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Spatial Inequality, Sub-regional governance and Subjective Well-being : The Case of South Africa

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Abstract
This paper examines how spatial variation in inequality and quality of institutions interact to explain variation in subjective wellbeing. Literature suggests that better institutions and lower level of inequality improve subjective wellbeing. However, evidence that examine how the interaction between these two variables explain variation in wellbeing is relatively scarce. Specifically, do better institutions improve the relationship between inequality and subjective wellbeing? This question is particularly important in high inequality contexts like South Africa (and other developing countries).

Despite several efforts to promote pro-poor growth, South Africa remains one of the most unequal countries in the world. While the country's colonial history and apartheid are known to have contributed to this inequality, the nature and dynamics of its impact on society are yet to be fully understood.

To investigate these interactions, we will utilize the National Income Dynamics Study (NIDS), a nationally representative survey of individuals across South Africa. Specifically, we assess how spatial variations in governance across South Africa's district municipalities, as well as its interaction with inequality among individuals (as captured by relative deprivation) explains variation in subjective well-being.

Our results show marked variation in inequality, well-being and governance across districts. We also find that good governance improves the effect of inequality on subjective wellbeing.

Keywords
Spatial inequality ; Subjective well-being, Sub-regional governance ; South Africa

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Résumé
Ce papier de recherche examine comment la variation spatiale des inégalités et de la qualité des institutions interagissent pour expliquer la variation du bien-être subjectif. La littérature suggère que de meilleures institutions et un niveau d'inégalités plus faible améliorent le bien-être subjectif. Cependant, les travaux qui examinent la façon dont l'interaction entre ces deux variables explique la variation du bien-être sont relativement rares. Plus précisément, de meilleures institutions améliorent-elles la relation entre les inégalités et le bien-être subjectif ? Cette question est particulièrement importante dans les contextes de fortes inégalités, comme l'Afrique du Sud (et d'autres pays en développement). Malgré les efforts pour promouvoir une croissance inclusive, l'Afrique du Sud demeure l'un des pays les plus inégalitaires au monde. Bien que l'histoire coloniale du pays et l'apartheid soient identifiés pour avoir contribué à ces inégalités, la nature et la dynamique de son impact sur la société ne sont pas encore pleinement examinées. Pour examiner ces interactions, ce papier utilise la National Income Dynamis Study (NIDS), une enquête représentative à l'échelle nationale des individus en Afrique du Sud. Plus précisément, nous évaluons comment les variations spatiales de la gouvernance dans les districts municipaux d'Afrique du Sud, ainsi que son interaction avec les inégalités entre les individus (mesurée par la privation relative), expliquent les variations du bien-être subjectif. Les résultats révèlent une variation marquée des inégalités, du bien-être et de la gouvernance entre les districts. Nous constatons également que la bonne gouvernance atténue l'effet négatif des inégalités sur le bien-être subjectif.

Mots-clés
Inégalités spatiales ; Bien-être subjectif ; Gouvernance sous-régionale ; Afrique du Sud

Introduction

A key objective of growth and development is the welfare and quality of life the citizens have access to. . Peoples' welfare and quality of life have traditionally been evaluated using money-metric measures like GDP, income and expenditure, etc. The use of money-metric measures implicitly assumes that increases in these measures will allow individuals (and countries) to increase their consumption and consequently well-being. It has however been noted that money-metric measures may miss important aspects of well-being pertaining to people's feeling about their welfare and the effect of psychological factors (Kahneman & Deaton, 2010). Further money-metric measures are hard to measure and may misrepresent the extent of poverty (Posel & Rogan, 2016). To address this, tracking subjective states of well-being has been recommended as an alternative/complementary way of assessing welfare, people's life evaluations and hedonic experiences in a way that can be useful for policy (Deaton, 2008; Stiglitz et al., 2010). However, while the determinants of money-metric measures of economic performance are well researched, the research on subjective well-being (SWB) on the other hand, is still growing, especially in terms of its relationship with inequality (Ngamaba et al., 2018).

Existing research suggests that individual level factors like income, financial satisfaction, health status, employment status, age group, religiosity and social connections are important determinants of SWB (Frey 2000; Diener et al., 2013; Fleche et al., 2011; Jorm & Ryan, 2014; Zagorski et al., 2014). Apart from these factors, a few aggregate/macro-level factors have been found to be correlated with SWB, including inequality and the quality of institutions, or the governance structures through which these institutions are functionalised (Alesina et al., 2004; Bjørnskov et al, 2010; Oishi et al., 2011; Spruk and Kešeljević, 2016; Amini and Douarin, 2020). Evidence suggests that these aggregate factors (inequality and quality of institutions) are interrelated as they tend to reinforce each other (Chong and Gradstein, 2007; Kotschy and Sunde, 2017). Further, it has been shown that higher level of institutional quality increases tolerance for inequality (Brock, 2020), suggesting that the negative relationship between inequality and subjective wellbeing may be mediated by the quality of institutions. Lastly, and more relevant to the South African case, there is an aspect of SWB that has to do with relative deprivation (Kingdon and Knight, 2007; Jiang et al., 2012).

This study examines the potential role of governance in influencing the relationship between inequality and subjective well-being, using South Africa as a case example. Our analysis is based on wave 5 of the National Income Dynamics Study (NIDS), a nationally representative survey of individuals across South Africa. Our results show that controlling for individual fixed effects, inequality and quality of governance have the expected relationship with SWB (higher inequality reduces well-being while good governance has the opposite effect). This confirms that these aggregate factors drive variation in an individual's subjective wellbeing once individual characteristics are controlled for. Furthermore, the interaction between inequality and quality of governance suggests that good governance reduces the negative effect of inequality on subjective wellbeing. This is consistent with the finding of Brock (2020) which suggested that institutions make inequality more tolerable.

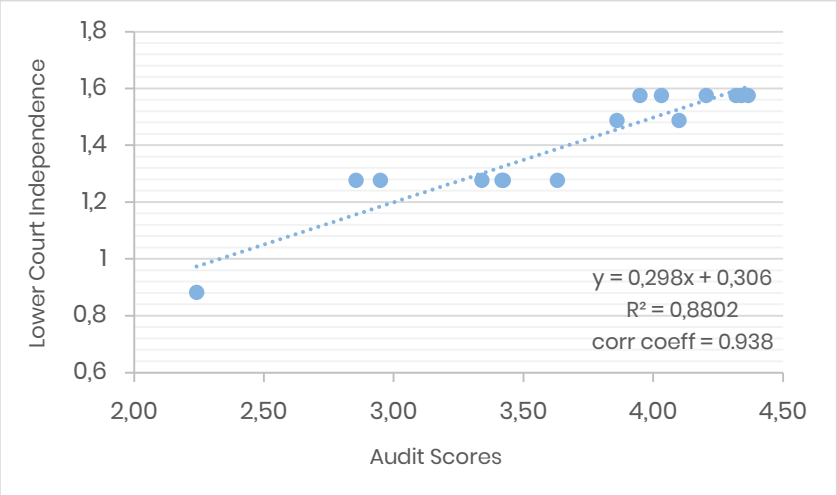
Our contribution to the literature is two folds; first (to the best of our knowledge) this paper is the first to show the positive and negative effect of inequality and quality of institutions (respectively) on subjective wellbeing in the South African context. Second, our results suggest that increasing the efficiency at the local government level is important to reducing inequality in SWB. In addition to these two contributions, given the spatial nature of inequality and institutions in South Africa, that may have persisted over time, we also make use of exploratory spatial data analysis (ESDA), from new economic geography to partly explain the spatial variation in inequality, institutions and well-being. This suggests that improving the quality of institutions at the local level may be an effective way of mitigating the legacy of Apartheid in South Africa.

The rest of the paper is organized as follows: the next section gives a review of the literature and motivation for the concepts and measures adopted. Section 2 presents the data and methodology employed. Section 3 presents the results and discussion, and section 4 concludes.

1. Review of literature

South Africa represents an interesting example for several reasons. Firstly, it is regarded as one of the most unequal societies in the world (World Bank 2022). In addition, inequality in South Africa is measured as relative deprivation in line with Runciman (1966), where group-based inequality is viewed in terms of relative deprivation across reference groups (Salti, 2010). This approach is relevant because inequality exhibits spatial heterogeneity in South Africa (Kingdon and Knight, 2007; Von Fintel, 2018; Todes and Turok, 2018; Mulumba et al., 2024). The spatial nature of inequality in income and SWB can be traced back to the enforcement of segregation based on race pursued by the Apartheid regime (Christopher, 1989). While Apartheid has been abolished since 1994, the residual effects of these policies still explain spatial variation in health and economic well-being in South Africa (Kwenda et al, 2023; Mudiriza and Edwards, 2021). This is consistent with the path dependent nature of institutions (David, 1994; Acemoglu et al., 2001; Fadiran, 2013). The premise for our analysis is that while inequality can directly impact SWB (Alesina et al., 2004; Graham & Felton, 2006; Oishi et al., 2011), institutions can also directly impact economic well-being (Przeworski et al., 2000; Frey & Stutzer, 2000; Helliwell, 2006). This means that analysing the effect of either inequality or institutions on SWB considering only one of them in isolation is only capturing a fraction of the relationship, and this might account for the lack of consensus in the literature on how either inequality or institutions impacts SWB (Banerjee and Duflo, 2003)[1]. At a broad level, institutions as coined by North (1990) are the rules of the game that guide human interaction. One commonly explored aspect of the institutions is government effectiveness. Inasmuch as the welfare of citizens is concerned, the quality of the government depends on how it is able to improve wellbeing. We follow the logic of Frey (2000), who classifies determinants of SWB into personal, micro and macroeconomics and institutional. Within the institutional group, Helliwell and Huang (2008) identify government effectiveness as significant in improving SWB. Ott (2010) refers to government effectiveness as a measure that captures the quality of public services, the quality of civil service, how independent it is from political pressures, and the commitment of government and the implementation of good quality policy. Although much of the measures used in the literature are at the national level and used for cross-country comparisons, in this study, we utilize municipal audit outcomes as our measure of governance. This measure is highly correlated with the measure of lower court independence from the V-dem project2 (see Figure 1) (Lindberg et al., 2014).

Figure 1. Lower court independence and Audit scores (2006-2020)



Source: Authors' calculations

[1] The study looks at the role of institutions in the relationship between inequality and economic growth.

[2] The measure captures when judges, who are not on the high court, rule on cases salient to the government and whether their decisions reflect the legal record or merely align with government preferences

To make sense of this, we borrow from the work of Veenhovev (1995) and Alvarez et al., (2010), where they propose that humans have universal material, psychological and social needs tied to our nature, and that societies are formed as a collective effort to meet these needs. Thus, variations in actual SWB across people and reference groups, once personal characteristics are accounted for, are attributable to the differences in how effective those socio-political formulations are (Veenhovev, 1995; Alvarez et al., 2010). In other words, the effectiveness of governments in ensuring or increasing the welfare of its citizens matters for variations in SWB across people and reference groups. We base our disaggregated institutional approach to assessing SWB on this. In addition, we assume that fiscal decentralization, and localization allows for political decision-making as well as formulation of collective societies closer to residents' preferences and direct control by citizens. All these, when incorporated with the effects of inequality, may reduce its effect on SWB.

The interaction between inequality and institutions did receive some attention in the literature in the past (Persson & Tabellini, 1994; Alesina & Rodrik, 1994; Acemoglu et al, 2015), with results being inconclusive. For example, Persson & Tabellini (1994), and Alesina & Rodrik (1994) find a negative effect of inequality on growth, within a political economy framework, while Acemoglu et al (2015) find evidence suggesting inequality tends to increases in the presence of democracy. Nevertheless, South Africa is a good example to explore within this context, as the legacy of apartheid has left a significant impact on institutions and levels of inequality. Further, inequality in South Africa has a spatial dimension to it which may also affect the relationship of interest. That is, these interactions may be spatially or geographically influenced across groups (Acemoglu et al., 2002), and South Africa's historical race-based segregation policies contributes to contemporary spatial patterns in outcomes related to health and economic well-being (Kwenda et al, 2023; Mudiriza and Edwards, 2021). The effects of race-based segregation on inequality and institutions also tend to be deep, and path dependent (Turok, 2001; Pieterse, 2009). This suggests that there may be marked variations in inequality, governance, and well-being across reference groups (district municipalities) in South Africa, and that there may be interesting interactions at play (Chong & Gradstein, 2007). Our data does indeed show that there is variation across reference groups, as shown in Figures 2 and 3 mapping 2017 measures of well-being inequality3, as well as governance (proxied by audit outcomes) across district municipalities.

[3] This is proxied by a measure of relative deprivation, which captures individual level inequality. However, we note that when this measure is averaged over each district municipality (in 2017), it is equivalent to the Gini coefficient.

2. Motivation for concepts and measures

There are two ways to contemplate the relationship between income and subjective wellbeing. The absolute income hypothesis (Veenhoven, 1991) suggests that income allows individuals to meet certain needs and consequently, at least at lower levels, is a cause of SWB (Diener et al, 1993). Therefore, income relaxes budget constraints and by so doing allows individuals to reach a higher level of utility. The relative income hypothesis (Duesenberry, 1949), on the other hand, suggests that people are also concerned about community consumption standard and therefore make evaluative judgements of themselves compared to others around them. The implication is that net of the effect of absolute income, relative deprivation can have negative consequences for an individual's perception of their well-being. Further, Duesenberry noted that social comparisons are not symmetric, because people tend to give more weight to upward as opposed to downward comparison. Therefore, well-being is not just a function of absolute income but also a function of relative income due to social comparisons. This distinction is important because as noted by Gerdtham and Johannesson (2004), if relative income is more important than absolute income, doubling everyone's income may for example, have little effect on SWB, as relative deprivation may have remained unchanged.

Relative deprivation is defined as a situation where an individual who is deprived of a status or commodity, sees other persons as having these assets and wishes to have them (Runciman, 1966). While Duesenberry (1949) proposed the concept of relative deprivation, Runciman (1966) clarifies the role of the reference group (with whom an individual compares him/herself). Specifically, since individuals do not live in isolation, they determine their well-being also from comparisons with others (Bossert and D'Ambrosio, 2014). The theory of relative deprivation suggests that the feeling of deprivation, relative to others, has negative effects on cognitive functions and psychological health (Lyu and Sun, 2020). Relative deprivation has been incorporated in the literature, into the measurement of inequality (Pedersen, 2004) and its effect on SWB. To operationalize this concept in empirical research Yitzhaki (1979) put forward a measure of relative deprivation. Yitzhaki's deprivation index calculates the aggregate differences between an individual's income and all other individuals earning higher incomes who belong to the same reference group (Yitzhaki, 1979; Verme, 2013). This approach by Yitzhaki (1974) strongly influences how we measure inequality in our study as well. Although, in our analysis we use household income instead of individual income. The motivation for this is that we are interested in the well-being of all individuals not only those who are employed. Further, for poorer households, one can expect that household income is made up of other transfers (e.g. social grants like child support grant and old age pension), which is not accounted for by income[4] .

The reference group in our analysis is the district municipality. District municipalities are administrative municipalities that oversee a number of local municipalities under them. In total, all 52 district municipalities in South Africa are included, of which 8 are metropolitan municipalities[5]. Therefore, our relative deprivation index measures level of deprivation of an individual's household relative to other households that share the same district.

The literature on institutions and their impact on economic outcomes has received considerable attention over the past two decades. This field builds upon North's (1990) seminal work, which defined institutions as the "rules of the game" shaping laws and guiding human interactions. Earlier foundational work by Ostrom (1978) provided an in-depth conceptualisation of institutions and their role within the economic structure of societies and markets. Since then, empirical studies have explored institutional dynamics, including their evolution, persistence, and path dependence, and more common, how institutions help explain variations in growth, development, and productivity

[4] Note that Yitzhaki's relative deprivation index at a societal level is equivalent to the Gini index (the Gini multiplied by the mean) (Verme, 2013).

[5] We acknowledge that this analysis can be performed at a lower level i.e. local municipalities. However due to data restrictions (our dataset do not contain local municipality identifiers) we have conducted our initial analysis based on district municipalities. We hope to perform a more disaggregated analysis when we get access to NIDS secure data. However, we note that it is unlikely that this will affect our substantive results.

across nations (Hall & Jones, 1999; Knack & Keefer, 1995; Acemoglu et al., 2001; Rodrik et al., 2004; Glaeser et al., 2004). More recently, research has focused on the specific channels through which institutions influence economic outcomes, such as governance structures (Pierre & Peters, 2020), entrepreneurship (Aparicio et al., 2016), and political settlements (Khan, 2018).

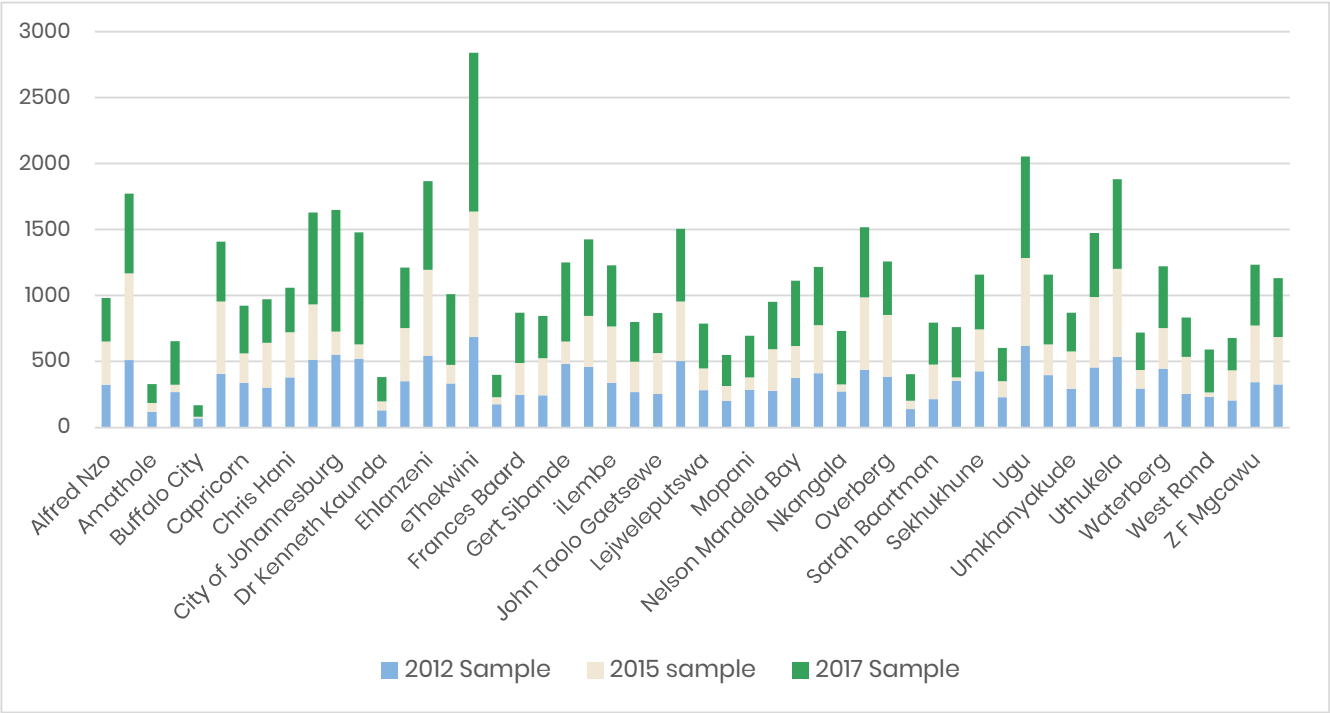
Much of the literature in the past had focused on the relationship and the channels of impact of institutions on economic growth, which is often, measured using traditional income-based economic welfare metrics. Our analysis is related to the strand of the literature that has shown that institutions are related to SWB (Spruk and Kešeljević, 2016; Bjørnskov et al, 2010; Amini and Douarin, 2020). In our analysis, we use district municipalities' audit performance (i.e. average over the local municipalities) as a proxy for institutional quality. In the institutional economics literature, the measurement of institutions has been a subject of much debate. This is partly due to the aggregate nature of most measures, which often raises concerns of what exactly institutional indicators capture. In addition to this, the often-subjective methodology used in capturing it, can lead to concerns of bias, and the indicative endogeneity issues that emerge. Within this, a number of indicators to capture varying aspects of the quality of institutions have been constructed, and have been very useful for institutional analysis[6]. However, some of the concerns remain. For example, concerning this present study, understanding the relative and spatial dynamics of SWB across groups is a key focus, and most institutional indicators are aggregated at the country level, thus limiting any use case for within-country analysis. We make use of the district level aggregated municipal scores for this reason. In doing so, we borrow from the empirical exercise in Frey (2000), in which a spatially disaggregated analysis of the relationship between institutions and SWB is done. In their study, they exploit differences in direct political participation across cantons in Switzerland, which scored on a scale of 1 to 6. In our case, we exploit differences in the performance of the municipal administration in carrying out their mandate with financial integrity. To this end, the audit scores assigned by the auditor general of South Africa, rates municipalities. Our construction of an index of governance from this is also scored on a scale of 1to 6. By capturing institutions and inequality at the district level, we hope to better understand spatial inequality in South Africa and factors that explain it.

[6] These include the indicators developed by Polity series, Freedom House, Heritage Foundation, World bank Governance Indicators (WGI), International country risk guide (ICRG), Governance matters, and more.

3. Data and Methodology

Data for our analysis is sourced from the last 3 waves of the National Income Dynamics Study (NIDS), conducted by the Southern Africa Labour and Development Research Unit (SALDRU). NIDS is a longitudinal nationally representative dataset conducted between 2008 and 2017, the last 3 waves (waves 3, 4 and 5) were conducted between 2012 and 2017 (waves are approximately 2 years apart). Anonymised data are available in the public domain (see http://www.nids.uct.ac.za). NIDS follows two-stage cluster design to represent the national population of South Africa. Over the course of the panel, 73 per cent of the original sample was re-interviewed by NIDS (Brophy et al. 2018). Across the 3 waves of NIDS used in this study, we have over 60, 000 person-years of data. The number of observations per district per wave is depicted in Figure 2. The data on both SWB and relative deprivation are obtained from the NIDS data, while the governance data is obtained from the district municipality audit outcomes.

Figure 2: Sample size by district.



Source: Authors' calculations

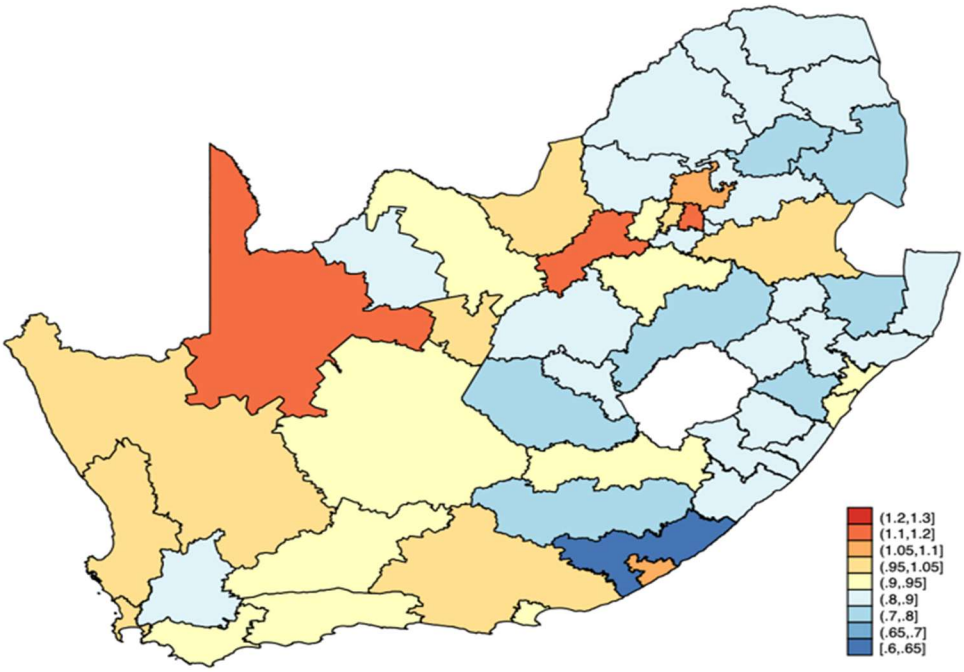
One of the questions in the NIDS survey captures the concept of Subjective wellbeing (SWB) or life satisfaction. It is measured using question M5 in the NIDS data. Question M5 reads: "Using a scale of 1 to 10 where 1 means 'very dissatisfied' and 10 mean 'very satisfied,' how do you feel about your life as a whole right now?". Although technically, subjective wellbeing is an ordinal variable, Ferrer-i-Carbonell and Frijters (2004) noted that treating the variable as a cardinal variable does not generally bias results and this approach has been used by other papers that investigate subjective wellbeing in the South African context (see Kollamparambil (2022) for example). Our main independent variables are district municipality audit opinions (averaged over the local municipalities) and inequality as captured by the Yitzhaki's deprivation index. The former is our proxy for the quality of governance while the latter is a measure of inequality.

A key aspect of our analysis is the idea of relative deprivation. To explore this, the choropleths in the Figures 3 & 4 present the averages of inequality and SWB across individuals within each district. However, this would effectively mask how the individual differs from the rest within their reference

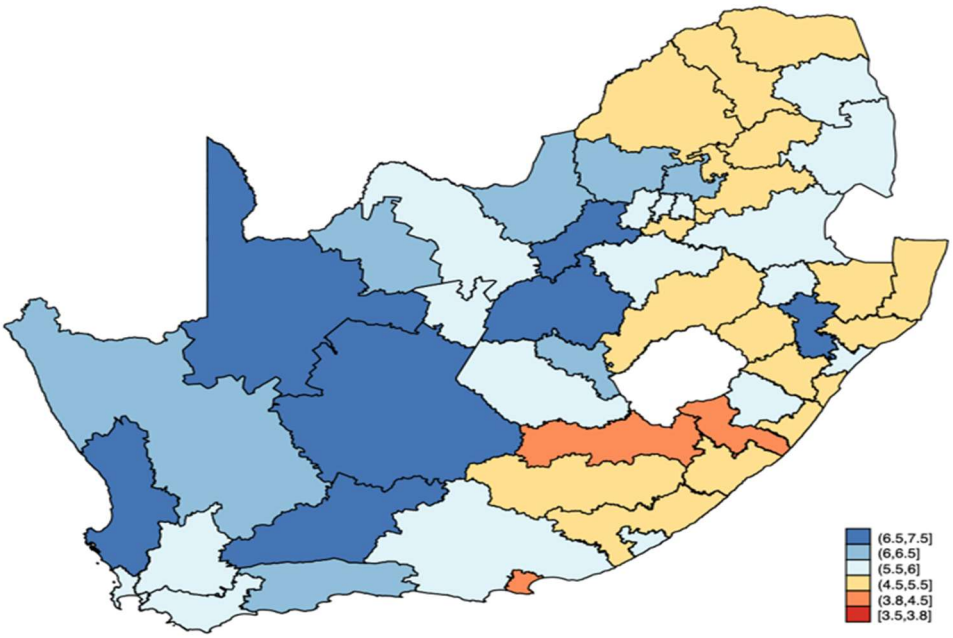
group (district municipality). Nevertheless, they show variation across district councils in the quantities of interest.

Figure 3: Map of average inequality and SWB across South African districts (2017)

(a) Inequality



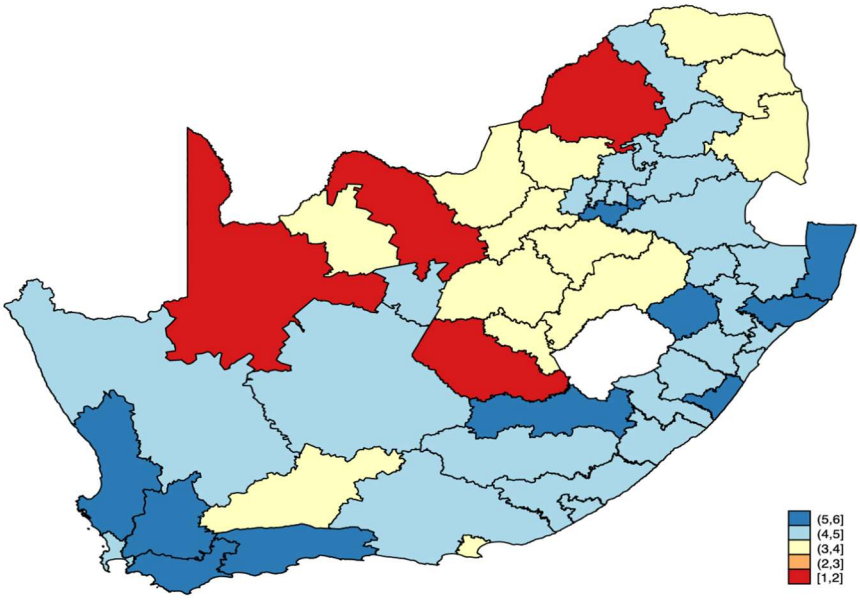
(b) Subjective well-being



Source: Authors' computations

Note : Inequality increases from red to blue ; Subjective well-being increases from red to blue

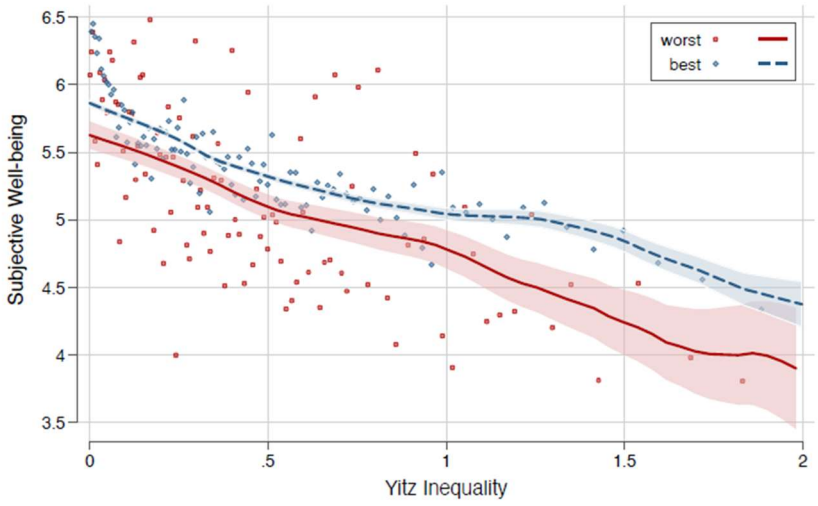
Figure 4 Map of quality of governance across South African districts (2017)



Source: Authors' computations
Note: Quality of governance increases from red to blue

To explore this further, both SWB and relative deprivation of individuals are plotted by governance outcomes of district municipalities using binned scatterplot (in Figure 5), with a polynomial curve fitted, and the 95% confidence interval highlighted (shaded area around the line). The governance scores, proxied by audit scored range from 2 to 6, with 2 representing district municipalities that oversaw local municipalities with an average audit outcome of "Adverse" & "Disclaimer"; 3 = Audit outstanding; 4 = Qualified; 5 = Financially unqualified with other matters; 6 = Financially unqualified (see Figure 4). However, for easy visibility we group them into two categories: worst and best, with the "worst" category containing adverse, disclaimer, and audit outstanding audit scores, the "best" containing qualified, financial unqualified with other matters, and financially unqualified with no matters audit scores. What the data shows in Figure 5 is that at lower inequality levels, SWB is quite high, however as inequality increases, the SWB, as expected, declines with it.

Figure 5: Scatter plot with polynomial regression fit of SWB and inequality, based on governance.



Source: Authors' calculations

The point of our analysis is illustrated by the figure 5 in that the confidence interval of the subjective wellbeing between the "worst" and the "best" district municipalities do not overlap (except for higher level of the deprivation index). The implication is that while subjective wellbeing generally decreases in inequality, there is a (statistically significant) difference between the subjective wellbeing of individuals in the "worst" versus "best" district municipalities for the same level of inequality (with the latter being better than the former). Further, it is only at high levels of inequality that the confidence intervals overlap, suggesting that the ameliorating effect of governance is eroded only at high levels of inequality.

Noting that the preceding analysis is bivariate, our multivariate analysis controls for a number of variables that are expected to explain variation in subjective wellbeing. We control for two district level characteristics (log of district population, labour participation rate), and a number of individual characteristics that are expected to be correlated with SWB following extensive literature (Kollamparambil, 2020 & 2022; Posel & Casale 2011). These covariates include age, the square of age, educational level (less than matric, matric, graduate), marital status (never married, married, cohabit, divorced/widowed), employment status. Other covariates include dummy for being enrolled in an academic institution, dummy for being a home maker, asset index divided into terciles[7], number of young (i.e. children younger than 6 years old) and number of older (between 6 and 15 years old) children in the household, an indicator as to whether violence within households in the neighbourhood is fairly or very common, a dummy variable indicating death of a household member within the last 24 months, a dummy variable indicating that the respondent is religious and some location variables (i.e. dummies indicating urban and metro residence and district dummies). Lastly, to mitigate bias due to individual propensity to report a certain level of subjective wellbeing and possible anchoring effects (Posel et al,2021), we control for reported value of subjective wellbeing 10 years ago.

Table 1 presents the summary statistics for the outcome, the key variables and the controls. The Yitzhaki relative deprivation index is based on deflated household income (values are deflated to March 2017 Rand using the headline CPI published by statistics South Africa)[8]. Finally, as noted earlier, the reference used to calculate the index is the district municipality in which the respondent resides.

[7] This is obtained using the first principal component of dummy variables that represent ownership of assets that include car, cell phone, computer, television, fridge, wifi and washing machine.

[8] http://www.statssa.gov.za/publications/P0141/CPIHistory.pdf

Table 1: Summary statistics by wave

	Wave 3		Wave 4		Wave 5	
	Mean	SD	Mean	SD	Mean	SD
a wbsat	4.97	2.4	5.52	2.33	5.57	2.46
audit cat1	4.36	1.33	4.99	.9	4.79	1
Yitz	.52	.47	.5	.45	.55	.48
metro	.18	.38	.2	.4	.22	.42
lnpop	12.23	1.39	12.33	1.45	12.43	1.52
lfpr	50.9	12.36	53.43	12.42	55.23	12.15
happier 10yr	.5	.5	.59	.49	.6	.49
same 10yr	.33	.47	.26	.44	.24	.43
Less 10yr	.18	.38	.15	.35	.16	.36
age	37.17	17.64	36.83	17.43	37.51	17.47
age2	1693.19	1569.17	1660.09	1551.37	1711.78	1561.27
Less matric	.77	.42	.75	.44	.71	.45
matric	.14	.35	.15	.35	.16	.37
graduate	.09	.29	.11	.31	.13	.33
nevermar	.58	.49	.58	.49	.57	.5
married	.24	.43	.23	.42	.25	.43
cohabit	.08	.26	.08	.27	.07	.25
divwid	.1	.3	.11	.32	.11	.32
employed	.34	.47	.39	.49	.38	.49
enrolled	.17	.37	.12	.33	.16	.37
homemaker	.07	.26	.08	.27	.07	.26
poorest	.52	.5	.49	.5	.45	.5
middle	.46	.5	.48	.5	.51	.5
richest	.02	.14	.02	.15	.03	.18
dumassets1	.32	.47	.34	.47	.37	.48
dumassets2	.33	.47	.31	.46	.3	.46
dumassets3	.35	.48	.35	.48	.33	.47
ychildhh	.54	.5	.53	.5	.5	.5
ochildhh	.55	.5	.54	.5	.54	.5
hhviolence	.23	.42	.18	.39	.23	.42
deathhh	.11	.31	.1	.3	.08	.28
religious	.91	.28	.93	.26	.91	.29
urban	.49	.5	.52	.5	.54	.5
	17960		21930		22558	

Source: Authors' calculations

Method

We are interested in how the interaction between district level governance and individual relative deprivation explain variation in individual SWB. Since the location where a respondent resides may be related to their characteristics, we note that estimating causal relationship is not possible without an exogenous variation (i.e. using instrumental variable). However, we account for time-invariant individual characteristics by using fixed effects regression, we also control for a rich set of covariates. We specify the following model.

$$swb_{ijw} = \alpha_i + gov_{jw}\beta + yitzhaki_{ijw}\gamma + gov_{jw} * yitzhaki_{ijw}\theta + X_i\mu + dist_j + \varepsilon_{ijw}$$

where swb_{ijw} is the SWB of individual i in district j and wave w, α_i and $dist_j$ are individual and district fixed effects that capture time invariant characteristics (at the individual and district level) , gov_{jw} and $yitzhaki_{ijw}$ represent the governance (proxied by audit opinions averaged across local municipalities within a district) and the relative deprivation index of individual i that resides in district j in wave w.

X_i is a vector of other individual and district level covariates presented in table 1 and ε_{ijw} is the error term. Therefore, the parameters β and γ captures the partial effects of governance and relative deprivation on respondents' subjective wellbeing and μ is a vector of covariates that describe the relationship between control variables and SWB. The focus of our analysis is the parameter θ, a positive θ will suggest that the relationship between relative deprivation and SWB depends on the quality of governance. For example, under the assumption that $\beta > 0$ and $\gamma < 0$ a positive θ will suggest that better governance quality reduces the negative effect of relative deprivation on SWB.

Spatial effects

In addition to the panel fixed effects estimation, the cross-district municipality spill-overs are also explored. Inequality exhibits spatial heterogeneity in South Africa (Kingdon and Knight, 2007; Von Fintel, 2018; Todes and Turok, 2018). The spatial nature of inequality in income and SWB can be traced back to the enforcement of segregation based on race pursued by the Apartheid regime (Christopher, 1989). In the same sense, the interrelations between governance, inequality and SWB may thus be subject to spatial autocorrelation as well. We test this out using exploratory spatial data analysis (ESDA). A spatial analysis of the district municipality inequality, SWB and governance is estimated to tease out the possible interactive effects arising from the geographical positioning of a reference group. For a cross-section of *n* district municipalities across space, the inter-municipal spatial interactions can be expressed by a spatial autoregressive model, in the form:

$$y_n = X_n\beta_n + \delta_n W_n y_n + u_n$$

$$u_n = \rho_n M_n u y_n + \varepsilon_n$$

where y_n denotes the $n \times 1$ vector of observations of the dependent variable (i.e. SWB), X_n denotes the $n \times k$ matrix of exogenous regressors, and W_n and M_n are $n \times n$ row-normalised spatial weight matrices with zeros in the main diagonal. n represents the number of municipalities in the sample, and the elements of the matrix W refer to 'spatial weight', proxying for the geographical link between neighbouring municipalities, using the contiguity method. u_n denotes the $n \times 1$ vector of regression disturbances, while ε_n is an $n \times 1$ vector of innovations. δ_n and ρ_n are spatial autoregressive parameters, and β_n is a $k \times 1$ vector of unknown parameters (Kelejian & Prucha 2010). Within this framework, both the local spatial autocorrelation and global spatial autocorrelation nature of the three key variables can be explored (LeSage and Anselin, 2008; Anselin, 2019).

4. Results and Discussion

4.1. Does governance mediate SWB's response to inequality

Table 2 presents the fixed-effects results that sequentially include key variables and controls into the analysis. In column 1, the parsimonious model with only relative deprivation and governance included in the analysis, shows that controlling for individual fixed effects, governance (audit outcome) is positively correlated with subjective wellbeing while relative deprivation reduces subjective wellbeing. This is consistent with expectation i.e. the SWB of individuals in district municipalities with good governance should be relatively higher than for those individuals in district municipalities with relatively poor governance. A unit change in the quality of district municipal governance quality is associated with about 19% increase in subjective wellbeing while a unit change in relative deprivation is associated with a 40% decrease in SWB. These associations are significant at the 1% level.

In column 2, we estimate the relationship with the 3 key variables only. That is, we regress SWB on municipal level governance, relative deprivation, and the interaction between relative deprivation and municipal governance. This interaction term captures the essence of our study. If the hypothesis put forward is to be confirmed, then the interaction term should be positive. That is, as the quality of governance in a district municipality goes up, the impact of relative deprivation on the subjective well-being of individuals is less severe. The interaction term in column 2 supports this. And while the value of the governance coefficient has decreased, it remains positive and statistically significant at the 1% level. This statistical significance suggests that for the same level of relative deprivation, higher levels of governance tend to increase SWB (by 9%) compared to lower levels of governance. However, it is possible that the estimated coefficients are largely overestimated because of some district municipality factors, other than the quality of governance. For example, metropolitan district municipalities have a wider variety of options for individuals in terms of services (e.g. there are more options in terms of transportation in metropolitan districts), while more populated regions can adversely affect people's sense of well-being due to congestion and pressure on services. We control for these potential confounding factors in subsequent estimates. In column 3, in addition to including our main factor of interest i.e. the interaction between inequality as measured by relative deprivation and governance as proxied by audit outcome, we also control for potential confounding factors at the municipal level, including municipal population, municipal labour force participation rate, and whether the district municipality is a metropolitan municipality or not. The results show that both relative deprivation and its interaction with the quality of governance remain the same. That is, the mediating role of governance on the negative effect of relative deprivation did not adjust much with the inclusion of district municipality characteristics. What does change is the magnitude of importance of the quality of governance, as this decreased by 4 percentage points.

That is, indeed, the role of district municipality governance was overestimated with the absence of some of these municipal characteristics. This highlights that, even though we control for individual level fixed effects, the role of relative deprivation and the interaction term may be overstated.

Columns 4 to 6 show that the interaction effect remain statistically significant and stable (in terms of size) when individual level characteristics (column 4), district dummies (not reported, but in column 5) and survey wave dummies (column 6) are added to the analysis. This suggests that the estimate of the interaction term is robust to the inclusion of these covariates with additional covariates only reducing the size of the effect of a 1 unit change to 8% in columns 5 and 6. We note that the inclusion of district fixed effects in column 5, does not impact the coefficient of the key variables. However, the inclusion of the district municipality fixed effects, as well as wave/time dummies (in column 6), renders the estimate on governance statistically insignificant (suggesting that audit outcomes can be explained by time dummies perhaps due to election cycles). The interaction effect remain statistically significant showing that the synergy effect between audit outcomes and relative deprivation holds, even when governance is not statistically significant.

Table 2: Fixed effects results – SWB

VARIABLES	(1) Reg 1	(2) Reg 2	(3) Reg 3	(4) Reg 4	(5) Reg 5	(6) Reg 6
audit_cat1	0.19***	0.15***	0.11***	0.06**	0.07***	0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Yitz	-0.40***	-0.82***	-0.83***	-0.70***	-0.69***	-0.67***
	(0.04)	(0.15)	(0.15)	(0.14)	(0.14)	(0.14)
c.audit_cat1#c.Yitz		0.09***	0.09***	0.09***	0.08***	0.08***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
metro			-1.17***	0.62	0.76	3.64*
			(0.37)	(0.38)	(1.84)	(1.89)
lnpop			0.21*	-0.15	-0.25	-1.34**
			(0.11)	(0.11)	(0.64)	(0.67)
lfpr			0.03***	-0.00	-0.04***	-0.07***
			(0.00)	(0.01)	(0.02)	(0.02)
2.a_wbsat10yr				-0.85***	-0.85***	-0.84***
				(0.03)	(0.03)	(0.03)
3.a_wbsat10yr				-1.71***	-1.71***	-1.70***
				(0.04)	(0.04)	(0.04)
age				0.11***	0.14***	0.03
				(0.02)	(0.02)	(0.04)
age2				-0.00**	-0.00**	-0.00**
				(0.00)	(0.00)	(0.00)
Less_matric				0.01	0.00	-0.00
				(0.09)	(0.09)	(0.09)
matric				-0.01	-0.01	-0.00
				(0.08)	(0.08)	(0.08)
employed				0.10***	0.10**	0.09**
				(0.04)	(0.04)	(0.04)
religious				0.42***	0.42***	0.41***
				(0.05)	(0.05)	(0.05)
urban				-0.03	-0.08	-0.09
				(0.09)	(0.10)	(0.10)
4.wave						0.55***
						(0.10)
5.wave						0.74***
						(0.18)
Constant	4.68***	4.89***	0.94	3.97***	6.39	23.68***
	(0.08)	(0.11)	(1.27)	(1.26)	(7.00)	(7.65)
Observations	62,448	62,448	62,448	62,448	62,448	62,448
R-squared	0.01	0.01	0.01	0.10	0.10	0.10
Number of pid	32,388	32,388	32,388	32,388	32,388	32,388

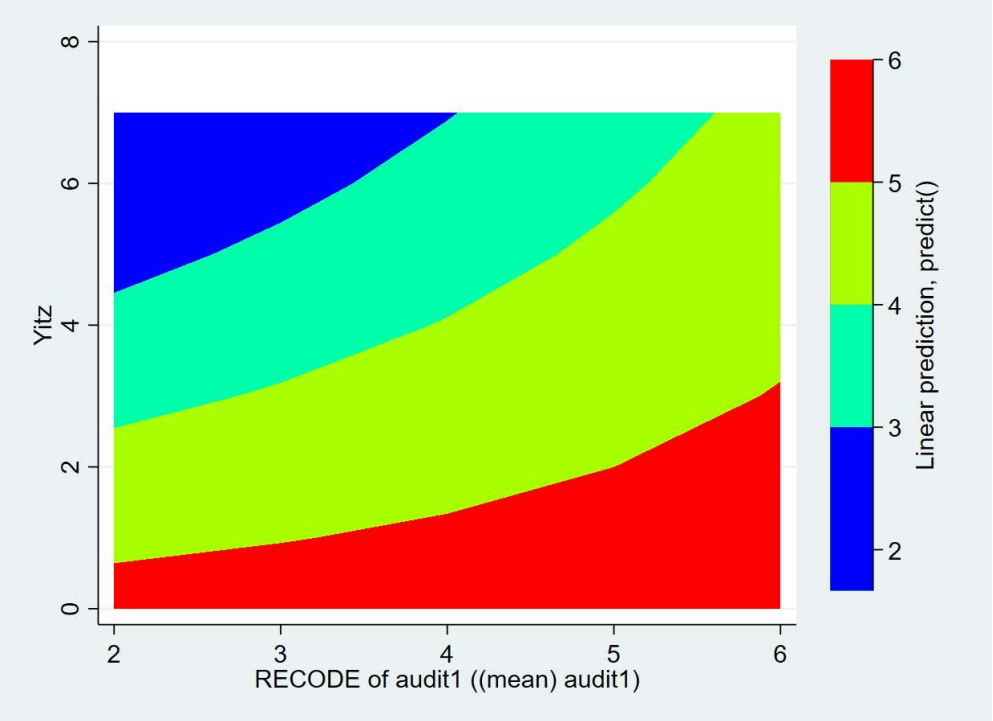
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations

4.2. What is the nature of mediation?

Consistent with figure 1, figure 6 illustrates this point by presenting a plot of the marginal effects from the model (in column 6 i.e. the model that accounts for the full set of controls). The marginal effects plot show that for the same level of relative deprivation, wellbeing tends to become more positive for higher levels of audit outcome. For example, if we hold relative deprivation constant at 6, individuals that live in districts with audit outcome of 2 have average subjective wellbeing between levels 2 to 3 while those with audit outcomes close to 6 have subjective wellbeing between levels 4 and 5.

Figure 6: Marginal effects Plot



Source: Authors' calculations

Our results also show the relationship between subjective wellbeing and other covariates. In terms of district level covariates, living in a metro increases subjective wellbeing while population and labour force participation have the opposite relationship with subjective wellbeing. In terms of individual characteristics, reporting the same or lower level of happiness (compared to 10 years ago) is negatively correlated with (current) subjective wellbeing; age is nonlinear in subjective wellbeing, while those who were never married or cohabiting report lower subjective wellbeing relative to those who are currently married. Being employed or enrolled (in an educational institution) is positively correlated with subjective wellbeing, while homemakers report lower wellbeing on average. Relative to those who are in the highest tercile of the asset index, being in the lowest or middle tercile reduces subjective wellbeing. Lastly, while living in a neighbourhood that is prone to violence is negatively related to subjective wellbeing being religious has a positive relationship with subjective wellbeing.

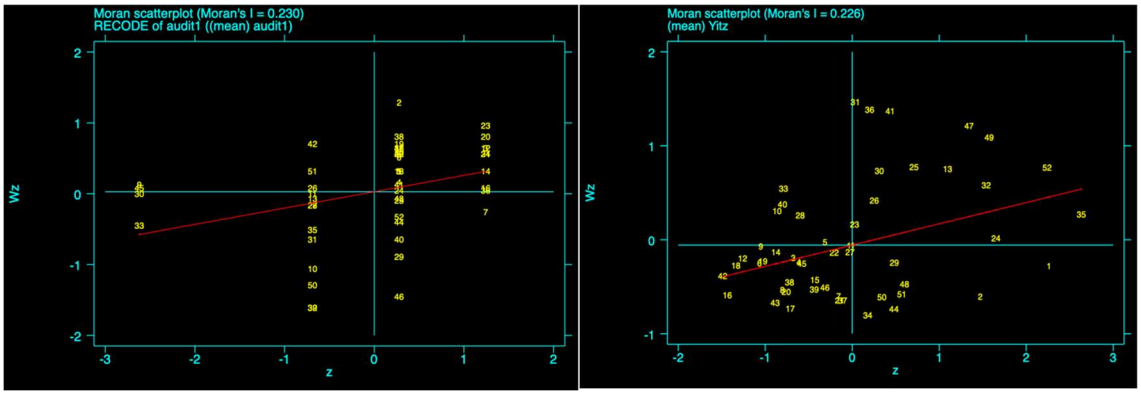
4.3. What kind of district neighbours influence each other the most?

Previous research has shown the significance of local government interactions in determining various macroeconomic outcomes in South African municipalities (Amusa et al., 2019), and also that inequality in South Africa has strong spatial heterogeneity (Von Fintel, 2018; Todes and Turok, 2018). In Figures 7 & 8, we present exploratory spatial data analysis (ESDA) statistics for the three key variables in the analysis. In the new economic geography (NEG) literature, two statistics are often used to examine global spatial autocorrelation. The first is Geary's C, which tests for spatial autocorrelation by making

use of the squared difference between pairs of data of the variable in concern as a measure of (co)variation in the variable. The second, and more popular test for spatial autocorrelation test is Moran's I. In an Exploratory Spatial Data Analysis (ESDA) framework, where the spatial autoregressive model is of the form: $y_n = X_n\beta_n + \delta_n W_n y_n + u_n$, where $u_n = \rho_n M_n u y_n + \varepsilon_n$. Here, W_n and M_n are $n \times n$ row-normalised spatial weight matrices with zeros in the main diagonal. n represents the number of municipalities in the sample. Moran's I is then used to detect spatial autocorrelation in district municipal inequality. It is calculated using a row-standardized spatial weight matrix in the simplified form: $I = [\frac{\Sigma_j \Sigma_w w_{jw} z_j . z_w}{S_0}]/[\frac{\Sigma_j z_j^2}{N}]$. In this regard, it is based on the slope of the regression of $\Sigma_w w_{jw} . z_w$ on z_w. It is adopted from following Anselin (1996, 2008).

The Moran's I checks whether similar values cluster together in geographic and spatial data. In either the Geary's C or Moran's I, the global spatial autocorrelation statistics can be impacted by their sensitivity to local neighbourhoods relative to global (Pisati, 2001). This might overlook nuanced information about the nature of spatial autocorrelation, such as the dominance of positive or negative spatial autocorrelation and the specific type of positive autocorrelation. Moran's I does take into account both local relative location and the global average of relative locations (Boots & Tiefelsdorf, 2000).

Figure 7: Scatterplot of Moran's I local spatial autocorrelation for governance and inequality

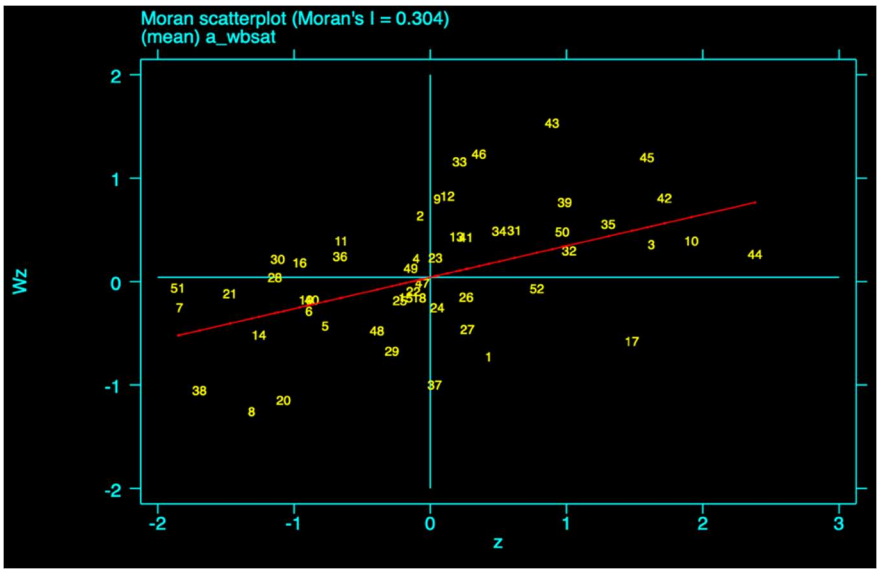


a. Governance **b. Inequality**

Source: Authors' calculations

To address the limitations of global measures, Anselin (2019) recommends visualizing local spatial autocorrelation through Moran's I scatterplots. These scatterplots categorize spatial relationships into four quadrants: the upper-right and lower-left quadrants indicate positive local spatial autocorrelation, while the upper-left and lower-right quadrants indicate negative local spatial autocorrelation. Figures 7a and 7b display Moran's I scatterplots for governance and inequality, respectively. Figure 7a illustrates the scatterplot for governance, which presents an unusual shape due to the categorical nature of the variable. Nevertheless, it is clear from visual assessment that the scatterplot is more concentrated in the upper-right and lower-left quadrants. This suggests that spatial autocorrelation across district municipal governance follows a positive rather than negative pattern.

Figure 8: Scatterplot of Moran's I local spatial autocorrelation for SWB



Source: Authors' calculations

In addition, this positive pattern is dominated by district municipalities with better governance. That is, district municipalities with higher governance scores are clustered together, and thus may be the key driver of spatial autocorrelation in governance across South African districts. Inequality exhibits a similar situation, with the scatterplot mostly located in the upper-right and lower-left quadrants. Although it is unclear if the upper-right or lower-left quadrant is more dominant, the upward slope of the fit line and the majority of points falling in those quadrants suggests a positive local spatial autocorrelation.

This suggests that the spatial nature of inequality across district municipalities is categorized in such a way that regions with high inequality cluster together, and regions with low inequality cluster together, but we do not often see a clustering together of high and low inequality regions. In essence, we find that districts with high (or low) levels of inequality, in the form of relative deprivation, tend to cluster together. The clustering of the low inequality municipalities seems to be more pronounced than for the high inequality district municipalities. What we do not observe, is the clustering of high inequality and low inequality district municipalities together. This is shown by the fact that the scatter points are more in the upper-right and lower-left quadrants. Lastly, in Figure 8, the Moran's I scatterplots for SWB display, to a lesser extent, a similar pattern with both inequality and governance. The points are more spread out, but still predominantly fall in the upper-right and lower-left quadrants. The dominance between the two quadrants is not vast, but is apparent enough to show that the upper-right quadrant is the most dominant of all quadrants. What this suggests is first, the existence of spatial autocorrelation in SWB across contiguous district municipalities, and second, this spatial autocorrelation is largely driven by district municipalities with high levels of SWB on average.

5. Conclusion

In this study, we set out to examine how the quality of governance, as an aspect of institutions, and its interaction with inequality affects the level of individual SWB. Furthermore, spatial variations as well as the spill-overs between district municipalities in governance, inequality, and SWB are explored. The findings contribute to the existing literature by shedding light on the role of disaggregated (rather than national level) institutions in improving the relationship between inequality and SWB.

The results confirmed that both inequality and quality of institutions have significant associations with SWB. Specifically, higher levels of inequality were found to be associated with lower SWB, while better institutions, in the form of governance are associated with better SWB. In addition to this, one of the key objectives of the study was to establish if good governance plays a significant role in reducing the negative association between relative deprivation and SWB. The study revealed a positive and statistically significant interaction between inequality and governance. This interaction suggests that the negative impact of relative deprivation on SWB is mitigated by higher levels of institutional quality. In other words, better governance at the district municipality level can offset the detrimental effects of inequality on well-being. The results remained consistent even with the inclusion of various covariates. Additionally, exploratory spatial data analysis provided insights into the spatial heterogeneity of inequality, SWB, and governance across South African district municipalities. The ESDA showed that spatial autocorrelation does exist across districts, and this is mostly driven by districts with high levels of inequality, governance and SWB, spilling over to each other.

The findings have important policy implications. They highlight the need to focus on improving the efficiency and quality of governance at the district municipality level to assuage the persisting negative effects of relative deprivation in South Africa. By enhancing governance and public service delivery, policymakers can contribute to reducing the negative impact of inequality on SWB. This does not undermine the need for better redistributive measures in the context of South Africa, given its historical legacy of apartheid and the spatial dimensions of inequality and well-being outcomes.

Overall, this study makes two key contributions to the literature. Firstly, it provides evidence on the negative and positive effects of inequality and institutional quality, respectively, on SWB. Secondly, it emphasizes the importance of disaggregated institutional improvements in mitigating and reducing inequality's adverse consequences for well-being. Future research can further explore these mechanisms at an even more disaggregated level, for example, the local municipality level. In addition, specific inquiry into the mechanisms through which governance and institutions mediate the relationship between inequality and SWB can be explored. Lastly, the effectiveness of targeted interventions at the local government level can be further explored.

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Appendix

Table A1 : Fixed effects results – SWB

VARIABLES	(1) Reg 1	(2) Reg 2	(3) Reg 3	(4) Reg 4	(5) Reg 5	(6) Reg 6
audit_cat1	0.19***	0.15***	0.11***	0.06**	0.07***	0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Yitz	-0.40***	-0.82***	-0.83***	-0.70***	-0.69***	-0.67***
	(0.04)	(0.15)	(0.15)	(0.14)	(0.14)	(0.14)
c.audit_cat1#c.Yitz		0.09***	0.09***	0.09***	0.08***	0.08***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
metro			-1.17***	0.62	0.76	3.64*
			(0.37)	(0.38)	(1.84)	(1.89)
lnpop			0.21*	-0.15	-0.25	-1.34**
			(0.11)	(0.11)	(0.64)	(0.67)
lfpr			0.03***	-0.00	-0.04***	-0.07***
			(0.00)	(0.01)	(0.02)	(0.02)
2.a_wbsat10yr				-0.85***	-0.85***	-0.84***
				(0.03)	(0.03)	(0.03)
3.a_wbsat10yr				-1.71***	-1.71***	-1.70***
				(0.04)	(0.04)	(0.04)
age				0.11***	0.14***	0.03
				(0.02)	(0.02)	(0.04)
age2				-0.00**	-0.00**	-0.00**
				(0.00)	(0.00)	(0.00)
Less_matric				0.01	0.00	-0.00
				(0.09)	(0.09)	(0.09)
matric				-0.01	-0.01	-0.00
				(0.08)	(0.08)	(0.08)
nevermar				-0.33***	-0.32***	-0.31***
				(0.08)	(0.08)	(0.08)
cohabit				-0.18**	-0.17*	-0.18**
				(0.09)	(0.09)	(0.09)
divwid				-0.05	-0.04	-0.07
				(0.09)	(0.09)	(0.09)
employed				0.10***	0.10**	0.09**
				(0.04)	(0.04)	(0.04)
enrolled				0.18***	0.19***	0.26***
				(0.06)	(0.06)	(0.06)
homemaker				-0.17***	-0.17***	-0.17***
				(0.06)	(0.06)	(0.06)
dumassets1				-0.30***	-0.30***	-0.29***
				(0.05)	(0.05)	(0.05)
dumassets2				-0.18***	-0.18***	-0.17***
				(0.04)	(0.04)	(0.04)
ychildhh				0.02	0.02	0.02
				(0.04)	(0.04)	(0.04)
ochildhh				-0.00	0.00	0.00

	(0.04)	(0.04)	(0.04)
hhviolence	-0.38***	-0.38***	-0.36***
	(0.03)	(0.03)	(0.03)
deathhh	0.06	0.06	0.06
	(0.04)	(0.04)	(0.04)
religious	0.42***	0.42***	0.41***
	(0.05)	(0.05)	(0.05)
urban	-0.03	-0.08	-0.09
	(0.09)	(0.10)	(0.10)
2.DISTRICT_coded		0.80	2.87**
		(1.31)	(1.34)
3.DISTRICT_coded		0.38	1.07
		(0.79)	(0.80)
4.DISTRICT_coded		-0.14	-0.03
		(0.80)	(0.80)
5.DISTRICT_coded		-1.09	-0.82
		(0.80)	(0.80)
6.DISTRICT_coded		-1.29*	-1.23*
		(0.67)	(0.67)
7.DISTRICT_coded		-2.07***	-1.60**
		(0.78)	(0.78)
8.DISTRICT_coded		-1.46	-0.47
		(1.04)	(1.05)
9.DISTRICT_coded		0.74	0.38
		(0.83)	(0.83)
10.DISTRICT_coded		0.64	1.01
		(0.68)	(0.68)
11.DISTRICT_coded		-0.34	0.13
		(0.74)	(0.75)
12.DISTRICT_coded		0.60	2.11**
		(0.97)	(1.00)
13.DISTRICT_coded		-0.30	0.38
		(0.85)	(0.85)
14.DISTRICT_coded		-0.98	-0.55
		(0.71)	(0.72)
15.DISTRICT_coded		-0.28	0.09
		(0.63)	(0.64)
16.DISTRICT_coded		-1.22	-0.68
		(0.77)	(0.77)
17.DISTRICT_coded		-0.31	0.06
		(0.72)	(0.73)
18.DISTRICT_coded		0.11	0.61
		(0.71)	(0.72)
19.DISTRICT_coded		-1.10	-0.33
		(0.94)	(0.95)
20.DISTRICT_coded		-0.75	-0.12
		(0.92)	(0.92)
21.DISTRICT_coded		-0.78	-0.13
		(0.76)	(0.76)

22.DISTRICT_coded	-0.46	0.29
	(0.82)	(0.82)
23.DISTRICT_coded	0.13	0.57
	(0.85)	(0.85)
24.DISTRICT_coded	0.28	1.17
	(0.78)	(0.79)
25.DISTRICT_coded	0.33	1.56*
	(0.90)	(0.92)
26.DISTRICT_coded	-0.37	1.26
	(1.12)	(1.15)
27.DISTRICT_coded	-1.42	-0.39
	(0.95)	(0.96)
28.DISTRICT_coded	-0.10	1.46
	(1.16)	(1.18)
29.DISTRICT_coded	0.10	1.31
	(0.99)	(1.01)
30.DISTRICT_coded	0.33	1.15
	(0.75)	(0.76)
31.DISTRICT_coded	0.75	2.14**
	(0.97)	(0.99)
32.DISTRICT_coded	0.05	0.79
	(0.83)	(0.83)
33.DISTRICT_coded	-0.14	-0.07
	(0.58)	(0.58)
34.DISTRICT_coded	0.27	0.79
	(0.70)	(0.70)
35.DISTRICT_coded	0.83	1.99**
	(0.96)	(0.98)
36.DISTRICT_coded	0.15	1.74*
	(1.00)	(1.02)
37.DISTRICT_coded	-0.25	0.20
	(0.69)	(0.69)
38.DISTRICT_coded	-1.05	-0.36
	(0.92)	(0.92)
39.DISTRICT_coded	0.46	0.44
	(0.68)	(0.68)
40.DISTRICT_coded	-0.53	0.38
	(0.93)	(0.94)
41.DISTRICT_coded	0.81	2.99**
	(1.22)	(1.26)
42.DISTRICT_coded	0.12	-1.14
	(1.32)	(1.34)
43.DISTRICT_coded	-0.05	-1.41
	(1.19)	(1.21)
44.DISTRICT_coded	0.17	-0.92
	(1.09)	(1.10)
45.DISTRICT_coded	-0.44	-1.16
	(0.80)	(0.81)
46o.DISTRICT_coded	-	-

47.DISTRICT_coded					0.23	2.15*
					(1.25)	(1.28)
48.DISTRICT_coded					0.30	2.11*
					(1.24)	(1.27)
49.DISTRICT_coded					0.74	3.06**
					(1.44)	(1.48)
50.DISTRICT_coded					0.76	0.76
					(0.86)	(0.86)
51.DISTRICT_coded					-0.39	0.09
					(0.86)	(0.86)
52.DISTRICT_coded					1.02	2.78**
					(1.21)	(1.23)
4.wave						0.55***
						(0.10)
5.wave						0.74***
						(0.18)
Constant	4.68***	4.89***	0.94	3.97***	6.39	23.68***
	(0.08)	(0.11)	(1.27)	(1.26)	(7.00)	(7.65)
Observations	62,448	62,448	62,448	62,448	62,448	62,448
R-squared	0.01	0.01	0.01	0.10	0.10	0.10
Number of pid	32,388	32,388	32,388	32,388	32,388	32,388

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