile towards European settlers benefited from increased colonial investment. McAlexander and Ricart-Huguet (2021) also note that in these ethnic regions, taxes and fees were reduced as the state disengaged

[4]Interestingly, Bandyopadhyay and Green (2016) do not find an association between pre-colonial ethnic centralisation and public goods provision of education and healthcare. Their findings rather point to centralised ethnic regions experiencing higher wealth, which can be classified as private goods.

in non-cooperating regions. In this case, centralisation would be inversely associated with the provision of public goods such as education due to contention between colonial and ethnic institutions.[5]

Studying the relationship between pre-colonial ethnic centralisation and public goods provision in Nigeria, Archibong (2019) finds that public services were provided as rewards for compliance between ethnic region leaders and colonial powers in centralised ethnic regions. When there was non-compliance and ethnic leaders failed to bargain with colonial powers, ethnic regions where 'punished' by withholding public goods. Although local ethnic leaders were more accountable in centralised ethnic regions, non-compliance and hostility coupled with the absence of British colonial administrators as discussed by Müller-Crepon (2020) may alter the conventional narrative regarding the effect of colonial and pre-colonial ethnic institutions on education.

### 3.2.3 Conceptual Framework

Formal education, as introduced by Europeans in sub-Saharan Africa, focussed on skills such as reading and writing in an organised environment like classrooms. Indigenous or traditional forms of education that were present prior to colonialism, focussed on learning for a vocation and skills were often transferred in informal settings, for example farming communities (Frankema, 2012). Based on the role of colonial rulers in the supply of formal education and the relationship between colonial rulers and pre-colonial ethnic regions, we discuss two potential mechanisms through which colonial rule, pre-colonial ethnic centralisation and these institutions' interaction may influence contemporary literacy outcomes.

Firstly, in centralised ethnic regions with strong established hierarchies, the enforcement of indirect British rule through traditional authority was likely opposed (Archibong, 2019; Clignet & Foster, 1964; Frankema, 2012; Gennaioli & Rainer, 2007). Accompanied by the decreased presence of British administrators, as noted by Müller-Crepon (2020), the potential positive effects of British colonial rule may be mitigated. With respect to French colonial rule, appointment of chiefs to colonial administrative units was contingent on the relationship with French colonial rulers (Bolt & Bezemer, 2009; Crowder, 1964; Müller-Crepon, 2020). It can therefore be conjectured that local leaders in centralised ethnic regions subject to French rule would have been more cooperative to maintain social standing. In fragmented ethnic regions, the British and French colonial approach did not differ substantially, with the British employing their own administrative systems that were less accommodative of local ethnic institutions (Müller-Crepon, 2020).

[5] In the Kuba Kingdom, more developed pre-colonial ethnic institutions are negatively associated with norms of rule and the likeliness to obey national laws (Lowes et al., 2017).

Secondly, formal education implemented by the British was not necessarily opposed, but simply did not persist after independence in centralised ethnic regions as in fragmented ethnic regions. McNamee (2019) associates indirect colonial rule to the contemporary salience of ethnicity in sub-Saharan Africa. Given that the British implemented indirect rule in centralised ethnic regions, we can suppose that ethnicity, ethnic-specific traits and indigenous forms of education are potentially more prominent in these ethnic regions. Although we do not specifically test for these mechanisms in this paper, we hypothesise that British 'indirect' rule's favourable education outcomes may be mitigated in centralised ethnic regions.

## 3.3 Data and Method

The main empirical specification is

$$literate_{iec} = \beta_1 British_{ec} + \beta_2 central_e + \beta_3 British_{ec} * central_e + \beta_4 X_{ec} + u_{iec} \tag{3.1}$$

where literacy, $literate_{iec}$, is a binary variable equal to 1 if individual $(i)$, residing in ethnic region $(e)$ and country $(c)$, is able to read parts of or a whole sentence, 0 otherwise.[6] We use literacy as a proxy for contemporary formal education, which measures contemporary quality of education that cannot be measured through school attendance and completion records. We obtain literacy statistics from the DHS for the respective countries in our study. The DHS are nationally representative household surveys conducted in various developing countries since the 1980s. We use data from the two latest geolocated surveys for Cameroon, Cote d'Ivoire, Ghana and Nigeria (ICF, 2017).

The DHS clusters (enumeration areas within which individuals are interviewed) are georeferenced to the Murdock Map (Murdock, 1959) and Ethnographic Atlas Codebook, from which we obtain pre-colonial ethnic centralisation data (Murdock, 1967). The specific ethnic region's pre-colonial centralisation is then attributed to individuals that fall within the pre-colonial ethnic group polygon. We assume that the distribution of ethnic groups remain similar to the distribution captured in Murdock's Ethnographic Map. According to Afrobarometer individual-level survey data in 2005, the location of respondents are 0.55 correlated to their historical ethnic region (Nunn & Wantchekon, 2011). Similarly, recent research by Anderson (2018) indicates that in eleven DHS surveys capturing ethnic information, 60 per cent of individuals reside in their historical ethnic region based on their reported ethnic group.

[6] Visually impaired individuals and those that did not have the appropriate language reading card available are coded as missing.

Although the Murdock Ethnographic Atlas has been validated by Bahrami-Rad, Becker, and Henrich (2021), we acknowledge that it has some shortcomings. Firstly, ethnic groups were sampled during different time periods over 1850 to 1950, capturing their characteristics over various stages of colonisation. Secondly, although we classify indigenous institutions as pre-colonial ethnic institutions, there were earlier European influences such as during the slave trades that occurred prior to data capturing in the 19th century (Gennaioli & Rainer, 2007). Giuliano and Nunn (2018), however, note that as ethnic group characteristics are persistent and remain rather stable over time, Murdock's data is still of value. Finally, there are some missing observations in the Murdock Ethnographic Atlas as shown in Figure 3.1. We are therefore not able to attribute pre-colonial ethnic characteristics to individuals residing in these ethnic regions and these observations are dropped. Despite these weaknesses, Murdock's data remains a reliable and popular source of pre-colonial ethnic information in Africa (see for example Gennaioli and Rainer (2007), Alesina et al. (2013), Michalopoulos and Papaioannou (2013, 2014, 2016) and Angeles and Elizalde (2017)).

Ethnic region centralisation, $central_e$ is a binary variable equal to 1 if the pre-colonial ethnic region was centralised, 0 if fragmented. Borrowing from Gennaioli and Rainer (2007), groups that do not have political authority beyond the local community or only a single level of jurisdictional hierarchy, such as petty chiefdoms, are classified as *fragmented*. These groups are smaller political entities that lack political integration above local community level. Groups that have more than two levels of jurisdictional hierarchy, such as larger chiefdoms (two) and states (three) are classified as *centralised*.

The influence of British colonisation, $British_{ec}$, is equal to 1 if the region within which the individual resides was part of a former British colony, 0 if French colony. Ethnic-country region level allows us to account for ethnic regions split by colonial country borders as well as the different colonial influences in present-day Cameroon.

We control for ethnic-country region demographic, location and geographic characteristics, $X_{ec}$, with data available from Michalopoulos and Papaioannou (2013). Ethnic-country region control variables include population in 1960 ($population_{ec}$), whether the capital city of the country is located in the ethnic region ($capital_{ec}$), distance to the national border ($borderdistance_{ec}$), mean elevation ($elevation_{ec}$), soil suitability for agriculture ($soilquality_{ec}$), the presence of an on-shore oil or gas deposit ($petroleum_{ec}$) and malaria ecology ($malaria_{ec}$).

Population and location controls include population size, a binary variable for the capital city and distance to the national border. The log of population by ethnic region in 1960 is used in various studies to measure development (Acemoglu et al., 2002). Ethnic regions and countries with higher populations in 1960 and are likely to be more developed today, with higher levels of education. The variable to control for the capital city is a binary variable equal to 1 if the capital city of the country is located within the ethnic-country region in which the individual resides, and 0 otherwise. Firstly, capital cities tend to have higher economic activity and be more developed relative to other regions. Secondly, colonial rule, which can be considered a national institution, may be more pronounced in ethnic region within which capital cities are located (Michalopoulos & Papaioannou, 2014). Distance to the national border is measured from the centroid of the ethnic-country region. Regions closer to national borders have been associated with lower development outcomes (Michalopoulos & Papaioannou, 2016).

Geographic controls include measures for terrain, natural endowments and disease. The suitability of soil for agriculture and average elevation of ethnic regions by country are also associated with economic development outcomes through the effect on technological diffusion, slave trade, colonial reach and public infrastructure provision (Frankema, 2012; Gennaioli, La Porta, Lopez De Silanes, & Shleifer, 2014; Michalopoulos, 2012; Nunn & Puga, 2012). Oil and gas are important natural resources in Cameroon, Ghana and specifically, Nigeria. We include a binary variable equal to 1 if an ethnic-country region has an on-shore oil or gas deposit, 0 otherwise. To account for disease environment, we control for malaria ecology, which measures the mean climatic conditions favourable for malaria. Many studies show the negative effects of disease such as malaria on economic and socio-economic outcomes, institutions, historic mission settlements and education (Acemoglu, Johnson, & Robinson, 2003; Cagé & Rueda, 2016; Frankema, 2012; Gallup & Sachs, 2001; Jedwab, Meier zu Selhausen, & Moradi, 2019). Higher incidence of contracting malaria in these climatic conditions will therefore be negatively associated with contemporary literacy outcomes.

We are able to map 146 954 individuals to 118 ethnic regions with ethnic centralisation data available. Summary statistics are provided in Table 3.2. In our sample, 63.9 per cent of individuals are literate, 74.1 per cent reside in ethnic regions that were subject to British rule and 47.3 per cent reside in pre-colonial centralised ethnic regions.

The variable $u_{iec}$ is an error term. We include country fixed effects to control for time-invariant factors specific to countries. Despite the inclusion of country fixed effects, we need to account for potential spatial

autocorrelation on country and ethnic region level. We therefore estimate a linear regression with two-way clustered standard errors using methodology developed by Cameron, Gelbach, and Miller (2011). Clustering at both ethnic region and country level allows for valid inference in the instance that errors within both geographical units are correlated. Neglecting to control for clustering may result in underestimated standard errors.

Table 3.2: Summary Statistics

| Variable | N | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| $literate_{iec}$ | 146,954 | 0.639 | 0.480 | 0 | 1 |
| $British_{c}$ | 146,954 | 0.741 | 0.438 | 0 | 1 |
| $central_{e}$ | 146,954 | 0.473 | 0.499 | 0 | 1 |
| $population_{ec}$ | 146,954 | 13.483 | 1.527 | 7.691 | 15.688 |
| $capital_{ec}$ | 146,954 | 0.102 | 0.303 | 0 | 1 |
| $borderdistance_{ec}$ | 146,954 | 4.673 | 0.805 | -0.808 | 5.892 |
| $elevation_{ec}$ | 146,954 | 0.298 | 0.254 | 0.006 | 1.376 |
| $soilquality_{ec}$ | 146,954 | 0.434 | 0.140 | 0.158 | 0.772 |
| $petroleum_{ec}$ | 146,954 | 0.253 | 0.435 | 0 | 1 |
| $malaria_{ec}$ | 146,954 | 0.863 | 0.207 | 0.333 | 1 |

*Note:* $literate_{iec}$, $British_{c}$, $central_{e}$, $capital_{ec}$ and $petroleum_{ec}$ are binary variables. $population_{ec}$ and $borderdistance_{ec}$ are logged variables. $elevation_{ec}$, $soilquality_{e}$ and $malaria_{e}$ variables are indices.

## 3.4 Results

### 3.4.1 British Rule and Pre-colonial Ethnic Centralisation

Table 3.3 columns 1 to 3 show results when considering British rule and pre-colonial ethnic centralisation independently. Results show that British rule relative to French is positively associated with the likelihood to be literate, as is the conventional narrative (Brown, 2000; Garnier & Schafer, 2006; Grier, 1999). In line with Bandyopadhyay and Green (2016), we do not find a statistically significant and positive association between pre-colonial ethnic centralisation and literacy rates. As stated, considering these two forms of institutions separately may lead to the wrong conclusion regarding the true effect of colonial and pre-colonial ethnic institutions. Our specification allows us to analyse the effect of these institutions and their interaction.

Columns 4 to 9 of Table 3.3 present results from equation 3.1 and we progressively add controls across columns to which regression coefficients for our main variables remain consistent. The statistically significant interaction term ($\beta_3$) suggests that the effect of British colonial rule and pre-colonial ethnic centralisation on present-day literacy also depends on the combination of these two forms of institutions. Interpreting the full model specification results reported in column 9, we can say that neither British rule nor ethnic centralisation

Table 3.3: Literacy Results

| | Dependent Variable: $literate_{iec}$ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| $British_{ec}$ | 0.051*** | | 0.029*** | 0.085*** | 0.109*** | 0.183*** | 0.267*** | 0.156*** | 0.107** |
| | (0.002) | | (0.010) | (0.013) | (0.024) | (0.032) | (0.013) | (0.031) | (0.042) |
| $central_e$ | | -0.036 | -0.036 | 0.131*** | 0.123*** | 0.170*** | 0.169*** | 0.135*** | 0.089*** |
| | | (0.054) | (0.054) | (0.042) | (0.029) | (0.027) | (0.020) | (0.018) | (0.032) |
| $British_{ec} * central_e$ | | | | -0.212*** | -0.234*** | -0.259*** | -0.228*** | -0.161*** | -0.136*** |
| | | | | (0.042) | (0.039) | (0.013) | (0.034) | (0.027) | (0.041) |
| $population_{ec}$ | | | | | 0.033 | 0.013*** | 0.027 | 0.015 | 0.024 |
| | | | | | (0.026) | (0.005) | (0.024) | (0.021) | (0.018) |
| $capital_{ec}$ | | | | | | 0.095 | 0.124 | 0.182** | 0.198** |
| | | | | | | (0.101) | (0.078) | (0.082) | (0.078) |
| $borderdistance_{ec}$ | | | | | | 0.115*** | 0.089** | 0.070* | 0.050 |
| | | | | | | (0.020) | (0.042) | (0.038) | (0.030) |
| $elevation_{ec}$ | | | | | | | -0.329** | -0.128 | -0.134 |
| | | | | | | | (0.153) | (0.188) | (0.181) |
| $soilquality_{ec}$ | | | | | | | 0.417 | 0.277 | 0.326 |
| | | | | | | | (0.469) | (0.443) | (0.396) |
| $petroleum_{ec}$ | | | | | | | | 0.188*** | 0.159*** |
| | | | | | | | | (0.052) | (0.049) |
| $malaria_{ec}$ | | | | | | | | | -0.226*** |
| | | | | | | | | | (0.057) |
| Observations | 182,036 | 146,954 | 146,954 | 146,954 | 146,954 | 146,954 | 146,954 | 146,954 | 146,954 |
| R-squared | 0.028 | 0.037 | 0.037 | 0.045 | 0.052 | 0.092 | 0.127 | 0.137 | 0.142 |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $literate_{iec}$ is a binary variable equal to 1 if an individual is able to read parts of or a whole sentence, 0 otherwise. $British_{ec}$ is a binary variable equal to 1 if ethnic-country region was part of a former British colony, 0 if French colony. $central_e$ is a binary variable equal to 1 if the pre-colonial ethnic region was classified as a large chiefdom or state, 0 otherwise. Standard errors in parentheses clustered by ethnic and country level. *** p<0.01, ** p<0.05, * p<0.1

can be confidently associated with positive education outcomes as suggested in previous literature. Being subject to British rule relative to French, is associated with an increase in the likelihood of being literate by 10.7 percentage points in fragmented ethnic regions ($\beta_1$). Yet, in centralised ethnic regions, British rule is associated with a decrease in the likelihood of being literate by 2.9 percentage points relative to French rule ($\beta_1 + \beta_3$). Similarly, ethnic centralisation relative to fragmentation is associated with an increase in the likelihood of being literate by 8.9 percentage points in former French colonies ($\beta_2$). Whilst in former British colonies, centralisation is associated with a decrease in the likelihood of being literate by 4.7 percentage points ($\beta_2 + \beta_3$).[7]

The control variables are in line with the literature. Population in 1960, a proxy for economic activity and development, is positively associated with the likelihood of being literate (Acemoglu et al., 2002; Obikili,

[7]The reference group is individuals in fragmented ethnic regions subject to French rule. The differential in literacy between individuals from centralised ethnic regions subject to British rule and individuals from fragmented ethnic regions subject to French rule is therefore 6.0 percentage points (obtained by adding $\beta_1$, $\beta_2$ and $\beta_3$ coefficient estimates together).

2016a). Individuals residing in capitals and those living further away from country borders are associated with increased literacy. Capitals are likely more developed and enjoy higher provision of education, as national institutions are expected to have increased power in these regions (Michalopoulos & Papaioannou, 2014). In contrast, regions closer to borders are associated with lower quality rule of law and tend to be less developed (Pinkovskiy, 2017). Petroleum and malaria controls are statistically significant in the full model specification, however, signs for all variables are as expected. Terrain elevation, which would inhibit transport and increase costs, is negatively associated with education as also shown by Angeles and Elizalde (2017). Suitability of soil for agriculture and the indicator for petroleum are positively associated with literacy outcomes. Natural resource endowments were important determinants of colonial activity and missionary expansion, which would affect the supply of education (Angeles & Elizalde, 2017; Jedwab et al., 2019). In line with findings by Frankema (2012), the index for malaria ecology is negatively associated with the likelihood of being literate as we would expect given the negative effect on development as well (Gallup & Sachs, 2001). As noted by Obikili (2016a), it is possible that ethnic regions with high disease environments experience lower investment in education and school attendance.

As a robustness test we conduct a birth cohort analysis to test whether results persist over time. We additionally specify a logistic regression and also check whether our results hold for primary and secondary school completion. Our results, reported in Appendix A3, remain robust and confirm findings from Table 3.3. In summary, our results suggests that the often-reported favourable effect of 'inherited' British rule is reduced in centralised ethnic regions, where British rule was indirect, potentially opposed and less salient relative to ethnic-specific institutions.

### 3.4.2 Reach of Colonial and Pre-Colonial Ethnic Institutions

The effect of colonial and pre-colonial ethnic institutions on present-day literacy may differ based on distance to the capital. As highlighted by Michalopoulos and Papaioannou (2014), the effect of national institutions, which in our case can be considered as colonial rule, is diminished in remote ethnic regions further away from capitals, whilst pre-colonial ethnic-specific institutional characteristics in these regions are found to be more important in determining development outcomes.

To test whether the effect of British rule and ethnic centralisation differ based on the distance to the capital,

we augment our estimation equation 3.1 with the distance to the capital city. The empirical specification is

$$\begin{aligned} literate_{iec} = \beta_1 British_{ec} + \beta_2 central_e + \beta_3 British_{ec} * central_e + \beta_4 capitaldistance_{ec} \\ + \beta_5 British_{ec} * capitaldistance_{ec} + \beta_6 central_e * capitaldistance_{ec} \\ + \beta_7 British_{ec} * central_e * capitaldistance_{ec} + \beta_8 X_{ec} + u_{iec} \end{aligned} \tag{3.2}$$

where $capitaldistance_{ec}$ is the distance of the centroid of ethnic region $e$ in country $c$ from the country's capital.

Table 3.4: Distance to Capital Results

| | Dependent Variable: $literate_{iec}$ | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $British_{ec}$ | 0.343*** | 0.338*** | 0.351*** | 0.523*** | 0.359*** | 0.308*** |
| | (0.063) | (0.060) | (0.067) | (0.100) | (0.095) | (0.094) |
| $central_e$ | -0.177*** | -0.174*** | 0.197 | 0.246*** | 0.172*** | 0.167*** |
| | (0.015) | (0.017) | (0.168) | (0.037) | (0.018) | (0.027) |
| $British_{ec} * central_e$ | 0.086 | 0.082 | -0.299*** | -0.330*** | -0.195* | -0.211** |
| | (0.069) | (0.071) | (0.102) | (0.052) | (0.104) | (0.082) |
| $capitaldistance_{ec}$ | -0.221*** | -0.213*** | -0.155*** | -0.222*** | -0.234*** | -0.241*** |
| | (0.033) | (0.031) | (0.051) | (0.063) | (0.061) | (0.047) |
| $British_{ec} * capitaldistance_{ec}$ | 0.146*** | 0.139*** | 0.132*** | 0.201*** | 0.175*** | 0.177*** |
| | (0.035) | (0.033) | (0.043) | (0.072) | (0.065) | (0.050) |
| $central_e * capitaldistance_{ec}$ | -0.201*** | -0.198*** | 0.031 | 0.059*** | 0.047* | 0.076*** |
| | (0.017) | (0.019) | (0.101) | (0.015) | (0.024) | (0.024) |
| $British_{ec} * central_e * capitaldistance_{ec}$ | 0.178** | 0.181** | -0.045** | -0.088 | -0.051 | -0.078 |
| | (0.089) | (0.090) | (0.019) | (0.083) | (0.116) | (0.092) |
| Observations | 146,954 | 146,954 | 146,954 | 146,954 | 146,954 | 146,954 |
| R-squared | 0.086 | 0.087 | 0.101 | 0.145 | 0.154 | 0.160 |
| Population | | Yes | Yes | Yes | Yes | Yes |
| Location Controls | | | Yes | Yes | Yes | Yes |
| Geographic Controls | | | | Yes | Yes | Yes |
| Petroleum | | | | | Yes | Yes |
| Malaria | | | | | | Yes |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $literate_{iec}$ is a binary variable equal to 1 if an individual is able to read parts of or a whole sentence, 0 otherwise. $British_{ec}$ is a binary variable equal to 1 if ethnic-country region was part of a former British colony, 0 if French colony. $central_e$ is a binary variable equal to 1 if the pre-colonial ethnic region was classified as a large chiefdom or state, 0 otherwise. $capitaldistance_{ec}$ is the log of the distance to the capital in 1 000 $km$. Location controls include whether the capital city of the country is located within the individual's ethnic region and ethnic region distance to the national border. Geographic controls include mean elevation and soil suitability for agriculture of the ethnic-country region.
Standard errors in parentheses clustered by ethnic and country level. *** p<0.01, ** p<0.05, * p<0.1

Firstly, Table 3.4 column 6 results show that even when controlling for distance to the capital, colonial rule, ethnic centralisation and the interaction between these two institutions are statistically significant in determining contemporary literacy outcomes as reported in Table 3.3. Secondly, contrary to previous

literature, the effect of British rule relative to French rule is more pronounced in ethnic regions located further away from the capital. This can be explained by the increased administrative effort by the British in fragmented and remote ethnic regions as highlighted by Müller-Crepon (2020). Thirdly, as expected, the effect of ethnic centralisation is also more pronounced in regions located further away from the capital. Results, however, do not suggest that the distance to the capital has a statistically significant effect on the interrelated effect of British rule and pre-colonial ethnic centralisation.

Table 3.5 reports the marginal effects of British rule in columns 1 and 2 and ethnic centralisation in columns 3 and 4 on literacy for the 10th, 50th and 90th percentile individuals according to distance to capital. As reported in Table 3.3, British rule is associated with an increase in literacy in fragmented ethnic regions. For 50th percentile individuals, British rule is associated with an increase in the likelihood of being literate by 11.4 percentage points and 19.1 percentage points for individuals within the 90th percentile. Similarly, as expected, the positive effect of ethnic centralisation in French colonies is also statistically significant for individuals further away from the capital within the 50th and 90th percentile. Colonial and pre-colonial ethnic institutions are therefore important in determining literacy for individuals in ethnic regions located further away from capitals.

Table 3.5: Conditional Marginal Effects

| | *British Rule* | | *Ethnic Centralisation* | |
|---|---|---|---|---|
| | Fragmented | Centralised | French | British |
| | (1) | (2) | (3) | (4) |
| *10th percentile* | -0.119 | -0.141 | -0.016 | -0.038 |
| | (0.082) | (0.136) | (0.061) | (0.110) |
| *50th percentile* | 0.114* | -0.011 | 0.084** | -0.041*** |
| | (0.065) | (0.050) | (0.036) | (0.011) |
| *90th percentile* | 0.191*** | 0.032 | 0.117*** | -0.042 |
| | (0.073) | (0.091) | (0.030) | (0.033) |

*Note:* Table reports conditional margins effects of British rule in fragmented ethnic regions (column 1) and centralised ethnic regions (column 2), as well conditional marginal effects of ethnic centralisation in former French colonies (column 3) and former British colonies (column 4).
Standard errors in parentheses clustered by ethnic and country level. *** p<0.01, ** p<0.05, * p<0.1

As an additional robustness test, we re-estimate our main equation 3.1 and restrict the sample to ethnic regions partitioned and not partitioned by colonial borders. In partitioned ethnic regions, British rule and ethnic region centralisation remains statistically significant in determining contemporary literacy, however, the interaction is not statistically significant. In ethnic regions not partitioned by colonial borders, the positive effect of British rule in centralised ethnic regions is again mitigated, supporting our main findings

as reported. Results are presented and discussed in Appendix A3.4.

## 3.5 Additional Analysis

### 3.5.1 Liberia Reference Case

In Table 3.6 we conduct an additional analysis to test results that British rule is positively associated with literacy outcomes in fragmented ethnic regions. We include Liberia to our sample of countries. Located next to Côte d'Ivoire, Liberia was not colonised by either the British or the French and comprise only of petty chiefdoms i.e. fragmented ethnic regions. Liberia was officially founded in 1824, on land that was home to slaves freed from the United States.

We test the effect of colonial rule and ethnic centralisation on literacy outcomes relative to fragmented ethnic regions not subject to colonial rule. The empirical specification is

$$\begin{aligned} literate_{iec} = \beta_1 British_{ec} + \beta_2 French_{ec} + \beta_3 British_{ec} * central_e \\ + \beta_4 French_{ec} * central_e + \beta_5 X_{ec} + u_{iec} \end{aligned} \tag{3.3}$$

where $\beta_3$ and $\beta_4$ capture the interaction between British rule and centralisation, and French rule and centralisation relative to no colonial rule and fragmented ethnic regions.[8]

Interpreting column 6 with all control variables included, results suggest that relative to no colonial rule, British rule in fragmented ethnic regions is associated with an increase in the likelihood of being literate by 8.7 percentage points. This positive effect is again mitigated in centralised ethnic regions, where the interrelated effect is only 4.2 percentage points. Ethnic centralisation subject to French rule is associated with an increase in the likelihood of being literate by 9.6 percentage points relative to fragmented ethnic regions subject to no colonial rule in Liberia.[9]

Confirming our main results, in pre-colonial ethnic centralised regions, French rule is associated with a more favourable effect on literacy than British rule. Since the appointment of chiefs to colonial administrative units in former French colonies was contingent on the relationship with colonial rulers (as discussed in Section 3.2.3), local leaders in these centralised ethnic regions were likely more cooperative in formal education policy

[8]The variable $central_e$ is not estimated independently as Liberia only comprise fragmented ethnic regions.
[9]In fragmented ethnic regions, the difference between French rule and no colonial rule is not statistically significant.

implementation to maintain social standing. On the other hand, fragmented ethnic regions were potentially more receptive to the British' direct yet more accommodative education policy.

Table 3.6: Reference Case Results

| | Dependent Variable: $literate_{iec}$ | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $British_{ec}$ | 0.056*** | 0.078*** | 0.146*** | 0.235*** | 0.132*** | 0.087** |
| | (0.007) | (0.019) | (0.030) | (0.011) | (0.031) | (0.039) |
| $French_{ec}$ | -0.214*** | -0.145** | -0.066* | 0.079 | 0.037 | -0.015 |
| | (0.011) | (0.057) | (0.036) | (0.059) | (0.054) | (0.066) |
| $British_{ec} * central_e$ | -0.081*** | -0.113*** | -0.091*** | -0.063*** | -0.028** | -0.045*** |
| | (0.016) | (0.017) | (0.023) | (0.020) | (0.012) | (0.014) |
| $French_{ec} * central_e$ | 0.119*** | 0.111*** | 0.154*** | 0.170*** | 0.136*** | 0.096*** |
| | (0.032) | (0.021) | (0.023) | (0.020) | (0.022) | (0.032) |
| Observations | 159,344 | 159,344 | 159,344 | 159,344 | 159,344 | 159,344 |
| R-squared | 0.052 | 0.059 | 0.093 | 0.126 | 0.136 | 0.140 |
| Population | | Yes | Yes | Yes | Yes | Yes |
| Location Controls | | | Yes | Yes | Yes | Yes |
| Geographic Controls | | | | Yes | Yes | Yes |
| Petroleum | | | | | Yes | Yes |
| Malaria | | | | | | Yes |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $literate_{iec}$ is a binary variable equal to 1 if an individual is able to read parts of or a whole sentence, 0 otherwise. $British_{ec}$ is a binary variable equal to 1 if ethnic-country region was part of a former British colony, 0 if otherwise. $French_{ec}$ is a binary variable equal to 1 if ethnic-country region was part of a former French colony, 0 if otherwise. $central_e$ is a binary variable equal to 1 if the pre-colonial ethnic region was classified as a large chiefdom or state, 0 otherwise. Location controls include whether the capital city of the country is located within the individual's ethnic region and ethnic region distance to the national border. Geographic controls include mean elevation and soil suitability for agriculture of the ethnic-country region. Standard errors in parentheses clustered by ethnic and country level. *** p<0.01, ** p<0.05, * p<0.1

### 3.5.2 Missionaries as Transmission Mechanism

Missionary education was already in place prior to official colonisation of countries (Cowan, O'Connell, & Scanlon, 1965). Bolt and Bezemer (2009) note that during the initial years of colonisation, missionaries remained in control of education policy in British colonies, as the British were concerned with law and order. The British were also concerned with the costs involved in taking responsibility for education, and therefore education was primarily provided by missionaries in the British colonies (Crowder, 1964; Lugard, 1929). Cogneau and Moradi (2014) find that higher literacy rates in former British colonies can mainly be attributed to missionary activities. More recently, Jedwab et al. (2021) find that although missionaries are not positively associated with local economic development in Ghana, human capital accumulation benefited

from Christian missions.[10]

British rule allowed all denominations of missionaries, Catholic and Protestant, to participate in conversion and education activities. In British colonies, missions were therefore able to compete with respect to schooling provision, which some have noted as the reason for improved education in former British colonies (Frankema, 2012; Gallego & Woodberry, 2010; Jedwab et al., 2019; Woodberry, 2012). French colonies restricted missionary entry to Protestant missions with the separate state and church system in mind, where the state provided financing to missionaries on the condition that missionary schools adhere to the French rigid and assimilated education policy (Bolt & Bezemer, 2009). This limited the reach of missionary education and the potential persistent effect on contemporary literacy outcomes. The British education system therefore allowed competition between various education providers that were more independent, whereas the French centralised education provided by the state and missionary schools (Feldmann, 2016).

We consider missionary locations as reported by Roome (1925) and digitised by Nunn (2010). The majority studies on missionary activity in Africa use Roome (1925) (Jedwab et al., 2019). We georeference missionary stations into the different ethnic regions according to the Murdock Map (Murdock, 1959). The empirical specification is

$$literate_{iec} = \beta_1 Britishmissions_{ec} + \beta_2 central_e + \beta_3 Britishmissions_{ec} * central_e + \beta_4 X_{ec} + u_{iec} \tag{3.4}$$

where $Britishmissions_{ec}$ is the log number of missionary stations by 1000 $km^2$ of land area by ethnic group in former British colonies, and 0 in former French colonies.[11] We code the variable as such to capture that missionaries were not independent in former French colonies and adhered to the prescribed French education policy. This specification allows us to measure the effect of missionaries in British colonies as a potential transmission mechanism and explanation for the often reported positive effects resulting from British rule.

Table 3.7 column 6 results suggest that missionaries in former British colonies are associated with increased literacy, specifically in centralised ethnic regions. A doubling of the number of British missionary stations by

[10] Just as Frankema (2012) notes the overstated effect of British education policy, Jedwab et al. (2019) show that the importance of missionary activity in overall present-day development is also frequently overstated. Missionaries tended to locate in more developed, accessible, healthier and populated regions. Similarly, earlier work by Fourie and Swanepoel (2015) find that although Christian missions in South Africa's Cape Colony are associated with higher educational attainment approximately 150 years later, persistence is dependent on early selection.

[11] We take the log of the number of missionary stations by 1000 $km^2$ of land area by ethnic group plus 0.1 to account for ethnic regions that did not have any missionary stations.

1000 $km^2$ of centralised ethnic land area is associated with an increase in the likelihood of being literate by 11.2 percentage points. Results speak to the *Africanisation* of missionary activity. Research often neglects the role of local citizens in missionary education and the expansion thereof. Local African citizens were essential in the implementation and continuation of missionary activities and formal education, perhaps more so than European missionaries themselves. Local converts also contributed financially to missionary stations and activities, either directly, or through taxes collected by colonial governments (De Haas & Frankema, 2018; Frankema, 2012; Meier zu Selhausen, 2019).

Table 3.7: Missionary Station Results

| | Dependent Variable: $literate_{iec}$ | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $Britishmissions_{ec}$ | 0.103*** | 0.087 | 0.070 | 0.051 | 0.049 | 0.048 |
| | (0.039) | (0.055) | (0.062) | (0.047) | (0.034) | (0.030) |
| $central_e$ | 0.186** | 0.190** | 0.167*** | 0.143*** | 0.159*** | 0.139*** |
| | (0.079) | (0.088) | (0.049) | (0.019) | (0.044) | (0.045) |
| $Britishmissions_{ec} * central_e$ | 0.137*** | 0.161*** | 0.145*** | 0.129*** | 0.120*** | 0.112*** |
| | (0.049) | (0.044) | (0.024) | (0.029) | (0.015) | (0.005) |
| Observations | 146,954 | 146,954 | 146,954 | 146,954 | 146,954 | 146,954 |
| R-squared | 0.111 | 0.114 | 0.137 | 0.142 | 0.154 | 0.158 |
| Population | | Yes | Yes | Yes | Yes | Yes |
| Location Controls | | | Yes | Yes | Yes | Yes |
| Geographic Controls | | | | Yes | Yes | Yes |
| Petroleum | | | | | Yes | Yes |
| Malaria | | | | | | Yes |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $literate_{iec}$ is a binary variable equal to 1 if an individual is able to read parts of or a whole sentence, 0 otherwise. $Britishmissions_{ec}$ is the log number of missionary stations by 1000 $km^2$ of land area by ethnic group in former British colonies. $central_e$ is a binary variable equal to 1 if the pre-colonial ethnic region was classified as a large chiefdom or state, 0 otherwise. Location controls include whether the capital city of the country is located within the individual's ethnic region and ethnic region distance to the national border. Geographic controls include mean elevation and soil suitability for agriculture of the ethnic-country region.
Standard errors in parentheses clustered by ethnic and country level. *** p<0.01, ** p<0.05, * p<0.1

## 3.6 Concluding Remarks

Contrary to the general view in the literature, contemporary education in Africa cannot be attributed to British rule or pre-colonial ethnic centralisation independently, it is instead the complementary between these two institutions that determine these outcomes. Using geolocated DHS data to measure present-day literacy in Cameroon, Côte d'Ivoire (former French colonies), Ghana and Nigeria (former British colonies), our results suggest that the effect of British rule on contemporary literacy depends on the pre-colonial centralisation of

ethnic regions. In fragmented ethnic regions, British rule is associated with favourable effects on literacy. In centralised ethnic regions, these positive effects are mitigated. In these ethnic regions, the often reported positive effect of British education policy can be attributed to missionary activity.

Findings from this study highlight the need for improved education policy formulation on a sub-national, ethnic region level. Sustainable Development Goal (SDG) Target 4.6 sets out to ensure that all youth and most adults are literate by 2030. To mitigate education challenges, colonial legacies and ethnic-specific institutional characteristics should be accounted for during policy decisions. Development and implementation of policies on a country level is not necessarily enough to address variations in literacy rates within countries.

Future studies can expand on our findings in two respects. Firstly, although we analyse the reach of institutions by controlling for distance to the capital, it is necessary to conduct more in depth analysis regarding colonial investments and diffusion in regions, which were unequal within the respective British and French colonies (Ricart-Huguet, 2021; Wietzke, 2015). Secondly, our results do not identify the specific supply and demand mechanisms behind the observed effects. There is therefore room for further analysis in this regard.

# A3 Appendix

## A3.1 Birth Cohort Analysis

To address potential concerns about persistence (Voth, 2021), we conduct a birth cohort analysis in Table A3.1. In columns 1 and 2 we restrict the sample to individuals born between 1960 and 1979. Columns 3 and 4 report results with respect to individuals born between 1980 to 1999. Across all birth cohorts, results indicate that an individual's centralised ethnic region subjection to British rule is associated with a decrease in the likelihood of being literate. Interpreting results from column 4, British rule imposed in a fragmented ethnic region is associated with an increase in the likelihood of an individual (born between 1980 and 1999) being literate by 10.4 percentage points, whilst in centralised ethnic regions, British rule is associated with a decrease in the likelihood of being literate by 3.1 percentage points. Our findings are in line with that of Frankema (2012) and Cogneau and Moradi (2014) that historical effects are persistent. We show that the effect of British rule on contemporary education outcomes depend on ethnic region centralisation for individuals born and schooled after independence.

Table A3.1: Birth Cohort Results

| | Dependent Variable: $literate_{iec}$ | | | |
|---|---|---|---|---|
| | 1960−1979 | | 1980−1999 | |
| | (1) | (2) | (3) | (4) |
| $British_{ec}$ | 0.066*** | 0.124*** | 0.103*** | 0.104** |
| | (0.015) | (0.038) | (0.010) | (0.047) |
| $central_e$ | 0.152*** | 0.119*** | 0.119*** | 0.081** |
| | (0.050) | (0.032) | (0.033) | (0.038) |
| $British_{ec} * central_e$ | -0.214*** | -0.142*** | -0.208*** | -0.135*** |
| | (0.050) | (0.038) | (0.034) | (0.046) |
| Observations | 57,290 | 57,290 | 95,140 | 95,140 |
| R-squared | 0.056 | 0.146 | 0.050 | 0.148 |
| Population | No | Yes | No | Yes |
| Location Controls | No | Yes | No | Yes |
| Geographic Controls | No | Yes | No | Yes |
| Petroleum | No | Yes | No | Yes |
| Malaria | No | Yes | No | Yes |
| Country FE | Yes | Yes | Yes | Yes |

*Note:* $literate_{iec}$ is a binary variable equal to 1 if an individual is able to read parts of or a whole sentence, 0 otherwise. $British_{ec}$ is a binary variable equal to 1 if ethnic-country region was part of a former British colony, 0 if French colony. $central_e$ is a binary variable equal to 1 if the pre-colonial ethnic region was classified as a large chiefdom or state, 0 otherwise. Location controls include whether the capital city of the country is located within the individual's ethnic region and ethnic region distance to the national border. Geographic controls include mean elevation and soil suitability for agriculture of the ethnic-country region.
Standard errors in parentheses clustered by ethnic and country level. *** p<0.01, ** p<0.05, * p<0.1

## A3.2 Alternative Model Specification

Since the outcome variable of interest is binary, we additionally estimate a logistic regression in Table A3.2. Although the magnitudes of the coefficient estimates are not comparable to the linear probability (OLS) model estimated in Section 3.4.1, the interrelated effect of British rule and ethnic region centralisation remains statistically significant and negative.

Table A3.2: Logistic Regression Results

| | Dependent Variable: $literate_{iec}$ | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $British_{ec}$ | 0.434 | 0.541 | 0.865*** | 1.650*** | 1.021** | 0.619 |
| | (0.473) | (0.390) | (0.233) | (0.521) | (0.500) | (0.435) |
| $central_e$ | 0.692 | 0.668 | 1.037*** | 1.070*** | 0.911*** | 0.759*** |
| | (0.457) | (0.425) | (0.272) | (0.312) | (0.295) | (0.254) |
| $British_{ec} * central_e$ | -1.038* | -1.156** | -1.445*** | -1.355*** | -1.012*** | -0.935*** |
| | (0.626) | (0.571) | (0.496) | (0.406) | (0.352) | (0.316) |
| Observations | 146,954 | 146,954 | 146,954 | 146,954 | 146,954 | 146,954 |
| Pseudo R-squared | 0.0346 | 0.0405 | 0.0735 | 0.105 | 0.114 | 0.120 |
| Population | | Yes | Yes | Yes | Yes | Yes |
| Location Controls | | | Yes | Yes | Yes | Yes |
| Geographic Controls | | | | Yes | Yes | Yes |
| Petroleum | | | | | Yes | Yes |
| Malaria | | | | | | Yes |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $literate_{iec}$ is a binary variable equal to 1 if an individual is able to read parts of or a whole sentence, 0 otherwise. $British_{ec}$ is a binary variable equal to 1 if ethnic-country region was part of a former British colony, 0 if French colony. $central_e$ is a binary variable equal to 1 if the pre-colonial ethnic region was classified as a large chiefdom or state, 0 otherwise. Location controls include whether the capital city of the country is located within the individual's ethnic region and ethnic region distance to the national border. Geographic controls include mean elevation and soil suitability for agriculture of the ethnic-country region.
Standard errors in parentheses clustered by ethnic level. *** p<0.01, ** p<0.05, * p<0.1

## A3.3 Primary and Secondary Education Analysis

In Table A3.3 we study the effect of British rule and pre-colonial ethnic centralisation, as well as the interaction of these two institutions on primary and secondary education. The estimating regression remains as specified in equation 3.1 and we simply determine alternative outcome variables. Primary school completion, $primary_{iec}$, is a binary variable equal to 1 if individual $(i)$, residing in ethnic region $(e)$ and country $(c)$ completed primary school, 0 if not. Secondary school completion, $secondary_{iec}$, is a binary variable equal to 1 if individual $(i)$, residing in ethnic region $(e)$ and country $(c)$ (above 20 years of age) completed secondary school, 0 otherwise. We again report linear regression findings using the approach by Cameron et al. (2011) to account for spatial autocorrelation.

Table A3.3: Primary and Secondary Education Results

| | *Panel A* | | | | | |
|---|---|---|---|---|---|---|
| | Dependent Variable: $primary_{iec}$ | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $British_{ec}$ | 0.154*** | 0.170*** | 0.229*** | 0.311*** | 0.171*** | 0.113** |
| | (0.012) | (0.021) | (0.027) | (0.023) | (0.041) | (0.051) |
| $central_e$ | 0.110*** | 0.105*** | 0.137*** | 0.141*** | 0.099*** | 0.043 |
| | (0.033) | (0.025) | (0.037) | (0.026) | (0.029) | (0.053) |
| $British_{ec} * central_e$ | -0.213*** | -0.227*** | -0.245*** | -0.218*** | -0.133** | -0.103 |
| | (0.053) | (0.043) | (0.040) | (0.058) | (0.055) | (0.072) |
| Observations | 148,093 | 148,093 | 148,093 | 148,093 | 148,093 | 148,093 |
| R-squared | 0.066 | 0.070 | 0.120 | 0.167 | 0.186 | 0.195 |
| | *Panel B* | | | | | |
| | Dependent Variable: $secondary_{iec}$ | | | | | |
| | (7) | (8) | (9) | (10) | (11) | (12) |
| $British_{ec}$ | -0.073*** | -0.050* | 0.033 | 0.134*** | 0.032*** | -0.028 |
| | (0.016) | (0.029) | (0.037) | (0.023) | (0.006) | (0.022) |
| $central_e$ | 0.116** | 0.109*** | 0.167*** | 0.151*** | 0.121*** | 0.063* |
| | (0.051) | (0.039) | (0.028) | (0.029) | (0.022) | (0.036) |
| $British_{ec} * central_e$ | -0.171*** | -0.193*** | -0.222*** | -0.174*** | -0.112*** | -0.081 |
| | (0.060) | (0.055) | (0.023) | (0.050) | (0.038) | (0.051) |
| Observations | 117,340 | 117,340 | 117,340 | 117,340 | 117,340 | 117,340 |
| R-squared | 0.044 | 0.050 | 0.093 | 0.133 | 0.141 | 0.148 |
| Population | | Yes | Yes | Yes | Yes | Yes |
| Location Controls | | | Yes | Yes | Yes | Yes |
| Geographic Controls | | | | Yes | Yes | Yes |
| Petroleum | | | | | Yes | Yes |
| Malaria | | | | | | Yes |
| Country FE | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $primary_{iec}$ is a binary variable equal to 1 if an individual completed primary school, 0 otherwise. $secondary_{iec}$ is a binary variable equal to 1 if an individual (aged 20 years and older) completed secondary school, 0 otherwise. $British_{ec}$ is a binary variable equal to 1 if ethnic-country region was part of a former British colony, 0 if French colony. $central_e$ is a binary variable equal to 1 if the pre-colonial ethnic region was classified as a large chiefdom or state, 0 otherwise. Location controls include whether the capital city of the country is located within the individual's ethnic region and ethnic region distance to the national border. Geographic controls include mean elevation and soil suitability for agriculture of the ethnic-country region. Standard errors in parentheses clustered by ethnic and country level. *** p<0.01, ** p<0.05, * p<0.1

Results support findings reported in Table 3.3. Our analysis points out that the positive effect of British rule is observed in fragmented ethnic regions and negated in centralised ethnic regions. School completion as outcome variable does not capture the quality of education and we therefore prefer literacy as measure of contemporary education.

## A3.4 Ethnic Region Partitioning

Partitioning of ethnic regions by colonial borders is associated with decreased education outcomes, decreased access to public goods and increased incidence and periods of political violence (Michalopoulos & Papaioannou, 2016). In Table A3.4 we restrict the sample to individuals in ethnic regions that were partitioned by colonial borders (columns 1 and 2) and to individuals in ethnic regions that were not partitioned by colonial borders (columns 3 and 4). Findings from column 2 show that in partitioned fragmented ethnic regions, British rule is associated with an increase in the likelihood of being literate by 17.1 percentage points. Centralisation is also positively associated with the likelihood of being literate in ethnic regions subject to French rule. There is, however, not a statistically significant interrelated effect between British rule and pre-colonial ethnic centralisation. Considering individuals in ethnic regions not partitioned by colonial borders, reported in column 4, the positive effect of British rule in centralised ethnic regions is again mitigated and associated with a decrease in the likelihood of being literate by 0.8 percentage points relative to French rule.

Table A3.4: Ethnic Region Partitioning Results

| | Dependent Variable: $literate_{iec}$ | | | |
|---|---|---|---|---|
| | Partitioned | | Not partitioned | |
| | (1) | (2) | (3) | (4) |
| $British_{ec}$ | -0.070*** | 0.171*** | 0.213*** | 0.127*** |
| | (0.011) | (0.019) | (0.005) | (0.036) |
| $central_e$ | 0.034 | 0.175** | 0.310*** | 0.112 |
| | (0.172) | (0.089) | (0.000) | (0.078) |
| $British_{ec} * central_e$ | -0.144 | -0.036 | -0.301*** | -0.135* |
| | (0.182) | (0.105) | (0.032) | (0.082) |
| Observations | 59,292 | 59,292 | 87,662 | 87,662 |
| R-squared | 0.074 | 0.203 | 0.041 | 0.089 |
| Population | No | Yes | No | Yes |
| Location Controls | No | Yes | No | Yes |
| Geographic Controls | No | Yes | No | Yes |
| Petroleum | No | Yes | No | Yes |
| Malaria | No | Yes | No | Yes |
| Country FE | Yes | Yes | Yes | Yes |

*Note:* $literate_{iec}$ is a binary variable equal to 1 if an individual is able to read parts of or a whole sentence, 0 otherwise. $British_{ec}$ is a binary variable equal to 1 if ethnic-country region was part of a former British colony, 0 if French colony. $central_e$ is a binary variable equal to 1 if the pre-colonial ethnic region was classified as a large chiefdom or state, 0 otherwise. Location controls include whether the capital city of the country is located within the individual's ethnic region and ethnic region distance to the national border. Geographic controls include mean elevation and soil suitability for agriculture of the ethnic-country region.
Standard errors in parentheses clustered by ethnic and country level. *** p<0.01, ** p<0.05, * p<0.1

# Chapter 4

# Slave Trades, Kinship Structures and Women Political Participation in Africa[1]

*We study whether present-day women political participation in sub-Saharan Africa can be linked to the temporary gender ratio imbalances caused by the transatlantic and Indian Ocean slave trades, taking into account pre-existing gender norms influenced by kinship structures. Using individual-level data for 28 sub-Saharan African countries from the latest Afrobarometer surveys, ethnic region kinship and slave trade data, we find that a woman's ethnic region exposure to the transatlantic slave trade is associated with an increase in her likelihood to vote, however, only in non-patrilineal ethnic regions. This effect is mitigated in patrilineal ethnic regions, where women have less decision-making power. This paper contributes to the literature on the contemporary sub-national effects of the slave trades and the historical causes of gender gaps in political participation.*

[1]We thank seminar audiences at American Economic Association (AEA) - Allied Social Science Associations (ASSA) Online Conference 2021, Economic Development and Well-being Research Group (EDWRG) Online Seminar 2021, Western Economic Association International (WEAI) Online Conference 2021, University of Pretoria PhD Online Workshop 2021 and African Economic History Network (AEHN) Regional Meeting in Stellenbosch 2021 for helpful comments. We acknowledge comments received from Racky Balde at WEAI Conference, Mdu Biyase at EDWRG Seminar, and Sarah Langlotz.

## 4.1 Introduction

Several studies have linked the slave trades to development outcomes and, specifically, underdevelopment in Africa. An important channel through which the slave trades affect contemporary development outcomes, is the temporary change in the male-to-female gender ratio in regions. The transatlantic slave trade decreased the gender ratio as more men were exported, whilst the Indian Ocean slave trade increased the gender ratio as more women were exported (Campbell, 2003; Lovejoy, 2011; Manning, 1990).

Although the change in the gender ratio is not necessarily persistent, the impact on society and gender dynamics is. The temporary gender ratio imbalance resulting from the transatlantic slave trade is for example associated with increased prevalence of present-day polygyny in Africa (Bertocchi, 2016; Dalton & Leung, 2014; Fenske, 2015). Such changes in marital composition and institutions entail further socio-economic consequences such as higher HIV infection rates amongst women, infidelity and child mortality (Bertocchi & Dimico, 2019).

Recent literature also links the temporary women-biased gender ratio from the transatlantic slave trade to contemporary women labour force participation. Using Demographic and Health Surveys (DHS) data, Teso (2019) shows that the likelihood of a woman being employed is higher in ethnic regions exposed to the transatlantic slave trade. In addition, he finds that the effect of this historic demographic shock is persistent. This association, however, only holds for the transatlantic slave trade and not the Indian Ocean slave trade, suggesting that it is the historic decrease in the gender ratio and subsequent change in gender roles that are responsible for the increase in women employment. Due to more men being exported during the transatlantic slave trade, women had to substitute for men in the workforce, which altered cultural beliefs in how women provide for their household.

We contribute to this literature by studying whether the transatlantic and Indian Ocean slave trades and the consequent temporary gender imbalances can explain contemporary women political participation. We further contribute by examining this association in the context of kinship structures. Ethnic region kinship structures determine how inheritance and lineage are traced. Patrilineal, matrilineal and other structures ultimately influence gender norms that entail varying cultural, social, economic and political implications for women in sub-Saharan Africa (Lowes, 2020a, 2020b; Robinson & Gottlieb, 2019; Tène, 2021). We can therefore not study the impact of the slave trades on gender outcomes, such as political participation, without taking pre-existing gender dynamics and culturally defined roles into account.

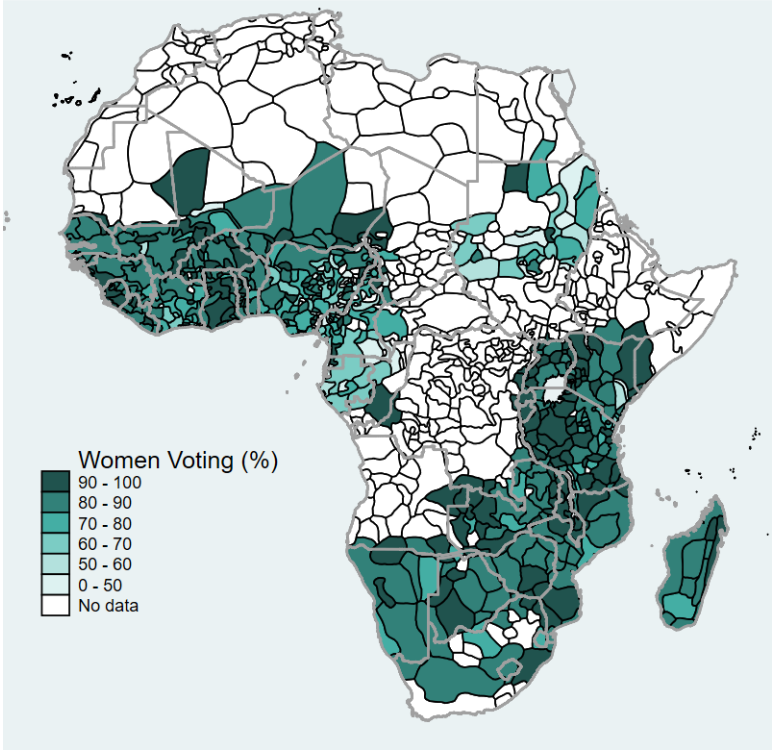
Gender gaps persist in social and economic outcomes, especially in developing countries (Lowes, 2020a). In sub-Saharan Africa, women representation in parliament remains relatively low and society still views women as inferior political leaders. Countries in the Pacific have 44 per cent women representation in the upper chamber of national parliament, the Americas and Europe approximately 33 and 30 per cent, whilst in Sub-Saharan Africa only 24 per cent of upper chamber members of national parliament are women (Inter-Parliamentary Union, 2020). Women political participation is essential for a democracy. More women in political office have been associated with decreased corruption, and improved education and health policy (Hessami & da Fonseca, 2020). Determining historical effects on contemporary inequality in political participation is thus essential in addressing socio-economic challenges faced by women in Africa.

The general agreement within the literature is that women are deprived of power economically, socially and politically (Bagues & Campa, 2020; Isaksson et al., 2014; Robinson & Gottlieb, 2019). Figure 4.1 illustrates the share of women who vote within an ethnic region. From the figure, it is clear that there is still substantial variation in voting by women across sub-Saharan Africa, not only between countries but also within. In Table 4.1 we present the average percentage of women voting by ethnic region exposure to the slave trades and kinship structures. As expected, average voting by women is higher in non-patrilineal relative to patrilineal ethnic regions. This is also true in ethnic regions that were exposed to the transatlantic and both the transatlantic and Indian Ocean slave trades. However, when we consider ethnic regions exposed to only the Indian Ocean slave trade, we see that the percentage of women voting in patrilineal ethnic regions is higher relative to non-patrilineal ethnic regions.

To evaluate the impact of historical events such as the slave trades, we use Afrobarometer survey data for 28 sub-Saharan African countries georeferenced to Murdock's Ethnographic Atlas (Murdock, 1959) and ethnic region level kinship structure and slave trade data (Murdock, 1967; Nunn & Wantchekon, 2011). We use the number of slaves exported during the respective slave trades as a measure of the intensity or level of exposure that an individual's ethnic region experienced. Our results suggest that a woman's historical ethnic region exposure to the transatlantic slave trade is associated with an increase in her likelihood to vote in non-patrilineal societies, where women have more decision-making power based on lineage and inheritance. The opposite is observed in patrilineal ethnic regions, as men would use their decision-making power to limit women's economic and political participation. Yet, although men constrain women's participation in patrilineal ethnic regions, exposure to the Indian Ocean slave trade in these ethnic regions is positively associated with gender norms such as views on women as political leaders and views regarding employment

opportunity. Altered gender norms may therefore be a mechanism through which the slave trades and consequent temporary imbalanced gender ratios affect women political participation in patrilineal and non-patrilineal ethnic regions.

Figure 4.1: Women Political Participation




*Note:* Map illustrates the percentage of surveyed women that voted by ethnic region. Source: Based on BenYishay et al. (2017) and Murdock (1959).

Table 4.1: Women Voting (%) by Ethnic Region Slave Trade Exposure and Kinship Structure

| | | Slave Trade | | | |
|---|---|---|---|---|---|
| | *Average* | *No Trade* | *Transatlantic* | *Indian Ocean* | *Both* |
| | 80.31 | 77.32 | 79.86 | 84.41 | 85.87 |
| *Non-patrilineal* | 81.80 | 77.24 | 80.46 | 82.01 | 88.31 |
| *Patrilineal* | 79.63 | 77.34 | 79.57 | 84.91 | 81.14 |

*Note:* Table reports the percentage of surveyed women voting in ethnic regions, according to slave trade exposure (columns) and kinship structures (rows). Source: Based on BenYishay et al. (2017), Murdock (1967) and Nunn and Wantchekon (2011).

The paper contributes to a growing literature on the long-run impact of historical events such as the slave trades on development in Africa. Seminal work by Nunn (2008) find that African countries exposed to higher intensity of slave trades have lower GDP per capita today.[2] Studies have also associated the higher

[2]He also shows that it was not necessarily poorer societies that were subjected to the slave trades, societies such as the Kongo Kingdom with high population density were even more affected.

intensity of slave trade with lower levels of trust between and within ethnic groups, increased contemporary civil conflict and violence, as well as ethnic diversity in countries (Besley & Reynal-Querol, 2014; Boxell et al., 2019; Fenske & Zurimendi, 2017; Green, 2013; Nunn & Wantchekon, 2011; Whatley & Gillezeau, 2011). Additionally, the transatlantic slave trade affected political institutions within ethnic regions. Obikili (2016b) finds that ethnic regions subject to higher slave exports are more likely to be fragmented with less political authority. In Nigeria and Tanzania, these areas are also associated with higher incidence of corruption. In West Africa, Whatley (2014) finds that the transatlantic slave trade decreases democracy and liberalism in ethnic regions. Obikili (2016a) also shows that the transatlantic slave trade in Nigeria and the Gold Coast is negatively associated with historical and contemporary literacy. On the other hand, Okoye and Pongou (2015) show that there is a positive relationship between the transatlantic slave trade and schooling, resulting from the missionaries that set up in regions more hindered by the slave trade.

Our paper furthermore expands the literature regarding gender norms and causes of gender gaps in political participation (Arriola & Johnson, 2014; Isaksson, 2014; Isaksson et al., 2014; Marien et al., 2010; Ndlovu & Mutale, 2013). Whilst other studies such as Robinson and Gottlieb (2019) and Alesina et al. (2013) have related historical aspects such as matrilineality and historical plough use to women political participation, we believe this is the first paper to study the interrelated effect of slave trades and kinship structures in this regard. Importantly, by distinguishing between the different slave trades, we are able to associate the consequent temporary gender ratio imbalances to gender outcomes.

The rest of the paper is organised as follows. In the next section, we provide background on the slave trades, kinship structures and discuss our conceptual framework. Section 4.3 describes the data and methodology used. Section 4.4 presents the main empirical results and Section 4.5 robustness checks. Section 4.6 concludes.

## 4.2 Background

### 4.2.1 Slave Trade in Africa

Africa experienced four slave trades over the 1400 to 1900 period. Noteworthy was the transatlantic slave trade exporting slaves from Western, West-Central and Eastern Africa to work in European colony plantations in the Americas. Pre-dating the transatlantic slave trade, the Indian Ocean slave trade exported slaves from Eastern Africa to the Middle East, India and plantation islands in the Indian Ocean (Nunn, 2008).

The other two smaller slave trades were the Red Sea and trans-Saharan slave trades.[3]

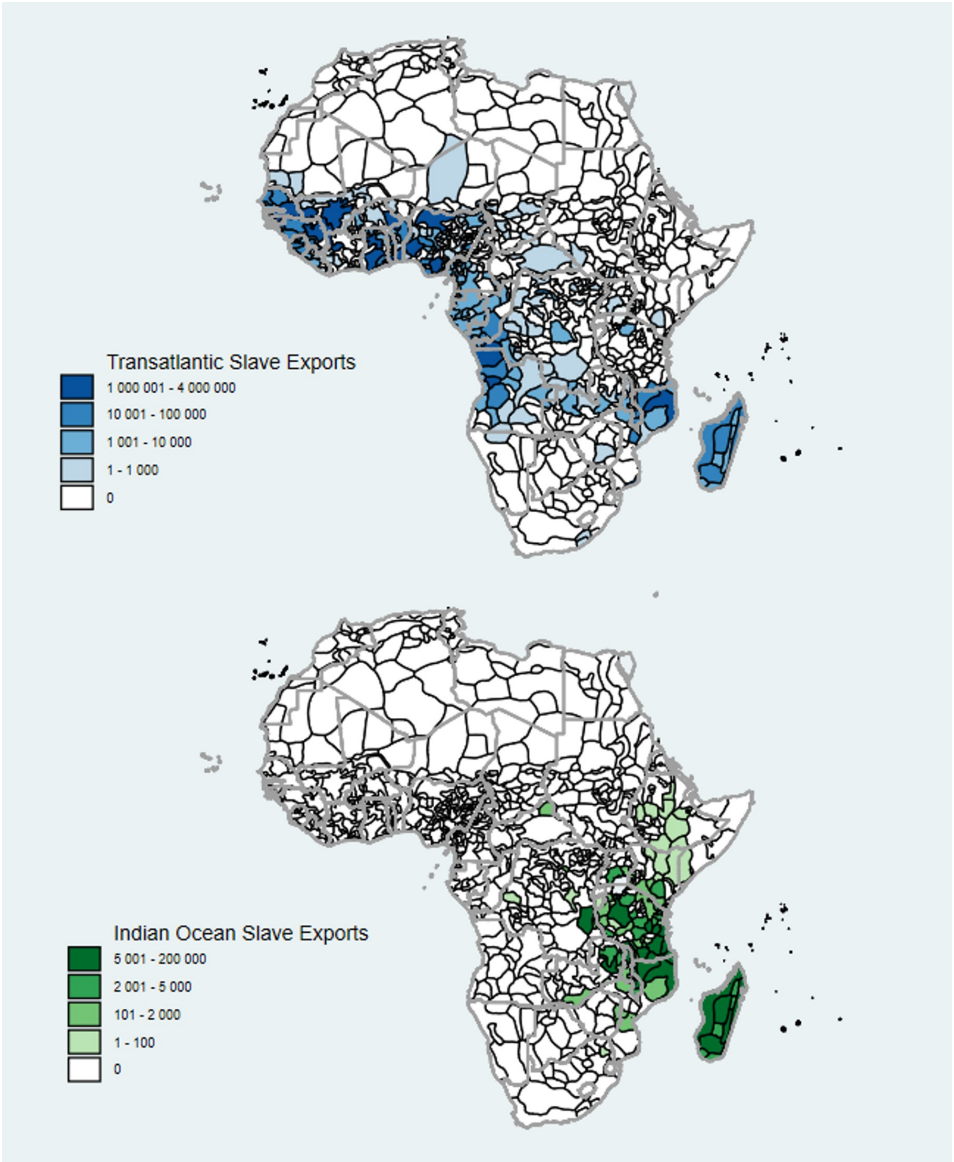
Slaves were captured by kidnapping people from neighbouring ethnic regions during raids, but also enslavement by family, friends and other people from the same ethnic group (Nunn, 2017). This did not only cause contemporary inter and intra- group mistrust, but also mistrust of political leaders, as slave traders were often chiefs and leaders within communities (Nunn & Wantchekon, 2011). Collecting data on the manner of enslavement in Sierra Leone, Koelle (1854) finds that approximately 40 per cent of slaves were kidnapped, 25 per cent enslaved through warfare, 20 per cent enslaved by family and friends and 16 per cent as a result of judicial processes. Enslaved people were sold to slave merchants in return for imported goods and guns, which were used to capture more people to be sold, also known as the 'gun-slave cycle' (Lovejoy, 2011). Another form of slavery that took place during the Indian Ocean slave trade was enslavement as a result of debt. Men would be indebted and resolve to pay-off debt through enslavement of their wives and/or children (Campbell, 2003). The slave trades diminished social conduct amongst and within ethnic regions, causing political instability and conflict (Besley & Reynal-Querol, 2014).

Additionally, the slave trades and associated deaths had a substantial effect on demography. Firstly, the slave trades affected the population size. Figure 4.2 shows the spatial distribution of the number of slaves exported during the transatlantic and Indian Ocean slave trades. Approximately 12 million slaves were exported during the transatlantic slave trade and 6 million all together during the Indian Ocean, Red Sea and trans-Saharan slave trades (Nunn, 2008). Manning (1990) notes that by 1800, the population in Africa had declined by half, whilst Whatley and Gillezeau (2011) estimate a more conservative but still noteworthy decline of 10 per cent. As noted by Dalton and Leung (2014), the mere volume of slaves captured and exported, especially during the transatlantic slave trade, reduced labour and human capital within these affected regions.Given that the African continent is land abundant and labour scarce, the negative effect on the labour force placed great constraints on productivity (Austin, 2008).

Secondly, the slave trades skewed the gender ratios in African countries. Figure 4.3 illustrates the impact of slave exports on the male-to-female gender ratio in Western and Eastern Africa. As mentioned, the transatlantic slave trade exported slaves to the Americas to work in plantations. Men were therefore preferred

[3]The Red Sea slave trade exported slaves to the Middle East and India from inland ethnic regions close to the Red Sea. The trans-Saharan slave trade exported slaves to North Africa from the Saharan desert (Nunn, 2008). Ethnic region data on the Red Sea and trans-Saharan slave trades is not yet available. In a recent working paper, La Ferrara, Corno, and Voena (2021) compile data on all four of the slave trades and show that women in ethnic regions with historical exposure to the Red Sea slave trade experience higher contemporary female genital cutting rates. We would be able to update our research once this data is published.

Figure 4.2: Slave Exports

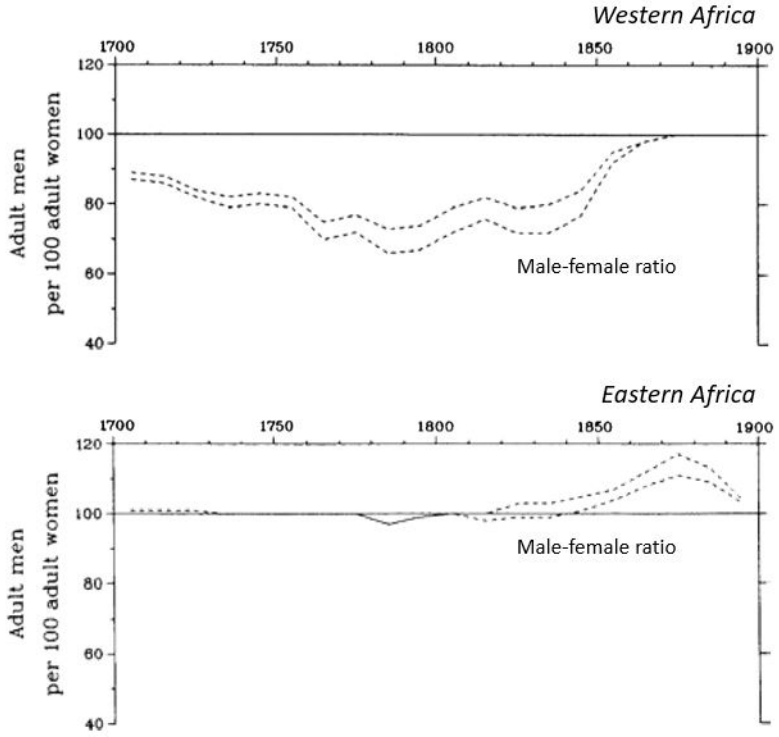



*Note:* Map illustrates the spatial distribution of the number of slaves exported from each ethnic region during the transatlantic slave trade (top) and Indian Ocean slave trade (bottom). Source: Based on Nunn and Wantchekon (2011).

for their strength, decreasing the gender ratio in the affected ethnic regions. Between the 17th and 19th century, the ratio of men to women exported in the transatlantic trade was 181:100, essentially 2 men for every woman (Lovejoy, 2011; Manning, 1990). The opposite occurred during the Indian Ocean slave trade on the Eastern coast of Africa. Women were mostly enslaved in this region as slaves were acquired to serve as domestic servants, entertainers and concubines. As more women were exported from Eastern Africa to the Middle East and India, the gender ratio increased (Campbell, 2003; Manning, 1990). This slave trade

and effect on the gender ratio was shorter in time and of a smaller scale relative to the transatlantic slave trade.

Figure 4.3: Impact of Slave Trades on Gender Ratio




*Note:* Figure illustrates the impact of the transatlantic slave trade on gender ratio from 1700 to 1900 in Western Africa (top panel) and the Indian Ocean slave trade in Eastern Africa (bottom panel). Source: Manning (1990).

Associated with the effect on demography and the change in gender ratio, Dalton and Leung (2014) find that ethnic regions subjected to the transatlantic slave trade and subsequent decreased gender ratio tend to be more polygynous today. With more women than men, a woman would need to enter into a polygynous marriage to have a husband. The Indian Ocean slave trade had the opposite effect as this slave trade is negatively associated with polygyny due to the increased gender ratio. Although Dalton and Leung (2014) do not find overwhelming causality between the Indian Ocean slave trade and polygyny on an ethnic region level, the negative relationship is statistical significant and robust to a selection of controls on a country level.

Teso (2019) argues that the altered gender ratio resulting from the transatlantic slave trade is associated with increased women labour force participation today. In ethnic regions where the intensity of transatlantic slave exports was higher, women had to substitute for men and provide for the household (Teso, 2019).

Earlier work by Manning (1990) also notes that women were obliged to fulfil the man's role and shifted to working in commerce.

### 4.2.2 Kinship Structures

Different kinship structures also determine norms that hold cultural, social, economic and political implications for women in sub-Saharan Africa. Kinship structures not only determine the inheritance of property or lineage of the family, but also the distribution of resources and obligations of family members (Robinson & Gottlieb, 2019; Tène, 2021).

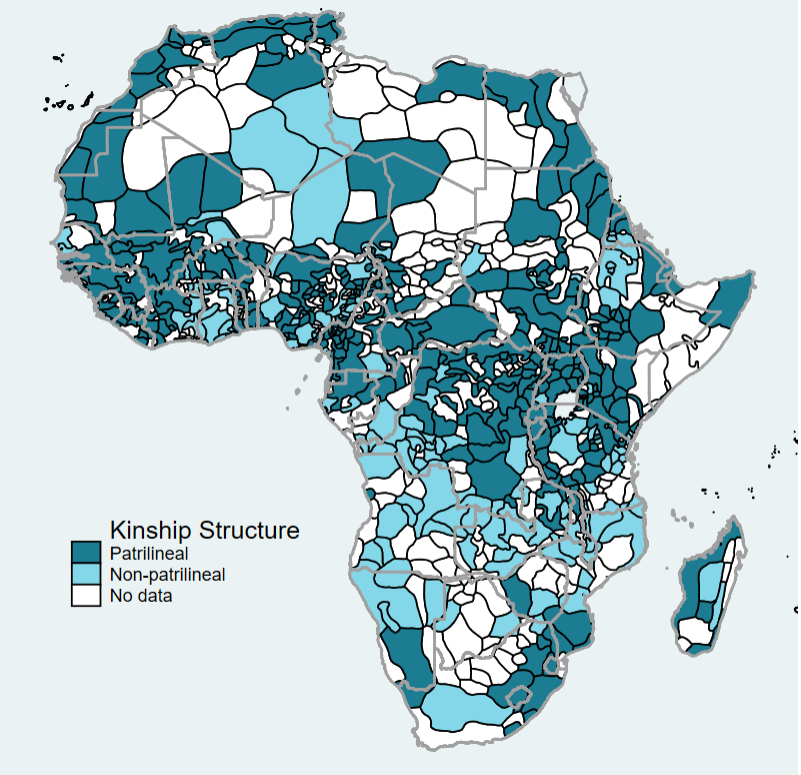
There are two types of *unilateral* kinship structures and several *cognatic* structures. In *unilateral* structures, descent is traced through either one of the two parents, fathers (patrilineal) or mothers (matrilineal). In patrilineal ethnic regions, lineage is traced through an individual's father's kinship group, and inheritance is passed to children from male group members. Although matrilineal societies are not the opposite of patrilineal kinships, lineage and inheritance are traced through female group members (Lowes, 2020b). Relative to women in patrilineal ethnic regions, women in matrilineal ethnic regions have greater support from their own kin networks, they are likely to hold more resources such as land, enjoy increased decision-making power, and are more willing to compete. Due to structural reasons such as matrilocality, where the husband and wife will live close to the wife's relatives, women have higher status and are more valued. Although matrilineality is not the same as matriarchy, women experience more empowerment relative to women in patrilineal ethnic regions (Lowes, 2020a; Robinson & Gottlieb, 2019; Tène, 2021).

*Cognatic* structures are more complicated. In these ethnic regions, lineage and inheritance are traced through both parents (Lowes, 2020a). These societies include duolateral, quasi-lineage, ambilineal, bilateral and mixed (Murdock, 1967). Although these kinship structures vary to a degree, both the biological ancestors are of importance. In quasi-lineage societies, men trace their lineage from their father and women from their mothers, whilst in ambilineal societies, individuals are able to choose and may choose based on social and economic standing of the mother's or father's family. To some extent, we can assume that in these ethnic regions, like in matrilineal societies, women have more decision-making power (or structural power, as we discuss in the next section) relative to women in patrilineal ethnic regions. Figure 4.4 shows the distribution of patrilineal and non-patrilineal ethnic regions in sub-Saharan Africa.

Studies have associated kinship structures with women political participation. Robinson and Gottlieb (2019)

find that matrilineality in sub-Saharan Africa is associated with closing the gender gap in political participation as a result of more progressive gender norms and views on gender roles. They highlight that increased women political participation in matrilineal societies should not be attributed to resource distribution, but to more equal gender and cultural norms. In India, Brule and Gaikwad (2020) find that kinship structures, which essentially determine decision-making regarding wealth through lineage, are key determinants of political participation and interest in politics. In patrilineal societies, men are more likely to participate in politics than women, however, in matrilineal societies this gender gap narrows.

Figure 4.4: Patrilineal and Non-Patrilineal Ethnic Regions




*Note:* Figure illustrates patrilineal and non-patrilineal kinship structures in sub-Saharan Africa. Source: Based on Murdock (1959) and Murdock (1967).

### 4.2.3 Conceptual Framework

As suggested by Guttentag and Secord (1983) and extended by South and Trent (1988), gender ratio imbalances affect the relative value of men and women. Gender ratio imbalances affect the dyadic power in interpersonal relationships, which specifically impact women's gender roles. Dyadic power, or bargaining power, is the relative power or influence that an individual has over the direction and nature of relationships with other individuals. When one gender is scarce, that gender will be more valued and less dependent on

their partner as alternative relationship options are available to them. Contrary, the gender in oversupply will have a shortage of alternative partners they could enter into relationship with. The gender in short supply will therefore have greater bargaining power than the oversupplied gender.

Importantly, the Guttentag and Secord (1983) theory assumes that structural power within a society resides with men. Structural power, which is the control of legal, economic and political structures, determines customs and practices which societies adhere to. Structural power can therefore be thought of as the decision-making power within a society. Therefore, the ability of women to use their bargaining (dyadic) power in a situation where they are the scarce gender, would be limited to some extent due to the structural power that men have. In our view, this is not the case in all societies.

In some societies, such as those with matrilineal or *cognatic* kinship structures (hereafter referred to as non-patrilineal societies), women would have some amount of structural power as lineage and inheritance are traced through female group members as well, which increases women participation in societal decision-making. Extending on Guttentag and Secord theory, South and Trent (1988) highlights that women, with greater structural power in a society, would be able to use their bargaining power to counteract men's attempts to limit their participation in activities and roles outside the family.

#### 4.2.3.1 Decreased Gender Ratio

Guttentag and Secord (1983) posit that in societies where men are scarce (decreased gender ratio), for example due to the transatlantic slave trade, men gain bargaining power within the society. In these societies, women are less valued as alternative options are available to men. Commitment to monogamous relationships is low and women may increase activities outside the family such as pursuing an education and entering into the labour force. Women become relatively more independent as they cannot rely on men remaining in monogamous relationships and providing for them. Additionally, in an attempt to oppose men's structural power within a society, women may increase political action and feminist movements may arise (Guttentag & Secord, 1983; South & Trent, 1988).

Findings by Dalton and Leung (2014) agree with this position, as they find that women, historically and in present-day, enter into polygynous relationships due to a lack of available options. Polygyny in itself entails far-reaching implications for gender norms within society. Tertilt (2006) finds that polygynous countries suffer more from gender inequality and have less power in national politics. Polygyny is also negatively associated

to women empowerment and measures of women health (Bertocchi & Dimico, 2019; Tertilt, 2005). Findings by Teso (2019) are also in line with these premises, as the author shows that the transatlantic slave trade is associated with higher contemporary female labour force participation.

Grant, Kesternich, Steckenleiter, and Winter (2018) associate a decrease in the gender ratio in Germany to women political participation. Considering the long-run effects of the gender ratio imbalance caused by the Second World War on the market for politicians, the authors find that a decreased gender ratio is associated with higher shares of women voters. As political parties adopted more gender equal and women oriented policies, women increased their political participation and also entered into the political arena as candidates for political office. Similar to previous research, Grant et al. (2018) argue that as men were in shortage, women had to enter into jobs and roles that were previously occupied by men.

#### 4.2.3.2 Increased Gender Ratio

In societies where women are scarce (increased gender ratio), for example due to the Indian Ocean slave trade, women are more valued. Due to the scarcity of women and less available options for men, men treat women with more 'deference and respect'. Yet, as women gain bargaining power, men use their existing structural power to limit women's economic and political participation. In this case, women's activities outside the family are constrained. As women's traditional and familial roles are more valued, women are less likely to enter the labour force and pursue an education (Guttentag & Secord, 1983; South & Trent, 1988).

Studying the effect of historical increased gender ratio in Australia, Grosjean and Khattar (2019) findings confirm the Guttentag and Secord (1983) hypothesis. During the 18th and 19th century, the British relocated more male convicts to Australia, increasing the gender ratio. They find that as a result, women are less likely to participate in the labour force today, and are more likely to enter into marriage. Findings also suggest more conservative views regarding women in the workforce.

#### 4.2.3.3 Gender Ratio and Kinship Structures

Although gender ratio imbalances can bring about changes in gender roles and norms as posited by Guttentag and Secord (1983), the pre-existing kinship structures, which allows us to measure women's structural power, would determine how these imbalances in gender ratios affect norms and gender outcomes that persist. We therefore study whether the transatlantic and Indian Ocean slave trades, and resulting temporary gender

ratio imbalances, can be associated with contemporary women political participation in the context of ethnic region kinship structures.

If we only consider the temporary gender ratio imbalance, we expect the transatlantic slave trade to be positively associated with women political participation, whilst we expect a negative association from the Indian slave trade. However, taking kinship structures into account, we then anticipate the correlations with women political participation to be different to our initial expectations between the two slave trades. We summarise our conceptual framework and the expected effect on voting in Figure 4.5.

Figure 4.5: Conceptual Framework

| | | **GENDER RATIO**<br>Guttentag and Secord (1983) Theory<br>Imbalanced gender ratio affects bargaining (*dyadic*) power | |
|---|---|---|---|
| | | **Transatlantic** (Decreased)<br>*Men gain bargaining power* | **Indian Ocean** (Increased)<br>*Women gain bargaining power* |
| **KINSHIP STRUCTURE**<br>Determines decision-making (*structural*) power | **Non-patrilineal**<br>*Women have some structural power* | Women increase activities outside of family and become economically independent<br>*Positive* | Women's traditional roles are encouraged, however, women are more valued (and already have some decision-making power)<br>*Positive* |
| | **Patrilineal**<br>*Men have structural power* | Although women's activities outside the family increase, their decision-making is limited<br>*Negative* | Although women are more valued, men attempt to limit women's gained bargaining power<br>*Positive/negative* |

*Note:* Figure illustrates the expected effect of the slave trades and consequent gender ratio imbalances in the context of kinship structures.

In non-patrilineal societies, where women have some structural power, we expect both the slave trades to be positively associated with women political participation. Although men gain bargaining power as a result of the transatlantic slave trade, women become economically independent as a result of increased activities outside the family. This in turn leads to increased political engagement and participation in a society where women's decisions are more valued. With respect to an increase in the gender ratio as a result of the Indian Ocean slave trade, we do not expect men to be able to oppress women's gained bargaining power and their political participation. The effect of the Indian Ocean slave trade may not be as salient in non-patrilineal ethnic regions as women already have some decision-making power in these societies.

In patrilineal societies, we expect a woman's ethnic region exposure to the transatlantic slave trade to be negatively associated with her political participation. In these societies, men gain bargaining power in addition to the structural power as determined by lineage. Although women may increase their roles outside the family, and it is expected that labour force participation will increase, men would use their structural power to limit women's activities and participation in societal decision-making. In terms of exposure to the Indian Ocean slave trade, the expected association is not as clear. As women gain bargaining power, men will attempt to use their structural power to limit women's economic and political participation. Therefore, although women are more valued, the gender dynamics that patrilineal kinship structure involves may offset the expected gain in bargaining power.

## 4.3 Data and Method

We use voting as a measure of contemporary political participation by women citizens. Data on voting is obtained from the Afrobarometer Survey Round 5 (2011 to 2013), Round 6 (2014 and 2015) and Round 7 (2016-2018) (BenYishay et al., 2017).[4] Countries surveyed and included in our sample are Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cote d'Ivoire, Gabon, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Senegal, Sierra Leone, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe. The variable $vote_{iec}$ is a binary variable equal to 1 if an individual ($i$), residing in ethnic region ($e$) and country ($c$), voted in the most recent election, 0 if not.

We assign geolocated individual coordinates as captured by the Afrobarometer to ethnic group polygons reported in the Murdock Map (Murdock, 1959). Estimates on the number of slaves exported from ethnic regions during the transatlantic and Indian Ocean slave trades are obtained from Nunn and Wantchekon (2011). The data set is constructed using data on the number of slaves exported from ports together with information on slaves' ethnic identity, georeferenced to the Murdock Map (Murdock, 1959). In line with Nunn and Wantchekon (2011) and Teso (2019), we measure the intensity of slave exports during the transatlantic trade, $atlantictrade_e$, and the Indian Ocean trade, $indianoceantrade_e$, by dividing the number of slaves from each ethnic region ($e$) with the historic land area of that ethnic region. To account for ethnic regions that did not experience slave trade and potential outliers, we use the natural log of the normalised slave trade measure plus 1.

[4]We use three rounds of geolocated surveys to mitigate the potential effect of a single election in a country on outcomes.

To capture the role of pre-existing cultural norms regarding women within society, we account for major type of descent as captured in the Murdock Ethnographic Atlas (Murdock, 1967). The variable $patrilineal_e$ is a binary variable equal to 1 if the ethnic group ($e$) is a patrilineal kinship and 0 if it is a matrilineal or another *cognatic* descent kinship (duolateral, quasi-lineage, ambilineal, bilateral, mixed). As discussed, it is more likely for women to have some amount of structural power in ethnic regions that follow matrilineal or *cognatic* kinship structures.

The main empirical specification is therefore

$$\begin{aligned} vote_{iec} = \beta_1 atlantictrade_e + \beta_2 patrilineal_e + \beta_3 atlantictrade_e * patrilineal_e \\ + \beta_4 indianoceantrade_e + \beta_5 indianoceantrade_e * patrilineal_e \\ + \beta_6 X_{iec} + \beta_7 X_{ec} + \alpha_{cs} + u_{iec} \end{aligned} \tag{4.1}$$

where the outcome variable, $vote_{iec}$, is whether a woman voted or not. To consider the effect on women political participation specifically, we follow Teso (2019) and Bertocchi and Dimico (2019) and estimate the empirical specification on a split sample of women.

The variable $X_{iec}$ is a vector of individual-level controls which include age ($age_{iec}$), age-squared ($age^2_{iec}$), whether an individual resides in an urban area ($urban_{iec}$), completed primary ($primary_{iec}$) and secondary school ($secondary_{iec}$), are Christian ($christian_{iec}$) or Muslim ($muslim_{iec}$), and fear political violence during election campaigns ($violence_{iec}$). We control for age, as older individuals are more likely to vote. Studying 10 African countries, Kuenzi and Lambright (2011) find that a 50-year-old is approximately 15 per cent more likely to vote than an 18-year-old. However, as we expect individuals to be less likely to vote after retirement, we also control for age-squared.

We include a binary variable equal to 1 if an individual resides in an urban area, 0 if not. Individuals from rural areas are more likely to vote than those from urban areas, since political parties often focus their political campaigns in these regions (Bratton, Mattes, & Gyimah-Boadi, 2005; Kuenzi & Lambright, 2011). We additionally include binary variables for primary and secondary school completion to measure education attainment, which also accounts for an individual's resource base (Isaksson, 2014). As secondary education completion amongst women is low relative to primary education, we expect a negative association to voting.

Belonging to a religion is found to enhance social capital and networking, which may increase participation

in community activities such as voting (Isaksson, 2014). We therefore include binary variables for Muslim and Christian religion.[5] Finally, to account for political intimidation that may deter women from voting during elections, the violence variable is a binary variable equal to 1 if an individual fears becoming a victim of political intimidation or violence during election campaigns in their country, 0 if not.

Borrowing from Teso (2019) and Bertocchi and Dimico (2019), we account for geographic and demographic ethnic-country region characteristics. The variable $X_{ec}$ represents ethnic-country region controls that may influence political participation. These variables include soil suitability for agriculture ($soilquality_{ec}$), the presence of large domesticated animals ($largeanimals_{ec}$), malaria ($malaria_{ec}$), a city in 1400 ($1400city_{ec}$), and distance to national border from the centroid of an individual's ethnic-country region ($borderdistance_{ec}$). Historical agricultural features of ethnic regions have been found to play an important role in gender roles and women participation in politics (Alesina et al., 2013). The suitability of soil for agriculture is associated with economic development outcomes through the effect on technological diffusion, colonial reach and public infrastructure provision (Nunn & Puga, 2012). Additionally, we control for the presence of large domesticated animals that correlates with lower plough use and crop farming. Plough use has been linked to less equal gender norms and lower contemporary women political participation (Alesina et al., 2013). We expect both these measures to be positively associated with women political participation, as women are often dependent on subsistence farming.

We also account for ethnic-country region disease environment, by controlling for the malaria ecology. Malaria ecology measures the mean climatic conditions favourable for malaria. Although many studies have shown the negative effects of malaria on economic and socio-economic outcomes, the opposite may be true for political participation (Gallup & Sachs, 2001). In Tanzania, Croke (2021) finds that citizens residing in regions with higher malaria incidence increase their approval of political leaders as a result of increased anti-malaria campaigns and bed net distribution in these regions. We can therefore expect that these citizens may be more likely to vote as well.

Historical prosperity of ethnic regions is controlled for using a binary variable if there was a city with more than 20 000 inhabitants located within the ethnic region's boundaries in 1400. Additionally, the distance to the border from the centroid of the individual's ethnic-country region captures the potential lower development and quality rule of law in ethnic regions closer to national borders (Michalopoulos &

[5]Relative to other religions such as traditional or ethnic religions, and not belonging to a religion.

Papaioannou, 2013; Pinkovskiy, 2017).

The variable $\alpha_{cs}$ captures the country-survey fixed effects. The variable $u_{iec}$ is an error term. We include country-survey fixed effect and account for potential spatial autocorrelation on country and ethnic region level with multi-way clustered standard errors using methodology developed by Cameron et al. (2011). Clustering at ethnic region and country level allows for valid inference in the instance that errors within geographical units are correlated.

Table 4.2: Summary Statistics

| Variable | N | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| $vote_{iec}$ | 35,595 | 0.803 | 0.398 | 0 | 1 |
| $atlantictrade_{e}$ | 35,595 | 0.500 | 0.926 | 0 | 3.656 |
| $Binary\ \ atlantictrade_{e}$ | 35,595 | 0.559 | 0.496 | 0 | 1 |
| $indianoceantrade_{e}$ | 35,595 | 0.040 | 0.203 | 0 | 3.330 |
| $Binary\ \ indianoceantrade_{e}$ | 35,595 | 0.240 | 0.427 | 0 | 1 |
| $patrilineal_{e}$ | 35,595 | 0.685 | 0.464 | 0 | 1 |
| $age_{iec}$ | 35,595 | 36.598 | 13.417 | 18 | 105 |
| $age^2_{iec}$ | 35,595 | 1519.439 | 1190.424 | 324 | 11025 |
| $urban_{iec}$ | 35,595 | 0.354 | 0.478 | 0 | 1 |
| $primary_{iec}$ | 35,595 | 0.546 | 0.498 | 0 | 1 |
| $secondary_{iec}$ | 35,595 | 0.223 | 0.416 | 0 | 1 |
| $muslim_{iec}$ | 35,595 | 0.292 | 0.455 | 0 | 1 |
| $christian_{iec}$ | 35,595 | 0.689 | 0.463 | 0 | 1 |
| $violence_{iec}$ | 35,595 | 0.326 | 0.469 | 0 | 1 |
| $soilquality_{ec}$ | 35,595 | 0.477 | 0.206 | 0.002 | 0.935 |
| $largeanimals_{ec}$ | 35,595 | 0.697 | 0.460 | 0 | 1 |
| $malaria_{ec}$ | 35,595 | 0.738 | 0.278 | 0 | 1 |
| $1400city_{ec}$ | 35,595 | 0.059 | 0.236 | 0 | 1 |
| $borderdistance_{ec}$ | 35,595 | 4.351 | 0.904 | -0.586 | 6.290 |

*Note:* $vote_{iec}$, $patrilineal_{e}$, $urban_{iec}$, $primary_{iec}$, $secondary_{iec}$, $muslim_{iec}$, $christian_{iec}$, $violence_{iec}$, $largeanimals_{ec}$ and $1400city_{ec}$ are binary variables. $atlantictrade_{e}$, $indianoceantrade_{e}$ and $borderdistance_{ec}$ are logged variables. $soilquality_{ec}$ and $malaria_{ec}$ variables are indices.

Women sample summary statistics are provided in Table 4.2. On average, approximately 80.3 per cent of women voted in the recent election. In our sample, 55.9 per cent of individuals reside in ethnic regions exposed to the transatlantic slave trade, whilst only 24.0 per cent of individuals reside in ethnic regions exposed to the Indian Ocean slave trade. The intensity of the transatlantic slave trade is also higher than that of the Indian Ocean slave trade. In our sample, 68.5 per cent of individuals reside in patrilineal ethnic regions.

## 4.4 Results

### 4.4.1 Women Political Participation

We firstly consider the effect of the slave trades and consequent gender ratio imbalances on women political participation independently in Table 4.3 column 1. The effect of a woman's historical exposure to the slave trades on her likelihood to vote is not obvious when considering sub-Saharan Africa as a whole without distinguishing between kinship structures that likely determine distribution of structural power between genders within societies. In column 2, even though we control for patrilineal kinship and the coefficient sign is negative as expected, we are unable to discern the association between the resulting gender imbalances and contemporary women political participation, without taking the interrelated effect into account.

Results from estimating equation 4.1 are presented in columns 3 to 6. We progressively add individual and ethnic-country region controls to which regression coefficients remain consistent.[6] Results suggest that a woman's ethnic region exposure to the transatlantic slave trade is associated with an increase in her likelihood to vote in non-patrilineal ethnic regions. In patrilineal ethnic regions, however, this effect is mitigated. Interpreting results from the full model specification in column 6, we can say that a one standard deviation increase in a woman's non-patrilineal ethnic region exposure to the transatlantic slave trade (0.828 in the estimated sample) is associated with an increase in her likelihood to vote by approximately 1.2 percentage points ($\beta_1$). On the other hand, a one standard deviation increase in a woman's patrilineal ethnic region exposure to the transatlantic slave trade (0.968 in the estimated sample) is associated with a decrease in her likelihood to vote by approximately 0.7 percentage points ($\beta_3$). The transatlantic slave trade is associated with a 1.5 per cent increase in women voting in non-patrilineal and a 0.9 per cent decrease in patrilineal ethnic regions relative to the average in these respective ethnic regions that were not exposed to the transatlantic slave trades. Indian Ocean slave trade coefficients are not statistically significant.

Considering that the majority of ethnic regions in sub-Saharan Africa are patrilineal in nature, we could therefore conjecture that, on average, women political participation would have been higher in the absence of the transatlantic slave trades. For example, in a patrilineal country like Kenya which experienced very low levels of transatlantic slave trade, a one standard deviation increase in historical exposure to the transatlantic slave would be associated with 800 000 fewer women registering to vote during the 2017 General Elections

[6] In column 5, we estimate equation 4.1 with only ethnic-country region controls included, as some individual-level controls, for example education, may be influenced by kinship structures. Such controls may therefore be additional channels through which political participation is affected (Robinson & Gottlieb, 2019). Our results, however, remain stable when including chosen individual controls.

Table 4.3: Women Voting Results

| | Dependent Variable: $vote_{iec}$ | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $atlantictrade_e$ | 0.002 | 0.001 | 0.013 | 0.014** | 0.015* | 0.015** |
| | (0.005) | (0.004) | (0.008) | (0.007) | (0.008) | (0.007) |
| $patrilineal_e$ | | -0.015* | 0.001 | 0.002 | -0.006 | -0.004 |
| | | (0.008) | (0.011) | (0.011) | (0.011) | (0.010) |
| $atlantictrade_e * patrilineal_e$ | | | -0.016* | -0.019** | -0.020** | -0.022*** |
| | | | (0.009) | (0.008) | (0.009) | (0.008) |
| $indianoceantrade_e$ | 0.003 | -0.000 | 0.008 | 0.003 | 0.007 | 0.003 |
| | (0.009) | (0.009) | (0.007) | (0.008) | (0.007) | (0.008) |
| $indianoceantrade_e * patrilineal_e$ | | | -0.044 | -0.043 | -0.024 | -0.034 |
| | | | (0.037) | (0.047) | (0.044) | (0.048) |
| $age_{iec}$ | 0.021*** | 0.021*** | | 0.021*** | | 0.021*** |
| | (0.001) | (0.001) | | (0.001) | | (0.001) |
| $age^2_{iec}$ | -0.0002*** | -0.0002*** | | -0.0002*** | | -0.0002*** |
| | (0.000) | (0.000) | | (0.000) | | (0.000) |
| $urban_{iec}$ | -0.045*** | -0.045*** | | -0.044*** | | -0.045*** |
| | (0.006) | (0.006) | | (0.007) | | (0.006) |
| $primary_{iec}$ | 0.005 | 0.005 | | 0.004 | | 0.005 |
| | (0.005) | (0.005) | | (0.005) | | (0.005) |
| $secondary_{iec}$ | -0.013** | -0.013** | | -0.013** | | -0.014** |
| | (0.006) | (0.006) | | (0.006) | | (0.006) |
| $muslim_{iec}$ | 0.063** | 0.062** | | 0.063** | | 0.063** |
| | (0.029) | (0.029) | | (0.028) | | (0.029) |
| $christian_{iec}$ | 0.038 | 0.038 | | 0.036 | | 0.037 |
| | (0.026) | (0.026) | | (0.025) | | (0.026) |
| $violence_{iec}$ | -0.014** | -0.015** | | -0.017*** | | -0.014** |
| | (0.006) | (0.006) | | (0.006) | | (0.006) |
| $soilquality_{ec}$ | 0.047 | 0.052 | | | 0.038 | 0.064* |
| | (0.034) | (0.033) | | | (0.033) | (0.033) |
| $largeanimals_{ec}$ | 0.012 | 0.011 | | | 0.015* | 0.013 |
| | (0.009) | (0.009) | | | (0.009) | (0.009) |
| $malaria_{ec}$ | 0.028 | 0.032 | | | 0.053** | 0.033 |
| | (0.026) | (0.025) | | | (0.026) | (0.025) |
| $1400city_{ec}$ | 0.046*** | 0.046*** | | | 0.060*** | 0.049*** |
| | (0.014) | (0.013) | | | (0.012) | (0.012) |
| $borderdistance_{ec}$ | -0.004 | -0.004 | | | -0.008** | -0.005 |
| | (0.004) | (0.004) | | | (0.004) | (0.004) |
| Observations | 35,626 | 35,595 | 39,254 | 36,921 | 37,745 | 35,595 |
| R-squared | 0.111 | 0.111 | 0.071 | 0.111 | 0.072 | 0.112 |
| Country-survey FE | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $vote_{iec}$ is a binary variable equal to 1 if a woman voted in the most recent election, 0 if not. $atlantictrade_e$ is the number of slaves exported during the transatlantic slave trade normalised by the historic land area of that ethnic region. $indianoceantrade_e$ is the number of slaves exported during the Indian Ocean slave trade normalised by the historic land area of that ethnic region. $patrilineal_e$ is a binary variable equal to 1 if the ethnic group is a patrilineal kinship, 0 if otherwise. Standard errors in parentheses clustered by ethnic region and country level. *** p<0.01, ** p<0.05, * p<0.1

(IEBC, 2017).[7] This is approximately equivalent to the female population in Bungoma or Meru, Kenya's fifth and sixth most populated counties (Kenya National Bureau of Statistics, 2019).

As pointed out by Teso (2019), the slave trades may have produced structural changes in society, which would affect political participation in general. It could be argued that the slave trades affect voting for all individuals due to lower trust or higher conflict in these regions (Besley & Reynal-Querol, 2014; Nunn & Wantchekon, 2011). To test whether our results are as a result of the temporary gender ratio imbalances that altered gender norms and not general societal effects, we estimate equation 4.1 for men in the Afrobarometer sample in Appendix A4.1. Our findings do not hold for men. We can therefore attribute the association we observe to changes in gender norms that the slave trades produced in the context of already existing gender dynamics in patrilineal and non-patrilineal societies.

We show that our results are persistent across different birth cohorts and different slave trade periods in Appendix A4.2 and A4.3. To account for the potential interrelated effect of the transatlantic and Indian Ocean slave trade in regions that experienced both, we consider the slave trades in isolation in Appendix A4.4. Furthermore, we ensure that our results remain robust to the inclusion of additional control variables in Appendix A4.5. In Appendix A4.6 we check our results using alternative standard errors and model estimations. We account for spatial correlation by computing Conley (1999) standard errors and cluster standard errors by ethnic region level to address correlation within ethnic regions only. Results from a logistic model accounting for nonlinearity and Lewbel (2012) IV model allowing for the potential effect of unobserved factors, also confirm our main findings.

In summary, although men gain bargaining power as a result of the transatlantic slave trade, women become economically independent, which may in turn lead to increased participation in other domains such as the political arena. Yet, although women increase their activities outside the family, their political participation is constrained where lineage is determined by male group membership. In these ethnic regions, where women have limited structural power and women empowerment is not supported, we see a negative association. We do not find a statistically significant relationship between a woman's ethnic region exposure to the Indian Ocean slave trade and her likelihood to vote.

[7] We use registered voters as reference, as voting data by gender is not readily available.

### 4.4.2 Gender Norms as Mechanism

In Table 4.4 we determine the effect of the transatlantic and Indian Ocean slave trade on gender norms in patrilineal and non-patrilineal ethnic regions as the potential mechanism through which women political participation is affected. We consider three measurements of gender norms using individual responses to questions regarding gender roles within society.

The variable $womenleaders_{iec}$ is a binary variable equal to 1 if an individual is of the view that women should have equal opportunity to be elected into political office as men, 0 if not. The Afrobarometer survey question asks an individual respondent to agree or strongly agree with one of two statements. We code the variable as equal to 1 if an individual agrees or strongly agrees with the following statement: "Women should have the same chance of being elected to political office as men." The variable is equal to 0 if an individual agrees or strongly agrees with the following statement: "Men make better political leaders than women, and should be elected rather than women." Results with respect to views regarding women as political leaders are reported in columns 1 to 3.

To measure whether women increase and decrease their activities outside the family when exposed to the transatlantic and Indian Ocean slave trade as theorised, we additionally consider views regarding employment and schooling. The Guttentag and Secord (1983) theory posits that increased gender ratios, such as during the Indian Ocean slave trade, encourages women's traditional roles within the family and society as men use their structural power to limit the bargaining (that may translate into economic and political) power gained by women. Contrary, a decrease in the gender ratio is associated with an increase in women's participation in activities outside the family.

The variable $employment_{iec}$ is a binary variable equal to 1 if an individual agrees or strongly agrees with the statement: "When jobs are scarce, men should have more right to a job than women?". The variable is equal to 0 if an individual disagrees or strongly disagrees. The variable $schoolboy_{iec}$ is a binary variable equal to 1 if an individual prefers boys be educated rather than girls, and 0 if an individual prefers the child with the greatest ability be educated (when funding is limited). The Afrobarometer survey question asks an individual respondent to agree or strongly agree with one of two statements. The variable is equal to 1 if an individual agrees or strongly agrees with the following statement: "If funds for schooling are limited, a boy should always receive an education in school before a girl." The variable is equal to 0 if an individual agrees or strongly agrees with the following statement: "If funds for schooling are limited, a family should send

the child with the greatest ability to learn." Should an individual be of the opinion that men should have more right to employment than women (columns 4 to 6) and that boys should be educated rather than girls (columns 7 to 9), we can assume that these individuals have less progressive gender norms.[8] We re-estimate our main model specification from equation 4.1 with these measurements of gender norms as the outcome variables. In Table 4.4 columns 1, 4 and 7 we report results for the full sample of men and women and control for gender. We subsequently split the sample by women (columns 2, 5, and 8) and men (columns 3, 6, and 9) to evaluate gender norms for each.

Table 4.4: Gender Norms Results

| | Dependent Variable: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | $womenleaders_{iec}$ | | | $employment_{iec}$ | | | $schoolboy_{iec}$ | | |
| | | Women | Men | | Women | Men | | Women | Men |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| $atlantictrade_e$ | -0.009 | -0.001 | -0.017 | -0.035** | -0.044*** | -0.026 | 0.027 | 0.013 | 0.040** |
| | (0.010) | (0.011) | (0.011) | (0.013) | (0.015) | (0.016) | (0.018) | (0.019) | (0.019) |
| $patrilineal_e$ | -0.018* | -0.022** | -0.015 | -0.007 | -0.015 | 0.002 | 0.032* | 0.039** | 0.025 |
| | (0.010) | (0.011) | (0.013) | (0.020) | (0.023) | (0.021) | (0.017) | (0.019) | (0.017) |
| $atlantictrade_e * patrilineal_e$ | 0.008 | 0.003 | 0.013 | 0.044*** | 0.053*** | 0.036* | -0.010 | 0.000 | -0.021 |
| | (0.011) | (0.013) | (0.013) | (0.016) | (0.017) | (0.019) | (0.020) | (0.021) | (0.021) |
| $indianoceantrade_e$ | 0.005 | 0.011* | -0.001 | 0.027* | 0.010 | 0.044*** | -0.040*** | -0.041** | -0.038*** |
| | (0.005) | (0.006) | (0.007) | (0.015) | (0.019) | (0.015) | (0.014) | (0.016) | (0.014) |
| $indianoceantrade_e * patrilineal_e$ | 0.156** | 0.216*** | 0.100 | -0.208*** | -0.140** | -0.278*** | -0.087 | -0.062 | -0.116 |
| | (0.067) | (0.068) | (0.072) | (0.064) | (0.069) | (0.098) | (0.085) | (0.084) | (0.098) |
| $woman_{iec}$ | 0.121*** | | | -0.141*** | | | -0.040*** | | |
| | (0.007) | | | (0.007) | | | (0.005) | | |
| Observations | 80,826 | 40,646 | 40,180 | 22,724 | 11,513 | 11,211 | 25,661 | 12,783 | 12,878 |
| R-squared | 0.071 | 0.061 | 0.063 | 0.071 | 0.056 | 0.063 | 0.048 | 0.053 | 0.047 |
| Individual controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country-survey FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $womenleaders_{iec}$ is a binary variable equal to 1 if an individual is of the view that women should have equal opportunity to be elected into political office as men, 0 if an individual is of the view that men make better political leaders than women. $employment_{iec}$ is a binary variable equal to 1 in an individual agrees that when jobs are scarce, men should have more right to a job than women, 0 if not. $schoolboy_{iec}$ is a binary variable equal to 1 if an individual agrees that a boy should have preference to attend school, 0 if the individual agrees that the child with the greatest ability to learn should be educated. $atlantictrade_e$ is the number of slaves exported during the transatlantic slave trade normalised by the historic land area of that ethnic region. $indianoceantrade_e$ is the number of slaves exported during the Indian Ocean slave trade normalised by the historic land area of that ethnic region. $patrilineal_e$ is a binary variable equal to 1 if the ethnic group is a patrilineal kinship, 0 if otherwise. Individual controls include age, age-squared, whether an individual resides in an urban area, completed primary and secondary school, are Christian or Muslim, and fear political violence during election campaigns. Region controls include soil suitability for agriculture, the presence of large domesticated animals, malaria, a city in 1400, and distance to national border from the centroid of an individual's ethnic-country region.
Standard errors in parentheses clustered by ethnic region and country level. *** p<0.01, ** p<0.05, * p<0.1

Results in columns 1 and 2 suggest a negative association between patrilineality and views regarding women's opportunity to be elected into political office, specifically, women's own views. For society as a whole, our

[8]These questions were only asked during single Afrobarometer surveys (Round 7 for $employment_{iec}$, Round 5 for $schoolboy_{iec}$) and we therefore have less observations in this analysis.

findings furthermore suggest that exposure to the Indian Ocean slave trade (increased gender ratio) is positively associated with views on women as political leaders in patrilineal ethnic regions. For women specifically, the Indian Ocean slave trade is positive and significantly associated with an improvement in how women view themselves as political leaders in non-patrilineal and especially in patrilineal ethnic regions. Interpreting results from column 2, we can say that a one standard deviation increase in a woman's patrilineal ethnic region exposure to the Indian Ocean slave trade (0.059 in the estimated sample) is associated with an increase in her likelihood to have the view that women should have equal opportunity to contend in political office by approximately 1.3 percentage points.

As women already have some structural power in non-patrilineal ethnic regions, it is not surprising that we do not find a large and significant effect on gender norms regarding women in the political arena in these societies. In patrilineal ethnic regions, where we assume men to have the structural power, changes in the dyadic power of women may have a larger effect in how society views women in the political arena. Therefore, a change in gender norms that increases the value of women, increases their view of themselves as political contenders even in ethnic regions where men have structural power. According to results from Table 4.3, the positive association to women's views regarding themselves as political leaders, is not translated into active political participation. We do not find a statistically significant relationship between ethnic region exposure to the transatlantic slave trade and views regarding women as political leaders.

Regarding attitudes on women's roles outside the family, such as employment and education, results are in line with expected changes as posited by Guttentag and Secord (1983). With respect to views regarding employment, the transatlantic slave trade (decreased gender ratio) is associated with a decrease in views that men should get a job rather than women. This is specifically true for women in non-patrilineal ethnic regions, as results from columns 4 to 5 suggest. On the other hand, an individual's patrilineal ethnic region exposure to the transatlantic slave trade is associated with an increase in his or her likelihood to have the view that when jobs are scarce, men should have more right to a job than women. These results support findings in Table 4.3 that the transatlantic slave trade is associated with decreased women political participation in patrilineal ethnic regions. As expected, the Indian Ocean slave trade has a different effect on these views. An individual's patrilineal ethnic region exposure to the Indian Ocean slave trade is associated with a decrease in the likelihood to have the view that men should have more right to a job, i.e. associated with more progressive gender norms.

With respect to views regarding schooling, in non-patrilineal ethnic regions (where women have some structural power) the increase in men's bargaining power due to the transatlantic slave trade is associated with an increase in men's view that boys should be educated rather than girls. Due to women gaining bargaining power as a result of the temporary increased gender ratio brought about by the Indian Ocean slave trade, views that boys should be educated rather than girls decreases in non-patrilineal ethnic regions, as reported in columns 7 to 9.[9]

The transatlantic and Indian Ocean slave trades do not affect gender norms in the same way. It is therefore not through the effect on the society in general that the slave trades affect women political participation, but through the temporary imbalance in the gender ratio and the differential effects on gender norms. Results are supportive of our hypothesis that the slave trades and consequent changes in gender ratios affected the value of women and norms regarding women differently within patrilineal and non-patrilineal ethnic regions.

## 4.5 Robustness Checks

### 4.5.1 Alternative Specifications

In Table 4.5 we estimate equation 4.1 using alternative measures of slave trade intensity borrowing from La Ferrara et al. (2021), Nunn and Wantchekon (2011) and Obikili (2016a). In column 1, slave trade intensity is calculated by normalising slave exports by the historical land area occupied by each ethnic group as reported by (Murdock, 1967).[10] From here, in column 2, we calculate the inverse hyperbolic sine (IHS) of the normalised slave trade intensity measure as suggested by Bellemare and Wichman (2020) to account for the skewed distribution of slave exports. Our slave trade data is skewed since there are ethnic regions that did not experience either of the slave trades and there are few ethnic regions that experienced quite intense exports. In column 3 we normalise slave trade exports using the size of the population of ethnic regions as reported in 1960 to account for prosperity of ethnic regions that may influence slave trade intensity, (Michalopoulos & Papaioannou, 2013). Finally, to capture whether it was the occurrence of the respective slave trades rather than the magnitude thereof, we create binary variables that are equal to 1 if an ethnic region experienced either the transatlantic or Indian Ocean slave trades, 0 if not. Results from Table 4.5 support our main findings as reported in Section 4.4.1.

[9] In columns 1, 4 and 7 we can see that women's views regarding their participation in political office, employment and schooling are more progressive relative to men.

[10] In this instance, we do not take the natural log plus 1.

Table 4.5: Alternative Slave Exports Results

| | Dependent Variable: $vote_{iec}$ | | | |
|---|---|---|---|---|
| | Area | IHS | Population | Binary |
| | (1) | (2) | (3) | (4) |
| $atlantictrade_e$ | 0.004*** | 0.011** | 0.127* | 0.025** |
| | (0.002) | (0.005) | (0.074) | (0.012) |
| $patrilineal_e$ | -0.005 | -0.005 | -0.010 | 0.003 |
| | (0.010) | (0.010) | (0.009) | (0.013) |
| $atlantictrade_e * patrilineal_e$ | -0.005*** | -0.017*** | -0.134* | -0.024 |
| | (0.002) | (0.006) | (0.074) | (0.017) |
| $indianoceantrade_e$ | 0.001 | 0.002 | -0.036 | -0.026 |
| | (0.001) | (0.007) | (0.032) | (0.020) |
| $indianoceantrade_e * patrilineal_e$ | -0.018 | -0.023 | -0.133 | -0.012 |
| | (0.032) | (0.038) | (0.184) | (0.018) |
| Observations | 35,595 | 35,595 | 35,595 | 35,595 |
| R-squared | 0.112 | 0.112 | 0.112 | 0.112 |
| Individual controls | Yes | Yes | Yes | Yes |
| Region controls | Yes | Yes | Yes | Yes |
| Country-survey FE | Yes | Yes | Yes | Yes |

*Note:* $vote_{iec}$ is a binary variable equal to 1 if a woman voted in the most recent election, 0 if not. $atlantictrade_e$ and $indianoceantrade_e$ are the respective measurements of slave trade intensity as discussed. $patrilineal_e$ is a binary variable equal to 1 if the ethnic group is a patrilineal kinship, 0 if otherwise. Individual controls include age, age-squared, whether an individual resides in an urban area, completed primary and secondary school, are Christian or Muslim, and fear political violence during election campaigns. Region controls include soil suitability for agriculture, the presence of large domesticated animals, malaria, a city in 1400, and distance to national border from the centroid of an individual's ethnic-country region.
Standard errors in parentheses clustered by ethnic region and country level. *** p<0.01, ** p<0.05, * p<0.1

In Table 4.6 we consider inheritance rule and locality as alternative specifications of patrilineality (Murdock, 1967). Patrilineal inheritance is a binary variable equal to 1 when the inheritance rule for real property is patrilineal, or to both children with daughters receiving less. Patrilineal inheritance is equal to 0 if individual property rights are absent, inheritance rule is matrilineal, or to both children equally. Non-patrilineal inheritance would therefore entail women having more access to resources such as land relative to women in ethnic regions where inheritance rule is patrilineal. We additionally consider patrilineal locality, presented in column 2. Patrilineal locality is a binary variable equal to 1 when marital residence after the first years of marriage is patrilocal, and 0 otherwise.

Again, results suggest that a woman's non-patrilineal ethnic region exposure to the transatlantic slave trade is associated with an increase in her likelihood to vote. In patrilineal ethnic regions, however, this effect is mitigated. Interestingly, a woman's non-patrilineal ethnic region exposure to the Indian Ocean slave trade is negatively associated with her likelihood to vote. A one standard deviation increase in a woman's

Table 4.6: Patrilineal Inheritance and Locality Results

| | Dependent Variable: $vote_{iec}$ | |
|---|---|---|
| | Inheritance | Locality |
| | (1) | (2) |
| $atlantictrade_e$ | 0.020** | 0.021** |
| | (0.010) | (0.010) |
| $patrilineal_e$ | 0.002 | 0.003 |
| | (0.014) | (0.013) |
| $atlantictrade_e * patrilineal_e$ | -0.021** | -0.024** |
| | (0.011) | (0.011) |
| $indianoceantrade_e$ | -0.056** | -0.012 |
| | (0.025) | (0.021) |
| $indianoceantrade_e * patrilineal_e$ | 0.066*** | 0.020 |
| | (0.025) | (0.021) |
| Observations | 31,693 | 34,822 |
| R-squared | 0.109 | 0.112 |
| Individual controls | Yes | Yes |
| Region controls | Yes | Yes |
| Country-survey FE | Yes | Yes |

*Note:* $vote_{iec}$ is a binary variable equal to 1 if a woman voted in the most recent election, 0 if not. $atlantictrade_e$ is the number of slaves exported during the transatlantic slave trade normalised by the historic land area of that ethnic region. $indianoceantrade_e$ is the number of slaves exported during the Indian Ocean slave trade normalised by the historic land area of that ethnic region. $patrilineal_e$ is a binary variable equal to 1 if the ethnic group follows patrilineal inheritance (column 1) and locality (column 2), 0 if otherwise. Individual controls include age, age-squared, whether an individual resides in an urban area, completed primary and secondary school, are Christian or Muslim, and fear political violence during election campaigns. Region controls include soil suitability for agriculture, the presence of large domesticated animals, malaria, a city in 1400, and distance to national border from the centroid of an individual's ethnic-country region.
Standard errors in parentheses clustered by ethnic region and country level. *** p<0.01, ** p<0.05, * p<0.1

non-patrilineal ethnic region exposure to the Indian Ocean slave trade (0.171 in the estimated sample) is associated with a decrease in her likelihood to vote by 0.95 percentage points. As noted by Guttentag and Secord (1983), where women are more valued due to their scarcity their traditional roles within the household are encouraged, which may cause a decrease in participation in other activities outside the family. In addition, given that women have economic structural power based on resources such as land, they may not see the need to participate in other spheres of society. A woman's patrilineal ethnic region exposure to the Indian Ocean slave trade is positively associated with her likelihood to vote. This is indicative of the offsetting effect between the structural power that men have and the bargaining power that women gain as a result of the increased gender ratio.

## 4.6 Concluding Remarks

Whilst the transatlantic slave trade exported more men resulting in a temporary decreased male-to-female gender ratio, the Indian Ocean slave trade exported more women resulting in a temporary increased gender ratio. We study whether the resulting temporary gender ratio imbalances can explain contemporary women political participation, in the context of pre-existing kinship structures that determine lineage and inheritance.

To study the potential effect of the slave trades on women political participation in societies where women have different decision-making power, we use geolocated Afrobarometer survey data from 28 African countries and ethnic region-level data on the transatlantic and Indian Ocean slave trades, as well as kinship structures. Our results suggest that a woman's non-patrilineal ethnic region exposure to the transatlantic slave trade is associated with an increase in her likelihood to vote. In patrilineal ethnic regions, on the other hand, transatlantic slave trade exposure is associated with a decrease in a woman's likelihood to vote, as men would use their structural power to limit women's economic and political participation. Altered gender norms are the potential mechanism through which the slave trades and consequent temporary imbalanced gender ratios affect women political participation in patrilineal and non-patrilineal societies.

This study substantiates literature on the long-run effect of slave trades and pre-colonial kinship structures on contemporary outcomes. It furthermore sheds light on the historical causes and considerations with respect to women political participation. Our study and findings speak to Targets 5.1 and 5.5 of the Sustainable Development Goals (SDGs) that set out to end discrimination and improve opportunities for and participation of women in the political arena (United Nations, 2020). Policies implemented on a national and sub-national level need to consider the deep-rooted causes of gender norms within societies to be able to address inequalities that persist.

# A4 Appendix

## A4.1 Men Political Participation

To test whether our results hold and are based on the effect of the temporary imbalanced gender ratio as hypothesised, we additionally estimate equation 4.1 for men in the Afrobarometer sample in Table A4.1. Results show that our findings only hold for women in the sample. Interestingly, results show that a man's non-patrilineal ethnic region exposure to the Indian Ocean slave is associated with a decrease in his likelihood to vote. As women gain dyadic power in a society where they likely already have some structural power, men's decision-making power and influence in the political arena may be constrained. We can therefore attribute changes in women political participation that we observe in Table 4.3 to the temporary gender ratio imbalances in patrilineal and non-patrilineal ethnic regions that had existing gender dynamics and practices that influence women roles.

Table A4.1: Men Voting Results

| | Dependent Variable: $vote_{iec}$ | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $atlantictrade_e$ | -0.001 | -0.002 | -0.001 | 0.003 | 0.001 | 0.004 |
| | (0.004) | (0.004) | (0.006) | (0.005) | (0.008) | (0.006) |
| $patrilineal_e$ | | -0.015** | -0.008 | -0.007 | -0.013 | -0.010 |
| | | (0.006) | (0.009) | (0.007) | (0.009) | (0.008) |
| $atlantictrade_e * patrilineal_e$ | | | -0.004 | -0.008 | -0.007 | -0.010 |
| | | | (0.007) | (0.006) | (0.008) | (0.007) |
| $indianoceantrade_e$ | -0.023*** | -0.025*** | -0.022*** | -0.025*** | -0.024*** | -0.024*** |
| | (0.008) | (0.008) | (0.006) | (0.007) | (0.006) | (0.008) |
| $indianoceantrade_e * patrilineal_e$ | | | -0.009 | -0.026 | 0.015 | -0.013 |
| | | | (0.036) | (0.035) | (0.037) | (0.037) |
| Observations | 35,871 | 35,840 | 39,947 | 37,175 | 38,460 | 35,840 |
| R-squared | 0.096 | 0.096 | 0.058 | 0.095 | 0.059 | 0.097 |
| Individual controls | Yes | Yes | | Yes | | Yes |
| Region controls | Yes | Yes | | | Yes | Yes |
| Country-survey FE | Yes | Yes | Yes | Yes | Yes | Yes |

*Notes:* $vote_{iec}$ is a binary variable equal to 1 if a man voted in the most recent election, 0 if not. $atlantictrade_e$ is the number of slaves exported during the transatlantic slave trade normalised by the historic land area of that ethnic region. $indianoceantrade_e$ is the number of slaves exported during the Indian Ocean slave trade normalised by the historic land area of that ethnic region. $patrilineal_e$ is a binary variable equal to 1 if the ethnic group is a patrilineal kinship, 0 if otherwise. Individual controls include age, age-squared, whether an individual resides in an urban area, completed primary and secondary school, are Christian or Muslim, and fear political violence during election campaigns. Region controls include soil suitability for agriculture, the presence of large domesticated animals, malaria, a city in 1400, and distance to national border from the centroid of an individual's ethnic-country region.
Standard errors in parentheses clustered by ethnic region and country level. *** p<0.01, ** p<0.05, * p<0.1

## A4.2 Persistence

Although gender ratio imbalances resulting from the slave trades were temporary and not necessarily persistent, the effect on gender norms continue. To check the persistence of our findings from Section 4.4.1, Table A4.2 reports birth cohort results for women. In column 1 we report results for women born within the first 25 years after the independence of their country of residence. As an example, this would include Kenyan women born between 1963 and 1987. In column 2 we report results for women born after 25 years of independence. For Kenyan women, this would include women born after 1988.[11]

Table A4.2: Birth Cohort Results

| | Dependent Variable:$vote_{iec}$ | |
|---|---|---|
| | Within 25 Years of Independence (1) | After 25 Years of Independence (2) |
| $atlantictrade_e$ | 0.011 | 0.023*** |
| | (0.009) | (0.008) |
| $patrilineal_e$ | -0.007 | 0.007 |
| | (0.013) | (0.016) |
| $atlantictrade_e * patrilineal_e$ | -0.023** | -0.028** |
| | (0.009) | (0.011) |
| $indianoceantrade_e$ | -0.003 | 0.014 |
| | (0.010) | (0.011) |
| $indianoceantrade_e * patrilineal_e$ | -0.009 | -0.095 |
| | (0.057) | (0.095) |
| Observations | 17,755 | 12,378 |
| R-squared | 0.087 | 0.129 |
| Individual controls | Yes | Yes |
| Region controls | Yes | Yes |
| Country-survey FE | Yes | Yes |

*Note:* $vote_{iec}$ is a binary variable equal to 1 if a woman voted in the most recent election, 0 if not. $atlantictrade_e$ is the number of slaves exported during the transatlantic slave trade normalised by the historic land area of that ethnic region. $indianoceantrade_e$ is the number of slaves exported during the Indian Ocean slave trade normalised by the historic land area of that ethnic region. $patrilineal_e$ is a binary variable equal to 1 if the ethnic group is a patrilineal kinship, 0 if otherwise. Individual controls include age, age-squared, whether an individual resides in an urban area, completed primary and secondary school, are Christian or Muslim, and fear political violence during election campaigns. Region controls include soil suitability for agriculture, the presence of large domesticated animals, malaria, a city in 1400, and distance to national border from the centroid of an individual's ethnic-country region.
Standard errors in parentheses clustered by ethnic region and country level. *** p<0.01, ** p<0.05, * p<0.1

Results reported in Table A4.2 are in line with results reported in Table 4.3. Specifically, for women born after 25 years of independence, results suggest that their non-patrilineal ethnic region exposure to the transatlantic slave trade is associated with an increase in the likelihood to vote. For both birth cohorts, patrilineal ethnic

[11] Our sample size for women born prior to independence is small, and we therefore do not consider the 25 years prior to independence.

region exposure to the transatlantic slave trade is negatively associated with the likelihood of women voting.

## A4.3 Heterogeneous Time Effects

In Table A4.3 we evaluate whether the effect of the slave trades varies across different time periods of the transatlantic and Indian Ocean slave trades. We use the number of slaves exported during the respective time periods, 1400 to 1599, 1600 to 1699, 1700 to 1799 and 1800 to 1899, as reported by Nunn and Wantchekon (2011). Results with respect to slave trades during the 1600 to 1899 period (columns 2 to 4) are in line with our main findings as presented in Table 4.3. Interpreting results from column 4, we can say that a one standard deviation increase in a woman's patrilineal ethnic region exposure to the transatlantic slave trade during the last century, 1800 to 1899 (0.379 in the estimated sample), is associated with a decrease in her likelihood to vote by approximately 1.6 percentage points.

Table A4.3: Slave Trades by Time Period Results

| | Dependent Variable: $vote_{iec}$ | | | |
|---|---|---|---|---|
| | 1400-1599 | 1600-1699 | 1700-1799 | 1800-1899 |
| | (1) | (2) | (3) | (4) |
| $atlantictrade_e$ | -0.096 | 0.085*** | 0.028*** | 0.015 |
| | (0.211) | (0.028) | (0.009) | (0.011) |
| $patrilineal_e$ | -0.015* | -0.005 | -0.002 | -0.006 |
| | (0.009) | (0.009) | (0.010) | (0.009) |
| $atlantictrade_e * patrilineal_e$ | 0.097 | -0.110*** | -0.034*** | -0.041*** |
| | (0.200) | (0.029) | (0.010) | (0.014) |
| $indianoceantrade_e$ | 0.005 | 0.014 | 0.009 | 0.006 |
| | (0.013) | (0.017) | (0.013) | (0.011) |
| $indianoceantrade_e * patrilineal_e$ | -0.007 | -0.111 | -0.164 | -0.056 |
| | (0.130) | (0.259) | (0.160) | (0.097) |
| Observations | 35,595 | 35,595 | 35,595 | 35,595 |
| R-squared | 0.111 | 0.112 | 0.112 | 0.112 |
| Individual controls | Yes | Yes | Yes | Yes |
| Region controls | Yes | Yes | Yes | Yes |
| Country-survey FE | Yes | Yes | Yes | Yes |

*Note:* $vote_{iec}$ is a binary variable equal to 1 if a woman voted in the most recent election, 0 if not. $atlantictrade_e$ is the number of slaves exported during the transatlantic slave trade normalised by the historic land area of that ethnic region. $indianoceantrade_e$ is the number of slaves exported during the Indian Ocean slave trade normalised by the historic land area of that ethnic region. $patrilineal_e$ is a binary variable equal to 1 if the ethnic group is a patrilineal kinship, 0 if otherwise. Individual controls include age, age-squared, whether an individual resides in an urban area, completed primary and secondary school, are Christian or Muslim, and fear political violence during election campaigns. Region controls include soil suitability for agriculture, the presence of large domesticated animals, malaria, a city in 1400, and distance to national border from the centroid of an individual's ethnic-country region.
Standard errors in parentheses clustered by ethnic region and country level. *** p<0.01, ** p<0.05, * p<0.1

## A4.4 Slave Trades in Isolation

To consider the potential that the two slave trades and their effects are interrelated, we evaluate the slave trades in isolation in Table A4.4 columns 1 to 4. In column 1, we consider the transatlantic slave trade and column 2, the Indian Ocean slave trade for the full sample. In columns 3 and 4, we consider the transatlantic and Indian Ocean slave trade, respectively, for a sample of women residing in ethnic regions that were affected by either or both of the slave trades. We therefore exclude individuals from ethnic regions that were not exposed to any of the slave trades. Results do not indicate that the transatlantic and Indian Ocean slave trades are interrelated in their effect on contemporary women voting. Excluding individuals residing in ethnic regions unaffected by the slave trades also do not attenuate our findings.

Table A4.4: Seperate Slave Trade and Affected Region Results

| | Dependent Variable: $vote_{iec}$ | | | | | |
|---|---|---|---|---|---|---|
| | All Regions | | Slave Trade Affected Regions | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $atlantictrade_e$ | 0.014** | | 0.012* | | 0.012* | 0.014* |
| | (0.007) | | (0.007) | | (0.007) | (0.007) |
| $patrilineal_e$ | -0.006 | -0.014 | -0.008 | -0.016 | -0.007 | -0.002 |
| | (0.009) | (0.009) | (0.015) | (0.019) | (0.015) | (0.016) |
| $atlantictrade_e * patrilineal_e$ | -0.022*** | | -0.017** | | -0.018** | -0.020** |
| | (0.008) | | (0.008) | | (0.008) | (0.008) |
| $indianoceantrade_e$ | | 0.0001 | | 0.007 | 0.005 | 0.008 |
| | | (0.009) | | (0.009) | (0.007) | (0.008) |
| $indianoceantrade_e * patrilineal_e$ | | -0.022 | | 0.021 | 0.001 | -0.013 |
| | | (0.045) | | (0.059) | (0.049) | (0.049) |
| $slavetrades_e$ | | | | | | 0.032 |
| | | | | | | (0.028) |
| Observations | 35,595 | 35,595 | 19,901 | 8,628 | 24,225 | 24,225 |
| R-squared | 0.112 | 0.111 | 0.111 | 0.087 | 0.106 | 0.106 |
| Individual controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Region controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Country-survey FE | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $vote_{iec}$ is a binary variable equal to 1 if a woman voted in the most recent election, 0 if not. $atlantictrade_e$ is the number of slaves exported during the transatlantic slave trade normalised by the historic land area of that ethnic region. $indianoceantrade_e$ is the number of slaves exported during the Indian Ocean slave trade normalised by the historic land area of that ethnic region. $patrilineal_e$ is a binary variable equal to 1 if the ethnic group is a patrilineal kinship, 0 if otherwise. Individual controls include age, age-squared, whether an individual resides in an urban area, completed primary and secondary school, are Christian or Muslim, and fear political violence during election campaigns. Region controls include soil suitability for agriculture, the presence of large domesticated animals, malaria, a city in 1400, and distance to national border from the centroid of an individual's ethnic-country region.
Standard errors in parentheses clustered by ethnic region and country level. *** p<0.01, ** p<0.05, * p<0.1

Focussing again on individuals from slave trade affected regions only, we estimate equation 4.1 in Table

A4.4 column 5 to check whether our results are robust when excluding individuals from ethnic regions not exposed to the slave trades. We additionally control for ethnic regions that experienced both slave trades in column 6. The variable $slavetrades_e$ is a binary variable equal to 1 if the ethnic region experienced both the transatlantic and Indian Ocean slave trade, 0 if only one. Results support findings from Table 4.3.

## A4.5 Additional Control Variables

In Table A4.5 we control for additional historical ethnic-country region factors that are often cited as important factors in determining contemporary outcomes.

Table A4.5: Additional Control Variables Results

| | Dependent Variable: $vote_{iec}$ | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| $atlantictrade_e$ | 0.015** | 0.011 | 0.011 | 0.015** | 0.015** | 0.016** | 0.015** |
| | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) |
| $patrilineal_e$ | -0.004 | -0.005 | -0.006 | -0.004 | -0.003 | -0.002 | -0.000 |
| | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) |
| $atlantictrade_e * patrilineal_e$ | -0.022*** | -0.021*** | -0.021*** | -0.023*** | -0.024*** | -0.025*** | -0.024*** |
| | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) | (0.008) |
| $indianoceantrade_e$ | 0.003 | 0.005 | 0.004 | 0.016 | 0.016 | 0.016 | 0.020 |
| | (0.009) | (0.008) | (0.009) | (0.012) | (0.012) | (0.012) | (0.014) |
| $indianoceantrade_e * patrilineal_e$ | -0.034 | -0.039 | -0.045 | -0.052 | -0.058 | -0.061 | -0.061 |
| | (0.048) | (0.047) | (0.049) | (0.042) | (0.042) | (0.043) | (0.043) |
| Observations | 35,595 | 35,595 | 35,595 | 35,595 | 35,595 | 35,595 | 35,595 |
| R-squared | 0.112 | 0.112 | 0.112 | 0.112 | 0.112 | 0.112 | 0.112 |
| Individual controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Hunter-gatherer | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Population | | Yes | Yes | Yes | Yes | Yes | Yes |
| Conflict distance | | | Yes | Yes | Yes | Yes | Yes |
| Elevation | | | | Yes | Yes | Yes | Yes |
| Lakes | | | | | Yes | Yes | Yes |
| Colonial railways | | | | | | Yes | Yes |
| Missions | | | | | | | Yes |
| Country-survey FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

*Note:* $vote_{iec}$ is a binary variable equal to 1 if a woman voted in the most recent election, 0 if not. $atlantictrade_e$ is the number of slaves exported during the transatlantic slave trade normalised by the historic land area of that ethnic region. $indianoceantrade_e$ is the number of slaves exported during the Indian Ocean slave trade normalised by the historic land area of that ethnic region. $patrilineal_e$ is a binary variable equal to 1 if the ethnic group is a patrilineal kinship, 0 if otherwise. Individual controls include age, age-squared, whether an individual resides in an urban area, completed primary and secondary school, are Christian or Muslim, and fear political violence during election campaigns. Region controls include soil suitability for agriculture, the presence of large domesticated animals, malaria, a city in 1400, and distance to national border from the centroid of an individual's ethnic-country region.
Standard errors in parentheses clustered by ethnic region and country level. *** p<0.01, ** p<0.05, * p<0.1

We progressively add variables controlling for ethnic regions being hunter-gatherer societies, ethnic-country region population size in 1960, distance to pre-colonial conflict areas, mean elevation, the presence of lakes,

and European influences such as the presence of colonial railways and the number of missionary stations per square kilometre of an historic ethnic region's land area.[12] Results remain stable and are in line with main findings.

### A4.6 Alternative Standard Error and Model Estimations

As an additional robustness check, we re-estimate equation 4.1 using different standard errors in columns 1 and 2. In column 1, we compute Conley (1999) spatial standard errors for a window of 100 kilometres, to further account for potential spatial correlation across ethnic regions. Coefficient estimates with respect to transatlantic slave trade exposure in patrilineal ethnic regions remain negative and statistically significant. In column 2, we cluster standard errors by ethnic region to account for correlation within ethnicities, as slave trade intensity measurements are constant by ethnic region level. Results are in line with those reported in Table 4.3 column 6.

In column 3, we estimate a logistic regression result instead of a linear probability model.[13] Again, results suggest that a woman's ethnic region exposure to the transatlantic slave trade is positively associated with her likelihood to vote in non-patrilineal ethnic regions, and negatively in patrilineal ethnic regions. For women in non-patrilineal ethnic regions, a doubling of historic slave trade intensity is associated with an increase in the odds of voting by approximately 9.4 per cent and a decrease by approximately 7.0 per cent for women in patrilineal ethnic regions.

Our results thus far have not indicated a causal relationship between the slave trades and women political participation. Although we are not concerned about economic endogeneity, we acknowledge that our results may suffer from omitted variable bias as noted in the slave trade literate.[14] To account for unobserved factors, we additionally estimate an instrumental variable (IV) regression model in column 4. We use Lewbel (2012) IV regression model approach, which offers heteroskedasticity-based instruments. The model constructs instruments as a function of our data without the need for an external instrument (Baum & Schaffer, 2012). This model yields similar results to the linear probability model reported in Table 4.3.

[12] Additional ethnic-country region control data is obtained from Michalopoulos and Papaioannou (2013). Missionary data is obtained from Roome (1925), digitised by Nunn (2010).
[13] Robust standard errors are clustered by ethnic region level.
[14] To test for endogeneity we use the Variation Addition Test (VAT) approach as suggested by Lin and Wooldridge (2019). Slave trade residual coefficients are not statistically significant on a 5 per cent level of significance and we therefore fail to reject exogeneity. Nevertheless, we cannot completely exclude the potential of endogeneity from other sources. Results are available on request.

Table A4.6: Alternative Estimations Results

| | Dependent Variable: $vote_{iec}$ | | | |
|---|---|---|---|---|
| | Standard Errors | | | |
| | Conley s.e. | Ethnic Region s.e. | Logistic model | Lewbel IV |
| | (1) | (2) | (3) | (4) |
| $atlantictrade_e$ | 0.012 | 0.015** | 0.090* | 0.014* |
| | (0.008) | (0.007) | (0.050) | (0.007) |
| $patrilineal_e$ | -0.005 | -0.004 | -0.032 | -0.005 |
| | (0.010) | (0.010) | (0.067) | (0.010) |
| $atlantictrade_e * patrilineal_e$ | -0.018** | -0.022*** | -0.163*** | -0.022*** |
| | (0.008) | (0.008) | (0.055) | (0.008) |
| $indianoceantrade_e$ | 0.004 | 0.003 | 0.031 | 0.002 |
| | (0.008) | (0.008) | (0.068) | (0.009) |
| $indianoceantrade_e * patrilineal_e$ | -0.017 | -0.034 | -0.401 | -0.029 |
| | (0.053) | (0.046) | (0.368) | (0.036) |
| Observations | 35,595 | 35,595 | 35,595 | 35,595 |
| R-squared | 0.044 | 0.112 | | 0.046 |
| Individual controls | Yes | Yes | Yes | Yes |
| Region controls | Yes | Yes | Yes | Yes |
| Country-survey FE | Yes | Yes | Yes | Yes |

*Note:* $vote_{iec}$ is a binary variable equal to 1 if a woman voted in the most recent election, 0 if not. $atlantictrade_e$ is the number of slaves exported during the transatlantic slave trade normalised by the historic land area of that ethnic region. $indianoceantrade_e$ is the number of slaves exported during the Indian Ocean slave trade normalised by the historic land area of that ethnic region. $patrilineal_e$ is a binary variable equal to 1 if the ethnic group is a patrilineal kinship, 0 if otherwise. Individual controls include age, age-squared, whether an individual resides in an urban area, completed primary and secondary school, are Christian or Muslim, and fear political violence during election campaigns. Region controls include soil suitability for agriculture, the presence of large domesticated animals, malaria, a city in 1400, and distance to national border from the centroid of an individual's ethnic-country region.

# Chapter 5

# Final Remarks

The purpose of this research was to study the effect of ethnicity and the interrelated effect of ethnic-specific and colonial institutions on sub-national development outcomes in sub-Saharan Africa. Our results indicate that these socio-political factors are important considerations for contemporary development and should be accounted for during policy considerations. Chapter 2 contributes to the debate on redistributive politics in Africa. By studying the interaction between ethnic and colonial institutions, Chapters 3 and 4 address a gap in the literature regarding the interrelated effect of historical institutions, as highlighted by Michalopoulos and Papaioannou (2020).

In Chapter 2, using municipal-level data for 52 district municipalities from 1996 to 2016 in South Africa, we study whether coethnicity with the president affects public infrastructure provision. We find a positive association between coethnicity and public infrastructure provision, which indicates that during the period in which the coethnic president was in power, citizens in Xhosa and/or Zulu municipalities experienced improved access to water and electricity relative to non-coethnic municipalities. The findings of ethnic favouritism remain robust to political and regional considerations, as well as different specifications of coethnicity thresholds.

In Chapter 3, we use geolocated Demographic and Health Surveys' (DHS) literacy outcomes for four countries in Western and Western-Central Africa to study the complementarity or contention between colonial and

pre-colonial ethnic institutions and the effect on contemporary education outcomes. We find that British rule is positively associated with literacy, however, only in fragmented ethnic regions. In politically complex ethnic regions with established hierarchies and political reach, the favourable effect of British rule is reduced.

In Chapter 4, we use geolocated individual-level data for 28 sub-Saharan African countries from the latest Afrobarometer surveys, to study the interrelated effect of pre-colonial kinship structures and the transatlantic as well as the Indian Ocean slave trade intensity on contemporary women political participation. The findings show that a woman's ethnic region exposure to the transatlantic slave trade is associated with an increase in her likelihood to vote in non-patrilineal societies. This effect is mitigated in patrilineal ethnic regions, where women likely have less decision-making power.

This thesis speaks to a number of the Sustainable Development Goals (SDGs). Specifically, Goals 4 pertaining to quality education, 5 gender equality and 16 strong institutions. The consideration of ethnicity, pre-colonial ethnic and colonial institutions additionally relates to SDG Target 10.2, which sets out to empower social, economic and political inclusion of all people, irrespective of ethnicity, origin, economic or other status. Policies, plans and programmes should consider these socio-political factors to address contemporary development challenges.

Future studies can expand on our research in two respects. Firstly, collect more refined and disaggregated financing and investment data with respect to the provision of public goods. Detailed data regarding grant allocations would assist in studying the mechanisms of ethnic favouritism in public infrastructure provision in South Africa. In addition, detailed and historical data regarding colonial investments in education would assist in understanding the diffusion and persistence of colonial institutions.

Secondly, future work with respect to the slave trades can update results using recent (not yet available) data from La Ferrara et al. (2021), which includes the number of people exported during the Red Sea and trans-Saharan slave trades. Findings from La Ferrara et al. (2021) show that women in ethnic regions with historical exposure to the Red Sea slave trade experience higher contemporary female genital cutting rates. It would therefore be of value to analyse alternative mechanisms through which the slave trades affect gender roles, norms and women political participation.

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