Public Infrastructure Provision and Ethnic Favouritism: Evidence from South Africa*

Leoné Walters†, Manoel Bittencourt‡ and Carolyn Chisadza§

June 24, 2023

Abstract

Does coethnicity with the President affect public infrastructure provision in South Africa? Using municipal-level data for 52 district municipalities from 1996 to 2016, we find that municipalities coethnic with the President are associated with higher water infrastructure provision relative to non-coethnic municipalities. Taking into account various political considerations, results show that ethnic favouritism occurs due to ethnic altruism. Our findings remain robust to different specifications of coethnicity thresholds and are applicable to electricity infrastructure provision. Results suggest that in order to minimise ethnic favouritism, politically independent institutions should oversee the allocation of funding and provision of infrastructure.

1 Introduction

Ethnicity and its complexity are central in explaining sub-national development differences between and within countries. Regions may benefit from ethnic diversity as the variety of skills may lead to higher productivity, increased political mobilisation, higher education provision and welfare outcomes on sub-national level (Alesina and La Ferrara, 2005; Egel, 2013; Gao, 2016; Gisselquist et al., 2016). Navigating diversity can therefore be considered as a potential asset (Henn and Robinson, 2021). On the other hand, regions with more ethnic groups may be disadvantaged as salient ethnic divisions may give rise to competition rather than collaboration in society (Cheeseman, 2018). For example, studies have associated ethnic diversity with political instability, rent seeking behaviour, lower social trust, and increased conflict amongst citizens (Alesina et al., 1999; Alesina and La Ferrara, 2005; Alesina and Zhuravskaaya, 2011; Easterly

*We thank seminar audiences at Economic Research Southern Africa (ERSA), Economic Society of South Africa (ESSA), Centre for the Study of African Economies (CSAE), University of the Witwatersrand, University of Pretoria and Comparative Economic Development Studies (CEDS) for comments. We also acknowledge comments received from Matthew Clance, 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.

† *Corresponding author.* Department of Economics, University of Pretoria, Private bag X20, Hatfield, 0028, South Africa. Email: leone.walters@gmail.com

‡ Department of Economics, University of Pretoria. Email: manoel.bittencourt@up.ac.za

§ Department of Economics, University of Pretoria. Email: carolyn.chisadza@up.ac.za

and Levine, 1997; La Porta et al., 1999; Montalvo and Reynal-Querol, 2005). Given the inconclusive evidence, our paper contributes to the literature by providing a better understanding of the possible dynamics related to ethnic diversity in the context of a newly democratic and diverse country.

Importantly, ethnic diversity is also associated with favouritism and prejudice, which as noted by Lee (2018), may be one of the channels through which ethnic diversity undermines public goods provision. 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 have been associated with higher health and education outcomes relative to non-coethnic citizens (Franck and 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).

We examine the effects of ethnic favouritism on welfare distribution, with our focus on the provision of public goods in South Africa. Ethnic favouritism occurs when members of the same ethnicity as political leaders benefit from patronage and other public or political decisions. 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, income and wealth inequality amongst South Africans remain high (Sulla and Zikhali, 2018). Moreover, inequality in access to basic public goods such as water is still high. Access to water is a public health measure that is correlated with growth and development (Weil, 2007). 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 to the President affect public water infrastructure provision? We argue that ethnic favouritism occurs through coethnicity to 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 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 with the President matters for public goods provision.

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

Finally, this paper contributes to empirical research on ethnic favouritism in Africa. Ahlerup and Isaksson (2015) use Afrobarometer survey data to show that populations in sub-Saharan Africa, including South Africa, that are coethnic to the President and reside in the President's region of origin are less likely to be treated unfairly by the government. In sub-Saharan Africa, excluding South Africa, Franck and Rainer (2012) find ethnic favouritism in primary education outcomes and infant mortality.

In Kenya specifically, coethnicity to the President during school-age years is linked to higher levels of education (Kramon and Posner, 2016; Li, 2018). In addition, Burgess et al. (2015) find ethnic favouritism in central government road building investment in Kenya 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. 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. Similarly, Ravetti et al. (2019) conduct a lab experiment amongst coal mine workers in South Africa and find that in contrast to trade union membership that fosters solidarity, ethnicity contributes to polarisation and discrimination by the Zulu majority ethnic 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 political competition is associated with higher provision of electricity infrastructure provision as the governing party faces fewer restrictions from opposition parties and therefore has more autonomy to implement policies. Kroth (2014), on the other hand, finds that electoral competition brings about targeting of intergovernmental transfers to provinces close to election periods. Her results motivate the notion that the grant system can be used in a way to strategically allocate funding.

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).

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 3 describes the data and methodology. Section 4 presents the main empirical results and Section 5 additional robustness checks. The last section concludes and discusses potential policy implications.

2 Background

2.1 Presidents and Ethnicity in South Africa

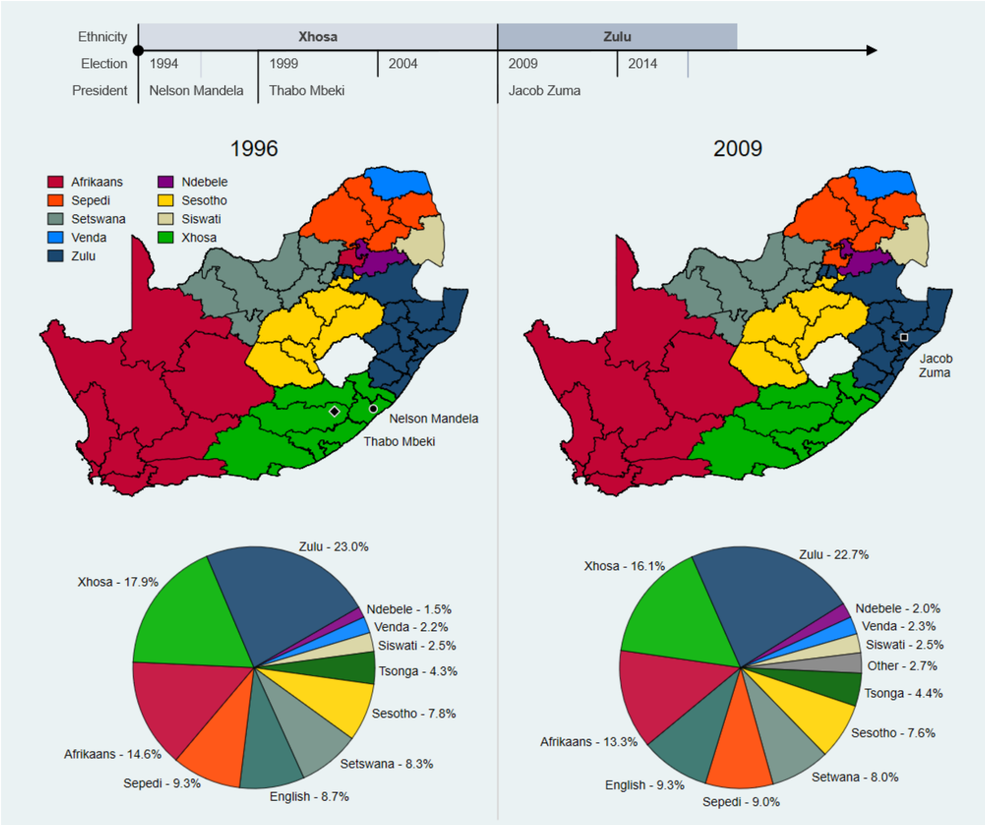
South Africa is a parliamentary representative country with a proportional representation voting system. The political party that wins the election and has more than 50 percent of seats in the Parliament is the governing party. Presidency is then awarded to the leader of the winning political party. 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, South Africa's governing party, the African National Congress (ANC), has been 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 1.[1] The figure also presents the ethnicity of the majority of the population within municipalities in 1996, the start of our ethnolinguistic data and also South Africa's democracy under the Xhosa regime, relative to 2009, the start of the Zulu regime. We also illustrate the population shares of ethnic groups in South Africa. As South Africa reports population demographics according to race, we use home language to derive ethnic affiliation.

The two major ethnic groupings in South Africa are the Nguni, comprising Ndebele, Swazi, Xhosa and Zulu; and the Sotho, which include the 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 17 and 22 percent 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).

[1] 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.

Figure 1: South African Presidents and Ethnolinguistic Composition



Source: South African Local Government Association (2020)
Note: The figure time-line shows the tenure and ethnicity of the Presidents included in our analysis. The maps show the ethnicity of municipalities according to the home language spoken by the majority of the population within the municipality and birth municipalities of Presidents (at the start of the respective ethnic regimes, 1996 and 2009). The pie charts indicate the population share of ethnic groups in the country.

Figure 1 points out three considerations. Firstly, nine of the eleven official languages represent the majority of the population within municipalities. 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. A map illustrating municipal and provincial boundaries is provided in Appendix Figure A.1.

Secondly, the population shares of ethnic groups according to home language represented in the pie charts do not change substantially between 1996 and 2009. Xhosa and Zulu remain in majority. Furthermore, except for 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, with the exception of 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 et al., 2018).

In South Africa, the President has the power to assemble the government by appointing the Deputy President, Ministers and Deputy Ministers that form the Cabinet (Parliament of the Republic of South Africa, 2018). The ethnic composition of the Cabinet Ministers during President Thabo Mbeki's term was approximately 38 percent Xhosa and 15 percent Zulu, whilst during President Jacob Zuma's term, the ethnic composition of the Cabinet shifted to approximately 28 percent Zulu and 17 percent 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.

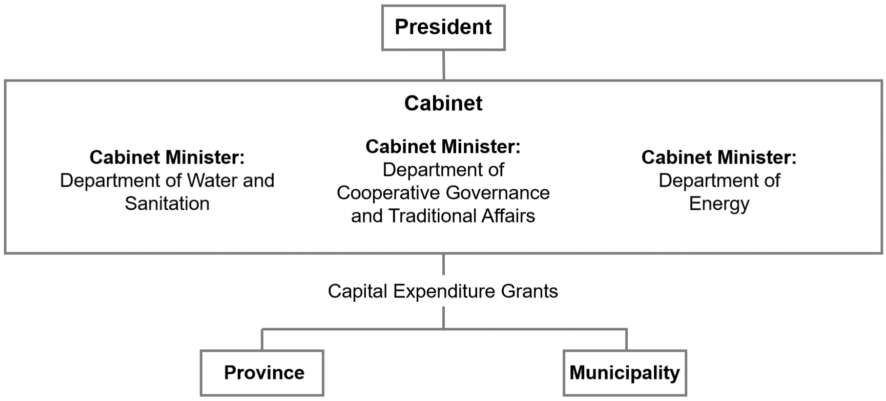
Municipal capital expenditure is mainly funded through conditional grants, which are essentially determined by the government's strategic development priorities as set out by development directives (African National Congress, 1994; National Planning Commission, 2012). These priorities are determined by the governing party. 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 and Thornhill, 2017). For instance, if a municipality requires funding to improve infrastructure related to basic services 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 (Minister of Finance, 2018).

Figure 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 co-ethnicity becomes apparent.

Funding for infrastructure is also allocated to municipalities based on the equitable share formula that takes into account various socioeconomic and demographic factors and also 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).

Other role players in water infrastructure, include local municipalities, private water service providers and 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).

Figure 2: President and Cabinet



Source: Own example based on Minister of Finance (2018); Oosthuizen and Thornhill (2017)
Note: Organogram for illustration of relationship between President, Cabinet Ministers and allocation of grants by national departments to municipalities.

2.2 Ethnic Politics

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

The first model is based on ethnic altruism, which is 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 and 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 and 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 for coethnic citizens due to personal reasons of ethnic altruism.

The second model is based on the mutual exchange of support (Franck and 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 and Mccubbins, 1986). The President can also efficiently provide public goods to gain votes if he/she is familiar with the coethnic citizen demands and preferences (Dixit and Londregan, 1996).

As the Zulu and Xhosa ethnicities represent the largest and second largest of the ethnic groups, strategically distributing water 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 municipalities in South Africa regarded as ANC key constituencies experience increased electricity infrastructure, supplied by Eskom (South Africa's state-owned electricity provider), 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 do 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 who is a coethnic member. That is, the citizens that are coethnic to the President will support him/her irrespective of the provision of public goods (Franck and Rainer, 2012). 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 and 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 and 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 in South Africa.

3 Data and Method

We construct a disaggregated municipal-level panel data set covering all district municipalities from 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 municipal-level statistics 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. Our data set covers the 52 district municipalities (44 district and 8 metropolitan municipalities) in South Africa over 21 years.

Water infrastructure is the percentage of households that have access to water at or above 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 data (Department of Water and Sanitation, 2020).

We choose water as the outcome variable for three reasons. Firstly, during apartheid, coethnic groups together with other non-white South Africans were denied this basic infrastructure. As such, the RDP was central in the ANC's election strategy for the 1994 elections (Kroth et al., 2016). Access to drinking water 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 to address by 2030 (National Planning Commission, 2012).

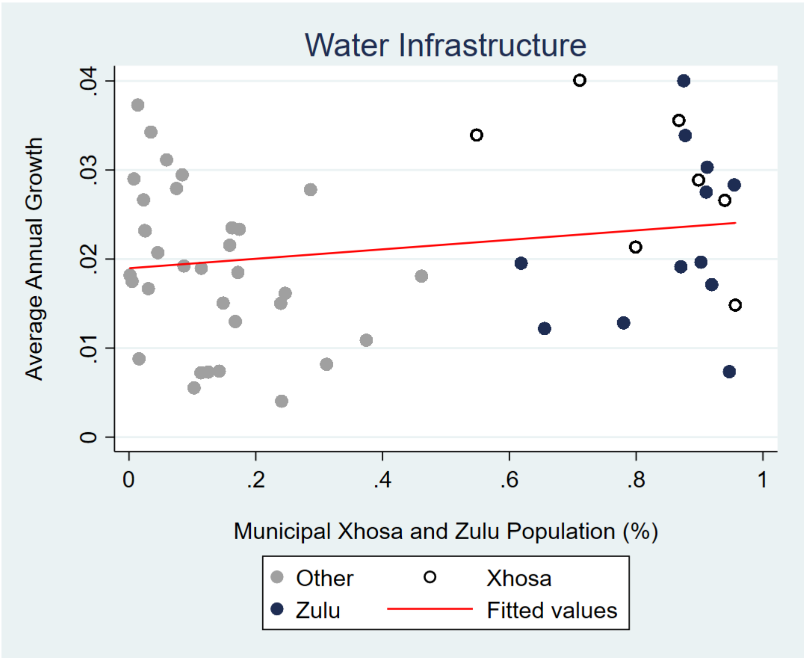
Secondly, as noted by Kramon and Posner (2013), the outcome variable studied determines the findings of ethnic favouritism in distributive politics. Although water infrastructure provision is a function of municipalities, different Departments are responsible for the financing and allocation of this infrastructure. For example, the Department of Water and Sanitation as well as CoGTA are responsible for capital expenditure grant allocations for water infrastructure to municipalities. Lastly, the outcome variable also provides us with the data covering three Presidents' terms.

Figure 3 depicts average annual growth in 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 percent 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 water infrastructure provision and the share of population that are Xhosa and Zulu.

The coethnicity variable, $coethnic(50\%)_{it-1}$, is influenced by Burgess et al. (2015) and Hodler and Raschky (2014) and is a binary variable equal to 1 if more than 50 percent of the municipality's population is coethnic to the President in time $t-1$, 0 otherwise. Like 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 percent of the population is classified as Xhosa (that is 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 than 50 percent of the population is classified as Zulu (that is 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).

Figure 3: Growth in Water Infrastructure Provision and Municipal Share of Coethnic Population



Source: South African Local Government Association (2020)
Note: Figure shows correlation between average annual growth in water infrastructure and the share of population that are Xhosa and Zulu by municipality.

Political competition measures the quality of institutions, in other words 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.[2]

Municipalities with more political competition can be considered as more democratic with increased freedom to vote for other political parties without fear of retribution or punishment. Besley et al. (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

[2]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).

ethnic favouritism. We therefore expect a positive association with this measure of the quality of institutions with infrastructure provision.

The population density is the total population divided by the square kilometre area of the municipality. Gonschorek et al. (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 captures the pressure that an increase in the population places on public infrastructure, financed by grants. 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 settlements and public infrastructure provision, as urban settlements closer to developed business areas are expected to have higher initial infrastructure.

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 that is well above the RDP's minimum requirement level. 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 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, potable water supply systems are classified as a district municipal function (South African Local Government Association, 2017). 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 1. The statistics indicate heterogeneity across the variables in the sample. The mean level of access to water is relatively high at approximately 77 percent of households across municipalities having access to water at or above the RDP level over the study period.

Table 1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
$rdpwater_{it}$	76.87	19.952	20.61	100	1040
$coethnic(50\%)_{it}$	0.167	0.373	0	1	1092
$polcomp_{ie}$	0.483	0.247	0.037	0.997	1092
$employment_{it}$	0.342	0.117	0.102	0.608	1092
$popdens_{it}$	195.167	447.501	0.852	3064.108	1092
$urbanrural_{it}$	3.011	7.119	0.002	60.727	984
$gvagovt_{it}$	18.892	8.656	6.04	41.99	1092

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 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 (α_i) we control for time-invariant factors specific to municipalities. Year fixed effects (δ_t) address aggregate trends that are omitted from the model specification and cross-sectional dependence. To account for persistence in water infrastructure we additionally estimate a lagged dependent variable specification. Standard errors are clustered at municipality level.

The fixed effects specification is

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

where X_{it} represents control variables as discussed and u_{it} is an error term. The coefficient estimate of interest is β_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.

4 Results

4.1 Ethnic Favouritism

In Table 2 column 6, the coefficient estimate of 0.087 indicates that coethnic municipalities are associated with approximately 9 percent higher water infrastructure provision relative to non-coethnic municipalities. In column 7 we include a lagged dependent variable, $rdpwater_{it\ \ 1}$. The coefficient estimate remains positive and significant, supporting our finding 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, where all control variables are included.

The inclusion of 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. As expected, employment is positively associated with water infrastructure provision as jobs created by business and government affect household income and wealth that in turn determine ability to access water. Population density is negatively associated with water 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.

Table 2: Coethnic (50%) Results

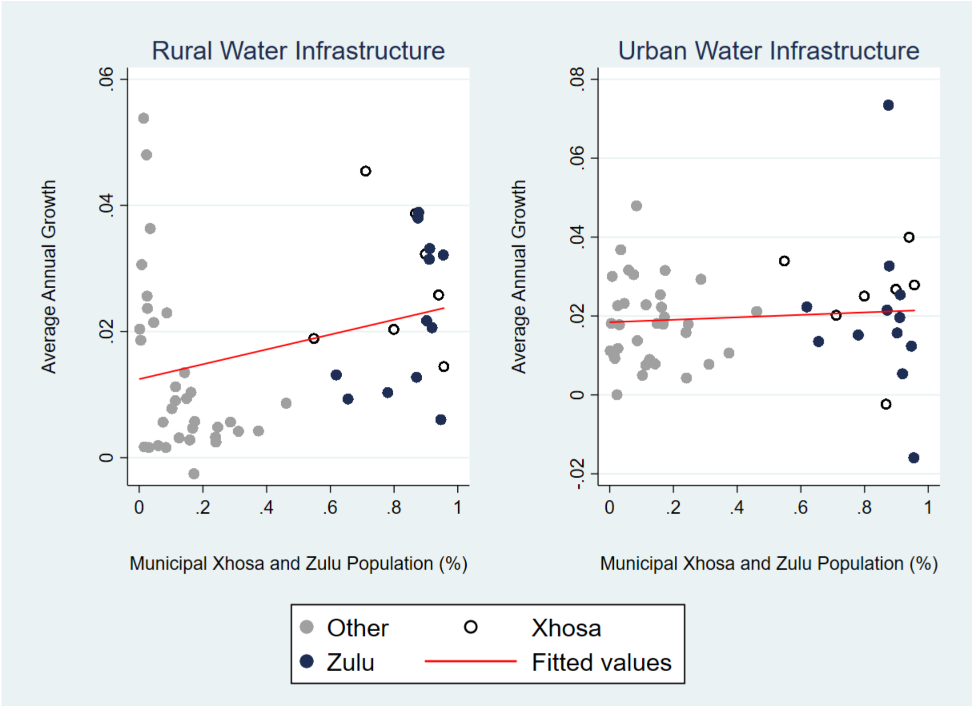
	Dependent Variable: $rdpwater_{it}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$coethnic(50\%)_{it-1}$	0.057	0.062*	0.090**	0.093**	0.088**	0.087**	0.031*
	(0.039)	(0.035)	(0.038)	(0.039)	(0.038)	(0.038)	(0.017)
$polcomp_{ie}$		0.052	0.045	0.060	0.060	0.057	0.013
		(0.098)	(0.085)	(0.080)	(0.073)	(0.072)	(0.027)
$employment_{it}$			0.910***	0.822***	0.821***	0.827***	0.080**
			(0.132)	(0.112)	(0.113)	(0.115)	(0.035)
$popdens_{it}$				-0.506***	-0.552***	-0.540***	-0.081***
				(0.100)	(0.097)	(0.103)	(0.028)
$urbanrural_{it}$					0.027	0.027*	0.005
					(0.016)	(0.016)	(0.005)
$gvagovt_{it}$						0.051	0.087**
						(0.087)	(0.036)
$rdpwater_{it-1}$							0.834***
							(0.026)
Observations	1,040	1,040	1,040	1,040	984	984	936
R-squared	0.616	0.617	0.698	0.719	0.732	0.732	0.921
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 percent 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 may suffer from the Nickell bias and we therefore run the Bruno (2005) consistent estimator. Bias corrected LSDV $coethnic(50\%)_{it-1}$ coefficients are similar to the lagged dependent variable specification results in columns 7 (0.031). Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.1.1 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 distinguish between rural and urban household access to water. Figure 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 percent 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 3, there is a positive correlation, however, with respect to rural water infrastructure provision the magnitude of the relationship is greater.

Figure 4: Growth in Rural and Urban Water Infrastructure and Municipal Share of Coethnic Population



Source: Department of Water and Sanitation (2020)
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.

Results are reported in Table 3 where 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). Given that rural households in most municipalities started from a lower initial base of water infrastructure as shown Figure A.2 in the Appendix, we expect higher provision across all rural households, irrespective of ethnicity. Yet, our results in Table 3 columns 1 and 2 confirm our findings of ethnic favouritism and indicate that there is indeed 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.

Table 3: 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)
$rdpwater(rural)_{it-1}$		0.874***		
		(0.022)		
$rdpwater(urban)_{it-1}$				0.798***
				(0.037)
Control variables	YES	YES	YES	YES
Observations	984	932	984	936
R-squared	0.700	0.928	0.594	0.858
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 percent or more of the municipality's population is coethnic to the President in time $t-1$, 0 otherwise. Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The positive association between coethnicity and water infrastructure provision does not hold for households in urban areas, where ethnicity may not be as salient as in rural areas. The lack of results with respect to urban households can furthermore be explained by the higher initial provision to these households in most municipalities, as shown in Figure A.2 in the Appendix.

4.2 Democracy and Elections

To 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 ($democraticyear_t$). The more time that passes since South Africa's first democratic elections, the more mature South Africa's democracy becomes. Results reported in Table 4 columns 1 and 2 are robust to the inclusion of the democratic maturity variable, which does not affect the association between the provision of water infrastructure and coethnicity of a municipality.

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, 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).

To test the first, 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 4, columns 3 and 4. Overall, coethnic municipalities are associated with higher provision of infrastructure relative to non-coethnic municipalities. Coethnic municipality and election interaction term results are not statistically significant and the coethnic coefficient estimates remain similar to that reported in Table 2. These findings suggest that provision of infrastructure is not politically motivated, but more in line with the ethnic altruism hypothesis.

Table 4: Coethnic (50%), Democratic Maturity and Elections Results

	Dependent Variable: $rdpwater_{it}$					
	Democratic Maturity		Elections		Term Limits Re-election	Term Limits No re-election
	(1)	(2)	(3)	(4)	(5)	(6)
$coethnic(50\%)_{it\quad 1}$	0.087**	0.031*	0.079**	0.033	0.065*	0.122*
	(0.038)	(0.017)	(0.039)	(0.023)	(0.033)	(0.061)
$democraticyear_t$	0.021***	0.004***				
	(0.002)	(0.001)				
$coethnic(50\%)_{it\quad 1}\quad Election_{t\quad 1}$			0.009	-0.008		
			(0.013)	(0.008)		
$coethnic(50\%)_{it\quad 1}\quad Election_t$			0.027	-0.015		
			(0.018)	(0.011)		
$coethnic(50\%)_{it\quad 1}\quad Election_{t+1}$			0.007	0.008		
			(0.020)	(0.019)		
$rdpwater_{it\quad 1}$		0.834***		0.835***		
		(0.026)		(0.026)		
Control variables	YES	YES	YES	YES	YES	YES
Observations	984	936	984	936	348	636
R-squared	0.732	0.921	0.732	0.921	0.714	0.763
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: $coethnic(50\%)_{it\quad 1}$ is a binary variable equal to 1 if 50 percent or more of the municipality's population is coethnic to the President in time $t\quad 1$, 0 otherwise. $democraticyear_t$ counts the number of years since democracy started in 1994. $Election_{t\quad 1}$ is a binary variable for the year prior to elections, $Election_t$ the year during elections, and $Election_{t+1}$ after the elections. Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

To test the second, we split our sample into periods in which re-election is possible (first term) and not (second term) and estimate $coethnic(50\%)_{it\quad 1}$ in Table 4, columns 5 and 6.[3] Re-election periods in our study are from 1999 to 2004 and 2009 to 2014. The South Africa Constitution provides that Presidents are only allowed to run for two election terms. Nelson Mandela announced early on during his term that he would not run for a second term. The positive and significant ethnic favouritism finding persists 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 of ethnic altruism, 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 governing party.

[3]Due to the split sample, we do not estimate a lagged dependent variable specification.

4.3 Presidential Terms

We conduct a regime analysis to study the association between coethnicity and water 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. $xhosa_{it}$ is a binary variable equal to 1 if 50 percent or more of the municipality's population is classified as Xhosa, 0 otherwise. $zulu_{it}$ is equal to 1 if 50 percent 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. $mandelaterm_t$ is a binary variable equal to 1 over the 1996 to 1998 period, 0 otherwise. $mbekiterm_t$ is a binary variable equal to 1 over the 1999 to 2008 period, 0 otherwise. $zumaterm_t$ is a binary variable equal to 1 over the 2009 to 2016 period, 0 otherwise. We include time (δ_t) and municipal fixed effects (α_i) as in Equation 1.

The specification is

$$rdpwater_{it} = \beta_1 ethnic_{it} \quad term_t + \beta_2 X_{it} + \alpha_i + \delta_t + u_{it} \tag{2}$$

where X_{it} represents control variables as discussed and u_{it} is an error term. The coefficient estimate of interest is β_1. A positive and significant coefficient therefore suggests an association between coethnicity and infrastructure provision during the President's term under consideration.

Table 5: Presidential Term Results

	Dependent Variable: $rdpwater_{it}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$xhosa_{it} \quad mandelaterm_t$	-0.097**	-0.044***				
	(0.037)	(0.013)				
$xhosa_{it} \quad mbekiterm_t$			0.152***	0.078***		
			(0.046)	(0.022)		
$zulu_{it} \quad zumaterm_t$					0.081**	0.021
					(0.035)	(0.013)
$rdpwater_{it \;\; 1}$		0.846***		0.834***		0.843***
		(0.027)		(0.025)		(0.025)
Control variables	YES	YES	YES	YES	YES	YES
Observations	984	936	984	936	984	936
R-squared	0.720	0.920	0.733	0.923	0.724	0.920
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 percent 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. Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5 reports the results. The negative and significant $xhosa_{it}$ $mandelaterm_t$ coefficient estimate in columns 1 and 2 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.

The positive and significant $xhosa_{it}$ $mbekiterm_t$ estimate in columns 3 and 4 suggests that during the Mbeki term, Xhosa municipalities are associated with higher water infrastructure provision relative to other municipalities. The $zulu_{it}$ $zumaterm_t$ coefficient estimate in column 5 indicates that Zulu municipalities are associated with approximately 8 percent higher water infrastructure provision during the Zuma term. Baseline results reported in Section 4.1 are therefore driven by coethnic municipalities being associated with higher water infrastructure provision during the Mbeki and Zuma 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. 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 water 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.

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). As expected, results are either negative or not statistically significant, indicating that Zulu municipalities are not associated with higher water infrastructure provision over the Xhosa leadership term. Similarly, Xhosa municipalities are not associated with higher infrastructure provision over the Zulu leadership term. Results support presidential term findings and are available in Appendix A.3 Table A.1.

5 Robustness Checks

5.1 Alternative Coethnic Thresholds

We specify different thresholds to check the robustness of our results in Table 2. Results are reported in Table 6. First, we use $coethnic(min)_{it\;\;1}$ as 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 2009 period.

Table 6: Coethnic Threshold Results

	Dependent Variable: $rdpwater_{it}$									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$coethnic(min)_{it\;\;1}$	-0.016	-0.010								
	(0.018)	(0.007)								
$coethnic(maj)_{it\;\;1}$			0.079**	0.030*						
			(0.034)	(0.015)						
$coethnic(50share)_{it\;\;1}$					0.116**	0.042*				
					(0.045)	(0.021)				
$coethnic(70)_{it\;\;1}$							0.125***	0.043**		
							(0.040)	(0.019)		
$coethnic(90)_{it\;\;1}$									0.086	0.032
									(0.073)	(0.033)
$rdpwater_{it\;\;1}$,		0.849***		0.835***		0.830***		0.824***		0.845***
		(0.026)		(0.025)		(0.027)		(0.026)		(0.026)
Control variables	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	984	936	984	936	984	936	984	936	984	936
R-squared	0.717	0.919	0.731	0.921	0.735	0.921	0.743	0.922	0.722	0.920
Number of municipalities	52	52	52	52	52	52	52	52	52	52
Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Municipality FE	YES	YES	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 percent and 90 percent or more of the municipality's population is coethnic to the President in time $t\;\;1$, 0 otherwise. $coethnic(50share)_{it\;\;1}$ is the share of a municipality's above-50-percent coethnic population in time $t\;\;1$. Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

As expected, coefficient estimates based on $coethnic(min)_{it\;\;1}$ are not statistically significant. Municipalities where the minority of the population are either Xhosa or Zulu, are not associated with higher water infrastructure provision during the period that the coethnic President is in power. According to the ethnic altruism model, as the well-being of Presidents' 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.

Second, to account for more ethnic fractionalised municipalities, we specify $coethnic(maj)_{it\;\;1}$. This variable is equal to 1 if the majority of the municipality's population is coethnic to the President, 0 otherwise. This variable is not subject to a threshold and captures whether the population that is the largest share within a municipality is coethnic to the President or not. For example, in this specification the City of Johannesburg is classified as coethnic to the President as the Zulu population is the largest ethnic group within the municipality, even though they only represent 22 percent of the municipality's population. Setting aside the strict 50 percent threshold, this specification allows us to study the effect of coethnicity to the President in ethnically fractionalised municipalities that would be equal to 0 in the $coethnic(50\%)_{it-1}$ specification.

Analysing ethnic favouritism according to the majority of the municipality's population in Table 6 columns 3 and 4, results support findings in Table 2. Equivalent to the baseline estimates, column 3 estimates suggests that coethnic municipalities are associated with approximately 8 percent higher water infrastructure provision relative to non-coethnic municipalities. Additionally, our results are robust to the inclusion of ethnic fractionalisation as a control variable. Results are reported in Appendix A.4 Table A.2.

Third, to evaluate ethnic favouritism in ethnically homogeneous municipalities we measure the degree of coethnicity in a municipality where more than 50 percent of the population is classified as coethnic to the President in time $t-1$. The variable $coethnic(50share)_{it-1}$ is therefore the share of a municipality's above-50-percent coethnic population. Results, reported in columns 5 and 6, are consistent with our previous findings and suggest that in above-50-percent coethnic municipalities, an increase in the degree of coethnicity is associated with increased water infrastructure provision.

Furthermore, in columns 7 to 10, we increase the coethnic classification threshold to 70 percent and 90 percent respectively (Li, 2018). The variable $coethnic(70\%)_{it-1}$ is a binary variable equal to 1 if 70 percent 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 percent or more of the municipality's population is coethnic to the President in time $t-1$, 0 otherwise. Results are in line with our expectations. As the threshold is increased to 70 percent, the size of the coefficient estimate increases and remains statistically significant. Further increasing the threshold to 90 percent, however, brings the size of the estimate back to that of our baseline findings.

5.2 Electricity Infrastructure Provision

To determine whether our findings hold across different forms of public infrastructure provision, 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. This measure of electricity infrastructure is useful 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 are 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 0 (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 et al., 2016).

Table 7: Coethnic (50%) Electricity Results

	Dependent Variable: $nlight_{it}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$coethnic(50\%)_{it\;\;1}$	0.060*	0.061**	0.060*	0.060*	0.062**	0.063**	0.031*
	(0.032)	(0.027)	(0.031)	(0.031)	(0.030)	(0.030)	(0.018)
$polcomp_{ie}$		0.405***	0.277***	0.278***	0.298***	0.300***	0.149***
		(0.077)	(0.044)	(0.045)	(0.045)	(0.045)	(0.031)
$employment_{it}$			1.043***	1.024***	1.037***	1.030***	0.387***
			(0.143)	(0.142)	(0.149)	(0.151)	(0.083)
$popdens_{it}$				-0.129	-0.111	-0.131	-0.027
				(0.180)	(0.184)	(0.184)	(0.093)
$urbanrural_{it}$					-0.001	-0.003	-0.010
					(0.014)	(0.015)	(0.007)
$gvagovt_{it}$						-0.059	-0.017
						(0.082)	(0.050)
$nlight_{it\;\;1}$							0.525***
							(0.042)
Observations	1,092	1,040	936	936	828	828	828
R-squared	0.287	0.351	0.356	0.358	0.371	0.371	0.542
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 percent 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 may suffer from the Nickell bias and we therefore run the Bruno (2005) consistent estimator. Bias corrected LSDV $coethnic(50\%)_{it\;\;1}$ coefficients are similar to the lagged dependent variable specification results in columns 7 (0.028). Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7 coethnic coefficient estimates similarly suggest ethnic favouritism in electricity infrastructure provision. Considering the full model specification in column 6, coethnic municipalities are associated with approximately 6 percent higher electricity infrastructure provision relative to non-coethnic municipalities. Results remain robust as control variables are progressively included.

We conduct additional robustness checks to verify that our baseline results with respect to water infrastructure provision hold. Firstly, we extend ethnic and control data to 1994 and 2019 (the first and last data points for our water infrastructure data). Secondly, we aggregate the data over the five-year elections periods. Thirdly, we consider different lag structures as there might be a longer than one year delay in water infrastructure provision. Finally, we re-estimate our regression taking potential cross-sectional dependence into account. Results are reported in Appendix A.5 and support our findings that coethnic municipalities are associated with higher water infrastructure provision relative to non-coethnic municipalities.[4]

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 public infrastructure relative to other municipalities.

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 public infrastructure provision. Our findings are only suggestive and call for future research. To confidently draw conclusions and determine the channel through which ethnic favouritism occurs, 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. 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).

[4] To account for bulk and natural water supply, we control for the number of dams in time *t-1* within a municipality and neighbouring municipalities, as well as the distance from the centroid of a municipality to natural water (shoreline, rivers and lakes) (Department of Water and Sanitation, 2018; Goodman et al., 2016). With respect to electricity infrastructure provision, we control for the percentage of households that use electricity as a source of lighting to measure grid connection in time *t-1* (South African Local Government Association, 2020). The inclusion of these controls does not change our findings. These results are available on request.

References

African National Congress (1994). The Reconstruction and Development Programme: A Policy Framework. Technical report, African National Congress, Johannesburg.

Ahlerup, P. and Isaksson, A. S. (2015). Ethno-regional favouritism in Sub-Saharan Africa. *Kyklos*, 68(2):143–152.

Alesina, A., Baqir, R., and Easterly, W. (1999). Public goods and ethnic divisions. *The Quarterly Journal of Economics*, 114(4):1243 – 1284.

Alesina, A., Devleeschauwer, A., Easterly, W., and Kurlat, S. (2003). Fractionalization. *Journal of Economic Growth*, 8(2):155–194.

Alesina, A. and La Ferrara, E. (2005). Ethnic diversity and economic performance. *Journal of Economic Literature*, 43(3):762–800.

Alesina, A. and Zhuravskaaya, E. (2011). Segregation and the quality of government in a cross section of countries. *American Economic Review*, 101(5):1872–1911.

Amodio, F. and Chiovelli, G. (2017). Ethnic Favoritism in Democracy: The Political Economy of Land and Labor in South Africa. In *Stanford Institute for Theoretical Economics (SITE)*, pages 1–47. Stanford University.

Bai, J., Choi, S. H., and Liao, Y. (2021). Feasible generalized least squares for panel data with cross-sectional and serial correlations. *Empirical Economics*, 60(1):309–326.

Besley, T., Persson, T., and Sturm, D. M. (2010). Political competition, policy and growth: Theory and evidence from the US. *Review of Economic Studies*, 77(4):1329–1352.

Bruno, G. S. F. (2005). Approximating the bias of the LSDV estimator for dynamic unbalanced panel data models. *Economics Letters*, 87(3):361–366.

Burgess, R., Jedwab, R., Miguel, E., Morjaria, A., and Padro i Miquel, G. (2015). The Value of Democracy: Evidence from Road-Building in Kenya. *American Economic Review*, 105(6):1817—-1851.

Calland, R. (2013). *The Zuma years: South Africa's Changing Face of Power*. Penguin Random House Struik, Cape Town.

Cheeseman, N. (2018). Ethnicity and Development. In Lancaster, C. and van de Walle, N., editors, *The Oxford Handbook of the Politics of Development*, chapter 10, pages 162–176. Oxford University Press, New York.

Cox, G. W. and Mccubbins, M. D. (1986). Electoral Politics as a Redistributive Game. *Journal of Politics*, 48(2):370–389.

De Kadt, D. and Lieberman, E. S. (2017). Nuanced Accountability: Voter Responses to Service Delivery in Southern Africa. *British Journal of Political Science*, 50(1):185–215.

De Luca, G., Hodler, R., Raschky, P. A., and Valsecchi, M. (2018). Ethnic favoritism: An axiom of politics? *Journal of Development Economics*, 132:115–129.

Department of Planning Monitoring and Evaluation (2014). Twenty year review: South Africa. Technical report, Pretoria.

Department of Water Affairs and Forestry (2004). A history of the first decade of Water Service delivery in South Africa 1994 to 2004. Technical report.

Department of Water and Sanitation (2015). Strategy Plan 2015/16-2019/20.

Department of Water and Sanitation (2018). Dam Safety Office.

Department of Water and Sanitation (2020). District Municipal: National (SA) Access to Basic Services.

Dixit, A. and Londregan, J. (1996). The Determinants of Success of Special Interests in Redistributive Politics. *Journal of Politics*, 58(4):1132–1155.

Dreher, A., Fuchs, A., Hodler, R., Parks, B. C., Raschky, P. A., and Tierney, M. J. (2019). African leaders and the geography of China's foreign assistance. *Journal of Development Economics*, 140:44–71.

Easterly, W. and Levine, R. (1997). Africa's Growth Tragedy: Policies and Ethnic Divisions. *The Quarterly Journal of Economics*, 112(November):1203–1250.

Egel, D. (2013). Tribal heterogeneity and the allocation of publicly provided goods: Evidence from Yemen. *Journal of Development Economics*, 101(1):228–232.

Ejdemyr, S., Kramon, E., and Robinson, A. L. (2018). Segregation, Ethnic Favoritism, and the Strategic Targeting of Local Public Goods. *Comparative Political Studies*, 51(9):1111–1143.

Electoral Commission of South Africa (2017). National and provincial election results.

Franck, R. and Rainer, I. (2012). Does the leader's ethnicity matter? Ethnic favoritism, education, and health in Sub-Saharan Africa. *American Political Science Review*, 106(2):294–325.

GADM (2018). GADM Data (version 3.6).

Gao, E. (2016). Tribal Mobilization, Fragmented Groups, and Public Goods Provision in Jordan. *Comparative Political Studies*, 49(10):1372–1403.

Gehring, K. and Schneider, S. A. (2018). Toward the Greater Good? EU Commissioners' Nationality and Budget Allocation in the European Union. *American Economic Journal: Economic Policy*, 10(1):214–239.

Gisselquist, R. M., Leiderer, S., and Niño-Zarazúa, M. (2016). Ethnic Heterogeneity and Public Goods Provision in Zambia: Evidence of a Subnational "Diversity Dividend". *World Development*, 78:308–323.

Gonschorek, G. J., Schulze, G. G., and Sjahrir, B. S. (2018). To the ones in need or the ones you need? The political economy of central discretionary grants? - empirical evidence from Indonesia. *European Journal of Political Economy*, 54:240–260.

Goodman, S., BenYishay, A., and Runfola, D. (2016). Overview of the Geo Framework. *AidData*.

Henderson, J. V., Storeygard, A., and Weil, D. N. (2012). Measuring economic growth from outer space. *American Economic Review*, 102(2):994–1028.

Henn, S. J. and Robinson, J. A. (2021). Africa's Latent Assets.

Hodler, R. and Raschky, P. A. (2014). Regional Favouritism. *Quarterly Journal of Economics*, 129(2):995–1033.

Kasara, K. (2007). Tax me if you can: Ethnic geography, democracy, and the taxation of agriculture in Africa. *American Political Science Review*, 101(1):159–172.

Khemani, S. (2007). Does delegation of fiscal policy to an independent agency make a difference? Evidence from intergovernmental transfers in India. *Journal of Development Economics*, 82(2):464–484.

Kramon, E. and Posner, D. N. (2013). Who benefits from distributive politics? How the outcome one studies affects the answer one gets. *Perspectives on Politics*, 11(2):461–474.

Kramon, E. and Posner, D. N. (2016). Ethnic Favoritism in Education in Kenya. *Quarterly Journal of Political Science*, 11(1):1–58.

Kroth, V. (2014). *Essays in Political Economy: Elections, Public Finance and Service Delivery in South Africa*. PhD thesis, London School of Economics and Political Science.

Kroth, V., Larcinese, V., and Wehner, J. (2016). A better life for all? Democratization and electrification in post-apartheid South Africa. *Journal of Politics*, 78(3):774–791.

La Porta, R., Lopez-de Silanes, F., Shleifer, A., and Vishny, R. (1999). The Quality of Government. *Journal of Law, Economics, and Organization*, 15(1):222–279.

Lee, A. (2018). Ethnic Diversity and Ethnic Discrimination: Explaining Local Public Goods Provision. *Comparative Political Studies*, 51(10):1351–1383.

Li, J. (2018). Ethnic favoritism in primary education in Kenya: effects of coethnicity with the president. *Education Economics*, 26(2):194–212.

Lindbeck, A. and Weibull, J. W. (1987). Balanced-budget redistribution as the outcome of political competition. *Public Choice*, 52(3):273–297.

Manuel Álvarez-Rivera (2016). Republic of South Africa 1994 General Election Results by Districts.

Mason, S. J. (1996). Climatic change over the lowveld of South Africa. *Climatic Change*, 32:35–54.

Mesthrie, R. (2002). South Africa: a sociolinguistic overview. In Mesthrie, R., editor, *Language in South Africa*, chapter 1. Cambridge University Press, Cape Town.

Michalopoulos, S. and Papaioannou, E. (2013). Pre-Colonial Ethnic Institutions and Contemporary African Development. *Econometrica*, 81(1):113–152.

Minister of Finance (2018). Division of Revenue Bill.

Montalvo, J. G. and Reynal-Querol, M. (2005). Ethnic Polarization, Potential Conflict, and Civil Wars. *American Economic Review*, 95(3):796–816.

National Planning Commission (2012). Chapter 4: Economic Infrastructure. In *National Development Plan*, pages 138–178.

Obikili, N. (2019). The Impact of Political Competition on Economic Growth: Evidence from Municipalities in South Africa. *South African Journal of Economics*, 87(March):3–21.

Oosthuizen, M. and Thornhill, C. (2017). The grant system of financing the South African local government sphere: Can sustainable local government be promoted? *Local Economy*, 32(5):433–450.

Parliament of the Republic of South Africa (2018). How Parliament is Structured.

Rand Water (2021). Core Business.

Ravetti, C., Sarr, M., Munene, D., and Swanson, T. (2019). Discrimination and favouritism among South African workers: Ethnic identity and union membership. *World Development*, 123:1–16.

Republic of South Africa (1997). Water Services Act 1997.

South African Local Government Association (2017). The Legislative Framework Governing Municipal Performance Measurement. Technical report, South African Local Government Association.

South African Local Government Association (2020). The Municipal Barometer.

Sulla, V. and Zikhali, P. (2018). Overcoming Poverty and Inequality in South Africa: An Assessment of Drivers, Constraints and Opportunities. Technical report, World Bank Group, Washington, D.C.

Wehner, J. (2000). Fiscal Federalism in South Africa. *Publius*, 30(3):47–72.

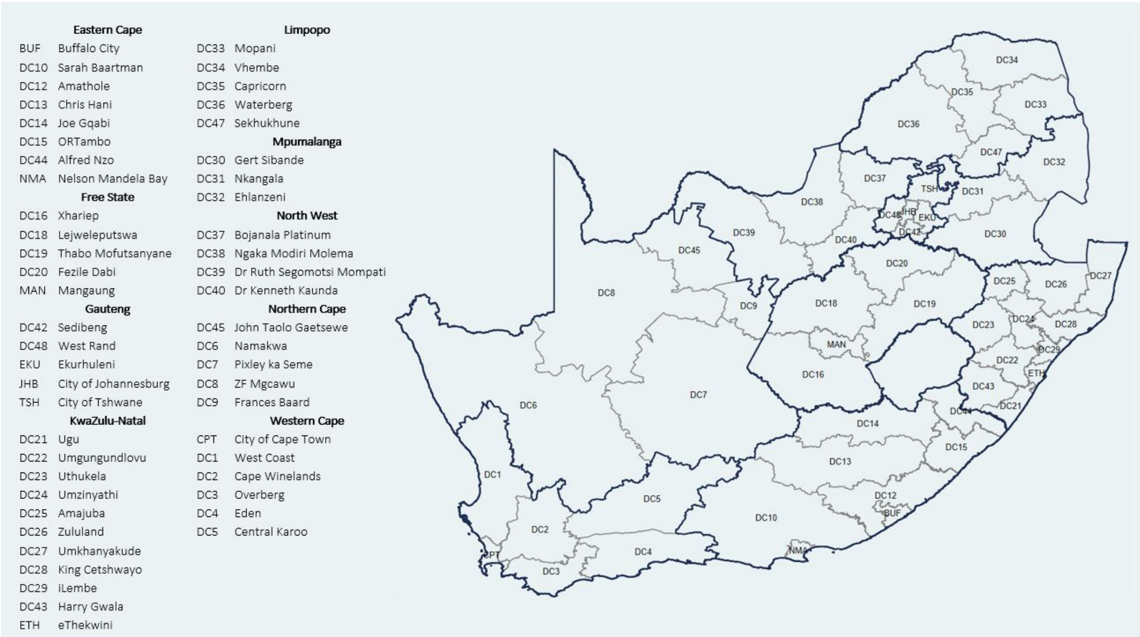
Weil, D. N. (2007). Accounting for the effect of health on economic growth. *Quarterly Journal of Economics*, 122(3):1265–1306.

A Appendix

A.1 Municipalities

In Figure A.1 we illustrate the 52 district municipal boundaries within the nine provinces.

Figure A.1: Municipal Boundaries and Provinces

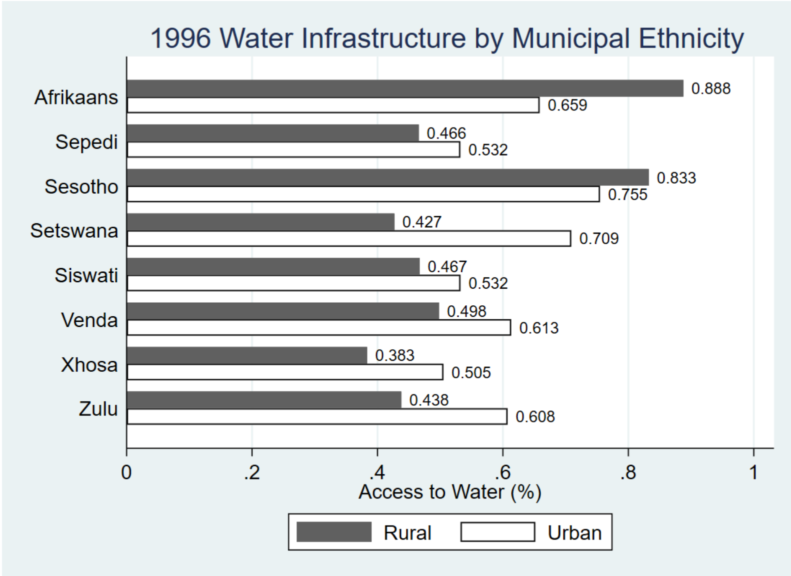


Source: GADM (2018)
Note: The map shows the 52 district municipal boundaries within the nine respective provinces.

A.2 Rural and Urban Provision in 1996

In Figure A.2 we show the percentage of rural and urban households with access to water at or above the RDP level in 1996 by municipal ethnicity, according to the 50 percent threshold. In all municipalities, except for Afrikaans and Sesotho municipalities, rural households start from a lower initial base of water infrastructure. On average, however, households that are located in closer proximity to economically active urban areas have improved access to infrastructure from the outset relative to rural households in tribal and farming areas.

Figure A.2: Rural and Urban Initial Water Infrastructure



Source: Department of Water and Sanitation (2020)
Note: The figure shows the percentage of rural and urban households with access to water at or above the RDP level in 1996 by municipal ethnicity (according to the 50 percent threshold).

A.3 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).

Table A.1: Presidential Term Results Check

	Dependent Variable: $rdpwater_{it}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$zulu_{it}\quad mandelaterm_t$	-0.090**	-0.039***				
	(0.037)	(0.010)				
$zulu_{it}\quad mbekiterm_t$			-0.025	0.003		
			(0.027)	(0.013)		
$xhosa_{it}\quad zumaterm_t$					-0.132**	-0.067**
					(0.061)	(0.029)
$rdpwater_{it\quad 1}$		0.844***		0.849***		0.840***
		(0.024)		(0.026)		(0.024)
Control variables	YES	YES	YES	YES	YES	YES
Observations	984	936	984	936	984	936
R-squared	0.722	0.920	0.718	0.919	0.727	0.922
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 percent 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. Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

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 water infrastructure provision over the Zulu leadership term.

A.4 Ethnic Fractionalisation and Regional Favouritism

We control for the degree of ethnic fractionalisation in Table A.2 columns 1 and 2. We calculate the standard ethnic fractionalisation index (ELF), $fractionalisation_{it}$, 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 percent probability that two individuals in a South African municipality are from two different ethnic groups. Our results remain robust to the inclusion of ethnic fractionalisation as a control variable.

Table A.2: Ethnic Fractionalisation and Regional Favouritism Results

	Dependent Variable: $rdpwater_{it}$			
	Ethnic Fractionalisation		Regional Favouritism	
	(1)	(2)	(3)	(4)
$coethnic(50)_{it-1}$	0.094**	0.030*	0.092**	0.032*
	(0.039)	(0.017)	(0.041)	(0.018)
$fractionalisation_{it}$	0.667*	-0.105		
	(0.361)	(0.099)		
$president\ municipality_{it}$			-0.050	-0.011
			(0.038)	(0.017)
$rdpwater_{it-1}$		0.838***		0.834***
		(0.026)		(0.027)
Control variables	YES	YES	YES	YES
Observations	984	936	984	936
R-squared	0.736	0.921	0.733	0.921
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 percent 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. $president\ municipality_{it}$, is a binary variable equal to 1 if the municipality is the home town of the President, 0 otherwise. Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In our study, favouritism is based on coethnicity rather than geography, which would be classified as regional ethnic favouritism as studied by Hodler and Raschky (2014) and De Luca et al. (2018). They use a panel of countries across the world, including South Africa, and find that birth regions of current political leaders experience more intense nighttime light density relative to regions unrelated to current political leaders. 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. Findings suggest that Presidents' municipalities are not significantly associated with higher water infrastructure provision and coethnic municipality coefficient estimates remain similar to our baseline analysis.

A.5 Additional Robustness Checks

A.5.1 Extended Control Data

We extend ethnic and control data to 1994 and 2019, the first and last data points for water infrastructure. Results are presented in Table A.3. The results are similar to our findings in Table 2. Results from column 6 suggest that coethnic municipalities are associated with approximately 7 percent higher water infrastructure provision relative to non-coethnic municipalities.

Table A.3: Coethnic (50%) Extended Control Data Results

	Dependent Variable: $rdpwater_{it}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$coethnic(50)_{it\ 1}$	0.048	0.052	0.076**	0.078**	0.074**	0.074**	0.028*
	(0.036)	(0.032)	(0.034)	(0.034)	(0.034)	(0.034)	(0.014)
$polcomp_{it}$		0.054	0.039	0.054	0.068	0.070	0.013
		(0.100)	(0.090)	(0.085)	(0.075)	(0.073)	(0.021)
$employment_{it}$			0.766***	0.696***	0.705***	0.701***	0.077***
			(0.120)	(0.108)	(0.108)	(0.110)	(0.027)
$popdens_{it}$				-0.397***	-0.437***	-0.444***	-0.075***
				(0.104)	(0.096)	(0.103)	(0.021)
$urbanrural_{it}$					0.034*	0.033*	0.005
					(0.017)	(0.017)	(0.004)
$gvagovt_{it}$						-0.029	0.053**
						(0.071)	(0.023)
$rdpwater_{it\ 1}$							0.848***
							(0.023)
Observations	1,300	1,300	1,300	1,300	1,236	1,236	1,140
R-squared	0.658	0.659	0.725	0.740	0.754	0.754	0.933
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 percent or more of the municipality's population is coethnic to the President in time t 1, 0 otherwise. Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

A.5.2 Data Aggregate over Election Periods

Given that infrastructure change occurs over a long period and to further account for the potential rationale of mutual exchange of support, we aggregate our data in five-year intervals according to elections and rerun our estimation. Results support baseline findings reported in Table 2.

Table A.4: Five-Year Average (Election Period) Results

	Dependent Variable: $rdpwater_{ie}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$coethnic(50)_{ie}$	0.096***	0.100***	0.104***	0.098***	0.090***	0.090***
	(0.036)	(0.032)	(0.031)	(0.030)	(0.028)	(0.028)
$polcomp_{ie}$		0.067	0.044	0.056	0.068	0.069
		(0.092)	(0.083)	(0.080)	(0.068)	(0.067)
$employment_{ie}$			0.837***	0.762***	0.767***	0.765***
			(0.121)	(0.105)	(0.109)	(0.111)
$popdens_{ie}$				-0.416***	-0.462***	-0.464***
				(0.102)	(0.098)	(0.103)
$urbanrural_{ie}$					0.031	0.031
					(0.021)	(0.021)
$gvagovt_{ie}$						-0.011
						(0.076)
Observations	260	260	260	260	248	248
R-squared	0.694	0.696	0.774	0.790	0.801	0.801
Number of municipalities	52	52	52	52	52	52
Time FE	NO	NO	NO	NO	NO	NO
Municipality FE	YES	YES	YES	YES	YES	YES

Note: $coethnic(50\%)_{ie}$ is a binary variable equal to 1 if 50 percent 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

A.5.3 Different Lag Structures

We consider different lag structures of the baseline specification in Table A.5. 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 1, this is not surprising.

Table A.5: Lag Structure Results

	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*	0.015**				
			(0.042)	(0.007)				
$coethnic(50)_{it\ 4}$					0.081**	0.029***		
					(0.036)	(0.009)		
$coethnic(50)_{it\ 5}$							0.099***	0.037***
							(0.034)	(0.010)
$rdpwater_{it\ 1}$		0.830***		0.841***		0.838***		0.824***
		(0.030)		(0.027)		(0.027)		(0.029)
Control variables	YES	YES	YES	YES	YES	YES	YES	YES
Observations	984	936	984	936	984	936	936	888
R-squared	0.736	0.921	0.730	0.920	0.729	0.921	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

Note: $coethnic(50\%)_{it\ 2}$, $coethnic(50\%)_{it\ 3}$, $coethnic(50\%)_{it\ 4}$, $coethnic(50\%)_{it\ 5}$ is a binary variable equal to 1 if 50 percent or more of the municipality's population is coethnic to the President in time $t\ \ 2$, $t\ \ 3$, $t\ \ 4$, $t\ \ 5$, 0 otherwise. Robust standard errors clustered at municipality level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

A.5.4 Cross-section Dependence

We acknowledge that panel data may be subject to cross-sectional dependence due to spillover effects, spatial dependence and potential unobserved common factors. In Table A.6 columns 1 and 2, we estimate linear regressions with panel-corrected standard errors (PCSE). This estimation assumes that disturbances are heteroskedastic and contemporaneously correlated across panels. In columns 3 and 4, we estimate our regression using feasible generalised least squares (GLS) which allows for cross-sectional correlation and heteroskedasticity across panels. According to Bai et al. (2021), the feasible GLS estimator is more efficient than the ordinary least squares in the presence of heteroskedasticity, serial and cross-sectional correlations. Results and overall findings remain consistent with main results reported in Table 2.

Table A.6: Alternative Estimation Results

	Dependent Variable: $rdpwater_{it}$			
	PCSE		GLS	
	(1)	(2)	(3)	(4)
$coethnic(50)_{it\ \ 1}$	0.069***	0.043**	0.066***	0.041***
	(0.013)	(0.019)	(0.002)	(0.001)
Control variables	YES	YES	YES	YES
Observations	984	984	984	984
R-squared	0.628	0.812	-	-
Number of municipalities	52	52	52	52
Time FE	NO	YES	NO	YES
Municipality FE	NO	NO	NO	NO

Note: $coethnic(50\%)_{ie}$ is a binary variable equal to 1 if 50 percent 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