

CHAPTER 7: ESTIMATING THE FACTORS THAT INFLUENCE MUNICIPAL EXPENDITURE

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7.1 Introduction

Local government is constitutionally mandated to provide basic services to communities within a three-sphere decentralised system of governance. Schedules 4B and 5B of the Constitution of South Africa (Act No. 106 of 1996) assign an array of expenditure responsibilities to the country's 283 municipalities.⁹⁷ The most essential of these is the provision of water, sanitation and electricity services. In addition to their service delivery mandate, municipalities continue to invest significantly in social and economic infrastructure in the country. Urban municipalities play a central role in local economic development through their planning and managing of the urban built environment, while rural municipalities continue to roll out basic social infrastructure to eradicate the massive service backlogs in these areas.

Municipalities are empowered with an array of revenue instruments that equip them to deliver on their mandates. To fund their expenditure, municipalities are largely reliant on their own revenues, which include property tax, user fees, surcharges on services and a wide range of other local taxes. Municipal own revenues are supplemented by intergovernmental transfers, predominantly from national government, in the form of unconditional and conditional grants.

However, it is important to recognise the discernible differences in revenue capacity and expenditure responsibilities of the various municipalities. The legacy of apartheid policies perverted the efficient and equitable distribution of wealth and resources in South Africa. As a result, several, mainly rural, municipalities have inadequate own-revenue capacity, extreme poverty and high service backlogs. Urban municipalities were also affected. Metropolitan municipalities and secondary cities operate within a spatial design that is characterised by large communities facing difficulties in accessing economic opportunities, and large-scale urbanisation, as rural inhabitants migrate to seek better economic prospects. These factors contribute to difficulties in planning spatial settlements and managing the urban built environment. Conversely, rural areas are characterised by sparsely populated settlements, scattered across terrain that ranges from relatively flat, such as in the Free State, to mountainous and hilly, such as in the Eastern Cape and KwaZulu-Natal.

Regardless of the nature of the circumstances, all municipalities are faced with the challenge of improving and extending service delivery and supporting the poor. The role of national government support, and intergovernmental fiscal transfers in particular, is pivotal in ensuring a competent, well-resourced and well-capacitated local government sphere. As Yinger (1986) notes, "tax base disparities [among others] influence local spending and [intergovernmental grant design should] offset these disparities".

7.1.1 Problem statement

In the Financial and Fiscal Commission's Annual Submission on the 2011/12 Division of Revenue (DOR),⁹⁸ several studies identified concerns over the application of several formula-based grant mechanisms, as the subsidy levels do not reflect the different expenditure pressures faced by municipalities. The mechanisms include the Local Government Equitable Share (LES)⁹⁹ and Municipal Infrastructure Grant (MIG),¹⁰⁰ which simply allocate funds to all municipalities based on uniform costs for services and backlogs respectively. These formulas do not factor in the different expenditure pressures faced by municipalities, which raises concerns over the efficacy of the distribution of resources. Reschovsky (2003, cited in Mahabir, 2010) notes

⁹⁶ Financial and Fiscal Commission (FFC).

⁹⁷ The number of municipalities changed to 278 after demarcation for 2011 municipal elections.

⁹⁸ The Annual Submission and accompanying Technical Report are available at www.ffc.co.za.

⁹⁹ The LES is an unconditional grant that largely finances the operating expenditure of municipalities.

¹⁰⁰ The MIG is a conditional grant afforded to municipalities to assist in the eradication of service backlogs, including water, sanitation, municipal roads and refuse removal.

that “general literature confirms that regardless of the type of service, other factors such as topography, population size, population density and other geological characteristics influence costs of services”. Yinger (1986) points out that “there exists no general analysis of the impact of cost factors on local public service delivery, and cost factors invariably enter empirical studies and grant formulae in an ad hoc manner”.

Therefore, it is important to understand the different expenditure pressures faced by municipalities and to quantify the primary drivers of this expenditure. This chapter will theoretically identify and subsequently estimate the factors that influence municipal operating expenditure. The research highlights factors that national governments should consider when designing accurate, differentiated, cost-based local government grant formulas, in particular that of the LES, which is the primary transfer supporting municipal operating expenditure. This includes exogenous factors, such as population density, migration, and topography and their effects on municipal operating expenditure.

7.1.2 Background to the research

In 2009 the Commission adopted a five-year research strategy to help attain its vision of “enhancing the developmental impact of public resources through the financial and fiscal system in South Africa”. Four thematic areas were identified to serve as fundamental principles and goals within the research strategy to direct the institution in attaining its vision:

- policy outcomes;
- accountable institutions;
- equitable growth and distribution of resources; and
- flexible responses.

This chapter contributes to the thematic areas of policy outcomes and, in particular, equitable growth and distribution of resources. It highlights the current economic and fiscal differences between municipalities and the contributing factors. Understanding and quantifying such differences will assist in developing appropriate long-term policies to ensure an equitable distribution of resources.

The primary aim of this chapter is to identify and estimate the factors that influence municipal operating expenditure by estimating a fully specified function, based on first principles. Estimations per type of operating expenditure, i.e. personnel expenditure, bulk costs and service-specific expenditure, go beyond the scope of this exercise.

Intergovernmental fiscal transfers, in the form of conditional and unconditional grants from higher spheres of government to sub-national governments, are a significant feature of any intergovernmental fiscal relations system. Criteria for the allocations of such grants need to be robust enough to ensure that sub-national governments are appropriately funded to fulfil their service delivery and economic development mandates. This is a vital component of the South African intergovernmental system, where local government is mandated to provide important basic services, such as water and sanitation.

Understanding the factors that influence municipal expenditure allows for proper planning of, for example, high levels of inward migration. As municipalities are required to ensure that all their citizens have access to quality basic services, understanding and tracking such movements ensures effective planning of service delivery. The impacts of population density in spatial settlements can also have important implications for built-environment planning, as municipalities should adopt the most cost-effective settlement form.

The outcomes of this chapter will contribute to improving general knowledge of the different factors that influence expenditure of municipalities, and to developing cost-reflective formula-based grants to ensure that diverse municipalities are well financed.

It is important to note that the chapter explores operating expenditure, not capital expenditure (i.e. municipal investments in new infrastructure). Capital expenditures are largely based on longer-term planning decisions around large projects or the coherent development of infrastructure in the built environment. Cross-sectional studies will not capture such dynamic effects. Capital expenditure can appear lumpy, i.e. depending on the scope of the project being funded, and can be undertaken over a certain period for the project with different levels of expenditure. For example, the bulk of the payment for the project can occur in the first year with subsequent smaller payments. This will result in a potential spike in the first year for the given municipality, and therefore a single year interpretation and analysis of capital expenditure can be highly skewed and inaccurate.

7.2 Defining and Understanding Municipal Expenditure

Ladd (1992) defines per capita spending as “the product of the quantity or quality of public sector outputs and the costs of providing those outputs”. Municipal expenditure results in outputs, in the form of public goods, to the constituents of the municipality. Embedded in the expenditure is the cost of producing such output.

These costs include the various input costs such as labour (municipal personnel expenditure), capital and intermediate costs (such as bulk purchases). Expenditure and costs are not interchangeable, as expenditure would capture additional demand-side factors, intergovernmental factors and institutional factors. These factors will form part of the expenditure specification later in the chapter. Another important consideration is the efficiency of municipal expenditure. Therefore, municipal operating expenditure illustrates not only the costs of providing public municipal goods and services, but also the quantity and quality of such services.

This can include technical efficiencies, i.e. the efficient use of given resources to produce an output or, in the case of municipalities, the delivery of a service. Certain municipalities might spend more to produce the same amount of service relative to another municipality because they are technically inefficient. In terms of this exercise, municipal efficiencies cannot be explicitly measured but will be captured in the error term in a well-specified expenditure function.

7.2.1 Composition and trends in municipal expenditure

Total municipal expenditure can be divided into two components - operating expenditure and capital expenditure. Table 7.1 illustrates the actual total municipal expenditure by operating and capital expenditure, in nominal and real terms and in percentages, for the period 2003/04–2008/09.

Table 7.1 Municipal operating and capital expenditure 2003/04–2008/09

Actual Expenditure R'000	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Municipal operating expenditure (nominal terms)	72,024,008	82,051,746	87,505,621	99,264,088	113,957,271	137,674,688
Municipal capital expenditure (nominal terms)	10,241,452	13,371,328	17,182,496	21,180,036	29,906,909	40,138,468
Total municipal expenditure (nominal terms)	82,265,460	95,423,074	104,688,117	120,444,124	143,864,180	177,813,156
Municipal operating expenditure (real terms)	79,548,028	85,614,862	86,236,825	91,261,370	96,763,870	07,399,040
Municipal capital expenditure (real terms)	11,311,330	13,951,981	16,933,356	19,472,491	25,394,678	31,311,732
Total municipal expenditure (real terms)	90,859,358	99,566,843	103,170,181	110,733,861	122,158,549	138,710,771
Yearly growth rates	Average growth	2004/05	2005/06	2006/07	2007/08	2008/09
Municipal operating expenditure (nominal terms)	14%	14%	7%	13%	15%	21%
Municipal capital expenditure (nominal terms)	32%	31%	29%	23%	41%	34%
Total municipal expenditure (nominal terms)	17%	16%	10%	15%	19%	24%
Municipal operating expenditure (real terms)	6%	8%	1%	6%	6%	11%
Municipal capital expenditure (real terms)	23%	23%	21%	15%	30%	23%
Total municipal expenditure (real terms)	9%	10%	4%	7%	10%	14%

Source: National Treasury Local Government Database

In 2003/04 municipalities spent a total of R82 billion, of which 88% was operating expenditure (R72 billion) and the remaining 12% capital expenditure (R10 billion). Total municipal expenditure increased by an average of 9% in real terms over the period under review.

Much of this was driven by large increases in capital expenditure, which grew by a massive 23% in real terms. Such increases were probably the result of government’s drive to eradicate service backlogs (2004/05–2005/06) and substantial investment in infrastructure related to the 2010 FIFA World Cup™ (around 2007/08–2008/09). The large increases in capital expenditure have resulted in infrastructure investments that now comprise 23% of total municipal expenditure (R40 billion in 2008/09).

Operating expenditure has increased quite modestly over the period, at 6% in real terms. Higher growth rates in operating expenditure would have been expected, given the increasing demand for services from communities and new households connected to services. Table 7.2 disaggregates the components of municipal operating expenditure over the same period.

Table 7.2 Operating expenditure per line item

Operating Expenditure	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
R'000						
Depreciation and amortisation	2,806,485	3,825,558	4,223,682	5,384,398	6,191,747	9,131,850
Employee costs	21,433,904	23,294,193	24,854,981	28,885,956	32,442,931	37,851,310
Finance charges	3,889,716	3,319,929	3,162,729	3,489,910	3,484,676	4,359,467
Grants and subsidies	1,249,062	1,838,078	2,526,063	2,934,465	4,224,310	3,749,971
Material and bulk costs	17,420,995	18,186,568	19,112,565	21,736,718	23,508,846	29,862,340
Other	20,448,367	26,282,843	27,294,585	29,177,488	35,151,669	42,830,229
Remuneration of councillors	504,252	705,999	1,096,343	1,707,719	1,878,965	2,091,520
Repairs and maintenance	4,271,227	4,598,578	5,234,674	5,947,434	7,074,127	7,798,001
Total	72,024,008	82,051,746	87,505,622	99,264,088	113,957,271	137,674,688
Percentage breakdown						
Depreciation and amortisation	3.9%	4.7%	4.8%	5.4%	5.4%	6.6%
Employee costs	29.8%	28.4%	28.4%	29.1%	28.5%	27.5%
Finance charges	5.4%	4.0%	3.6%	3.5%	3.1%	3.2%
Grants and subsidies	1.7%	2.2%	2.9%	3.0%	3.7%	2.7%
Material and bulk costs	24.2%	22.2%	21.8%	21.9%	20.6%	21.7%
Other	28.4%	32.0%	31.2%	29.4%	30.8%	31.1%
Remuneration of councillors	0.7%	0.9%	1.3%	1.7%	1.6%	1.5%
Repairs and maintenance	5.9%	5.6%	6.0%	6.0%	6.2%	5.7%
Total	100.0%	100.0%	100.0%	100.0%	99.9%	100.0%

Source: National Treasury Local Government Database

The largest expenditure item in local government is employee-related costs, which means that, when remuneration of councillors is included, over 30% of municipal expenditures are geared towards maintaining the administrative and political structure.

The second-largest expenditure item is material and bulk costs, which include the necessary bulk purchases required to provide (for example) water and electricity services. Over half of municipal operating expenditure is necessary for the delivery of services. Table 7.2 also shows that approximately 6% of the operating budget is spent on repairs and maintenance of existing infrastructure, which is far below the National Treasury guidelines of 8–12%. It confirms the concern over poor maintenance of infrastructure, which is widespread in local government.

7.2.2 Differences in expenditure across municipalities

It is important to clarify the differences in municipal expenditure across the various municipalities,¹⁰¹ and the factors that drive these differences. This will provide a conceptual framework for determining expenditure and lay the foundations for identifying variables that can test and quantify this model. Table 7.3 outlines the differences in expenditure and other factors for the 2007/08 financial year.

¹⁰¹ The Constitution defines three types of municipalities. These are the six metropolitan (category A) municipalities, 231 local (category B) municipalities and 46 district (category C) municipalities, as of January 2011. This chapter only considers categories A and B. It is important to note that local municipalities share their service and expenditure responsibilities with their respective district municipalities.

Table 7.3 Expenditure, demographic, social and economic profiles of municipalities, 2007/08

Type of Municipality	Total population	Total households	Total gross value add per capita	% of people employed	% of households earning below R3200pm	% of households without access to water	% of households without access to electricity	Average population density	Operating expenditure per capita	Personnel expenditure per capita	Bulk costs per capita	Revenue from local taxes per capita
Metropolitan municipalities	16,974,424	4,714,021	75,67	34%	46%	1%	14%	1388	3,789.48	1,075.29	920.02	3,279.51
Secondary cities	8,233,208	2,207,004	50,80	29%	59%	3%	16%	221	2,242.55	618.00	543.32	1,940.00
Larger towns	3,985,216	1,074,513	40,83	27%	62%	7%	18%	87	1,843.08	593.19	336.67	1,513.82
Smaller towns	6,906,926	1,808,666	29,16	22%	69%	7%	20%	19	1,466.46	459.74	234.53	988.70
Rural municipalities	12,331,695	2,673,914	9,44	13%	80%	28%	35%	81	370.49	111.70	20.15	120.77
Total/average	48,431,469	12,478,118	41,18	25%	63%	9%	20%	359	1,942.41	571.59	410.94	1,568.56

Source: National Treasury Local Government Database; 2007 Community Survey, CSIR

Table 7.3 distinguishes municipalities based on their spatial design (i.e. relatively urban or rural) to highlight the social, economic and demographic differences within local government, and their impact on total operating expenditure, personnel expenditure and bulk costs. Looking at the expenditure, the more urban form a municipality takes, the higher its per capita expenditure. In 2007/08 a metropolitan municipality spent an average of R3,789.48 per capita on operating costs, which included the highest personnel expenditure (R1,075.29) and highest bulk costs (R920.02) per capita of all types of municipalities.

This higher expenditure is probably the result of greater demand for services in metropolitan areas. Metropolitan and other urban municipalities have higher numbers of people, households and businesses, which is confirmed by the higher economic activity. Therefore, urban municipalities are required to provide a greater quantity of services. The profiles of the population and households also determine the quantity and quality of services. Firstly, urban municipalities have the highest numbers of households connected to services (water and electricity), which have higher operating costs. This suggests the provision of higher-quality services, which would increase expenditure in these municipalities relative to those in rural areas.

Secondly, rural areas have the highest levels of poverty and unemployment, which implies less demand for services than in urban municipalities, where people demand greater quantity and quality of services, in terms of sophisticated technologies, and are able to pay more for these services. In urban areas individuals and communities tend to have higher political bargaining powers, which further influence the provision of services. Conversely, rural areas are likely to accept lower and less sophisticated levels of services, as the communities' needs are different, for example their focus is on subsistence farming. Urban agglomerates also have higher infrastructure requirements, such as traffic lights, street lighting and greater security. Lastly, urban municipalities have more fiscal capacity to generate local taxes that can support a greater quantity and quality of service delivery.

Institutional arrangements and intergovernmental factors play an important role in determining the levels of expenditure across local government. Most metropolitan and secondary cities are authorised to provide all major basic services. However, most of the other local municipalities (i.e. larger to smaller towns and rural municipalities) share these services with the respective district municipalities. This institutional arrangement is probably captured in the differences in expenditure across the municipalities. Larger to smaller towns and rural municipalities are likely to have lower per capita operating expenditure and lower bulk costs because the district municipality provides the services.

Per capita expenditure also differs due to supply-side considerations, which include the costs of labour, materials and capital to provide services. In urban areas, wage rates are likely to be higher and more competitive because of the competition for skilled labour. Alternatively, rural areas might offer higher wages to attract the appropriate skills. Costs are also affected by the physical, geographic and topographic nature of municipalities and are thus an important consideration in an expenditure function. Municipalities characterised by hilly terrain or ones that have many natural barriers are likely to incur higher operating costs, given the strain on existing infrastructure to deliver services.

7.3 Literature Review

There are several international studies that estimate the factors that affect local government expenditure. Many studies attempt to answer various research questions that result in specifying a municipal expenditure function. The most common research

question relates to the impacts of spatial patterns in terms of population density on municipal expenditure. These studies pertain to the smart cities debates, which promote a compact city urban plan.

In their assessment of the smart cities assumptions, Cox and Utt (2004) estimate an expenditure function looking at factors such as migration, community age and population density. They conclude that variations in personnel expenditure are more correlated with variations in municipal expenditure. Furthermore, the impacts of population density on municipal costs are statistically significant, but their quantifiable impacts are minimal, whereas migration is insignificant. The latter suggests that municipalities do not account for population growth in their expenditure plans, at least in the short term. They also conclude that political factors – more than economic factors – play an important role in explaining the variations in municipal expenditure.

Ladd (1992) estimates a fully specified expenditure function to test the impacts of population densities and population growth on municipal expenditure. A piecewise linear regression model is estimated to account for segments of data that appear to have different slopes. Analysis is undertaken for operating and capital expenditure. The model specification includes demand-side and supply-side variables as control variables. The demand side looks at the tastes and preferences of communities and includes income variables, education levels and municipal fiscal capacity. Supply-side factors include the average wage rate faced by local authorities compared with the private sector. Most of the control variables are significant. On the tested variables, Ladd finds a nonlinear, J-shaped relationship between density and per capita municipal expenditure, which suggests that municipal expenditure is higher at very low levels of population density, but gradually increases with higher density. Ladd also concludes that rapid population growth puts a tremendous fiscal strain on communities and existing infrastructure, and can result in lower levels of services for existing and new households. This conclusion is based on the inverse relationship between population growth and municipal expenditure.

In their analysis of German states, Buttner et al. [sa] find that, although municipal costs are in general directly proportional to total population, the relationship between municipal expenditure and population density is not significant. However, they also conclude that the results are service specific and vary depending on the nature of the service provided by the municipality. Sub-national government expenditure on more social services, such as education and policing, tends to increase with denser settlement patterns, while services such as housing can be “provided at lower per capita costs in more densely populated areas” (ibid.). This is an important finding, as it suggests trade-offs in expenditure among the different services provided by municipalities. The Buttner et al. study confirms the cost benefits of compact settlements for services such as transport and housing, but other costs such as security may increase. They also find that the current design of German intergovernmental transfer systems, which favours highly urbanised settlements, is not justifiable. This finding can also be linked to the current LES and MIG formulas, which allocate larger funds to urban areas.

Kushner et al. (1996) assess the determinant of municipal expenditure in the Ontario region of Canada. As with other studies, a piecewise linear regression model is estimated. The functional form of the expenditure model includes local government fiscal capacity, age of the community to capture demand for services, population density, regional and institutional variables. The existence of economies of scale in the provision of services is also tested. In this instance, population density has positive impacts on per capita expenditure, while expenditure increases with the size of the municipality, i.e. economies of scale do not exist in the provision of services. Institutional or organisational forms of local government have no impact on municipal expenditure.

7.4 Data Sources and Methodology

A fully specified expenditure function is estimated using a cross-sectional dataset from the 2007/08 municipal financial year for a sample of 237 municipalities. The municipalities in the sample include metropolitan and local municipalities.

7.4.1 Data sources

The latest and most-comprehensive data available at the municipal level can be obtained from Statistics South Africa’s 2007 Community Survey, which restricted the analysis of municipal expenditure to the 2007/08 financial year. The 2007 Community Survey provided the economic, social and demographic data, while municipal budgeted data was sourced from the National Treasury local government budget database.

Poor reporting on financial statistics (and statistics in general) is widespread in municipalities. This is due primarily to the poor administrative capacity of certain municipalities. Consequently, it is highly unlikely that a full set of accurate budget outcomes data for all 237 municipalities can be obtained. In cases where figures for the 2007/08 financial year were missing, the 2006/07 reported outcomes were inflation-adjusted in order to have a comprehensive set of data for the exercise.

The migration variable was computed using the 2007 Community Survey, Census 1996 and Census 2001. To account for the numerous re-demarkations of municipal boundaries, the data from Census 1996 and Census 2001 has been converted to current municipal boundaries as of 2005 (the latest municipal re-demarkation available).

7.4.2 Model specification

Based on conceptual discussions, municipal expenditure can be expressed as the following expenditure function:

Municipal expenditure per capita = f (household demand, taste and preference variables, intergovernmental relations variables, spatial form, migration, input costs, environmental variables).

Hence the specification of the equation will be:

$$EXP_i = \beta_0 + \beta_1 DCT_i + \beta_2 IGR_i + \beta_3 SPF_i + \beta_4 PDN_i + \beta_5 PD_i + \beta_6 INC_i + \beta_7 GE_i + \epsilon$$

Where:	<i>EXP</i>	= per capita municipal expenditure
	<i>DCT</i>	= a vector of demand, tastes and preferences variables
	<i>IGR</i>	= a vector of intergovernmental relations variables
	<i>SPF</i>	= spatial nature of the municipality
	<i>PDN</i>	= population density variable
	<i>PD</i>	= migration variable
	<i>INC</i>	= a vector of variables capturing input costs
	<i>GE</i>	= a vector of geographic variables
	ϵ	= a random error term

The ordinary least squares (OLS) method is used to estimate the factors that influence municipal operating expenditure. The dataset was tested for violations of the general OLS assumptions, such as heteroskedasticity and multicollinearity that are prevalent in cross-sectional datasets. The data appeared to be heteroskedastic, with various tests undertaken to test for heteroskedasticity.

A Breusch-Pagan/Cook-Weisberg test for heteroskedasticity was carried out on the dependent variable. A chi-squared statistic of 175.46 was computed. This was significant at all conventional statistical levels and thus rejected the null hypothesis of homoscedasticity. Therefore, to correct for this violation, White (robust) standard errors were used to estimate the model. This ensured corrected standard errors and reliable statistics.

7.4.3 Description of variables and a priori expectations¹⁰²

In this exercise, total municipal operating expenditure per capita is used as the dependant variable.

Demand, tastes and preferences variable

Municipal expenditure is likely to be strongly correlated with the local demand from communities. The following variables measure community demand, tastes and preferences for municipal services:

Community demand and preferences – measured by average household income

A household's income can be a proxy for taste and preferences for the type and level of service demanded by individuals. The higher the income per capita for a given municipality, the higher the costs of provision, since these people will probably require and be able to pay for a higher level of service. Likewise, demand for services will be lower if poverty levels are higher and households are not able to pay for these services.

¹⁰² Please refer to Annexure7 A for the details and descriptive statistics for the variables used in the model.

Economic activity – measured by percentage of population employed

The effects of unemployment will be similar to those of the income variable. People who are employed are likely to have a higher income. They would thus demand more and be able to pay for a higher level of service. Conversely, the unemployed will find it difficult to pay for services, thus indicating a lower demand.

Access to water, electricity and refuse – measured as percentage of households with access to the basic services¹⁰³

Although these variables are stated separately in the model specification, the impact of each should be similar. A positive relationship would be expected on the operating side – as the more households that are connected to services, the greater the expenditure required to service these households. In addition, operating costs to households not connected to basic infrastructure can include alternative sources of services, such as boreholes for water and paraffin for energy, which cost less to provide.

Authorised municipality for service provision

The local government system gives all metropolitan municipalities full executive and legislative authority within their jurisdiction, and full responsibility for the services provided as assigned by the constitution. However, local and district municipalities share these powers, as either a local or a district municipality is authorised to provide a function, which is usually the case for the water and sanitation service. This asymmetric division of service powers and functions influences municipal expenditure. As an initial proposal, municipal powers and functions will be interpreted as a dummy variable, where 1 indicates the provision of a service. Municipalities with authorisation for services are expected to have greater per capita expenditures.

Spatial nature of municipality

The spatial nature of a municipality, i.e. whether it is relatively urban or rural, has a significant impact on its per capita operating expenditure. An urban jurisdiction would be expected to have more per capita operating expenditure than a rural area because of several factors, including the greater need for additional infrastructural requirements such as traffic lights. The urban/rural effect is captured by a dummy variable that is 1 if the municipality is a metro or secondary city and 0 otherwise.

Population density

As previous empirical research is divided on the impact of population density on expenditure, the impact of this variable can assumed to be relative to the specific characteristics of the country in question. Hence no expectation is placed on this variable. A negative relationship will suggest that denser settlements result in less strain on the infrastructure networks, as they are spread over shorter distances, which reduces the maintenance costs and degree of water and electricity losses. However, there is still much debate about the actual relationship between municipal expenditure and population density. It is possible that the provision of certain services, such as water and electricity, might have lower costs associated with density. However, overall expenditure in high-density populations is likely to be higher because of the greater need for more services, such as traffic lights, transport and roads. The externalities associated with increased strain on the environment caused by higher populations and increased social costs that result in higher crime levels can also influence costs and expenditure in higher-density areas.

Migration

A larger growth in population, be it internal population growth or migration from other municipalities, would be expected to have a positive impact on municipal expenditure, as municipalities will be required to spend more in servicing these households. The migration variable is measured as the annual percentage increase/decrease in population of a municipality from 1996–2007.

103 Minimum access levels as per RDP standards.

Input costs

On the supply side, the costs of inputs in terms of labour, capital and materials also have an impact on municipal expenditure. Higher input costs result in higher expenditure to deliver a service. Significant and positive impacts on these variables on municipal operating expenditure would therefore be expected. Data on average wage rates, average costs of materials and capital costs is not readily available for municipalities. Therefore, a set of appropriate proxies was required for these costs. To capture the cost of labour, average personnel expenditure per municipal employee was used, as this would capture average differences in personnel costs per municipal employee across the various municipalities. For material and capital costs, bulk purchases and expenditure on maintenance and depreciation were calculated per consumer unit¹⁰⁴ receiving the services, in an attempt to capture cost variations across the municipalities.

Geographic variables

The South African geographic landscape is diverse. Municipalities located mainly in the heart of the country lie on a flat plateau and are characterised by a generally flat gradient. Municipalities on the coasts, particularly those in the Eastern Cape and KwaZulu-Natal, are characterised by steep gradients and precipitous settlements. It is argued that there are increased costs in providing services to settlements across hilly terrain. Unfortunately, no geographic and topographic variables or proxies were available at a municipal level to assess the impacts of these factors on municipal expenditure. However, in theory these factors are likely to have a significant impact on municipal expenditure and so cannot be ignored. These variables need to be quantified for each municipality and, ideally, factored into the local government fiscal framework.

7.5 Model Estimations and Results

The model has overall significance and an R-squared value of over 80%. This means that the model explains 80% of the variation in per capita operating expenditure. Given the nature of the model, a degree of multicollinearity can be expected and was confirmed by a correlation matrix. However, most of the variables remained as long as it was supported by theoretical demand and supply-side considerations that impact municipal expenditures.

Table 7.4 Estimation results – robust standard errors estimation, 2007/08

Dependent variable: Total municipal operating expenditure per capita 2007/08			
Independent variables:	Coefficient	t Statistic	P Value
Avg hhincome	0.017***	4.37	0.000
Percentemployed	1277.60**	2.12	0.035
Percentwateraccess	35.71	0.71	0.481
Percentrefuseaccess	1230.30***	7.25	0.000
Percelectricityaccess	-31.21	-0.16	0.870
Watersp	259.18***	2.77	0.006
Urban	126.04	1.05	0.296
Pop dens	0.399***	3.30	0.001
Migration	-4502.99***	-3.25	0.001
Wagerate	0.000	-0.07	0.942
Kapitalcosts	0.143	1.47	0.144
Materialcosts	0.113	1.08	0.280
Constant	-444.06***	-3.60	0.000
*** significant at 1% level		**significant at 5% level	*significant at 10% level

Source: Author

104 A consumer unit is defined in the Non-financial census of municipalities undertaken annually by Statistics South Africa. It is the point to which a specific service is billed.

Of the variables that capture the demand, tastes and preferences of the communities, both the average household income and employment variables meet expectations and are significant. Firstly, the results confirm the a priori expectations as the more affluent households demand higher levels and quality of services. Therefore, expenditure is less in poorer areas. Although municipalities offer social support to poor households via free basic services policies, this support is relatively less in rand value compared to the expenditure requirements for richer households. The results also confirm that municipalities with higher levels of economic activity have higher expenditures, which is due to the greater demand for services from businesses and other commercial entities. Although employment was used here to measure economic activity, higher levels of employment also impact positively on demand for services in the sense that employed people have greater disposable income to demand higher levels and quantities of services.

In terms of access to services, only the percentage of households with access to refuse variable is significant and positively impacts on expenditures. Both the access to water and electricity variables are insignificant. This could be due to the fact that higher numbers of households have access to these services relative to the refuse service, thus variations in both access levels and expenditure is more evident in the refuse service.

The population density variable is significant and has positive impacts on expenditures. This confirms that denser settlements in general require greater levels of expenditures due to the greater demands for services from compact communities. This includes demand for additional infrastructure in terms of traffic lights, street lighting etc as well as possibly higher costs for social amenities due to, for example, higher levels of crime. Although the urban dummy variable is insignificant, it captures any spatial effects that can distinguish different levels of expenditures.

A municipality authorised to provide the water and sanitation service has on average higher expenses than a municipality that is not a water service authority. This coincides well with the water and sanitation expenditure comprising on average one-quarter of a municipality's budget. Therefore, institutional arrangements within local government impacts on expenditures.

Lastly, the migration variable is significant in explaining the variation in operating expenditure but has a negative effect on such expenditure. This suggests that municipalities are finding it difficult to cope with the increased pressures of migration, which has a negative impact on the quality of service provision. Such a finding supports the conclusion made by Ladd (1992).

7.6 Conclusion

The chapter raises some important points for debate, and an interesting result is that denser settlements require higher levels of expenditures from municipalities. This suggests that denser settlements do not result in any net cost savings because of a greater demand for additional services that require higher expenditures from local government. This contradicts the smart cities urban planning assumptions. There might be cost savings on certain services, such as housing and transportation, but in general denser settlements seem to be more costly. Municipalities appear to be finding it difficult to cope with the expenditure pressures of migration, resulting in lower expenditures as resources are stretched. Service quality is decreasing as a result.

In terms of the design of intergovernmental transfers, the LES is the primary operating grant for municipalities. This grant adopts a formula-driven equalisation framework. Therefore, the formula needs to accurately estimate the expenditure pressures faced by municipalities relative to their fiscal capacity to determine allocations. Based on the analysis and results described above, several factors clearly have an impact on municipal operating expenditures. Therefore, the assumptions that inform the expenditure estimations in the model must reflect the different factors that have an impact on the costs of providing services.

Furthermore, the current LES formula is based on 2001 census data, and so migration patterns, population movements and service-related dynamics over the past ten years are not accounted for. Thus, it is possible that funds from this grant are not being appropriately distributed relative to the demand for services and concentration of poor within local government. Such considerations should be factored into the review of the LES formula, which the government is currently undertaking.

Annexure 7A

Variables	Description	Mean	Max	Min	St Dev
Totopexpc	Total municipal operating expenditure per capita in 2007/08 in rands	1495.76	4528.28	138.92	1072.77
Avghincome	Average household income in 2007 rands	39627.6	103338.77	13485.35	19163.3
percentemployed	% of people employed, 2007	0.22	0.48	0.04	0.10
Percentwateraccess	% of households with access to basic water	0.87	0.99	0.05	0.18
Percentrefuseaccess	% of households with access to basic refuse removal	0.48	0.97	0.001	0.33
Percelectricityaccess	% of households with access to basic electricity	0.76	0.98	0.12	0.18
Watersp	Dummy variable = 1 if municipality provides the water and sanitation service and 0 otherwise				
Urban	Dummy variable = 1 if municipality is a metro or secondary city				
Popdens	People per kilometre squared 2007	97.10	2363.72	0.35	245.64
Migration	Annualised growth in population 1996 – 2007	0.0016	0.09	-0.1	0.029
Wagerate	Personnel costs per total municipal employees in 2007 rands	246213	n/a	0	880881
Kapitalcosts	Total repairs and maintenance per consumer unit receiving a service in 2007 rands	299.069	5574	0	352.04
Materialcosts	Municipal bulk purchases per consumer unit receiving services in 2007 rands	360.732	2674.33	0	413122

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