

The Effects of Social Spending on Economic Activity in South African Provinces

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3.1 Introduction

Mainstream economists have traditionally viewed government as less efficient than market forces in allocating resources. However, the recent global economic crisis has reinforced the view that government has an important role to play in maintaining and promoting economic growth and development. When asking whether or not fiscal policy has an effect on the economy, a deeper understanding is needed of the relationship between public expenditure and economic activity (growth) and, specifically, whether government spending is a consequence, rather than a cause, of economic growth. In addition, understanding the channels through which public expenditure affects growth can also aid in understanding how to redirect public spending and which components should be limited. Apart from necessary reforms in public service delivery, South Africa will need to moderate public spending growth as the economy recovers, in order to stabilise the growth in the medium-term public debt. Composition of public expenditure is thus an important issue to consider. If the aim is to promote growth, development and economic activity (as it is the case for most economies), the focus should be on the more productive items of the budget, such as investment in capital. This project looks specifically (but not exclusively) at the social spending components of the budget in South African provinces, with the aim of ascertaining their effect on economic activity. The focus on the provincial sphere is warranted, as provinces in South Africa are tasked with meeting social spending objectives and are responsible for the majority of government's social spending.

Social policy is as important to economic development as economic policy. However, theoretical and empirical evidence of social spending's impact on economic growth is ambiguous. Some papers argue that social spending impedes economic growth and development, while others maintain that social spending is instrumental in stimulating economic development. An important question to ask is whether or not social spending is a potential lever for economic growth and development in South Africa. Efficient social spending contributes to the formation of capital: human capital, through its investment in education and health, and physical capital, through its investment in infrastructure (for example related to education and health). Human and physical capital are both crucial for economic growth and development and are continuously emphasised in the government's fiscal framework. The National Development Plan (NDP) also emphasises human capital, productive capacity and infrastructure as prerequisites for the creation of a more equitable and inclusive South Africa (NPC, 2012). In addition to the NDP, the New Growth Path (NGP) focuses on the government's role in directing resources towards job drivers (i.e. drivers necessary for the creation of decent jobs for South Africans), such as infrastructure investment. The NGP also emphasises that a productive labour force can be achieved through human capital development, which is vital in addressing structural problems inherent in the South African labour market (for example, skill shortages).

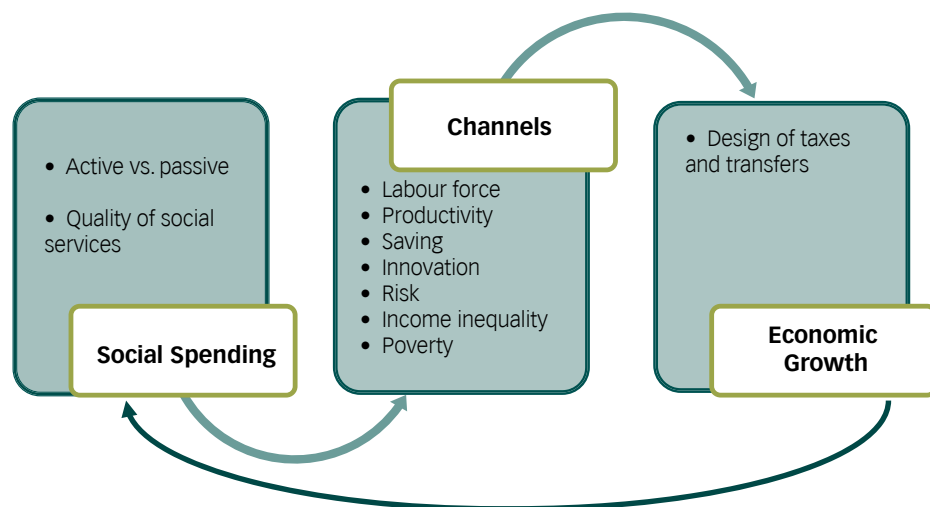
The intention of this research is to analyse and evaluate the effect of South Africa's provincial social expenditure on economic activity. Components of social expenditure that are considered include expenditure on education, health, and social development. The work will by no means be exhaustive, as many aspects need to be considered³⁰ in reaching a definitive conclusion, but will provide a useful starting point for how budget allocations can be made between different types of policy arenas, so as to create the best possible outcome for economic activity and output. A secondary outcome of the study will be to consider the crowding-in (or crowding-out) effects of social spending on investment (as an important indicator of economic activity) in South African provinces.

3.2 Literature Review

Social spending is defined as the provision of benefits (and financial contributions) by public (and private) institutions to households and individuals, in order to provide support during circumstances that adversely affect their welfare (OECD, 2007). In South Africa, social spending refers to spending on education, health and social development.

Social spending has not traditionally been investigated in terms of its effect on economic activity, but rather in terms of its effect on inequality and poverty reduction, which are related to economic growth (cf. Kuznetz, 1955; Barro, 2000; Dollar and Kraay, 2002). However, as noted in Furceri and Zdzienicka (2011), social spending can affect output (particularly in the short run) through a number of theoretical channels. An increase in social spending can have numerous effects on the economy, including increased demand through public consumption, increased private consumption, and decreased unemployment (given that social spending is geared towards employment creation). Social spending can also enhance productivity (albeit with a lag) and human capital (through spending on education, health and nutrition). Figure 6 presents the channels through which social spending affects economic growth

Figure 6: Social Spending and Economic Growth



Source: The Commission.

³⁰ For example, in terms of economic aspects, medium-term and longer-term investment, as well as personnel expenditure, also need to be considered. In addition, political aspects such as fiscal commitment beyond the electoral cycle are also important in the context of budget reallocations.

Arjona et al. (2002) distinguish between two types of social spending: active spending (social spending that attempts to change the distribution of market income by promoting labour market participation of the population with “lower-than-normal” market income) and passive spending (pure transfers, cash or service, from one group to another). Their results indicate that active social spending tends to boost economic growth, whereas other social spending is associated with lower economic growth. As Figure 6 shows, social spending affects factors such as labour force, savings³¹, innovation³², risk, income inequality and poverty, the effects of which feed into the economic growth process. Effective utilisation of public sector spending on investment and the social sector can promote long-term human and economic development, and poverty reduction (Doytch et al., 2010). Enhanced social spending can also direct resources to households and sectors that are most vulnerable, thus protecting and strengthening human capital and other investments, while fostering robust social and economic recovery.

Theoretical and empirical evidence of social spending’s impact on economic growth is ambiguous. The arguments for consider social spending as “social investment” and/or a “productive factor”, whereas the arguments against typically see social spending as a cost of foregone output. Table 20 summarises the relationship between social spending and economic growth as discussed in Arjona et al. (2002). It shows that social spending has positive or negative effects on economic growth through the channels identified in Figure 6.

Table 20: Arguments for and against Social Spending

Social Spending is Good for Economic Growth	Social Spending is Bad for Economic Growth
Presents an insurance against risk (i.e. sickness, unemployment, etc.), so that individuals take more risks in economic behaviour. Assuming a positive relationship between risk and return, the net effect on growth will be positive.	When it discourages people from working (lower labour supply leads to lower output).
Creates a more cohesive society, better able to make political and economic decisions.	When it discourages people from saving (lower savings imply less capital available for reinvestment).
Prevents a group/class from falling behind the mainstream and from being unable to participate in the market economy.	Taxes necessary to finance social protection may reduce the return to innovation.
Keeping children out of poverty may have long-term benefits for social and intellectual development.	

Source: Adapted from Arjona et al. (2002).

Another proponent of the positive effect of social spending on economic growth is Lindert (1996, 2004) who argues that higher social spending does not erode gross domestic product (GDP) per capita for two main reasons:

- High-budget democracies are careful when choosing the design of taxes and transfers so as to avoid compromising growth; and
- Broad universalism in taxes and entitlements is better at fostering growth than the low-budget countries’ preference for strict means testing and complicated tax compromises.

³¹ Recent studies such as Barnett and Brooks (2010) and Baldacci et al. (2010) find that social spending leads to decreased household saving. However, Baldacci et al. (2010) note that the magnitude of the marginal impact of social spending on household saving differs across spending items and depends on the initial level of spending.

³² Innovation is an important driver of economic growth. For example, Arjona (2002) notes that the taxes needed to finance social spending may reduce returns on innovation.

Furthermore, Baldacci et al. (2004) find that the positive effects of social spending on economic growth are the highest in low-income countries and sub-Saharan Africa. This also supports the view that social spending can be more effective in these countries achieving millennium development goals (MDGs).

Empirical examinations of the relationship between social spending and economic growth find support for both arguments. Castles and Dowrick (1990), Cashin (1994), Perotti (1994), Baldacci et al. (2004) and Furceri and Zdzienicka (2011) find evidence that social spending increases economic growth³³, whereas Gwartney et al. (1998), Atkinson (1999) and Arjona et al. (2002) find the opposite to be true.

It should also be noted that economic growth also potentially has an effect on social spending – either positive (in the sense that government does not have to prioritise more productive expenditure because economic growth and the tax base are sufficient to carry out all necessary social expenditure) or negative (in the sense that higher economic growth means that less people have to rely on social welfare, and hence social expenditure is lower). The research methodology employed in this project explicitly tests for the direction of causality between economic growth and social spending and is discussed in detail in the following section.

3.3 Research Methodology

3.3.1 Data

Audited fiscal data for provinces was sourced from various editions of Provincial Budgets, and Provincial Budgets and Expenditure Reviews (www.treasury.gov.za/publications/igfr). Socioeconomic data for provinces was sourced from Quantec (Quantec EasyData, www.easydata.co.za), where the variables of interest include GDP, population growth, private investment, employment and inflation. The sample under consideration was driven by data availability, resulting in a sample 1995/96–2011/12³⁴. All nine provinces were included in estimation. The following variables were used:

- Fiscal variables, each of which are decomposed into compensation of employees, goods and services, transfers and subsidies³⁵, and payment for capital assets³⁶:

³³ Two other studies are interesting in this regard. Alam et al. (2010) use panel cointegration techniques to examine the long-run relationship between social expenditure and economic growth in Asian developing countries. They conclude that social expenditure can enhance productivity (by spending on items such as infrastructure, education and health), which then feeds into economic growth. Perhaps the most important finding of Alam et al. (2010) is that fiscal adjustment can lead to economic growth when it reduces unproductive expenditure and protects social expenditure. Using panel techniques on a sample of South-Eastern European countries, Alexiou (2009) also finds evidence that social spending contributes to economic growth. In particular, he finds that government spending on gross fixed capital formation, development assistance, private investment and trade openness all contribute positively to economic growth.

³⁴ All of the socioeconomic indicators are measured in calendar year frequency. However, for provinces, the financial year runs from 1 April to 31 March of the following year. This has implications for estimation, as the different data sets are not strictly comparable. Thus, to obtain calendar year data for (say) 2009, a weighted average of the provincial data for the financial years 2008/09 and 2009/10 was calculated. The data was weighted in accordance with the proportion of the 2009 calendar year that fell within the two financial years respectively (i.e. $\frac{1}{4}$ for 2008/09 and $\frac{3}{4}$ for 2009/10 in the instance of provincial data). An alternative way of dealing with calendar and fiscal year data matching entails using the calendar year data for the beginning of the fiscal year. Thus for provincial/municipal data for fiscal year 1998, calendar year data from 1997 is used. This reflects the fact that decisions about fiscal structure are set at the beginning of the fiscal year, which occurs in the previous calendar year.

³⁵ These include transfers and subsidies to provinces and municipalities; departmental agencies and accounts; universities and technicians; public corporations and private enterprises; foreign governments and international organisations; non-profit organisations; and households.

³⁶ Buildings and other fixed structures; machinery and equipment.

- Total health expenditure
- Total education expenditure
- Total social development expenditure
- Total other³⁷ expenditure
- Socioeconomic variables:
 - Gross value add (GVA) as a proxy for economic activity (economic growth)
 - Gross fixed capital formation as a proxy for private investment
 - Population growth
 - Employment
 - Inflation

Appendix 1 includes the decomposition of health, education and social development expenditure by programme in order to give a more exact idea of how these funds are spent.

3.3.2 The Model

A dynamic growth equation specified as follows provides a good starting point for the model:

$$\Delta y_{it} = a_i + b_t + \sum_{j=1}^m \beta_j \Delta y_{i,t-j} + \sum_{j=0}^n \delta_j \Delta s_{i,t-j} + \gamma' X_{it} + \varepsilon_{it} \quad [1]$$

Where:

i denotes the provincial dimension of the model (i.e. nine provinces abbreviated as EC, FS, GT, KZN, LIM, MPU, NC, NW and WC)

t denotes the time dimension of the model (1995/96–2011/12, 17 years)

a denotes provincial fixed effects (given that equation [1] has a number of socioeconomic and fiscal variables on the right-hand side, these can arguably be correlated with unobservable time-invariant, historical, province-specific characteristics; thus, it is important to control for provincial fixed effects in order to eliminate this possible endogeneity bias)

b denotes time-fixed effects (helps to remove common time-related shocks and thus correlations in errors across countries)

y denotes log of output (note that lags of output are included in the equation [1] to control for autocorrelation; the level of augmentation will have to be limited given the degrees-of-freedom considerations)

s denotes government spending component (i.e. education, health, social development and other, as well as their subcomponents outlined in the previous sub-section; note that coefficients δ_j represent government spending multipliers)

X vector of control variables (such as labour, capital, population dynamics, inflation, etc. – in other words, variables that are normally included in regressions that look at growth dynamics)

Equation [1] is clearly a simple model of determinants of economic growth that has been augmented with measures of social spending. Such models have been used in a number of studies, such as Arjona et al. (2002) and Baldacci et al. (2004).

³⁷ This expenditure component comprises: Office of the Premier; Provincial Legislature; Public Works; Housing, Local Government and Traditional Affairs ; Agriculture; Economic Affairs; Environment and Tourism; Roads and Transport; Provincial Treasury; Sports, Recreation, Arts and Culture; Safety and Liaison.

3.3.3 Estimation Method

Equation [1] can be presented in the vector error correction model (VECM) format as follows. Assume a $p \times 1$ vector x_{it} (including economic growth, government spending and socioeconomic variables discussed earlier), which follows a non-stationary process VAR(k):

$$x_{it} = \delta_i d_t + \sum_{j=1}^{k-1} \Phi_{ij} x_{i,t-j} + \varepsilon_{it} \quad [2]$$

Where d_t denotes the deterministic components, Φ denotes a $p \times p$ coefficient matrix and ε_{it} denotes a matrix of disturbances. Also, $t = 1, 2, \dots, T$ and $i = 1, 2, \dots, N$. Rewriting [2] as a VECM yields the following:

$$\Delta x_{it} = \delta_i d_t + \Pi_i x_{i,t-1} + \sum_{j=1}^{k-1} \Gamma_{ij} \Delta x_{i,t-j} + \varepsilon_{it} \quad [3]$$

Where $\Pi = \alpha\beta$, α denotes a matrix of short-run coefficients, and β denotes a matrix of long-run coefficients. In the instance that the variables are not cointegrated³⁸, equation [2] can be estimated as a stationary VAR by transforming the variables in a stationary process VAR(k).³⁹

3.4 Results

3.4.1 Preliminary Examination of the Data

Table 21 presents the average shares of expenditure on compensation, goods and services, transfers and capital expenditure in total expenditure for the categories education, health, social development and other, all by province. What is evident is that education and health spend the majority of their budgets on compensation and very little on capital. For social development, most of the budget is spent on transfers, whereas the budget for other is spread fairly evenly between the different categories. It should also be mentioned that category "other" has the largest share of capital expenditure (an average of about 20% for the nine provinces) compared to education, health and social development. What is also noticeable is that no really stark differences are found across provinces regarding the different expenditures and their components.

³⁸ Maximum eigenvalue and trace statistics will be used to test whether or not variables are cointegrated.

³⁹ Panel unit root tests will be used to determine the order of integration of variables.

Table 21: Average Expenditure Shares in Total Provincial Expenditure on Education, Health, Social Development and Other (1995/96–2011/12)

	EC	FS	GT	KZN	LIM	MP	NC	NW	WC	Average
Education										
Compensation	88%	84%	80%	85%	87%	82%	81%	86%	82%	84%
Goods and services	7%	7%	8%	7%	8%	12%	9%	8%	8%	8%
Transfers	2%	6%	7%	3%	2%	2%	8%	3%	8%	5%
Capital	2%	3%	4%	4%	3%	3%	2%	3%	3%	3%
Health										
Compensation	59%	62%	51%	60%	63%	57%	55%	63%	57%	59%
Goods and services	23%	28%	34%	29%	24%	35%	33%	27%	29%	29%
Transfers	11%	4%	8%	4%	3%	3%	3%	3%	9%	5%
Capital	7%	5%	7%	8%	9%	6%	9%	7%	5%	7%
Social Development										
Compensation	25%	29%	20%	23%	25%	20%	29%	31%	19%	25%
Goods and services	15%	12%	13%	16%	17%	21%	23%	17%	12%	16%
Transfers	58%	56%	65%	56%	49%	56%	46%	49%	68%	56%
Capital	2%	3%	2%	4%	9%	3%	3%	3%	1%	3%
Other										
Compensation	36%	39%	18%	26%	43%	32%	28%	35%	20%	31%
Goods and services	22%	23%	23%	25%	21%	25%	31%	23%	31%	25%
Transfers	24%	20%	36%	23%	24%	20%	20%	27%	24%	24%
Capital	18%	18%	24%	26%	12%	23%	21%	16%	26%	20%

Source: Commission's calculations.

Table 22 presents the average inflation rate and the average growth rates for investment, population and employment by province. Similar to the results in Table 21 the growth rates in the socioeconomic variables reveal no stark differences among provinces.

Table 22: Average Inflation, Investment, Population and Employment Growth by Province (1995/96–2011/12)

	EC	FS	GT	KZN	LIM	MPU	NC	NW	WC	Ave.
Inflation	7%	8%	7%	7%	9%	8%	8%	9%	7%	8%
Investment growth	6%	6%	7%	6%	8%	6%	7%	7%	6%	7%
Population growth	1%	0%	3%	1%	1%	1%	1%	1%	2%	1%
Employment growth	0%	-1%	2%	0%	-1%	0%	1%	-1%	0%	0%
Economic growth	3%	2%	4%	3%	3%	3%	2%	2%	4%	3%

Source: Commission's calculations.

Appendix 2 (Table 23) presents the panel unit root tests on all of the variables presented in Tables 21 and 22. What is notable is that all of the variables can be considered I(1) and are possibly cointegrated. Appendix 3 presents the results of the cointegration analysis with the following baseline specifications that are considered.⁴⁰

- First, a specification where economic growth is modelled explicitly as a function of the four expenditure components, i.e. total expenditure on education, health, social development and other; and
- Second, a specification where economic growth is modelled as a function of the four expenditure components, as well as capital and labour inputs.

For the first specification, Table 24 (Appendix 3) reports that no cointegrating relationships are present. Hence, for the first specification, the variables will have to be differenced once in order to carry out a panel Granger causality analysis. It should also be noted that the first specification deals with short-run causalities (because the analysis employs differenced variables).

For the second specification, Table 25 (Appendix 3) seems to indicate some cointegration. Assuming that there is a linear intercept in the cointegrating relationship and no time trend (in line with the model specified in equation [1]), the panel cointegration test for the second specification indicates the presence of a single cointegrating relationship. Hence, for the second specification, both long-run as well as the short-run causalities can be examined.

3.4.2 Panel Granger Causalities

Table 26 (Appendix 3) presents the results of the panel Granger causality analysis for the first baseline specification. It should be noted that the VAR system underlying the Granger causality results is stable and that the residuals of individual equations of the system are well behaved.⁴¹ The first result from this analysis is that, in the short run, only social development and other expenditure contribute to provincial economic growth, while expenditure on education and health has no effect on provincial economic growth. Other causalities that were found to be statistically significant include the following:

- Economic growth has an effect on all of the government expenditure components (a plausible channel for this may be that higher economic growth leads to higher revenue collection and hence higher government spending).
- Expenditure on education has a short-run effect on other expenditure.

Therefore, when a very simple specification is considered, the effects of social spending on economic growth cannot be discerned in South Africa at provincial level.

⁴⁰ Each specification also includes a dummy variable for the 1998–1999 period in the deterministic part of the VAR/VECM (i.e. dt in equation [2]). This is to control for possible structural breaks in the data due to changes in the manner in which the fiscal variables were compiled. Estimation assumes a homogenous panel, which is a plausible assumption given the preliminary examination of data summarised in Tables 21 and 22, where no stark differences in fiscal and socioeconomic dimensions were found among provinces.

⁴¹ In the interests of brevity, these results have not been reported.

Next, a specification is considered where capital and labour inputs are included in the estimation, as is the case with standard economic growth functions. Given that this specification led to the detection of a single cointegrating (long-run) relationship, the estimation was carried out in levels (the results are reported in Table 27 in Appendix 3). The estimated long-run relationship can be written as:

$$\begin{aligned} \text{Log}(GVA_{i,t-1}) = & 0.112 - \mathbf{0.105} * \text{Log}(Education_{i,t-1}) - 0.001 * \text{Log}(Health_{i,t-1}) - 0.112 * \text{Log}(SocDev_{i,t-1}) + \\ & 0.128 * \text{Log}(Other_{i,t-1}) + \mathbf{0.500} * \text{Log}(Employment_{i,t-1}) + \mathbf{0.343} * \text{Log}(Capital_{i,t-1}) + e_{i,t-1} \end{aligned} \quad [2]$$

The following should be noted from equation [2]:

- Only education, employment and capital were found to be statistically significant (i.e. coefficients in bold). Other variables were found to be statistically insignificant and hence have no effect on long-run economic growth.
- The coefficient on the education variable is negative, implying that provincial expenditure on education contributes negatively to provincial economic growth.
- The coefficients on capital and labour inputs are positive and relatively large, indicating that capital and labour are very important to provincial economic growth.

The error correction terms, although statistically significant, are all positive, indicating that, in the short run, none of the variables adjust to the long-run relationship as indicated by equation [2]. Further examination of the stability of the system reported indicates that the system is not stable: at least one unit root is present, indicating that estimation in first differences might be appropriate. Table 28 in Appendix 3 reports the results of the panel Granger causality for the second specification. The results indicate that social development, other expenditure and capital contribute to provincial economic growth in the short run. Other causalities that are present in the estimated model include:

- Economic growth has an effect on health, social development, other expenditure, employment and capital in the short run.
- There are also some causalities between the different types of expenditure, for example causality from social development to health.

3.4.3 An Extension of the Baseline Models

An extension of the second baseline model is now considered, where total education, health, social development and other expenditure are divided into expenditure on compensation and expenditure on all other items excluding compensation (i.e. sum of expenditure on goods and services, transfers and subsidies, and capital assets).⁴² This is an important consideration particularly given the South African government's commitment to moderate growth in the public sector wage bill. Hence, as a matter of interest, the effect of provincial expenditure on compensation on economic growth is considered. All of the variables were found to be integrated of order 1 and hence are possibly cointegrated. Under the assumption of a linear intercept and no trend,

⁴² The qualitative results do not change considerably with the inclusion of inflation and the population growth variables, which consistently come out statistically and/or economically insignificant when included in the baseline specifications. In the interest of brevity, estimations including these variables are excluded from the current version of the project.

maximum eigenvalue and trace statistics indicate the presence of two cointegrating relationships. Weak exogeneity tests reveal log of GVA and log of capital as possible dependent variables. Imposing the necessary identifying restrictions yields the following long-run relationship between economic growth and social expenditure components⁴³:

$$\begin{aligned} \text{Log}(GDP_{i,t-1}) = & 1.818 + 0.025*\text{Log}(Education_all_other_{i,t-1}) - 0.309*\text{Log}(Education_comp_{i,t-1}) + \\ & 0.377*\text{Log}(Health_all_other_{i,t-1}) + 0.196*\text{Log}(Health_comp_{i,t-1}) + 0.272*\text{Log}(SocDev_all_other_{i,t-1}) \\ & - 0.728*\text{Log}(SocDev_comp_{i,t-1}) + 0.940*\text{Log}(Other_all_other_{i,t-1}) - 0.407*\text{Log}(Other_comp_{i,t-1}) + \\ & 0.701*\text{Log}(Capital_{i,t-1}) + e_{i,t-1} \end{aligned} \quad [3]$$

The following should be noted from equation [3]:

- Coefficients in bold are statistically significant at the 10% significance level.
- Together with private capital expenditure, non-compensation expenditure for the social development and other categories result in positive effects on provincial economic growth in the long run. The largest contributor to provincial economic growth (gauged by the coefficient magnitude) is non-compensation expenditure on the other category, followed by employment and non-compensation expenditure on social development.
- Compensation expenditure for the social development and other categories result in negative effects on provincial economic growth in the long run.
- Other variables were found to be statistically insignificant and hence have no effect on long-run provincial economic growth.

The error correction terms are mostly positive and, where negative, either very small or statistically insignificant. This indicates that in the short run, none of the variables adjust to the long-run relationship as shown by equation [3]. Further examination indicates that the system is not stable. As with the baseline specification, at least one unit root is present, indicating that estimation in first differences (i.e. short-run analysis) is more appropriate. The following are the statistically significant short-run causalities.⁴⁴

- Non-compensation expenditure on “other” and private capital formation contribute towards provincial economic growth (p-values of 0.100 and 0.034, respectively).
- Non-compensation expenditure on the other category has an effect on the non-compensation expenditure on education and social development (p-values of 0.006 and 0.067, respectively).
- There are indications of short-run feedback effects from economic growth to non-compensation expenditure on other and health categories, as well as on private capital expenditure (p-values of 0.004, 0.037 and 0.027, respectively).
- Non-compensation expenditure on social development contributes towards non-compensation expenditure on health and on private capital (p-values of 0.055 and 0.075, respectively).
- Employment contributes towards non-compensation expenditure on social development

⁴³ Because just-identifying restrictions are necessary to identify the system, a zero restriction was placed on the employment variable. None of the social expenditure variables were restricted because this project’s main focus is on the effect of these variables on economic growth.

⁴⁴ In the interests of brevity, statistically insignificant results are not reported. The VAR in first differences was found to be stable with no unit roots present in the system.

(p-value of 0.067), while private capital formation contributes towards employment (p-value of 0.005).

- There are no significant short-run causalities from any compensation expenditure to the other variables.

3.5 Conclusion and Policy Recommendations

This project analysed and evaluated the effect of South Africa's provincial social expenditure on economic activity. For this purpose, a panel cointegration technique was applied to socioeconomic data and fiscal expenditure data on education, health, social development and other social expenditure. The results of this project imply the following recommendations:

- Evidence of a long-run relationship between social expenditure and economic growth for South African provinces is limited. Hence, longer-term economic-growth powers seem not to be well suited to the provincial level in South Africa. This is in line with past recommendations made by the Commission, from research that implied economic-development powers are well placed at the provincial level, while economic-growth powers could be better placed at the municipal level.
- There is evidence that expenditure on social development and other social expenditure contribute to provincial economic growth in the short run. This implies that provinces could potentially constitute key role-players in socioeconomic development in South Africa and justifies the NDP and NGP calls for provinces to adapt their drivers towards the achievement of national policy objectives.
- In the short run, economic growth has an effect on all of the social expenditure components. Hence, provincial strategies geared towards socioeconomic development need to take into account that higher economic growth is also necessary for higher social spending. Given South Africa's slow economic recovery and government's expenditure reprioritisation efforts, this result supports government's efforts to moderate growth in social expenditure components over the medium term.
- When social expenditure is decomposed into compensation and non-compensation expenditure, the results indicate that non-compensation expenditure on other social expenditure is a significant contributor to short-run economic growth. On the other hand, compensation expenditure has no effect on economic growth in the short run, thus providing justification for government's efforts to moderate the growth in the public sector wage bill. This finding also provides some evidence that compensation expenditure is potentially a good candidate for government's expenditure reprioritisation efforts, at least in the short to medium term.
- Private capital is an important contributor to provincial economic growth, particularly in the short run. Therefore, provinces should create conditions that are conducive to private capital investment. In addition, there does not seem to be any evidence of social expenditure crowding out private capital investment.

3.6 References

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Appendix 1: Description of Education, Health and Social Development

Expenditure by Programme

Education by programme:

- Administration
- Public ordinary school education
- Independent school subsidies
- Public special school education
- Further education and training
- Adult basic education and training
- Early childhood development
- Auxiliary and associated services

Health by programme:

- Administration
- District health services
- Emergency medical services
- Provincial hospital services
- Central hospital services
- Health sciences and training
- Health care support services
- Health facilities management

Social development by programme:

- Administration
- Social welfare services:
 - Administration
 - Substance abuse, prevention and rehabilitation
 - Care and services to older persons
 - Crime prevention and support
 - Services to persons with disabilities
 - Child care and protection services
 - Victim empowerment
 - HIV and Aids
 - Social relief
 - Care and support services to families
- Development and research
 - Administration
 - Youth development
 - Sustainable livelihoods
 - Institutional capacity building and support
 - Research and demography
 - Population capacity development and advocacy

Appendix 2: Unit Root Test on Variables

Table 23: Panel Unit Root Tests on Variables used in Estimation

Transformation	Level				First difference				
	Unit Root Test	LLC	IPS	ADF	PP	LLC	IPS	ADF	PP
Variable									
Education	0.968	1.000	1.000	0.996	0.974	0.024	0.041	0.000	
Compensation	0.711	1.000	1.000	0.489	0.582	0.006	0.013	0.000	
Goods and Services	0.907	0.999	1.000	0.995	0.000	0.000	0.001	0.000	
Transfers	0.504	0.993	0.999	0.999	0.001	0.001	0.002	0.000	
Capital	0.412	0.710	0.816	0.108	0.000	0.000	0.000	0.000	
Health	0.917	1.000	1.000	0.984	0.945	0.014	0.029	0.000	
Compensation	0.174	0.995	1.000	0.619	0.003	0.000	0.000	0.000	
Goods and Services	0.848	1.000	1.000	0.985	0.003	0.000	0.000	0.000	
Transfers	0.406	0.621	0.746	0.001	0.013	0.000	0.000	0.000	
Capital	0.130	0.917	0.974	0.371	0.000	0.000	0.000	0.000	
Social Development	0.770	0.992	0.977	1.000	0.007	0.026	0.043	0.000	
Compensation	0.140	0.845	0.387	0.683	0.000	0.000	0.000	0.000	
Goods and Services	0.003	0.089	0.151	0.001	0.000	0.000	0.000	0.000	
Transfers	0.933	0.667	0.775	0.627	0.249	0.014	0.027	0.000	
Capital	0.021	0.365	0.431	0.002	0.000	0.000	0.000	0.000	
Other	0.886	1.000	1.000	1.000	0.000	0.000	0.000	0.000	
Compensation	0.570	0.996	0.994	0.921	0.000	0.000	0.000	0.000	
Goods and Services	0.790	0.999	1.000	0.977	0.015	0.000	0.001	0.000	
Transfers	0.681	0.938	0.997	0.809	0.001	0.000	0.001	0.000	
Capital	0.000	0.036	0.041	0.288	0.000	0.000	0.000	0.000	
Deflator	0.691	1.000	1.000	1.000	0.489	0.027	0.070	0.001	
Investment	0.987	1.000	1.000	1.000	0.006	0.040	0.061	0.047	
Population	0.000	0.122	0.011	0.000	0.000	0.000	0.000	0.000	
Employment	0.000	0.054	0.047	0.946	0.000	0.000	0.000	0.000	
GVA	0.151	0.996	1.000	1.000	0.000	0.000	0.000	0.000	

Notes: *p*-values reported in the table. LLC represents the Levin, Lin and Chu *t*-test for a panel unit root. IPS represents the Im, Pesaran and Shin *W*-test for a panel unit root. ADF represents the Augmented Dickey-Fuller Fisher Chi-square test for a panel unit root. PP represents the Phillips-Perron Fisher Chi-square test for a panel unit root. The null hypothesis for all of the panel unit root tests is unit root (i.e. assuming an individual unit root process). Hence, all *p*-values less than 0.100 lead to the rejection of the null hypothesis.

Appendix 3: Cointegration Analysis

Model 1 Specification

The first specification uses the following variables (in log form): Administration

- Real GVA
- Total expenditure on education
- Total expenditure on health
- Total expenditure on social development
- Total expenditure on other

Table 24: Panel Cointegration Test

Data Trend	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	0	0	0	0	0
Max-Eig	0	0	0	0	1

Note: Selected at 0.05 level, number of cointegrating relations by model. Lags included: 2.

Table 25: Panel Granger Causality Results

Dependent variable: D(LGVA_REAL)		
Excluded	Chi-sq	Prob.
D(LEDUCATION_TOT)	0.075	0.812
D(LHEALTH_TOT)	0.443	0.500
D(LSOCDEV_TOT)	4.972	0.022
D(LOTHER_TOT)	4.002	0.039
Dependent variable: D(LEDUCATION_TOT)		
Excluded	Chi-sq	Prob.
D(LGVA_REAL)	3.223	0.065
D(LHEALTH_TOT)	0.316	0.674
D(LSOCDEV_TOT)	4.127	0.033
D(LOTHER_TOT)	0.883	0.400
Dependent variable: D(LHEALTH_TOT)		
Excluded	Chi-sq	Prob.
D(LGVA_REAL)	7.005	0.009
D(LEDUCATION_TOT)	0.776	0.411
D(LSOCDEV_TOT)	5.101	0.040
D(LOTHER_TOT)	0.001	0.981
Dependent variable: D(LSOCDEV_TOT)		
Excluded	Chi-sq	Prob.
D(LGVA_REAL)	4.330	0.041
D(LEDUCATION_TOT)	0.445	0.657
D(LHEALTH_TOT)	0.021	0.870
D(LOTHER_TOT)	2.217	0.121

Dependent variable: D(LOTHER_TOT)

	Chi-sq	Prob.
Excluded		
D(LGVA_REAL)	5.564	0.020
D(LEDUCATION_TOT)	9.652	0.002
D(LHEALTH_TOT)	0.442	0.501
D(LSOCDEV_TOT)	1.993	0.176

Note: Values in bold indicate statistically significant causalities.

Model 2 Specification

The second specification uses the following variables (in log form):

- Real GVA
- Total expenditure on education
- Total expenditure on health
- Total expenditure on social development
- Total expenditure on other
- Total employment
- Gross fixed capital formation

Table 26: Panel Cointegration Test

Data Trend	None	None	Linear	Linear	Quadratic
Test Type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	1	2	1	0	0
Max-Eig	2	1	1	0	1

Note: Selected at 0.05 level, number of cointegrating relations by model. Lags included: 2.

Table 27: Panel Cointegration Results

Variable:	Cointegrating Eq:	Error Correction:
LGVA_REAL	1	0.089*
LEDUCATION_TOT	0.105**	0.186871
LHEALTH_TOT	0.001	0.229
LSOCDEV_TOT	0.112	0.347
LOTHER_TOT	-0.128	0.772**
LEMPPL	-0.500*	0.057*
LGFCF	-0.343*	0.432*
C	-0.112	

Note: * and ** denote statistical significance at 1% and 5% level of significance, respectively.

Table 28: Panel Granger Causality Results

Dependent variable: D(LGVA_REAL)		
Excluded	Chi-sq	Prob.
D(LEDUCATION_TOT)	0.005	0.981
D(LHEALTH_TOT)	1.133	0.290
D(LSOCDEV_TOT)	4.348	0.036
D(LOTHER_TOT)	4.101	0.044
D(LEMP)	0.373	0.925
D(LGFCF)	4.998	0.029
Dependent variable: D(LEDUCATION_TOT)		
Excluded	Chi-sq	Prob.
D(LGVA_REAL)	2.233	0.187
D(LHEALTH_TOT)	0.576	0.502
D(LSOCDEV_TOT)	3.553	0.068
D(LOTHER_TOT)	0.333	0.614
D(LEMP)	2.063	0.150
D(LGFCF)	0.179	0.677
Dependent variable: D(LHEALTH_TOT)		
Excluded	Chi-sq	Prob.
D(LGVA_REAL)	5.001	0.037
D(LEDUCATION_TOT)	0.494	0.546
D(LSOCDEV_TOT)	3.399	0.061
D(LOTHER_TOT)	0.000	0.996
D(LEMP)	0.661	0.515
D(LGFCF)	0.511	0.486
Dependent variable: D(LSOCDEV_TOT)		
Excluded	Chi-sq	Prob.
D(LGVA_REAL)	4.366	0.033
D(LEDUCATION_TOT)	0.097	0.771
D(LHEALTH_TOT)	0.045	0.930
D(LOTHER_TOT)	1.657	0.179
D(LEMP)	2.005	0.165
D(LGFCF)	0.398	0.899
Dependent variable: D(LOTHER_TOT)		
Excluded	Chi-sq	Prob.
D(LGVA_REAL)	4.112	0.039
D(LEDUCATION_TOT)	8.005	0.004
D(LHEALTH_TOT)	0.177	0.721
D(LSOCDEV_TOT)	1.558	0.289
D(LEMP)	1.899	0.173
D(LGFCF)	1.638	0.182

Table 28 continued on page 92.

Dependent variable: D(LEMPL)

Excluded	Chi-sq	Prob.
D(LGVA_REAL)	3.001	0.072
D(LEDUCATION_TOT)	0.022	0.715
D(LHEALTH_TOT)	3.998	0.054
D(LSOCDEV_TOT)	5.765	0.010
D(LOTHER_TOT)	0.572	0.422
D(LGFCF)	8.564	0.004

Dependent variable: D(LGFCF)

Excluded	Chi-sq	Prob.
D(LGVA_REAL)	6.167	0.011
D(LEDUCATION_TOT)	0.117	0.769
D(LHEALTH_TOT)	0.976	0.310
D(LSOCDEV_TOT)	4.655	0.037
D(LOTHER_TOT)	0.661	0.387
D(LEMPL)	1.879	0.189

Note: Values in bold indicate statistically significant causalities.