The Effect of the Local Government Equitable Share on Own Revenue Generation in South African Municipalities*

Lerato Shai[1]

Abstract

An important evaluation criterion for successful intergovernmental transfer programmes is the creation of incentives for sound financial management and resource mobilisation. A programme fails to meet this criterion if it has grants that are viewed by recipients as a substitute for their own revenue i.e. the grants crowds out municipal own resource effort. There is a well-established body of theoretical and empirical literature on intergovernmental transfers and the incentives they create. While some scholars establish the presence of crowding out, the findings are largely inconclusive and vary from country to country. The case for South Africa remains unclear due to limited empirical research on this topic. Using an instrumental variable approach, the paper shows if and to what extent the local government equitable share (LGES)crowds out municipalities' own revenue generation. The paper applies the approach by Serrato and Wingender (2016) and exploits the difference between actual census counts and the administrative estimates used in the grant allocation formula to create an instrument that addresses the inherent endogeneity of the LGES. The study is currently ongoing, however preliminary analysis shows that LGES has a statistically significant negative effect on category A and B municipal own revenues when controlling for fiscal capacity and fiscal effort. The effect of the LGES is insignificant and close to zero when lagged operating expenditure are also controlled for in the model. Empirical evidence of an over reliance on grant revenue at the expense of municipal own resource effort calls for a policy review of the LGES to explore design options that lead to reduced perverse incentives of the grant.

JEL classifications: H72; H41; H29; H79

Keywords: Intergovernmental transfers; crowding out; crowding in; own revenue generation; public finance

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[1] Researcher and consultant at Palmer Development Group, lerato@pdg.co.za

1. Introduction

Most countries have adopted decentralisation as an approach to tackling their developmental challenges. Decentralisation devolves a subset of national mandates to local governments with the justification that these governments have closer proximity to communities and are therefore best placed to meet their needs. Furthermore, the process is hoped to improve performance by increasing financial management efficiency and increasing local government accountability. Increasing the autonomy of local governments creates vertical and horizontal imbalance as most local governments are unable to meet their new expenditure requirements due to variations in the cost of providing services between local governments and varying administrative capacity to raise own revenues (Oates, 2006). The central government distributes intergovernmental transfers to address these imbalances and capacitate local governments to deliver successfully on their assigned mandates.

Well-designed intergovernmental transfer programmes also aim to create incentives for sound local government financial management and resource mobilisation (Schroeder & Smoke, 2000). Understanding the effect of these transfers on the behaviour of local governments is crucial to ensuring that programmes achieve this objective. There is a well-established body of theoretical and empirical literature on intergovernmental transfers and the incentives they create. While some scholars find the presence of crowding out, i.e. recipients of the transfer substitute it for their own revenue, the findings are largely inconclusive and tend to vary from country to country. Crowding out undermines the benefits of decentralisation by limiting service delivery capacity of local governments and their accountability to constituencies. It is however important to note that there are multifaceted objectives to transfers, crowding out can therefore sometimes be justified if the overall net effect of the transfer is positive.

The case for South Africa remains unclear due to limited empirical research on this topic. This paper aims to contribute to closing this gap by investigating the existence and quantifying the size of crowding out created by the transfer of the local government equitable share (LGES) to municipalities. The LGES is an unconditional transfer that supplements the revenue that municipalities can raise themselves (including revenue raised through property rates and service charges). It provides funding for municipalities to deliver free basic services to poor households and subsidises the cost of administration and other core services for those municipalities that have the least potential to cover these costs from their own revenues.

Using an instrumental variable approach, the paper shows if and to what extent the LGES crowds out municipalities' own revenue generation in the years between 2003/4 and 2004/5, a period with limited changes to the formula following release of new census data. The paper applies the approach by Serrato and Wingender (2016) and exploits the difference between actual census counts and the administrative estimates used in the transfer allocation formula to create an instrument that addresses the inherent endogeneity of the LGES. The study is currently ongoing, however based on preliminary analysis the LGES is shows a statistically significant negative effect of LGES on municipal own revenues. The effect of the LGES is insignificant and close to zero when lagged operating expenditure is controlled for in the model.

The evidence emerging from the analysis supports the ongoing policy reviews of the LGES to explore optimal design options and suggests the need for more interventions to manage the perverse incentives of the transfer. It is however important to acknowledge the complexity and challenges of designing intergovernmental transfer systems and note that the perverse incentive may be an acceptable trade-off for achieving other developmental objectives.

The remainder of the paper is organised as follows: section 2 provides a short review of the literature on the effect of transfers on own revenue generation, section 3 sets the context and gives an overview

of the equitable share and discusses options for local government revenue generation. Section 4 presents the methodology, discusses the data used and presents the descriptive statistics. Section 5 discusses the estimation results and section 6 offers some concluding remarks.

2. Brief review of the literature

Previous research on the effect of intergovernmental transfers on local revenue generation presents a mixed bag of results. Most scholars report a crowding out effect (Bravo, 2013; Mogues et al.,2009), however more recent studies (Masaki, 2016; Brun & Khdari, 2016) are also suggesting that transfers can have a crowding in effect on local revenue. Dahlberg et al. (2008) report a statistically significant zero effect of transfers on revenue and a positive effect on spending.

A common theory applied in the literature to explain crowding out is the median-voter model first introduced by Bradford and Oates (1971a, 1971b) which assumes that grant revenue is equivalent to any other source of income in the jurisdiction and hence it can be allocated between public and private goods according to the income elasticities of the median voter. In this context, grants to subnational governments are expected to reduce (or crowd out) local taxes and fees because some of these grants are distributed as lower taxes and fees. Caldeira & Rota-Graziosia (2014) propose a theoretical ambiguity in this model that is introduced when the cost of revenue collection is assumed to be high all else equal. In this context, transfers reduce the cost of collection and thereby increase local revenue generation. Masaki (2016) further argues that the public spending itself can contribute to greater own revenue generation through improved service delivery that in turn increases willingness to pay rates and fees.

The existing research into the effect of transfers on own revenue generation was until recently comprised of studies that applied standard linear regression models (Shah, 1990; Baretti et al., 2002; Rajaraman and Vasishtha, 2000) which did not account for the inherent endogeneity of intergovernmental transfers. This is one potential reason for the differences in the results observed in the literature. Endogeneity can occur by design if the formula used to calculate the transfer has an incentive component which transfers a higher amount for subnational governments that mobilise more own source revenues (Brun & Khdari, 2016). Furthermore, subnational governments with higher levels of own revenue are likely to require fewer transfers creating a simultaneity bias which makes it impossible to determine the direction of the effect (Masaki, 2016). It is therefore likely that papers that assume exogeneity of transfers report biased estimates of the effect. Moreover, the endogeneity of transfers is one explanation for the common finding in the literature of a crowding out effect of transfers on subnational government spending (Knight, 2002).

The literature also suggests that different types of transfers create different incentives depending on the degree of autonomy that they afford the subnational government. General purpose (unconditional) transfers give full expenditure autonomy to subnational governments while specific purpose (conditional) transfers[2], can be highly restrictive controlling for example the labour choices and nonlabour input choices of recipient subnational governments (Schroeder & Smoke, 2000). Caldeira & Rota-Graziosia (2014) argue that simple unconditional grants can have a stimulating effect on own revenue in contexts of limited fiscal capacity. Using a panel data set of 77 communes in Benin, the authors find a positive and significant effect of a simple formula based general purpose transfer on local revenue generation in Benin. Brun and Khdari (2016) consider both unconditional and conditional transfers in their analysis and find significant and robust positive effect of unconditional transfers on local revenue generation in Moroccan municipalities while conditional transfers have a positive but less robust effect. They argue that the difference is explained by the predictability of the unconditional transfer compared to the conditional transfers which are more ad hoc. Furthermore, tax effort is

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[2] A third type, the sectoral limited block allocation, is less common and limits the use of funds to a sector but allows autonomous use within the sector (Schroeder & Smoke, 2000)

encouraged and accounted for in the formula used to distribute the unconditional transfers. Bravo (2013) investigates the effect of unconditional transfers in Chilean municipalities and finds an overall negative effect arguing that unconditional transfers create disincentives to collect revenue.

The importance of autonomy relates to the purported benefits of decentralisation where the local government benefits from optimal allocation of resources due to their superior knowledge of the local context (Bardhan, 2002). This feature is particularly important in contexts of low fiscal capacity as shown by Masaki (2016) finding of a positive effect in rural district in Tanzania. After taking fiscal capacity into account, Bravo (2013) finds an effect that is close to zero and statistically insignificant. Mogues, et al. (2009) consider largely conditional transfers from the central government and donors to district governments in Ghana and find a negative effect which they attribute to the limited of fiscal autonomy in the face of weak fiscal capacity. External transfers constitute the largest share of district revenues and are mostly non-discretionary with a focus on capital investments. With respect to South Africa, the Financial Fiscal Commission (2014) finds a positive effect of the LGES on rural municipalities' property rates tax collection efforts in their submission for the Division of Revenue bill on the dynamics that influence the rural municipality tax base. They suggest that the result is likely due to municipalities using the LGES to improve billing and collection efforts.

The emerging finding is that the institutional context and the type of transfers can play a fundamental role in determining the incentives that are created for subnational governments. This paper adds to the literature by considering the South African local government financing framework. It aims to provide insight into the effect of the LGES on local municipal own revenue generation. Key differences between this paper and the analysis by the Financial Fiscal commission include scope and methodology. Whereas the Financial Fiscal Commission only analysed rural municipalities, this paper considers all metropolitan and local municipalities. Moreover, this analysis uses an instrumental variable approach to identify the causal effect compared to the Stochastic Frontier Analysis applied by the Commission. The paper complements this existing research by providing insight on the effect across all of local government.

3. Background and context

3.1. The equitable share of nationally generated revenue to local government

Local governments in developing countries are typically assigned service delivery mandates that are unmatched to their revenue generation ability (Schroeder & Smoke, 2000). Transfers to subnational governments are necessary to close the vertical fiscal gap and are crucial to the success or failure of decentralisation as a development strategy. The South African context is no different, moreover, the requisite support from national government is made explicit in the Constitution. Section 227 states that local government is entitled to an equitable share of nationally raised revenue to enable it to provide basic services and perform its allocated functions (Republic of South Africa, 1996). National Treasury brought this clause into effect in the 1998 budget with the introduction of a formula-based mechanism to distribute revenue between all spheres of government. This mechanism is what is now referred to as the LGES at the local level (National Treasury, SALGA and Cooperative Governance, 2012).

Table 1 The evolution of the LGES since 1994

BUDGET YEAR	EQUITABLE SHARE DEVELOPMENT
1994/5	First democratically elected government comes into power
1998/9	First introduction of the formula based LGES
1999/2001	The removal of funding for the South African Local Government Association (SALGA) through the LGES as SALGA is not constitutionally defined as part of the local government sphere
2000/1	Funding for former R293 towns to shift functions from provinces to municipalities in the former homeland areas

2001/2	Census 2001 takes place
	Poverty measure changes from income to imputed household expenditure
2002/3	Nodal Priority Programmes – additional funds were made available for specific programmes in specified nodal areas in 2002/03.
2003/4	Free basic services introduced, added to formula
	Statistics South Africa (Stats SA) releases Census 2001 data
2004/5	Comprehensive review of the formula, update of fundamental data from 1996 Census to 2001 Census
	Last year of distribution using the original formula
2005/6	Revised formula introduced
2007/8	Introduction of funding for municipal health services as part of the basic services component
2009/10	Change in the measurement of the revenue raising capacity (RRC) correction and the introduction of the differentiated tax system in the RRC
2010/11	Adjustments to the subsidy levels in the basic services component due to large increases in the electricity bulk price
2011/12	Removal of the population escalation factor from the I-component and its replacement with a poverty factor and reweighting of the basic services subsidies for serviced and un-serviced households
	Census 2011 takes place
2012/13	Comprehensive review of the formula
	Stats SA releases Census 2011 data
2013/14	Revised formula introduced, phase in changes for 5 years. Update Census 2001 with Census 2011

Source: National Treasury, SALGA and Cooperative Governance, 2012

Table 1 shows the evolution of the LGES from 1994 to present. The development can be split into three key phases namely (1) "funding windows approach" (pre-2005), (2) "components approach" (2005 – 2012) and (3) "adjusted components approach" (post- 2012). The first revision to the formula was introduced in 2005 and it saw a shift from the windows based approach to a components approach. The second and latest revision to the formula took place in 2012 and resulted in a formula that includes a component for non-trading services and only applies a revenue adjustment factor to the institutional and non-trading services components instead of the entire formula. The analysis for this paper is based on the period before 2005 when the original formula was in place. This section outlines all the key adaptations to the formula in this time and their implications for our analysis.

The original formula proposed four formulae driven subgrants: the basic services grant (S) which supplements the cost of service provision to poor households. The municipal institution grant (I) that supports the funding of institutional and political structures, the tax base equalisation grant intended to minimise disparities across metropolitan municipalities substructures and a matching grant meant to address impacts of externalities between jurisdictions. Only the S and I grant were ultimately used to allocate funds because the tax base equalisation grant became obsolete with the changes to the configuration of metropolitan municipalities and the matching grant was difficult to calculate due to data limitations. The S grant makes up the largest proportion of the allocation to municipalities at 67% of total LGES. The remaining 33% is allocated to other funding windows. The formulae are shown in table 2.

Table 2 LGES S and I formulae 1998 - 2005

Formula	Description
S – GRANT FORMULA $$S = \alpha\beta LH_i$$	• Alpha is a phase-in parameter with 0 < alpha[3] < 1 that accounts for "different levels of present actual servicing of the poor in urban and rural areas" • Beta is a budget-adjustment parameter, set to adjust the size of the grants to the available budget • L is the estimated annual cost of providing basic public services per poor household • H is the number of poor households
I – GRANT FORMULA $$I_i = I_0 P_i - 0.075\,(y_i - 250)\,P_i I_i$$	• I_0 is a per capita I-grant parameter that serves to determine the total amount of money allocated through the I-grant • P_i is the population in the municipality • Gamma is a scale parameter that could take any value > 0 and <= 1 • y_i is the average monthly per capita expenditure in municipality I for values of y_i below the stated monthly per capita floor of R250

Source: National Treasury, SALGA and Cooperative Governance, 2012

Three major changes to the formula took place over the period 1998 to 2004. Firstly, in 2001/2 the funding for former R293 towns was shifted from provincial to local government and a new funding window was created in the equitable share to account for this change. The allocations were operational and staff subsidies to municipalities in the former Bantustan areas to fund the transfer of municipal functions and personnel from province to municipalities. Secondly, the poverty measure used to count the number of poor households was changed from an income based to an imputed expenditure based measure in 2002/3. Under the income method, the household was considered poor if income was less than R800 per month whereas using the expenditure approach, a household is considered poor if it spends less than R1100 per month. The effect of this was to increase the number of poor households in each municipality and hence the allocation of the S grant. Lastly, the provision of free basic services to poor households was introduced in 2003/4 and two new funding windows were created in the equitable share to account for the increased costs to municipalities.

The timeline of the LGES highlights how equitable share is largely still a "transfer in design" with numerous adjustments made to the allocation over short periods of time. The formula was and continues to be constantly changed and adapted to fit the local context and achieve developmental objectives. The empirical implication is a challenge to separate the effects LGES has on economic outcomes from the effect of changes in the formula. Most of the changes outlined above were implemented by 2004 and 2005, our period of analysis. No further changes were implemented in this time until the formula was changed in 2005/6 making this period suitable for studying the effect of the allocation.

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[3] The formula did not fully fund all municipalities for the costs of service provision to all their poor households since not all poor households were connected to the municipal infrastructure. The alpha was set at 0.6 in urban areas and 0.1 in rural areas when the formula was introduced in 1998. It was then increased by 0.1 each year until it reached a value of 1 (in both rural and urban areas).

It is also important to note that the above formula did not allocate LGES to all municipalities. Local government in South Africa is divided into three types of municipalities which differ by the degree of service delivery. Metropolitan municipalities (also referred to as category A) are responsible for all service delivery in cities. This a key difference from areas which are primarily rural where local municipalities (category B) share government functions with district municipalities (category C). Metropolitan municipalities and districts form the governing sphere below province and local municipalities are the lowest sphere of government (National Treasury, 2011). The formula only allocate LGES to metropolitan and local municipalities and not districts except for cases where the local municipality was deemed to lack capacity (National Treasury, SALGA and Cooperative Governance, 2012). The implication for the analysis is that it will not include category C municipalities in the sample.

3.2. Options for own revenue generation in South African municipalities

As discussed, South Africa has a decentralised system of government that comprises national, provincial and local governments. The national government is responsible for provision of services such as education, defence, housing and welfare. Provincial governments implement nationally determined policies and are also responsible for the construction and maintenance of provincial roads. Local governments provide basic services (water, sanitation, electricity and refuse removal) as well as other publicly accessed services such as street lights, public cleansing and community services. The allocation of revenue raising capacity between subnational governments to meet these various mandates is uneven which provides justification for an intergovernmental transfer system (Yemek, 2005).

Table 3 outlines the key sources of revenue for local government, the constitutional provisions associated with these sources and the legislation that governs them.

Table 3: Sources of local government funding

Sources of local government funding	Constitutional provisions	Governing legislation
Municipal own revenue sources		
Rates on property	Section 229 and 227(2)	Municipal Property Rates Act
Surcharges on fees for services	Section 229 and 227(2)	Municipal Fiscal Powers and Functions Act
Service charges/fees	Section 229 and 227(2)	Municipal Systems Act Municipal Finance Management Act Electricity Act and Electricity Regulation Act National Water Act Provincial land use planning ordinances
Other taxes, levies or duties	Section 229 and 227(2)	Municipal Fiscal Powers and Functions Act
Administrative fees		Municipal Systems Act
Fines		National Road Traffic Act
Borrowing	Section 230A	Municipal Finance Management Act
Credit control and debt collection		Municipal Systems Act
Transfers from national and provincial government		
Local government equitable share of nationally collected revenues	Section 214 and 227	Intergovernmental Fiscal Relations Act The annual Division of Revenue Act

Fuel levy sharing with metropolitan municipalities	Section 229(1)(b)	The annual Taxation Laws Amendment Act
Conditional grants from national government	Section 214(c), 226(3) and 227(1)(c)	Intergovernmental Fiscal Relations Act The annual Division of Revenue Act The annual National Appropriation Act
Conditional grants from provincial government	Section 226	The annual Division of Revenue Act The annual Appropriation Act of the relevant province

Source: National Treasury, 2011

Local governments rely on two key sources of revenue to fund their operations namely own revenue sources and transfers from national and provincial government. Rates on property and service charges and fees are the main sources of own revenue accounting for more than 80% of local own source revenue (Financial Fiscal Commission, 2011). At more than 50% of transfers, the LGES is the most significant source of transfers to local government. It is important to note here that although LGES is a significant source of external funding for local government, the total share of nationally raised revenue that is allocated to local government was only 2% in 2004/5 compared to 55% and 43% for national and provincial governments respectively (Republic of South Africa, 2004).
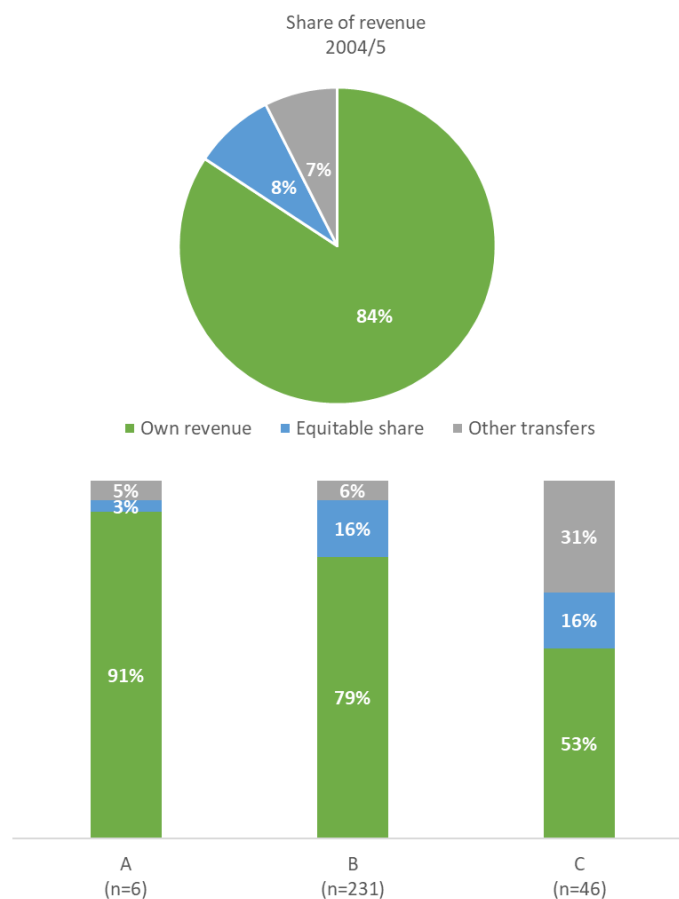

Figure 1 Revenue share by source (2004/5)

Figure 1 displays the share of operating revenue by source in all municipalities in 2004/5. The accompanying stacked bar graph is a breakdown of the revenue mix by type of municipality in the same budget year. Notable observations from the descriptive summary above is a clear relative dependency on national transfers in category C municipalities. Own revenue is a larger share of total operating

revenue in Category A and B municipalities due their relatively higher revenue raising powers compared to category C municipalities. This paper seeks to understand the relationship between these two sources and the extent to which transfers stimulate or crowd out own revenue sources.

4. Methodology

4.1. Econometric model and estimation technique

The analysis estimates the following linear model:

$$Own\ Revenue_{i,t} = \beta_0 + \beta_1 LGES_{i,t} + X'\gamma + \varepsilon_{i,t} \tag{1}$$

where i is the municipality at time t. $Own\ Revenue_i$ is the log transformed per household[4] own revenue which in this case is the sum of property rates and service charges, two main sources of operating revenue. $LGES_i$ is the log transformed equitable share per household and X is a vector of control variables. The control variables included in the model account for two main determinants of own revenue generation in municipalities: (1) fiscal capacity and (2) fiscal effort. The former refers to the revenue base within the municipality i.e. what is the potential revenue that a municipality could generate? The latter refers to the municipality's ability to translate its existing revenue base into actual revenue i.e. how much of the available revenue is the municipality collecting?

Fiscal capacity includes factors such as economic activity within the municipalities, demographic factors such as the population size and income levels. The model controls for gross value added per household to capture economic activity. Although local governments in South Africa have relatively higher revenue raising powers than provincial governments, the high proportion of poor households limits the revenue raising potential of municipalities (Layman, 2003). The model also controls for the proportion of households where the head of household[5] is 65 years or older. The higher the population of this age cohort, the greater the levels of property rates rebates that are paid out by the municipality to offer protection[6] for pensioners incomes. This translates into revenue that is forgone and the more social protection is required the less revenue the municipality can collect. For similar reasons, the model also controls for the proportion of indigent households. The number of indigent households can exert pressure on the municipality's resources in the form of free services and rebates on property rates.

Fiscal effort is typically limited by factors such as municipal inefficiencies, administrative capacity and level of competency, all of which pose a challenge to quantify. A measurable proxy for fiscal effort is the number of vacancies in the municipalities (Financial Fiscal Commission, 2013). Municipalities with high and persistent vacancy rates operate with an inadequate staff complement to optimally deliver on their mandates which negatively affects revenue collection. Moreover, attempts to increase tax and fee collection either through greater efficiency or higher tariffs may induce unwillingness to pay from customers limiting own revenue generation (Bravo, 2013). The model controls for the proportion of total posts in community services, housing and trading services departments that are vacant.

In addition to fiscal capacity and effort, the municipal's cost of operations is another key determinant of the level of own revenue generated. The cost of operations is generally a starting point for most tariff setting processes in municipalities to ensure that revenue raised will adequately cover expenditures. It

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[4] The key variables are all adjusted by number of households because it provides a better adjustment of the figures to the size of the customer base of the municipality than the population size. Municipalities charge bills to properties and not individuals or households, hence the ratio between customers and households is not always 1:1. Additionally, municipalities have a mix of residential and non-residential customers.

[5] The analysis uses the proportion of households with a head that is 65 years or older as a proxy for the person responsible for paying the municipal bill. The head of household is also highly likely to be the property owner.

[6] Municipalities have full discretion in deciding how much rebates to offer. For example, the City of Johannesburg metropolitan municipality decides on the percentage of rebates to offer based on the income profile of the owner with property owners that are receiving the national social grant qualifying for a 100% rebate on their rates.

is hence realistic to expect municipalities with larger budgets to raise more revenue. However, it is also plausible that municipalities with higher budgets have more expenditures than others because they raise more revenue. The lagged log transformed expenditure per household is included in this model in the model to account for the potential simultaneity bias; it is probable that past expenditure will influence future revenue but the reverse is less likely.

Following from the literature review, the LGES is expected to be endogenous to municipal own revenue and thus Ordinary Least Squares (OLS) estimation would yield biased and inconsistent estimates of the effect of LGES on own revenue. To address this endogeneity, an instrumental variable (IV) estimation technique is applied to the model[7] presented above. The Census shock is used as an instrument for the LGES. First introduced by Serrato and Windgender (2016) in their study that estimates local fiscal multipliers, the shock is the difference between the Census population estimates and the estimates used in the year the Census was conducted since data is not released immediately.

Adapting the instrument to the South African context, the LGES provides a similar source of variation that can be used to identify the causal effect of the LGES on own revenue. As shown in section 3.1, the LGES formula uses the number of poor households to determine municipal allocations. Stats SA only conducts a Census count every ten years and therefore the National Treasury uses a different method to estimate non-census year household numbers. Census data is typically only released two years after the count, hence National Treasury still requires an estimate of the households in the year the actual count was conducted. When the LGES formula was first implemented in the 1999/2000 budget year, it was updated to reflect the final 1996 Census results. The formula was phased in over five years with which was completed in 2003/4 budget year. National Treasury used 1996 Census figures to project[8] 2001 population and household figures which were then used to allocate LGES. The only other change to data in this year was a replacement of the gross geographic product with remuneration data based on Stats SA's quarterly report on remuneration based on the regional services council payroll levy (National Treasury, 2017). Given that the population would have changed between the two Census counts, there is measurement error in the data used in 2001/2 that can be used to define the Census shock as follows:

$$Census\ Shock_{i,\ census} = log\left(Household^{C}_{i,census}\right) - log\left(Household^{E}_{i,census}\right) \quad (2)$$

where *i* is the municipality and *census* is the year that the Census took place. The Census shock is the difference between the log household numbers from the Census count and the estimated household numbers in the year that the Census took place. The next section discusses the key assumptions that the Census shock is required to satisfy for inclusion as a valid instrument in the analysis.

4.1.1 Does the Census shock meet the exclusion restriction?
The exclusion restriction for the analysis is as follows:

$$E\left(\varepsilon_{i,t}|Census\ Shock_{i,t}, X_{i,t}\right) = 0 \quad \forall\ i\ \text{and}\ t \quad (3)$$

An instrumental variable is considered valid if it is correlated with the endogenous variable while being uncorrelated with the error term.

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[7] The results of OLS estimation are still presented to offer a comparison with the results from the IV method.
[8] National treasury relies on the most up-to-date available data from a credible source. Until the 2016 Community Survey, Stats SA did not provide credible estimates of the number of households per municipality in between the censuses. The municipality's average annual growth between the censuses (i.e. 2001-2011) was used to adjust the population and household growth. Each municipality's growth was then adjusted by a provincial ratio that aligns the household growth rate to the General Household Survey estimates released annually.
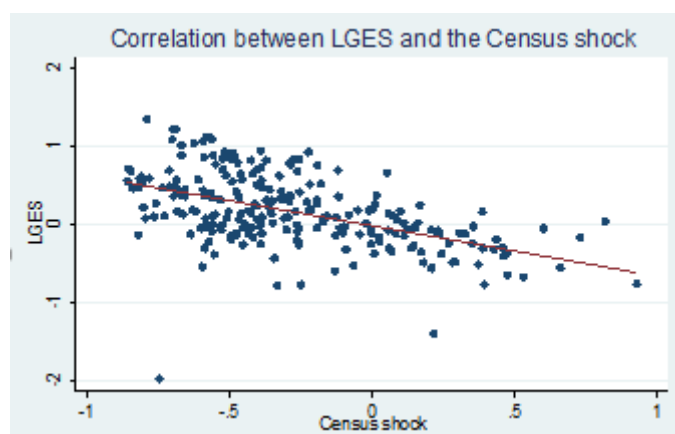
Figure 2: The relationship between LGES and the Census shock

The formula described in Table 2 motivates the Census shock as a key determinant of the LGES because it uses the number of households to allocate a significant portion of the transfer. Two properties of the Census shock that make it a useful source of variation are: (1) errors in household measurement lead to significant changes in the household numbers and (2) it takes two years for the Census data to be updated. The former is useful because it guarantees a correlation between the LGES and the Census shock. Figure 2 shows a decreasing relationship between the Census shock9 and the LGES. The latter provides a powerful test of the identification strategy since the shock should be uncorrelated with the LGES and therefore own revenue at the municipal level before the release of the Census counts.

4.2.Data and descriptive statistics

The analysis is conducted at a municipal level due to the relatively large sample size of this sphere of government compared to provinces. The final dataset used in the analysis is a merger of Census data, publicly available data from National Treasury and data from the non-financial Census of municipalities. Data on municipal own revenue, expenditure and transfers is sourced from the Local Government Budgets and Expenditure Review summary tables that are publicly available on the National Treasury website. These tables summarise the operating and capital budgets, outcomes and estimates over the Medium-Term Expenditure Framework. More importantly, the data also reports the key components of operating revenue namely property rates and services charges and key expenditure items per municipality. An additional dataset imperative to the analysis that was sourced directly from National Treasury is the excel workbook used to calculate the LGES allocation to each municipality. This spreadsheet also contains the household estimates used in the formula, a crucial number for calculating the Census shock. The figures for Gross Value Added are obtained from the IHS-Global Insight estimates for 2003 to 2013. Census 2001 data from Stats SA contains data on population size, number of households and the proportion of households with a head aged above 65 for each municipality. Finally, the 2004/5 Non-financial Census of Municipalities[10] is used for data on vacancies in municipalities and the proportion of indigents in the municipality.

A key limitation with the data used is that it only covers two financial years and thus only enables a snapshot of the effect. Ideally, the analysis would be carried out on a panel dataset to better establish the effect of the growth of LGES on the growth of own revenue, however the combined effect of using an instrument that affects the data only two years after the Census and significant structural changes to the formula make it challenging to identify the causal effect of LGES on own revenue. Another limitation introduced by using different data sources is variation in quality which derives from

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[9] The largest positive and negative census shocks are tabled in Appendix A.

[10] Launched in 2002, this census is an annual survey covering and serve the purpose of measuring the level of development and performance of municipalities. Municipalities provide information in the form of answering a questionnaire that covers total employment, demographic and services related questions.

estimations from municipalities. The data from the Non-financial Census of Municipalities is largely self-reported and thus relies on the administrative capacity and competencies of the municipalities and where these are low, poor data management and updating leads to poor estimations.

Table 4 presents the summary statistics for the key variables used in the analysis. There is significant variation in own revenue across the municipalities highlighting differing fiscal capacity and fiscal effort. The contribution of LGES to total transfers is also evident from the above. The average LGES per household is R1280 against total grants per household of R1611 for all grants. The challenging socio-economic contexts that municipalities operate in is made more apparent by the average GVA per household of R1409, an amount that is notably less than total transfers. On average 16% of total households are headed by adults aged 65 years and older and 26% are indigent, placing further strain on municipal resources in the form of forgone revenue.

Table 4 Descriptive statistics

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
All grants	237	1.611	0.812	0	5.300
Own revenue	237	6.069	6.057	0.016	25.75
Operating revenue	237	7.680	6.154	0.587	28.17
LGES	237	1.283	0.638	0	3.821
Operating expenditure	237	6.621	5.290	0.377	23.87
Gross value added	237	140.9	136.1	7.511	850.4
Households with a head older than 65	237	16.02	6.751	0	50.66
Indigent households	233	26.36	24.52	0	100
Vacant posts	221	12.58	15.85	0	100
Households	237	49555	118728	1576	1049673
Population	237	188779	404473	6679	3225813

Notes: Grants, own revenue, LGES, operating expenditure and gross value added are in R'000 per household. Indigents, pensioner households and vacant posts are expressed as a percentage.

5. Estimation results and discussion

The main results are presented in Table 4. Model 1 and 2 present the results from an OLS estimation while model 3 and 4 present the results from the IV method. The first set of models under each method only control for fiscal capacity related factors while the second set include the vacancy rate to capture fiscal effort. The OLS results are included for comparison and to demonstrate the effect of failing to address the endogeneity of transfers. The results reported refer to those from Model 4. The analysis finds a statistically significant negative effect of own the LGES on own revenue generation in local municipalities. A percentage increase in the LGES results in a 0.95% decrease in municipal own revenue. It is clear from the results that not controlling for the endogeneity of LGES leads to an underestimation of the degree of crowding out and to conclusions of a non-substantive effect. The factors controlling for fiscal capacity have varying effects on own revenue with GVA emerging as the strongest and most consistent predictor. It has a statistically significant positive effect on own revenue with a 1% increase in GVA leading to a 1.3% increase in own revenue. The proportion of households with a head that is a pensioner has a negative effect on own revenue while the proportion of indigent households has an effect close to zero. Both estimated effects are not statistically significant. Adding the proportion of vacancies to capture fiscal effort moderates the effect of the LGES on own revenue

but only slightly. The estimated effect is negative as expected, however it is close to zero and not statistically significant.

Table 5 The effect of the LGES on own revenue generation

| | OLS | | IV | |
VARIABLES	Model 1	Model 2	Model 3	Model 4
Log equitable share	-0.185	-0.119	-1.0***	-0.95***
	(0.149)	(0.143)	(0.282)	(0.272)
Log GVA	1.370***	1.358***	1.310***	1.303***
	(0.0827)	(0.0902)	(0.0915)	(0.0975)
Proportion households (> 65)	-0.00454	-0.0115	-0.00462	-0.0102
	(0.00918)	(0.00872)	(0.00861)	(0.00797)
Proportion indigent households	0.00000	0.000372	0.00302	0.00337
	(0.00291)	(0.00302)	(0.00310)	(0.00319)
Proportion vacancies		0.000407		-0.00139
		(0.00446)		(0.00467)
Constant	-5.149***	-4.968***	-4.826***	-4.665***
	(0.474)	(0.501)	(0.509)	(0.533)
Observations	229	214	229	214
R-squared	0.641	0.646	0.588	0.586

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

As discussed in section 4.1., municipalities tariff setting process considers the cost of operations. Table 6 presents the results from considering the effect of lagged expenditure. The addition of expenditure has a notable result on the relationship between LGES and own revenue. The effect of the LGES on own revenue is positive suggesting a potential crowding in, however it is negligible in size and it is not statistically significant. Operating expenditure emerges as a key driver of own revenue generation. Although GVA is still a relevant predictor of own revenue, its effect is reduced to 0.26% increase in own revenue for a 1% increase. Furthermore, after controlling for the variation in own revenue that is due to municipal operating expenditure, the proportion of households with a head that is a pensioner has a negative and statistically significant effect on own revenue.

Table 6 Results with municipal operational expenditure

| | OLS | | IV | |
VARIABLES	Model 1	Model 2	Model 3	Model 4
Log equitable share	-0.119	-0.161**	-0.959***	0.00145
	(0.143)	(0.0619)	(0.272)	(0.134)
Log GVA	1.358***	0.250***	1.303***	0.263***
	(0.0902)	(0.0856)	(0.0975)	(0.0870)
Proportion households (> 65)	-0.011	-0.012***	-0.010	-0.012***
	(0.00872)	(0.00403)	(0.00797)	(0.00400)
Log lagged operating expenditure		1.313***		1.309***
		(0.0735)		(0.0712)
Observations	214	214	214	214

		R-squared		0.646	0.883	0.586	0.881

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

Despite the theoretical justification for controlling for municipal operating expenditure, it raises concerns about the validity of the results due to potential simultaneity bias that is introduced by including it in the model. The use of lagged expenditure in the model has a mitigating effect, however it is still likely that there is a structurally ambiguous relationship between own revenue and expenditure that biases the reported estimates[11].

6. Robustness checks

The results are also prone to bias if either the instrument is weak, the endogenous variable is not significantly related to the outcome variable; or if the instruments are over or under-identified. Table 7 presents the results from first stage tests that seek to determine the validity of the Census shock as an instrument for LGES against these measures. The F test for significance of the LGES rejects the null hypothesis that it is not related to own revenue. This is the case across all three models used in the analysis. The Kleibergen-Paap test for under-identification also rejects the null hypothesis that the instruments are under-identified since the model is exactly identified. Finally, the Stock-Yogo critical values and the F statistic from the first stage regression results are included and compared to draw conclusions on the weakness of the instrument. In all three models, the F statistics are higher than the reported critical values which means the null hypothesis of weak instrument can be rejected. This however does not mean that the instrument is necessarily relevant or a good source of variation. Such a claim requires further checks for validity.

Table 7 First stage tests results

	(1)	(2)	(3)
	Capacity	+Effort	+ Exp.
F test for excluded instruments (p-value)	0.0002	0.0000	0.0000
Kleinbergen-Paap LM statistic (p-value)	0.0000	0.0000	0.0000
F statistic	60.83	58.14	49.37
Stock-Yogo critical values			
10% maximal IV size		16.83	
15% maximal IV size		8.96	
20% maximal IV size		6.66	
25% maximal IV size		5.53	

In addition to the above, an important feature of the appropriateness of the instrumental variable approach for causal inference is that the instrument needs to be the only mechanism through which the endogenous variable affects the outcome variable i.e. the use of the Census shock as an instrument is only valid if the LGES is the only mechanism through which it affects own revenue. Potential bias arises if other factors that influence own revenue generation also respond to the shock in way that confounds the effect of LGES on own revenue. This could occur in cases where municipalities revise

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[11] This study is ongoing and a second set of estimations considering the dynamics LGES own revenue will be included in later versions of this paper. These models will look at the effect of a change in LGES on a change in own revenue controlling for a change in operating expenditure instead of lagged actual expenditure per household. Factors that affect growth in expenditure are markedly different to those affecting changes in own revenue reducing the potential bias from simultaneity.

expenditure requirements based on changes in household numbers. The census shock would thus be correlated to the change in expenditure in the year the Census results were released and the financial year thereafter. Geographic correlation of the Census shock is another potential source of confounding. If the Census shock is strongly correlated across nearby municipalities in each province, it would provide evidence that the shock is related to a province wide shock that might explain own revenue. Tests for the plausibility[12] of both occurrences suggest that the Census shock does not influence own revenue through these two channels.

7. Conclusion

South Africa remains committed to decentralisation as a strategy for redressing the inequities of the past by equipping subnational governments to deliver services and create enabling environments for local economic development. A few notable successes of the decentralisation process include a well-developed system of intergovernmental finance that allocates horizontal allocations based on objective formulas and measures for intergovernmental fiscal monitoring (Reschovsky, 2004). Despite this progress, local government performance has been poor with many municipalities still finding themselves facing challenging socio-economic contexts under conditions of limited internal capacity to raise the required revenue to adequately deliver on the mandates assigned to them. Optimal collection and efficient use of available financial resources becomes imperative in such a context.

The constitutional provision for a local share of nationally raised revenue in the form of the LGES provides some financial assistance to municipality and closes the vertical gap created by mandates that require expenditure beyond what municipalities can raise. This paper investigated if and to what the LGES crowds out own revenue generation in the years between 2003/4 and 2004/5. When present, crowding out attenuates the benefits of decentralisation with negative effects on development and social redress objectives. Using an instrumental variable approach, the paper finds a statistically significant negative effect of the LGES on municipal own revenues when controlling for fiscal capacity and fiscal effort. When operating expenditure is included in the model, the effect of the LGES is close to zero and statistically insignificant.

The evidence emerging from the analysis supports the ongoing policy and formula reviews of the LGES to identify optimal design options. Moreover, they suggest the need for more interventions to manage the perverse incentives of the transfer. Schroeder and Smoke (2000) note that the objectives of intergovernmental transfers often conflict with each other and hence the design of such system by default requires trade-offs between different goals. Hence, a perverse incentive may be an acceptable trade-off for achieving other developmental objectives depending on the size of such an effect and the priorities of the national government. Further research into the topic should thus attempt to quantify this balancing act by investigating the effect of LGES on local public spending and the overall redistributive effect of the transfer for a nuanced understanding of the costs and benefits of crowding out.

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[12] The analysis for these two sources of confounding to be added to once complete.

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Appendix A – The Census shock

Code	Municipality	Household difference	Census shock
Positive shocks			
WC014	Saldanha Bay	11 436	0.930
GT483	Westonaria	28 759	0.818
NW405	Merafong City	51 657	0.731
WC044	George	17 478	0.662
KZ282	uMhlathuze	33 143	0.602
WC032	Overstrand	7 874	0.533
CPT	City of Cape Town	294 770	0.477
GT482	Randfontein	15 335	0.476
TSH	City of Tshwane	221 377	0.462
WC047	Bitou	3 285	0.459
MP312	Emalahleni	29 121	0.437
Negative shocks			
EC05b2	Umzimvubu	118 752	- 0.856
EC154	Port St Johns	39 429	-0.852
EC135	Intsika Yethu	59 864	-0.844
EC136	Emalahleni	34 195	-0.838
NP03a2	Makhuduthamaga	68 814	-0.820
KZ211	Vulamehlo	21 288	-0.819
EC126	Ngqushwa	27 524	-0.814
EC137	Engcobo	39 288	-0.811
EC151	Mbizana	57 634	-0.808
EC121	Mbhashe	66 055	-0.807