Ethnic Favouritism in South Africa: Evidence from Public Infrastructure Provision

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Abstract

Ethnic favouritism occurs when members of the same ethnicity as political leaders benefit from public or political decisions. Such bias has been found to be present in Africa. The objective of this paper is to study ethnic favouritism in public infrastructure provision in South Africa. We use panel data methodology based on municipal-level data covering 52 district municipalities over the 1996 to 2016 period to analyse ethnic favouritism in water and electricity infrastructure. We account for time and municipal fixed effects throughout and include a dynamic specification to account for persistence in infrastructure. Additionally, we construct a counterfactual scenario to test our baseline results. Our findings suggest that coethnic municipalities are associated with higher growth in infrastructure relative to non-coethnic municipalities.

Keywords: Ethnic Favouritism, South Africa, Public Infrastructure

JEL: J15, H54, O55

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1 Introduction

Culture, ethnicity and the diversity thereof are central in explaining economic growth and development (Alesina, Baqir, & Easterly, 1999; Alesina & La Ferrara, 2005; Easterly & Levine, 1997; Michalopoulos & Papaioannou, 2013). Associated with such diversity is favouritism and bias, which have been found to be present in Africa (Ahlerup & Isaksson, 2015; Amodio & Chiovelli, 2017; Burgess, Jedwab, Miguel, Morjaria, & Padro i Miquel, 2015; Franck & Rainer, 2012; Kasara, 2007; Kramon & Posner, 2016).

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). Unavoidably, this bias involves negative developmental and welfare effects (Amodio & Chiovelli, 2017; Franck & Rainer, 2012) which are important concerns for a developing democracy such as South Africa. Accordingly, the objective of this paper is to study ethnic favouritism in public infrastructure provision in South Africa.

Our study contributes to existing literature in several ways. We collect national data from various resources, including the recently published and unexplored Municipal Barometer Databank (South African Local Government Association, 2017b) and construct a disaggregated municipal-level panel data set. This is beneficial as electricity and water infrastructure provision and maintenance thereof are within the power and functions of municipalities (South African Local Government Association, 2017a). Our data set covers 52 district municipalities over the 1996 to 2016 period.

Different classifications of coethnicty according to specified thresholds allow us to run baseline and counterfactual analyses that ensure robustness of our results. In our baseline analysis, we classify coethnicity of a municipality in the same way as Burgess et al. (2015). A municipality is classified as coethnic if more than 50 per cent of the population in the municipality is coethnic to the president. In the counterfactual scenario, we classify coethnicity according to the smallest population share of a municipality.

Moreover, as a first step to study the dynamics behind ethnic favouritism, we conduct a regime specific analysis considering the prevalence during the different ethnic ruling periods. We account for time and municipal fixed effects throughout and additionally include a dynamic specification to account
for persistence in infrastructure.

Baseline findings suggest coethnic municipalities are associated with higher growth in water infrastructure provision, relative to non-coethnic municipalities. These results are justified by our counterfactual analysis findings. Additionally, to centre in on the association between water infrastructure and coethnicity we distinguish between rural and urban household water infrastructure.

Findings with respect to electricity infrastructure also suggest an association based on coethnicity of the municipality to the president and support findings by Hodler and Raschky (2014) and De Luca, Hodler, Raschky, and Valsecchi (2018). They find that in a panel of countries, birth regions of current political leaders experience more intense nighttime light density relative to regions not associated with current political leaders.

Finally, our study specifically builds on research focussing on ethnic favouritism in South Africa, which has received limited attention in the literature. To the best of our knowledge, the only study focussing on South Africa is a recent working paper by Amodio and Chiovelli (2017) in which they find evidence of ethnic favouritism in the local South African labour market and agricultural sector, using local municipal election results for 2000 and 2001 Census data from Statistics South Africa (Stats SA). 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. Contrary to Amodio and Chiovelli (2017), we use longitudinal data to analyse ethnic favouritism in public infrastructure provision, a research topic not yet dealt with in the literature.

A number of other studies focus on the incidence of ethnic favouritism in Africa, excluding South Africa. Burgess et al. (2015) find ethnic favouritism between the Kikuyu and Kalenjin ethnic groups in central government road building investment in Kenya.

Franck and Rainer (2012) associate ethnic favouritism to and highlight the detrimental effects thereof on primary education outcomes. Similarly, Kramon and Posner (2016) find that coethnicity to the president during school-age years can be linked to higher levels of education. Favouritism does not occur through expectations of future employment opportunities or spill over effects, but though concious spending targeted toward ministers’
and the president’s ethnic groups (Kramon & Posner, 2016).

In line with Kramon and Posner (2016) and others (Ahlerup & Isaksson, 2015; Burgess et al., 2015; De Luca et al., 2018; Hodler & Raschky, 2014) we argue that ethnic favouritism can occur through coethnicty to the president, who has the ability to direct infrastructure provision through the Cabinet.

Affiliation with political leaders may not necessarily involve positive rewards for coethnic members. Kasara (2007) studies tax rates on crop types and find that farmers coethnic to political leaders face higher taxes relative to non-coethnic farmers. She argues that this may be indicative of the power a political leader exhibits over those of the same ethnicity or that favouritism occurs through unmeasured forms. Even in this setting there exists an association between coethnicity and economic outcomes.

Studying Sub-Saharan African countries, including South Africa, Ahlerup and Isaksson (2015) use 2005 and 2006 Afrobarometer survey data to show that 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. This finding negates the constitution of the South African governing party, the African National Congress (ANC), 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.

Whether the governing party is upholding its constitution (ANC, 2012) and distributing resources in a fair and equitable manner is therefore a valid uncertainty based on perceptions of unfairness by the government.

2 South African Background

The focus on the ethnicity of the president is motivated by the channel through which funds are allocated to provide public infrastructure. Municipal capital expenditure is mainly funded through conditional grants, managed by national departments headed by the respective Cabinet ministers that the president appoints (Minister of Finance, 2018; Oosthuizen & Thornhill, 2017). For example, if a municipality requires funding to improve infrastructure related to basic services provision, the municipality submits a business plan to the National Department of Cooperative Governance and
Traditional Affairs, the national transferring department for the Municipal Infrastructure Grant, which will then (depending on the conditions) transfer funding to the municipality (Minister of Finance, 2018). The diagram in Figure 1 depicts the link between the president, the Cabinet and public infrastructure provision.

Figure 1: President and Cabinet

![Diagram of President and Cabinet]

Source: Minister of Finance (2018); Oosthuizen and Thornhill (2017)

Since the end of Apartheid in 1994, South Africa’s governing party has been the ANC, led by presidents from different ethnic groups. Nelson Mandela, South Africa’s first democratic president and Thabo Mbeki are from the Xhosa ethnicity. Jacob Zuma is a Zulu (see Table A.1). Figure 2 indicates their respective places of birth and illustrates South Africa’s ethnolinguistic composition.

The two major black 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, Tswana, Tsonga and Venda. The white population encompass Afrikaners, from Dutch, German and French Huguenot descent and British settlers. The coloured population stem from varied descent and speak Afrikaans and English (O’Malley, 2000). South Africa has eleven official languages of which all indigenous languages can be associated to ethnic groups. Nine of the eleven official languages represent the home language spoken by the majority of the population within the different municipalities.
We show ethnicity of municipalities in 1996, the start of our ethno-
linguistic data and also South Africa’s democracy under the Xhosa regime,
relative to 2009, the start of the Zulu regime. With the exception of the City
of Tshwane, where the majority language spoken changed from Afrikaans in
1996 to Sesotho in 2009, migration has not taken place to such an extent that
the ethnolinguistic classification of municipalities changed. This motivates
the notion that the president is able to distinguish coethnic municipalities
from non-coethnic municipalities.

3 Data and Method

The dependent variable is water infrastructure measured by the percentage
of households that have access to water at or above RDP level, $rdp_{water}$.
The Reconstruction and Development Programme (RDP) level is the pre-
scribed minimum standard of water supply to households. Water at or above
the RDP level is classified as water supply, i.e. a tap, that provides potable
water within 200 metres of the household (Department of Water and San-
itation, 2015). The RDP was set in place in 1994 and prioritises access
to water and sanitation (Department of Water Affairs and Forestry, 2004).
Furthermore, one of the key milestones of the 2012 implemented National
Development Plan (NDP) (National Planning Commission, 2012) is that all South Africans have access to clean and safe water by 2030.

Data on water supply is available from 1994 to 2017 and is obtained from the Department of Water and Sanitation, National Water Services Knowledge System. The Department of Water and Sanitation updates and models data sourced from Stats SA’s Census data (Department of Water and Sanitation, 2018).

To illustrate different priorities in terms of water infrastructure provision, Figure 3 presents average annual growth in access to potable water within 200 metres of households’ dwellings over the two different regimes, Xhosa (1996 to 2008) and Zulu (2009 to 2016). During the Xhosa regime relatively higher growth took place in the parts of the Eastern Cape, KwaZulu-Natal, Free State, North West and the Western Cape, whilst the Zulu regime focussed on Gauteng, parts of Northern Cape, Mpumalanga, KwaZulu-Natal and one municipality in Limpopo.

We acknowledge that these maps capture some level of convergence as municipalities with lower infrastructure bases caught up to more developed municipalities, yet access to water infrastructure remains unequal more than 20 years after the ANC came into power.

In addition, we use average nighttime light density as a proxy for electricity infrastructure ($n_{light}$). We follow Michalopoulos and Papaioannou (2013) and Hodler and Raschky (2014) and take the natural logarithm of $n_{light}$ plus 0.01 in order to account for possible observations that have no reported nighttime light. Nighttime light density data is used in an attempt to capture all man-made light including household and commercial lights, street lights and light emitted by schools, healthcare facilities, recreational and other public infrastructures.

Night light density data is captured by the United States Air Force Defense Meteorological Satellite Program (DMSP) satellites that circle the earth 14 times per day. Intensity of nighttime light 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 zero (no light) to 63 (rich and dense light) (Henderson, Storeygard, & Weil, 2012). Night light data is available from
Figure 3: South Africa Water Infrastructure Map

1992 to 2013 and is obtained from AidData according to GADM 2.8 demarcation (Goodman, BenYishay, & Runfola, 2016).

Figure 4 illustrates average annual growth in electricity infrastructure by district municipality, over the two respective regimes. During the Xhosa regime, electricity infrastructure in parts of the Eastern Cape and Limpopo grew at relatively higher rates, whilst KwaZulu-Natal and the North West experienced relatively higher growth during the Zulu regime.

The main control variable is a binary indicator capturing whether the municipality is coethnic to the president in time $t-1$. The variable $coethnic(50\%)_{t-1}$, is based on Burgess et al. (2015) and Hodler and Raschky (2014). $coethnic(50\%)_{t-1}$ is equal to 1 if more than 50 per cent of the municipality’s population is coethnic to the president and 0 otherwise. Like Hodler and Raschky (2014), we use lagged values of coethnicity measures as there are likely delays between the president or government’s decision to allocate funds and the actual provision of infrastructure. Furthermore, we create a counterfactual, $coethnic(cf)_{t-1}$, which is a binary variable equal to 1 if the ethnic group representing the smallest share of the municipality’s population (the minority) is coethnic to the president in time $t-1$ and 0
As South Africa reports population demographics according to race, we use home language to derive ethnic affiliation. Home language data is obtained from the Municipal Barometer Databank which allows the extraction of annual municipal data from 1996 to 2016 (South African Local Government Association, 2017b). The Municipal Barometer, initiated by the South African Local Government Association (SALGA) in 2011, provides municipal-level statistics with the aim to assist municipalities with planning and oversight.

Another control variable of interest is political competition, \( \text{polcomp}_{it} \). We argue that in municipalities where the ruling government face high levels of political competition, i.e. opposition parties threatening to win majority votes in the next election, government may be inclined to increase public infrastructure provision in an attempt to secure votes and retain power.

We construct \( \text{polcomp}_{it} \) by calculating the inverse of the winning margin between the top two political parties on a municipal level. A large variable therefore corresponds to high levels of political competition and vice-versa. The first democratic election, 1994, results are obtained from Election Re-
Additional control variables include 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). They control for demographic, economic and geographic factors. Demographic factors are captured by $popdens_{it}$ and $urbanrural_{it}$, whilst $employment_{it}$ and $gvagovt_{it}$ represent economic activity within municipalities. We do not include geographic factors, as these controls may not be as relevant in explaining water and electricity infrastructure provision. Additionally, our chosen control variables account for socioeconomic 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. In addition to these factors, the formula corrects for the disproportionate revenue earned by municipalities (Minister of Finance, 2018).

Population density is the total population divided by the area km$^2$ of the municipality. Population density accounts for the pressure that an increase in the population within an area places on public infrastructure. 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. The employment rate is the employed population divided by the working age population. Employment aims to account for household income and wealth that affects access to and use of infrastructure, as well as the level of economic activity in a municipality. The gross value added share of government expenditure measures the role of government in a municipality’s economic activity.

With the exception of the coethnic binary and political competition variable, our regression model uses the natural logarithm of variables.

The above mentioned demographic and economic development indicators are obtained from the Municipal Barometer Databank (South African Local Government Association, 2017b) and the Department of Water and
Sanitation (2018). The dataset spans from 1996 to 2016 and covers 52 municipalities in South Africa (44 district and 8 metropolitan municipalities). Summary statistics are provided in Table 1.

Table 1: Summary statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min.</th>
<th>Max.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>rdpwater_{it}</td>
<td>75.084</td>
<td>20.616</td>
<td>20.61</td>
<td>100</td>
<td>1144</td>
</tr>
<tr>
<td>nlight_{it}</td>
<td>5.676</td>
<td>10.087</td>
<td>0.057</td>
<td>57.037</td>
<td>1144</td>
</tr>
<tr>
<td>coethnic(50%)_{it}</td>
<td>0.167</td>
<td>0.373</td>
<td>0</td>
<td>1</td>
<td>1301</td>
</tr>
<tr>
<td>coethnic(cf)_{it}</td>
<td>0.023</td>
<td>0.15</td>
<td>0</td>
<td>1</td>
<td>1301</td>
</tr>
<tr>
<td>polcomp_{it}</td>
<td>0.484</td>
<td>0.252</td>
<td>0.037</td>
<td>0.997</td>
<td>1171</td>
</tr>
<tr>
<td>employment_{it}</td>
<td>0.342</td>
<td>0.117</td>
<td>0.102</td>
<td>0.608</td>
<td>1092</td>
</tr>
<tr>
<td>popdens_{it}</td>
<td>195.167</td>
<td>447.501</td>
<td>0.852</td>
<td>3064.108</td>
<td>1092</td>
</tr>
<tr>
<td>urbanrural_{it}</td>
<td>2.984</td>
<td>7.009</td>
<td>0.002</td>
<td>60.727</td>
<td>1080</td>
</tr>
<tr>
<td>gvangovt_{it}</td>
<td>18.892</td>
<td>8.656</td>
<td>6.04</td>
<td>41.99</td>
<td>1092</td>
</tr>
</tbody>
</table>

Based on the dimension of the data, we use a fixed effects model to produce more efficient estimates. By including municipal ($\alpha_i$) and year fixed effects ($\delta_t$) we control for time-invariant factors specific to municipalities and aggregate trends that are omitted from the model specification. We conduct the study on a district municipal level. As per the Legislative Framework Governing Municipal Performance Measurement (South African Local Government Association, 2017a), 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. Aggregation on a district municipal level furthermore addresses the challenge of the high number of changes in the demarcation of local municipalities and towns since 1994.

The fixed effects specification is

$$
infrastructure_{it} = \beta_1coethnic_{it-1} + \beta_2polcomp_{it} + \beta_3employment_{it} + \beta_4popdens_{it} + \beta_5urbanrural_{it} + \beta_6gvangovt_{it} + \alpha_i + \delta_t + u_{it}
$$

(1)

where $infrastructure_{it}$ is $rdpwater_{it}$ or $nlight_{it}$; and $coethnic_{it-1}$ is $coethnic(50\%)_{it-1}$ in the baseline and $coethnic(cf)_{it-1}$ in the counterfactual analysis.

The coefficient estimate of interest is therefore $\beta_1$. In the baseline analysis, a positive and statistically significant coefficient estimate suggests that coethnic municipalities are associated with higher growth in public infras-
4 Results

4.1 Baseline Analysis

In Table 2 Panel A, water infrastructure based on water access at or above RDP level, \( rdp\text{water}_{it} \), is the dependent variable. Columns 1 to 6 report fixed effects estimates. Results suggest an association between coethnicity of a municipality and growth in water infrastructure. Although not statistically significant in column 1, the result improves in significance as we include control variables that may explain water infrastructure provision. The coefficient estimate of 0.083 (\( \beta_1 \)) in column 6 implies that coethnic municipalities are associated with approximately 9 per cent higher growth in water infrastructure relative to non-coethnic municipalities.

Although positive, our findings suggest that political competition \( (polcomp_{it}) \) is not significant in explaining water infrastructure provision. As expected, employment coefficient estimates are positive and significant. Interpreting column 6 results, an increase in the employment rate in a municipality by 10 per cent is associated with an increase in water infrastructure by approximately 8 per cent. Population density \( (pop\text{dens}_{it}) \) is significant and negatively associated with water infrastructure provision. Population growth in an area necessitates maintenance and upgrades to public infrastructure, which are often not adequate to sustain increased pressures. Other control variables are not statistically significant in explaining water infrastructure provision.

In column 7 we include a lagged dependent variable, \( rdp\text{water}_{it-1} \), to account for persistence in infrastructure. Although the coefficient estimate is relatively smaller, it is positive and significant, supporting our findings that coethnicity is associated to growth in water infrastructure provision. In this specification, government’s contribution to economic activity is statistically significant and positive. The preferred specifications are columns 6 and 7, where all control variables are included.

As a robustness check, we extrapolate ethnolinguistic and control data to 1994, our first data point for water infrastructure, to study the association over an additional two years. Estimates from this exercise support findings as discussed and results are available on request.
Table 2 Panel B reports estimates with respect to electricity infrastructure ($nlight_{it}$). Results suggest an association between coethnicty and elec-

Table 2: Coethnic (50%) Results

<table>
<thead>
<tr>
<th>Panel A</th>
<th>Dependent Variable: rdpwater$_{it}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>coethnic(50%)$_{it-1}$</td>
<td>0.062</td>
</tr>
<tr>
<td></td>
<td>(0.038)</td>
</tr>
<tr>
<td>polcomp$_{it}$</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>(0.102)</td>
</tr>
<tr>
<td>employment$_{it}$</td>
<td>0.948***</td>
</tr>
<tr>
<td></td>
<td>(0.137)</td>
</tr>
<tr>
<td>popdens$_{it}$</td>
<td>-0.557***</td>
</tr>
<tr>
<td></td>
<td>(0.097)</td>
</tr>
<tr>
<td>urbanrural$_{it}$</td>
<td>0.022</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
</tr>
<tr>
<td>gva$_{it}$</td>
<td>0.120</td>
</tr>
<tr>
<td></td>
<td>(0.112)</td>
</tr>
<tr>
<td>rdpwater$_{it-1}$</td>
<td>0.823***</td>
</tr>
<tr>
<td></td>
<td>(0.026)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.580</td>
</tr>
<tr>
<td>F-test</td>
<td>22.10***</td>
</tr>
<tr>
<td>Observations</td>
<td>988</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B</th>
<th>Dependent Variable: nl1ght$_{it}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(8)</td>
</tr>
<tr>
<td>coethnic(50%)$_{it-1}$</td>
<td>0.018</td>
</tr>
<tr>
<td></td>
<td>(0.043)</td>
</tr>
<tr>
<td>polcomp$_{it}$</td>
<td>0.278***</td>
</tr>
<tr>
<td></td>
<td>(0.060)</td>
</tr>
<tr>
<td>employment$_{it}$</td>
<td>0.993***</td>
</tr>
<tr>
<td></td>
<td>(0.153)</td>
</tr>
<tr>
<td>popdens$_{it}$</td>
<td>-0.133</td>
</tr>
<tr>
<td></td>
<td>(0.210)</td>
</tr>
<tr>
<td>urbanrural$_{it}$</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
</tr>
<tr>
<td>gva$_{it}$</td>
<td>-0.085</td>
</tr>
<tr>
<td></td>
<td>(0.096)</td>
</tr>
<tr>
<td>nl1ght$_{it-1}$</td>
<td>0.510***</td>
</tr>
<tr>
<td></td>
<td>(0.045)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.145</td>
</tr>
<tr>
<td>F-test</td>
<td>45.04***</td>
</tr>
<tr>
<td>Observations</td>
<td>884</td>
</tr>
</tbody>
</table>

Number of dmuni | 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 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: 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.

Columns 1 to 6 and 8 to 13 report fixed effects estimates and columns 7 and 14 report the dynamic specification estimates by including the lagged dependent variable. We acknowledge that these estimates may suffer from the Nickell bias, and we additionally run the Bruno (2005) consistent estimator. Bias corrected LSDV results are available on request.
tricity infrastructure provision. This is in line with results reported in Panel A and support findings by Hodler and Raschky (2014) and De Luca et al. (2018). The coefficient estimate of 0.064 ($\beta_1$) in column 13 implies that coethnic municipalities are associated with approximately 7 per cent higher growth in electricity infrastructure relative to non-coethnic municipalities.

Results improve as control variables are included to take into account other factors that may affect electricity infrastructure. Different to water infrastructure, political competition is positive and significantly associated with electricity infrastructure provision. This is in line with our expectations that in municipalities where the ruling party face higher levels of competition, they may increase infrastructure provision in an attempt to retain the majority vote. Political competition may be significantly associated with electricity infrastructure provision due to the different measures of the dependent variables. Water infrastructure is household specific, whilst the proxy for electricity infrastructure includes the infrastructure itself and use thereof by all economic players.

Corresponding to results in Panel A, employment is found to have a positive and statistically significant association with electricity infrastructure provision. Not only is employment a proxy for income and wealth of the household determining the personal use of electricity, but employment is also an indication of economic activity within a municipality, related to the night light emitted by commercial businesses and other infrastructures.

Again, population density in Panel B is negatively associated with infrastructure provision, accounting for the burden that an increase in population brings about.

In column 14 we include a lagged dependent variable, $n_{lightt-1}$, to account for persistence in infrastructure. Although the coefficient estimate is relatively smaller, it is positive and significant, supporting our findings that coethnicity is associated with higher growth in electricity infrastructure relative to non-coethnic municipalities. In this specification, political competition and employment remain significant. The preferred specifications are columns 13 and 14, where all control variables are included.

As a robustness check, we extrapolate ethnolinguistic and control data to 1992, our first data point for the electricity infrastructure measure. Estimates from this exercise support findings as discussed and results are available on request.
4.2 Counterfactual Analysis

Table 3 Panel A reports counterfactual results using the model specification as in Equation 1. $\beta_1$ coefficient estimates based on $coethnic(cf)_{u-1}$ are negative and not statistically significant. This result suggests that coethnicity by the minority of the population is not associated with water infrastructure provision. As expected, there is thus no association between coethnicity and growth in water infrastructure when only a small share of the municipality’s population is coethnic to the president.

Table 3 Panel B reports results with respect to electricity infrastructure. The coethnic coefficient estimate is no longer significant and coethnicity by a small share of the population is not associated with electricity infrastructure provision.

The counterfactual findings support the baseline results that suggest an association between coethnicity and infrastructure provision, where a substantial majority (more than 50 per cent) of the population is coethnic to the president.

Additionally, we construct another coethnic variable defining coethnicity based on the majority of the population. Results are discussed in Appendix A.2.
Table 3: Counterfactual Results

<table>
<thead>
<tr>
<th>Panel A</th>
<th>Dependent Variable: <em>rdpwater</em>&lt;sub&gt;it&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>coethnic&lt;sub&gt;(cf)&lt;/sub&gt;&lt;sub&gt;it&lt;/sub&gt;-1</td>
<td>-0.038 (0.029)</td>
</tr>
<tr>
<td>polcomp&lt;sub&gt;it&lt;/sub&gt;</td>
<td>-0.025 (0.119)</td>
</tr>
<tr>
<td>employment&lt;sub&gt;it&lt;/sub&gt;</td>
<td>0.880*** (0.136)</td>
</tr>
<tr>
<td>popdens&lt;sub&gt;it&lt;/sub&gt;</td>
<td>-0.557*** (0.102)</td>
</tr>
<tr>
<td>urbanrural&lt;sub&gt;it&lt;/sub&gt;</td>
<td>0.025 (0.018)</td>
</tr>
<tr>
<td>gvagovt&lt;sub&gt;it&lt;/sub&gt;</td>
<td>0.154 (0.129)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.571</td>
</tr>
<tr>
<td>F-test</td>
<td>18.05***</td>
</tr>
<tr>
<td>Observations</td>
<td>988</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B</th>
<th>Dependent Variable: <em>nlight</em>&lt;sub&gt;it&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(7)</td>
</tr>
<tr>
<td>coethnic&lt;sub&gt;(cf)&lt;/sub&gt;&lt;sub&gt;it&lt;/sub&gt;-1</td>
<td>-0.013 (0.077)</td>
</tr>
<tr>
<td>polcomp&lt;sub&gt;it&lt;/sub&gt;</td>
<td>0.266*** (0.064)</td>
</tr>
<tr>
<td>employment&lt;sub&gt;it&lt;/sub&gt;</td>
<td>0.957*** (0.149)</td>
</tr>
<tr>
<td>popdens&lt;sub&gt;it&lt;/sub&gt;</td>
<td>-0.136 (0.212)</td>
</tr>
<tr>
<td>urbanrural&lt;sub&gt;it&lt;/sub&gt;</td>
<td>-0.001 (0.013)</td>
</tr>
<tr>
<td>gvagovt&lt;sub&gt;it&lt;/sub&gt;</td>
<td>-0.070 (0.100)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.144</td>
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<td>F-test</td>
<td>44.36***</td>
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<tr>
<td>Municipality FE</td>
<td>YES</td>
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</tbody>
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Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: coethnic<sub>(cf)</sub><sub>it</sub>-1 is a binary variable equal to 1 if the ethnic group representing the smallest share of the municipality’s population (the minority) is coethnic to the president in time t − 1, 0 otherwise.
5 Robustness Checks

5.1 Rural and Urban Household Water Infrastructure Analysis

In Table 4, the dependent variables are water infrastructure access by rural households, \( rdpwater(\text{rural})_{it} \) in Panel A and urban households, \( rdpwater(\text{urban})_{it} \) in Panel B.

Panel A findings suggest that rural households in coethnic municipalities are associated with higher growth in water infrastructure relative to rural households in non-coethnic municipalities.

Growth in urban settlements relative to rural settlements, \( \text{urbanrural}_{it} \), is statistically significant and positively associated to rural household water infrastructure provision. Gross value added share of government, \( \text{gvagovt}_{it} \), is also positively associated with water infrastructure provision and implies the importance of economic activity generated by the government in the local economy for rural household infrastructure. Other control variable coefficients are in line with Table 2 Panel A results.

Panel B reports results with respect to urban households. In this case, results are not statistically significant and we do not find an association between coethnicity and provision of water infrastructure. Urban households are households living in urban settlements such as towns, cities, townships, suburbs and settlements adjacent to these formal urban areas. We would expect these households to have improved access to infrastructure from the outset relative to tribal and farming areas located far away from business corridors.

Table 5 reports counterfactual results with respect to rural and urban household water infrastructure provision. Panel A and B results justify \( \text{coethnic}(50\%)_{it-1} \) results reported in Table 4. The \( \beta_1 \) coefficient estimate is negative and not statistically significant, suggesting that coethnicity of the minority population is not associated with water infrastructure provision.
Table 4: Coethnic (50%) Rural and Urban Water Infrastructure Results

<table>
<thead>
<tr>
<th>Panel A</th>
<th>Dependent Variable: ( rdpwater(rural)_{it} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>coethnic((50%))(_{it-1})</td>
<td>0.062</td>
</tr>
<tr>
<td></td>
<td>(0.039)</td>
</tr>
<tr>
<td>polcomp(_it)</td>
<td>0.012</td>
</tr>
<tr>
<td></td>
<td>(0.108)</td>
</tr>
<tr>
<td>employment(_it)</td>
<td>1.019***</td>
</tr>
<tr>
<td></td>
<td>(0.148)</td>
</tr>
<tr>
<td>popdens(_it)</td>
<td>-0.666***</td>
</tr>
<tr>
<td></td>
<td>(0.140)</td>
</tr>
<tr>
<td>urbanrural(_it)</td>
<td>0.027*</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
</tr>
<tr>
<td>gvagov(_it)</td>
<td>0.219*</td>
</tr>
<tr>
<td></td>
<td>(0.120)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.545</td>
</tr>
<tr>
<td>F-test</td>
<td>14.09***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B</th>
<th>Dependent Variable: ( rdpwater(urban)_{it} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(7)</td>
</tr>
<tr>
<td>coethnic((50%))(_{it-1})</td>
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<tr>
<td></td>
<td>(0.042)</td>
</tr>
<tr>
<td>polcomp(_it)</td>
<td>-0.031</td>
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<tr>
<td></td>
<td>(0.087)</td>
</tr>
<tr>
<td>employment(_it)</td>
<td>0.153</td>
</tr>
<tr>
<td></td>
<td>(0.233)</td>
</tr>
<tr>
<td>popdens(_it)</td>
<td>-0.428***</td>
</tr>
<tr>
<td></td>
<td>(0.103)</td>
</tr>
<tr>
<td>urbanrural(_it)</td>
<td>-0.005</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
</tr>
<tr>
<td>gvagov(_it)</td>
<td>-0.002</td>
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<tr>
<td></td>
<td>(0.095)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.529</td>
</tr>
</tbody>
</table>

Observations 988 978 978 978 926 926  
Number of dmuni 52 52 52 52 52 52  
Time FE YES YES YES YES YES YES  
Municipality FE YES YES YES YES YES YES  

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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.
Table 5: Counterfactual Rural and Urban Water Infrastructure Results

<table>
<thead>
<tr>
<th>Panel A</th>
<th>Dependent Variable: ( rdp_{water(rural)_{it}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
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<tr>
<td>coethnic((cf))_{it-1}</td>
<td>-0.044*</td>
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<tr>
<td></td>
<td>(0.024)</td>
</tr>
<tr>
<td>polcompit</td>
<td>-0.022</td>
</tr>
<tr>
<td></td>
<td>(0.124)</td>
</tr>
<tr>
<td>employmentit</td>
<td>0.936***</td>
</tr>
<tr>
<td></td>
<td>(0.154)</td>
</tr>
<tr>
<td>popdensit</td>
<td>-0.673***</td>
</tr>
<tr>
<td></td>
<td>(0.147)</td>
</tr>
<tr>
<td>urbanruralit</td>
<td>0.030*</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
</tr>
<tr>
<td>gvagovt</td>
<td>0.254*</td>
</tr>
<tr>
<td></td>
<td>(0.136)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.538</td>
</tr>
<tr>
<td>F-test</td>
<td>14.13***</td>
</tr>
<tr>
<td>Observations</td>
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</tr>
<tr>
<td>Time FE</td>
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<tr>
<td>Municipality FE</td>
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</table>

<table>
<thead>
<tr>
<th>Panel B</th>
<th>Dependent Variable: ( rdp_{water(urban)_{it}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(7)</td>
</tr>
<tr>
<td>coethnic((cf))_{it-1}</td>
<td>-0.059</td>
</tr>
<tr>
<td></td>
<td>(0.053)</td>
</tr>
<tr>
<td>polcompit</td>
<td>-0.036</td>
</tr>
<tr>
<td></td>
<td>(0.079)</td>
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<tr>
<td>employmentit</td>
<td>0.141</td>
</tr>
<tr>
<td></td>
<td>(0.236)</td>
</tr>
<tr>
<td>popdensit</td>
<td>-0.424***</td>
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<td>(0.103)</td>
</tr>
<tr>
<td>urbanruralit</td>
<td>-0.004</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
</tr>
<tr>
<td>gvagovt</td>
<td>0.000</td>
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<tr>
<td></td>
<td>(0.095)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.532</td>
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<td>F-test</td>
<td>20.69***</td>
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<td>Time FE</td>
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<td>Municipality FE</td>
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</tr>
</tbody>
</table>

Robust standard errors in parentheses

*** \( p<0.01 \), ** \( p<0.05 \), * \( p<0.1 \)

Note: coethnic(\(cf\))_{it-1} is a binary variable equal to 1 if the ethnic group representing the smallest share of the municipality’s population (the minority) is coethnic to the president in time \( t-1 \), 0 otherwise.

5.2 Regime Analysis

In an attempt to study whether ethnic favouritism occurred during the Xhosa or Zulu regime, we specify a fixed effects model that includes in-
interacted binary variables that control for the regime and the ethnicity of municipalities. To account for the ethnicity of municipalities (ethnic), we construct two binary variables. $xhosa$ is a binary variable equal to 1 if 50 per cent or more of the municipality’s population is classified as Xhosa according to their home language, and 0 otherwise. $zulu$ is equal to 1 if 50 per cent of the municipality’s population is classified as Zulu, 0 otherwise. This specification allows us to compare Xhosa and Zulu municipalities relative to all other municipalities.

We additionally construct two period binary variables. $xperiod$ is a binary variable equal to 1 over the 1996 to 2008 (Xhosa regime) period, 0 otherwise. $zperiod$ is a binary variable equal to 1 over the 2009 to 2016 (Zulu regime) period and equal to 0 otherwise. To account for unobserved heterogeneity, we include time and municipal fixed effects as in Equation 1.

The specification:

$$infrastructure_{it} = \beta_1 \text{ethnic} \ast \text{period}_{it} \ast \beta_2 \text{polcomp}_{it} \ast \beta_3 \text{employment}_{it}$$

$$+ \beta_4 \text{popdens}_{it} \ast \beta_5 \text{urbanrural}_{it} \ast \beta_6 \text{govagovt}_{it} + \alpha_i + \delta_t + u_{it} \tag{2}$$

where $infrastructure_{it}$ is either $rdpwater_{it}$ or $nlight_{it}$.

The coefficient estimate of interest is $\beta_1$. A positive and significant coefficient therefore suggests an association between coethnicity and infrastructure provision during the regime period under consideration.

Table 6 reports the regime analysis results. $xhosa \ast xperiod_{it}$ coefficient estimates suggest that during the Xhosa regime, Xhosa municipalities are associated with approximately 14 per cent higher growth in water infrastructure and 19 per cent higher growth in electricity infrastructure relative to other municipalities. The positive and significant $zulu \ast zperiod_{it}$ estimate suggests that during the Zulu regime, Zulu municipalities are associated with approximately 8 per cent higher growth in water infrastructure relative to other municipalities. With respect to electricity infrastructure, results are not statistically significant.

The specific government programmes adopted during the different regimes may possibly explain these findings. During the Xhosa regime, the RDP was implemented, guiding government expenditure to improve access to water, sanitation and electricity. During the Zulu regime, the 2012 implemented NDP set out government’s plan for South Africa with a focus on provid-
Table 6: Regime Analysis Results

<table>
<thead>
<tr>
<th>Regime</th>
<th>Dependent Variable:</th>
<th>Xhosa</th>
<th>Zulu</th>
<th>Xhosa</th>
<th>Zulu</th>
</tr>
</thead>
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<tr>
<td>xhosa * xperiod</td>
<td>rdpwater_{it}</td>
<td>0.135**</td>
<td>0.174***</td>
<td>(0.061)</td>
<td>(0.046)</td>
</tr>
<tr>
<td></td>
<td>nlight_{it}</td>
<td>0.174***</td>
<td>0.023</td>
<td>(0.046)</td>
<td>(0.036)</td>
</tr>
<tr>
<td>zulu * xperiod</td>
<td>polcomp_{it}</td>
<td>0.018</td>
<td>0.036</td>
<td>0.297***</td>
<td>0.291***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.079)</td>
<td>(0.073)</td>
<td>(0.047)</td>
<td>(0.051)</td>
</tr>
<tr>
<td>employment_{it}</td>
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<td>0.830***</td>
<td>0.700***</td>
<td>(0.140)</td>
<td>(0.119)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.160***</td>
<td>1.012***</td>
<td>(0.168)</td>
<td>(0.162)</td>
</tr>
<tr>
<td>popdens_{it}</td>
<td></td>
<td>-0.692***</td>
<td>-0.543***</td>
<td>-0.233</td>
<td>-0.082</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.128)</td>
<td>(0.096)</td>
<td>(0.203)</td>
<td>(0.205)</td>
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<tr>
<td>urbanrural_{it}</td>
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<td>0.031*</td>
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<td>0.002</td>
<td>-0.000</td>
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<td>(0.017)</td>
<td>(0.015)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>gvgovt_{it}</td>
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<td>(0.093)</td>
<td>(0.099)</td>
<td>(0.081)</td>
<td>(0.090)</td>
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<tr>
<td>R-squared</td>
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<td>F-test</td>
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<td>129.23***</td>
<td>66.83***</td>
<td>58.88***</td>
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<td>YES</td>
<td>YES</td>
<td>YES</td>
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<td>Municipality FE</td>
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<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: xhosa (zulu) 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. xperiod (zperiod) is a binary variable equal to 1 over the Xhosa (Zulu) regime, 0 otherwise.

ing access to basic services, with an emphasis on access to clean and safe water (Department of Water Affairs and Forestry, 2004; National Planning Commission, 2012). We may argue that the association between coethnicity and infrastructure provision follows from the directed funding in the context of these adopted programmes. As discussed in Section 2, the president is able to direct funds to municipalities through Cabinet ministers that head national transferring departments of grants. There is room for additional analysis in this regard. Future research could study conditional grants allocated to municipalities, with the aim to uncover patterns in transfers by national departments during the different regimes.
6 Concluding Remark

This study contributes to the debate on redistributive politics. We use district municipal level data over the 1996 to 2016 period to study ethnic favouritism in public infrastructure provision in South Africa. Empirical results suggest that there is an association between coethnicity to the president and relative higher growth in water and electricity infrastructure. Building on this finding, future research could study conditional grant allocations towards infrastructure improvements as the specific channel through which ethnic favouritism occurs.
References


organisations/democratic-alliance-da
A Appendix

A.1 South African Presidents

In Table A.1, we provide information on the ethnicity and birth locations of South Africa’s post-apartheid leaders. In our dataset, the Xhosa regime ends in 2008 and the Zulu regime starts in 2009, as Kgalema Motlanthe was interim president for a negligible period of time. The 2017 elected leader of the ANC, Cyril Ramaphosa, was born in City of Johannesburg and his parents are from Venda.

<table>
<thead>
<tr>
<th>President</th>
<th>Ruling Period</th>
<th>Ethnicity</th>
<th>Birth District</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nelson Mandela</td>
<td>10 May 1994 - 16 June 1999</td>
<td>Xhosa</td>
<td>OR Tambo (EC)</td>
</tr>
<tr>
<td>Kgalema Motlanthe</td>
<td>24 September 2008 - 9 May 2009</td>
<td>Northern Sotho</td>
<td>City of Johanne-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>sburg (GP)</td>
</tr>
<tr>
<td>Jacob Zuma</td>
<td>9 May 2009 - 14 February 2018</td>
<td>Zulu</td>
<td>King Cetshwayo</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(KZN)</td>
</tr>
</tbody>
</table>


A.2 Supplementary Robustness Checks

As a supplementary robustness check, we extend our analysis by classifying an additional coethnic binary variable. \( \text{coethnic}(m)_{t-1} \) is equal to 1 if the majority (no percentage threshold) of the municipality’s population is coethnic to the president, 0 otherwise. With this classification, we are able to study the effect of coethnicity to the president in metropolitan municipalities that are ethnically fractionalised and hence equal to 0 in the \( \text{coethnic}(50\%)_{t-1} \) specification.

Results in Table A.2 support findings with respect to water infrastructure provision according to the \( \text{coethnic}(50\%)_{t-1} \) classification reported in Table 2 Panel A. Municipalities where the majority of the population, irrespective of the magnitude, are coethnic to the president, are associated with higher growth in water infrastructure relative to non-coethnic municipalities.
Column 6 coefficient estimates suggest that coethnic municipalities are associated with approximately 8 per cent higher growth in water infrastructure relative to non-coethnic municipalities.

Table A.2: Coethnic (Majority) Water Infrastructure Results

<table>
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<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{coethnic(m)}_{it-1} )</td>
<td>0.048</td>
<td>0.048</td>
<td>0.070**</td>
<td>0.080**</td>
<td>0.078**</td>
<td>0.075**</td>
</tr>
<tr>
<td></td>
<td>(0.034)</td>
<td>(0.030)</td>
<td>(0.034)</td>
<td>(0.035)</td>
<td>(0.034)</td>
<td>(0.035)</td>
</tr>
<tr>
<td>( \text{polcomp}_{it} )</td>
<td>-0.001</td>
<td>0.006</td>
<td>0.024</td>
<td>0.020</td>
<td>0.014</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.106)</td>
<td>(0.092)</td>
<td>(0.084)</td>
<td>(0.075)</td>
<td>(0.075)</td>
<td></td>
</tr>
<tr>
<td>( \text{employment}_{it} )</td>
<td>0.930***</td>
<td>0.784***</td>
<td>0.767***</td>
<td>0.777***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.134)</td>
<td>(0.118)</td>
<td>(0.123)</td>
<td>(0.127)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \text{popdens}_{it} )</td>
<td>-0.601***</td>
<td>-0.657***</td>
<td>-0.641***</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(0.113)</td>
<td>(0.107)</td>
<td>(0.109)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \text{urbanrural}_{it} )</td>
<td></td>
<td></td>
<td></td>
<td>0.024</td>
<td>0.026</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.016)</td>
<td>(0.016)</td>
<td></td>
</tr>
<tr>
<td>( \text{gvagovt}_{it} )</td>
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<td>0.111</td>
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</tr>
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<td>(0.111)</td>
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</tr>
</tbody>
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R-squared 0.577 0.581 0.663 0.689 0.704 0.706
F-test 21.80*** 19.06*** 75.51*** 101.52*** 115.05*** 134.49***
Observations 988 978 978 978 926 926
Number of dmuni 52 52 52 52 52 52
Time FE YES YES YES YES YES YES
Municipality FE YES YES YES YES YES YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: \( \text{coethnic(m)}_{it-1} \) is a binary variable equal to 1 if the ethnic group representing the largest share of the municipality’s population (the majority) is coethnic to the president in time \( t-1 \), 0 otherwise.

Table A.3 presents water infrastructure results for rural (Panel A) and urban (Panel B) households. Both Panel A and Panel B support results reported in Table 4. Findings suggest that rural households in coethnic municipalities are associated with higher water infrastructure provision relative to rural households in non-coethnic municipalities.

Our findings differ in the case of electricity infrastructure provision. Although positive in columns 3 to 6, results in Table A.4 are not statistically significant. These results may suggest that only in municipalities where a strict majority of the population are coethnic to the president, an association with electricity infrastructure provision exists.
Table A.3: Coethnic (Majority) Rural and Urban Water Infrastructure Results

**Panel A**

<table>
<thead>
<tr>
<th>Dependent Variable: rdpwater(rural)_it</th>
<th>(1)</th>
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<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>coethnic(m)_it-1</td>
<td>0.048</td>
<td>0.047</td>
<td>0.074**</td>
<td>0.084**</td>
<td>0.084**</td>
<td>0.079**</td>
</tr>
<tr>
<td></td>
<td>(0.035)</td>
<td>(0.031)</td>
<td>(0.036)</td>
<td>(0.036)</td>
<td>(0.036)</td>
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<tr>
<td>polcomp_it</td>
<td>0.005</td>
<td>0.023</td>
<td>0.034</td>
<td>0.059</td>
<td>0.047</td>
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<tr>
<td></td>
<td>(0.111)</td>
<td>(0.100)</td>
<td>(0.093)</td>
<td>(0.080)</td>
<td>(0.081)</td>
<td></td>
</tr>
<tr>
<td>employment_it</td>
<td>0.998***</td>
<td>0.809***</td>
<td>0.836***</td>
<td>0.855***</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(0.146)</td>
<td>(0.141)</td>
<td>(0.141)</td>
<td>(0.146)</td>
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<td></td>
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<tr>
<td>popdens_it</td>
<td>-0.714***</td>
<td>-0.719***</td>
<td>-0.688***</td>
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<tr>
<td></td>
<td>(0.156)</td>
<td>(0.140)</td>
<td>(0.143)</td>
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<tr>
<td>urbanrural_it</td>
<td>0.090**</td>
<td>0.033**</td>
<td>0.209*</td>
<td>(0.015)</td>
<td>(0.120)</td>
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<tr>
<td>gva_govt_it</td>
<td>0.542</td>
<td>0.552</td>
<td>0.633</td>
<td>0.667</td>
<td>0.674</td>
<td>0.678</td>
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<tr>
<td>R-squared</td>
<td>0.529</td>
<td>0.525</td>
<td>0.529</td>
<td>0.553</td>
<td>0.558</td>
<td>0.558</td>
</tr>
<tr>
<td>F-test</td>
<td>21.73***</td>
<td>18.80***</td>
<td>20.39***</td>
<td>23.37***</td>
<td>21.06***</td>
<td>20.86***</td>
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**Panel B**

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<td>0.010</td>
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<td>(0.038)</td>
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<td>(0.039)</td>
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<tr>
<td></td>
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<td>(0.231)</td>
<td>(0.244)</td>
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<td>-0.473***</td>
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<td>(0.113)</td>
<td>(0.116)</td>
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<td>0.525</td>
<td>0.529</td>
<td>0.553</td>
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<tr>
<td>F-test</td>
<td>21.73***</td>
<td>18.80***</td>
<td>20.39***</td>
<td>23.37***</td>
<td>21.06***</td>
<td>20.86***</td>
</tr>
</tbody>
</table>

Note: coethnic(m)\_it-1 is a binary variable equal to 1 if the ethnic group representing the largest share of the municipality’s population (the majority) is coethnic to the president in time t – 1, 0 otherwise.
Table A.4: Coethnic (Majority) Electricity Infrastructure Results

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<td>(0.015)</td>
<td>(0.016)</td>
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<td>0.254***</td>
<td>0.270***</td>
<td>0.272***</td>
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<td></td>
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<td>(0.037)</td>
<td>(0.042)</td>
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<tr>
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<td>0.954***</td>
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<td>(0.083)</td>
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<td>(0.014)</td>
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<td>$gvagovt_{it}$</td>
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<td>YES</td>
<td>YES</td>
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<td>YES</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: $coethnic(m)_{it-1}$ is a binary variable equal to 1 if the ethnic group representing the largest share of the municipality's population (the majority) is coethnic to the president in time $t - 1$, 0 otherwise.