An efficiency analysis of basic service provision in South African local government (2006/7 to 2008/9)

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Abstract

The South African local government sector has undergone changes in the post-apartheid era as policy makers have sought to improve basic services provided to disadvantaged local communities. While scholars have considered various dimensions of the reform program, little effort has been directed at evaluating the effectiveness and efficiency dimensions of the changes in service provision, with some notable exceptions (van der Westhuizen and Dollery, 2009; Krugell, et al., 2010). This article seeks to contribute to this literature by evaluating the efficiency with which municipalities have provided (Reconstruction and Development Program) RDP water, RDP sanitation RDP electricity and RDP refuse removal, using Data Envelopment Analysis techniques (DEA) applied to panel data from 2006/2007 to 2008/2009 for 231 local municipalities and 46 district municipalities.

Keywords: Efficiency, local government, local service provision, South Africa.

Disciplines: Natural sciences (mathematics) and social sciences (economics, econometrics, political science), and applied professions studies (management and public management).

1. Introduction

Post-apartheid policy makers inherited a landscape characterised by extreme economic, spatial and social inequality between the different ethnic communities, which had been segregated into separate urban areas. Various policy instruments were adopted to ameliorate these inequalities, the most important of which was the 1994 Reconstruction and Development Programme (RDP), which aimed to coordinate central, provincial and local government programs into an integrated national approach (Lester, Nel and Binns, 2000). The RDP emphasised the role of local government in implementing RDP targets.

A more detailed vision of this process was set out in the *White Paper on Local Government* (Republic of South Africa, 1998, p.17) which advanced the concept of 'developmental local government' in encouraging local economic development and local economic growth (see, for example, Nel and Binns, 2002). The *White Paper on Local Government* proposed four major aims for developmental local government: (a) the provision of a basic level of household services to households without these services as a matter of urgency; (b) the integration of

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formerly segregated urban areas; (c) the stimulation of local economic growth and local job creation; and (d) that local 'community empowerment' should be fostered.

The importance of these goals in the overall RDP strategy, as well as the centrality of the local government sector in achieving these goals, placed a heavy burden on South African local government which had historically focussed on a comparatively narrow range of 'services to people'. Moreover, local government was ill-equipped to tackle these formidable challenges given its limited administrative and technical capacity (Buthelezi and Dollery, 2004; Dollery et al., (2005), acute funding constraints (Bahl and Smoke, 2003), and weak financial management (Dollery and Graves, 2009; Graves and Dollery, 2009). Given the immensity of the difficulties faced by South African local government, the importance of the RDP basic local service targets, and the constraints on the capacities of the local government sector, it is essential that policy makers are informed by sound empirics of how well the municipal system has performed.

The empirical analysis of the effectiveness and efficiency with which South African local government has delivered basic services in the post-1994 era can be decomposed into two broad strands. In the first place, scholars have sought to measure the effectiveness of basic service provision based on various kinds of socioeconomic indicators (Krugell et al., 2010). Three main approaches have been adopted in order to investigate this question. Firstly, national-level development indicators have been deployed (see, for example, Hirschowitz and Orkin, 1997; Budlender, 1999; Møller and Devey, 2003; Ngwane *et al*. 2003; Le Roux Booysen 2003; Leibbrandt *et al*. 2006). In general, Krugell et al. (2010: 310) have observed that while this line of inquiry has established 'the familiar South African picture of disparities in access to basic services and improvements since 1994', it did not allow 'further distinctions of the performance of local governments in meeting the basic needs of their communities'. Secondly, in order to obtain a clearer perspective on local performance, researchers examined specific surveys of more disaggregated 'quality of place' indices, in particular areas (Møller and Jackson, 1997; Møller, 2001; Sotshongaye and Møller, 2000). Finally, a third avenue of investigation has considered instances in which poor service delivery sparked public protest, such as Botes *et al*. (2007), which examined four case studies of local unrest.

While this line of inquiry has generated useful broad results, it has not provided policy makers with a sufficiently detailed comparative local perspective on local delivery performance. In an effort to provide greater clarity, Krugell et al. (2010, 321) examined 'the progress made in the delivery of basic services across local municipalities in South Africa' by means of constructing of a 'service delivery index for each municipality and analysis of variance to explain the changes in service delivery over the period 2001-2007'. They found that 'mean access to basic services showed a marked improvement, but that the variation of access to basic services between places increased'.

A second embryonic empirical approach has focused on the efficiency rather than the effectiveness with which South African local government has delivered basic services under the RDP framework. This approach was followed by van der Westhuizen and Dollery (2009) who estimated the productive efficiency with which municipal councils provided electricity, domestic waste removal, sanitation and water in line through the RDP using Data Envelopment Analysis (DEA) techniques applied to cross-sectional data covering the period 2006/2007 for local municipalities as well as district municipalities. They found that eight out of the nine South African provinces had one or more local municipality that was fully technically efficient, with the single exception of the Western Cape, and concluded that there

were significant inter-provincial differences in the relative efficiencies of local municipalities. Van der Westhuizen and Dollery (2009) added the caveat that data irregularities implied their findings should be treated with caution. The present article seeks to augment this nascent efficiency measurement literature by investigating the efficiency of RDP water, RDP sanitation, RDP electricity and RDP refuse removal provision using DEA methodology with panel data covering the period 2006/2007 to 2008/2009 for 231 local municipalities and 46 district municipalities.

The article is divided into five main parts. Section 2 offers a brief description of the institutional structure of South African local government by way of background. Section 3 provides a synoptic generic outline of efficiency analysis, focusing on data envelopment analysis. Section 4 considers the complexities of efficiency analysis in the local government milieu. Section 5 summarises the data and models employed in the analysis. Section 6 discusses the results obtained from the estimation process. The article ends with some brief concluding comments in section 7.

2. STRUCTURE OF SOUTH AFRICAN LOCAL GOVERNMENT

The South African local government sector is comprised of three types of local authority: metropolitan municipalities, district councils and local councils. Metropolitan municipalities hold executive and legislative authority over municipal functions for the major urban areas of Cape Town, Durban, the East Rand, Johannesburg, Port Elizabeth and Pretoria. District councils have municipal executive and legislative authority over large geographical zones, holding responsibility for district-wide capacity-building and planning. The spatial jurisdiction of each district council usually contains several local councils which have responsibility for service provision within the regulatory and planning established framework established by the district council. In total, South Africa has 284 local government entities comprised of these three types of local authority (Atkinson, 2002).

This structure is explicitly tied to developmental policy. For example, district municipalities and local municipalities share responsibility to make sure that all communities, including deprived particularly communities, have equivalent access to services. Moreover, the resources necessary for this purpose derive in part from the fact that because district municipalities typically encompass both affluent and poor communities, cross-subsidisation becomes possible allowing financially stressed, low capacity local municipalities to provide basic services to poor communities. The structure also provides scope for shared services which can yield generate scale and scope economics. District municipalities discharge numerous functions. For instance, district councils undertake development planning for the district municipality, supply bulk water, bulk electricity; bulk sewerage purification, main sewerage disposal, waste disposal sites, municipal roads, storm water drainage, municipal public works, street lighting, municipal parks and recreation facilities. While South African local government has traditionally provided a comparatively narrow range of services, the *White Paper on Local Government* and the RDP has seen the role of municipalities expanded to include a greater range of service objectives.

3. Efficiency measurement and data development analysis

According to the Department of Cooperative Governance and Traditional Affairs (COGTA) (2009:7), 'a municipality must structure and manage its administration and budgeting and planning processes to give priority to the basic needs of the community, and to promote the

social and economic development of the community, and participate in national and provincial development programs'. If a municipality can achieve these objectives consistently, given its financial and administrative capacity, then it represents a 'functional, well-performing municipality'. Under these circumstances, a 'functional, well-performing municipality' is one that is economically efficient.

For many years efficiency measurement has been a subject of considerable interest to public policy makers. Farrell (1957:254, 258) defined a simple measure of firm efficiency, which could account for multiple inputs, and proposed that the efficiency of any given firm consists of two components: technical efficiency (i.e. the ability of a firm to maximise output from a given set of inputs) and allocative efficiency (i.e. the ability of a firm to use its inputs in cost-minimising proportions, given their respective prices). Total or economic efficiency (also known as cost efficiency) is the result of combining these two measures.

According to Cook and Seiford (2009:1), Charnes *et al*. (1978) expanded on the Farrell approach, responded to the need for satisfactory procedures to assess the relative efficiencies of multi-input multi-output production units, and introduced a powerful methodology in the form of data envelopment analysis (DEA). The original idea behind DEA was to provide a methodology whereby, within a set of comparable decision making units (DMU's), those entities exhibiting best practice could be identified and could form an efficient frontier. The methodology enables us to measure the level of efficiency of non-frontier units and to identify benchmarks against which such inefficient units can be compared (Cook and Seiford, 2009:1-2). DEA involves the use of linear programming methods to construct a non-parametric piece-wise surface (or frontier) over the data. Efficiency measures are then calculated relative to this surface (Coelli *et al*., 2005:162).

The linear programming method may involve an input-orientated or output-orientated model. Input-orientated models are preferred where firms have particular orders to fill (such as the supply of water and electricity in the case of local governments) and hence the input quantities appear to be the primary decision variables. Output-orientation may be more appropriate where firms may be given a fixed quantity of resources and asked to produce as much output as possible. In essence, one should select the orientation according to which quantities (inputs or outputs) the managers have most control over (Coelli *et al*., 2005:180). Input-orientated and output-orientated models may include constant returns to scale (CRS) or variable returns to scale (VRS) assumptions.

A VRS estimate is obtained as the minimised value of the objective function in the following LP:

$$\textbf{Error!}\theta_n$$

$$\text{s.t.} \quad \mathbf{Y}\boldsymbol{\lambda}_n - \mathbf{y}_n \geq 0$$

$$\theta_n \mathbf{x}_n - \mathbf{X}\boldsymbol{\lambda}_n \geq 0$$

$$\mathbf{j}'\boldsymbol{\lambda}_n = 1 \qquad \text{(VRS constraint)}$$

$$\boldsymbol{\lambda}_n \geq \mathbf{0},\ \theta_n \geq 0$$

where $\mathbf{Y} = (\mathbf{y}_1, \ldots, \mathbf{y}_N)$ is a $J \times N$ matrix of observed outputs, $\mathbf{X} = (\mathbf{x}_1, \ldots, \mathbf{x}_N)$ is an $I \times N$ matrix of observed inputs, $\boldsymbol{\lambda}_n$ is an unknown $N \times 1$ vector, and θ_n is an unknown scalar where $\mathbf{j}$ is an $N \times 1$ vector of ones.

4. Local government efficiency measurement

The characteristics of local government service provision have made it difficult to develop precise measures of productive efficiency, particularly for benchmarking and comparative performance measurement. These characteristics encompass the following complicating factors: (a) multiple inputs and outputs in service provision; (b) the difficulties involved in determining the costs of service provision; (c) numerous stakeholders each competing needs, and (c) 'non-discretionary' factors which fall outside the control of local government (Worthington and Dollery, 2002).

In the realm of local government empirical analysis, five different approaches have been employed in local public sector efficiency analysis (Worthington, 2001): Least squares econometric production models; the deterministic frontier approach; the stochastic frontier approach; the fee-disposal hull approach; and the DEA approach. DEA is often used to measure the relative efficiency (or productivity) of entities in the same industry, such as the local government sector. DEA generally represents the preferred measure of relative efficiency for local government entities since they are quintessentially complex organizations in complex environments. In particular, DEA allows us to analyse multiple outputs of local authorities, where binding budgets and other constraints are in operation. In sum, DEA merges available input and output data on a municipality into a unitary measure of productive efficiency which can be used to gauge the relative efficiency of local authorities in comparison to each other. Output measures used in DEA estimates of local government have typically used only quantitative measures, as well as 'non-discretionary' quantitative output measures, such the number of residents requiring a specific service. Worthington and Dollery (2000) and Worthington (2001) provide detailed surveys of the empirical efficiency analysis in local government.

5. Data and model

The data used for the analysis in this article represent budget data for the relevant variables used. In common with all efficiency measurement exercises, the quality of the data obviously determines the quality of the results obtained from the analysis. This raises various potential problems in the present context. For instance, an improved municipal budgeting process may change efficiency results without any corresponding real change in local services actually delivered. However, there is some evidence which suggests that this may not be a significant problem in the time period under review (Dollery and Graves, 2009:162-174). Panel data covering the fiscal year 2006/2007 to the fiscal year 2008/2009 were employed, which included 231 local municipalities and 46 district municipalities.

According to Bahl and Smoke (2003), securing adequate and satisfactory data on South African local government represents a formidable challenge to all researchers in the area. Due to the inability of individual local municipalities and individual district municipalities to supply adequate and satisfactory data that could be used to estimate the efficiency of various local services, we were obliged to use data published by the Demarcation Board of South Africa for the sample period, 2006/2007, 2007/2008, and 2008/2009. This data comprised *inter alia* total number of households, RDP water, RDP sanitation, RDP electricity, RDP refuse removal, the number of staff, various types of income that can be aggregated as total operating income and staff costs. The number of households, RDP water, sanitation

electricity and refuse removal are derived from the 2001 national census. This was adjusted to represent number of households in 2006/2007 up to 2008/2009 using the population growth rate in proportion to the estimates of the population per province (Statistics SA, 2008).

A DEA was performed using as output variables the total number of households receiving RDP water, RDP sanitation RDP electricity and RDP refuse removal. For input variables, the rand value of staff costs and total operational income were used. Total operational income was employed as an input since this represented the aggregate funds expended to deliver the various local services under review; it incorporates the rand value of rates income, services income and government grants.

The software package DEAP Version 2.1 developed by Coelli (1996) is 'purpose-built' to solve the DEA problem in efficiency estimation procedures and typically forms the methodological basis for many local government efficiency measurement exercises. Accordingly, it has been used for the estimations reported in this article to generate estimates of technical efficiency and scale efficiency. The efficiency estimates are executed under variable returns to scale (VRS) under input-orientated approaches. The input-orientated approach applies to the situation in which the local and district municipality seek to deliver the desired output with the minimum inputs. Following Coelli *et al*. (2005:172), the use of the constant returns to scale (CRS) specification when not all entities are operating at the optimal scale results in measures of relative efficiency (TE), which are confounded by scale efficiencies (SE). The use of VRS specification thus permits the calculation of TE devoid of these SE effects. Scale efficiency can be estimated by dividing a CRS estimate of technical efficiency by a variable return to scale (VRS) estimate.

6. Discussion of results

The comparative relative efficiency estimates for district municipalities are depicted in Table 1. The average technical efficiency estimate during the year 2008/2009 was 46.0% indicating that the district municipalities should, on average, be able to reduce inputs by 54% without any reduction in outputs. Between 2006/2007 and 2008/2009 the mean technical efficiency estimate increased from 38.1% to 46.0%, while the median for technical efficiency increased from 27.7% to 33.3%. This means that, on average, some district municipalities were able to reduce inputs without any reduction in outputs. During the same period the mean scale efficiency estimate increased from 71.8% to 79.2% and the median scale efficiency estimate increased from 76.1% to 88.0%.

During the period 2006/7 to 2008/9, thirty four district municipalities experienced an improvement in technical efficiency, while twelve district municipalities experienced deterioration in technical efficiency. During 2006/7, two district municipalities were fully technical and scale efficient, and during 2008/9 five district municipalities were fully technical efficient and three were fully scale efficient. Over the three year period, the majority of the district municipalities were operating at increasing returns to scale, meaning that they operated at a scale that was too small in efficiency terms.

A number of district municipalities experienced considerable improvement in technical efficiency during the sample period. During the period 2006/2007 to 2007/2008, district municipality DC46 experienced the highest improvement in technical efficiency. During the period 2007/2008 to 2008/2009, district municipality DC12 experienced the highest improvement in technical efficiency, while during the sample period, 2006/2007 to

2008/2009, district municipality DC48 experienced the highest improvement in technical efficiency. The district municipality with the highest net improvement in technical efficiency during the sample period is DC48.

Table 1: Comparative Relative Efficiency Estimates for District Municipalities

District	2006/2007			2007/2008			2008/2009		
	TE	SE	Returns	TE	SE	Returns	TE	SE	Returns
DC1	0.100	0.729	irs	0.091	0.731	irs	0.110	0.726	irs
DC2	0.115	0.980	irs	0.128	0.991	irs	0.143	0.991	irs
DC3	0.128	0.630	irs	0.134	0.639	irs	0.135	0.687	irs
DC4	0.089	0.913	irs	0.115	0.901	irs	0.121	0.974	drs
DC5	0.198	0.203	irs	0.196	0.197	irs	0.205	0.231	irs
DC6	0.291	0.303	irs	0.263	0.267	irs	0.267	0.434	irs
DC7	1.000	0.592	irs	0.356	0.399	irs	0.324	0.480	irs
DC8	0.276	0.453	irs	0.220	0.512	irs	0.254	0.643	irs
DC9	0.369	0.706	irs	0.355	0.679	irs	0.359	0.742	irs
DC10	0.184	0.717	irs	0.170	0.674	irs	0.188	0.752	irs
DC12	0.295	0.761	drs	0.151	0.677	drs	1.000	0.157	drs
DC13	0.162	0.761	irs	0.153	0.769	irs	0.190	0.963	irs
DC14	0.091	0.417	irs	0.118	0.417	irs	0.113	0.691	irs
DC15	0.098	0.769	irs	0.095	0.788	irs	0.179	0.994	irs
DC16	0.729	0.394	irs	0.972	0.336	irs	1.000	0.470	irs
DC17	0.606	0.991	drs	0.547	0.988	drs	0.643	0.863	drs
DC18	0.688	0.936	irs	0.661	0.964	irs	0.658	0.936	drs
DC19	0.776	0.915	irs	0.696	0.921	irs	0.868	0.990	irs
DC20	0.816	0.786	irs	0.737	0.803	irs	0.717	0.947	irs
DC21	0.070	0.713	irs	0.063	0.671	irs	0.082	0.967	irs
DC22	0.278	0.995	drs	0.159	0.998	-	0.240	0.989	irs
DC23	0.088	0.654	irs	0.086	0.673	irs	0.095	0.976	irs
DC24	0.640	0.353	irs	0.627	0.396	irs	0.649	0.630	irs
DC25	0.770	0.655	irs	0.774	0.660	irs	0.644	0.792	irs
DC26	0.175	0.569	irs	0.084	0.587	irs	0.116	0.936	irs
DC27	0.222	0.376	irs	0.222	0.405	irs	0.288	0.680	irs
DC28	0.184	0.762	irs	0.215	0.825	irs	0.227	0.952	irs
DC29	0.089	0.655	irs	0.118	0.613	irs	0.165	0.897	irs

DC30	0.646	0.952	irs	0.657	0.975	irs	0.860	0.988	drs
DC31	1.000	1.000	-	0.872	0.986	irs	1.000	1.000	-
DC32	0.560	0.964	irs	0.950	0.852	drs	1.000	1.000	-
DC33	0.435	0.987	irs	0.472	0.991	drs	0.612	0.970	drs
DC34	0.502	0.932	drs	0.483	0.907	drs	0.782	0.984	drs
DC35	0.111	0.984	irs	0.444	0.965	drs	0.488	0.997	irs
DC36	0.834	0.791	irs	0.507	0.846	irs	0.665	0.980	irs
DC37	0.678	0.956	drs	0.822	0.817	drs	1.000	1.000	-
DC38	0.237	0.892	irs	0.144	0.925	irs	0.234	0.990	irs
DC39	0.439	0.655	irs	0.329	0.658	irs	0.342	0.722	irs
DC40	1.000	1.000	-	1.000	0.763	drs	1.000	0.714	drs
DC42	0.180	0.998	-	0.152	0.996	irs	0.290	0.582	drs
DC43	0.177	0.428	irs	0.145	0.471	irs	0.195	0.854	irs
DC44	0.156	0.374	irs	0.184	0.369	irs	0.209	0.823	irs
DC45	0.043	0.158	irs	0.353	0.318	irs	0.351	0.441	irs
DC46	0.360	0.446	irs	1.000	0.412	irs	0.700	0.489	irs
DC47	0.468	0.902	irs	0.362	0.922	irs	0.469	0.988	irs
DC48	0.167	0.930	irs	0.178	0.998	-	1.000	0.423	drs
Mean	0.381	0.718		0.382	0.710		0.460	0.792	
Min	0.043	0.158		0.063	0.197		0.082	0.157	
Max	1.000	1.000		1.000	0.998		1.000	1.000	

Note: TE = Technical Efficiency; SE = Scale Efficiency; IRS = Increasing returns to scale; DRS = Increasing returns to scale.

The comparative relative efficiency estimates for local municipalities are reported in Table 2. From the results it is clear that between 2006/7 and 2008/9 four provinces experienced deterioration in technical efficiency, three provinces experienced improvement in technical efficiency while two provinces experienced mixed results. In the case of scale efficiency, five provinces experienced deterioration while four provinces experienced an improvement in scale efficiency. The median technical efficiency during 2006/7 was 44.3% and during 2008/9 the median technical efficiency was 52.8%. The median scale efficiency during 2006/7 was 85.9% and during 2008/9 the median scale efficiency was 86.4%. It is clear that there was an improvement in both technical and scale efficiency.

Table 2: Comparative Relative Efficiency Estimates for Local Municipalities (Average per Province)

Local municipality	2006/2007		2007/2008		2008/2009	
	TE	SE	TE	SE	TE	SE
WC	0.298	0.890	0.267	0.886	0.260	0.889
NC	0.529	0.713	0.474	0.722	0.485	0.753
EC	0.412	0.834	0.416	0.852	0.528	0.908
FS	0.443	0.879	0.447	0.878	0.482	0.864
KZN	0.501	0.784	0.466	0.794	0.547	0.876
MP	0.428	0.867	0.455	0.863	0.551	0.833
LIM	0.636	0.895	0.504	0.878	0.576	0.904
NW	0.490	0.859	0.483	0.829	0.591	0.820
GT	0.422	0.843	0.440	0.818	0.440	0.814
Median	0.443	0.859	0.455	0.852	0.528	0.864

Note: TE = Technical Efficiency; SE = Scale Efficiency , WC: Western Cape, NC; Northern Cape, EC; Eastern Cape, FS: Free State, KZN: Kwazulu Natal, MP: Mpumalanga, LIM: Limpopo, NW: North West, GT: Gauteng.

Table 3 contains the efficiency estimates for the top ten district municipalities over the period of three years instead of each individual year. Nine district municipalities were fully technically efficient during this period. Only two of the top ten district municipalities were fully scale efficient during this period, with five of them operating at increasing returns to scale, meaning that they were operating at a scale that was too small in efficiency terms. Three district municipalities were operating at decreasing returns to scale, meaning that they were operating at a scale that was too large in efficiency terms. The names of two provinces (Western Cape and Limpopo) do not appear in the list of the top ten district municipalities. The names of three provinces (Eastern Cape, Kwazulu Natal and North West) appear twice in the list of the top ten district municipalities.

Table 3: Top ten Relative Technically Efficient District Municipalities – 2006/2007 to 2008/2009

District	TE	SE	Returns
DC7 NC	1.000	0.592	irs
DC12 EC	1.000	0.225	drs
DC16 EC	1.000	0.288	irs
DC24 KZ	1.000	0.230	irs
DC25 KZ	1.000	0.506	irs
DC31 MP	1.000	1.000	-
DC37 NW	1.000	0.651	drs
DC40 NW	1.000	1.000	-
DC42 GT	1.000	0.182	drs
DC20 FS	0.963	0.673	irs

Note: TE = Technical Efficiency; SE = Scale Efficiency; IRS = Increasing returns to scale; DRS = Increasing returns to scale.

The efficiency estimates over a period of three years, instead of for each individual year, for the bottom ten district municipalities are reported in Table 4. Three of the district municipalities were less than 10% technical efficient. Between the bottom ten district municipalities, technical efficiency ranges between 4.4% and 12.8%. All of these entities were operating at increasing returns to scale, meaning that they were operating at a scale that was too small. The names of two provinces (Western Cape and Kwazulu Natal) appear three times on the list of the bottom ten technically efficient district municipalities, and the name of the Eastern Cape appears twice. The names of four provinces (North West, Mpumalanga, Free State and Gauteng) do not appear on this list.

Table 4: Bottom ten Relative Technically Efficient District Municipalities – 2006/2007 to 2008/2009

District		TE	SE	Returns
DC14	EC	0.128	0.296	irs
DC1	WC	0.122	0.602	irs
DC2	WC	0.116	0.985	irs
DC29	KZ	0.114	0.519	irs
DC15	EC	0.112	0.675	irs
DC35	LIM	0.112	0.975	irs
DC23	KZ	0.107	0.540	irs
DC4	WC	0.096	0.855	irs
DC21	KZ	0.087	0.584	irs
DC45	NC	0.044	0.155	Irs

Note: TE = Technical Efficiency; SE = Scale Efficiency; IRS = Increasing returns to scale; DRS = Increasing returns to scale.

The efficiency estimates over the period of three years, instead of for each individual year, for the top twenty technically efficient local municipalities are reported in Table 5. The names of six provinces appear on the list (Northern Cape four times, Kwazulu Natal four times, Limpopo four times, Free State three times, Mpumalanga three times and the Eastern Cape twice). The names of two provinces, the Western Cape, Gauteng and North West are not on the list. Five of these municipalities were fully scale efficient, meaning that they were of the right size. Thirteen local municipalities were operating at decreasing returns to scale, meaning that they were operating at a scale that was too large, in efficiency terms and two were operating at increasing returns to scale, which means that they were operating at a scale that was too small in efficiency terms.

Table 5: Top twenty Relative Technically Efficient Local Municipalities – 2006/2007 to 2008/2009

Local municipality	TE	SE	Returns
NC078	1.000	1.000	-
NC081	1.000	0.291	irs
NC084	1.000	0.726	irs
NC091	1.000	1.000	-
EC125	1.000	0.358	drs
EC442	1.000	0.769	drs
FS172	1.000	0.368	drs
FS184	1.000	0.589	drs
FS185	1.000	0.942	drs
KZN213	1.000	1.000	-
KZ236	1.000	1.000	-
KZ252	1.000	0.538	drs
KZN433	1.000	0.966	drs
MP315	1.000	0.762	drs
MP316	1.000	0.498	drs
MP325	1.000	0.487	drs
LIM332	1.000	0.722	drs
LIM342	1.000	1.000	-
LIM343	1.000	0.844	drs
LIM344	1.000	0.546	drs

Note: TE = Technical Efficiency; SE = Scale Efficiency; IRS = Increasing returns to scale; DRS = Increasing returns to scale.

The efficiency is estimated over the period of three years instead of for each individual year, for the bottom twenty technically efficient local municipalities are reported in Table 6. The name of four provinces (North West, Mpumalanga, Gauteng and Limpopo) appear only once on the list, while the name of the Northern Cape appears nine times. The only province that has no local municipality in the bottom twenty is the Free State. Fourteen of the local municipalities operated at increasing returns to scale, meaning that they operated on a too small scale, in efficiency terms, five operated on decreasing returns to scale, meaning that they operated on a scale that was too large in efficiency terms, while one local municipality was fully scale efficient, meaning that, in efficiency terms, it was operating at the right size. The technical efficiency in this group ranged between 6.9% and 35.9%.

Table 6: Bottom twenty Relative Technically Efficient Local Municipalities – 2006/2007 to 2008/2009

Local municipality	TE	SE	Returns
NW401	0.359	0.912	irs
EC126	0.357	0.985	irs
EC102	0.354	0.987	irs
EC152	0.348	0.608	irs
KZN432	0.343	0.507	irs
MP303	0.341	0.988	drs
EC108	0.330	0.941	drs
WC042	0.308	0.992	drs
WC048	0.305	0.944	drs
KZ284	0.303	0.999	-
EC138	0.292	0.840	irs
EC151	0.282	0.923	irs
WC047	0.281	0.998	irs
GT422	0.259	0.972	drs
EC135	0.250	0.960	irs
NC452	0.234	0.994	irs
LIM362	0.210	0.956	irs
EC154	0.197	0.635	irs
EC153	0.184	0.881	irs
NC451	0.069	0.934	irs

Note: TE = Technical Efficiency; SE = Scale Efficiency; IRS = Increasing returns to scale; DRS = Increasing returns to scale.

7. Concluding remarks

The results obtained from this second attempt at measuring relative efficiency in South African local government should be regarded with caution mainly because the data from which they were derived are questionable. It would have been preferable to employ data provided directly from a large sample of district municipalities and local municipalities. However, since this once more proved impossible, we were obliged to use the only available data.

From the results it is clear that there has been an improvement in the mean technical efficiency estimate of district municipalities during the sample period. The mean technical efficiency estimate increased from 38.1% to 46.0% which means that the district municipalities were able to reduce its inputs without any reduction in outputs. During this period the median for technical efficiency increased from 27.7% to 33.3% which indicates that there has been an increase in the number of district municipalities which experienced improvement in technical efficiency. Thirty four district municipalities experienced improvement in technical efficiency, while twelve district municipalities experienced deterioration in technical efficiency. A number of district municipalities experienced considerable improvement in technical efficiency during the sample period.

In the case of local municipalities, four provinces experienced deterioration in technical efficiency, three provinces experienced improvement in technical efficiency while two

provinces experienced mixed results. Five provinces experienced deterioration in scale efficiency and four provinces improvement in scale efficiency. According to the median efficiency estimates there has been an improvement in technical and scale efficiency.

If the efficiency estimates are calculated over the period of three years instead of each individual year, nine of the ten top district municipalities were fully technical efficient. Only two of the top ten district municipalities were fully scale efficient. The names of two provinces (Western Cape and Limpopo) do not appear on the list of the top ten district municipalities, while the names of three provinces (Eastern Cape, Kwazulu Natal and North West) appear twice in the list of the top ten district municipalities. In the list of the bottom ten district municipalities the names of two provinces (Western Cape and Kwazulu Natal) appear three times and the name of the Eastern Cape appear twice. The names of four provinces (North West, Mpumalanga, Free State and Gauteng) do not appear on the list.

When the efficiency estimates for local municipalities are calculated over the three years period instead of each individual year, the names of six provinces (Northern Cape four times, Kwazulu Natal four times, Limpopo four times, Free State three times, Mpumalanga three times and Eastern Cape twice) appear on the list of the top twenty technically efficient local municipalities. The names of three provinces, the Western Cape, Gauteng and North West do not appear on the list. In the case of the bottom twenty technically efficient local municipalities, the name of four provinces (North West, Mpumalanga, Gauteng and Limpopo) appear only once on the list, while the name of the Northern Cape appears nine times. The only province that has no local municipality in the bottom twenty is the Free State.

Compared to the results in a previous study by van der Westhuizen and Dollery (2009), there has been a slight deterioration in the average technical efficiency of district municipalities (47 per cent to 46 per cent), while there has been a substantial improvement in the average scale efficiency of district municipalities (64.1 per cent to 79.2 per cent). A lack of comparable tables of the results for local municipalities makes it impossible to compare the previous results with those obtained in the previous study.

Published budget data will no longer be available from the Demarcation Board of South Africa which means that a similar study covering a longer sample period will no longer be possible. The results obtained in this study should be read in conjunction with the following.

COGTA (2009) investigated the reasons for the poor performance by district and local municipalities. COGTA (2009:5) seek to answer the following questions: "Is the municipality delivering on the desired outcomes, and is it operating on a sustainable basis?" "What is the state of local government in 2009 and what must be done to restore the confidence of our people in this sphere of government by 2011 and beyond?"

COGTA (2009:7) states that a municipality must structure and manage its administration and budgeting and planning processes to give priority to the basic needs of the community, and to promote the social and economic development of the community, and participate in national and provincial development programmes'. For this reason municipalities were categorised in four different groups according to the performance.

According to COGTA (2009:63) municipalities are showing a poor ability to accurately plan and spend their budgets (i.e. credible budgets). A credible budget is regarded as one with a variance of less than 20 per cent. 35 municipalities overspent their total adjusted budgets to the total amount of R2.6 billion while 182 municipalities under spent to the amount of R19.1

billion. When analysing the capital adjusted budget spending, 177 municipalities under spent to the amount of R7.3 billion and 32 municipalities overspent to the amount of R350 million.

Analysis of the operating adjusted budget indicates that 24 municipalities overspent their operating budget to the value of R2.6 billion while 166 municipalities under spent to the value of R12.3 billion. A very significant risk going forward is that municipalities' spending plans outstrip realistically collectable revenues.

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