

# Crowding-out effects of municipal expenditure in South Africa

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## *Abstract*

This paper examined whether municipal expenditure on governance and administration is crowding-out other categories of municipal current expenditure, notably municipal current expenditure on trading, economic and environmental, and community and public safety services. The secondary objective was to detect the crowding-out effects between categories of municipal current expenditure. Budget information for a sample of 141 municipalities for the period of 2008/2009 - 2013/2014 was collected and analysed by adopting a dynamic panel data framework proposed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). Three dynamic panel functions of municipal expenditure categories were estimated using the First-Differenced Generalised Method of Moments and the System Generalised Method of Moments. Empirical evidence showed that municipal expenditure on governance and administration did not crowd-out other categories of expenditures. Instead, it was discovered that municipal expenditure on trading services were crowded-in by municipal expenditure on governance and administration. In respect to the secondary objective, it was found that there were crowding-in effects between categories of municipal expenditures.

**Key words:** crowding-out (in) effects; expenditure on governance and administration; municipalities

**JEL classification:** H72, H76

## **1 Introduction**

The main objective of this paper is to answer the following questions: (i) does municipal expenditure for governance and administration crowd-out other categories of municipal expenditure in South Africa? (ii) Is there any other category of municipal expenditure that crowd out other categories of municipal expenditure in South Africa? The issue of crowding-out effects stems from the trade-offs that municipalities must make during the budget process to share resources between various functions.

There is crowding-out in a municipal budget when the share of a category of expenditure increases over time, leading to that of other categories decreasing. The primary focus on expenditure for governance and administration does not suggest that the function of governance and administration, which is funded by this expenditure category, is less important in municipalities. In fact, the governance and administration function is strategic in municipalities for effective and efficient service delivery. The objective in this paper, however, is to understand the manner in which South African municipalities, over time, make budget choices with regard to the allocation of resources towards functions that are directly concerned with service delivery.

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The provision of services, in particular of potable water, electricity, refuse removal, roads and sanitation, is the core mandate of municipalities in South Africa. Also, despite some progress made in terms of service delivery by municipalities since the end of apartheid in 1994 there are still people in the country with no access to municipal services. Therefore, the analysis of the crowding-out effects of expenditure for governance and administration sheds light on understanding the impact of municipal fiscal choices on service delivery.

There are four categories of current expenditure according to the standard classification of government expenditure, in which each category of expenditure funds a group of specific functions or services.<sup>2</sup> But the interest in this paper is on the crowding-out effects of current expenditure on governance and administration on the other three categories. The other three categories, according to the standard classification, are: (i) community services and public safety; (ii) economic and environmental services; and (iii) trading services. Unlike current expenditure on governance and administration, expenditure for these three functions is directly related to service delivery.

The topic of crowding-out effects of government expenditure has for a long time been the subject of economic studies focusing on central government. However, there is lack of agreement amongst authors with regard to the crowding-out effects of municipal expenditure. There are studies that confirm the existence of crowding-out effects of some expenditure categories on others, while other studies refute such a hypothesis. Therefore, the analysis of the crowding-out effects of municipal expenditure remains an empirical issue, which depends on each separate case. To the best of the author's knowledge, there is not yet a study that examines the crowding-out effects of municipal expenditure in South Africa. Hence, this paper is one of the contributions of this thesis to the knowledge and literature on local government finance.

From a policy perspective, the examination of the crowding effects of municipal expenditure is important. For instance, in order to understand the impact of a decision by the national government to assign an additional local taxing power, such as local business tax to service delivery at the municipal level, it requires, amongst others, first understanding the crowding-out effects of municipal expenditure categories. This means that it cannot be assumed that increasing the revenue power of local government, either by assigning more taxing power or increasing the size of fiscal transfer, will automatically lead to municipalities improving service delivery. Hence, it is important in this paper to understand the issue of the crowding-out effects of municipal expenditure.

This paper is structured as follows. The literature review is presented in section 2. The discussion on the crowding-out effect hypothesis is presented in section 3. The methodology used is discussed in section 4. Section 5 presents the discussion of the data used in this paper. The empirical results are discussed in section 6, and section 7 concludes the paper.

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<sup>2</sup> The standard classification of municipal revenues and expenditure is as per the South African Government finance statistics. This classification is similar to the economic classification in the government finance statistics of the International Monetary Fund. Municipal budgets in South Africa are presented in many ways, including according to the standard classification.

## 2 Literature review

There are few studies in the literature that examine the composition of public expenditure and detect the crowding-out effects at local government level. Many empirical studies in the literature, however, focus on national governments. These studies vary in terms of their objectives. Some studies examine the impact of government expenditure on contraction policies during the period of fiscal consolidation of the composition and structure of expenditure. For instance, Sanz and Velázquez (2003) investigate the impact of fiscal adjustment on the composition of expenditure in 26 OECD countries from 1970 to 1997. These authors used the generalised method of moments (GMM) in a dynamic panel data approach. Their empirical findings confirm the social spending hypothesis. In other words, during times of fiscal consolidation, the composition of government expenditure in the 26 OECD countries changed, but social spending was not crowded-out.

Other studies have examined the relationships between the composition and structure of national government expenditure and economic growth. The objective of these studies was to understand how national government expenditure crowds-in or crowds-out private investment that leads to economic growth. To name just a few, Bojanic (2013) studied the relationship between economic growth and productivity of budget share ratios in Bolivia. The author found that expenditure on defence and transfers to subnational governments accelerated economic growth in Bolivia. Ahmed and Miller (2000) used a sample of 39 countries for the period 1975 - 1984 to study the effects of disaggregated expenditure on investment. Their findings suggest that tax-financed expenditure crowds-out more investment than debt-financed expenditure. In particular, expenditure on social security and welfare reduced investment in all their samples, whereas expenditure on transport and communication accelerated investment in Africa.

There also are studies that examine the composition of government expenditure to understand the phenomenon of the political cycle. It is argued that during the election, the structure and composition of public spending changed not because socioeconomic conditions changed, but due to political manipulation. Incumbent politicians have the tendency to increase public spending to fund the delivery of visible services in order to increase the chances of their (or their party's) re-election (Drazen & Eslava, 2010). The focus area of these studies includes national, state, provincial, regional and local government, provided that these institutions are subject to elections. This paper fits into this group for two reasons. First, the focus area of studies in this group is not only limited to expenditure at national government level. Second, the objective of these studies is to examine the impact of changes in some categories of government expenditure on other categories.

Brazer and McCarthy (1986, 1987) tested the hypothesis of municipal overburden in three states in the US. According to these authors, municipal overburden hypothesis refers to the interactions between demand for education and for municipal services. These authors also hypothesise that expenditure on education and municipal services is mutually exclusive. This means that an increase in expenditure for municipal services will lead to a decrease in expenditure for education programmes. The aim of Brazer and McCarthy (1986, 1987) is to find out whether the increase in municipal services in each of the three states studied in the US leads to a decrease in expenditure for education programmes. Their findings do not support the hypothesis of

municipal overburden. This means that expenditure on municipal services does not crowd-out expenditure on education in each of the three US states examined, all other things being equal.

It is important to note that Brazer and McCarthy (1987) use panel data for a long period of time and shed some light on the interaction between expenditure on education and municipal services. One of the shortcomings in South Africa is the lack of municipal information over a long period of time. It is currently difficult to get municipal budget information over a long period, for two reasons. First, the new system of local government has been in place for 15 years only. Second, municipal demarcation changes with every municipal election, which results in some municipalities being absorbed by others. Third, there are some municipalities that are still not able to provide complete and accurate financial information, for instance to the National Treasury.

Bastiaens, De Borger and Vanneste (2000) examine the crowding-out effects in the local budget and in the allocation of local public consumption, focusing on Flemish municipalities during the period of fiscal consolidation. These authors derived a function of municipal expenditure from the Stone-Geary utility function and conclude that there is indeed crowding-out effect between expenditure categories in local budgets. Because of these crowding effects, there is a significant decrease in the budget shares for education and economic policy programmes of Flemish municipalities.

McCarthy and Schmidt (1997) use the Panel Vector autoregressive framework to analyse the composition of US state expenditure, and find no evidence of crowding-out effects. However, the empirical framework used by these authors does not take into account the state-fixed effects and/or time-fixed effects in analysing expenditure.

There are studies in the literature that use new methods to examine the crowding-out effects of public expenditure. For example, Landon, McMillan, Muralidharan and Parson (2006) and Birkelöf (2009) use the instrumental variable (IV) method. In the first study, the IV approach was used to assess whether provincial expenditure is crowding-out the expenditure on health-care programmes among other expenditure in Canada. Birkelöf (2009) studied the crowding effects of municipal expenditure allocated for functionally impaired programmes on other expenditure. There are two interesting features to be considered in both studies. First, they are similar in the sense that they both acknowledge the issue of endogeneity in the specification of the models. Hence, they use the IV method to circumvent that challenge. In Landon *et al.* (2006), the IV method is applied in a dynamic panel data framework and it is found that there is no evidence to support the hypothesis that increased provincial government health expenditure resulted in lower levels of spending on other categories of government-provided goods and services for the period under investigation. In contrast, Birkelöf (2009) applied the IV method in the context of static panel data consisting of Swedish municipalities and found that municipal expenditure for functionally impaired did not crowd-out expenditure programmes for social assistance, childcare and preschool and culture and leisure. However, the evidence of crowding effects is confirmed with respect to municipal expenditure on expenditure on education programme in Sweden.

Similarly, Marlow and Shiers (2001) use the two-stage least square method (TSLS) to empirically verify the validity of the hypothesis of existing competition between expenditure on education and crime-related programmes at the state and local government levels in the US. The hypothesis put forward stipulates that, if one programme gains, the other must lose, as in a fixed-pie situation. The alternative hypothesis tested by these authors is that spending on these two public programmes is unrelated and, therefore, that higher crime-related spending may also lead to higher taxes or public debt issuance, or to a reduction in spending on programmes other than education. Apart from overcoming the challenge with regard to limited series, the methodology used in this study acknowledged the endogeneity in the estimation of the model for each category of expenditure. The endogeneity is due to the fact that, in the specification, it is put forward that expenditure on education programmes is partially explained by expenditure on law-enforcement programmes, and vice versa. Marlow and Shiers (1999) conclude that there is no evidence that expenditure on law enforcement programmes has crowded out spending on education in 1985, 1992, or for the period 1985 to 1992, at the level of state and local government. However, their findings indicate that there is a strong positive relationship between expenditure on law enforcement programmes and expenditure on education. In other words, states and local government that spend more on education are also found to allocate more resources to law enforcement programmes. This also means that a spending increase in one of these two programmes is not funded by decreasing funding commitment to other programme. Rather, increases in either of these programmes are funded through either reductions in other programmes, general tax increases, or issuance of additional public debt.

Marlow and Shiers (2001) examine the crowding-out effects of crime-related expenditure on education in 47 US state governments. The authors estimate a three-equation model of spending on crime-related programmes, spending on higher education, and the crime rate equation, which they use to test whether spending on crime-related programmes and higher education influence each other. Their empirical finding points to weak evidence that spending on crime-related programmes has crowded out spending on higher education.

The challenge with regard to studies that use the IV method is that it requires information on variables that need to be used as instruments for endogenous variables in the model. Given the scarcity of information at the municipal level in most developing countries, including South Africa, it is difficult to use this method. Also, to use the IV in a dynamic panel data framework presupposes that there are many time periods for the panel, so that the lagged dependent variable is not correlated with the error term. If this is not possible, it requires that the lagged dependent variable is also instrumented in case it is correlated with the error term. The last condition applies when the number of cross-sections is large, while the time period is short.

The review of empirical studies in the literature reveals the following. First, the few existing studies on crowding-out and/or crowding-in effects between government expenditure focus more on states (regions) in developed countries. Yet, in a decentralised system of government, the lower sphere, such as local government in South Africa, is the nucleus of social, environmental and economic development in a country. For instance, in South Africa, municipalities are responsible for the provision of essential services such as water, electricity, sanitation, refuse removal, and other public services. The lack or poor delivery of these services cannot only hamper development, but it is susceptible to cause social tensions. It becomes crucial to

understand the issue of crowding-out effects in municipal budgets. The present paper is therefore an attempt to fill this gap by studying the crowding-out effects of municipal expenditure.

Secondly, the issue of missing data with respect to municipal budget information in developing countries is one of the reasons that there are limited studies that focus on these countries. This also applies to South Africa to some extent. As indicated before, it is difficult to gather budget information for South African municipalities for a long period of time. To deal with this challenge and that of endogeneity of expenditure categories, the dynamic panel data approach proposed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) is used to analyse the crowding-out effects of municipal current expenditure on governance and administration in other categories of current expenditure for a sample of South African municipalities. Section 4.3, on the methodology, discusses in depth the relevancy of the approach and its applicability in the case of South Africa.

### **3 Hypothesis of crowding-out effects**

As discussed above, the issue of crowding-out effects of a category of municipal expenditure on others is critical from a policy perspective. First, in a system of fiscal decentralisation, municipalities independently determine the level of expenditure given the available resources. Second, there is tendency by local government to advocate for more funding either from own sources or from intergovernmental transfers. In other words, there is a view that local governments are underfunded. In other words, expenditure responsibilities of local government outweigh by far their revenue potential. For instance, in South Africa, municipalities continue to demand for a bigger share of the Local Government Equitable Share (LGES) claiming that they have more indigent households that are in need of basic services.<sup>3</sup> As shown in Figure 1.1 of papers 1 of this thesis, despite the fact that South African municipalities have the power to raise their own revenue through property tax and user charges, the LGES has increased from 1.3 % in 1998/1999 to 8.8% in 2013/14 (National Treasury, 2014a). Yet, there is no study to demonstrate if there is a correlation between increases in LGES and own revenue sources for municipal access to municipal services. One way to understand this phenomenon is to examine the competition between categories of municipal expenditure, which is the crowding-out effects.

The main reason for this paper to focus on municipal expenditure for governance and administration is to understand amongst others the issue of rent-seeking in local government. According to the standard classification of municipal expenditure as discussed in section 4.1, it appears that, except for expenditure on governance and administration, the three categories of expenditure have a direct link with service delivery. This is not to say that expenditure on governance and administration is less important. A well-functioning municipal administration is a condition for service delivery. However, expenditure for governance and administration is considered as a proxy to check whether municipal administrations are more concerned with

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<sup>3</sup> The Local Government Equitable Share is the fiscal transfer that is annually allocated to Local Government as a result of vertical division of nationally raised revenue between the three spheres of government in South Africa. The Local Government Equitable Share is then horizontally divided among municipalities based on a formula as discussed in Paper 3 of this thesis.

service delivery than rent-seeking. Hence, the focus in this paper is to examine if municipal expenditure on governance and administration are crowding-out other expenditure categories.

It is also important to note that, although municipalities in South Africa have the autonomy to determine the level of expenditure and revenue, national government has an oversight role and policy power over local government. Hence from a policy point of view, the understanding of public choice becomes critical.

Municipal expenditure for a given category may increase (decrease) for various reasons such as increase (decrease) in demand for municipal services, and increase (decrease) in the cost of inputs to provide services. Whatever the reason for that increase or decrease, municipalities have to make a choice between different categories of expenditure given a budget constraint. For instance, if for whatever reason municipal expenditure on governance and administration increases, while expenditure on other category is decreasing, therefore there is reason to believe that expenditure on governance and administration is crowding-out the latter. As discussed further in section 4 in the methodology, econometric techniques can be applied to a sample data of municipal budget variables to provide answers to the posed research questions.

## **4 Methodology**

### **4.1 Introduction**

There are four reasons why the dynamic panel data approach is used in this paper to investigate the crowding-out effects between municipal expenditure categories in a panel of South African municipalities (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell and Bond, 1998), which is referred to as the AB and BB approach throughout this paper. First, the sample consists of a large number of cross-sections, notably 141 municipalities, whereas there are a fewer number of time periods or financial years that the data covers, namely six years. Second, the challenge of endogeneity issue between variables to be estimated is addressed by using the Generalised Method of Moments. However, section 4.3 discusses the estimation procedure in the case where some independent variables (budget variables, which include the lagged dependent variable) are strictly exogenous. Third, the lags in the dependent variable can be included as covariates. By including the lags in the dependent variable, it means that the dependent variable is partly explained by its own lags. Fourth, this study assumes that South African municipalities are not homogenous. Therefore, the unobserved heterogeneity in the panel is considered and captured by the variable municipal fixed effects.

### **4.2 Model specification**

To estimate the crowding-out effects of municipal expenditure on governance and administration on a category of expenditure, Equation (1) below is specified. This estimation is consistent with the standard empirical model for municipal expenditure, which is expressed as a linear relationship between expenditure and factors within a municipal jurisdiction. Since there are three categories of expenditure on which the test of crowding-out effects of expenditure on

governance and administration is carried out, Equation (1) is specified by alternately considering each of these categories of expenditure as the dependent variable (Trad, Eco, and Comm).<sup>4</sup>

$$Y_{it} = \phi_{it} + \alpha Y_{i,t-1} + \beta_K F_{it} + \lambda_k F_{i,t-1} + \omega_s C_{it} + (\eta_i + v_{it}) \quad (1)$$

where

$Y_{it}$  is a vector of the dependent variable;<sup>5</sup>

$Y_{i,t-1}$  is a vector of the lagged dependent variable considered endogenous;

$F_{it}$  is a matrix of  $k$  endogenous explanatory variables (municipal expenditure categories);

$F_{i,t-1}$  is the lag in municipal expenditures, which are considered as endogenous explanatory variables;

$C_{it}$  is a set of control and strictly exogenous independent variables;

$\eta_i$  is municipal fixed effects;

$v_{it}$  is the idiosyncratic disturbances;

$\phi, \alpha, \beta_k, \lambda_k,$  and  $\omega_k$  are the parameters to be estimated.

The coefficients in the vector  $F_{it}$  are of interest in this paper in order to assess the crowding-out and crowding-in effects of the endogenous budget variables on the dependent variable. Suppose equation (1) is estimated with the method of ordinary least squares (OLS), there are three possibilities: (i) if one of the coefficients in the vector  $F_{it}$  is negative and different from zero, this means that the dependent variable is crowded-out by the concerned independent variable; (ii) However, if that coefficient is positive and significant, it means that the dependent variable is crowded-in by that concerned variables.; and (iii) if the coefficient is not different from zero, regardless of its sign, the conclusion is that there is no relationship between the dependent variable and the concerned independent variable. It also means that there is neither crowd-out nor crowd-in effects.

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<sup>4</sup> Trad, Eco, and Comm are per capita current expenditure for trading, economic, and community services respectively.

<sup>5</sup> The dependent variable changes in each of the specified equations. For instance, in one equation it represents municipal expenditure for trading services, whereas in the other it is municipal expenditure for economic and environmental services, etc.

But, equation (1) cannot be estimated with OLS to obtain consistent and efficient parameter estimates due to difficulties that arise with its specification. First, the assumption that unobserved heterogeneity or municipal fixed effects  $\eta_i$  are stochastic implies that these fixed effects are correlated with explanatory variables. Second, the dependent variable may be correlated with municipal fixed effects  $\eta_i$ . Moreover, the lagged dependent variable,  $y_{i,t-1}$ , is also correlated with municipal fixed effects  $\eta_i$ .

There are two commonly used procedures in the literature of panel data models to resolve these difficulties. The first procedure consists of removing municipal fixed effects  $\eta_i$  by the within-groups transformation. This means that each element of equation (1) is subtracted from its mean value. In this case, equation (1) is expressed, in matrix form, in deviations from individual means and not levels, as shown in equation (2) below:

$$Y_{it}^* = \alpha Y_{i,t-p}^* + \beta F_{it}^* + \lambda F_{i,t-p}^* + \omega C_{it}^* + v_{it}^* \quad (2)$$

where

$$Y_{it}^* = Y_{it} - \bar{Y}_{it} ;$$

$$Y_{i,t-p}^* = Y_{i,t-p} - \bar{Y}_{i,t-p} ;$$

$$F_{it}^* = F_{it} - \bar{F}_{it} ;$$

$$F_{i,t-1}^* = F_{i,t-1} - \bar{F}_{i,t-1} ;$$

$$C_{it}^* = C_{it} - \bar{C}_{it} ; \text{ and}$$

$$v_{it}^* = \varepsilon_{it} - \bar{\varepsilon}_{it} .$$

First of all, it is important to note that, for demonstration purpose, the discussion is limited to one period-lagged dependent variable. However, the same reasoning can be extended when including endogenous variables considered in the specification. Applying the standard OLS estimator to the within-group transformed equation in equation (2) produces consistent and efficient estimates, provided that there are many time periods in the panel ( $T \rightarrow \infty$ ). However, in situations where the time period dimension is limited, as it is in this paper, estimating equation (2) will still yield inconsistent parameters. The inconsistency is due to the fact that the within-groups transformation method brings a non-negligible correlation between the transformed lagged

dependent variable  $Y_{i,t-1}^*$  and the transformed disturbances  $v_{it}^*$ .<sup>6</sup> Nickell (1981) argues that these two components are mainly responsible for a negative correlation between  $Y_{i,t-1}^*$  and  $v_{it}^*$ . This negative correlation does not disappear even if the number of cross-sections in the panel increases. Therefore, the within-groups transformation becomes inconsistent when dealing with dynamic panel models, especially when  $N$  is large and  $T$  is fixed. The second procedure used in the literature to get rid of municipal fixed effects in equation (1) is the first difference transformation. This consists of subtracting each element of equation (1) with its one-period lags, as shown in equation (3).

$$\Delta Y_{it} = \alpha \Delta Y_{i,t-p} + \beta \Delta F_{it} + \lambda \Delta F_{i,t-p} + \omega \Delta C_{it} + \Delta v_{it} \quad (3)$$

Equation (3) does not have municipal fixed effects anymore because the first difference of variable  $\eta_i$  is equal to  $\eta_i$ , hence the variable is eliminated. Unlike in the within-groups transformation, the first difference transformation does not introduce all realisations of the disturbances ( $v_{i2}, v_{i3}, \dots, v_{iT}$ ) into the error term of equation (3) for  $t$ . Another interesting feature of equation (3) is that  $Y_{i,t-1}$  in  $\Delta Y_{i,t-1}$  is a function of the one-period lagged disturbances term  $v_{i,t-1}$ , which is also in the first difference disturbances,  $\Delta v_{it}$ . This implies that using OLS to estimate equation (3) will yield inconsistent parameters, since the orthogonality criterion between regressors and the error term is not satisfied.

The two-stage least squares (TSLS) method with instrumental variables has been proposed by Anderson and Hsiao (1981) to get consistent parameters of equation (3). The 2SLS estimator is based on using further lags of  $\Delta Y_{i,t-1}$  as instruments for  $\Delta Y_{i,t-1}$ . For instance, if  $v_{it}$  is identical and independently distributed over  $i$  and  $t$ , it means that  $\Delta Y_{i,t-2}$  would be a valid instrument for  $\Delta Y_{i,t-1}$ . This approach has been extended by developing estimators based on moment equations constructed from further lagged levels of  $Y_{it}$  and the first-difference errors (Holtz-Eakin, Newey & Rosen, 1988; Arellano and Bond, 1991). These authors argue that the TSLS is not exploiting all available information in the data with regard to finding instruments. Instead, Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) propose a procedure that consists of applying GMM estimators to get consistent parameters of equation (4.3).

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<sup>6</sup> If  $Y_{i,t-1}^*$ , which may also be rewritten as  $Y_{i,t-1} - \frac{1}{T-1}(Y_{i1} + \dots + Y_{it} + \dots + Y_{i,T-1})$ . The disturbances term  $v_{it}^*$  can be expressed as:  $v_{it} - \frac{1}{T-1}(v_{i2} + \dots + v_{i,t-1} + \dots + v_{iT})$ . The component  $\frac{-Y_{it}}{T-1}$  in the transformed lagged dependent variable is correlated with  $v_{it}^*$  in the transformed disturbances, and the component  $\frac{-v_{i,t-1}}{T-1}$  in the transformed disturbances is also correlated with  $Y_{i,t-1}^*$  in the transformed lagged dependent variable.

The issue of endogeneity in equation (1) through to equation (3) is not only limited to the lagged dependent variable. The presence of endogenous explanatory variables in all equations also raises the issue of biasness of the parameter estimates. Therefore, the above discussion on the relationships between the lagged dependent variable and the disturbance terms also apply in the case of endogenous explanatory variables.

As discussed before in this section under the assumption that equation (1) can be estimated with OLS, the coefficients of interest to understand the crowding-out/crowding-in effects of a category of per capita current expenditure on the dependent variable, using the FD-GMM and system-GMM, are those in the vector  $F_{it}$  in equation (3). Assuming that the dependent variable in equation (3) is the first difference of per capita current expenditure for trading services, if the point estimates for first difference of per capita current expenditure for governance is negative and different from zero, this means the latter is crowding-out the former. But, if it is positive and different from zero, it means that current expenditure for trading services is crowded-in by current expenditure for governance and administration, all other things being equal.

### 4.3 Model estimation procedure

#### *Endogeneity tests*

The first step in the estimation procedure consists of testing whether some independent variables are endogenous, in particular the budget variables including the lagged dependent variable. To test for endogeneity, equation (1) is estimated using the Instrumental Variable (IV) method. The  $\chi^2$  statistic is then used to test the null hypothesis that the three independent variables, including the lagged dependent variable, are not endogenous. The alternative hypothesis is that the concerned independent variables are endogenous. The rejection of the null hypothesis means that FD-GMM and System GMM can be used as estimators.

But, if the null hypothesis cannot be rejected, it means the concerned independent variables are exogenous. In this case, the Least Square Dummy Variable Corrected (LSDVC) method proposed by Judson and Owen (1999) and Bruno (2005) is used to generate unbiased coefficients. The LSDVC is appropriate for dynamic panel data that exhibits a large number of cross-sections, fixed period of time, and strict exogeneity of independent variables apart from the lagged dependent variables.

#### *Application of FD-GMM and System-GMM*

As discussed above, if the null hypothesis of  $\chi^2$  statistic is rejected, it means that the concerned independent variables are endogenous. Therefore, the FD-GMM and System GMM, as described above, can be applicable. As also discussed above, these estimators are applicable even if in addition there is a mixture of endogenous and exogenous independent variables. The estimation procedure of the FD-GMM and System-GMM are set out below.

Matrix  $\Delta F_{it}$  in equation (3) contains categories of municipal current expenditure that are considered part of the endogenous independent variables. Their estimated coefficients are used to

assess the crowding-out effects of each of the categories of expenditure on the dependent variable. For instance, if the dependent variable is municipal expenditure on trading services, the matrix  $\Delta F_{it}$  will include expenditure on governance and administration, expenditure on economic and public safety, and expenditure on economic and environmental services.

Since the objective in this paper is to establish whether there are crowding-out effects in municipal expenditure categories, of which the main focus is on expenditure on governance and administration, the assessment consists of interpreting the magnitude, sign and significance of estimated coefficient  $\hat{\beta}$ . To confirm that a particular category of municipal expenditure crowds out the expenditure category  $Y_{it}$ , the corresponding estimated coefficient  $\hat{\beta}$  must be negative and statistically significant. This means, all things being equal, that a positive (or negative) change in the share of one expenditure category in the matrix of endogenous independent variables simultaneously leads to a negative (or positive) change in the dependent variable.

Because of municipal fixed effects and endogeneity, equation (3) is estimated by applying the GMM methods proposed in the AB and BB approach. The AB and BB approach is based on the notion that the TSLS estimator does not exploit all of the potential orthogonality conditions of instrumental variables available in the sample. However, the key concept in both the TSLS and the AB and BB approach is the assumption that the necessary instruments are internal or in the sample. In other words, the instruments are based on the lagged values of the instrumented variables. The AB and BB approach is also related to the simple method of instrumental variables (IV) in the sense that it also allows external instruments to be considered alongside internal instruments to estimate the equation (3).

There are two types of GMM in the AB and BB approach, notably the first-difference generalised method of moments (FD-GMM) and the system-generalised method of moments (system-GMM). These methods are robust because they do not require information on the exact distribution of the error term and they are efficient even in the presence of autocorrelation and heteroskedasticity in the disturbances. In both estimators, a generalised method of moments problem is set up in which equation (3) is re-specified as a system of equations, one per time period, where the instruments applicable to each equation differ. The difference between FD-GMM and system-GMM is that the former uses only the lagged values of variables in levels as instruments for the transformed variables, whereas the latter uses the lags of variables in levels and transformed variables as instruments for the transformed variables, as shown in equation (3). Arrelano and Bover (1995) and Blundell and Bond (1998) argue that the instruments in the first estimator are weak for equation (3) in cases where variables are close to a random walk. In such a situation, the second estimator is suitable. In this paper both estimators are used in order to compare their results for robustness purpose.

## *FD-GMM and System-GMM diagnostic tests*

It is recommended to check for the validity of assumptions when  $T > 3$  and the model is over-identified.<sup>7</sup> In this paper the Hansen test is used to diagnose whether the over-identification restrictions due to the number of instruments considered are valid. Details of this test are provided in Hansen (1982). The test has a chi-squared distribution with a null hypothesis of valid over-identification restrictions. Moreover, the residuals produced by the FD-GMM when using the transformed variables possess serial correlation. But if the assumption of serial independence in the original errors is warranted, the differenced residuals should not exhibit significant AR(2) behaviour. In this context, the assumption of no autocorrelation in the disturbances of equation (4.1) can be verified by testing for no second-order serial correlation in the first-difference residuals. The Arellano-Bond test (Arellano & Bond, 1991) is used for the autocorrelation diagnosis. The null hypothesis of this test is that there is no autocorrelation in first-difference errors.

## **5 Data**

The sample selected for analysis in this paper comprises 141 out of 278 South African municipalities. The selection is based on the availability of data to constitute the panel. Budget information of these municipalities was collected from 2008/2009 to 2013/2014 (National Treasury, 2014b).

### **5.1 Budget variables**

From the municipal budget information collected, this paper defines four categories of current expenditure according to the standard classification used by South African municipalities. Each category of current expenditure is expressed in per capita. All variables, including budget variables and control variables, are entered in logarithms.

#### ***Current expenditure on governance and administration (GOV)***

This variable includes all expenditure related to the functioning of the municipal executive and council, expenditure for the functioning of the municipal budget and the treasury office, and expenditure for the functioning of corporate services within a municipality.

#### ***Current expenditure on community services and public safety (COMM)***

This variable is comprised of expenditure on community services, expenditure on sport and recreation, expenditure on public safety, expenditure on housing, and expenditure on health services provided by municipalities. Taken in real values, this category will differ from one group of municipalities to another, given that not all municipalities in South Africa are assigned

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<sup>7</sup> Model over-identification implies that there are more instruments than instrumented variables to be estimated. This is always the case when using GMM estimators because all available instruments in the sample are considered.

the same functions. However, taking the variable as a share of the total municipal expenditure is one way of ensuring that there are no disparities in the magnitude of values across municipalities.

***Current expenditure on economic and environmental services (ECO)***

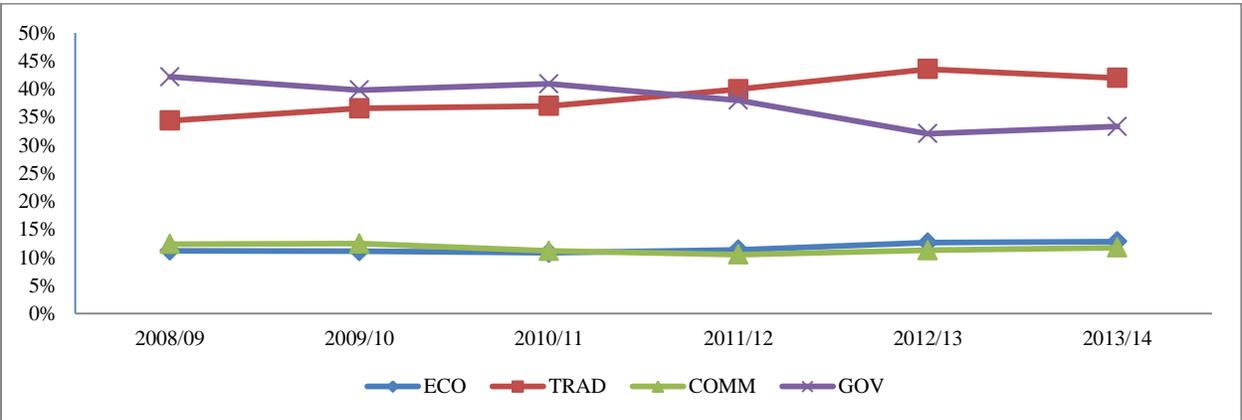
According to the standard classification, this category includes expenditure incurred by municipalities for town planning and development regulation, municipal expenditure on roads and public transport, and expenditure related to environmental protection incurred by municipalities.

***Current expenditure on trading services (TRAD)***

This variable covers the expenditure incurred by municipalities to provide trading services that they are assigned to deliver to residents. These range from expenditure on the provision of potable water, electricity distribution, expenditure to provide sewerage service, and expenditure to provide a refuse removal service.

Figure 1 shows that the average current expenditure on trading services as a share of total municipal current expenditure is the second largest component. It also shows that this category of expenditure grew from 2008/2009 to 2011/2012, whereas current expenditure on governance and administration is the biggest component and it decreased for the same period. The trend changed from 2011/2012, where expenditure on trading services continued to grow, but becomes the biggest component as share of total municipal expenditure. The share of current expenditure on governance and administration became the second largest component and it continued to decrease. On average, shares of expenditure on economic and community services remained stagnant for the same period.

**Figure 1: Average expenditure shares 2008/2009 to 2013/2014**



Source: National Treasury (2014b)

## 5.2 Control variables

In addition to the municipal budget variables described above, three control variables are included in the analysis. These variables are sourced from Global Insight (2014). There is a difference between municipal budget data and the control variables in terms of coverage period. Municipal budget information is published according to the municipal financial year, which starts from 1 July and ends on 30 June of the following year. In contrast, the control variables gathered in this paper are published according to the normal calendar year, which is from 1 January to 31 December of each year. To circumvent this challenge, information on control variables was collected for the period from 2007 to 2013. These are the control variables considered in this paper:

### *Number of unemployed persons (UNE)*

This variable measures the number of persons of working age (15 years and more) in a municipality who are unemployed. From a municipal finance point of view, the relationship between unemployment and municipal expenditure is ambiguous. First, unemployment affects the ability of a municipality to collect revenue for service delivery. It also means that the level of municipal expenditure is affected by the level of unemployment. However, in South Africa, municipalities receive a grant from the national budget that is intended, amongst others, to finance the provision of basic services to indigent households. Considering that unemployment contributes to poverty, therefore, its negative effect on expenditure is somehow offset by the grant that municipalities receive from the national budget. This means that, in this paper, the relationship between unemployment and a category of current expenditure could be positive or negative. It is an empirical question to be answered after the estimation of the model. The other reason for considering the unemployment rate than population as a control variable is because of the strong correlation found between these two variables. The variable population was dropped to allow that all the control variables are strictly exogenous.

### *Per capita real municipal GDP (GDP)*

GDP is considered as the proxy measure of fiscal capacity that exists in a municipality. An increase in GDP means that the fiscal capacity of the municipality has also increased. In this case, the municipality is able to collect more revenue and increase the quantum of services. Hence, a positive and significant relationship is expected between municipal current expenditure and GDP.

### *Gini coefficient*

The Gini coefficient is a summary statistic that measures income inequality in a municipality. Income inequality impacts on municipal expenditure through the principle of cross-subsidisation and access to basic services by all residents, despite their financial ability. The capacity of municipalities to raise the income necessary for service delivery is limited in jurisdictions where there is a high level of inequality. It is predicted that there will be a negative relationship between high level of inequality and municipal current expenditure.

## 6 Empirical results

This section presents the discussion of the empirical results. The interpretation of these results is carried out with a view to answering the two research questions asked in this paper. It is important to note that all variables were entered into natural logarithms. The results are presented for each of the three groups of regressions considered in this analysis.

### 6.1 Testing for endogeneity

Table 1 below shows the results of the endogeneity tests. As discussed in section 3.3 in this paper and based on equation (1), each model is estimated separately using IV estimator. Results in the first row of Table 1 are related to equation (1) in which the dependent variable is the logarithm of current expenditure for trading services. In this equation, the lagged of current expenditure for trading services, logarithm of current expenditure for economic services, logarithm of current expenditure for community services, and logarithm of current expenditure for governance and administration are assumed as endogenous. The rest of control variables are assumed as strictly exogenous. The logarithm of current expenditure for economic services is considered as the dependent variable in the second row, whereas in the third row the logarithm of current expenditure for community services is the explained variable.

**Table 1: Results of endogeneity tests<sup>8</sup>**

Equation	$\chi^2(4)$	P-value
TRAD	25.606*	0.000
ECO	29.531*	0.000
COMM	22.185**	0.000

*Figures in parentheses are the p-values; \*\* and \* refer to statistical significance at 5% and 10% respectively.*

Figures in Table 1 shows that the null hypothesis of no endogeneity can be rejected for three models because the probability values associated with  $\chi^2$  statistics are smaller than 0.01. This means that, in the case of trading services equation, the lagged logarithm of current expenditure for trading services, the logarithm of current expenditure for economic services, the logarithm of current expenditure for community, and the logarithm of current expenditure for governance are endogenous. Similarly, the lagged logarithm of current expenditure for economic services, the logarithm of current expenditure for trading services, the logarithm of current expenditure for

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<sup>8</sup> The use-written STATA command XTIVREG2 by Schaffer (2005) is used to estimate equation (1) for each category of per capita current expenditure in levels. The advantage of this command is that it computes the  $\chi^2$  statistic to test for endogeneity of independent variables. For the purpose of this paper, Table 1 above only shows the extract of the results of endogeneity tests. Full results of the IV estimation can be obtained by request.

community services, and the logarithm of current expenditure for governance are endogenous in explaining the logarithm of current expenditure for economic services, all other things being equal. Likewise, results in the third row show that the lagged logarithm of current expenditure for community services, the logarithm of current expenditure for trading services, the logarithm of current expenditure for economic services, and the logarithm of current expenditure for governance are endogenous in explaining the logarithm of current expenditure for community services, all other things being equal.

Based on these results, it is econometrically sound to alternatively estimate equation (1) with AB and BB estimators for each model. Bruno (2005) argues that the LSDVC may be applied in dynamic panel models to correct the biasness of AB, BB and the AH estimators in cases where the independent variables, except for lagged dependent variable, are strictly exogenous.<sup>9</sup> Therefore, results in Table 1 above are an indication that the LSDVC is not appropriate to estimate these models.

To check for robustness of these results, equation (1) was also estimated for each of the three categories of current expenditure in first differences, of which the results are not reported for space purpose. However, based on these results, the null hypothesis of no endogeneity was also rejected for each category of current expenditure. Hence, AB and BB are adopted as suitable estimators for equation (1). The paragraphs set out below present the discussion of the results for each of the three municipal current expenditure estimations using AB and BB frameworks.

## 6.2 Results of municipal expenditure on trading services

Table 2 below shows the parameter estimates for municipal expenditure for trading services. Models 1, 2, 3, and 4 refer to one-step FD-GMM, two-step FD-GMM, one-step system-GMM, and two-step system-GMM approaches respectively. First, it is important to note that the use-written STATA XTABOND2 command by Roodman (2009) is used to estimate the equations. One of the advantages of this command is the possibility to control the number of instruments to be used to avoid the issue of overidentification that often arises in traditional AB and BB.

Second, as discussed in section 3, Arellano and Bover (1995) and Blundell and Bond (1998) argue that the system-GMM gives efficient estimates, in particular when variables are non-stationary in levels. Because of these assumptions, it is not necessary in this paper to assess for panel stationarity as is the tradition in panel data and time series analyses. By applying the system-GMM method, the effects of panel unit roots, provided they exist, are wiped out. However, to check for robustness of the results, results of the FD-GMM are also presented.

Third, focusing of the coefficient of  $\Delta GOV$ , which is the first variable of interest in this paper, the results in the first row of Table 2 show that this coefficient is positive for all models. It is important to note the differences in magnitude between coefficients of  $\Delta GOV$  in the first row of Table 2. The coefficients of  $\Delta GOV$  in Models 1 and 2 are smaller than the ones reported in Model 3 and 4. It means that the FD-GMM approach is underestimating the parameters due to the fact that it does not allow more instruments as in the system-GMM. This can be seen at the

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<sup>9</sup> AH refers to the estimation procedure proposed in Anderson and Hsiao (1981).

bottom of Table 2 that the number of instruments used for FD-GMM (Models 1 and 2) is 22, whereas the system-GMM (Models 3 and 4) uses 26 instruments. Moreover, the reported coefficient of determination ( $R^2$ ) is 81.99 in Model 4, which indicates the soundness of system-GMM models.

**Table 2: Estimates of municipal expenditure for trading services**

Independent variable	Model 1	Model 2	Model 3	Model 4
$\Delta GOV$	0.107 (0.301)	0.120 (0.243)	0.363*** (0.001)	0.222** (0.017)
$\Delta GOV (t-1)$	0.130** (0.032)	0.130** (0.038)	0.250*** (0.001)	0.188*** (0.002)
$\Delta TRAD (t-1)$	0.237*** (0.003)	0.325*** (0.000)	0.414*** (0.000)	0.416*** (0.000)
$\Delta ECO$	0.083 (0.366)	0.101* (0.075)	0.103 (0.798)	0.121** (0.018)
$\Delta ECO (t-1)$	-0.009 (0.819)	-0.026 (0.534)	0.012 (0.268)	0.002 (0.952)
$\Delta COMM$	0.114* (0.074)	0.161*** (0.002)	0.144* (0.088)	0.173*** (0.006)
$\Delta COMM (t-1)$	0.062 (0.188)	0.070* (0.097)	0.046 (0.449)	0.035 (0.479)
$\Delta UNEMP$	0.448** (0.039)	0.361** (0.027)	0.502** (0.046)	0.201 (0.302)
$\Delta GDP$	0.0037 (0.792)	0.004 (0.729)	0.021 (0.252)	0.008 (0.514)
$\Delta GINI$	-3.807* (0.083)	-1.826 (0.272)	0.921 (0.632)	0.253 (0.895)
F statistic	19.35*** (0.000)	29.13*** (0.000)	1222.33*** (0.000)	1419.29*** (0.000)
Arellano-Bond test for AR(2)	-1.26 (0.209)	-1.21 (0.228)	-0.90 (0.369)	-0.96 (0.335)
R2	62.54	77.55	75.79	81.99
Hansen test	14.77 (0.255)	14.77 (0.255)	18.14 (0.315)	18.14 (0.315)
No of Instrument	22	22	26	26

*Figures in parentheses are the p-values; \*\*\*, \*\* and \* refer to statistical significance at 1%, 5% and 10% respectively.*

However, from a significance point of view, the reported coefficient of  $\Delta GOV$  is not statistically significant in the cases of Models 1 and 2, whereas it is significant in the cases of Models 3 and 4. For Model 3, the point estimate for  $\Delta GOV$  means that for every R100 increase (decrease) in per capita current expenditure for governance and administration, per capita current expenditure for trading services increases (decreases) by R 36, all other things being equal. For Model 4, the point estimate of 0.222 for  $\Delta GOV$  shows that for every R100 increase (decrease) in per capita current expenditure for governance and administration, there is an increase (decrease) of R22 in per capita current expenditure for trading services. The fact that the point estimates in Models 3

and 4 are positive and not negative is an indication that current expenditure for governance and administration are crowding-in current expenditure for trading services.

Fourth, the results in Model 4 show that the coefficient of  $\Delta ECO$  and that of  $\Delta COMM$  are positive and statistically significant. This means that there are some relationships between per capita current expenditure on trading services, per capita current expenditure for economic services. For instance, every R100 increase (decrease) in per capita current expenditure for economic services corresponds with R12 increase (decrease) in per capita current expenditure for trading services. Similarly, for every R100 increase (decrease) in per capita current expenditure for community services, there is R17 increase (decrease) in per capita current expenditure for trading services, all other things being equal. Like in the case of per capita current expenditure for governance, the empirical evidence suggests that current expenditure on trading services in South Africa are not crowded out by other categories of current expenditure. But, other categories of current expenditure are crowding-in current expenditure for trading services in South African municipalities. From the magnitude point of view, it is important to note that the impact of crowding-in effect of per capita current expenditure for governance on per capita current expenditure for trading services is bigger than those of per capita current expenditure for economic, and community services respectively.

One of the main reasons to explain why per capita current expenditure for trading services is crowded-in and not crowded-out by per capita current expenditure for other categories of services may be related to role of trading services. The primary mandate assigned to municipalities in South Africa is to provide essential services such as water, electricity, refuse removal, and sanitation. Despite the fact that municipalities are autonomous, they are under constant pressure from a range of stakeholders (national and provincial governments, local politicians, and communities) to deliver these essential services. Therefore, municipalities will increase expenditure for trading services as a result of an increase in other category of expenditure.

Fifth, it can be noticed that none of the reported coefficients for control variables in Models 3 and 4 of Table 2 above is statistically insignificant. But, since the probability value associated with the F-statistic is smaller than 10%, the hypothesis of global insignificance of independent variables is then rejected. This means that the coefficients of controls variables can globally explain the model, all other things being equal.

Sixth, the specification requirements in relation to validity of instruments are satisfied. From Model 1 through Model 4, it can be seen that the results the two specification tests, notably the Arellano and Bond test for autocorrelation in the residuals and the Hansen test for instrument over-identification, are consistent with all requirements discussed in section 3 of this paper with regard to the methodology. Given that the probability values associated with the Arellano and Bond tests (2) are greater than 10% in all models, this means that the null hypothesis of no autocorrelation in first-difference errors cannot be rejected. Similarly, the null hypothesis that over-identifying restrictions are valid cannot be rejected because the probability values associated with the Hansen test are greater than 10% in all models. The reported results with respect to specification tests are an indication that the estimated models are sound. Therefore, the

inferences and conclusions made about the parameter estimates reported in Table 2 above are valid.

### 6.3 Results of expenditure on economic and environmental services

Equations for economic and community services are estimated with FD-GMM and system-GMM because of the endogeneity issues in the independent variables. The results for municipal expenditure on economic and environmental services are reported in Table 3 below. Although, the conclusions are made based on the results of the system-GMM (Models 3 and 4), the FD-GMM results (Models 1 and 2) are also presented for robustness purpose.

First, by focusing on the coefficients of  $\Delta GOV$  in Table 3 below, it can be seen that they are negative for all models. But, only the coefficient of  $\Delta GOV$  in Model 3 is statistically significant at 10%. That is to say, for every R100 increase (decrease) in per capita current expenditure for governance and administration, per capita current expenditure for economic and environmental services decreases (increases) by R23, all other things being equal.

Given that the coefficient of  $\Delta GOV$  in Model 4 is statistically insignificant, it becomes difficult to conclude whether indeed per capita current expenditure for governance and administration is crowding-out per capita current expenditure for economic and environmental services. Therefore, based on the reported parameter estimates, there is no evidence that per capita current expenditure for economic and environmental services is crowded-out by per capita current expenditure for governance and administration, *ceteris paribus*.

Second, it is important to note that the coefficients of  $\Delta ECO_{(t-1)}$  are positive and statistically significant from Model 1 through Model 4. This shows that indeed, current expenditure for economic and environmental services is partly explained by its past realisations. For instance, in Model 4, it can be seen that for every R100 increase (decrease) in the lagged per capita current expenditure for economic and environmental services, per capita current expenditure for economic and environmental services will increase (decrease) by R27. Furthermore, some estimated coefficients of the lags of other endogenous variables are significant. For instance, the coefficients for  $\Delta GOV_{(t-1)}$  and  $\Delta COMM_{(t-1)}$  in Model 4 of Table 3 are (-0.179) and (0.568) respectively. This shows that the contemporaneous level of per capita current expenditure for economic and environmental services is individually explained by past values of per capita expenditure on governance, and community services respectively.

Third, the coefficients of  $\Delta TRAD$  and  $\Delta COMM$  in Model 4 are positive and statistically significant, which is an indication of a positive relationship or crowding-in effects. For instance, if per capital current expenditure for trading services increase (decreases) by R100, all other things being equal, per capita current expenditure for economic and environmental services will increase (decrease) by R22. An increase (decrease) of per capita current expenditure for community services by R100 corresponds with an increase (decrease) in per capita current expenditure for economic services by R56. These results show that the impact of crowding-in effects of expenditure for community on expenditure for economic services is greater than that expenditure for trading services.

**Table 3: Estimates of municipal expenditure for economic and environmental services**

Independent variable	Model 1	Model 2	Model 3	Model 4
$\Delta GOV$	-0.128 (0.433)	-0.059 (0.713)	-0.230* (0.096)	-0.166 (0.202)
$\Delta GOV$ (t-1)	-0.120 (0.318)	-0.117 (0.229)	-0.178 (0.109)	-0.179** (0.037)
$\Delta ECO$ (t-1)	0.246** (0.012)	0.284*** (0.000)	0.237** (0.012)	0.277*** (0.000)
$\Delta TRAD$	0.303** (0.015)	0.373** (0.023)	0.178 (0.335)	0.223* (0.058)
$\Delta TRAD$ (t-1)	-0.161 (0.128)	-0.099 (0.325)	-0.180* (0.064)	-0.108 (0.250)
$\Delta COMM$	0.669*** (0.000)	0.545*** (0.000)	0.648*** (0.000)	0.568*** (0.000)
$\Delta COMM$ (t-1)	-0.156* (0.079)	-0.212*** (0.006)	-0.159* (0.084)	-0.218*** (0.007)
$\Delta UNEMP$	0.114 (0.709)	0.099 (0.711)	0.304 (0.275)	0.244 (0.218)
$\Delta GDP$	-0.013 (0.600)	-0.003 (0.904)	-0.016 (0.571)	-0.005 (0.806)
$\Delta GINI$	-6.414* (0.073)	-5.082 (0.101)	-8.797*** (0.004)	-7.401*** (0.004)
F statistic	10.89*** (0.000)	22.40*** (0.000)	300.74*** (0.000)	373.03*** (0.000)
Arellano-Bond test for AR(2)	-0.11 (0.912)	-0.03 (0.980)	-0.03 (0.979)	0.11 (0.916)
R2	41.69	48.18	23.21	34.17
Hansen test	7.75 (0.805)	7.75 (0.805)	10.09 (0.862)	10.09 (0.862)
No of Instrument	22	22	26	26

*Figures in parentheses are the p-values; \*\*\*, \*\* and \* refer to statistical significance at 1%, 5% and 10% respectively.*

Fourth, as discussed in section 6.2 above, the inferences and conclusions made in relations results reported in Table 3 are valid and econometrically sound. This is due to the fact the reported Arellano-Bond test for AR (2), the Hansen test of overidentification, and the F-statistics meet the specification requirements.

#### **6.4 Results of expenditure on community services and public safety**

Table 4 below presents the parameter estimates for municipal expenditure on community services and public safety equations. Like in other cases, it can be seen that these coefficients for  $\Delta GOV$  in Models 1, 2 and 4 are positive, where the one in Model 4 is negative. But, the fact these coefficients are not statistically significant shows that there is no relationship between per capita current expenditure for community and public safety services, and per capita current expenditure for trading services, and economic services respectively. Since Model 4 is preferred in this paper, its results are used to interpret the effect of expenditure on governance and administration on expenditure on community services and public safety.

It can be concluded that per capita current expenditure for governance and administration neither crowds-out nor crowds-in per capita current expenditure for community services and public safety in South Africa, all other things being equal. This is because the reported point estimate of  $\Delta GOV$  in Model 4 of Table 4 above is positive, but statistically not different from zero. The results of Table 4 could also mean that there are no trade-offs in the allocation of resources between governance and community services and public safety in South African municipalities for the period under consideration.

**Table 4: Estimates of municipal expenditure for community services and public safety**

Independent variable	Model 1	Model 2	Model 3	Model 4
$\Delta GOV$	0.120 (0.310)	0.158 (0.165)	-0.012 (0.894)	0.032 (0.708)
$\Delta GOV (t-1)$	0.189** (0.015)	0.208** (0.011)	0.189** (0.012)	0.158** (0.037)
$\Delta COMM(t-1)$	0.283*** (0.001)	0.350*** (0.000)	0.312*** (0.000)	0.326*** (0.000)
$\Delta TRAD$	0.255* (0.051)	0.401*** (0.003)	0.156 (0.101)	0.247** (0.024)
$\Delta TRAD (t-1)$	0.216** (0.010)	0.175 (0.105)	0.177*** (0.028)	0.113 (0.279)
$\Delta ECO$	0.345*** (0.000)	0.358*** (0.003)	0.347*** (0.000)	0.432*** (0.000)
$\Delta ECO (t-1)$	-0.003 (0.942)	0.009 (0.854)	-0.028 (0.532)	-0.006 (0.912)
$\Delta UNEMP$	-0.477** (0.047)	-0.573*** (0.008)	-0.371*** (0.022)	-0.315* (0.052)
$\Delta GDP$	0.020 (0.223)	0.010 (0.541)	0.012 (0.497)	0.003 (0.854)
$\Delta GINI$	6.524** (0.019)	8.312*** (0.003)	4.260* (0.091)	5.635** (0.036)
F statistic	13.86*** (0.000)	14.52*** (0.000)	760.87*** (0.000)	728.25 (0.000)
Arellano-Bond test for AR(2)	-0.46 (0.642)	-0.18 (0.858)	-0.24 (0.811)	-0.03 (0.974)
R2	65.99	65.51	69.09	68.48
Hansen test	17.50 (0.132)	17.50 (0.132)	22.96 (0.115)	22.96 (0.115)
No of Instrument	22	22	26	26

*Figures in parentheses are the p-values; \*\*\*, \*\* and \* refer to statistical significance at 1%, 5% and 10% respectively.*

Second, the per capita current expenditure for community services and public safety is partly explained by its past values. This is to confirm the assertion by White (1994) that municipal expenditure at a given time is in part a reflection of past events and conditions. For instance, Model 4 of Table 4 above shows that for every R100 increase (decrease) in lagged per capita current expenditure for community services and public safety, there is an increase (decrease) R32 in contemporaneous per capita current expenditure for community services and public safety, all other things being equal.

Third, the coefficients of  $\Delta TRAD$  and  $\Delta ECO$ , as reported in Model 4 of Table 4, are positive and statistically significant, which is an indication of crowding-in effects. For instance, for every R100 increase (decrease) in per capita current expenditure for trading services, there is a R24 increase (decrease) in per capita current expenditure for community services and public safety. Also, an increase (decrease) of R100 in per capita current expenditure for economic and environmental services corresponds with an increase (decrease) of R42 increase (decrease) of per capita current expenditure for community services and public safety.

Fourth, it can be seen that the results the two specification tests, notably the Arellano and Bond test for AR(2) and the Hansen test for instrument over-identification reported in Model 1 through Model 4 of Table 4.4 above, are consistent with all the specification requirements. Given that the probability values associated with the Arellano and Bond tests (2) are greater than 10% in all models, this means that the null hypothesis of no autocorrelation in first-difference errors cannot be rejected. Similarly, the null hypothesis that over-identifying restrictions are valid cannot be rejected because the probability values associated with the Hansen test are greater than 10% in all models. The reported results with respect to specification tests are an indication that the estimated models are sound. For that reason, the inferences and conclusions made about the parameter estimates reported in Table 4 above are valid.

## 6.5 Estimation summary

In the view of the foregoing discussion, the parameter estimates reported in Tables 2, 3, and 4 are used to answer the two research questions posed in this paper: (a) does municipal expenditure for governance and administration crowd-out other categories of municipal expenditure in South Africa? (b) Is there any other category of municipal expenditure that crowd out other categories of municipal expenditure in South Africa? In relation to the first question, there is no empirical evidence that per capita current expenditure for governance and administration is crowding any other category of per capita current expenditure in South Africa. Instead, it is found that per capita current expenditure is crowding-in per capita current expenditure for trading services. This is because the coefficients of  $\Delta GOV$  for Models 3 and 4 in Table 2 above are positive and statistically significant.

As an answer to the second research question, the results in the above mentioned do not support the evidence that there are some categories of per capita current expenditure that are crowding-out other categories of expenditure. However, it is important to note the evidence of crowding-in of some categories of expenditure on others in the context of South African municipalities. For instance, results in Table 4 show that per capita current expenditure on trading services is crowded-in by per capita current expenditure for economic services, and community services respectively. Similarly, per capita current expenditure for economic and environmental services is crowded-in by per capita current expenditure for trading services, and community services respectively.

## 7 Conclusion

The main purpose of this paper was to investigate whether municipal current expenditure on governance and administration in South Africa is crowding-out other categories of municipal

current expenditure. The motivation for this objective, as stated in section 1 of this paper, was the idea that, due to competition between different needs, municipalities make trade-offs during the budget process to distribute resources between categories of functions, including the function of governance and administration. One of the consequences of these trade-offs is that the share of resources allocated to some functions might diminish, while others increase.

The core mandate of municipalities is to supply services, which cannot be effective and efficient without municipal governance and administration. Without undermining the important role that governance and administration play in realising quality service delivery, it has become important to understand whether the trade-offs have resulted in an increase per capita current expenditure for governance and administration to the detriment of service delivery functions.

In addition, the secondary objective of this paper was to understand whether, except for governance and administration, resources allocated to some functions in terms of per capita current expenditure are decreasing as a result of choices by municipalities to increase per capita current expenditure for other functions.

Budget information for a sample of 141 municipalities from 2008/2009 to 2013/2014 was analysed using the dynamic panel data approach proposed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). First, the suitability of the AB and BB approaches was discussed. For instance, it was demonstrated that since the number of cross-sections is larger than the time period, these approaches suits well the data. The essence of using both the FD-GMM and the system-GMM estimators in this paper was to ensure the robustness of the empirical findings.

However, before the application of the AB and BB frameworks, a test based on the user-written STATA XTIVREG2 command by Schaffer (2005) was used to assess whether some of the budget variables, including the lagged dependent variables that are amongst the independent variables are endogenous. The idea for this test was to determine if LSDVC estimator proposed by Bruno (2005) could be used instead of the AB and BB approaches. Based on results reported in Table 4.1, it was found that the LSDVC could not be applied in this case given that, except for the lagged dependent variable for each model, the budget variables considered as independent variables are not strictly exogenous as required by this approach. Instead, it was found that these variables were endogenous. Therefore, to have consistent and efficient parameter estimates, the AB and BB approaches as discussed in section 4.3 of this paper were used as estimators.

Based on the empirical findings, the answers with regard to the testing of the hypothesis stated in this paper are as follows. In terms of whether municipal current expenditure on governance and administration is crowding-out other categories of municipal current expenditure in South Africa, there is strong empirical evidence to refute this hypothesis. Instead, there is only one case where the crowding-in effects of per capita current expenditure for governance and administration on per capita current expenditure for trading services is confirmed. There are two reasons to explain this positive relationship. First, the fact that the primary role of municipalities in South Africa is to deliver essential services such as water, electricity, refuse removal, and sanitation. Second and related to the first reason is the pressure that other stakeholders have on local government could be the reasons of such positive relationships. It was also found that, apart from per capita current

expenditure for governance and administration, there are some categories of per capita current expenditure that are crowding-in other categories of expenditure.

It is important to note that the review of the literature revealed that the question of crowding-out effects of municipal expenditure remains an empirical question. This is because of the lack of unanimity in the literature. Some previous literature confirmed the existence of crowding-out effects, whereas other refuted the argument. Also, most studies in the literature focused on countries besides South Africa. This paper was an attempt to bridge that gap in the literature to understand whether there are crowding-out effects between municipal expenditure in the case of South Africa.

However, the approach has some limitations. For instance, this paper confirmed that municipal current expenditure on governance and administration is crowding-in expenditure on trading services in South Africa. The analysis does not explain what really informs the decision by municipalities to increase per capita current expenditure on governance and administration to the detriment of other expenditure while also increasing per capita current expenditure for trading services. Given that current expenditure on governance and administration is an aggregate component, could there be some sub-components that are drivers of these increases? Could this decision by municipalities to simultaneously increase per capita current expenditure on governance and administration, and trading services be determined by external factors that are not under the full control of municipalities? These limitations present a possibility for further research, one of them being the relationship between an increase in current expenditure on governance and municipal service delivery. These questions are beyond the scope of this paper.

The following policy implication can be deduced from the empirical findings of this study. The governance and administration function is important for effective and efficient municipalities. It is therefore important for government, when formulating policies that will impact on municipal finance, to take into consideration the fact that expenditure on service delivery is crowded-in by expenditure on governance and administration in South African municipalities.

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