ECONOMIC BULLETIN

QUARTER 2 2016/17

Investigating the Economic Growth Effects of Gauteng Municipal Capital Expenditure: A Pooled Panel Approach

GAUTENG PROVINCE
PROVINCIAL TREASURY
REPUBLIC OF SOUTH AFRICA

Hotline: 0860 428 8364
www.gautengonline.gov.za

Abstract

This paper examines the impact of Gauteng municipal capital expenditure on output. Effective implementation of capital expenditure infrastructure programmes is important in the development of regional economic development. Municipalities have a mandate to play a significant role in providing necessary infrastructure that could spur local development. The results of this study show that Gauteng municipal capital spending on water & sanitation, and electricity had undesirable effects on municipal output. The category of municipal infrastructure spending that had a positive effect on municipal output was road transport. When including dummy variables that capture the time-effects of increased spending relating to the 2010 FIFA World Cup preparation, the results show that capital spending relating to the World Cup did not have an immediate positive effect on regional growth, however after the tournament, the effects were positive and economically significant. When aggregating municipal expenditure to distinguish between priori productive and unproductive expenditure, the results show that over the medium-term, productive expenditures have the most significant positive effect on regional growth. Furthermore, the effect of capital expenditure was found to be more significant in the metros than in districts. This was not unexpected given that metros have a much better implementation capacity in terms of their budgets, than the smaller municipalities.

Keywords: Gauteng, municipal capital expenditure, regional economic growth, pooled, panel analysis, fixed effects.

Executive Summary

The aim of this paper was to investigate the growth effects of capital expenditure at the local level, focusing primarily at municipalities in the Gauteng province. The focus of the study is primarily on three categories of capital expenditure, namely, water & sanitation, road transport, electricity and other capital expenditure, and uses data spanning from 2006 to 2015. The study used a pooled panel approach to estimate four equations that assess the effect of municipal capital expenditure on Gauteng output. To date, most studies have looked at the impact of government expenditure on output growth at a national level rather than at a municipal level. The emphasis on the local level is very important as this level of government plays a significant role in the development of local economies and communities.

Four equations that were estimated include a baseline equation which looks at the impact of the specified category of capital expenditure on output, an equation that captures time-effects of increased spending relating to the 2010 FIFA World Cup preparation, a third equation that presents the classification of expenditure split in two categories, a *priori* productive and unproductive expenditure, and the last one which compares the growth effects of capital expenditure in the metros with those in the districts.

Of all the featured categories of capital expenditure on this study, outlays on road transport were the only category that had a positive effect on Gauteng municipal output, particularly in the baseline equation. When including dummy variables that capture the time-effects of increased spending relating to the 2010 FIFA World Cup preparation, the results show that capital spending relating to the preparations of the World Cup did not have an immediate positive effect on regional growth, however over time, particularly after the tournament, the effects were positive and economically significant. When aggregating municipal expenditure to distinguish between *priori* productive and unproductive expenditure, the results show that over the medium-term, productive expenditures have the most significant positive effect on regional growth. When comparing the metros and districts, the effect of capital expenditure on growth was much stronger in the metros. This was, however not surprising given that metros have a much better implementation capacity in terms of their budgets, than the smaller municipalities.

There are various challenges that were experienced with data in conducting this study, including inconsistencies in reporting and recording of expenditure data. These raise questions around the reliability of municipal financial information in decision-making. It is hoped that the ongoing municipal budget and reporting reforms by the National Treasury will improve the credibility of the information which could be used to enhance future studies of this nature.

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List of Abbreviations

ASGISA	Accelerated and Shared Growth Initiative for South Africa
BRT	Bus Rapid Transport
CoE	City of Ekurhuleni
CoJ	City of Johannesburg
CoT	City of Tshwane
FIFA	Fédération Internationale de Football Association
GDP	Gross Domestic Product
GDP-R	Gross Domestic Product by Region
IDP	Integrated Development Plan
IYM	In-year Monitoring
METROs	Metropolitan Municipalities
MFMA	Municipal Finance Management Act no. 56 of 2003
MSA	Municipal System Act no. 32 of 2000
MTEF	Medium Term Expenditure Framework
NDP	National Development Plan (2012)
NGP	National Growth Path (2010)
SA	South Africa
SDBIP	Service Delivery and Budget Implementation Plan
TMR	Transformation, Modernisation and Revitalisation

1. Background

The relationship between government infrastructure and economic growth has, over the years, taken a center stage in policy debates. In developed countries, increased spending on infrastructure and maintenance such as transport, power, water and telecommunication networks are viewed as essential to boosting economic efficiency which is conducive to growth (Amusa, 2015). Since 2006, various growth policies in South Africa have placed much emphasis on a developmental framework that supports accelerated capital infrastructure to promote economic and social development.[1] This shift was aimed at reversing the patterns of underinvestment and addressing the gap in infrastructure investment which was created during the apartheid years. Capital expenditure under the apartheid system was mainly aimed at benefiting the minority group and thus, created significant inequalities between the well-resourced areas (e.g. former white suburbs) and black communities (Department of Planning, Monitoring and Evaluation, 2013).

The country's economic policy framework advocates for a significant ramp-up of public-sector investment to drive growth and employment. Whilst all the three spheres of government are responsible for carrying out and implementing infrastructure related projects, the local government sphere has a mandate to play a significant role in providing necessary infrastructure towards service delivery.[2] The Constitution of South Africa[3] provides powers and functions to municipalities to ensure the provision of infrastructure that supports service delivery and promotes social and economic development.

Given the importance of investment in infrastructure towards growth prospects, municipal spending on infrastructure has become an important component of public capital expenditure. According to the National Treasury municipal data base, consolidated capital expenditure for municipalities in South Africa has grown by an annual average of 10.1 per cent between 2007 and 2014. For Gauteng municipalities, capital expenditure has grown relatively faster, at an annual average of 14.7 per cent during the same period.

Whilst much progress has been made in extending access to services such as electricity, water & sanitation and housing, the slow pace of service delivery across some Gauteng municipalities is somewhat reflective of implementation gaps in the delivery of municipal infrastructure. As such, it has become necessary to assess the effectiveness of infrastructure investment as a driver of municipal economic growth and social development. This study would attempt to investigate the economic growth effects of capital expenditure on Gauteng municipalities. It draws from a similar panel study done by

[1] For example, this includes policy documents such as the Accelerated and Shared Growth Initiative for South Africa (ASGISA, 2006), the National Growth Path (NGP, 2010), the National Development Plan (NDP, 2012) and government policy for the province, the Transformation, Modernisation and Revitilisation programme (TMR, 2014).
[2]Infrastructure projects are distributed from national government to local (and provincial) government through municipal (and provincial) grant programmes, whilst most municipalities have further funds collected from their own revenue sources for capital expenditure.
[3] See Section 151 of Chapter 7 of the Constitution.

Amusa (2015) which looked at the growth effects of municipal capital expenditure in 234 municipalities in South Africa. The paper gives account of the growth effects of capital expenditure on water & sanitation, road transport, electricity and other capital expenditure of Gauteng municipalities[4], between 2006 and 2015.

The Section 2 of this paper looks at the policy framework in which municipalities operate, highlighting trends in municipal capital expenditure and sources of funding. Section 3 reviews the existing literature around the impact of government capital spending on real the gross domestic product by region (GDP-R) growth. Section 4 describes the data used in this study. Section 5 empirically investigates the growth effects on Gauteng municipal capital expenditure, which is then followed by the analysis of the model results in Section 6. Finally, Section 7 highlights data challenges experienced in compiling this study, whilst Section 8 concludes.

2. Policy Framework for Local Government

2.1 Institutional Mandate and Policy Framework

Municipalities are responsible for the provision of services, including water, sanitation, refuse removal and electricity. Local government is founded in the Section 151 of the Constitution. The Section 152 (1) and (2) provides powers to municipalities including the structuring, and management of administration and planning processes. The Section 229 (1) and (2) of the Constitution gives municipalities the powers to impose rates on property and to levy tariffs on the services they provide, such as water, electricity, sanitation and refuse removal. Municipalities are also entitled to the share of revenue collected at the national government in the form of equitable share grants.

In terms of Section 71 of the Municipal Finance Management Act (MFMA) (Act no. 56 of 2003), municipalities are required to report, in a prescribed framework, on their state of budgets on a monthly and quarterly basis, to the relevant Provincial Treasury and the National Treasury. This forms part of the In-year Monitoring (IYM) System, which enables provincial and national government to exercise oversight over municipal finances (National Treasury, 2015). In terms of the Chapter Five of the Municipal System Act (MSA) (Act no. 32 of 2000), municipalities are required to develop an Integrated Development Plan (IDP), which is a strategic document that co-ordinates the plans for the development of a municipality. The IDPs also need to be consistent and aligned with the resources available to the municipality (i.e. the budget) and its capacity. Whilst the MFMA and MSA are not the only two acts that set out the framework and key requirements for municipal operations, both are very important in

[4] Before the 3rd of August 2016 Municipal Elections, Gauteng had 12 municipalities, namely: City of Johannesburg (CoJ), City of Tshwane (CoT), City of Ekurhuleni (CoE), Sedibeng, West Rand, Midvaal, Lesedi, Emfuleni, Randfontein, Westonaria, Mogale city and Merafong City. After the elections, the Randfontein and Westonaria municipalities merged into a single municipality, called Rand West local municipality. The analysis for the new municipality is not included in this study.

facilitating and ensuring that priorities, budgets, implementation actions and reports are correctly aligned (National Treasury, 2011).

In an ongoing effort to improve the financial reporting system, the National Treasury, since 2014, has embarked on the process of reclassifying and reforming the municipal financial system to achieve a uniform classification of municipal expenditure data. Contained in the Municipal Regulations on Standard Chart of Accounts (2014), the regulations provide for a national standard for the uniform recording and classification of municipal budget and financial information by prescribing a standard chart of accounts for municipalities and their entities. Although the implementation of these regulations will not improve historic data, it is envisaged that it will enhance the alignment of budget and financial reporting formats across municipalities. Before the reforms, each municipality was reporting on its financials according to its own organisational structure and unique chart of accounts, which often resulted in disjuncture across municipalities on how revenue and expenditure are reported on (National Treasury, 2014).

Figure 1: Municipal Financial Management Cycle

Source: National Treasury, 2016
Note: SDBIP = Service delivery and budget implementation plan

Figure 1 shows in brief, the current municipal financial management cycle and these are explained as follows:

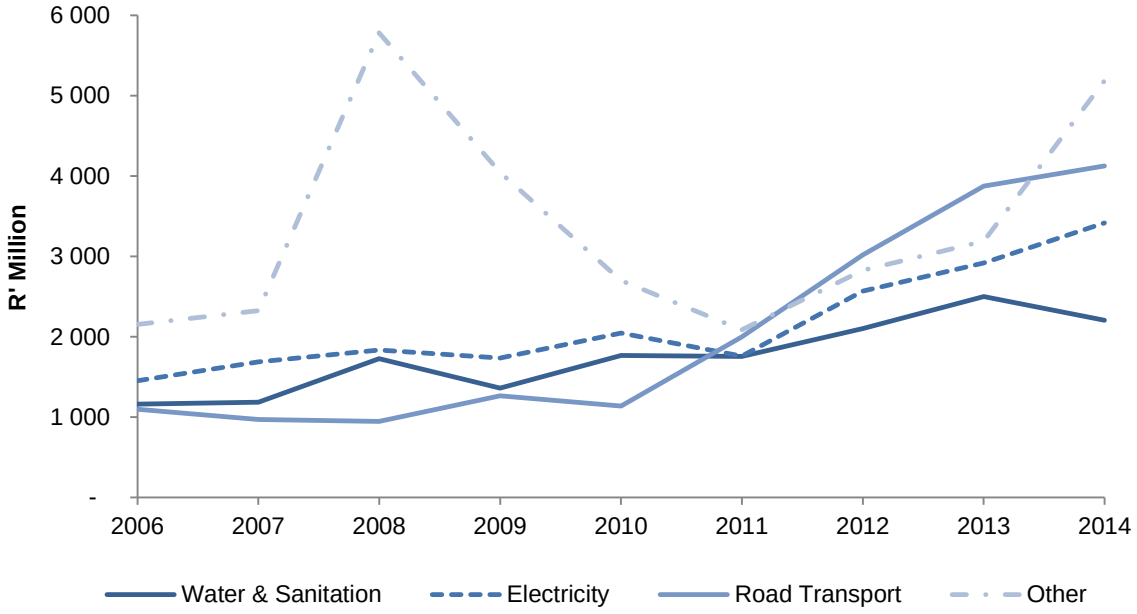
- The IDP sets out the municipality's five-year development plan.
- The three-year budget cycle (or Medium Term Expenditure Framework (MTEF)) outlines the revenue raising and expenditure plans, in which the allocation of funds must be aligned with the priorities of the IDP.
- The SDBIP outlines the monthly and quarterly service delivery and financial target needs, which must be aligned with annual targets set in the IDP and the budget.
- On a monthly and quarterly basis, a municipality submits a report on the implementation of the budget. This is a requirement of the in-year reporting that the Provincial and National Treasuries use to exercise oversight.
- The annual financial statements are then compiled to reflect the financial position of the municipality and submitted to the Auditor-General at the end of the municipal Financial Year in June.
- The annual reports serve as accountability instruments where the mayor's and municipal manager's provide feedback on the implementation and the outcomes of the budget, SDBIP and the progress made in the IDP priorities.

2.2 Trends in Gauteng Municipal Capital Expenditure and Funding Sources

2.2.1 Municipal Capital Expenditure Patterns

Municipal expenditure consists of operating and capital expenditure. Operating expenditure is an ongoing necessity whereby money is required to run the day-to-day functions of municipalities. These daily functions include the provision of immediate services to communities like, salaries & wages of employees, repairs & maintenance of the infrastructure and bulk purchases of services such as electricity. Capital expenditure is more of a long-term investment towards social and economic infrastructure and thus, does not necessarily result in an immediate benefit to the consumer. Figure 1 shows capital expenditure by budget line item for Gauteng municipalities.

Figure 2: Gauteng Municipal Capital Expenditure



Source: Provincial & National Treasury Data Sources, 2016

Capital expenditure for Gauteng municipalities has grown by over ZAR 9 billion between 2006 and 2014. Much of the increase, at least until 2010, can be attributed to the 2010 Fédération Internationale de Football Association (FIFA) World Cup spending commitments. 'Other' expenditure[5] makes up the bulk of the capital expenditure, except between 2011 and 2013 when expenditure on road transport was the highest. The high expenditure on road transport was likely due to the roll-out of the Bus Rapid Transport (BRT) system, which was mainly in the metropolitan municipalities (metros). Furthermore, the bulk of capital expenditure in municipalities that was geared towards the preparations of the World Cup was more on roads construction,

[5] 'Other" capital expenditure usually includes items that do not necessarily generate revenue, such as town halls or municipal buildings (FFC, 2011). In this case however, 'other' also includes expenditure for line items which data was not consistently available across all municipalities and for all the years under review, e.g. housing and waste management.

improving public transport infrastructure and the construction of stadia.[6] Infrastructure expenditure on electricity was the second highest (except for between 2011 and 2014), followed by water & sanitation (except from 2011).

Table 2: Actual Capital Expenditure as a Percentage of Budgeted Capital Expenditure

Municipality	2006-2008	2009-2011	2012-2014
CoJ	87.9%	85.5%	88.7%
CoT	84.6%	85.0%	93.4%
CoE	74.1%	78.5%	79.2%
Sedibeng	37.8%	33.2%	93.9%
West Rand	25.5%	65.7%	93.9%
Lesedi	78.3%	88.9%	98.8%
Midvaal	72.8%	69.5%	66.7%
Emfuleni	34.7%	66.6%	47.3%
Westonaria	81.3%	135.4%	94.1%
Merafong	33.0%	119.2%	71.6%
Randfontein	201.9%	52.4%	55.3%
Mogale City	54.6%	68.8%	83.4%

Source: Own Calculations based on National Treasury Data Sources, 2016
Note: Averages were calculated based on the availability of data and thus, are not indicative of the MTEF period.

Table 1 shows the actual capital expenditure as a percentage of the budgeted capital expenditure, which gives an indication of whether the municipalities were spending all their budgets accordingly. Particularly between 2006 and 2008, the trend was that municipalities significantly under-spent on their budgets. However on average, all the metros spent over 75 per cent of their capital budgets throughout the period, with the CoT spending over 93 per cent of its budget on average, between 2012 and 2014. On average, Sedibeng, West Rand, Emfuleni and Merafong had only spent roughly a quarter of their capital budgets between 2006 and 2008. There have been some improvements however, especially within the metros and districts, and to a lesser extent, the local municipalities.

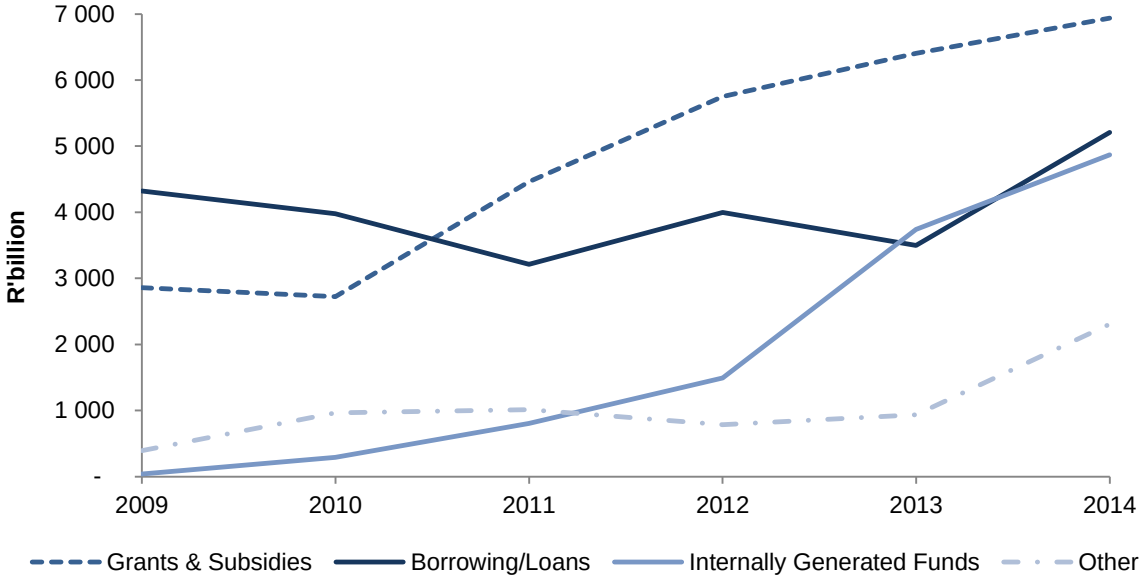
Despite these improvements, under-spending is still a concern across Gauteng municipalities, highlighting possible challenges in the ability of the municipalities to compile reliable budgets or to manage the implementation of infrastructure programmes. The effects of underspending are cumulative because it means that a municipality was unsuccessful in fulfilling the identified priorities for the advancement of the socio-economic development of the region, and this could result in backlogs in demand for services.

[6] This is according to the budget allocations by the National Treasury.

2.2.2 Trends in Municipal Funding Sources for Capital Expenditure

Municipalities rely on various sources to fund their capital expenditure budgets, including intergovernmental transfers which are mainly grants and subsidies. The other sources include borrowings, internally generated funds (i.e. own revenue) and public contributions & donations. Figure 2 shows trends in sources of funding for the capital expenditure.[7]

Figure 3: Sources of Funding for Gauteng Municipal Capital Expenditure



Source: Provincial & National Treasury Data Sources, 2016

In general, the transfers, in the form of grants, from the provincial and national government constitute the bulk of funding for municipal capital expenditure. Municipal grants have more than doubled since 2009, growing by an annual average of 19.4 per cent between 2009 and 2014. Grants are applied judiciously and have been used increasingly as a mechanism to transfer funding to provinces and municipalities to advance national policy objectives (FFC, 2014). Municipalities are also allowed to borrow funds for capital investments. However, the metros dominate the municipal borrowing market as they are able to finance these loans and provide higher levels of collateral. Smaller municipalities, (i.e. districts and local municipalities) are somewhat limited in their ability to borrow (FFC, 2010). Municipalities also have the powers to generate their own revenue from user fees on electricity, water, refuse removal, and property rates & taxes.

[7] The analysis period was shortened to 2009 due to data limitations and inconsistencies prior to then.

3. Review of Literature on the Economic Growth Effects of Municipal Capital Expenditure

There is not an extensive literature examining the economic growth effects of capital expenditure by the local government or municipalities. Although some studies have found government's current expenditure, i.e. expenditure on consumption, to have a negative effect on economic growth (Barro, 1991), others believe that any form of government expenditure can positively influence economic growth, (e.g. Le & Suruga, 2005 and Barro, 1990). There are a couple of broad transmission mechanisms in economic theory that concludes that public spending on productive infrastructure can positively affect economic growth. For example, efficiently run infrastructure can improve the cost of production, whereas inadequate infrastructure can push up the cost of doing business for firms (Fedderke & Garlick, 2008). It may also not be cost effective for firms to provide their own transport infrastructure as compared to when the state provides such infrastructure, as the state is able to achieve significant economies of scale (Fedderke & Garlick, 2008).

Manurung, Abipraja and Masjkuri (2015) made an observation that the provision and availability of infrastructure for services such as water & sanitation, roads & transportation, housing and electricity as one of government expenditure that can positively influence economic development in a region. Manurung et al. (2015) highlight that the efficient operation of such infrastructure can create a conducive environment for the private sector investment, which in turn can stimulate economic development of the community. Savage (2008) also contends that inadequate provision of these services can delay private-sector investment. In their paper, Todaro and Smith (2003) found that the development of infrastructure such as roads, electricity, and water & sanitation would provide a conducive environment for economic activities, which in turn will improve productivity and positively influence economic growth.

There are few studies that look at the impact of public capital expenditure growth at a local government level, some are referred to below. In using a panel of Brazilian municipalities between 1985 and 1994, Mello (2002) estimated the impact of local government spending on housing/urbanization, health/sanitation and transport services on the economic growth of municipalities in Brazil. He found that, infrastructure spending affects economic growth in municipal areas due to positive externalities associated with public investment. Of the three categories he focused on, Mello (2002) found that spending on health/sanitation had the strongest impact on economic growth at the local level. A panel study done by Mursinto (2004) found a positive and significant correlation between expenditure on development and the gross domestic product (GDP) of cities in Indonesia. In the same light, using a panel regression model, a study conducted by Amusa (2015), which was looking at the effects of municipal capital spending on growth for all municipalities in South Africa found outlays on some, but not all municipal infrastructure to have positive and significant effects on growth. Expenditure on infrastructure for water, electricity and repairs & maintenance were reported to have had a positive

impact on growth, whilst outlays on road and housing infrastructure were found to have an opposite effect. Outlays on other municipal infrastructure were also found to have negatively and statistically insignificantly affected regional economic growth. Amusa (2015) attested these results to various challenges such as under-spending on capital budgets, poor planning and recording of municipal capital expenditure.

In contrast, other studies claim a negative relationship between capital expenditure and economic growth. Using data from 43 countries over 20 years, Devarajan, Swaroop and Zou (2001) found that increased capital component of public expenditure (including spending on transportation and communication infrastructure) has a negative impact on growth. This study concluded that when used excessively, productive expenditures could become unproductive. This same study however, found an increase in the share of current expenditure to have a positive and statistically significant relationship with growth. In their paper, which was looking at a panel study of a sample of rich countries, Folster and Henrekson's (2000) results pointed to robust negative relationship between government expenditure and growth in rich countries. In fact, the latter paper raises concerns about studies that may have found opposite results, highlighting that in part, this may reflect the fact that many studies report regressions that contain multicollinearity, heteroscedasticity and other specification problems.

4. Data Description

This study uses a composite of budgeted and actual figures, drawn from the National Treasury's municipal data sources and the Gauteng Provincial Treasury unit that manages local government resources. The capital and operational expenditure data is presented in nominal form. Real GDP-R figures are extracted from the IHS Global Insight regional databases. Initially, a number of control variables were incorporated in the regression, namely population size and income per capita. According to Mello (2002), local government spending is affected by the size of the municipality, which is measured by the resident population. Furthermore, the size of the municipality is likely to have a bearing on the ability of the municipality to provide services and improve the quality of life, which in turn, affects the economic development of the municipality. He uses income per capita as a proxy for economic development. However, for this study, income per capita was highly statistically insignificant and did not seem to be important. The variable was later excluded. The municipal population size data was extracted from the IHS Global Insight regional database.

5. Model Specification

The model that is used in this study is adopted from Mello (2002) and Amusa (2015) who conducted a similar study for municipalities in Brazil and South Africa, respectively. Mello (2002) mentions that whilst the endogenous growth models have focused on government spending as provision of a productive input by the public sector, little has been demonstrated about the impact of government spending on

output growth at the local government level. The estimated equation used for this specific study is defined as follows:

$$Y_{it} = \beta_0 + \beta_1 Pop_{it} + \beta_2 G_{it} + \upsilon_{it} \quad \textbf{1}$$

where *Y* denotes municipal GDP, *Pop* the resident population, *G* government capital spending and υ the error term. The β variables denote coefficients, whilst i denotes Gauteng municipalities featured in the study and t the years from 2006 to 2015. There are certain factors in individual municipalities that can affect output growth. However, these factors which are different across municipalities are unobserved and thus, are excluded from the set of explanatory variables. These could include things like location and the education of the population. Failure to account for these differences (also known as municipal heterogeneity) may cause serious misspecification (Baltagi, 2005). The panel data model allows for overcoming this problem because it includes a parameter for unobserved municipal-specific effects, thereby allowing for heterogeneity across municipalities (Baltagi, 2005). Thus equation 1 is re-written as follows:

$$Y_{it} = \beta_0 + \beta_1 Pop_{it} + \beta_2 G_{it} + \mu_i + \vartheta_{it} \quad \textbf{2}$$

The error term υ_{it} now becomes the sum of unobservable individual municipal specific effects μ_i and a disturbance term ϑ_{it}. The individual specific effects can be modelled using fixed or random effects model, (Baltagi, 2005). The G variable is further disaggregated into outlays that are applicable for the objective of this study which are electricity, water & sanitation, road transport and other capital expenditure.

Although this study is adapted from Amusa (2015) and Mello (2002), it introduces some unique aspects which attempt to improve the quality of the study especially given the data limitations, as outlined in sub-section 5.2. Firstly, **Model 1** as specified in equation 2 is a baseline model in which broader effects of capital spending on municipal output are analysed. Secondly, dummy variables that capture anomalies in the data (**Model 2**), especially around periods immediately before and after the hosting of the 2010 World Cup were added to form the equation 3. Thirdly, another aspect that presents the classification of expenditure split in two categories, a *priori* productive (capital expenditure) and unproductive (operational expenditure) municipal spending[8] was added to the model (**Model 3**).[9] In similar studies, Moreno-Doson (2008) and Mello (2002) also split expenditures by two categories; this

[8] As Mello (2002) states, municipal spending can be distinguished in two categories: operational outlays such as wages and pensions and capital or investment expenditures such as road building, transport services, water supply and sanitation. The latter is a priori considered productive as it is likely to affect productivity of private investment and thus boost output growth. Current spending is considered unproductive.

[9] In this case, productive expenditure refers to expenditure on water & sanitation, electricity, road transport and other capital expenditure. Unproductive expenditure only refers to municipal operational expenditure.

is in line with the theory behind endogenous growth models which highlight that only productive spending should be expected to have a positive impact on growth. The equation for Model 3 is rewritten as follows:

$$Y_{it} = \beta_1 Pop_{it} + \beta_2 Prod\,(-1)_{it} + \beta_3 OE\,(-1)_{it} + 2009dummy_i + 2011dummy_i + \mu_i + \vartheta_{it} \quad \textbf{3}$$

where $Prod\,(-1)_{it}$ is a lagged variable of productive capital expenditure, $OE\,(-1)_{it}$ is a lagged variable of operational expenditure and *2009dummy* and *2011dummy* are dummy variables that capture the effects of immediately before and after the 2010 FIFA World Cup. The statistical significance of the results increase when the productive and operational expenditure variables are lagged, which is consistent with the theory that productive expenditure is more of a long-term investment and thus, does not result in immediate benefits Mello (2002). In the last addition to the model (**Model 4**), the growth effects of capital expenditure in the metros are compared with those in the districts. To obtain the district averages, the local municipalities were aggregated into their respective districts.

The regressions are estimated using pooled cross-section data techniques used in cross-country studies. This technique has various advantages over standard time-series modelling, (see Baltagi, 2005). Amongst other things, panel data can control for heterogeneity (differences across individual, regions and countries), whereas time-series and cross-section studies not controlling this heterogeneity, run the risk of obtaining biased results.

6. Estimation Results

6.1 The Overall Results

Variable definitions and data sources are summarized in Table A1 in the Appendix. Preliminary descriptive analyses of the data revealed significant differences across municipalities in terms of capital expenditure patterns and GDP-R.[10] Additional considerations are noteworthy in estimating equations 2 and 3. The models where estimated with fixed effects. The Hausman (1978) test was used to support the use of the fixed effects method over the random effects. Furthermore, various statistical procedures are also applied to all variables to ensure that it makes statistical sense to combine the variables in a regression equation. All level data was transformed into natural logarithms in order to compare elasticities. A test for stationarity in the panel data was also conducted using Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), and the Augmented Dickey-Fuller and Phillips-Perron tests. The unit root test results of the logged level transformation were mixed

[10] For space consideration, the results are not reported here.

The results of Models 1 to 4 are presented in Table A2 and Table A3 for the cross-section effects. The results are distinguished between estimates with economic significance and estimates with statistical significance.[11] Model 1 results show that outlays on water & sanitation negatively affect regional growth. The results suggest that a 10 per cent increase in capital expenditure thereof will result in 0.76 per cent decrease in municipal output. In terms of economic significance, spending on road transport infrastructure positively affects growth but spending on electricity infrastructure negatively affects regional growth.

The results are in contrast to a *priori* expectation that spending on water & sanitation, and electricity infrastructure would positively affect regional growth. There are various factors at play that may explain this result. In terms of electricity, Schedule 4 (Part B) of the Constitution makes electricity reticulation a function of municipalities. In practice however, Eskom and municipalities both distribute electricity to consumers[12]. In the past, Eskom was more instrumental in the investment of electricity infrastructure, National Treasury (2012). This may explain the insignificance effect of capital expenditure on electricity, probably due to capacity challenges in municipalities, on municipal output during the period reviewed in this study.

As highlighted by Amusa (2015), municipalities, particularly smaller ones have been confronted with capacity constraints including shortages of planning and management skills, and poor administrative capacity to implement projects and complete them on time. Consequently, these impede on the positive externalities that may results from the effective roll-out of such infrastructure (Amusa, 2015), and it also limit the developmental role envisioned for municipalities. Lastly, capital expenditure is more of a long-term investment on social and economic development, and it turns to fluctuate in the short-term. As such, the investment benefits associated with it may take time to materialise especially given the relatively short timeframe of the analysis in this research. In fact, to mitigate this latter problem on a similar study, Devarajan, et al. (2006) selected a five-year forward moving average of the gross domestic product (GDP) growth to eliminate short-term fluctuations induced by shifts in government capital expenditure. This was also done to reflect the fact that government capital expenditure often takes time before the effects on output growth can be registered.[13]

When including dummy variables that capture the time-effects of increased spending relating to the 2010 FIFA World Cup preparations (results of Model 2), the statistical significance of the results improve, although the coefficient signs remain the same. The parameter for the 2009 dummy is negative, whilst that of 2011 dummy is positive, although statistically insignificant. This suggests that

[11] Although there is no universal definition of the term yet, the notion of the economic significance has been mentioned repeatedly, especially in few social studies by McCloskey & Ziliak (1996, 2004, 2013), Steward and O'Donnell (2014) and more recently, Amusa (2015). They emphasise that when explaining a set of empirical findings, the magnitude and implications of reported effects of the coefficient should be taken into consideration. They further state that economic significance is not the same thing as statistical significance and that each can exist without the other.

[12] However, no district municipality is authorised to distribute electricity in South Africa.

[13] Unfortunately, a similar approach for this study could not be adopted given the short and limited time-series of data for Gauteng municipalities.

capital spending relating to the preparations of the World Cup did not have an immediate positive effect on regional growth however, over-time (especially after the tournament) the effects were positive and economically significant.

When aggregating municipal expenditure to distinguish between a *priori* productive and unproductive expenditure (Model 3), the results indicate that, in fact it is productive expenditures that have the most significant positive effect on regional growth. This finding is in line with the results from the study by Moreno-Doson (2008). He found that expenditures considered a *priori* as being productive are confirmed to be the categories of spending that are most relevant for growth, particularly in the medium-term when unproductive spending is not significant at all. Furthermore, as proven in Devarajan, et. al (2001), the result of Model 3 shows that allowing for a time lag in the effect of public capital expenditure on growth has strong effects on the signs of the coefficients.

Lastly, when comparing metros with districts (Model 4), electricity infrastructure positively affect regional growth, which is contrary to the results of the previous models. Furthermore, the results suggest that the effect on growth is stronger in the metros, particularly the City of Johannesburg (CoJ), which is not surprising as metros have better implementation capacity than the smaller municipalities in the province. In fact, when looking at the municipal-specific effects across the four regressions (Models) run in this study, the growth effects of capital expenditure were more significant in the metros than in the local municipalities (see Table A3).

6.2 Discussion

Although the scope of the study was limited by the shortcomings of the data used in the analysis, the surprising nature of the results is in part, are reflective of the challenges that the local government system is faced with. These could be summarised as follows:

- Although the national government has implemented capacity building initiatives in municipalities, the results suggest that poor administrative capacity to implement and account for projects is still a huge challenge, especially across district and local municipalities in the province.
- A shortage of skills to implement projects, especially in smaller municipalities is also a challenge, which leads to dependency on the services of consultants. As noted in the study done by Peters and Nieuwenhuyzen (2014), unless the necessary skills and knowledge are transferred to municipalities, the dependency on consultants will only result in short-term improvements.
- In most cases, infrastructure projects often run for a long time, resulting in massive cost overruns, which leads to excessive spending. As highlighted by Devarajan, et. al (2001), when used excessively, productive expenditure can become inefficient and unproductive.

Whilst infrastructure spending by some municipalities may be poorly planned and implemented, the importance of municipal infrastructure investment should not be ignored based solely on this evidence. Additional considerations are noteworthy. The local government financial management reforms that deal with the alignment of municipal financial transactions against predefined classification framework in terms of revenue and expenditure were only implemented recently in 2014. Consistent data over a greater number of years is required to construct a reliable time-series. Thus, the data (post the reforms) included in this study is not sufficient enough to determine a long and reliable time-series. However, it does lay a better foundation and gives impetus for future studies of this nature.

7 Data Limitations

As previously highlighted, there were various data challenges experienced in conducting this study. Although in-year reporting is now well institutionalised, with most municipalities consistently reporting on their financial position on a quarterly basis (National Treasury, 2015), getting municipalities to provide their in-year financial reports is often a challenge. Prior to when the municipal financial management reforms, information on municipal capital expenditure was reported on an aggregated level. Inconsistencies in recordkeeping and reporting by municipalities, realignment of local government boundaries, and reforms on municipal financial management have resulted in incomplete and relatively incomparable datasets. Even after reforms were implemented, municipal capital expenditure data is still not comparable between years and between municipalities. There are also large discrepancies in expenditure patterns between years for even the same municipality, which made the analysis challenging. For example, in some years, capital expenditure was significantly high and in other years abnormally low.

There were some municipalities that were excluded from the analysis due to unrecorded data. These are Sedibeng and West Rand; the inclusion thereof would have resulted in a large number of missing observations. In addition, expenditures on housing and refuse removal infrastructures were not covered due to reporting discrepancies across municipalities, despite those being important on social and economic effects. Overall, these data concerns have made the analysis challenging, an update of this study once a reliable and longer time-series is available would be of value add.

8 Conclusion

This paper looked at the growth effects of capital expenditure at the local level, focusing primarily at municipalities in the Gauteng province. To date, most studies have looked at the impact of government expenditure on output growth at a national level rather than at a municipal level. The emphasis on the local level is very important as this level of government plays a significant role in the development of local economies and communities. The focus of this study is primarily on three categories of capital

expenditure, namely, water & sanitation, road transport, electricity and other capital expenditure, and uses data spanning from 2006 to 2015.

Although this study was adapted from Amusa (2015) and Mello (2002), given the limitations and challenges regarding the Gauteng municipal capital expenditure data, the paper introduces some different aspects in an attempt to holistically understand how capital expenditure affect municipal output. The paper introduces a model with dummy variables in an attempt to capture excessive spending around periods immediately before and after the hosting of the 2010 FIFA World Cup. It also introduces two other models, one which presents the classification of expenditure split in two categories, a *priori* productive and unproductive expenditure, and the other which compares the growth effects of capital expenditure in the metros with those in the districts.

Overall for the baseline model, Gauteng municipal capital spending on water & sanitation and electricity was found to have undesirable effects on municipal output over a short-term. The category of municipal infrastructure spending that had a positive effect on municipal output in the baseline model was road transport. However, the results of the model improved notably when capturing the effects of the World Cup and splitting classification of expenditure into productive and unproductive spending over a medium-term. When including dummy variables that capture the time-effects of increased spending relating to the 2010 FIFA World Cup preparation, the results show that capital spending relating to the preparations of the World Cup did not have an immediate positive effect on regional growth, however over time, particularly after the tournament, the effects were positive and economically significant. When aggregating municipal expenditure to distinguish between *priori* productive and unproductive expenditure, the results show that over the medium-term, productive expenditures have the most significant positive effect on regional growth. When comparing the metros and districts, the effect of capital expenditure on growth was much stronger in the metros. This was, however not surprising given that metros have a much better implementation capacity in terms of their budgets, than the smaller municipalities. In relative terms, the magnitude of the effects of capital expenditure on output was relatively higher in the CoJ, however when capturing the time-effects of the 2010 FIFA World Cup, the effects were more significant in the CoE.

Despite the fact that the results of this study may be reflective of, amongst others, implementation gaps in delivery of infrastructure, inconsistencies in recordkeeping and reporting of budgeted expenditure by municipalities, they still highlight the important role that municipalities play in spurring local economic development through infrastructure investment. Of all the three categories of spending analysed, road transport infrastructure is the capital spending category that had an immediate positive effect on municipal growth. However, in the medium-term (or over-time) all categories of capital expenditure combined into *priori* productive expenditure seem to have a highly positive and significant impact on Gauteng municipalities' output.

The challenges experienced with municipal data raises questions around the reliability and calls for improvement in this regard. Capital expenditure is mostly funded through conditional grants in order to support national policy objectives including the NDP's long-term vision of economic growth spurred through public investment in infrastructure. As such, consistent reporting, monitoring and recording of capital data are very important to evaluate the effectiveness of municipal investment spending. In order to improve studies of this nature in future, maintaining reliable data and consistent data sets are some of areas in municipal budgets that need to be improved. It is hoped that the ongoing budget and reporting reforms by the National Treasury will improve the credibility of the information from planning, budgeting, implementing, monitoring and reporting across municipalities, which can be used for future studies.

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Appendix

Table A1: Variable Definitions and Sources

Variable	Definition	Source
Y	Dependent variable measured as real municipal output for GDP-R, at constant 2005 prices	IHS Global Insight ReX
Pop	Municipal population size	IHS Global Insight ReX
G Variable:	Actual municipal expenditure disaggregated into capital (electricity, water & sanitation, road transport, other capital expenditure) and operational expenditure in value terms, at nominal prices.	National Treasury mun data base Provincial Treasury's Government unit.
Electricity		
Water & Sanitation		
Road Transport		
Other Capital Expenditure		
Operational Expenditure		
Prod (-1)	Lagged variable of a *priori* productive expenditures classified as infrastructure investment on electricity, water & sanitation, road transport & other capital expenditure.	National Treasury mun data base Provincial Treasury's Government unit.
OE (-1)	Lagged variable of municipal operational expenditure (also classified as unproductive expenditure)	National Treasury mun data base Provincial Treasury's Government unit.

Table A2: Results of the Fixed Effects Model

	Dependent Variable: Regional GDP Growth			
	Model 1	**Model 2**	**Model 3**	**Model 4**
Electricity	-0.0084 (-0.2997)	-0.0054*** (-1.9540)	-	0.0099 (1.4257)
Water & Sanitation	-0.0076** (-2.2023)	-0.0058*** (-1.8067)	-	-0.0200** (-4.4517)
Road Transport	0.0047 (1.4853)	0.0067** (2.2889)	-	-0.1688*** (-1.7462)
Other Capital Expenditure	0.0040 (0.0695)	-0.0004 (-0.0664)	-	-0.0136** (-3.2145)
Productive Expenditure (-1)	-	-	0.2865** (3.8489)	-
Operational (unproductive) expenditure (-1)	-	-	0.0091 (0.5614)	-

Population	-0.0963 (-1.5786)	-0.2394** (-2.6740)	-0.1894*** (-1.8358)	-0.1203 (-1.5000)
2009 dummy	-	-0.0404** (-2.7540)	-0.0397*** (-2.6939)	-0.0196** (-3.0957)
2011 dummy	-	0.0179 (1.2209)	0.0097 (0.6352)	0.0168*** (1.9344)
No. of observation	80	80	78	45
R^2	0.44	0.55	0.54	0.73
Adjusted – R^2	0.32	0.44	0.44	0.64

Source: Own Calculations

The numbers in parentheses are t-statistics. * indicates significant at 1 per cent level, ** significant at 5 per cent level and *** significance at 10 per cent level. (-1) indicates variables lagged one period. 2011 dummy captures all years included in the analysis post the 2010 Soccer World Cup

Table A3: Model Results with Cross-sections

Cross – Section Effects	Model 1	Model 2	Model 3	Model 4
City of Johannesburg	1.6492*** (1.7892)	3.7935** (2.7909)	2.6977*** (1.9139)	0.5810** (3.1217)
City of Tshwane	1.6138)*** (1.7999)	3.6985** (2.7978)	2.6300*** (1.9183)	0.5596** (2.9859)
City of Ekurhuleni	1.6003*** (1.7740)	3.7003** (2.7831)	2.6305*** (1.9087)	0.5629** (3.0040)
Sedibeng[a]	-	-	-	0.5145)** (2.8573)
West Rand	-	-	-	0.5600** (3.1104)
Lesedi	1.2378*** (1.7807)	2.8543** (2.7906)	2.0179*** (1.9129)	-
Midvaal	1.2555*** (1.8197)	2.8552** (2.8106)	2.0052*** (1.9178)	-
Emfuleni	1.4739*** (1.8143)	3.3576** (2.8072)	2.3719*** (1.9148)	-
Westonaria	1.2310*** (1.7621)	2.8578** (2.7731)	1.9902*** (1.8743)	-
Merafong	1.2415*** (1.6870)	2.9499** (2.7293)	2.0721*** (1.8549)	-

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For further information contact Gauteng Provincial Treasury,
Address: 75 Fox Street, Imbumba House, Marshalltown, Johannesburg, 2107
Tel: 011 227 9000
Fax: 011 227 9055
Email: GPTCommunication@gauteng.gov.za
Postal Address: Private Bag X112, Marshalltown, Johannesburg, 2107