A Barometer of Electoral Change?
Towards a better understanding of voter behavioural dynamics in the context of municipal by-elections in South Africa

Report Prepared for

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Contents

List of Tables

List of Figures

List of Acronyms

Adj. R^2	Adjusted R Square
DA	Democratic Alliance
DBE	Department of Basic Education
DoH	Department of Health
ESS	Election Satisfaction Survey
GHS	General Household Survey
GRNN	General Regression Neural Network
HSRC	Human Sciences Research Council
IEC	Electoral Commission of South Africa
LGE	Local Government Election
MAPS	Marketing All Product Survey
MRF	Market Research Foundation
N	Number of respondents
NPE	National Provincial Election
N.S.	Not Significant
OLS	Ordinary Least Squares Regression
SAPS	South African Police Service
SASAS	South African Social Attitudes Survey
SEM	Socio-Economic Measure
URL	Universal Resource Locator
VAP	Voting Age Population
VPS	Voter Participation Survey
WHO	World Health Organisation

EXECUTIVE SUMMARY

THE AIM OF THE SURVEY SERIES

The study aims to inform and guide the Electoral Commission with its plans, policies, and practices by evaluating by-election turnout in South Africa for the period 2016-2023. In this study, the country's socio-economic and political landscape is examined together with political factors that might impact voting behaviour. To understand what is driving turnout, specific drivers (such as political competitiveness, demographics, crime and election timing) are examined.

METHODOLOGY

A data set of 634 by-elections was created using data gathered between 2016 and 2023. We selected two dependent variables to assess South African by-election participation: absolute turnout and relative turnout. We employed a multivariate regression analysis to test a range of different determinants of by-election turnout. An Ordinary Least Squares regression (OLS) approach was utilised.

RESULTS

Socio-demographic conditions (e.g., population size and economic development) were found to be significant predictors of voter turnout during by-elections. Large communities that suffered from poor socio-economic conditions (e.g., high unemployment and crime) were discovered to have low levels of electoral participation. The racial composition of wards was not a good predictor of turnout. Election closeness was found to be a robust correlate of turnout, the more competitive the election the higher the turnout. Election timing (both concurrent elections as well as election frequency) was not a salient determinant of turnout.

CONCLUSION

If one compares South Africa today to where it was 30 years ago, it is clear that the country has overcome many obstacles and has generally made important progress which some may have thought impossible. As South Africa's democracy matures, it is imperative that citizens' commitment to elections does not waiver. Nurturing civic participation among our citizens will be the key to maintaining this commitment. The data provided in this report will help the Election Commission design interventions to improve voter turnout in the country's by-elections.

1. Introduction: The importance of by-election research in South Africa

Since the late 1990s, the Electoral Commission of South Africa has commissioned survey-based research in order to provide a comprehensive understanding of the attitudes, preferences, and experiences of the voting-age public as well as voters in order to inform electoral management efforts over time. Specifically, the Electoral Commission has appointed the Human Sciences Research Council (HSRC) to undertake Voter Participation Surveys (VPS) in the months prior to elections as well as Election Satisfaction Surveys (ESS) on Election Days in order to provide insight into the actual experience of voters around the country. These studies have been commissioned in relation to both national and provincial elections as well as municipal elections. Over time, this has become an increasingly valuable tools through which to examine the electorate's knowledge, attitudes, beliefs and behaviour, and the extent to which they are

changing. A data curation project has also been conducted which prepared cumulative files for the VPS and ESS series. This programme of work will facilitate further empirical analysis and the production of new routine outputs that can be used for ongoing cycles of election management and planning.

One notable gap in relation to this series is monitoring dynamics and developing a more nuanced understanding of context in relation to municipal by-elections. A by-election is an election that takes place in a ward in a municipality between general municipal elections which are held every five years. A by-election and a general election in South Africa are similar in that they are both used to elect representatives to various positions of power. However, there are some differences between the two: Firstly, a by-election is held when a vacancy arises in an elected position before the end of the term, while a general election is held at the end of a term or when the term of office for a particular position expires. Secondly, a by-election is usually held within 90 days of the vacancy arising, while a general election is held at fixed intervals, typically every five years in South Africa. By-elections are generally smaller in scale and scope than general elections and by-elections are held in a single constituency or ward, while general elections are held across the entire country. By-elections typically have lower voter turnout than general elections, as they are held on a smaller scale and are often not as widely publicized.

In summary, by-elections in South Africa are used to fill vacant positions in a particular constituency or ward, while general elections are held across the entire country at fixed intervals. By-elections are typically smaller in scale and scope than general elections and have different candidate eligibility criteria and voter turnout rates.
By-elections can occur as a result of the following:

- The Electoral Commission does not declare the results of the election of a municipal council or in ward within the specified period.
- A court sets aside the election of a council or a ward.
- The council is dissolved.
- A ward vacancy occurs. Vacancies occur when there is the death of a ward councillor, when a ward councillor resigns from a party or municipal council or if a ward councillor is expelled from a party or municipal council.

Given the research gap discussed earlier, a three-phase project was initiated that would pull together three strands of information, two of which already exist and the third is suggested as new research undertaken by the Electoral Commission. The three phases are discussed in more detail below.

Phase 1: Development of a by-election database using voter participation data

The voter's roll in conjunction with the voter participation data, which is generated on Election Day and collected using scanners, is an invaluable source from which key analytical information can be derived regarding the basic characteristics of by-elections and how these are changing over time. This initial phase of research is intended to develop a database based on information that is derived from the Electoral Commission's administrative data. Each record in the By-Election Database would contain basic attributes about that by-election, including the following:

- Basic characteristics about the municipal ward council seat that has become vacant: name and number of ward, province, date of by-election, and so forth.
- Number of registered voters, the number that participated in the by-election and the calculated turnout rate based on these figures.
- The same registration, participation, and turnout figures as above disaggregated by gender.
- The same registration, participation, and turnout figures as above disaggregated by age group/age cohort.
- By-election outcome: reported in a non-partisan manner that would ideally include two variables, namely: (i) whether the municipal ward council seat is retained or lost to another party candidate, and (ii) the margin of victory (percentage point difference in the share of the vote received between the winning party and the runner-up)
- Other variables deemed of relevance once a review has been undertaken of the voter participation data, as well as other specific contextual variables of interest that could be drawn from official statistics (area-level unemployment rates, education levels, and so forth).

This report deals with the results from Phase 1 of the research.

Phase 2: Fuller population of the By-Election Database and analysis of longitudinal trends

Building on the work in Phase 1, the focus of the next component of the research would entail working with the Electoral Commission in order to: (i) include historical data on by-elections that occurred prior to the 2016 Municipal Election, and (ii) update the database to include any subsequent by-elections that have occurred since the creation of the database. More fully populating the database with older by-election data is a critical step in providing a more comprehensive and technically sophisticated analysis of patterns of turnout in by-elections in the country. This would move the demographic profile beyond basic descriptive analysis by ensuring that there are sufficient cases with which to perform multivariate analysis. It will also allow for inclusion of a longitudinal perspective by allowing us to determine whether there are distinct or emerging signs of variation over time based on the age, gender and geographic location of voters.

It is envisaged that these results would be compiled into an Electoral Commission report that could be updated on a periodic basis — preferably annually — to chart the level of stability or change in demographic patterns underlying the by-election experience. This will be important for distilling lessons that could be used to inform operational planning for future by-elections. This project will be undertaken at a later stage.

Phase 3: Conducting small scale Voter Participation and By-Election Satisfaction Surveys, and triangulating this data with the By-Election Database and Municipal Election VPS/ESS data

The development and population of the By-Election Database, as described in Phases 1 and 2, would represent a substantial milestone in respect of improving our understanding of the attributes and dynamics associated with by-elections. However, at the same time it must be acknowledged that the database will include only basic information and will not be able to provide insight into aspects of voter psychology which may be crucial in terms of understanding

the preferences and experiences of those participating in or abstaining from by-elections. Such information would be invaluable from an electoral management perspective because it would provide a more nuanced set of information on electoral context, and electoral choice, in addition to election day preferences and evaluations (for those that vote), all of which would be relevant input information for planning purposes.

What is proposed initially is that a methodology be developed for effectively conducting small-scale versions of the VPS and ESS that have been routinely conducted in the context of past national and provincial as well as municipal elections by the HSRC on behalf of the Electoral Commission. This would then be piloted in context of one or two by-elections. The results of these micro-studies would then be compared to the provincial and national results of the last conducted municipal VPS and ESS) to provide a sense of whether the attitudes, preferences and experiences in the by-election context appear to be broadly equivalent or fundamentally distinct in nature. This data could also be coupled with the By-Election Database analysis to provide a fuller relative account of the dynamics involved in the by-election.

This pilot project could then be refined and replicated in a select number of by-elections each year or biennially to steadily expand the available voter data to accompany the administrative data. Over time, this would provide an increasingly rich relational resource through which to understand the complex dynamics of by-elections and how they compare and contrast with municipal and even national and provincial elections.
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2.   Research context

Municipalities are a critical tier of democratic governance in South Africa; the significance of this form of government was highlighted in the Constitution (Act No. 108 of 1996). The Election Commission works diligently to promote public participation in Local Government Elections (LGEs) in the country, yet voter turnout has tended to be lower in National and Provincial Elections (NPE) than during LGEs. Consider, for instance, that turnout (measured as percentage of registered voters) was 77% in the 2004 NPE but only 48% in the 2000 LGE (Table 1). We discovered higher than average turnout in both the 2011 and 2016 LGEs. Although the 2021 LGE witnessed the lowest turnout for democratic elections in South Africa, it was only marginally below the 2000 LGE figure. Even though all provinces experienced declining turnout between the 2016 and 2021 LGEs, the largest drop was recorded for Gauteng and the Western Cape.

Table 1: Voter turnout between the 2000 Local Government Elections to the 2021 Local Government Elections (measured as percentage of registered voters)

	2000 LGE	2004 NPE	2006 LGE	2009 NPE	2011 LGE	2014 NPE	2016 LGE	2019 NPE	2021 LGE
Eastern Cape	56%	81%	56%	77%	58%	70%	56%	61%	47%
Free State	49%	79%	47%	77%	55%	73%	56%	63%	45%
Gauteng	43%	76%	42%	79%	56%	77%	58%	72%	44%
KwaZulu-Natal	47%	74%	51%	80%	62%	77%	61%	67%	48%
Limpopo	42%	77%	45%	70%	50%	63%	50%	59%	44%
Mpumalanga	45%	80%	46%	80%	56%	76%	56%	66%	43%
North West	45%	77%	46%	73%	53%	69%	54%	59%	42%

Northern Cape	58%	76%	54%	76%	63%	74%	61%	67%	53%
Western Cape	58%	73%	52%	78%	64%	74%	63%	68%	49%
Total	48%	77%	48%	77%	58%	73%	58%	66%	46%

Source: Election Commission Data.

The HSRC has investigated, on behalf of the Election Commission, voting intention in both South African NPEs and LGEs. Using public opinion data from the VPS, Roberts et al. (2021) showed that voting intention had declined in the country, decreasing from 82% in 2004 to 60% in 2021. When asked, the vast majority of those who did not intend to vote gave political disinterest and disillusionment as their main reason. Discontent appears to be driven by a perceived unhappiness with the instrumental returns to democracy. A large majority of the adult populace said that their lives have worsened during the 2016-2021 period, and there is considerable dissatisfaction with the general economic situation. A growing number of people believe the country is heading in the wrong direction and distrust South Africa's current political leadership. This trend does not represent a sudden, abrupt break from past data is but part of a gradual change over the last decade.

As indicated above, important research has been conducted by the HSRC to examine voter participation during South African NPEs and LGEs. But, as has already been pointed out, by-elections are rarely investigated by scholars. But this is not just an issue of South African election studies (for a review of the political science literature on by-elections, see Quinlan 2023). Most countries tend to have limited research on by-elections with the notable exception of Britain (perhaps because of the higher than average number of by-elections in that country, see Norris 1990). In addition, most literature (e.g., Middleton 2023; Norris & Feigert 1989; Ortmann 2014; Stray & Silver 1983) that exists on by-elections has tended to focus on who wins the election contest and what is the relationship with the performance of government at the national level. Much less is known about voter turnout in these kinds of elections and how they may differ from normal municipal elections.

But what is a by-election and, how can it be defined? It is an election that takes place in a municipal ward between LGEs. A by-election and a LGE in South Africa are similar in that they are both used to elect representatives to various positions of power. There are, however, some differences between by-elections and LGEs: first, a by-election is held when a vacancy arises in an elected position before the end of the term[1], while a general election is held at the end of a term or when the term of office for a particular position expires; second, a by-election is usually held within 90 days of the vacancy arising, while a general election is held at fixed intervals, typically every five years in South Africa. Furthermore, by-elections are generally smaller in scale and scope than general elections and by-elections are held in a single constituency or ward, while general elections are held across the entire country.

The report will draw on the relevant literature to develop research hypotheses that will then be explored using bivariate and multivariate methods. An attempt will be made to identify what

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[1] What are some of the reasons that a by-election may be held in South Africa. By-elections can occur as a result of the following: (i) the Electoral Commission does not declare the results of the election of a municipal council or a ward within the specified period; (ii) a court sets aside the election of a council or a ward; (iii) the council is dissolved; (iv) a ward vacancy occurs. Vacancies can also occur when there is the death of a ward councillor, when a ward councillor resigns from a party or municipal council, or if a ward councillor is expelled from a party or municipal council.

factors are influencing both absolute and relative turnout (i.e., the change in registered voter participation between the by-election and the relevant LGE). Given the scarcity of available research on by-elections both in South Africa and elsewhere, we drew on existing literature on general voter turnout. There is a large body of research on what drives participation in established and transitioning democracies (reviews of this work are offered by Cancela & Geys 2016; Geys 2006; Smets & van Ham 2013; Stockemer 2017). A number of factors were covered in our report including demographic and socio-economic composition, political closeness as well as election timing.

3. Research methodology

3.1. By-Election Database design

As previously mentioned, Phase 1 of the research involves the analysis of secondary data derived from by-elections. Below is more detail about the research universe and analysis undertaken. The study was conducted in two main phases. The first phase was to transfer the by-election data from the Independent Electoral Commission (IEC) website into an Excel spreadsheet. This included the linking of the extracted by-election data to the ward spatial boundaries. The second phase involved the aggregation of the contextual data to the ward boundaries.

The approach that was decided upon in the transfer of the IEC by-election data to an Excel spreadsheet was to use web scraping. Web scraping is the extraction of specific data from a website that is then exported into an Excel file format. Using a software programme, the web scraper is given a universal resource locator (URL) to load before scraping. The web scraper loads all the hypertext markup language (HTML) code for that page and then extracts specific data defined by the user. In this instance it was all the data from all by-elections since 2016. The data was then transformed into a format that was linked to the ward boundaries for South Africa. The data layers that were integrated with the IEC by-election data included the following: (i) demographic estimates; (ii) Socio-economic Measure (SEM) and individual and household income data; (iii) labour market data; (iv) poverty data; (v) crime statistics; (vi) access to clinics and schools, and (vii) area type.[2]

The methods that are used in the updating or development of the above data sets are described in more detail below.

Demographic estimates: The basis of the demographic estimates is the 2011 census. The 2011 census enumeration area boundaries are used as the spatial boundaries for this data set. On an annual basis demographic estimates are calculated using both geospatial and statistical methods. Using the dwelling frame from Statistics South Africa as a "measure of size" estimates of the population at an enumeration area are updated on an annual basis. Statistical techniques are then used to benchmark and weight the demographic estimates to the mid-year estimates.

SEM: Data for this measure originates from the Marketing All Product Survey (MAPS) which is a nationally representative survey conducted on an annual basis by the Market Research

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[2] The data sets are updated on a regular basis at an enumeration area level. The latest ward boundaries for South Africa were sourced and the above data sets aggregated from the enumeration area level to the wards. Only the crime statistics that are available at a police station level were disaggregated to the enumeration area level.

Foundation (MRF). Using small area estimation techniques, the SEM data in sampled enumeration areas is linked to the demographic estimates that cover the entire country. A General Regression Neural Network (GRNN) is then used to impute the SEM data from sampled enumeration areas to all enumeration areas in the country.

Individual and household income: The individual and household income data originates from the General Household Survey (GHS) which is a nationally representative survey conducted on an annual basis by Statistics South Africa. Using small area estimation techniques, the income data in sampled enumeration areas is linked to the demographic estimates that cover the entire country. A GRNN is then used to impute the income data from sampled enumeration areas to all enumeration areas in the country.

Employment data: The employment data originates from the GHS which is a nationally representative survey conducted on an annual basis by Statistics South Africa. Using small area estimation techniques, the employment data in sampled enumeration areas is linked to the demographic estimates that cover the entire country. A GRNN is then used to impute the employment data from sampled enumeration areas to all enumeration areas in the country.

Poverty data: The poverty data is generated using the 2021 national poverty line defined by Statistics South Africa. The national poverty line for 2021 has a lower and upper bound poverty line, which is R890 and R1 335. Using the median value of R 1 113 the poverty data is generated using the individual income data from the 2021 GHS.

Crime statistics: On an annual basis the South African Police Service (SAPS) provides crime statistics at a police station level. These statistics are integrated into a geospatial format. For this study, the data is proportionally disaggregated from the police station to the ward-level.

Access to schools and health facilities: The Department of Basic Education (DBE) on a regular basis provides data on the location of primary and secondary schools across the country. Similarly, the World Health Organisation (WHO) and the Department of Health (DoH) in South Africa provide the location of clinics and hospitals in South Africa. Using schools and health facilities as a proxy for service delivery, the count of the number of these facilities at a ward-level is provided. School and health facilities are the best indication of the ability of the government to provide services to citizens in the country.

Area type: From the 2011 census information is available on the area type at an enumeration area level. This includes the classification of areas into formal and informal urban and rural areas.

Having aggregated/disaggregated the data to the ward-level the variables associated with the above data sets were merged into the by-election data as an Excel spreadsheet and provided to the HSRC.

3.2. Data analysis
We selected two dependent variables to assess by-election turnout in South Africa. The first was absolute turnout — the percentage of registered voters who turned out during a by-election. This kind of turnout varied considerably in our data set with 6.2% at the minimum to

a high of 75.3% at the maximum. The mean level of turnout was 41% (SE=0.531) with 30% of wards exhibiting turnout levels below a third of registered voters. The second was relative turnout — the change in registered voter participation in comparison to the most recent LGE. Unsurprisingly, this variable showed a remarkable level of variation. In some wards, turnout was down by 60 percentage points from the most recent LGE. In other wards turnout had improved. Overall, 12% of wards reported improved participation. The significant diversity noted for the two dependent variables allows for quite a comprehensive test of how different factors have impacted turnout.

We utilised a multivariate regression analysis to identify determinants of by-election turnout. Since the dependent variables we are trying to model are continuous in nature, we selected a standard linear regression technique — Ordinary Least Squares regression (OLS). This is the most common technique for estimating coefficients of linear regression equations. When selecting this approach, we made a number of different assumptions. First, that there is a linear relationship between the dependent and the selected independent variables. Second, that there are not a significant number of outliers in the sample[3]. Third, that the data is homoscedastic and, finally, that the residuals (errors) of the regression line are more or less normally distributed.

A number of background controls were included in our multivariate regression analysis of voter turnout. These included provinces of by-election, year, and geotype. The former is particularly important. According to sociological theory, urbanisation weakens social pressures to participate in society (Monroe 1977). People are theorised to be more individualistic in cities and care less about the loss of social prestige if they do not participate in civic life (also see Riker & Ordeshook 1968). Accordingly, we generated a variable that controlled for whether a by-election took place in an urban or rural environment. We did not want to add more control variables as there was a concern about producing over-specified models. If regression models contain too many redundant predictors this can result in problems (such as inflated standard errors for the coefficients) that may undermine interpretation.

4. Results from By-Election Database analysis: Examining key factors influencing by-election outcomes

In this section of the report, we test the validity of specific hypotheses relating to the factors influencing by-election outcomes in the South African context in the post-2016 LGE period. In particular, we concentrate on six key aspects relating to turnout levels: (i) simultaneous by-elections; (ii) the mobilising role of local social issues; (iii) ward-level demographic characteristics including population size of racial diversity; (iv) the degree of by-election contest closeness; (v) election frequency, and (vi) voter fatigue. Other hypotheses will be tested once additional variables are incorporated in the By-Election Database in the short-term. This includes number of contestants in the by-election, the underlying reason the by-election was called, the gender profile of by-election contestants, and the age and gender profile of registered and participating voters.

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[3] Outliers are just single data entries within the data set that are wildly outside the usual pattern.

4.1. Demobilisation hypothesis: Turnout will be lower in by-elections compared to turnout in the previous municipal election.

As described earlier in the report, one of the enduring hypotheses in the narrow international research literature on voter behaviour in the context of by-elections relates to the level of turnout in by-elections relative to LGEs. This relates to the conceptual distinction of 'first-order' and 'second-order' elections proposed by Reif and Schmitt (1980) in the case of European elections. First-order elections were understood as those that determine the government and/or executive power in a political system and were 'first-order' from the perspective of being considered generally more important by political parties, the voting public, and the media. By extension, 'second-order' elections were those that were perceived as being of lesser importance by these stakeholders. In their conceptualisation, Reif and Schmitt (1980) focused mainly on national elections versus local and regional elections as examples of first- and second-order elections, respectively. However, it could be argued that this could apply equally to the distinction between local government and by-elections in South Africa, even though turnout in municipal elections is admittedly lower than in national elections.

Figure 1: Average ward-level turnout in by-elections is lower than in local government elections, 2016-2023 (%)

(a) Average turnout of registered voters in ward by-elections compared with average ward turnout in the previous local government elections

(b) Percentage point difference between by-election and local government election turnout
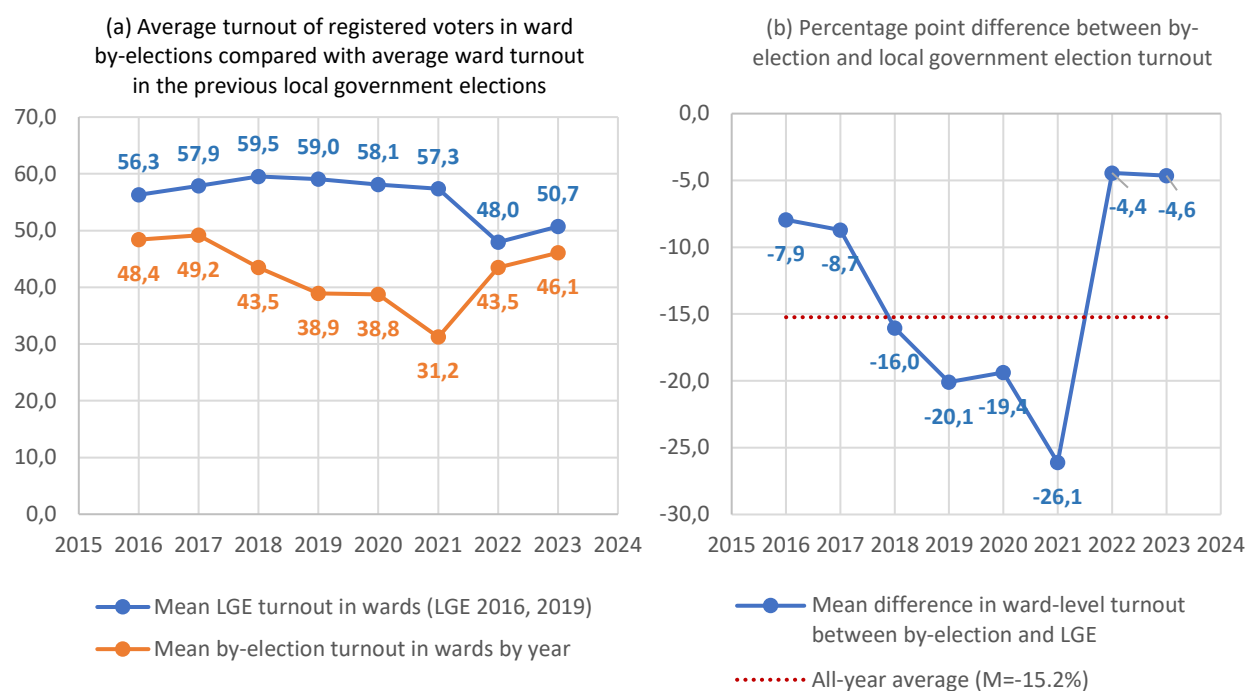
Source: HSRC IEC By-Election Database, own analysis

For the analysis data from 634 by-elections was used; all these by-elections took place between 3 August 2016 and 8 March 2023. The two-line graphs presented in Figure 1 clearly demonstrate that the average turnout in by-elections in each year of observation was lower than that observed in the same wards in the previous LGE. The graph on the left-hand side (a) indicates the scale of variation in turnout in the different election types over the period. The by-election turnout line is consistently below the LGE turnout line, with signs of growing divergence between 2016 and 2021. This divergence trend was followed, after the 2021 municipal election on 1 November 2021, by narrow consecutive differences in 2022 and early 2023. This is due to

convergence as a result of lower 2021 electoral turnout figures coupled with resurgent by-election turnout. The graph on the right-hand side (b) simply shows the percentage-point difference between the two turnout statistics in each year over the period. On average, over the full period, mean by-election turnout was 15.2 percentage points below the municipal election turnout in the same wards (represented by the dotted red line). In 2016, the difference in turnout was around 8 percentage points, but this progressively increased to a high of 26 percentage points in 2021. Following the 2021 LGE, the difference reduced to a more nominal four-to-five percentage point range.

In general, this pattern of results tends to offer confirmatory evidence that the second-order, low turnout hypothesis seems to apply to South African by-elections, when focusing on the 2016-2023 period.

Figure 2: Average ward-level voter turnout in previous local government elections and by-elections, by province and urban-rural location over the 2016-2023 period (%)

Average ward-level voter turnout in previous LGE and by-elections

Province	Turnout in previous LGE	By-election turnout
Northern Cape	61,2	51,7
Western Cape	61,2	42,9
Gauteng	59,3	25,2
KwaZulu-Natal	58,6	46,6
Free State	56,1	45,4
Eastern Cape	54,6	39,0
Mpumalanga	52,8	35,6
Limpopo	51,6	42,6
North West	50,6	43,3
Urban	57,7	35,8
Rural	56,0	45,9

■ Turnout in previous LGE   ■ By-election turnout
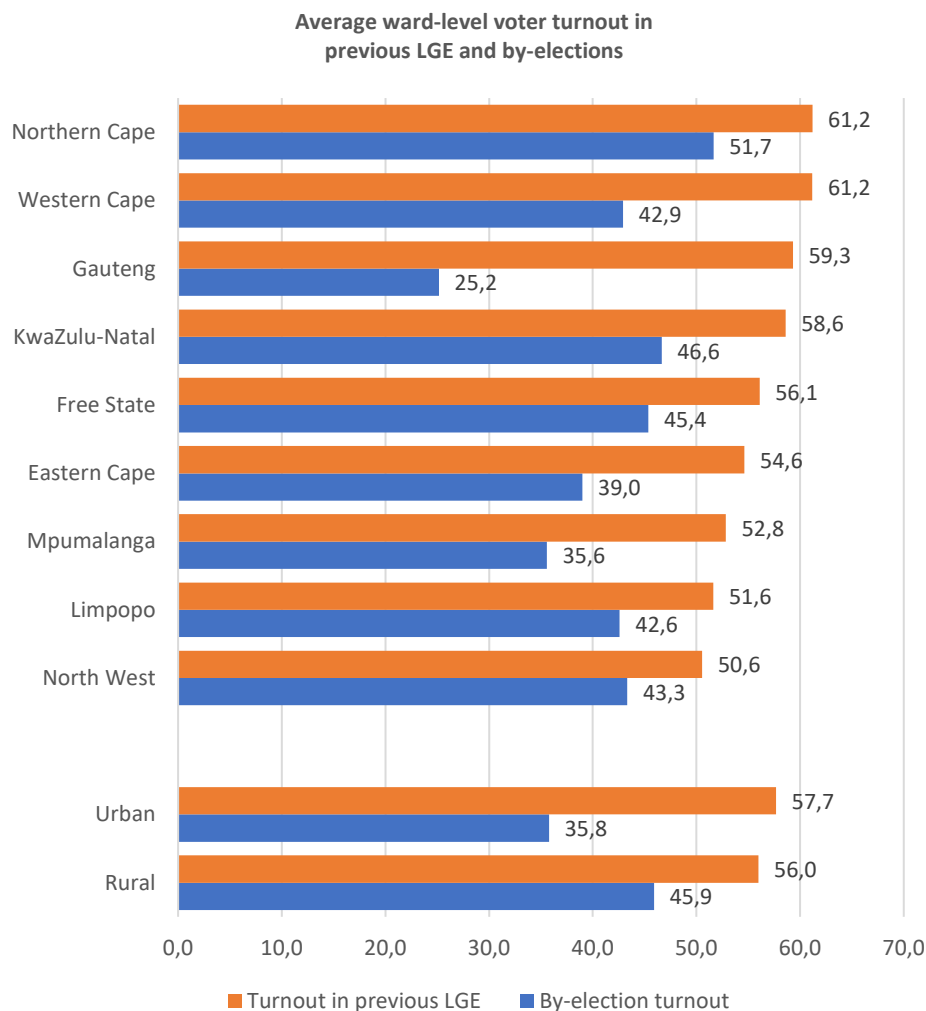
Source: HSRC IEC By-Election Database, own analysis

If we move below the national level to focus on the provincial patterning of by-election versus municipal elections turnout, the picture remains consistent (Figure 2). In all nine provinces, by-election turnout at the ward-level is on average lower than turnout in the previous LGE. The scale of difference in turnout between these two election types varies appreciably, from a low

of 7 and 9 percentage points in the cases of the North West and Limpopo, respectively, to a high of 34 percentage points in Gauteng. The case of Gauteng is something of an outlier, with by-election turnout at a mere 25% on average across the 67 by-elections that took place between August 2016 and March 2023, compared to nearly two thirds (59%) in previous LGEs. Above-average percentage point differences in turnout between the two election types (16 to 18 percentage points) was also observed in the cases of the Western Cape, Mpumalanga, and Eastern Cape, though the depth of this variation does not come close to that of Gauteng.

With regard to type of geographic location, there is a distinct urban-rural divide in by-election turnout. While turnout in by-elections in both urban and rural wards is again lower in general than in LGEs, by-election turnout is significantly lower than municipal contests in urban relative to rural localities. In urban wards, the difference in by-election and municipal election turnout is 10 percentage points, which is less than half that observed in rural wards over the 2016-2023 period (22 percentage points). This clearly suggests that rural voters have a greater propensity to participate in municipal by-elections and elect a new ward councillor than their urban counterparts.

Table 2: Ordinary Least Squares regression model on the association between local government election turnout and by-election turnout

Dependent variable: By-election turnout (% registered population)	Standardised Beta	Std. Err.	t	P>t	Sig.
Local government election turnout	0.347	0.052	10.240	0.000	***
By-election year (reference=2016)					
2017	-0.015	2.510	-0.230	0.820	n.s.
2018	-0.139	2.547	-2.220	0.027	*
2019	-0.300	2.432	-3.900	0.000	***
2020	-0.302	2.449	-4.030	0.000	***
2021	-0.281	2.641	-5.080	0.000	***
2022	-0.012	2.566	-0.190	0.853	n.s.
2023	-0.019	3.135	-0.460	0.648	n.s.
Urban-rural location (reference=urban)					
Rural	0.297	0.827	9.670	0.000	***
Province (reference=Eastern Cape)					
Free State	0.126	1.620	3.580	0.000	***
Gauteng	-0.213	1.622	-5.690	0.000	***
KwaZulu-Natal	0.144	1.281	3.640	0.000	***
Limpopo	0.081	1.977	2.560	0.011	*
Mpumalanga	-0.062	1.548	-1.780	0.075	n.s.
North West	0.128	1.604	3.660	0.000	***
Northern Cape	0.251	1.704	7.280	0.000	***
Western Cape	0.070	1.520	1.930	0.054	n.s.
Constant	.	3.731	2.930	0.004	**
N=633; F(17,615)=38.88; Adj. R^2=0.5047					

Note: Statistical significance is denoted as n.s.=not significant; * p<0.05; ** p<0.01; *** p<0.001.
Source: HSRC IEC By-Election Database, own analysis

On a related but separate note, correlation analysis between by-election and municipal election turnout (of registered voters) was undertaken. This revealed that there is a statistically significant positive association between turnout in the previous LGE and by-election turnout. What does this mean? Basically, wards with higher voter turnout in LGEs tend to similarly display higher levels of turnout in by-elections on average, even though we have established that turnout in the latter type of election tends generally to be lower than the former.

Regression analysis was also conducted (OLS model); it showed that by-election turnout was positively and significantly associated with municipal turnout, even after controlling for by-election year, province, and urban-rural location (Table 2). The standardised regression coefficient (ß=0.3472) is positive, and the p-value is significant at the 99.9% level. The model explains half of the variance in by-election turnout (Adjusted R^2=0.5047), but it is the spatial variables rather than LGE turnout that is driving this explanatory power. Municipal election turnout explains around 6% of variation in by-election turnout, whereas the spatial variables account for 35% of the variation.

4.2. A demographic dividend? Population size and by-election turnout

Scholars regularly describe population size as an essential determinant of any aggregate-level electoral turnout model. Meta-analyses cite it as one of the most common determinants included in existing research on election participation (Cancela & Geys, 2016; Geys, 2006; Smets & van Ham, 2013). The rational voter model proposed by Downs (1957) is often used to explain how population size may influence election behaviour. According to this thesis, voters consider the probability of casting a *decisive vote* (i.e., making or breaking a tie) in any election that they participate in (also see Blais 2000). In other words, voters consider the likelihood that their ballot will be able to change the electoral outcome. If they think that they can do this, then they are willing to incur the costs (both material and psychological) of participating. In small electoral pools, the probability of casting the *deciding ballot* is much greater (Kaniovski & Mueller 2006). The larger the number of registered voters in a community, conversely, the smaller the probability that your vote will be decisive (also see Owen & Grofman 1984)..

Figure 3: By-election turnout percentage across number of registered voters in ward (exponential trendline)
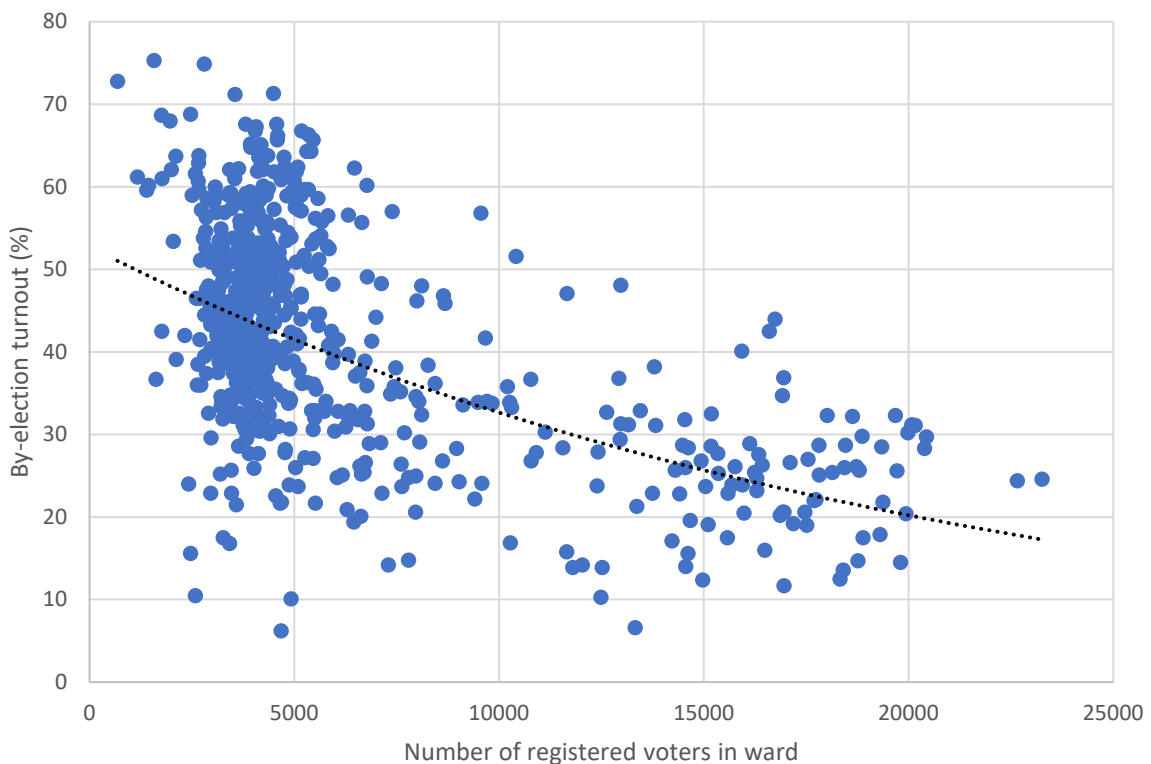
Source: HSRC IEC By-Election Database, own analysis

In terms of the size of the registered population, the different wards in our data set are quite diverse. They range from just 681 to 23 258, although a majority (62%) are comprised of less than 5,000 registered persons. A scatter plot is presented in Figure 3 that compares by-election turnout and the registered population size of wards in our sample. The results, consistent with the rational voter model, shows a positive relationship between registered population size and turnout. The greater the size of the population, the higher the level of electoral participation. To better measure the magnitude of this effect, a pairwise correlation test was utilised. Test outcomes indicated a robust (and statistically significant) correlation between these two variables ($r(633) = -0.565$, $p<0.0001$). Alternative measures of ward population size include the Voting Age Population (VAP); we also assessed the association between VAP and turnout using a pairwise correlation test. We found that our VAP measure had a somewhat stronger correlation with by-election turnout ($r(632) = -0.589$, $p<0.0001$) than registered population size.

Table 3: The effect of population size on by-election turnout in South Africa (2016-2023), beta coefficients

Dependent variable: By-election turnout (% registered population)	Model I	Model II	Model III	Model IV
Registered population (number)	-0.564 ***	-0.457 ***		
Voting age population (number)			-0.589 ***	-0.468 ***
Background controls	No	Yes	No	Yes
N	634	633	633	633
R^2	0.319	0.558	0.347	0.554
Adj R^2	0.318	0.546	0.346	0.542

Note: 1. Positive beta coefficients indicate positive by-election turnout; 2. Background controls include province of election, year and type of geographic location,3. Significance is denoted as follows: * $p<0.05$, **$p<0.01$, *** $p<0.001$.
Source: HSRC IEC By-Election Database, own analysis

To provide a more comprehensive test of population size and by-election turnout, we utilised a linear multivariate regression approach. Different sets of models were produced to test various alternative measures of population size; this will allow us to determine which has the strongest effect on by-election turnout. First the measure was tested in a model without background controls and then, as a robustness check, these controls were included in the second model. In total four models were produced for this analysis. The results are represented in Table 3. As anticipated, both measures of population size had a robust and negative correlation with the dependent variable. Each measure had a similar effect although the variable with the largest association was the VAP measure ($\beta=-0.468$) followed by registered population ($\beta=-0.457$)[4].

Let us turn our attention to whether population size will decrease relative turnout in by-elections in South Africa. As with the previous analysis, a discrete set of models was constructed to test which of the relevant measures had the greatest impact on by-election turnout. Initially each measure was examined in a model without background controls and then, as a further validity check, background controls were introduced. Results, depicted in Table 4, show that all measures of population size had a large and negative correlation with the dependent variable. The more people living in the ward, the lower the probability that relative turnout would be

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[4] To further test this result, we modified Model IV to replace VAP with a variable that accounted for total population size. Reviewing the new model, we concluded that this variable had a slightly weaker (but still robust statistically significant) positive correlation with turnout ($\beta=-0.426$). This finding provides empirical evidence for the rational voter model.

high in that ward. The measure that had the most powerful relationship with the dependent variable was registered population (β=-0.414) and this was followed by VAP (β=-0.398).

Table 4: The effect of population size on relative change in by-election turnout in South Africa (2016-2023), beta coefficients

Dependent variable: Relative change in by-election turnout compared to previous LGE turnout	Model I	Model II	Model III	Model IV
Registered population (number)	-0.595 ***	-0.414 ***		
Voting age population (number)			-0.606 ***	-0.398 ***
Background controls	No	Yes	No	Yes
N	634	633	633	633
R^2	0.354	0.607	0.367	0.592
Adj R^2	0.353	0.596	0.366	0.581

Note: 1. Positive beta coefficients indicate positive by-election turnout; 2. Background controls include province of election, year and type of geographic location; 3. Significance is denoted as follows: * $p<0.05$, **$p<0.01$, *** $p<0.001$.
Source: HSRC IEC By-Election Database, own analysis

In sum, we learnt that population size was a powerful predictor of by-election turnout in South Africa. The effect was very strong for both relative turnout as well as absolute turnout. Furthermore, it is important to highlight the sheer robustness of the measure, accounting for about a third of the variation in those models without background controls. This outcome can be interpreted according to the rational voter model. A large population size at the ward-level decreases the expected utility from casting a ballot and makes citizens more likely to abstain from voting. But are there other explanations? It could be argued that small communities may stimulate turnout in elections because there is strong interpersonal bonds and civic norms in those communities. These norms buttress the 'social pressure' to turn out and cast a vote among local residents. Indeed, it could be argued that population size represents an important factor in individuals' attachment to one's local community in South Africa.

4.3. Age composition

Appreciating generational differences is key to understanding the future of South African democracy. Repeatedly identified as the group least likely to vote, young adults are infamous abstainers in both NPEs and LGEs. This is often attributed to the well-known life-cycle effect on political participation frequently discussed in the political science literature (Konzelmann et al. 2012; Nie et al. 1974; Smets 2016). As a consequence, the electoral turnout gap between younger and older people tends to be wide in South Africa. The elderly, in particular, are thought to be much more inclined to turnout. This section seeks to assess age gap trends by looking at how age composition influences participation. Taking the literature on age differences in political participation as a point of departure, two main hypotheses are the focus of this section. First, that there will be a positive association between turnout and the proportion of a ward that is elderly. Second, we will examine whether the share of youth in a ward is correlated with low by-election turnout.

We constructed a measure that gauged the percentage of persons in the ward that were older than 64 years. Few of the wards in our sample had significant numbers of elderly people; less

than one tenth of the ward population was older than 64 years in 70% of wards. Keeping this lack of age diversity in mind, let us compare by-election turnout at ward-level with the proportion of older people in our sample (Figure 4). We did not find a robust relationship between these two variables. To better evaluate the strength of this effect, a pairwise correlation test was employed. The results indicated only a weak correlation ($r(633) = 0.169$, $p<0.0001$). It would appear that the elderly share of ward population is not a meaningful correlate of election participation.

Figure 4: By-election turnout percentage across proportion of people 64 years and older in ward (exponential trendline)
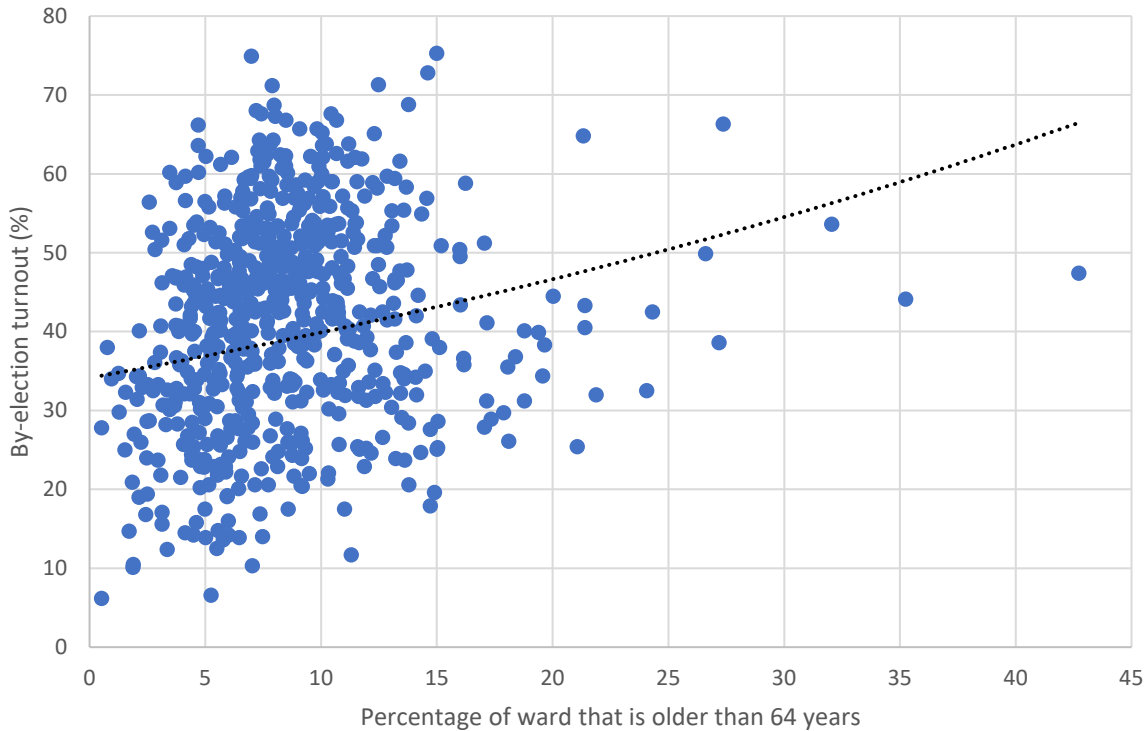
To substantiate the bivariate testing completed above, we utilised a linear multivariate regression approach. Different set models were produced to test whether the share of elderly people in a ward impacted by-election turnout. First the measure was assessed in a model without background controls and then, as a robustness check, controls were included. A set of models was generated for absolute turnout and then another set for relative turnout. Model outcomes are presented in Table 5 and show that the elderly proportion of a ward was a positive correlate of absolute turnout ($\beta=0.120$) in Model II. On the other hand, it was a negative correlate of relative turnout. The size of this effect was, then again, quite small ($\beta=-0.095$) and only statistically significant at the 1% level in Model IV[5].

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[5] Wards that have a high proportion of old people may, on average, have lower population sizes. As we observed in Section 3.4, population size was strongly correlated with turnout (both in absolute and relative terms). So to confirm the validity of this result, we altered Model IV to include a variable that controlled for ward population size. After computing this alternation, we discovered that the share of elderly people was a more robust negative correlate in our modified model ($\beta=-0.136$).

Table 5: The effect of elderly share of ward on South African by-elections (2016-2023), beta coefficients

	Absolute voter turnout in by-elections (% registered population)		Relative change in by-election turnout compared to previous LGE turnout	
	Model I	Model II	Model III	Model IV
Elderly share of population (%)	0.169 ***	0.120 ***	-0.053	-0.095 **
Background controls	No	Yes	No	Yes
N	633	633	633	633
R^2	0.029	0.450	0.003	0.515
Adj R^2	0.027	0.434	0.001	0.502

Note: 1. Positive beta coefficients indicate positive by-election turnout; 2. Background controls include province of election, year and type of geographic location; 3. Significance is denoted as follows: * $p<0.05$, **$p<0.01$, *** $p<0.001$.

Source: HSRC IEC By-Election Database, own analysis

This section will now shift focus and investigate whether youth share will decrease turnout in by-elections at the ward-level. The South African population is very young and the mean age in our wards tends to skew towards the youth. For ease of interpretation, we defined youth as those who were in the 18-29 age group. Many of the wards in the data set had significant numbers of young people; the mean share of this group in the sample was 34%. A scatter plot was computed to evaluate the relationship between by-election turnout and the proportion of youth in our sample (Figure 5). We did not observe a strong association between these two variables in the figure. To corroborate this initial finding, we computed a pairwise correlation test. Only a weak correlation ($r(633) = 0.119$, $p<0.0050$) was detected. We may have expected a larger youth effect on turnout and, consequently, this much more muted correlation is somewhat surprising.

Figure 5: By-election turnout percentage across 18-29 age group share in ward (exponential trendline)
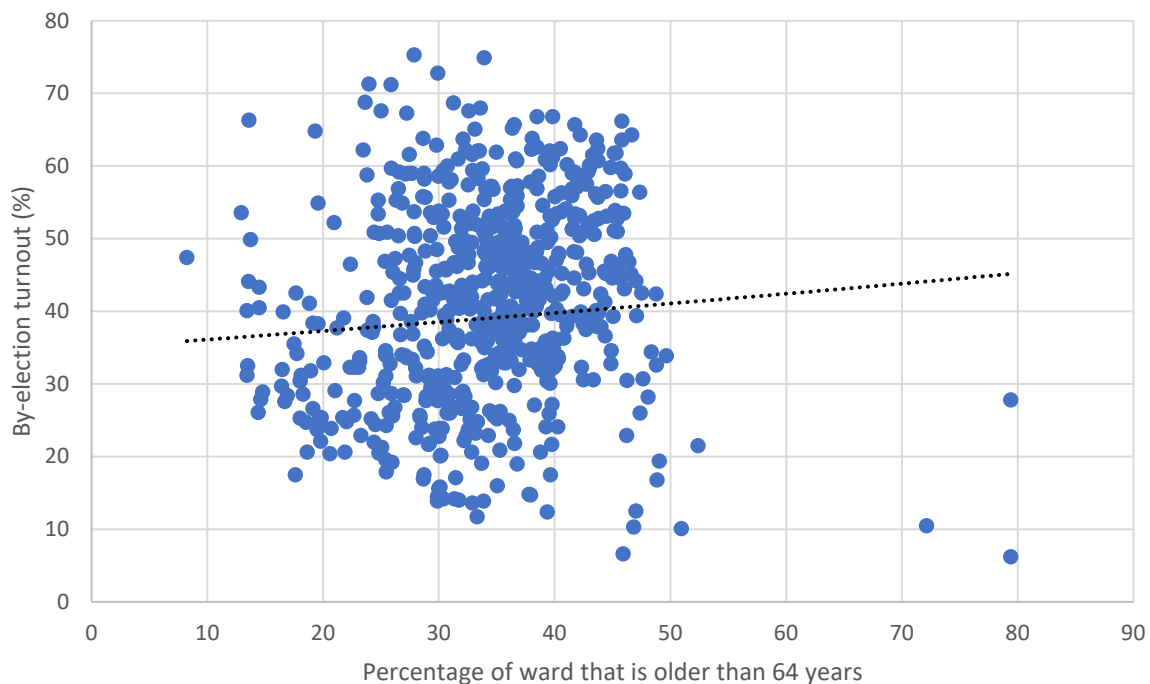
Source: HSRC IEC By-Election Database, own analysis

16

A linear multivariate regression approach was employed to verify the results of the bivariate testing presented in Figure 5. Two sets of models were produced to test whether the youth share of a ward affected by-election turnout. As a preliminary test we evaluated the relationship without background controls and then completed the analysis by introducing the controls into the model. We started with absolute turnout and then moved to relative turnout, computing four models in total. Model outcomes are presented in Table 6. It is apparent that the presence of young people was a negative correlate of the dependent variable in Model II. But the correlation was not statistically significant at the 5% level. However, it was a positive (and statistically significant) correlate of relative turnout; the size of this effect was quite large (β=0.302) in Model IV[6]. It would appear that the younger a ward is, the greater the by-election turnout relative to the LGE.

**Table 6: The effect of youth share of ward on South African by-elections (2016-2023), beta coefficients**

	Absolute voter turnout in by-elections (% registered population)		Relative change in by-election turnout compared to previous LGE turnout	
	Model I	Model II	Model III	Model IV
Youth share of population (%)	0.119 **	-0.208	0.378 ***	0.302 ***
Background controls	No	Yes	No	Yes
N	633	633	633	633
R^2	0.014	0.436	0.143	0.564
Adj R^2	0.013	0.421	0.141	0.552

Note: 1. Positive beta coefficients indicate positive by-election turnout; and 2. Background controls include province of election, year and type of geographic location; 3. Significance is denoted as follows: * $p<0.05$, **$p<0.01$, *** $p<0.001$.
Source: HSRC IEC By-Election Database, own analysis

Age composition was found to be quite a remarkable predictor of by-election turnout in South Africa. Given the existing literature on electoral participation, the dynamics of the observed relationships were different from what was expected. Having a higher proportion of elderly people did not significantly change turnout (both absolute and relative) in our models. Youth share was a good correlate of relative but not absolute electoral participation. Having more young people in a ward improve relative participation, enhancing turnout when judged against the previous LGE. The size of this effect was quite robust in Model III, explaining 14% of variation in relative turnout. Given existing narratives about youth apathy, this is an interesting and unexpected finding. Further exploration of this novel result is required to see if a more comprehensive election data set would produce confirmatory evidence.

4.4. Voter diversity: The case of racial composition of the ward-level population

Racial composition at the local level may be a significant factor that affects turnout in government elections. In recent years there has been a lot of academic interest in this subject (especially in the United States (US)). Many have contended that racial diversity at the neighbourhood level is influencing civic life (Alesina & La Ferrara 2000; Costa & Kahn 2003; Hill

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[6] Young people have a tendency to live in high density areas of South Africa. As we demonstrated in Section 3.4, population size is a very robust determinant of both absolute and relative by-election participation. To provide an adequate test of whether youth share at ward-level is influencing electoral behaviour, we introduced ward population size into Model IV. The results of this modified model show that the share of youth was a robust correlate of the dependent (β=0.271).

& Leighley 1999). It has been asserted that as racial diversity increases group solidarity decreases and this, in turn, affects political participation. Communities with a high degree of racial homogeneity, on the other hand, are thought to have stronger civic norms around participation (also see Portes & Vickstrom 2011). Homogeneous populations are considered to enhance feelings of group identification and have, consequently, stronger social pressures to adhere to norms of civic engagement. Although scholars have examined the impact of racial composition on voter turnout, the results have often been quite mixed. Overall, meta-analyses (such as Cancela & Geys 2016) tend to show that the relationship between racial diversity and voter turnout is often non-existent or weak.

The wards in our sample are reasonably dissimilar in terms of racial composition. However, a majority (77%) are comprised of wards dominated by the Black African majority[7]. We constructed a racial homogeneity indicator that ranged from 0-100; the higher the number the more homogeneous the ward. Although some wards were quite diverse, most (61%) scored above 90 on our homogeneity measure. Acknowledging this caveat, let us now contrast by-election turnout and racial homogeneity by ward in our sample (Figure 6). We find a weak but positive relationship between racial composition and turnout. The more homogeneous the ward population, the higher the level of turnout. To substantiate this initial conclusion, we applied a pairwise correlation test. Test outcomes indicated only a weak correlation between these two variables ($r(632) = 0.128$, $p<0.0050$).

Figure 6: By-election turnout percentage across racial homogeneity in ward (exponential trendline)
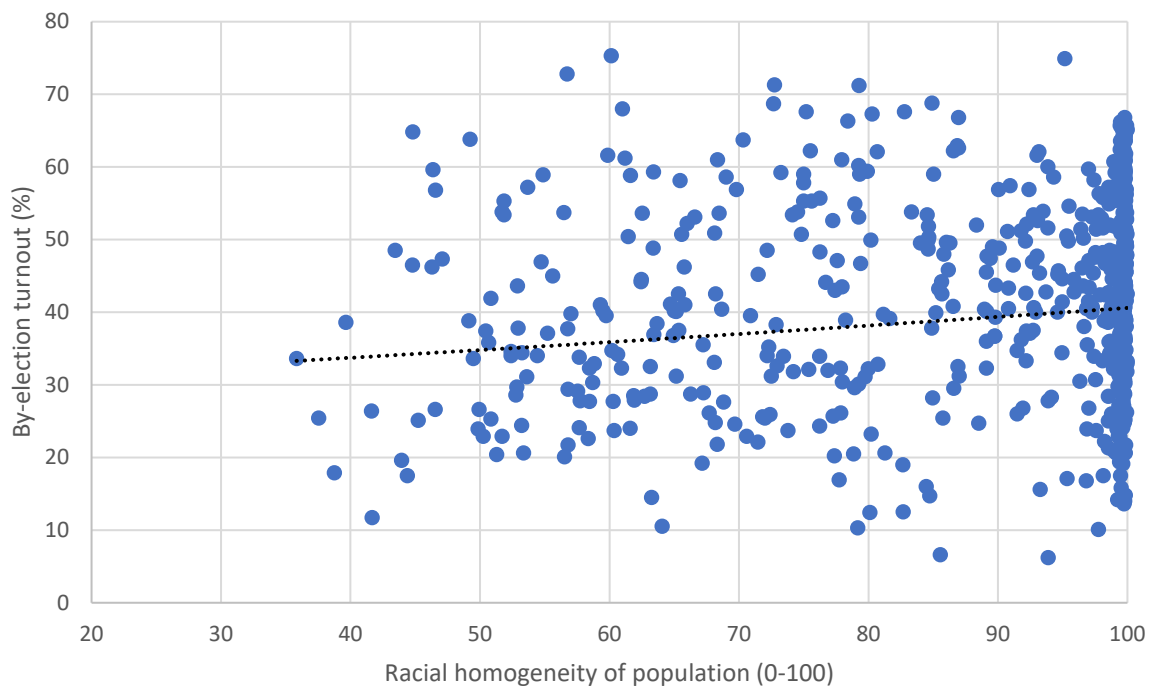
Source: HSRC IEC By-Election Database, own analysis

An alternative way to look at racial diversity is to consider the relative size of the majority population living in a ward. In other words, looking at the percentage of the ward that is Black African. Another reason to investigate racial composition is to understand whether the Black

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[7] Most wards in our sample (58%) are more than 90% Black African.

African majority are being informally disenfranchised. Studies of electoral turnout in the US have frequently analysed racial effects to see whether African Americans face *de facto* barriers to voting. Bobo and Gilliam (1990), for example, showed that African Americans are less likely to participate in elections than whites when one controls for demographic differences. Geys (2006) also noted research showing that turnout rates in the US were more likely to be lower in areas with a larger black community. A scatter plot analysis was performed to assess the association between by-election turnout in our sample and percentage of a ward that is Black African. It is apparent from Figure 6 that we did not find a strong association between these two variables. A pairwise correlation test confirmed this result (r(632) = -0.031, p>0.0050).

Figure 7: By-election turnout percentage across percentage of population that is Black Africa in ward (exponential trendline)
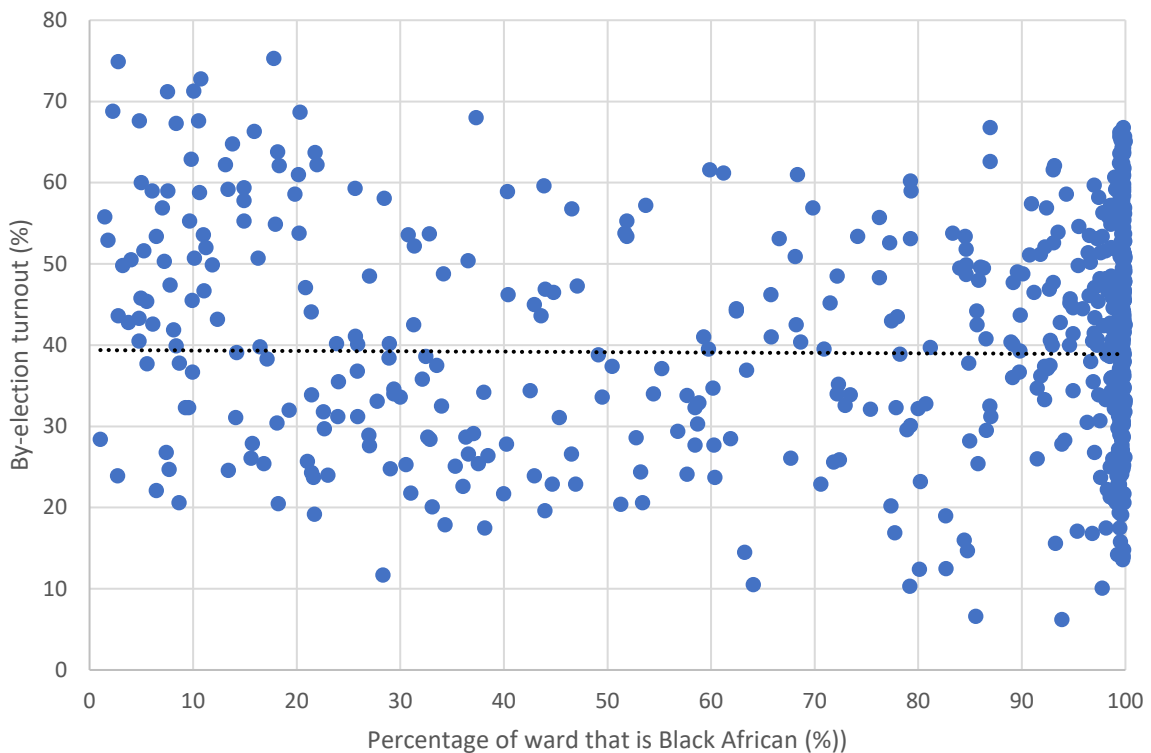
Source: HSRC IEC By-Election Database, own analysis

The bivariate testing conducted above is inconclusive. To better understand the relationship between racial composition and turnout a linear multivariate regression analysis was conducted. Two sets of regression models were generated to evaluate the predictive power of racial composition. At the first stage, the different measures were tested in a model without background controls and then, in the second stage, the background controls were included. Overall, we created four models for this analysis; the results are presented in Table 7. Racial homogeneity had a small (but statistically significant, albeit at the 5% level) impact on the dependent variable and appeared to improve the log odds of turnout (β=0.070).[8] A larger Black African population in the ward was negatively associated with relative turnout. But much like what was observed for racial homogeneity it was quite a weak correlate (β=-0.089).

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[8] To confirm this result, we altered Model II to include a variable that accounted for which race group was dominant in the ward. After modifying the model in this way, racial homogeneity emerged as a somewhat more robust statistically significant (and positive) correlate in the adjusted model (β=0.098).

Table 7: The effect of racial composition on by-election turnout in South Africa (2016-2023), beta coefficients

Dependent variable: By-election turnout (% registered population)	Model I	Model II	Model III	Model IV
Racial homogeneity of population	0.128 **	0.070 *		
Black African share of population (%)			-0.031	-0.089 *
Background controls	No	Yes	No	Yes
N	633	633	633	633
R²	0.016	0.440	0.001	0.441
Adj R²	0.015	0.425	-0.001	0.425

Note: 1. Positive beta coefficients indicate positive by-election turnout; and 2. Background controls include province of election, year and type of geographic location; 3. Significance is denoted as follows: * p<0.05, **p<0.01, *** p<0.001.
Source: HSRC IEC By-Election Database, own analysis

What would our results look like if we shifted our focus towards relative turnout in by-elections? Would a similar set of findings present themselves? To answer these questions, a series of regression models was produced to test various measures of racial composition to identify which has the strongest effect on by-election turnout. In the first set, the racial composition variables were tested in models that did not include background controls. Following this course of testing, the models were reproduced but this time they included the background controls. Results, showcased in Table 8, confirm that racial composition had a more robust effect on the dependent variable then in Table 7. More racial homogeneous wards were more likely to have higher turnout when weighed against the relevant LGE (β=0.236).[9] In addition, the greater the proportion of Black Africans in a ward, the more likely that ward was to have higher relative turnout (β=0.214).

Table 8: The effect of racial composition on relative change in by-election turnout in South Africa (2016-2023), beta coefficients

Dependent variable: Relative change in by-election turnout compared to previous LGE turnout	Model I	Model II	Model III	Model IV
Racial homogeneity of population	0.327 ***	0.236 ***		
Black African share of population (%)			0.255 ***	0.214 ***
Background controls	No	Yes	No	Yes
N	633	633	633	633
R²	0.016	0.553	0.065	0.533
Adj R²	0.015	0.540	0.064	0.520

Notes: 1. Positive beta coefficients indicate positive by-election turnout; 2. Background controls include province of election, year and type of geographic location; 3. Significance is denoted as follows: * p<0.05, **p<0.01, *** p<0.001.
Source: HSRC IEC By-Election Database, own analysis

About one tenth of wards in our sample have a majority White population. Voting may be habit-forming, with some communities exhibiting long histories of civic participation (Plutzer 2002). This is based on the psychological concept of 'adaptive' or 'reinforcement' learning that we have discussed previously (also see Fowler 2006). South African democracy has a history of racial oppression that may have prevented some localities from developing habits of electoral

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[9] Would this result be different if we changed Model II to include a variable that controlled for which race group was dominant in the ward? When this change was made, we found that racial homogeneity was a weaker (but still statistically significant) positive correlate in the modified model (β=0.145).

participation. This habit element may imply that contemporary turnout could (to some extent) be explained by the historical legacy of settler colonialism. Consequently, it is worth exploring whether the White population in a ward is influencing by-election turnout in South Africa. Figure 8 shows the relationship between the White share of a ward and turnout. It would appear that there is a weak but negative correlation between these two variables. A pairwise correlation test confirmed this result ($r(632) = -0.137$, $p<0.005$).

Figure 8: By-election turnout percentage across percentage of population that is white in ward (exponential trendline)

Source: HSRC IEC By-Election Database, own analysis

To validate the analysis portrayed in Figure 8, we utilised a linear multivariate regression approach. A number of different models were generated to evaluate whether the share of Whites in a ward impacted by-election turnout. A base model was produced without background controls and, following this initial test, a final model with the controls included. The first set of models was created for absolute turnout and then was repeated for relative turnout. Model outcomes are presented in Table 9; we find that the percentage of Whites living in the ward was not a statistically significant correlate of turnout in Model II. On the other hand, we discovered that the White population was a negative (and statistically significant) correlate with the dependent in Model IV. The size of the association ($\beta=-0.341$) was much larger than anticipated[10]. It would appear that members of the White minority are less likely to vote in by-elections relative to the LGE.

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[10] This result could be due to the fact that many Whites live in high density areas in South Africa. But even if we adjusted Model IV to control for population size the White percentage variable remains statistically significant and negatively associated with the dependent variable ($\beta=-0.364$).

Table 9: The effect of percentage of whites in the ward and turnout in South Africa (2016-2023), beta coefficients

	Absolute voter turnout in by-elections (% registered population)		Relative change in by-election turnout compared to previous LGE turnout	
	Model I	Model II	Model III	Model IV
White share of population (%)	-0.137 **	-0.056	-0.414 ***	-0.341 ***
Background controls	No	Yes	No	Yes
N	633	633	633	633
R²	0.019	0.439	0.172	0.609
Adj R²	0.017	0.560	0.170	0.598

Note: 1. Positive beta coefficients indicate positive by-election turnout; and 2. Background controls include province of election, year and type of geographic location; 3. Significance is denoted as follows: * p<0.05, **p<0.01, *** p<0.001.
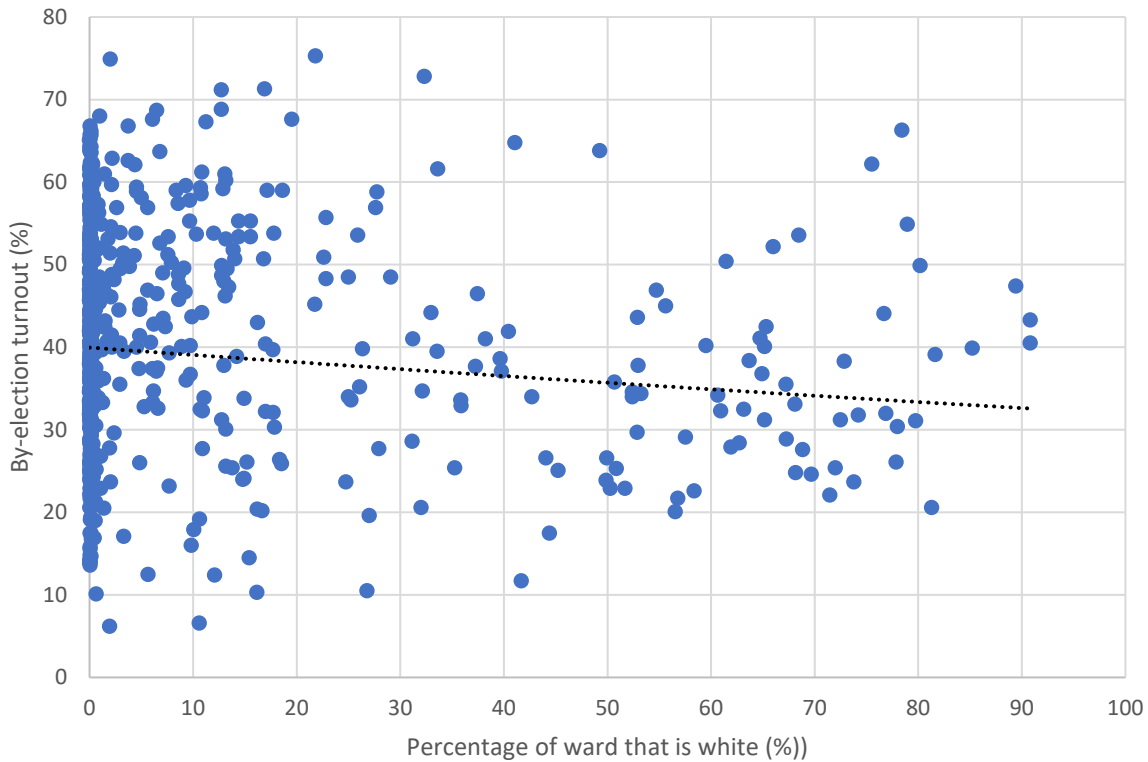Source: HSRC IEC By-Election Database, own analysis

Racial composition was, on the whole, not a powerful predictor of by-election turnout in South Africa. Racial homogeneity, in particular, had very limited effects on behaviour in our models. Homogeneity had a non-existent effect on absolute turnout and a minor (and positive) effect on relative turnout. Rather than facing disenfranchisement, we found that the greater the share of Black Africans in a ward, the more likely we were to see high by-election turnout. But this correlation was only significant for relative turnout models and not absolute turnout models. The more Whites living in an area, the less prone that a ward was to have high relative voter turnout during by-elections. The magnitude of this relationship was remarkably strong in Model III, explaining 17% of the variation in relative turnout. This unanticipated finding is interesting given our initial concerns about the legacy effect of racial oppression. Additional examination of this unique finding is required in future research. It is hoped that a larger data set that tracks by-elections over a longer time frame will confirm the findings presented in this section.

4.5. (Local) context matters: Social issues and by-election turnout tendencies

Some of the most pressing challenges facing the country, and indeed more localised geographies, remain the triple bind of poverty, unemployment, and inequality, as well as crime and violence. These national priority issues are typically top-ranked in nationally representative survey series, such as the HSRC's South African Social Attitudes Survey (SASAS) and Afrobarometer. One of the crucial questions relates to whether such social issues at national and/or local level exert a decisive bearing on patterns of electoral turnout and abstention. To provide an understanding of whether such issues influence by-election turnout and in what way, regression modelling was undertaken to examine the difference that ward-level poverty and unemployment levels, as well as the incidence of violent contact crime and property crime, makes to turnout in by-elections over the 2016-2023 period.

Table 10: OLS regression model on the influence of ward-level poverty and unemployment rates on by-election turnout, standardised regression coefficients

Dependent variable: By-election turnout (% registered population)	Model I			Model II		
	Standardised Beta	P>t	Sig.	Standardised Beta	P>t	Sig.
Poverty incidence at ward level (2020)	-0.089	0.009	**	…	…	…
Unemployment rate at ward level (2020)	…	…	…	-0.198	0.000	***
By-election year (reference=2016 / 20)						
2017	-0.021	0.777	n.s.	0.006	0.930	n.s.
2018	-0.124	0.066	n.s.	-0.099	0.134	n.s.

2019	-0.290	0.001	**	-0.257	0.002	n.s.
2020	-0.301	0.000	n.s.	-0.277	0.001	**
2021	-0.280	0.000	***	-0.279	0.000	***
2022	-0.137	0.054	n.s.	-0.118	0.090	n.s.
2023	-0.082	0.064	n.s.	-0.062	0.156	n.s.
Urban-rural location (reference=urban)						
Rural	0.325	0.000	***	0.238	0.000	***
Province (reference=Eastern Cape)						
Free State	0.111	0.004	**	0.191	0.000	***
Gauteng	-0.161	0.000	n.s.	-0.079	0.062	n.s.
KwaZulu-Natal	0.197	0.000	***	0.224	0.000	***
Limpopo	0.045	0.188	n.s.	0.080	0.018	*
Mpumalanga	-0.068	0.069	n.s.	-0.034	0.366	n.s.
North West	0.092	0.016	*	0.156	0.000	***
Northern Cape	0.298	0.000	***	0.355	0.000	***
Western Cape	0.126	0.002	**	0.151	0.000	***
Constant	.	0.000	***	.	0.000	***
N=633; F(17,615)=28.67; Adj. R²=0.4267 / N=633; F(17,615)=30.69; Adj. R²=0.4440						

Note: Observations are clustered on the date of the by-election. Statistical significance is denoted as n.s.=not significant; * p<0.05; ** p<0.01; *** p<0.001.

Source: HSRC IEC By-Election Database, own analysis

In Table 10, the poverty and unemployment rate influence on by-election turnout is tested. Outcomes in Model I showed that the ward-level poverty rate exerts a significantly, inverse influence on by-election turnout when controlling for by-election year, province and urban-rural location. The implication is that higher levels of poverty in a ward where a by-election is occurring, the lower the likely level of electoral turnout. The depressing effect of poverty incidence on by-election turnout is mirrored when testing for the effect of local unemployment rates on turnout. We again find the statistically significant, inverse association. In the case of unemployment, the negative bearing on by-election turnout is slightly stronger in character, explaining on its own around 11 per cent of variation in turnout. This set of findings suggests that local social challenges such as poverty and unemployment dampen rather than encourage a desire to cast one's ballot for one's ward councillor in by-elections.

To what extent is this pattern evident for other social issues, such as local crime rates? To determine this, use is made of two crime indices, namely violent or contact crime rates per 100 000 population and property crime rates per 100 000 population. In constructing these ward-level crime rates, definitions employed by the Institute for Security Studies were adopted. Specifically, violent or contact crime included the following categories of crime: murder, attempted murder, common and serious assault; sexual offences and common and aggravated robbery. Property-related crimes included the following crime categories: residential burglary, business burglary, commercial crime, shoplifting, theft out of or from motor vehicles, theft of motor vehicles, stock theft, and 'all theft not mentioned elsewhere'. The OLS regression modelling separately tested the influence of these two crime rates on by-election turnout (Table 11).

Table 11: OLS regression model on the influence of ward-level violent (contact) crime and property crime rates (per 100 000 population) on by-election turnout, standardised regression coefficients

Dependent variable: By-election turnout (% registered population)	Model I			Model II		
	Standardised Beta	P>t	Sig.	Standardised Beta	P>t	Sig.
Violent or contact crime rate per 100,000 population at ward level (2020)	-0.117	0.000	***	…	…	…
Property crime per 100,000 population at ward level (2020)	…	…	…	-0.140	0.000	***
By-election year (reference=2016 / 20)						
2017	-0.019	0.860	n.s.	-0.004	0.958	n.s.
2018	-0.113	0.092	n.s.	-0.100	0.135	n.s.
2019	-0.280	0.001	**	-0.266	0.001	**
2020	-0.300	0.000	***	-0.290	0.000	***
2021	-0.288	0.000	***	-0.284	0.000	***
2022	-0.138	0.050	n.s.	-0.127	0.071	n.s.
2023	-0.073	0.095	n.s.	-0.068	0.119	n.s.
Urban-rural location (reference=urban)						
Rural	0.340	0.000	***	0.339	0.000	***
Province (reference=Eastern Cape)						
Free State	0.127	0.001	**	0.128	0.001	**
Gauteng	-0.139	0.001	n.s.	-0.138	0.001	**
KwaZulu-Natal	0.208	0.000	***	0.213	0.000	***
Limpopo	0.044	0.199	n.s.	0.049	0.147	n.s.
Mpumalanga	-0.083	0.027	*	-0.081	0.029	*
North West	0.101	0.007	**	0.103	0.006	**
Northern Cape	0.325	0.000	***	0.327	0.000	***
Western Cape	0.180	0.000	***	0.183	0.000	***
Constant	.	0.000	***	.	0.000	***
N=633; F(17,615)=29.28; Adj. R^2=0.4321 / N=633; F(17,615)=30.00; Adj. R^2=0.4382						

Note: Observations are clustered on the date of the by-election. Statistical significance is denoted as n.s.=not significant; * $p<0.05$; ** $p<0.01$; *** $p<0.001$.
Source: HSRC IEC By-Election Database, own analysis

The results of the modelling corroborate the poverty and unemployment incidence findings. Wards with higher violent (contact) crime rates and property crime rates display a lower likelihood of turnout in by-elections when controlling for by-election year, province and urban-rural location. Even when individual crimes are included rather than these composite indices, we find that this significant negative association is almost universally applicable. It applies to all the violent crime categories, and all property crimes apart from stock theft. This finding confirms that local contextual social issues matter for turnout, with participation in by-elections generally lower as the scale of challenge becomes more widespread. Perhaps local residents regard these challenges as reflections of poor governance, with the consequence of withdrawal of participation rather than a reinforcing of turnout tendencies. After all, ward councillors are, in theory, supposed to be the local elected representative that helps ensure that such social issues are progressively being addressed. A greater degree of disillusionment and loss of sense of political efficacy may partly explain why more widespread social issues are turning local citizens away from the ballot box in by-elections.

4.6. Socio-economic composition

Recently the election effects of economic inequality have received considerable attention from political scientists. Some studies suggest that economic equality decreases electoral

participation. This argument was, in particular, famously made by Schattschneider (1960) who contended that poor voter turnout in the US was the result of high economic inequality. Recent research has provided some support for this thesis (Jensen & Jespersen 2017; Schäfer & Schwander 2019; Solt, 2010). But many others are very sceptical about the role played by economic equality in driving voting behaviour. In their review of the determinants of voter turnout in sub-national elections, Cancela and Geys (2016) noted that the evidence on this issue was mixed. The authors concluded that economic equality may matter little for explaining turnout in sub-national elections. This section will look to expand our understanding of by-election turnout in South Africa by considering a ward's socio-economic composition.

For purposes of analysis, we constructed a socio-economic homogeneity indicator that was scaled from 0-100; the higher the number the greater the equality in the ward. Here we employed the SEM metric to measure the socio-economic conditions of households at ward-level[11]. Most of the wards under review scored poorly on this measure of economic equality, a majority (86%) scored below 30 on our homogeneity measure. It would appear that the wards in our sample are characterised by high levels of class inequality. A scatter plot was composed to weigh by-election turnout against socio-economic homogeneity. There does not seem, as can be observed in Figure 9, to be a strong association between economic composition and turnout. To verify this supposition, a pairwise correlation test was performed. Test outcomes indicated only a very weak correlation ($r(604) = -0.084$, $p<0.0500$).

Figure 9: By-election turnout percentage across socio-economic homogeneity in ward (exponential trendline)
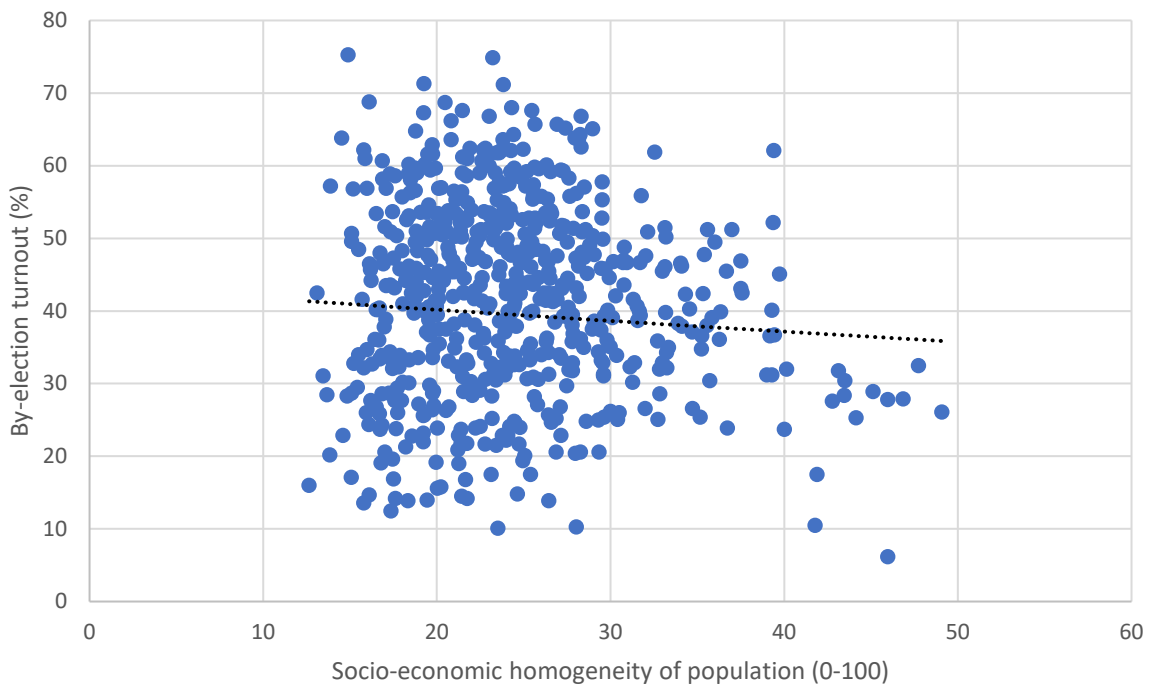
Source: HSRC IEC By-Election Database, own analysis

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[11] This measure depicts how South Africans live based on what they have access to in and near their homes. Each person is given a score between 0 and 100, depending on what items they have in their household and what public services they have access to. People are, based on these scores, divided into 10 blocks that range from 1-10. The higher the value of the block, the more affluent the individual is thought to be. SEM is produced as part of the Establishment Survey data set.

We performed a linear multivariate regression approach to assess the socio-economic equality and by-election turnout. Four models were created to assess whether socio-economic homogeneity affected by-election turnout. At the first stage a model was computed without background controls and then in the final stage controls were entered into the model. This analytical testing was performed for both absolute and relative by-election participation. Model outcomes are presented in Table 12 and show that socio-economic equality was a negative correlate of the dependent variable (both absolute and relative) in the table. In both cases, however, the correlation was not statistically significant at the 5% level[12]. Consequently, we can conclude that there is no evidence that socio-economic inequality is driving down by-election turnout in South Africa.

Table 12: The effect of socio-economic homogeneity on South African by-elections (2016-2023), beta coefficients

	Absolute voter turnout in by-elections (% registered population)		Relative change in by-election turnout compared to previous LGE turnout	
	Model I	**Model II**	**Model III**	**Model IV**
Socio-economic homogeneity	-0.084 *	-0.006	-0.077	-0.049
Background controls	No	Yes	No	Yes
N	605	605	605	605
R^2	0.007	0.451	0.006	0.532
Adj R^2	0.005	0.435	0.004	0.519

Note: 1. Positive beta coefficients indicate positive by-election turnout; 2. Background controls include province of election, year and type of geographic location; 3. Significance is denoted as follows: * $p<0.05$, **$p<0.01$, *** $p<0.001$.

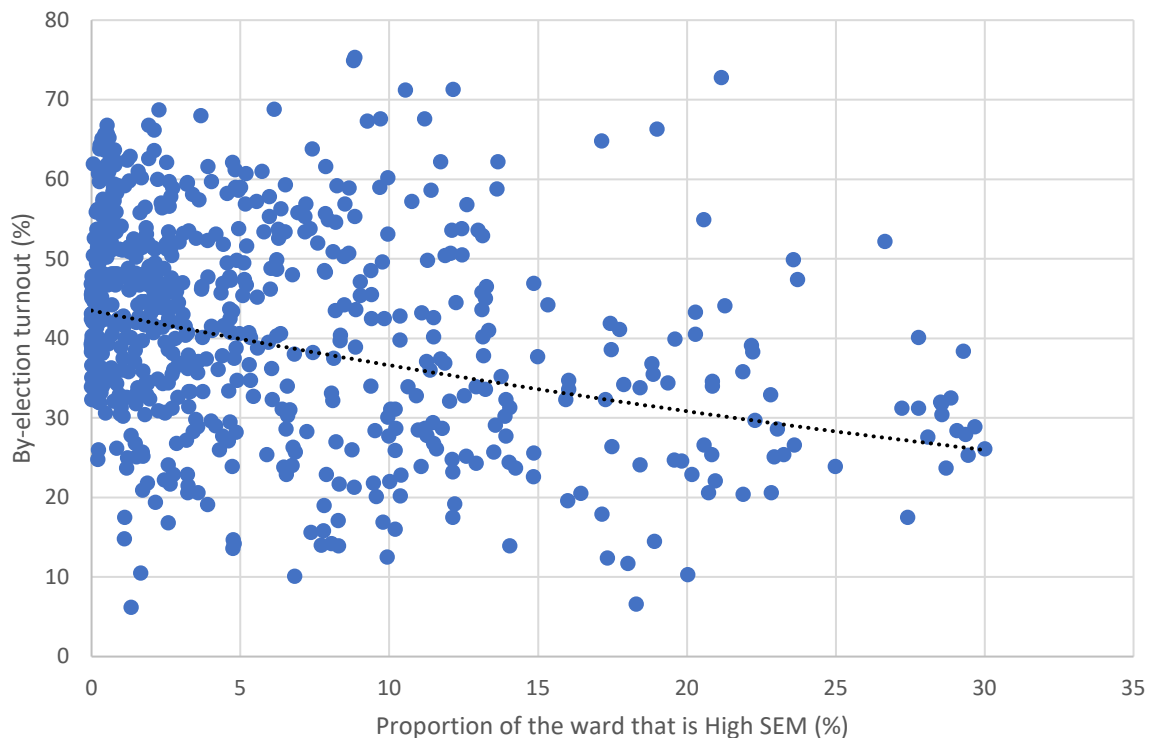Source: HSRC IEC By-Election Database, own analysis

In addition to the issue of economic inequality discussed above, we were also interested in the possibility of a class bias on by-election turnout (i.e., whether economic composition affects participation) in South Africa. There has been significant interest in such a bias in voter turnout in recent years. This is especially true in the US where voter participation has long been biased toward the wealthy (Almond & Verba 1963, Blais 2000; Leighley & Nagler 2007;). Class bias is used to judge whether there is a power imbalance between middle class and working-class groups in an electorate (Leighley & Nagler 1992). Because class bias inflates the electoral power of the affluent, this can have serious policy effects that negatively disenfranchise the poor (also see Avery 2015). South Africa has a long history of challenging class conflict, and it is worth considering whether there is a class bias in by-election turnout.

We constructed a metric to indicate which proportion of each ward scored 80 or above on the SEM indicator. This measure allowed us to gauge the degree to which a given ward was economically advantaged. We must remember that most wards in our sample were poor or working class. Fifty-nine per cent of wards scored below five on this measure. If we compared by-election turnout and High SEM share by ward, then we can observe a class bias in our sample. Looking at the pattern of results in Figure 10, we can discern a moderate (and negative) relationship between the two variables. To more adequately appraise the scale of this effect, we conducted a pairwise correlation test. Our initial assumptions were confirmed; test

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[12] It could be argued that we need to take the ward's dominant SEM group into account to more adequately validate this finding. Following this line of argument, we altered Model II and IV to control for the dominant SEM group. Reviewing the results of our altered models, we found that socio-economic homogeneity was not a more robust correlate in any of the modified models.

outcomes (r(632) = -0.309, p<0.0001) showed a moderate association. It would appear that the more affluent people that live in a ward, the lower the level of electoral participation.

Figure 10: By-election turnout percentage across High SEM share in ward (exponential trendline)

Source: HSRC IEC By-Election Database, own analysis

To further examine if there was a class bias in by-election participation, we employed a multivariate regression approach. We built four models to evaluate whether having middle class people living in a ward would affect by-election turnout. We first generated a model without background controls and then, after this check, controls were introduced. We first tested the effect of High SEM share on absolute turnout and then on relative turnout. Model outcomes are presented in Table 13 and show that the presence of middle-class people was a negative correlate of the dependent variable (both absolute and relative). The size of the correlate was much larger in Model II (β=-0.145) than in Model IV (β=-0.432). We can conclude that wealthier persons are less likely to vote in by-elections relative to the LGE[13].

Table 13: The effect of High SEM share on South African by-elections (2016-2023), beta coefficients

	Absolute voter turnout in by-elections (% registered population)		Relative change in by-election turnout compared to previous LGE turnout	
	Model I	**Model II**	**Model III**	**Model IV**
High SEM share	-0.309 ***	-0.145 ***	-0.546 ***	-0.432 ***
Background controls	No	Yes	No	Yes
N	633	633	633	633

[13] This result could be due to the fact that many whites live in middle class wards in South Africa. It was established in Table 10 that the presence of Whites in a ward reduced relative voter tunrout in by-elections. But, even if we adjust the model to control for the percentage of a ward that is White, the High SEM variable remains statistically significant and negatively associated with the dependent variable (β=-0.249).

R^2	0.096	0.448	0.299	0.611
Adj R^2	0.094	0.432	0.298	0.600

Note: 1. Positive beta coefficients indicate positive by-election turnout; 2. Background controls include province of election, year and type of geographic location; 3. Significance is denoted as follows: * p<0.05, **p<0.01, *** p<0.001.

Source: HSRC IEC By-Election Database, own analysis

We determined that poor socio-economic conditions were associated with low by-election turnout in Section 4.5. Given the findings outlined above, it seems prudent to test whether there will still be a class bias in participation if we control for ward-level poverty. Both Model II and IV were amended to include the 2021 national poverty line (i.e., R1 113 per month). The results from modified Model II show that the presence of middle-class people was an even greater negative correlate of the dependent variable than in the unamended model (β=-0.220). A similar outcome was found for the altered Model IV, although the observed level of difference was somewhat smaller[14]. These results show that even when you control for poverty within a ward, there was still a class bias in by-elections turnout.

In conclusion, we found that socio-economic composition was not a powerful predictor of by-election turnout in South Africa. Economic inequality at the ward-level did not have an effect on past behaviour in our models. It may be that inequality is a better predictor of turnout at the local or district municipal level, and future research should look more closely at this issue. The study did, however, detect an unanticipated class bias in our analysis, particularly in terms of electoral participation. The more affluent people that live in an area, the less predisposed that a ward was to have high voter turnout during by-elections. The size of this effect was surprisingly robust in Model III, explaining 30% of variation in relative turnout. Given what has been found in Global North election studies, this is a surprising and positive outcome. This unanticipated result requires more assessment but showcases the unique dynamics of South African electoral participation.

4.7. Election closeness: Turning out for tight contests

Electoral competitiveness is considered by scholars to be one of the most important correlates of voter turnout. Elections that are close are theorised to be associated with high levels of turnout. According to the rational theories of voting that we have discussed before, participation is influenced by the prospect that a single voter could impact the election outcome (Downs 1957). The closer the election is, the greater the likelihood that any one ballot cast will affect the outcome. Consequently, a close election increases the anticipated utility of participation (also see Barzel & Silberberg 1973). The thesis that closeness will influence turnout has been labelled the 'Downsian Closeness Hypothesis' (Matsusaka & Palda 1993). The aim of this section will be to empirically test the applicability of this hypothesis to the case of South African by-elections.

When compared to the relevant LGE, most by-elections we studied experienced a negative change in vote share for the political party that won . The mean percentage change is negative 3%, and 58% of by-elections see a negative change. Looking at the margins of victory in our data

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[14] To corroborate the findings on socio-economic conditions, we replaced the poverty line variable in our modified models with unemployment level. After changing the models, middle class percentage emerged as a statistically significant (and positive) correlate in both adjusted Models II (β=-0.155) and IV (β=-0.438).

set, the disparate wards in our sample are quite varied. In some wards elections were quite competitive. Other areas have remained completely uncompetitive with a single political party dominating the ward. Although the margin of victory ranged from less than 1% to almost 100%, the average margin was 35 percentage points. Reviewing the results, we found that the mean margin of victory was highest in wards won by the Democratic Alliance (DA) and African National Congress (ANC). This diverse election landscape provides opportunities to test the applicability of the 'Downsian Closeness Hypothesis'.

A scatter plot was produced comparing by-election turnout and margin of victory in our sample. The results show a positive relationship between political closeness and turnout (Figure 11). The smaller the margin of victory, the higher the level of electoral participation. To better gauge the size of this effect, a pairwise correlation test was used. Test outcomes indicated only a robust (and statistically significant) correlation between these two variables ($r(633) = -0.370$, $p<0.0001$). An alternative measure of electoral closeness is the share of the ward that voted for the winning party. We also assessed the association between winning vote share and turnout using a pairwise correlation test. We found that winning vote share had a somewhat weaker correlation with by-election turnout ($r(632) = -0.305$, $p<0.0001$) than victory margin.

Figure 11: By-election turnout percentage across percentage point margin of victory for party that won by-election in ward (exponential trendline)
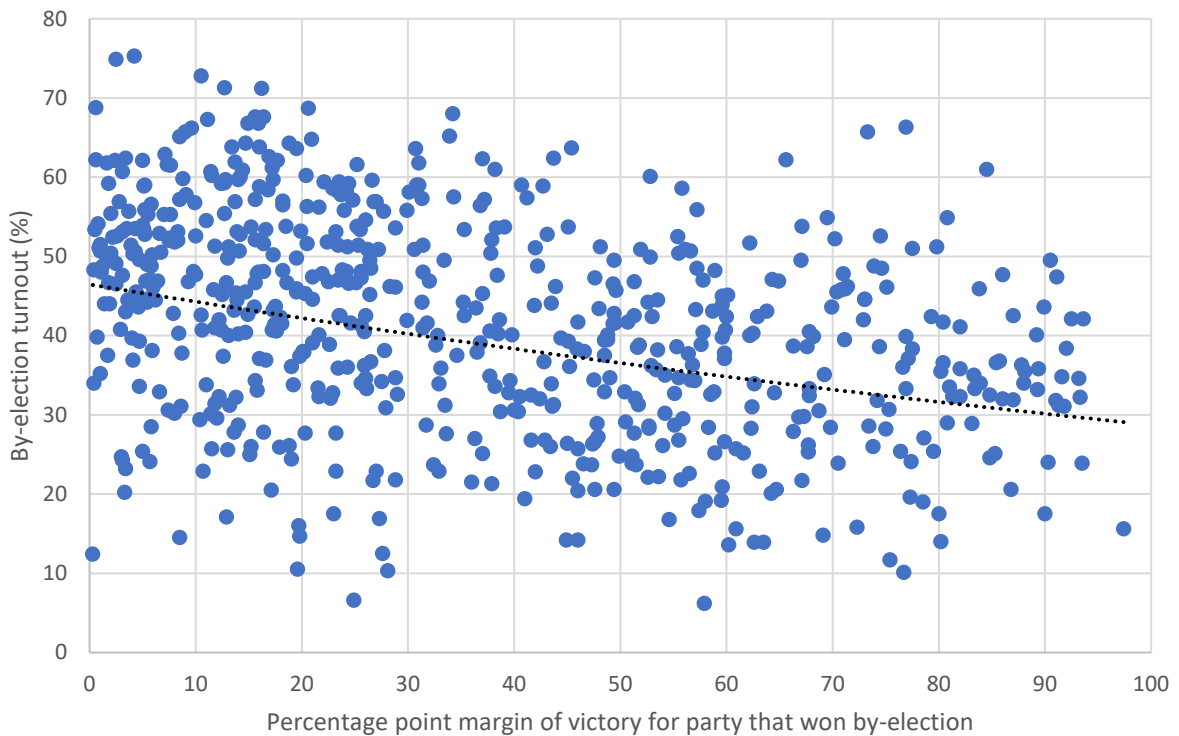
Source: HSRC IEC By-Election Database, own analysis

Figure 11 provides some empirical support for the 'Downsian Closeness Hypothesis'. But to sufficiently validate the hypothesis it is necessary to perform a multivariate regression analysis. Two sets of models were produced to test various alternative measures of closeness to determine which has the strongest effect on by-election turnout. First, we tested each measure in a regression model without background controls. After reviewing these results, we repeated the tests but now included background controls in our models. In total four models were

computed for this analysis with the results represented in Table 14. As expected, both measures of closeness had a robust (and positive) correlation with the dependent variable. While both measures had a comparable influence on the dependent variable; win margin (β=-0.274) had a somewhat larger correlation with the dependent variable than winning party's vote share (β=-0.222).[15]

Table 14: The effect of election closeness by-election turnout in South Africa (2016-2023), beta coefficients

Dependent variable: By-election turnout (% registered population)	Model I	Model II	Model III	Model IV
Percentage point margin of victory for party that won by-election	-0.370 ***	-0.274 ***		
Percentage of votes received by the winning party in the by-election			-0.305 ***	-0.222 ***
Background controls	No	Yes	No	Yes
N	634	633	633	633
R²	0.137	0.499	0.093	0.476
Adj R²	0.135	0.485	0.092	0.462

Note: 1. Positive beta coefficients indicate positive by-election turnout; 2. Background controls include province of election, year and type of geographic location; 3. Significance is denoted as follows: * p<0.05, **p<0.01, *** p<0.001.
Source: HSRC IEC By-Election Database, own analysis

Would competitiveness have a greater or weaker association with relative by-election turnout in South Africa? For us to answer this question, we need to calculate regression models that investigate whether measures of election closeness determine relative by-election turnout. To begin with, the closeness measures were analysed in regression models without background controls. But then, as a confirmatory check, the models were reproduced with the background controls taken into account. As can be seen in Table 15, both measures had a robust and negative association with the dependent variable. We can conclude that the less competitive the by-election, the more likely that a ward would have low relative turnout. Although both measures had an analogous effect, win margin (β=-0.317) had the most robust correlation and this was followed by winning party vote share (β=-0.292)[16]. This is similar to what was observed in Table 14, suggesting that election closeness has an effect on both absolute and relative by-election turnout.

Table 15: The effect of election closeness on relative change in by-election turnout in South Africa (2016-2023), beta coefficients

Dependent variable: Relative change in by-election turnout compared to previous LGE turnout	Model I	Model II	Model III	Model IV
Percentage point margin of victory for party that won by-election	-0.395 ***	-0.317 ***		
Percentage of votes received by the winning party in the by-election			-0.363 ***	-0.292 ***
Background controls	No	Yes	No	Yes

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[15] To explore the validity of this finding further, we modified both Model II and Model IV by introducing a variable that controlled for which political party won the ward. Even when taking the electoral outcome into account, victory margin was still a statistically significant (and negative) correlate in Model II (β=-0.267). A similar outcome was observed for the adjusted Model IV (β=-0.217).

[16] As a robustness check, we adjusted both Model II and Model IV to include a variable that controlled for which political party won the ward. Even if we controlled for electoral outcome, victory margin remained a statistically significant (and negative) correlate in Model II (β=-0.312). An analogous outcome was also detected for the amended Model IV (β=-0.293).

	634	633	633	633
N				
R^2	0.156	0.591	0.132	0.576
Adj R^2	0.155	0.580	0.130	0.565

Note: 1. Positive beta coefficients indicate positive by-election turnout; 2. Background controls include province of election, year and type of geographic location; 3. Significance is denoted as follows: * $p<0.05$, **$p<0.01$, *** $p<0.001$.

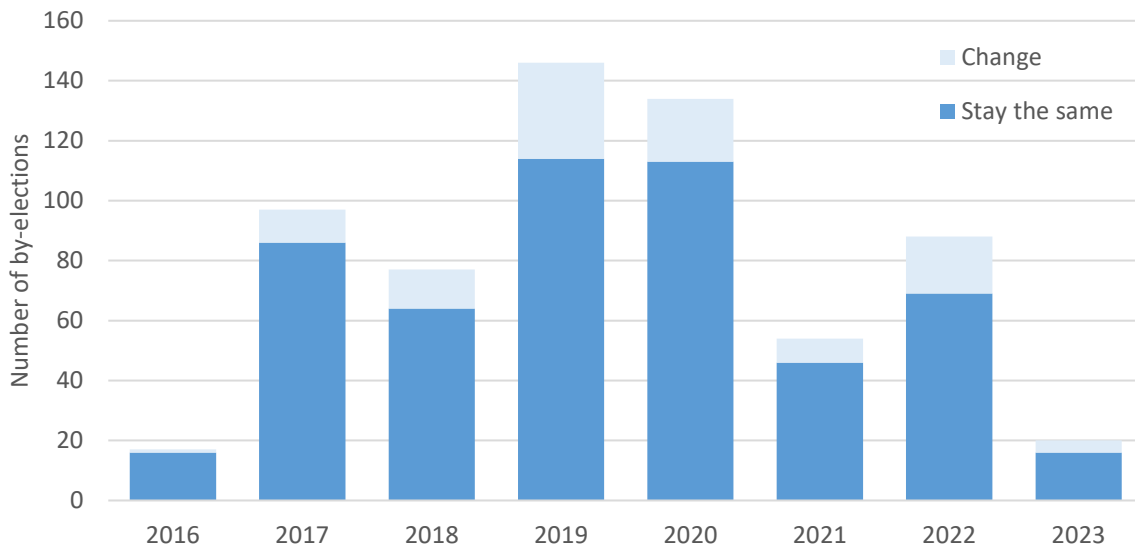Source: HSRC IEC By-Election Database, own analysis

We can conclude that election closeness was a good predictor of by-election turnout in South Africa, validating the 'Downsian Closeness Hypothesis'. The effect was very strong for both relative turnout as well as absolute turnout. Our measures of competitiveness accounted for about one tenth of variation in the models without background controls presented in this section. This conclusion should not be surprising; election closeness is by far the most analysed element in the turnout literature. In their meta-analysis, Cancela and Geys (2016) assess 105 studies on whether closeness affects turnout. Examining about 600 tests, the authors find that more than three-fifths identified a positive (and statistically significant) correlation. But the results presented in this section are unique. Only a few studies exploring the link between competitiveness and turnout are conducted outside of the Global North.

Could there be alternative explanations for the relationship between closeness and turnout observed in this section? Kirchgässner and Schulz (1981) provide such an alternative explanation. In close elections, they argue, political parties are incentivised to drum up as many votes as possible. Their mobilisation efforts increase the level of turnout. This argument follows Denver and Hands (1974) who contended that close elections motivate more political elite engagement and greater campaign efforts. Although election competitiveness is thought to be closely related to turnout, this argument suggests that the association is indirect (via divergences in campaign expenditure for example). However, South Africa tends to see less expenditure on election campaigns than in more established democracies. This alternative explanation, as a result, seems less convincing in our context than the 'Downsian Closeness Hypothesis'.

4.8. The 'referendum hypothesis'

As previously discussed, most of the existing by-election literature has focused on how these elections are affected by perceptions of national government. Scholars have put forward the 'referendum hypothesis', arguing that by-elections can be seen as tests of government performance at the national level. This hypothesis appears to be quite popular in Britain where by-elections are often linked to the performance of national government. Mughan (1988), for example, contends that approval of the national government has a strong influence on British by-election results. Studying by-election data in Britain and Canada, Feigert and Norris (1990) find support for the referendum hypothesis. Turnout should be higher in by-elections where the political party of the incumbent national government holds the contested seat. But in a comprehensive examination of British by-elections, Norris (1990) expresses scepticism and disputes the thesis that by-elections provide a highly reliable guide to national election trends.

Figure 12: Number of by-elections that lead to a change in the political party winning relative to the relevant Local Government Election per year, 2016-2023 period

Source: HSRC IEC By-election database, own analysis.

Building on existing research on the 'referendum hypothesis', we considered the effect of party change on election turnout. A majority of by-elections held between 2016 and 2023 did not reverse the results of the relevant LGE. Only 17% (N=109) saw a change in the political party governing the ward. The years with the highest level of change was 2019 and 2022; the level of change in those years was about 22% (Figure 12). It could be argued that such changes are the consequence of mobilised discontent, a popular response to poor ward governance. Voters dissatisfied with the incumbent are motivated to come to the polls and cast their ballot for change. To test this thesis, we devised four models to appraise the impact that political change would have on electoral participation. We computed two models without background controls and then, following a review of the results, introduced controls into these early models.

Table 16: The effect of political party change on South African by-elections (2016-2023), beta coefficients

	Absolute voter turnout in by-elections (% registered population)		Relative change in by-election turnout compared to previous LGE turnout	
	Model I	Model II	Model III	Model IV
Change in Party	0.183 ***	0.140 ***	0.161 ***	0.058 *
Background controls	No	Yes	No	Yes
N	633	632	633	633
R^2	0.034	0.441	0.034	0.455
Adj R^2	0.032	0.426	0.032	0.440

Notes: 1. Positive beta coefficients indicate positive by-election turnout; 2. Background controls include the following: province of election, year and type of geographic location; and 3. Significance is denoted as follows: * $p<0.05$, **$p<0.01$, *** $p<0.001$.
Source: HSRC IEC By-election database, own analysis.

The outcomes of our four models are displayed in Table 16, showing a positive (if somewhat weak) correlation between political party change and voter turnout. If the ward experienced a change as a consequence of a by-election, this had a statistically significant (and positive) effect on absolute turnout. It would appear that a change was associated with higher by-election participation, supporting our mobilised discontent thesis. The association may be explained by

variations in by-electoral competition. Section 4.7 showed that the more competitive the by-election, the greater the turnout. Indeed, if we altered Model II to control for margin of party victory, political party change had a much weaker correlation with the dependent variable (β=0.068). We detected a weak (but still statistically significant) correlation (β=0.058) between change and relative turnout in Model IV[17]. Even if we controlled for electoral outcome, victory margin remained a statistically significant (and negative) correlate in modified Model II (β=-0.312). An analogous outcome was also detected for the amended Model IV (β=-0.293).

To provide a more comprehensive assessment of the 'referendum hypothesis', we investigated the African National Congress (ANC) and its election victories. During the period under consideration, the ANC was the ruling party at the national level. Almost two-thirds (65%) of wards in sample were governed by the ANC before by-elections, most years had many by-elections where ANC control was contested (Figure 13). The number of by-elections where the ANC had to campaign to retain control was highest in 2021 (70%). An overwhelming proportion of these by-elections (87%) returned the ruling party to power. Indeed, wards held by the ANC were less likely to see a political change, relative to the most recent LGE, during by-elections. In by-elections that the ruling party won, the ANC tended to receive a marginally larger than average share of the vote.

Figure 13: Number of by-elections that were controlled by the African National Congress before the election per year, 2016-2023 period
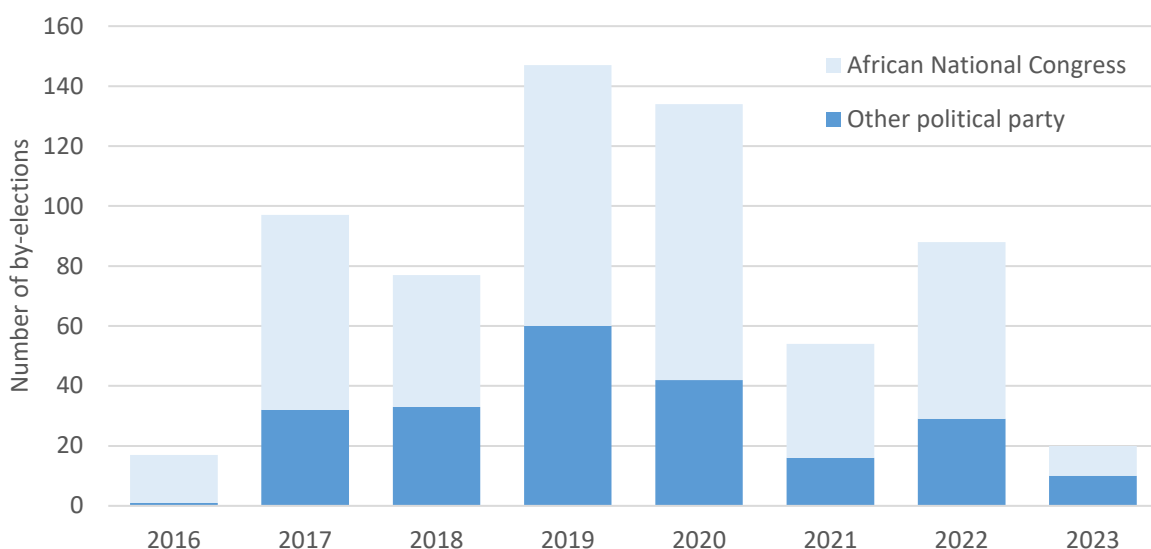
Source: HSRC IEC By-election database, own analysis

The 'referendum hypothesis' would suggest that voter participation will be higher in by-elections that were governed by the ANC. This is because by-elections give people a chance to voice approval or disapproval against politics at the national level. We designed four models to assess whether ruling party control would affect by-election turnout. We first created models without background controls and, after this first test, controls were then introduced. Computed

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[17] To validate these results, we reproduced Model II and IV to include percentage of votes received by the winning party. This robustness test confirms our previous findings, and political party change retained its statistically significant (and positive) correlation with the dependent in both the modified Model II (β=0.093) and Model IV (β=0.078).

beta coefficients for this analysis are presented in Table 17. If the ANC controlled the ward in the previous LGE this had no effect on absolute turnout in Model I and only a marginal (and negative) effect in Model II (β=-0.081). ANC control emerged as a positive (and statistically significant) correlate of the dependent in Model IV (β=0.135). The observed positive association was somewhat surprising as ANC control was a negative correlate in the first two models[18].

Table 17: The effect of ruling party control on South African by-elections (2016-2023), beta coefficients

	Absolute voter turnout in by-elections (% registered population)		Relative change in by-election turnout compared to previous LGE turnout	
	Model I	Model II	Model III	Model IV
Ruling Party Control	-0.006	-0.081 *	0.238 ***	0.135 ***
Background controls	No	Yes	No	Yes
N	633	633	633	633
R^2	0.000	0.441	0.057	0.521
Adj R^2	-0.001	0.426	0.055	0.507

Notes: 1. Positive beta coefficients indicate positive by-election turnout; 2. Background controls include the following: province of election, year and type of geographic location; and 3. Significance is denoted as follows: * $p<0.05$, **$p<0.01$, *** $p<0.001$.
Source: HSRC IEC By-election database, own analysis

Figure 14: The number of by-election victories by major political party per year, 2016-2023 period
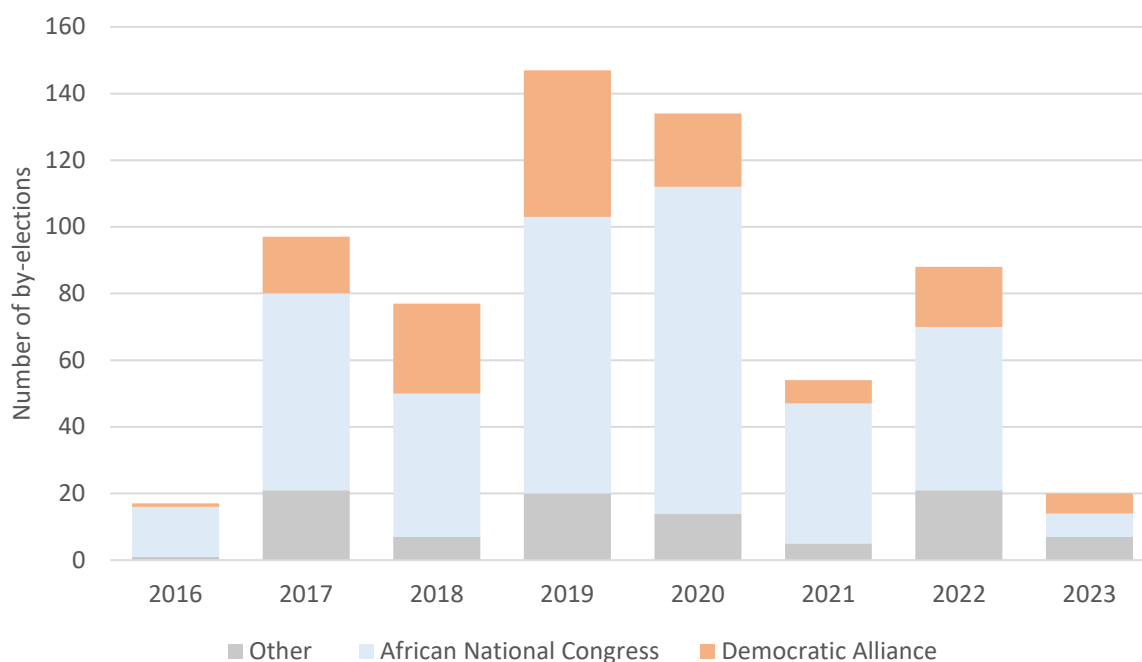
Source: HSRC IEC By-election database, own analysis

Election outcomes may play a significant role in predicting voter turnout, and an adequate assessment of the 'referendum hypothesis' must take political outcomes into account. Most (85%) of the by-elections in our sample were won by just two political parties, the ruling ANC

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[18] It could be that ruling party controlled wards face more electoral competition than other wards and this may account for this unexpected result. But even if we adjusted Model IV to control for margin of party victory, ruling party control still has a statistically significant (and positive) association with the dependent variable (β= 0.145).

and the Democratic Alliance (DA). We can better appreciate this pattern if we assess by-election outcome per annum for the 2016-2023 period in Figure 14. As can be observed, the ANC was the most likely to emerge victorious during the period under review and won 396 (63%) of all by-elections in that period. Victory levels were particularly high in 2020 and 2021. The DA only won 142 (21%) of by-elections during the period under consideration; the greatest number of victories occurred in in 2019.

We produced four models to evaluate the relationship between by-election outcome and voter participation. First two models were calculated without any background controls and then we introduced the requisite controls into the models. Model results, displayed in Table 18, show that electoral outcomes were a robust predictor of both absolute and relative turnout. Using other political party as a reference, both ANC and DA victory emerged as a statistically significant negative correlates of absolute turnout. The former (β=-0.247) had a much weaker coefficient than the latter (β=-0.187) in Model II, suggesting that ANC victories were associated with lower absolute turnout[19]. The results of Models III and IV show that a victory for either the ruling party or the main opposition party decreased the possibility that people would vote in by-elections relative to the LGE. DA victory was a better predictor (β=-0.393) of the dependent in Model IV than ruling party success (β=-0.188). This outcome is thought-provoking given that the opposite was true in Model II.

Table 18: The effect of election outcome on voter participation during South African by-elections (2016-2023), beta coefficients

	Absolute voter turnout in by-elections (% registered population)		Relative change in by-election turnout compared to previous LGE turnout	
	Model I	Model II	Model III	Model IV
Ruling Party Control	-0.380 ***	-0.247 ***	-0.308 ***	-0.188 ***
Democratic Alliance	-0.370 ***	-0.187 ***	-0.569 ***	-0.393 ***
Background controls	No	Yes	No	Yes
N	634	633	634	633
R^2	0.087	0.462	0.176	0.574
Adj R^2	0.084	0.447	0.173	0.561

Notes: 1. Positive beta coefficients indicate positive by-election turnout; 3. The reference group for political party victory is 'other'; 2. Background controls include the following: province of election, year and type of geographic location; and 3. Significance is denoted as follows: * $p<0.05$, **$p<0.01$, *** $p<0.001$.
Source: HSRC IEC By-election database, own analysis

In this section we found only limited empirical evidence to support the 'referendum hypothesis'. Political party change during a by-election was not a good predictor of electoral turnout. Although change emerged as a positive (and statistically significant) correlate, it only explained about 3% of variation. The data presented in this section examined whether voter turnout was higher in those by-elections where the political party of the incumbent national government held the contested seat. But this correlation was only significant for relative turnout models

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[19] To adequately understand the robustness of these results, it was necessary to consider whether prior ruling party control was influencing model outcomes here. Model II was adjusted to include a variable that accounted for whether the ward was held by the ruling party. We found that ANC control prior to the by-election was not a statistical significant predictor of turnout at the 5% level.

and not absolute turnout models. We are, in closing, quite doubtful about the explanatory power of the 'referendum hypothesis'. Further analysis showed that electoral outcome was a much better predictor of turnout than other variables considered in this section. Electoral outcome explained about 17% of variation in the relative participation model and 9% in the absolute model. This may speak to the kinds of election campaigns launched by victorious parties or the existing network of political party support in wards in our sample. Further research is required to more adequately appreciate the subtleties of this noteworthy finding.

4.9. Election frequency: Evidence for a voter fatigue effect

The act of electoral participation, as the rational voter models demonstrate, inflicts a cost (whether material or immaterial) onto the voter. It is reasonable to assume that if voters are asked to vote too frequently, then fatigue may develop. In their assessment of voter fatigue, Rallings et al. (2003) identify a cost to participation associated with the frequency of election events. Their study shows that the less time that has elapsed between elections the lower the turnout. Therefore, according to their thesis, a short time interval will cause voter fatigue and this lassitude will discourage turnout (also see Boyd 1986). By-elections may be particularly susceptible to the negative affect of time intervals on turnout. Adapting this model to the South African case, we can imagine turnout will be more robust closer to the relevant LGE. Further away from the LGE, however, voters will have an opportunity to become more fatigued and less inclined to vote.

Figure 15: Average number of days between a by-election and the Local Government Election per year, 2016-2023 period (mean scores)
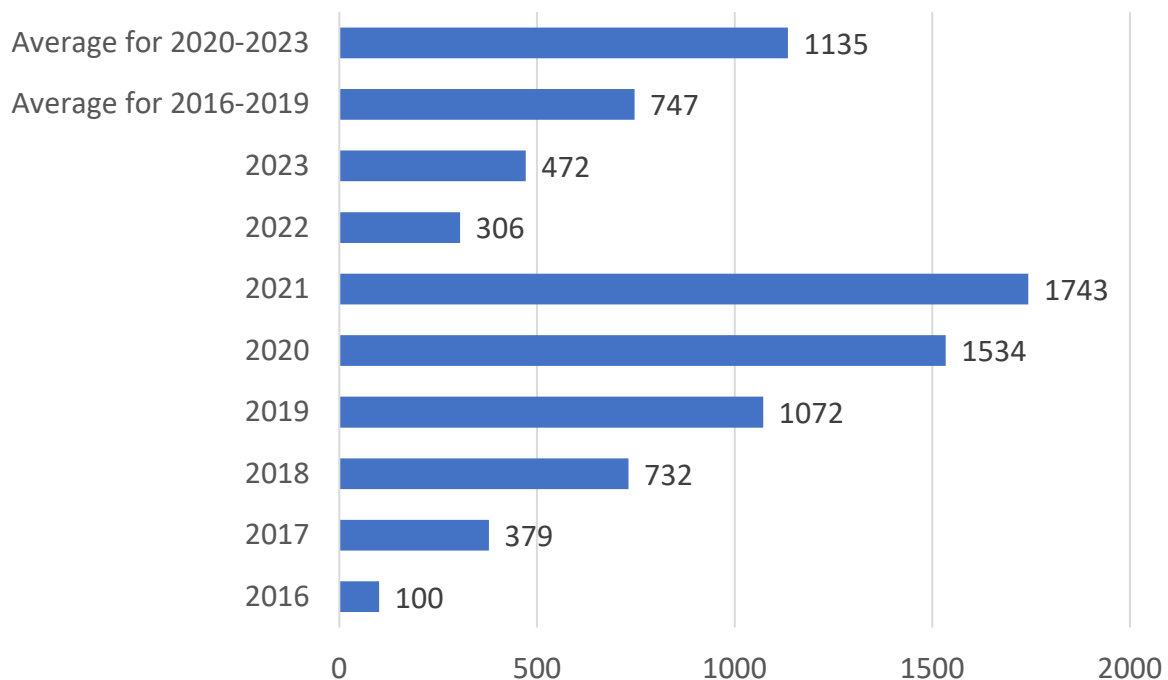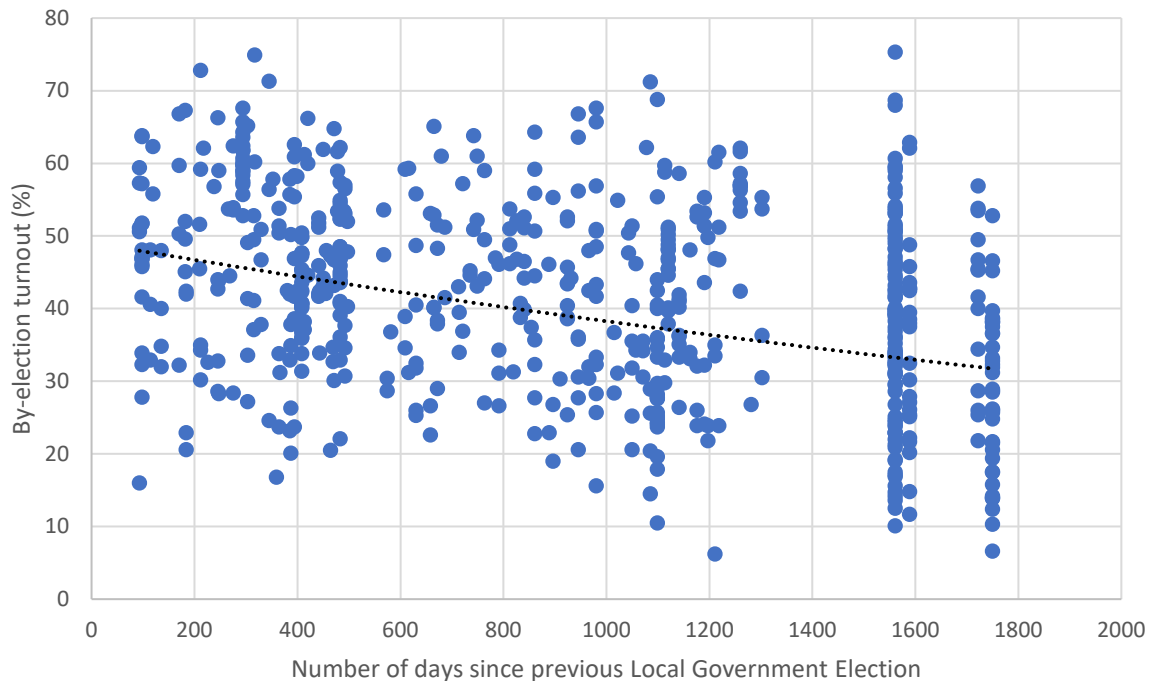

Source: HSRC IEC By-Election Database, own analysis

To assess the effect of time intervals on by-election turnout, we calculated the number of days that had elapsed between the LGE and the by-election for each ward in our data set. The by-elections in our data set are very diverse in terms of this time interval. We can better observe

this diversity if we examine the average time interval (in days) per annum for the 2016-2023 period in Figure 12. Between 2016 and 2019 the average time interval was 747 days, with 2019 having the high mean interval of 1 072 days. Many by-elections were delayed because of the COVID-19 pandemic and the mean interval during the 2020-2023 period was 1 135 days. Of the different years under consideration, both 2020 and 2021 had the highest mean intervals. Given the voter fatigue thesis put forward above, we would expect this latter period to suffer from lower levels of fatigue than the earlier 2016-2019 period.

Figure 16: By-election turnout percentage across number of days since previous Local Government Election in ward (exponential trendline)

Source: HSRC IEC By-Election Database, own analysis

A scatter plot comparing by-election turnout and time interval in our sample showed a weak negative association between these two variables (Figure 13). This outcome contradicted the voter fatigue thesis. However, it is clear that there was a large cluster of by-elections that were significantly delayed in the right half of the figure. This observed cluster did not conform to the earlier general pattern and may be affecting the linear regression between time interval and by-election turnout. To provide a more comprehensive test of these two variables, a linear multivariate regression analysis was conducted. A series of models were constructed to appraise the impact that election frequency has on electoral participation. The first step was to construct a model without controls and then, to check the validity of our result, to introduce the controls. Two models were produced for absolute turnout and then another two for relative turnout.

Regression model outcomes are portrayed in Table 18; it is apparent that the time interval variable had a robust (and negative) relationship with the dependent variable[20]. The observed

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[20] In the model for the 2016-2019 period, the time interval correlate was negative (β=-0.240) but not statistically significant at the 5% level. Conversely, in the model for the 2020-2023 period, the time interval (β=-0.954) had a large and negative correlation that was statistically significant at the 1% level.

correlation was similar for absolute turnout (β=-0.584) as well as relative turnout (β=-0.583). In other words, the shorter the time interval the higher the level of participation. The multivariate model outcomes validate the observed relationship depicted in Figure 13 and refute the voter fatigue thesis above. However, as previously discussed, the observed correlation may be the result of delays caused by the COVID-19 pandemic. If we conducted distinct analyses for both the 2016-2019 and 2020-2023 periods, then this becomes apparent. We can conclude, based on this additional testing, that the observed correlation in Table 18 was due to the COVID-19 conditions in which many of the by-elections in the 2020-2023 period were conducted.

Table 19: The effect of time interval between by-election and turnout in South Africa (2016-2023), beta coefficients

	Absolute voter turnout in by-elections (% registered population)		Relative change in by-election turnout compared to previous LGE turnout	
	Model I	Model II	Model III	Model IV
Days since the previous local government elections	-0.338 ***	-0.584 ***	-0.452 ***	-0.583 ***
Background controls	No	Yes	No	Yes
N	634	633	633	633
R^2	0.114	0.445	0.205	0.516
Adj R^2	0.113	0.430	0.203	0.502

Notes: 1. Positive beta coefficients indicate positive by-election turnout; 2. Background controls include province of election, year and type of geographic location; 3. Significance is denoted as follows: * $p<0.05$, **$p<0.01$, *** $p<0.001$.
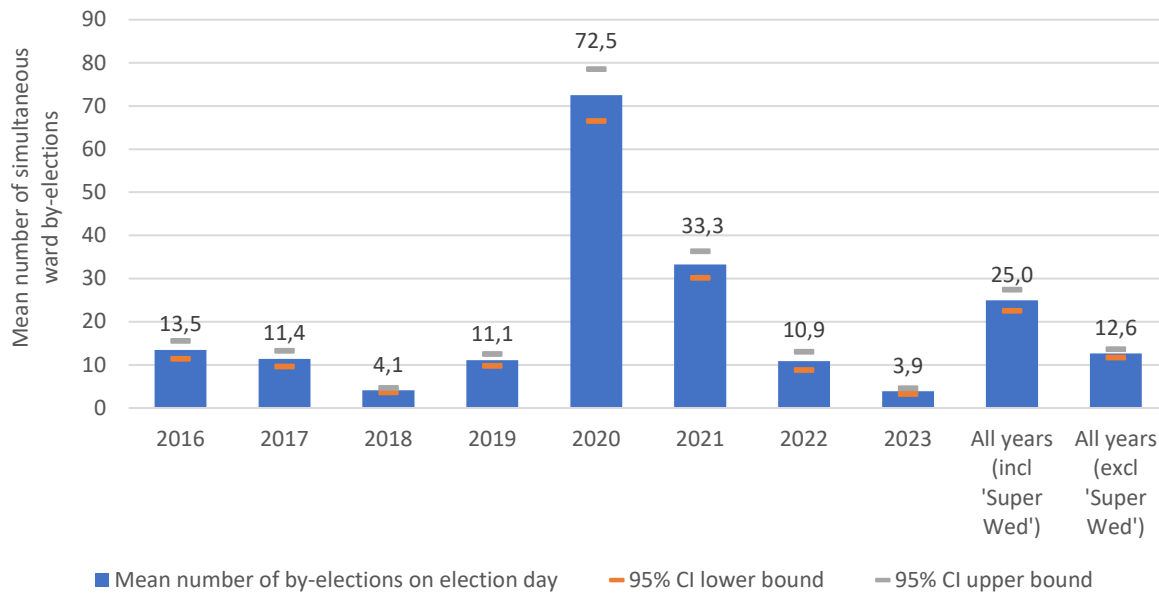Source: HSRC IEC By-Election Database, own analysis

Our models showed that time intervals were a negative predictor of by-election turnout (both absolute and relative) in South Africa. In those models without controls, it was clear that time interval was a better correlate of the dependent variable in the relative model. The variable accounted for 21% of the variation in Model II compared to only 11% in Model I. But why is the result negative when the voter fatigue thesis would have predicted a positive association? Further analysis revealed that the negative correlate recorded was due to the COVID-19 conditions that affected many by-elections in the 2020-2023 period. The time interval variable was not a robust predictor in the 2016-2019 period. Although we will have to wait for more data, this evidence suggests that by-election turnout in the 2024-2027 period will be unaffected by time interval. Consequently, we can conclude that there is no evidence that voter fatigue caused by-election frequency is driving down by-election turnout in South Africa.

4.10. Strength in numbers: Do simultaneous by-elections promote increased turnout?

In South Africa, it is common for simultaneous by-elections to take place. Of the 634 by-election contests that were examined in this study, 611 or 96.4% were held on the same day as another ward by-election. There is a sizeable degree of variation in the number of simultaneous by-elections occurring on each by-election day, ranging from two wards to a high of 95 wards. The latter case, referred to as 'Super Wednesday' in the media, was an exceptional circumstance, with various by-elections in 2020 being postponed due to the COVID-19 pandemic. Eventually, 95 by-elections were scheduled for 11 November 2020 — an unprecedented number. From Figure 14, it is apparent that the mean number of by-elections across the full period being considered was 25.0, falling to 12.6 if the 'Super Wednesday' event is excluded, with the annual

range fluctuating from a low of 3.9 in 2023 to a high of 72.5 in 2020 (this figure falls to 17.7 if 'Super Wednesday' is excluded).

Figure 17: Average number of by-elections taking place simultaneously per year, 2016-2023 period (mean scores)

Source: HSRC IEC By-Election Database, own analysis

It has been suggested that the larger numbers of concurrent by-elections on the same day have the potential to encourage higher levels of electoral participation due to the higher level of media coverage this is likely to generate. Greater media coverage could lead to voters possibly being more aware of the by-elections and receiving a greater degree of relevant and useful information about these contests (Loewen & Bastien 2010; Quinlan 2023). Testing of this hypothesis proved that the number of by-elections on the same day was not a significant determinant of by-election turnout or the ratio of by-election to municipal election turnout in Canada (controlling for other factors) (Loewen & Bastien 2010), with the Irish case study reaching a similar conclusion (Quinlan 2023). Do these findings apply to the South African context over the seven-year interval being examined?

To provide an empirical answer to this question, regression analysis was performed using OLS modelling. The results of the modelling are displayed in Table 19, and reveal that, unlike the Canadian and Irish examples, there is a statistically significant association between the number of concurrent wards holding by-elections on the same day and the level of by-election turnout when controlling for by-election year, province, and urban-rural location. Counter to theoretical expectations, the association is an inverse one, meaning that as the number of concurrent by-elections goes up, turnout diminishes. This holds true even if the control variables are excluded from the regression model. So, the supposition that higher public awareness and informational resources will result from media attention to by-elections as the number of wards simultaneously holding by-elections increases does not seem to bear out.

Table 20: OLS regression model on the influence of the number of by-elections occurring on the same day and by-election turnout

Dependent variable: By-election turnout (% registered population)	Standardised Beta	Std. Err.	t	P>t	Sig.
Number of by-elections on the same day	-0.153	0.023	-2.850	0.004	**
By-election year (reference=2016)					
2017	-0.010	2.698	-0.140	0.887	n.s.
2018	-0.119	2.741	-1.770	0.077	n.s.
2019	-0.274	2.613	-3.320	0.001	**
2020	-0.169	2.956	-1.860	0.063	n.s.
2021	-0.253	2.871	-4.210	0.000	***
2022	-0.126	2.720	-1.790	0.074	n.s.
2023	-0.078	3.351	-1.780	0.076	n.s.
Urban-rural location (reference=urban)					
Rural	0.301	0.890	9.100	0.000	***
Province (reference=Eastern Cape)					
Free State	0.134	1.745	3.550	0.000	***
Gauteng	-0.156	1.726	-3.910	0.000	***
KwaZulu-Natal	0.217	1.354	5.180	0.000	***
Limpopo	0.050	2.120	1.490	0.138	n.s.
Mpumalanga	-0.074	1.666	-1.990	0.047	*
North West	0.096	1.726	2.550	0.011	*
Northern Cape	0.325	1.798	8.930	0.000	***
Western Cape	0.144	1.599	3.770	0.000	***
Constant	.	2.661	15.290	0.000	***
N=633; F(17,615)=28.81; Adj. R²=0.4279					

Note: Observations are clustered on the date of the by-election. Statistical significance is denoted as n.s.=not significant; * p<0.05; ** p<0.01; *** p<0.001.
Source: HSRC IEC By-Election Database, own analysis

One potential factor that complicates the picture is the COVID-19 pandemic. With the first COVID case officially confirmed on 5 March 2020, and the ensuing hard lockdown for much of the next six months, there was a deferral of by-elections to 11 November 2020, when an unprecedented 95 wards held by-elections, and again 40 wards on 19 May 2021. These large concentrations of concurrent by-elections, coupled with public concerns over public gatherings and risk of COVID infection and spread, may unduly complicate the pattern of results. To gauge whether COVID may have played a role or not, we reran the modelling outline above but, in this instance, limited the scope of analysis exclusively to those by-elections occurring prior to 5 March 2020.

Table 21: OLS regression model on the influence of the number of by-elections occurring on the same day and by-election turnout, limited to by-elections occurring before and after the first confirmed Covid case (5 March 2020) in the country

Dependent variable: By-election turnout (% registered population)	Model I By-elections pre-Covid			Model II By-elections after first Covid case		
	Standardised Beta	P>t	Sig.	Standardised Beta	P>t	Sig.
Number of by-elections on the same day	-0.116	0.013	*	0.045	0.629	n.s.
By-election year (reference=2016 / 20)						
2017 / 2021	-0.054	0.549	n.s.	-0.044	0.521	n.s.
2018 / 2022	-0.212	0.016	*	0.288	0.003	*
2019 / 2023	-0.377	0.000	***	0.127	0.063	n.s.
2020 / …	0.009	0.874	n.s.	…	…	…
Urban-rural location (reference=urban)						
Rural	0.378	0.000	***	0.231	0.000	***
Province (reference=Eastern Cape)						

Free State	0.275	0.000	***	0.034	0.502	n.s.
Gauteng	-0.085	0.094	n.s.	-0.234	0.000	***
KwaZulu-Natal	0.349	0.000	***	0.102	0.109	n.s.
Limpopo	0.061	0.165	n.s.	0.044	0.408	n.s.
Mpumalanga	-0.002	0.965	n.s.	-0.139	0.019	*
North West	0.137	0.008	**	-0.021	0.727	n.s.
Northern Cape	0.322	0.000	***	0.337	0.000	***
Western Cape	0.205	0.000	***	0.110	0.065	n.s.
Constant	.	0.000	***	.	0.000	***
N=352; F(14,337)=21.34; Adj. R²=0.4479 / N=281; F(13,267)=15.42; Adj. R²=0.4288						

Note: Observations are clustered on the date of the by-election. Statistical significance is denoted as n.s.=not significant; * $p<0.05$; ** $p<0.01$; *** $p<0.001$.
Source: HSRC IEC By-Election Database, own analysis

As Table 20 indicates, the strength of association between the number of by-elections held simultaneously on the same day and by-election turnout weakens slightly (Model I), with the standardised Beta coefficient falling from -0.1530 to -0.1136. The negative association therefore remains but it has lost some of its salience. However, in the case of by-elections following the first COVID case in March 2020 (Model II), there is no statistically significant association between number of concurrent by-elections and turnout. The core message is that an increasing number of concurrent by-elections did not yield the envisaged positive effect on turnout in by-elections. A modest inverse effect is instead evident, but this has fallen away since the onset of COVID in South African society.

5. Conclusion

Electoral turnout is one of the most important indicators of civic life in any country. Traditionally, political scientists have seen it as an essential feature of democracy (Almond & Verba 1963; Blais 2007; Downs 1957). A large body of literature has examined electoral participation at both the national and sub-national level, investigating the drivers of turnout. Data suggests that turnout has received more and more academic attention over time (Cancela & Geys 2016). By-elections in South Africa sometimes attract media interest. Journalists occasionally interpret by-election results as both gauges of government approval and forecasts for the next government election. But scholars in the country have tended to ignore by-elections. This is also a feature of the political science literature in the Global North. The aim of this study was to address this knowledge gap and shed greater light on what is driving turnout during by-elections in South Africa.

The study focused on by-elections during the period 2016-2023, providing the most contemporary analysis possible. We examined turnout in 634 by-elections between 2016 and 2023 and found that turnout tended to be under half the registered population in a majority of the wards sampled. This is, perhaps unsurprising; by-elections tend to attract less attention from political elites and the media. Indeed, we found that most (88%) of by-elections sampled had lower turnout than what was seen in the relevant LGE. This is consistent with what is observed in other countries where by-elections have, on average, much lower levels of turnout. In this report we reviewed the international literature on turnout in by-elections (as well as general elections) and identified a range of possible drivers of participation. Multivariate models were then utilised to test whether these identified drivers were valid determinants of

turnout. The present study is one of the largest and most comprehensive evaluations of by-election data in the country.

Reviewing the empirical analysis of voter turnout presented in this report, it is evident that there are multiple predictors of by-election turnout in the country. Assessing a wide range of different variables, we found that a few theoretically important drivers are significantly correlated with turnout rates. Drivers that are essential to Downsian Rational Choice Theory (such as the effect of population size and electoral closeness) were, in particular, found to be powerful predictors at both the absolute and relative level. Turnout is, following the rational voter model, higher when the ward population is smaller and when the election is close. In contrast, we found that the racial, age and socio-economic composition of a ward had mixed effects. Though questions remain, our examination has made significant headway in explaining turnout during by-elections in South Africa.

Another major determinant of voter turnout investigated in this report concerned socio-economic conditions at ward-level. HSRC research on voting intention has demonstrated the importance of these conditions (Roberts et al. 2021). This work has shown that societal discontent is driving down the willingness of people to participate in South African elections. Accordingly, we expected that poor socio-economic conditions (a source of discontent) were negatively associated with participation. This study validated this expectation, showing that socio-economic conditions were quite important predictors of by-election turnout. Poor and unsafe communities tend to have populations that are less willing to participate in by-elections in South Africa. This result is quite noteworthy as empirical assessments of socio-economic conditions on turnout in young or transitional democracies have tended to produce mixed results (Endersby & Krieckhaus 2008; Geys 2006; Stockemer, 2017).

In this report we look at two kinds of timing factors: (i) concurrent elections and (ii) frequency of elections. Having multiple by-elections occur on the same day has been hypothesised, following the work of Boyd (1989), to increase turnout[21]. But multivariate regression model outcomes found no evidence to support this thesis, and we must conclude that concurrent elections have no effect on by-election turnout in South Africa. Election frequency was also found to have no observable influence on turnout. These results seem to suggest that the voter fatigue thesis that is sometimes put forward to explain turnout trends is not applicable in our case. Summing up these findings, it is apparent that election timing is not a crucial factor that predicts by-election turnout in South Africa.

Data represented in this report support the thesis that voting is a habit or a consequence of 'adaptive' learning. Wards with high LGE participation tended to have corresponding high levels of by-election turnout. Accordingly, it was difficult to discern what factors most influenced by-election turnout, and which just influenced turnout overall. We tended to find that most factors (e.g. population size or election closeness) that affected absolute turnout also impacted on relative turnout. However, there were a few factors that only appeared to affect the relative participation of registered voters. If a ward was comprised of a high share of White, middle class and non-youth people, then it was likely to have lower by-election turnout than it did in the

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[21] Looking at US elections, Boyd (1986) discovered that holding mutiple by-elections on a single day increased voter turnout. The study attributed this to the stimulus of greater media attention during concurrent elections as well as the fact that political parties work harder to mobilise voters during such periods.

LGE. These findings are quite novel given the existing literature on electoral participation and deserve further study.

What factors have not been explored? Little research has been conducted investigating the effect of by-election cause on turnout in South Africa. If the reason for the by-election was irregular (such as a scandal) it may have a powerful effect. There is growing evidence that scandalous departures influence turnout in subnational elections. Praino et al. (2013), for instance, discovered that scandalous departures encouraged turnout from the opposition (also see Pattie & Johnston 2012). Their work suggested that a scandal causing the elected official to step down will positively influence voter turnout. Then again, as Funck and McCabe (2022) argue, we should be careful of theorising a linear relationship between scandalous departure and turnout. Scandal information and political identity can often interact in unexpected ways. Currently, there have been no studies that look at how by-elections influence turnout in South Africa. This gap in the body of knowledge needs to be addressed in future examinations of by-election participation.

Another issue that was not explored in this analysis was political fragmentation. The general thesis here is that political fragmentation is a kind of election competition variable that will increase turnout (Blais 2000). From a theoretical viewpoint, a positive effect can be anticipated on the basis of two propositions. First, the more parties competing for votes, the more competitive the election will be. Second, the more parties operating in a given area, the greater the probability people will identify with at least one of these. This identification will motivate them to participate in an election[22]. On the other hand, it could be argued that political fragmentation may drive down turnout. Lots of division can make it difficult for voters to choose among the various options (Zagórski 2022). This increases information costs (i.e., the cost of participation) which may decrease turnout (also see Geys & Heyndels 2006). More research is needed to examine how political fragmentation at the ward-level may influence by-election participation in South Africa.

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[22] Of course, the issue is not how many parties there are on the ballot paper but how many are effectively operating (Laakso & Taagepera 1979). Consequently, the issue is the number of' effective' political parties (i.e. the number with a credible support base).

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