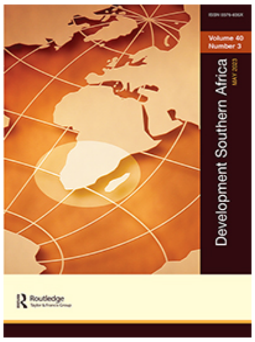

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RESEARCH ARTICLE

Non-payment culture and the financial performance of urban electricity utilities in South Africa

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ABSTRACT

Non-payment for services continues to challenge sustainability in municipal service delivery across South Africa. Literature provides that the culture of non-payment stems from the apartheid era where mass civil disobedience manifested through boycotting the payment of rates. This study examines the impact of the non-payment culture on municipal financial performance in South Africa. Panel data for 28 municipalities for the years 2005–19 is used, and the random-effects model is employed to estimate the relationship between municipal financial performance and non-payment. Results confirm that non-payment has a negative impact on financial performance. For every R1000 increase in bad debts written off, financial performance is reduced by R291. Further, grants from the national government, the number of consumers, and the number of household units receiving free basic electricity positively affect financial performance. These revelations warrant the need for more innovative approaches that transform non-payment into a culture of payment.

KEYWORDS

Electricity provision; municipal financial performance; non-payment culture

JEL CLASSIFICATION

H26; H63; H68; R58

1. Introduction

Consumer debt continues to threaten the sustainability of public service provision across South African municipalities. Households, businesses, and government owe South African municipalities about R170 billion for services rendered (Omarjee, 2020). In this regard, households account for most of the debt, owing around R120 billion, followed by businesses with over R25 billion and government which owes around R10 billion. High consumer debt levels increase the propensity for bad debts, which consequentially make municipalities struggle to meet their credit obligation for bulk purchases of electricity and water. For example, in 2020 South African municipalities owed Eskom (the power utility) R46.1 billion, of which R31 billion was overdue debt (Department of Public Enterprises, 2020). Municipalities usually argue that they struggle to meet their debt obligations because they are also not paid by their customers. This has major implications on the long-term sustainability of municipal service provision. With the provision of electricity, for example, Eskom sometimes threatens to stop supplying electricity to those municipalities whose debt to the power utility is overdue.

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While many factors are cited for the increasing consumer debt, and the subsequent bad debts written off by municipalities, the culture of non-payment for services is often mentioned among the key determinants. According to Lubbe & Rossouw (2005), the culture of non-payment for public services can be traced back to the apartheid-era where mass civil disobedience which manifested through boycotting the payment of rates, was dominant. Although this could be viewed as a culture that dates back into history, several factors are constantly identified as key drivers of the culture of non-payment in post-apartheid South Africa. Evidence exists that the non-payment of municipal services is influenced by socio-economic factors such as poverty, unemployment, level of formal education and race group (Worku, 2017; Enwereji & Uwizeyimana, 2020). Other drivers include the culture of entitlement, dissatisfaction with service provision, corruption of municipal workers, rise in the cost of municipal services, communication gaps, and problems in the municipal decision-making process (Enwereji & Uwizeyimana, 2020). Non-payment is regarded in other studies as 'people protesting against the commodification of everyday life' (Day et al., 2021).

Although the culture of non-payment has received considerable attention in the South African literature, most of the existing studies use qualitative methods, and report on people's views and perceptions on the phenomenon (van Schalkwyk, 2012; Enwereji & Potgieter, 2018; Day et al., 2021). Very few studies apply quantitative approaches to examine this phenomenon. Those that use quantitative approaches mostly employ survey data and report on descriptive and inferential statistics (van Schalkwyk, 2012; Worku, 2017; Enwereji & Uwizeyimana, 2020). Most importantly, current studies in the literature examine the determinants of the non-payment culture, and none quantifies the impact of non-payment for services on the financial performance of municipalities in South Africa. This implies that a gap exists on studies that use comprehensive municipal data and robust statistical models to examine the impact of non-payment for municipal services in the context of South Africa. Each year, municipalities provide financial and non-financial data which reflect their respective performance. This data is rarely used by academics to provide scientific evidence on municipal performance.

This study examines the impact of the non-payment culture on the financial performance of South African municipalities. Many studies in the literature have examined the determinants of non-payment for public services in South Africa. Such determinants are usually grouped into two main categories, namely, inability to pay and refusal to pay (van Schalkwyk, 2012; Worku, 2017; Enwereji & Uwizeyimana, 2020). However, this study is different to such studies as it acknowledges the various reasons for non-payment identified in the literature and proceeds to examine how non-payment affects the financial performance of municipalities. Thus, non-payment in the context of this study is modelled as a determinant of municipal financial performance. Bad debts written off by the electricity department of each municipality are used as a proxy for non-payment.

Although a typical South African municipality provides many services including electricity, water, sanitation, solid waste collection, waste management, among others, the electricity function was selected for several reasons. Post-apartheid South Africa continues to experience several challenges in the supply of electricity. Such challenges are due to factors including inadequate electricity generation capacity, industrialisation and economic development, population growth and excess demand, climate change as well as the regulation of the electricity distribution sector which leads to very low tariffs that are not cost-reflective. The problems of low tariffs and defaults by municipalities in honouring their financial obligations towards Eskom has exacerbated power outages in South Africa. Eskom has been having challenges with refurbishing and maintaining the electricity-generating infrastructure mainly due to financial and operational problems. Consequently, most of the electricity generating plants frequently experience breakdowns (Cowan, 2022; Tshikalange, 2022). As a result, loadshedding has been a tool utilised to prevent a total collapse of the grid. In 2021 alone, South Africa had a record 1150 h of electricity outages (Burkhardt, 2022). These challenges have far-reaching effects, including major effects on economic growth and development. Therefore, understanding the performance of the electricity distribution function of municipalities, and how it is affected by the culture of non-payment for electricity is warranted.

The study is organised into six sections. Section 2 presents the literature review. Section 3 discusses the methodology and specifies the empirical model. Section 4 discusses the data used in the study and presents descriptive statistics. Section 5 discusses the results of the study. Section 6 concludes the study.

2. Literature review

The study draws on the systems and contingency theories which address and provide solutions to challenges institutions such as municipalities experience in order to optimise financial performance. The systems theory views municipalities as units of interacting parts that work as a full structure, converting available resources into outputs, while interacting with both internal and external environments (Checkland, 1994; Mele et al., 2010). The theory stresses the necessity for municipal departments to have a clear understanding of their purposes to ensure efficient service delivery. Thus, it underlines the need for municipal departments to best-manage their relationships with stakeholders. On the other hand, the contingency theory of leadership suggests that effective leaders are determined by how well their leadership style suits a particular situation within an organisation (Sauser et al., 2009). These contingencies are related to various circumstances including the lack of resources, social, environmental, and governmental challenges, new technologies, and the size and structure of an organisation. The theory emphasises the need for institutions like municipalities to be more self-aware, objective and flexible by adopting adequate contingency plans to deal with problems arising within or beyond the municipality control.

Apart from the systems and contingency theories, the study further draws on the New Public Management (NPM) theory. The foundation of NPM is in the work of Hood (1991), which drew attention to the growth of a distinctly managerial, as opposed to administrative, approach to the delivery of public services. Key elements in the theory are autonomy, accountability, customer orientation and market orientation. Thus, it formalises the link between the utility and its environment, where the utility has the autonomy to set performance targets and eventually be accountable for results. One of the conditions necessary for the NPM theory to work is that the utility should have proper financial cost recovery systems in place. The theory is strongly linked to good governance, which works with contracts and performance indicators. This link is clearly discussed in Van Dijk (2006). Over the years, NPM has been both critiqued and praised in the literature (Schachter, 1997; Osborne et al., 2013). Generally, the legitimacy and relevance of NPM have been the frequent implicit assumptions of a unified and integrated body of management theory derived from private sector experience upon which contemporary public management is grounded (Osborne et al., 2013). In a nutshell, the study uses the NPM theory as a normative conceptualisation intending to provide services that people value to increase the autonomy of public managers and reward organisations and individuals for improving public sector production efficiency (Islam, 2015).

Another essential theory is the urban management (UM) approach which is rooted in local government reform and geographical concepts of 'urban managerialism' (Devas, 1993; Chakrabarty, 2001) to control the provision of essential government services like housing, education, healthcare, electricity, and energy at the urban level. The UM approach adopted in this study incorporates the five managerial functions related to municipality planning, organising, leading, and controlling to address utility challenges effectively and equitably. This approach brings about some institutional adjustments needed to better manage new urban investments due to a lack of ongoing maintenance (McGill, 1998), yet it also sparked discussions regarding local authority and autonomy in urban governance (De Souza, 2000; Rzenca, 2017; Cardullo & Kitchin, 2019). Based on the public choice theory (i.e. a type of UM approach advanced by Paul Peterson), urban managers and administrators compete to capture new investment and capital through the infrastructure put in place in the cities they manage, which support the needs of business and economic development (Boyne, 1998). The UM approach is relevant to assist municipality managers and administrators in providing quality service delivery to citizens by improving the efficiency and effectiveness of electricity (a core service) in South Africa.

The electricity distribution industry plays a vital role within the South African economy. Key players in this industry are Eskom, the National Energy Regulator (NERSA), municipalities, and end-users of electricity. Eskom is the power utility responsible for the majority of generation, transmission and distribution of electricity in the country. Electricity generated by Eskom is mostly sold to municipalities (42%) that further distribute it to end-users, followed by industrial consumers (23%) and mining (14%) (Eskom, 2016). In practice, Eskom is a natural monopoly. As such, NERSA keeps an oversight on the behaviour of Eskom, especially in the distribution and pricing of bulk electricity. More specifically, NERSA was established in terms of the National Energy Regulator Act of No. 48 of 2004, the Electricity Regulation Act No. 4 of 2006, the Gas Act No. 48 of 2001, and the Petroleum Pipelines Act No. 60 of 2003. It is a juristic body whose legislative mandate is the regulation of the country's electricity, piped gas, and petroleum industries. Overall, NERSA oversees these three sectors, regulating prices and reducing adverse monopolistic tendencies.

The electrification rate in South Africa is comparatively very high for the region, standing between 85 and 90%. Municipalities in the country earn significant proportions of their income from selling electricity. For example, in 2016 metropolitan municipalities earned an average of 29% of their income from selling electricity, while local municipalities were slightly less dependent, with electricity contributing an average of 27% (Statistic South Africa, 2017). Nevertheless, various challenges are noted within the electricity supply chain. Many of these challenges stem from the reality that South Africa's power system is constrained and will be for years, until the capacity needed to relieve the current shortage is generated (Joffe, 2018). Further, the misalignment of the electricity sector's long-term plan with other national strategic plans, and the minimal endogenisation of this long-term plan into existing sustainability transitions governance frameworks is also criticised for the challenges currently facing the sector (Mqadi et al., 2018). Overall, the sector is in a crisis which Moeti (2013) suggests is a result of policy decisions revolving around pricing coal-produced electricity to take account of current and future infrastructural needs, and capital investment in newer cleaner technologies. Thus, Joffe (2018) proposes that if South Africa wishes to sustain the sector, a transition which includes more diverse sources of supply and players must be adopted.

While the electricity sector in general, is going through a plethora of challenges, municipalities who are distributors of electricity are also struggling with the problem of non-payment of electricity services. To address this problem, the adoption of prepayment technologies have been proposed as an appropriate solution. However, pressure groups resist this technology, citing that the use of prepaid metres entails the creation of 'spaces of calculability', where poor residents subject their daily consumption practices to a constant metrological scrutiny (Ruiters, 2007; von Schnitzler, 2008). Since the end of apartheid, South Africa has been faced by prevalent non-payment of service charges, often interpreted as a 'culture of non-payment' believed to stem from the anti-apartheid rent boycotts of the 1980s (von Schnitzler, 2008; Lubbe & Rossouw, 2005). As such, municipalities are losing out billions of revenues and struggle to honour their financial obligations to bulk suppliers (Department of Public Enterprises, 2020).

Studies in the literature have attempted to establish the determinants of the culture of non-payment in South Africa. While most of them agree that the culture stems from the anti-apartheid rent boycotts, other determinants are noted (van Schalkwyk, 2012; Worku, 2017; Enwereji & Uwizeyimana, 2020). Commonly noted drivers include ignorance, poverty, unwillingness, unemployment, culture of entitlement, dissatisfaction services, corruption of municipal workers, rise in the cost of services, communication gaps, and problems with municipal decision-making processes. In addition, Fjeldstad (2004) argues that non-payment in South Africa is also related to whether citizens perceive the municipality to act in their interest. It is believed to be linked to three dimensions of trust, thus trust in the authorities to use collected revenue to provide expected services, trust in the authorities to establish fair procedures for revenue collection and distribution of services, and trust in other citizens to pay their share (Fjeldstad, 2004). Interestingly, the reluctance to pay is also reported to be linked to the level of formal education and the racial group of citizens (Worku, 2017).

The consequences of non-payment to the municipalities are both far-reaching and documented in the literature. In most cases, municipalities struggle to meet their financial obligations for bulk purchases, which significantly threatens sustainability in the provision of services such as electricity. As a result, municipalities struggle to meet their service delivery goals which would consequentially lead to service delivery protests, which in most cases result in vandalism and the damaging of municipal infrastructure (van Vuuren, 2013; Kanyane, 2014; Morudu, 2017). The loss in revenue imply that municipalities are unable to reinvest in the much needed infrastructure which would improve service delivery efficiency. Further, bulk service providers may withhold the provision of bulk supplies due to non-payment by municipalities. This has been common in South Africa where Eskom would withhold or threaten to withhold the provision of bulk electricity to municipalities whose debt to the power utility has been overdue. For example, in 2020 Eskom threatened to disconnect power to a third of municipalities in a bid to claw back about R31 billion (Mafolo, 2020).

Efforts to develop solutions that promote a culture of payment are noted in the literature. Enwereji and Potgieter (2018) devise a conceptual framework to disclose innovative measures municipalities can consider in order to establish a responsible payment culture. The proposed framework involves traditional leaders, influential persons or groups and municipal role-players, and the application of emerging innovations and communications to establish a favourable payment culture. Further, municipalities are recommended to uphold the prescripts of strategic management and leadership in order to be visionary, dynamic, goal-oriented, transformational and tactical to manage payment and conflict. These recommendations are further echoed in Enwereji & Uwizeyimana (2020). However, Kroukamp & Cloete (2018) argue that the lack of professionalism in municipalities cultivates unwillingness to pay for services rendered. The study criticises problematic political/administrative interfaces, a lack of accountability, dysfunctional caucuses, unsatisfactory labour relations, weak public participation structures and weak financial management for creating the belief that professionalism is not part and parcel of local government. As such, municipalities should ensure sound leadership, provide monitoring and evaluation mechanisms for performance management, create a culture of service, ensure sound financial local government, inculcate professional values to employees, and apply different direct and indirect support interventions (Kroukamp & Cloete, 2018). These interventions may be essential in improving municipal performance and subsequently transform the culture of non-payment into a culture of payment.

3. Methodology and empirical model specification

This study is set to examine the impact of bad debts on the financial performance of South African municipalities in their electricity provision function. To do this, panel regression models are used. Panel models are preferred in this study because they increase the sample size and provide insights into analytical questions that cannot be answered using time-series or cross-sectional data alone (Reed & Ye, 2011). Further, panel data models are adopted because they allow for variables that can differ between municipalities yet remain unchanged over time and those that change over time but are similar for all municipalities in each period. Additionally, panel models are dynamic allowing for variables that vary both over time and between municipalities as well as those that vary in predictable ways.

The most common estimators used in panel data modelling are the pooled ordinary least squares (pooled OLS) model, fixed effects (FE) model and random effects (RE) model. These three use different assumptions and more details on their individual assumptions and specifications are given in Wooldridge (2016). Nonetheless, the basic mathematical formulation for panel data regression models is specified as:

$$y_{it} = \alpha + x'_{it}\beta + v_i + \epsilon_{it} \tag{1}$$

where y_{it} is the dependent variable for decision-making unit i (which in this study is municipality i) in time period t (i.e. year t in the context of this study); α is the constant;

x'_{it} represents the explanatory variables; β is the coefficient for each explanatory variable; v_i is the municipal specific error term which differs between municipalities, but has a constant value for any particular municipality; and ϵ_{it} is the 'common' error term with the usual properties (i.e. mean 0, uncorrelated with itself, uncorrelated with x, uncorrelated with v, and homoscedastic). Normally, ϵ_{it} could be decomposed to $\epsilon_{it} = v_t + \omega_{it}$, assuming that ω_{it} is a conventional error term which better describes v_t. Regardless of the properties of v_t and ϵ_{it}, if Equation (1) is true, then it is true that:

$$\bar{y}_i = \alpha + \bar{x}_i\beta + v_i + \bar{\epsilon}_i \quad (2)$$

where $\bar{y}_i = \sum_t y_{it}/T_i$ and $\bar{x}_i = \sum_t x_{it}/T_i$; while $\bar{\epsilon}_i = \sum_t \epsilon_{it}/T_i$. When Equation (2) is subtracted from Equation (1), then it must also be true that:

$$(y_{it} - \bar{y}_i) = (x_{it} - \bar{x}_i)\beta + (\epsilon_{it} - \bar{\epsilon}_i) \quad (3)$$

Equations (1)–(3) provide the basis for estimating β in panel data analysis. For the fixed effects (FE) model, which is also called the within estimator, it amounts to using the OLS to perform the estimation of Equation (3). However, the RE model is a weighted average of estimates produced by the between and within estimators, which is equivalent to the estimation of:

$$(y_{it} - \theta\bar{y}_i) = (1-\theta)\alpha + (x_{it} - \theta\bar{x}_i)\beta + \{(1-\theta)v_i + (\epsilon_{it} - \theta\bar{\epsilon}_i)\} \quad (4)$$

where θ is a function of σ_v^2 and σ_ϵ^2. If $\sigma_v^2 = 0$, it means v_i is 0, then $\theta = 0$ implying that Equation (2) can be directly estimated using the OLS. However, if $\sigma_\epsilon^2 = 0$, it means ϵ_{it} is 0, then $\theta = 1$, suggesting that the within estimator returns all the information available, thus the regression will have an R^2 of 1. Further discussions on panel data modelling are given in the literature (Wooldridge, 2016).

These panel regression estimators are used to estimate the impact of non-payment of electricity services on the financial performance of each municipality in this study. This is done by estimating municipal financial performance as a function of bad debts written off, and selected control variables that are expected to have a direct impact on the financial performance of each municipality in its electricity provision function. The model estimated is expressed as follows:

$$PERF_{it} = \alpha_{it} + \beta_1 DEBT_{it} + \beta_2 GRANT_{it} + \beta_3 LAB_{it} + \beta_4 CON_{it} + \beta_5 FBE_{it} + v_i + \epsilon_{it} \quad (5)$$

where $PERF_{it}$ is the financial performance of municipality i in year t; $DEBT_{it}$ represents bad debts written off by municipality i in year t; $GRANT_{it}$ is the grant received from the national government by municipality i in year t; LAB_{it} is the total number of employees attached to the electricity department of municipality i in year t; CON_{it} is the number of consumer units served by municipality i in year t; FBE_{it} is the number of consumer units in municipality i who received free basic electricity during year t; v_i is the municipal specific error term; and ϵ_{it} is the 'common' error term. A full description of these variables is given in the next section.

A pooled OLS model is conducted to test whether the same coefficients apply across all selected municipalities. Where different coefficients apply across municipalities, one would need to make a choice between FE and RE models. This study will choose the best model between the pooled OLS, FE and RE models.[1] If the problem of autocorrelation (or serial correlation) exists in the model, Druker (2003) suggests deriving the first-order serial correlation. After specifying the appropriate model, Druker (2003) proposes manually estimating the model, creating first differences on all variables. The residuals of the last pooled difference model are then predicted and further regressed over their first lag. Finally, the hypothesis suggesting whether the lagged residual is equal or not to 0.05 is tested. If the result indicates a significant p-value, the null hypothesis of no serial correlation should be rejected at 5% significant level, implying that the model has serial correlation. The outlined procedure is adopted in this study. Further, the study will perform other diagnostic tests to detect multicollinearity and heteroscedasticity problems using the Spearman's correlation matrices and the Breusch Pegan test, respectively.

4. Data and descriptive statistics

Financial and non-financial census data for 28 urban municipalities for the years 2005–19 is used. Thus, the data is a panel consisting of cross-sections ($N = 28$ municipalities) and time series ($T = 15$ years). The data refers to the electricity provision function of each municipality and was obtained from the Statistics South Africa (Stats SA) website. The selected sample of 28 municipalities consists of 8 metropolitan municipalities and 20 category B1 local municipalities. The latter refers to local municipalities with a large town or city as urban core and are also called 'secondary cities'. These municipalities where selected because they are home to a very large percentage of the country's population, are the industrial hubs and contribute significantly to the country's gross domestic product (Donaldson et al., 2020). Therefore, their performance is of great importance to the country's performance and should be overemphasised (Marais & Cloete, 2017). Data for the six variables identified in the previous section were compiled. It should be emphasised that this data refers to the electricity service provision function of each municipality. Descriptive statistics for the data set are given in Table 1 and detailed descriptions of the variables given after the table.

PERF is the financial performance of each municipality each year which is used as the dependent variable for the model estimated in this study. The surplus/deficit for the electricity unit of each municipality during a given year is used as a proxy for financial performance. Table 1 shows that there are more variations between municipalities (R339 156 000) than within (R305 803 000). One can link this variation to the categorisation of municipalities in South Africa. The average PERF ranges between R170 869 000 and R1 239 743 000 across municipalities but varies by 15 years (2005–19) for each municipality. Such variability can be a result of the nature and characteristics of the selected municipalities which vary in terms of size and operating environments. This is possible because the sample contains both metropolitan and category B1 local municipalities which were drawn from the different provinces of the country.

[1]The Hausman test is used to choose between the FE and RE models. The null hypothesis of this test is that FE coefficients are not statistically different from RE coefficients. If the test statistic is significant, the decision would be to reject the null hypothesis, thus FE coefficients are consistent and would therefore be the right model to choose, and otherwise. The Breusch and Pagan Lagrangian Multiplier (BPLM) test is used to choose between the pooled OLS and RE models. The null hypothesis for this test is that there is no random effect. If the BPLM value is insignificant, the null hypothesis is rejected. Thus, the RE model would be chosen over the pooled OLS model.

Table 1. Descriptive statistics.

Variable	Unit of measurement	Variation	Mean	Std. Dev.	Min.	Max.
PERF	R'000	Overall	204 205	452 436	−661 483	3 506 347
		Between		339 156	170 869	1 239 743
		Within		305 801	−1 035 539	2 559 870
DEBT	R'000	Overall	70 484	194 755	0	1 877 903
		Between		151 613	135	649 233
		Within		125 344	−578 749	1 299 154
GRANT	R'000	Overall	33 321	84 406	0	552 877
		Between		54 977	0	208 294
		Within		64 830	−174 973	418 535
LAB	Number	Overall	430	669	0	3 650
		Between		655	10	2 274
		Within		181	−1 516	2 259
CON	Number	Overall	195 059	236 083	6 173	1 106 663
		Between		234 368	8 763	869 700
		Within		51 405	−66 851	432 023
FBE	Number	Overall	63 146	122 085	0	793 225
		Between		100 664	2 506	428 476
		Within		71 486	−171 143	470 566

Note: $N = 420$; $n = 28$; $T = 15$.

DEBT refers to the value of bad debts written off by the electricity unit of each municipality each year. This is the main independent variable and is used to reflect the culture of non-payment for electricity services. A negative relationship is expected between the bad debts written off and the financial performance of municipalities. This expectation is based on the accounting principle that bad debts written off are treated as an expense to the organisation, thus they reduce the organisation's surplus (or increase its deficit). Table 1 shows an average surplus of R70 484 000 (about US$4 695 803)[2] with a higher overall standard deviation, suggesting great variability between the reported mean surplus and figures for individual municipalities. Higher variations are noted between municipalities than within each municipality over the period.

GRANT refers to the financial grant (including the equitable share grant) received from the national government by each municipality each year. The national government allocates finance in the form of an unconditional grant to municipalities in order to enable them to provide free basic services to poor households. GRANT is a control variable, and a positive relationship is expected between this variable and financial performance because grants are treated as income. Table 1 shows an average grant of R33 321 000 (about US$2 219 920) for the sample, with a higher overall standard deviation. Unlike in the other variables where variations were higher between municipalities than within, for GRANT, the variation is greater within municipalities than between. This is possible because most grants from the national government (for example, the equitable share grant) depend on the revenue raised each year nationally. This revenue may differ from one year to the other, which may justify the variations observed in the grants received by each municipality over the period.

LAB refers to the total number of employees (full time and part-time) attached to the electricity department of each municipality each year. The number of employees is used as a control variable and we expect municipalities with more employees to financially perform better because of better capacity. Table 1 shows an average number of employees

[2]On 15 March 2021, US$1 = R15.01.

Table 2. Spearman's correlation matrices of explanatory variables.

	DEBT	GRANT	LAB	CON	FBE
DEBT	1.000				
GRANT	0.278	1.000			
LAB	0.527	0.331	1.000		
CON	0.501	0.252	0.731	1.000	
FBE	0.448	0.202	0.534	0.654	1.000

of 430, with a larger overall standard deviation of 669. For this variable, higher variations are noted between municipalities than within each municipality over the period.

CON refers to the number of domestic and non-domestic consumer units receiving electricity from each municipality each year. This is another control variable which is expected to have a positive relationship with financial performance. This is because more consumer units can translate to more revenue (given that revenue is a function of quantity and unit price). Table 1 shows an average number of consumer units of 195 059, with a larger overall standard deviation of 236 083 which indicates great variability of individual figures from the sample mean. Equally for CON, higher variations are noted between municipalities than within each municipality over the period.

FBE is the number of consumer units which received free basic electricity from each municipality each year. This is a control variable which shows the number of poor consumers in each municipality during a given year. Poor consumer units are expected to have an inverse relationship with financial performance as municipalities collect less revenue from these consumers. Table 1 shows an average of 63 146 consumer units receiving free basic electricity in the sample, with a larger overall standard deviation of 122 085. For FBE, there are higher variations between municipalities than within each municipality over the period.

To have a clear understanding of the explanatory variables and how they relate to each other, it is important to test for their correlation. Correlation tests are essential in determining whether the problems of multicollinearity among the explanatory variables or serial correlation among residuals exist. The existence of multicollinearity among explanatory variables can have an effect when fitting the model and interpreting empirical results (Gujarati & Porter, 2012). Serial correlation in linear panel-data models biases the standard errors and causes the results to be less efficient (Drukker, 2003). Therefore, a Spearman's correlation test is used to measure the strength and direction of association among the explanatory variables. Results are presented in Table 2.

The correlation coefficients in Table 2 are small, except for the coefficient for the LAB and CON matrix which is larger at 0.731. While this may be a cause for concern regarding serial correlation among these variables, it is important to note that the two are control variables and not the major independent variables. Equally, their individual relationship with the main variable of interest (DEBT) shows smaller correlation coefficients. This implies that the problem of multicollinearity is not a major concern between the main variable of interest (DEBT) and all control variables. Therefore, empirical estimation to understand the impact of bad debts written off on the financial performance of South African urban electricity providing municipalities can proceed.

5. Results

This study conducts three forms of panel regression, namely, pooled ordinary least square (OLS), fixed effects (FE) and random effects (RE) models. Pooled OLS ignores the cross section and time series nature of the data, thus assuming no heterogeneity among the 28 selected municipalities. Through pooled OLS, the problem of multicollinearity among the explanatory variables is checked using the variance inflating factor (VIF) test. This test evaluates how the variance of an estimator may be inflated due to high correlation between more than two variables. A VIF value that is greater than 10 would imply the existence of a multicollinearity problem in the pooled model (Gujarati & Porter, 2012). Although the Spearman's correlation test was performed earlier, the study further performs a VIF test to check whether the multicollinearity test results reported for the Spearman's test in Table 2 were consistent. The estimated VIF values of all explanatory variables range between 1.56 and 8.14, with a mean VIF value of 4.19, suggesting that the problem of multicollinearity does not exist among the explanatory variables. This confirms the Spearman's test results which showed very little multicollinearity among the explanatory variables. Further, the problem of heteroscedasticity in the pooled OLS model was checked using the Breush-Pagan test. This test examines whether the variance of the error terms from the model is dependent on the values of the independent variables. Breush-Pagan test result indicated a significant Chi^2 value of 901.16 with a *p*-value of 0.000 suggesting that variances are not constant, thus confirming the presence of heteroscedasticity. Therefore, robust estimations were applied to solve the heteroscedasticity problem in the panel regression models.

Subsequently, both FE and RE panel regression models were estimated. The Hausman test is then used to decide on the most robust model between FE and RE. The null hypothesis of the Hausman test suggests that the RE model is appropriate, while the alternative hypothesis suggests that the FE model is appropriate. Where the probability value of the Hausman test is statistically significant, the null hypothesis that RE is appropriate is rejected, otherwise the null hypothesis is accepted. Hausman test results showed an insignificant *p*-value of 0.202 suggesting the RE model as the best model. Since the problem of heteroscedasticity was established earlier, an RE model with robust standard errors is estimated to address the problem of heteroscedasticity. Additionally, a Breush and Pagan Lagragian Multiplier (BPLM) test is conducted to decide on the best model between the pooled OLS model and the RE model. This test examines the null hypothesis that there is no random effect in the dataset, versus the alternative hypothesis that there is a random effect. BPLM test results show a significant Chi^2 with a *p*-value of 0.003, suggesting that a random effect exists in the data, thus the RE model should be chosen over the pooled OLS model. After checking for serial correlation for panel data using Druker's (2003) procedure, the first lag of the predicted residual was significant, thus confirming the presence of serial correlation in the RE model with robust standard errors. The problem of serial correlation was then corrected using an RE model with an autoregressive process. Estimation results for the pooled OLS model with robust standard errors (Model 1), RE model with robust standard errors (Model 2), and RE without serial correlation (Model 3) are presented in Table 3. Although all three models are presented, the best model is the robust RE model (without serial correlation), thus Model 3 is adopted in the study and its results discussed after Table 3.

Table 3. Estimation results of the municipal financial performance models.

	Model 1	Model 2	Model 3
DEBT	−0.235	−0.206	−0.291***
	(0.211)	(0.259)	(0.089)
GRANT	1.214***	1.063*	0.509***
	(0.466)	(0.573)	(0.186)
LAB	94.547	90.640	52.838
	(106.016)	(105.185)	(58.832)
CON	1.020***	1.074***	1.177***
	(0.393)	(0.372)	(0.186)
FBE	0.063	0.091	0.346**
	(0.359)	(0.327)	(0.170)
_cons	−63318.59***	−71000.21**	−73717.01**
	(24633.82)	(32825.46)	(32373.83)
N	420	420	420
Prob > Chi^2	0.000	0.000	0.000
R^2	0.560		
Within		0.218	0.250
Between		0.906	0.884
Overall		0.579	0.563
Rho		0.034	0.591
Sigma_u		49210.852	0
Sigma_e		261210.79	229180.06

Note: ***, ** and *significance at 1%, 5%, 10% level, respectively. Standard errors in parenthesis ().

As mentioned earlier, Model 3 was the most robust and its results are adopted in this study. Empirical estimates in the adopted model show that all the variables statistically significant determinants of municipal financial performance, except for LAB. All statistically significant variables have positive coefficients except for DEBT which has a negative coefficient of −0.206. The negative coefficient of DEBT implies that a unit increase in bad debts written off on average reduces the financial performance of each municipality by −0.291. In other word, if bad debts written off increase by a thousand Rands, the municipal financial performance decreases by about R291, *ceteris paribus*. DEBT is the main independent variable in the model and is used to reflect the culture of non-payment for electricity services by consumers. A negative relationship was expected between the bad debts written off and the financial performance of municipalities.

In terms of the control variables, GRANT and CON are statistically significant at 1% significance level while FBE[3] is significant at 5% significance level. All three variables have positive coefficients. LAB is the only control variable that is not statistically significant, implying that the number of employees a municipality has in its electricity department is not a significant determinant of the municipality's financial performance in the provision of electricity services. In terms of GRANT, the positive coefficient suggests that municipalities receiving higher grants from the national government (including the equitable share grant) are likely to perform better, financially. More specifically, the results show that a thousand Rand increase in the grant received by each municipality from

[3]While it may be argued that FBE and GRANT may be used interchangeably because the number of poor households in a municipality determines the grant received by each municipality, it is important to note that some grants are not determined by the number of poor households in a municipality. The variable GRANT in this study is inclusive of both conditional and non-conditional grants. Thus, it does not only capture the grant that is based on the number of poor households. As such, GRANT and FBE cannot be used as proxies of each other in this context. Further, the correlation coefficient of these variable is very low at 0.202 as shown in Table 2, indicating no evidence of multicollinearity. Thus, the two can be included as explanatory variables in the same model.

the national government would increase the financial performance of the electricity provision unit of that municipality by an average of about R509.

The positive coefficient of CON suggests that municipalities with more consumers financially perform better, a unit increase in the number of consumers would increase the municipality's financial performance by about 1.177, implying that if the number of consumers served by the municipality increase by a thousand, the municipality's financial performance will improve by about R1177. On the other hand, the positive coefficient of FBE suggests that a unit increase in the number of households receiving free basic electricity will increase the municipality's financial performance by about 0.346. In other words, if the number of households receiving free basic electricity increases by a thousand, the municipality's financial performance would increase by about R346. This finding was expected since municipalities receive some government grants based on the number of indigent households they have, thus the quantity of free basic services they do provide. One can then argue that more free basic electricity offered by the municipality improves the municipality's performance if the national government supports that municipality through grants.

The findings of this study show that the culture of non-payment affects the financial performance of the electricity departments of South African municipalities. Although several studies which argue that the culture of non-payment is a result of several determinants highlighted in the literature exist (van Schalkwyk, 2012; Worku, 2017; Enwereji & Uwizeyimana, 2020), there is no evidence of studies that test the impact of the non-payment culture on municipal financial performance. The current results show that bad debts written off, viewed as one of the main predictor variables in this study, has a negative and significant effect on municipal financial performance. This shows that an increase in bad debt written off increases the gap of revenue losses, resulting in poor municipal financial performance. While there are clear studies that examine this phenomenon in the public administration domain, results on the impact of bad debts reported in this study are consistent with Ibarra (2012) which also determines how bad debt expenses and bad debts written-off affect the overall operating expenses of business organisations.

Further results indicate that grants received from the national government, the number of consumers, and the number of household units receiving free basic electricity positively affect the financial performance of municipalities. Despite several difficulties caused by the non-payment culture, municipalities remain committed to providing services to communities as mandated by the South African Constitution. Hence, they receive each year governmental grants which provide support that improves service delivery and enhances municipal financial performance. The result corroborates the findings of Shai (2017) where the idea of creating a solid revenue base by municipalities to avoid depending on grants from national government while providing services to local communities is supported. Further, the findings are also consistent with evidence from Statistics South Africa (2019) which shows that grants and subsidies were the second-best source of income after the value of electricity sales. Grants and subsidies accounted for about R24.7 billion (i.e. 25% of total revenue), while revenue from electricity sales accounted for about R26.5 billion (i.e. 27% of total revenue) across municipalities in 2019 (Statistics South Africa, 2019). Considering that municipalities in South Africa play an intermediate role, purchasing electricity directly from Eskom and reselling it to final consumers ensured a financial surplus of about R6 billion in 2019 (Statistics South Africa, 2019). This evidence is a clear confirmation that an increase in consumers paying for electricity services enhances the financial performance of municipalities.

6. Conclusion

This study was set to establish the impact of the culture of non-payment for electricity services on the financial performance of South African municipalities. The study uses a panel dataset of 28 municipalities for the period 2005–19. The random effects panel data regression model was used to analyse the relationship between municipal financial performance and non-payment of electricity. Two main findings are reported. First, non-payment was found to adversely affect the financial performance of municipalities. Bad debts written off, used in the study as a proxy for the non-payment culture reported a significant negative coefficient. It was found that a thousand rand increase in the bad debts written off reduces the municipal financial performance by about R291. Second, grants received from the national government, the number of consumers, and the number of household units receiving free basic electricity were positive and significant determinants of financial performance. While studies in the literature examine the determinants of the non-payment culture, this study is unique because it quantifies the impact of non-payment using a case of electricity services.

Revelations from the study warrant the need to devise more innovative approaches to transform non-payment into a culture of payment. Considering the extent of bad debts written off and the established impact of such write-offs on financial performance, it is important for urban electricity distribution utilities to implement other strategies. While they can legally cut-off non-paying customers from the grid and use legal channels to recover the debt, this approach seems not to yield sufficiently positive results. This is because some people may still not honour their financial obligations even after being threatened with legal action. Such resistance which is due to the sense of entitlement has also become a culture among some citizens, as constantly highlighted in the literature.

Therefore, the study recommends urban electricity distribution utilities to draw knowledge from the theoretical dictates of the NPM theory and borrow some private sector business practices that can promote financial sustainability. Indigent households should register and be verified each year to qualify for free basic electricity, while the rest of the citizens are reformulated as 'customers' as suggested by Hood (1991). Municipalities should continue with their autonomy, however, with extended levels of accountability, customer orientation, and market orientation. Good governance, contracts and performance indicators should be prioritised to create competitive urban electricity utilities. Further, the development and implementation of effective financial cost recovery systems should be prioritised, as Van Dijk (2006) explained. Generally, urban electricity distribution utilities should draw much from theory and develop internal systems and contingencies that may improve their own technical efficiency and cost recovery effectiveness. Such systems can significantly reduce bad debts written-off and improve sustainability in the provision of electricity in the urban areas. In terms of the UM approach, much is still needed considering the efficiency challenges South Africa experiences in the provision of electricity.

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