



**Literature Review**

**North West Provincial Treasury: Computable General Equilibrium (CGE)  
analysis of the economic effect of the introduction of a mining tax in the North  
West Province.**

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## Introduction

The North West Provincial Government's revenue consists mainly of its equitable share allocation from National Government. In 2015/16 the North West is to receive R26 billion from the equitable share allocation representing 76.5 percent of the province's total revenue, and R6.9 billion from conditional grants representing 20 percent of its total revenue. The province is expected to generate just over R1 billion in own receipts which contributes 3 percent to total provincial revenue. (Department of Finance NWPG 2015:49)

The equitable share is unconditional and the intention of the funding of free basic services, however for municipalities with little own revenue it may also be used towards the cost of administration and other services. Infrastructure spending, in turn, is funded through conditional grants. The equitable share is determined by a formula that includes a basic services portion, a portion that include three parts, namely (1) institutional funding, (2) funding for community services, and (3) a revenue adjustment factor for municipalities with less own revenue capacity, as well as a component that ensure that the allocation covers all guarantees and is stable. (National Treasury 2013: 10-12)

Mining activity plays a very large role in the North West Province's economy. The mining sector has been recently under pressure due to low commodity prices which slows economic growth. The Province also has high levels of unemployment and poverty (42 percent of its population are still living below the breadline of around R20 per day). The low economic growth means that the North West Provincial Government's projections for the generation of own receipts are lower. Added to this the Provinces equitable share portion has also been reduced given the National Government's lower economic growth projections. This puts pressure on the North West Provincial Government's ability to deliver on its development objectives. (Nelson,WJ. 2015, 2). The development objectives of the North West provincial government include:

- The economy and employment
- Economic infrastructure
- An integrated and inclusive rural economy
- Human settlement and spatial transformation
- Improving education, training and innovation
- Building a capable and developmental state
- Fighting corruption
- Transforming society and uniting the province.

(North West Planning Commission, 2013:xvi)

The North West Provincial Government is investigating the potential of mining taxes to generate additional revenue in order to achieve the set objectives above and to protect the environmental. The purpose of this study is to evaluate the economic impact of mining taxation as an additional source of revenue for the North West Provincial Government.

## Rationale for a Mining Tax

The following points are made as a rationale for a mining tax:

1. Mining causes damage to the environment:
  - a. In the form pollution of the air, surface and underground areas, adjacent farm land, ridges, river systems, conservation areas, archaeological and cultural sites and causes dolomitic land areas and soil erosion.
  - b. Mining also has an impact on water resources; the revenue from the mining tax will be used to implement Mine Waste Management Plans.
  - c. The mining activities may have an impact on and damage to the health of miners and people living in mining areas (visual, noise, dust). The revenue from the mining tax will alleviate the pressure on provincial health services.

- d. Mining activities may have a negative impact on vegetation and endangered animals (mammals, birds, amphibians, reptiles and invertebrates).
2. The revenue generated from the mining tax is also needed for rehabilitation of disturbed areas.
3. Migration as a result of the mining activities puts pressure on health, education and social services and housing.
4. The transport of raw commodities has a negative impact on the road infrastructure and safety. The revenue from the mining tax would be used to maintain road infrastructure.
5. There is a need to create a sustainable economic environment long after exhausting the mines and mining activities. This include the development of alternative economic activities to generate jobs.

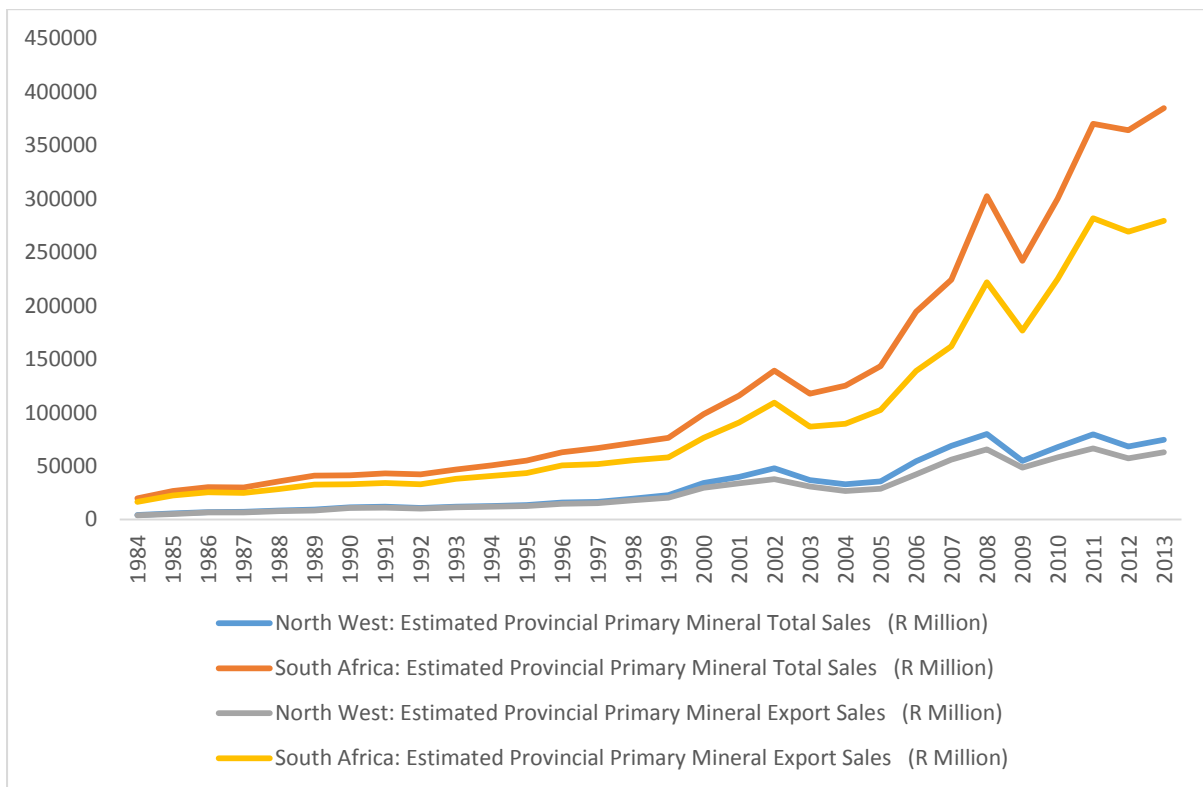
## Mining in the North West Province

The North West Province's economy is focussed on the mining of mineral resources and the exportation thereof. The minerals mined in the North West include gold, uranium, platinum, and diamonds. In 2013, the mining sector in the North West contributes 22 percent to the economy of the North West, 23.2 percent to mining in South Africa, and 1.3 percent to the South African economy. The mining sector employs 35 percent of the employed in the North West and 1.2 percent of South African employment. (Quantec Regional Data).

Table 1 Regional output and Gross Value added at basic prices

Regional output and GVA at basic prices by 2006 local municipality 1995-2013			
	R million (constant 2005 prices)		% of total
Industry	Total GVA	Mining and quarrying	
North West	103347	22980	22
Bojanala	52975	19515	37
Central	17646	257	1
Bophirima	5860	199	3
Southern	26866	3009	11
Source: Quanted Regionalised			

Figure 1 Value of Primary Mineral Sales and Exports by North West Province and South Africa (R Million)



Source: Department Mineral Resource

North West total sales of primary minerals is 19.4 percent in 2013 of total South African sales, while exports represent 22.5 percent of total South African exports of primary minerals in 2013. (DMR)

Table 2 Employment in mining and quarrying in 2013

Geography	Number	% of total	
Total: South Africa	512367		
P6: North West	177922	35	
P6D01: Bojanala	118052		66
P6D02: Central	2161		1
P6D03: Bophirima	1555		1
P6D04: Southern	56155		32

Source: Quantec Regionalised

The economic performance of the province is therefore closely linked to the performance of the mining industry. Factors that influence the performance of the mining industry include weak global demand, low commodity prices, and domestic issues such as labour market instability.

Other economic activities in the North West province is tourism and government services, and agriculture.

The socio-economic issues within the North West Province, with specific reference to Rustenburg is closely linked to the platinum mining industry. According to a report by Eunomix on the impact of platinum mining in Rustenburg, the socio-economic problems are as a result of the demographic effect of the migrant labour system with a high concentration of young men separated from their families, a large number of health issues such as HIV, tuberculosis, malnutrition and respiratory illnesses, high crime levels, lack of access to formal education, high poverty levels and income inequality, large number of informal settlements and housing backlogs, and a general lack in government responsiveness. (Eunomix, 2016: 1-5).

## Mining taxes in South Africa

The National Government of South Africa already collects tax revenue from the mining industry in the form of corporate taxes and mining royalties. The corporate income tax, as it is levied currently, allows for various support measures including incentives for research and development, learnerships, targeted investment toward small mines, and the acceleration of post-rehabilitation depreciation. Companies are taxed at 28 percent, the normal corporate income tax rate, except for gold mines. Gold mines are taxed at a lower rate (based on a specific formula) with the aim to increase the life span of marginal gold mines in South Africa. The royalty levied in South Africa is based on the volume (weight) of the minerals mines or on its value, but do take an element of profit into account when calculating the rate. The aim of the royalty is payment to the state for the right to mine. There are also some relief provisions in the rate determination for marginal mines, smaller, and start-up mining enterprises. (Mining Taxation, 2013:13-14) and (The Davis Tax Committee, 2015: 40,50).

When levying a mining tax one needs to identify the type of tax to be levied, the level of the tax (the rate), and the basis for the calculation of the tax. In South Africa, most taxes are levied at the national level, with some degree of fiscal decentralization as local municipalities do generate own income (Otto,2001:2-3). However, at this point all mining taxes is levied at a national level. Otto (2001) suggests that taxes such as income taxes, and import and export duties should rather be collected at a national level, while it may be appropriate to collect royalties and licensing fees at a provincial or local level. (p.8).

The following tax instruments are available as a mining tax:

- A brown tax levied as a constant percentage of annual net cash flow of a resource project with cash payments made to private investors in year of negative cash flow.

- A resource rent tax where negative net cash flows are accumulated at a threshold rate and offset against future profits.
- A corporate income tax levied on profits of mining companies.
- A profit-based royalty based on measure of accounting profit.
- An ad valorem royalty based on percentage of the value of production.
- A specific royalty based on a percentage per physical unit of production.

(Mining taxation, 2013:9-10)

A tax instrument should be chosen based on its economic efficiency. The efficiency of the tax instrument is determined by the following principles:

- **Neutrality:** Projects should not become unprofitable after a tax is imposed; usually rent- and profit based taxes are more neutral compared to output-based taxes.
- **Project risk:** The taxes imposed should not increase the perceived risk associated with a project. Output based taxes have higher perceived project risk as the tax is imposed on volume produced and does not take cost structures into account.
- **Sovereign risk:** This includes country risk and includes political stability; tax instruments and tax rates should remain stable.

(Mining taxation 2013:10)

The administration of the tax, when deciding what tax instrument to impose, is also important and deals with aspects such as flexibility of rent collection, the cost of collection, revenue delay, and the administration and compliance cost associated with the tax. (Mining taxation, 2013:10)

The Davis Committee (2015) also discuss proposals for the introduction of new tax instruments including windfall taxes, a rent resource tax, a sovereign wealth fund, an export tax, unitary tax regime, some IMF proposals, a flat royalty, standard CIT with



mining ring fence with economic depreciation and Allowance for Corporate Capital, and various others. The Davis Committee highlighted the advantages and disadvantages of each proposal and made its recommended each case. (The Davis Tax Committee, 2015:83-95).

The stage of the lifecycle of a mine should also be brought into consideration when designing a tax instrument:

- The exploration phase is expensive and there are no revenue streams with potentially also no future revenue streams.
- It is a capital intensive process to develop a mine with low revenue streams; equipment is often imported and is expensive even when purchased domestically.
- Mines are sensitive to volatile commodity prices and currency fluctuations.
- Most of the minerals mined is often exported leaving no scope for tax revenue collection.
- At the end of the mine's lifespan the mines become marginal and little revenue is generated.

(Mitchell, nd : 28 and Otto,2001:4,5).

### **The Legal Framework**

A provincial legislature is authorised to impose provincial taxes in terms of section 228(1) of the Constitution of the Republic of South Africa, 1996, which includes taxes, levies and duties other than income tax, value-added tax, general sales tax, rates on property or customs duties, and flat-rate surcharges on any tax, levy or duty that is imposed by national legislation, other than on corporate income tax, value-added tax, rates on property or customs duties.

Current departmental own revenue sources have been benchmarked against other provinces in South Africa in order to identify opportunities in terms of s228(1)(a) of the Constitution and make recommendations to enhance own revenue. The obvious revenue enhancement opportunities are currently addressed in various revenue enhancement strategies at both provincial and municipal levels.

Accordingly, a provincial legislature is sufficiently authorised by the Constitution to implement new provincial taxes in respect of the numerous socio-economic activities that take place within its provincial boundaries. The imposition of new provincial taxes carries certain restrictions, however, in that provincial legislature may not impose taxes, levies, duties and surcharges that in any way materially and unreasonably prejudice national economic policies, economic activities across

provincial boundaries, or the national mobility of goods, services, capital or labour, and must be regulated in terms of an Act of Parliament after giving consideration to recommendations of the Financial and Fiscal Commission (FFC).

A number of studies have been undertaken in respect of which taxes are available to provincial governments, with important recommendations having been made by the FFC and the Katz Commission. The Katz Commission noted that 'piggybacked' taxes or surcharges are mostly practised by developed countries and not developing nations. It was of the opinion that the more provinces are able to make use of user charges for their own facilities the better. For the North West Province, this would entail the increase of existing charges or the introduction of new charges for provincial facilities.

After consideration of the main budgeted revenue items to be collected by national government in the 2016/17 financial year and, accordingly, we believe that the following nationally-raised revenue items present new tax opportunities for provincial government:

- Income tax on persons and individuals
- Excise duties
- Plastic bags levy
- Skills development levy
- So-called "sin taxes"

The FFC interpreted s228(1) of the Constitution as permitting provincial governments to impose a flat-rate surcharge on the national personal income tax (PIT) base. Furthermore, no authorisation from national government was required to do so, although national legislation was needed to regulate such activity. The FFC made several recommendations from studies carried out since 1998 on the possibility of introducing a PIT surcharge, including that:

- The national PIT base in each province must constitute the provincial PIT base
- SARS must collect the surcharge yield (i.e. the revenue) on behalf of the provinces
- Provinces must pass their own legislation dealing with such revenue source

Consequently, the Katz Commission was requested by the Minister of Finance to investigate certain aspects relating to provincial and taxation. It was required to review, inter alia, the viability of provincial taxes in general and the possible imposition of **surcharges on personal income tax**. The Katz Commission observed that a surcharge on the PIT base (also referred to as provincial 'piggybacking' on a national tax) can be found in several industrialised countries. However, it is seldom implemented in any developing country because tax administration in developing countries is inadequate. Mindful of the capacity problems experienced by South African Revenue Service (SARS) at the time of the 7th Interim Report, the Katz Commission expressed serious concerns about the imposition of a surcharge on the PIT base. The Katz Commission rejected the possibility of a provincial **surcharge on excise duties**, reflecting that the imposition and collection of excise taxes or so-called "sin taxes" on alcoholic beverages, tobacco products and soft drinks were best left to SARS. The Davis Tax Committee also looked at the various dimensions of the tax system during 2014 and released the first interim report for public comment by January 2016.

However, there are no major or recent studies which we are aware of that refute the findings of the Katz Commission although a decade or more have passed since the completion of the 7th Interim Report by the Katz Commission. In that time, the capacity of SARS to carry out effective fiscal revenue collection has improved substantially. The reservations expressed by the Katz Commission with regard to tax administration may no longer be as relevant as they were at the time of the publication of the 7th Interim Report back in 1998. Accordingly, the opportunity to revisit

the debate on the imposition of provincial surcharges on excise duties and on the PIT base continues to exist. The Customs and Excise Act No. 91 of 1964 was also amended to provide for an environmental levy in respect of the import or manufacture of certain plastic bags (e.g. the carrier bags made available by various retailers). A 'plastic bag tax' was built into the price that shoppers pay for a bag at the till. The tax was imposed on the manufacturing industry with the intention that the money collected would be used to set up a national recycling programme, which would both clean up the environment and create thousands of jobs. The Minister of Finance has recently pronounced a further increase in this form of tax for the 2016/17 financial year.

### **PROPOSED PROVINCIAL SURCHARGES (NEW REVENUE SOURCES)**

However, the environmental levy does not fall within the meaning of a 'customs duty' contemplated in the exclusion contained in s228(1)(b) of the Constitution and the subsequent opportunity arises to impose a **flat-rate surcharge on the 'plastic bag tax'**. Similarly, the 'skills development levy' is collected by SARS in terms of the Skills Development Act No. 9 of 1999, for distribution amongst the national skills fund, the various SETAs and the National Revenue Fund in terms of sections 8 and 9, and the opportunity also arises to impose a **flat-rate surcharge on the 'skills development levy'**. However, these distinct possibilities should be further investigated by the acting Manager Legal Services for the Department of Finance with the assistance of the Legal Services Chief Directorate at the Office of the Premier and the Office of the State Attorney. It would be advisable if the Corporate Services Manager of the Department of Finance could monitor and report on the progress made in this regard at regular intervals.

### **ADMINISTRATIVE AND LEGAL PROCESS**

Also note that the Provincial Tax Regulation Process Act No. 53 of 2001 ('the PTRPA') as amended was promulgated to regulate the intergovernmental process that must be followed by provinces in the exercise of their power to impose provincial taxes. Where a province intends to impose a new provincial tax, the procedure set out in terms of section 3 of the PTRPA must be followed, namely:

- The MEC for Finance must submit particulars of the proposed provincial tax to the Minister of Finance;
- The particulars must include the information contained in sub-sections (2)(a)-(g);
- The Minister of Finance may consult other organs of state or interested persons;
- Copies of the particulars of the submission must be distributed to members of the Budget Council and must also be referred to the FFC;
- The Minister of Finance is required to advise the Budget Council of progress made in the valuation of the submission;
- If the Minister of Finance is satisfied that the proposed provincial tax will not be in breach of s.22(1) of the Constitution, then notify the province in writing and, within 90 days, introduce a Bill in Parliament to regulate the proposed provincial tax;
- Where the Minister of Finance has reservations about the constitutionality of the proposed provincial tax, then notify the MEC for Finance, refer the submission back for reconsideration, and submit a report to the Budget Council and both Houses of Parliament; and

- If the reconsidered provincial tax still fails to accommodate the reservations of the Minister of Finance, then he or she can refer it to the Constitutional Court for a decision on its constitutionality.

Source: Treasury, North West Provincial Government

## Potential economic implications of a mining tax

The mining industry is already facing certain risks and as identified in Mining Taxation (2013) includes resource nationalisation, skills shortage, access to infrastructure, cost-push inflation, capital project execution, the requirement of a social license to operate, currency volatility, sharing the benefits, and fraud and corruption. (Ernst & Young, 2012-13:6 and cited in Mining Taxation, 2013:12).

Factors that influence investment in mining include geological potential against fiscal and socio-political issues. Mining companies weigh the potential profitability of a mine against risks. One of the risk is the stability of the tax regime. Role of taxes on mining is to generate government revenue, but should not deter investment in the mining sector. Too high tax rates may deter mining investment and may cause marginal mines close. Different taxes impact investment decision differently. Taxes levied on production (and not profits) generate economic inefficiencies as it discourages the mining of lower grade minerals thereby shortening the lifespans of mines. Taxes on profits are generally more efficient. (Mitchell nd: 27-28)

The aim of this study is not to design a mining tax system, but rather to evaluate the potential impact of different mining tax instruments on the North West Provincial economy, in order to assist the Provincial Government in its proposals to National Government.

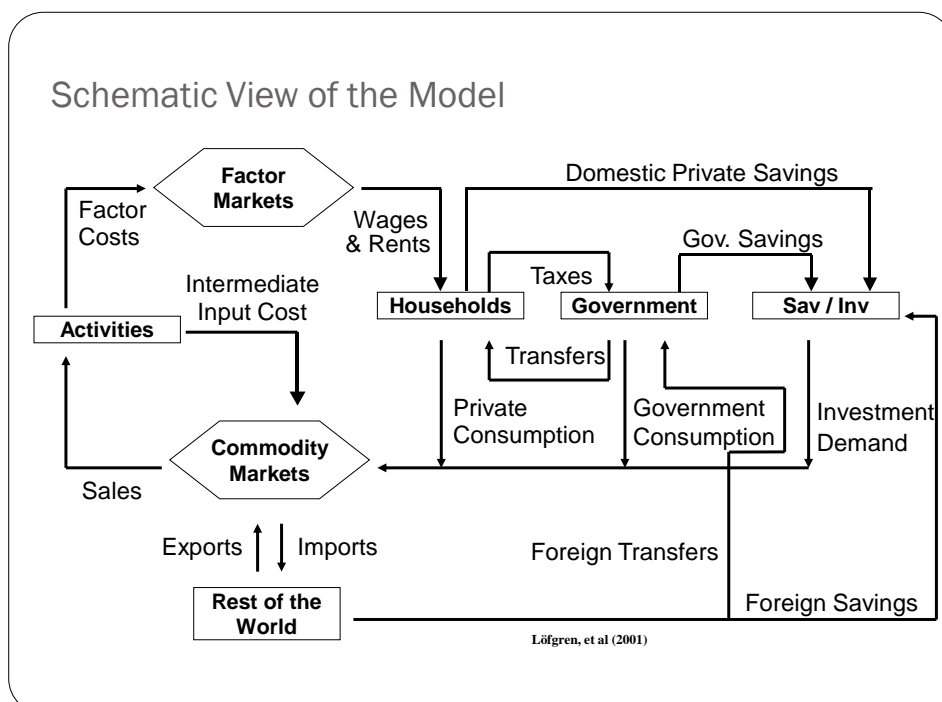
## CGE model

A Computable General Equilibrium (CGE) model of the North West Provincial economy within the greater South African economy will be used to analyse the impact of mining tax related policy issues on the North West Province economy as well as the South African economy.

### Methodology used

A CGE model provides a comprehensive overview of the North West Provincial economy within the South African economy and is highly suitable to be used in policy analysis; CGE models are widely used as policy tools across the world. A CGE model captures the whole economy by (1) capturing the flow of goods and services, (2) the flow of factors and factor payments between the agents in the economy, and (3) by representing the economy and all the economic decisions through a system of equations based on micro-economic foundations. The system of equations is simultaneously solved to capture the impact of economic policy.

Figure 2 Schematic View of the CGE Model



The use of a CGE model in policy analysis contributes to evaluate the cost of policies on the South African economy by studying its impact on production and economic growth, employment, household income and welfare, the government balance, and the foreign balance.

A comparative static CGE model as developed by the International Food Policy Research Institute (IFPRI) will be used for this analysis. The IFPRI standard model is based on the neoclassical-structural modelling tradition as introduced by Dervis et al (1982)<sup>1</sup>. A complete discussion of the model may be found in Lofgren, H, et al (2001)<sup>2</sup>, the main characteristics of the model are:

- Each producer maximizes profits, subject to production technology. Production technology are represented in levels. A Leontief function is assumed to model the aggregation of value-added and intermediate use, as well as the combination of commodities within intermediate use.
- Factor market have alternative closure rules depending on the nature of the factor under consideration; that is whether the factor is considered to be fully employed or unemployed.
- Households are assumed to maximize utility. Households receive income from factors of production as well as from transfers from other institutions such as the government. Households use their income for consumption according to a linear expenditure system (LES) demand function which is derived from the maximization of a Stone-Geary utility function. Households also pay taxes, make transfer payments to other institutions, and save a share of their earnings.
- The government collects revenue from different taxes and also receives revenue from transfers from other institutions such as the rest of the world. The government use the income generated for government consumption, transfer payments. The difference between government revenue and

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<sup>1</sup> Dervis, K., J. De Melo and S. Robinson. 1982. *General Equilibrium Models for development policy*. New York. Cambridge University Press.

<sup>2</sup> Lofgren, H., R.L. Harris, S. Robinson. 2001. *A Standard Computable General Equilibrium (CGE) model in GAMS*. Microcomputers in Polic Research No. 5. <http://www.ifpri.org>.

spending is savings. The model will reflect the economic activities of the provincial and national government.

- The rest of the world earn income through factor payments and transfers from domestic institutions, while it makes payments to domestic factors and domestic institutions in the form of transfer payments. Commodity trade (exports and imports) also takes place between the domestic economy and the rest of the world. Foreign savings is the result of the balance generated by foreign inflows and outflows. All foreign payments are expressed in foreign currency.
- In the commodity market all goods are sold on a market. Domestically produced goods may either be sold on the domestic market or exported. The decision between domestic sales and exports is modelled using a Constant Elasticity of Transformation (CET) function which allows for imperfect transformability between exports and domestic sales. Domestic demand is made up of household consumption, government consumption, investment, intermediate use, and trade and transport margins. Domestic demand is satisfied by either domestic sales or imports. The substitutability between domestic sales and imports are modelled using a Constant Elasticity of Substitution (CES) function which means that domestic demanders minimize cost subject to imperfect substitutability.
- There are various macroeconomic balances in the model, namely the government balance, the external balance, and the Savings-Investment balance. Difference macroeconomic closure rules are available for each of these balances.

The advantages of using the IFPRI model rather than redeveloping a CGE model are:

- It saves time to use an existing CGE model; various CGE modellers have spent time developing this model.
- This model has been applied to various policy issues across developing countries.

- Various modellers are familiar with the CGE model; skill transfer is easier to do and sunken-cost of getting to know the model is much lower.
- There are resources available to assist with further model development; whether it is already developed models on the internet, papers using the model, or other modellers that will provide inputs.

Various adaptations have been made to this model to make it specific to the South African economy, including a South African dataset, South African specific elasticities, and assumptions on the labour market.

### [The Social Accounting Matrix](#)

The main source of data used for the CGE modelling is a Social Accounting Matrix (SAM). A SAM is a comprehensive, economy-wide data framework. It is a square matrix in which each account is represented by a row and a column: each cell shows the payment from its column account to its row account. The CGE model follows the flows captured in the SAM.

The impact on the economy will be measured based on:

- Impact on GDP
- Impact on GDP by industry
- Employment gains and losses
- Income distribution and welfare impact on households
- Impact on government revenue

The impact will be measured for the North West Province as well as for the rest of South Africa.

The SAM is developed by Quantec and is for the year 2013. The SAM will capture the North West Provincial economy within the South African economy and has the following disaggregated accounts:



- There are 43 commodities and activities included in the SAM. (See

- Table 3 for a complete list).
- There are four labour groups in the SAM, namely (1) high skilled labour, (2) skilled labour, (3) semi- and unskilled labour, and (4) informal labour.
- Capital is also included as a production factor with the labour groups mentioned above.
- Institutions incorporated in the SAM are households, enterprises, the government, and the rest of the world.
- The SAM contains fourteen household groups divided according to decile with the top decile further divided. (See Table 4 for the household group specification).
- Various taxes are included, namely VAT, import tariffs, excise duties, fuel levy, other indirect taxes on products, indirect taxes on production, as well as personal and company taxes. Indirect taxes are net of subsidies.

**Table 3 List of activities and commodities included in the Quantec SAM**

1	<b>Agriculture, forestry &amp; fishing</b>
2	<b>Coal mining</b>
3	<b>Gold &amp; uranium ore mining</b>
4	<b>Other mining</b>
5	<b>Food</b>
6	<b>Beverages &amp; Tobacco</b>
7	<b>Textiles</b>
8	<b>Wearing apparel</b>
9	<b>Leather &amp; leather products</b>
10	<b>Footwear</b>
11	<b>Wood &amp; wood products</b>
12	<b>Paper &amp; paper products</b>
13	<b>Printing, publishing &amp; recorded media</b>
14	<b>Coke &amp; refined petroleum products</b>
15	<b>Basic chemicals</b>
16	<b>Other chemicals &amp; man-made fibres</b>
17	<b>Rubber products</b>
18	<b>Plastic products</b>
19	<b>Glass &amp; glass products</b>
20	<b>Non-metallic minerals</b>
21	<b>Basic iron &amp; steel</b>
22	<b>Basic non-ferrous metals</b>
23	<b>Metal products excluding machinery</b>
24	<b>Machinery &amp; equipment</b>
25	<b>Electrical machinery</b>
26	<b>Television, radio &amp; communication equipment</b>
27	<b>Professional &amp; scientific equipment</b>
28	<b>Motor vehicles, parts &amp; accessories</b>
29	<b>Other transport equipment</b>
30	<b>Furniture</b>
31	<b>Other industries</b>
32	<b>Electricity, gas &amp; steam</b>
33	<b>Water supply</b>
34	<b>Construction</b>
35	<b>Wholesale &amp; retail trade</b>
	<b>Catering &amp; accommodation services</b>

36	
37	Transport & storage
38	Communication
39	Finance & insurance
40	Business services
41	Medical, dental & other health & veterinary services
42	Other community, social & personal services
43	Government

Table 4 List of household deciles included in the Quantec 2014 SAM

	Category	Income Range
1	d0	10% of population – 1 <sup>st</sup> decile
2	d1	10% of population – 2 <sup>nd</sup> decile
3	d2	10% of population – 3 <sup>rd</sup> decile
4	d3	10% of population – 4 <sup>th</sup> decile
5	d4	10% of population – 5 <sup>th</sup> decile
6	d5	10% of population – 6 <sup>th</sup> decile
7	d6	10% of population – 7 <sup>th</sup> decile
8	d7	10% of population – 8 <sup>th</sup> decile
9	d8	10% of population – 9 <sup>th</sup> decile
10	d91	10% of population – 10 <sup>th</sup> decile
11	d921	10% of population – 10 <sup>th</sup> decile
12	d922	10% of population – 10 <sup>th</sup> decile
13	d923	10% of population – 10 <sup>th</sup> decile
14	d924	10% of population – 10 <sup>th</sup> decile

Table 5 List of all the taxes in the SAM

Direct taxes <ul style="list-style-type: none"><li>• Company tax</li><li>• Personal taxes</li></ul>
Taxes on production
Subsidies on production
Taxes on products <ul style="list-style-type: none"><li>• VAT</li><li>• Import duties</li><li>• Fuel levy</li><li>• Excise duties</li><li>• Other taxes on production</li></ul>
Subsidies on products

## Scenarios

The following scenarios are proposed:

- (1) Impose different types of mining taxes – impose same R amount – set a revenue collection target
  - Impose a commodity based tax on mining commodities in the North West Province
  - Impose an increase in royalties based on value of production this is simulated as an activity tax
  - Impose an export tax to exports of North West mining industry – collected nationally redistributed provincially
  - Impose an increase in corporate income taxes in the North West Province
  - Impose an increase in personal income taxes in the North West Province
  - Increase equitable share to NWPG funded through a general increase in household taxes
- (2) All taxes (except for the general increase in household taxes) are imposed in the North West Province, collected nationally, and transferred via equitable share allocation to the North West Province.

- (3) All taxes are imposed at equal rand value. Three different levels are imposed and compared against each other, namely a 10 percent increase in the equitable share allocation (which represents R3.615 billion), a 20 percent increase (R7.230 billion), and a 30 percent increase (R10.845 billion).
- (4) All the scenarios are evaluated against the alternative applications of the additional revenue generated, namely
  - Use additional revenue towards general infrastructure spending in province
  - Use additional revenue towards higher government spending
- (5) Evaluate the above scenarios against changes in commodity prices of mining products.
- (6) Analyse the impact of a one percent increase in productivity on the investment scenarios.
- (7) The scenarios are first performed using a short run closure (investment is fixed), and then using a long run closure (investment adjusts).

## Assumptions

The following assumptions were made:

- All labour categories, except high-skilled labour, are assumed to be fully employed. High-skilled labour is assumed fully employed, but are mobile across industries.
- The exchange rate is flexible, while foreign savings are assumed to be fixed.
- Direct tax rates are assumed to be fixed, while government savings adjust.
- Investment is determined by the level of savings in the economy.
- The consumer price index is the numeraire in the model.

## Modelling Results

### Expected impact of shocks imposed

- The commodity tax on the mining commodities of the North West Province will lead to an increase in their selling prices making them more expensive for the users of these commodities. The commodity tax is borne by the consumer of these commodities, which is mostly industries using these commodities as

intermediate inputs. This is more applicable to other mining, though, as gold mining products have very little domestic sales. Most of gold is exported.

- The activity tax is a tax levied on the production of mining products in the North West. The activity tax is borne by the producer as the tax raises the production cost of the producer, resulting in a decline in output compared to the base scenario. There is also has negative impact on employment in the mining sector as a result.
- An export tax reduced the competitiveness of our exports as it raises the export price of the mining products in the North West Province. There may be some substitution by the mining industry from exports to domestic sales if possible. For gold mining, this is not a strong possibility as domestic sales are very small compared to exports. Output of the mining industries will fall as they are not able to substitute to domestic sales to full extent.
- Corporate taxes in the North West Province are raised to generate additional revenue. In the short run, to keep investment levels constant at base scenario levels, household will have to save more to generate the savings needed for the required investment. For the scenarios where the additional revenue is invested it means that household savings have to increase with even more. In the long run, investment from firms will decline due to the corporate tax levied.
- Household taxes in the North West Province is raised to generate additional revenue. This cause a decline in the disposable income of households and household consumption expenditure decline in the North West Province.
- Household taxes in South Africa is raised to generate additional revenue which is transferred to the North West Provincial Government as part of its equitable share allocation. The increase in household taxes cause the disposable income of all households in South Africa to decline.

### Short run Impact

In the short run it is assumed that the investment levels are fixed. The level of investment therefore does not change as a result of the taxes imposed, but rather the level of savings in the economy. Saving rates will adjust to maintain the fixed level of savings. The change in investment associated with the investment scenarios are imposed exogenously.

### GDP impact

The GDP impact shows the impact of the scenarios on South African GDP. The 10 percent increase in revenue scenarios, with the additional revenue invested resulted in the following impact on GDP:

- In all the scenarios investment spending increase by 0.51 percent as a result of the assumption that all additional revenue generated is invested. The increase in investment requires significant imports as investment spending is heavily reliant on the importation of capital goods such as machinery and equipment. As a result of the modelling assumptions exports need to increase to finance the required imports. In most scenarios this is the case.
- The impact of a 10 percent increase in revenue financed through additional commodity taxes is negative on GDP as the real GDP is lower compared to the base scenario; GDP decrease by 0.015 percent compared to the base scenario. The negative impact imposing the commodity tax on mining products in the North West Province, on economic activity, is therefore larger than any positive impact generated from reinvesting the additional revenue. The commodity taxes imposed lead to higher commodity prices which impacts negatively on all domestic consumers of these mining products. Mining products are mostly consumed by industries as intermediate inputs. With the commodity tax most of the negative impact is therefore associated with lower consumption expenditure. When the commodity tax is levied both exports and imports decrease (the opposite of the expected change as a result of the higher investment spending), because of the negative impact of the commodity tax on our export competitiveness.
- With both the activity tax and export tax output of the mining industries decline leading to higher commodity prices. The decline in output results in relative large declines in employment, (see the Table 10) which impacts negatively on household consumption. This negative impact on household consumption outweighs the positive impact from reinvesting the additional revenue so that the GDP impact is negative for both scenarios. GDP decreases by 0.009 percent when an activity tax is imposed, and by 0.007 percent when the export tax is imposed.
- The impact of an increase in corporate taxes in the North West has a positive impact on GDP. However, there are some distributional implications for households. Household consumption decline as the short run closure, of investment being fixed, means that household savings has to increase to maintain the level of investment in the economy. The net effect on GDP is still positive with GDP increasing by 0.01 percent compared to the base scenario.
- The impact of an increase in household taxes in the North West has a positive impact on GDP; GDP is 0.005 percent higher compare to the base scenario. The household tax cause household consumption expenditure to fall. The positive impact from the additional investment still outweighs the negative impact as a result of the household tax so that GDP increase.



- The highest positive impact on GDP is when the equitable share allocation of the North West Province is increased and financed through a general increase in household taxes. Even there is a negative impact on household consumption it is smaller than when the tax is levied on North West Province households' only. The net effect on GDP is an increase of 0.011 percent compared to the base scenario.
- The model also does not take into account how investments in this period leads to capital accumulation and economic growth in future periods.

**Table 6 The impact on Real GDP – a 10 percent increase in revenue – additional revenue is invested – short run**

Real GDP							
10% increase in revenue plus increase in investment							
GDP Components	BASE (R billion)	Percentage Change from Base					
		Commodity tax	Activity tax	Export tax	NW Corporate	NW Household	Increased ES
Private Consumption	2143.215	-0.194	-0.183	-0.181	-0.152	-0.160	-0.151
Gross Fixed Investment	708.357	0.510	0.510	0.510	0.510	0.510	0.510
Change in Inventories	47.117	0.000	0.000	0.000	0.000	0.000	0.000
Government Consumption	715.959	0.000	0.000	0.000	0.000	0.000	0.000
Exports	1094.771	-0.060	0.004	0.014	0.046	0.031	0.046
Imports	-1175.091	-0.056	0.003	0.013	0.042	0.029	0.043
GDP at Market Prices	3534.328	-0.015	-0.009	-0.007	0.010	0.005	0.011
Net Indirect Taxes	417.615	-0.063	-0.024	-0.010	-0.015	-0.022	-0.014
GDP at Factor Cost	3116.713	-0.007	-0.006	-0.006	0.013	0.009	0.014

The 10 percent increase in revenue scenarios, with the additional revenue allocated to government spending resulted in the following impact on GDP:

- In all the scenarios government consumption increase by 0.505 percent as a result of the increase in additional revenue. Government consumption use more domestically produced goods and services compared to investment. The domestic multipliers of government consumption are therefore larger than that of investment as well as those associated with the mining products so that the impact of the increase in government consumption outweighs the negative impact from the taxes imposed.
- The commodity tax has a negative impact on private consumption due to a general increase in commodity prices. Although commodity prices increase significantly for the mining commodities, this should not affect household consumption that much as these commodities are not consumed by households. However, commodity prices in general increase due to increase in demand from increase in government consumption. The increase in government consumption (due to the additional revenue) outweighs the negative impact on private consumption so that GDP increase. GDP increase by 0.045 percent compared to the base scenario.
- In both the activity and export tax scenarios input prices increase leading to a decrease in output of the mining industries in the North West and employment. Commodity prices increase as a result. This impacts negatively on household

consumption. The impact is not as severe, compared to the investment scenarios, as the increase in government spending cause employment to increase to such an extent that most of the employment losses associated with both the activity and export tax are reversed. The net effect is therefore also positive and GDP increases by 0.051 and 0.053 percent respectively.

- The impact from an increase in corporate taxes on North West Province firms when additional revenue is allocated to government consumption is also more positive compared to when additional revenue is spent on investment as government consumption has larger domestic multipliers.

**Table 7 The impact on Real GDP – a 10 percent increase in revenue – additional revenue is allocated to government spending – short run**

Real GDP							
10% increase in revenue plus increase in government spending							
GDP Components	BASE (R billion)	Percentage Change from Base					
		Commodity tax	Activity tax	Export tax	NW Corporate	NW Household	Increased ES
Private Consumption	2143.215	-0.095	-0.084	-0.082	-0.054	-0.061	-0.053
Gross Fixed Investment	708.357	0.000	0.000	0.000	0.000	0.000	0.000
Change in Inventories	47.117	0.000	0.000	0.000	0.000	0.000	0.000
Government Consumption	715.959	0.505	0.505	0.505	0.505	0.505	0.505
Exports	1094.771	-0.088	-0.026	-0.016	0.017	0.001	0.017
Imports	-1175.091	-0.082	-0.024	-0.015	0.015	0.001	0.016
GDP at Market Prices	3534.328	0.045	0.051	0.053	0.070	0.065	0.070
Net Indirect Taxes	417.615	-0.048	-0.008	0.006	0.000	-0.007	0.001
GDP at Factor Cost	3116.713	0.059	0.060	0.060	0.079	0.075	0.080

## Investment spending by government, productivity and growth

The potential link between investment spending by government (or more specifically infrastructure spending) and productivity improvements was not considered in the “investment” scenarios. The economic argument is that government investment (especially infrastructure spending on roads, hospitals, and schools) should increase the productivity of not only for labour but also for capital. Table 19 provides an illustration of the potential impact of an increase in productivity (associated with the increase in investment) on GDP. Here it is assumed that the increase in investment spending of about R3.6 billion in the North West Province will lead to an increase of 1 percent in productivity. This is merely an assumption, as there are no underlying reasons for or validity of this assumption. It is not clear what the exact impact should be, although some studies exist to determine the link between government spending, productivity, and growth. The results show that productivity improvements may result in a positive impact on GDP compared to the negative impact when productivity improvements were not considered. However, more studies should be done to estimate the exact size of the productivity improvement to be considered.

**Table 8 The real GDP impact of a 10 percent change in revenue with investment compared to a 1 percent increase in productivity - run**

GDP Components	Real GDP at market prices		
	BASE (R billion)	Percentage change from base	
		Commodity tax	Commodity tax with productivity
Private Consumption	2143.215	-0.194	-0.100
Gross Fixed Investment	708.357	0.510	0.510
Change in Inventories	47.117	0.000	0.000
Government Consumption	715.959	0.000	0.000
Exports	1094.771	-0.060	0.007
Imports	-1175.091	-0.056	0.007
<b>GDP at Market Prices</b>	<b>3534.328</b>	<b>-0.015</b>	<b>0.042</b>
Net Indirect Taxes	417.615	-0.063	-0.002
<b>GDP at Factor Cost</b>	<b>3116.713</b>	<b>-0.007</b>	<b>0.049</b>

## The graphs below (Error! Reference source not found. and

Figure 4) illustrates the impact of different levels of the taxes on the real GDP when the additional revenue is invested and shows that the impact of most of the taxes continue to increase as the level of tax increases, whether the initial impact is positive or negative.

Figure 3 The impact on real GDP from different scenarios at different levels – with investment – short run

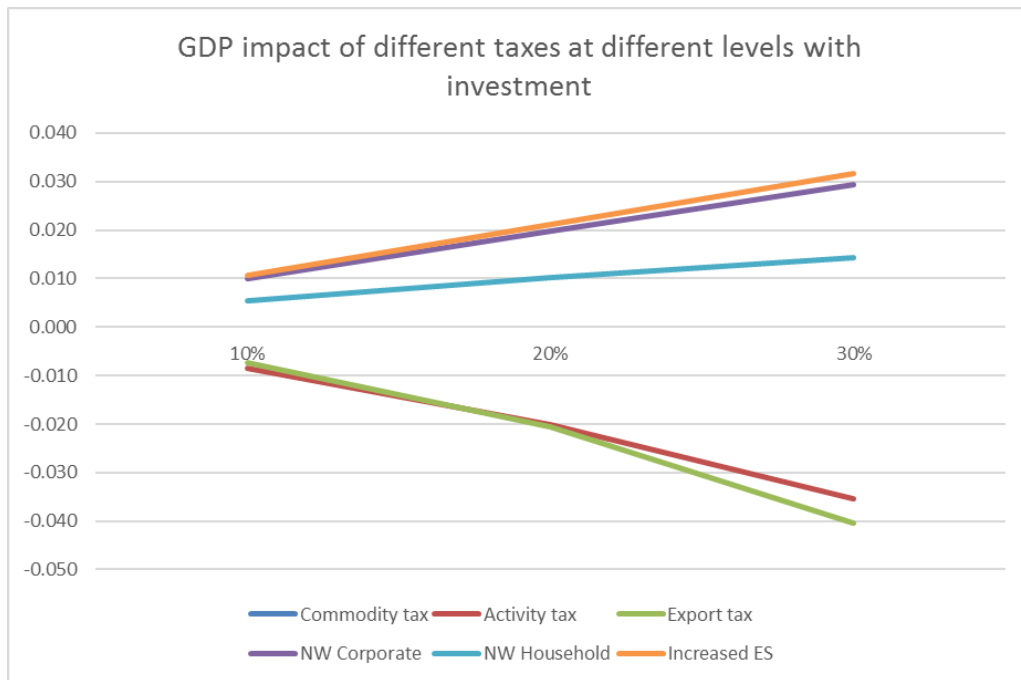
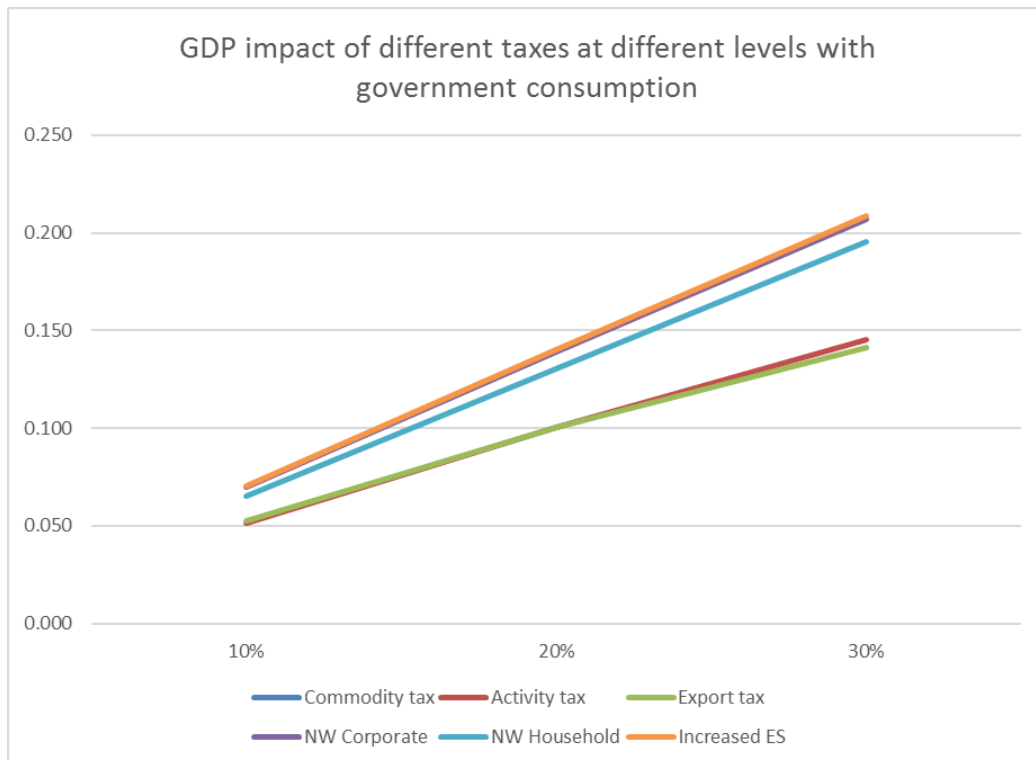


Figure 4 The impact on real GDP from different scenarios at different levels – with government spending – short run



North West Provincial GDP impact

GDP at factor cost is used to measure the impact of the scenarios at a provincial level. GDP at factor cost excludes the impact of commodity taxes as these are levied at a national level.

At a provincial level, the impact of these scenarios are marked. When the additional revenue is re-invested what benefit exist, accrue to the rest of South Africa while the negative impact of the taxes on household consumption are felt in the province. It is only when the provinces revenue is increase via an increase in its equitable share that there is a positive benefit from investing the additional revenue. When the additional revenue is used for government spending the benefit in the province is positive and is much greater. In most scenarios GDP at factor cost increase by more than 100 percent, with the largest increase again when the equitable share is increased.

Table 9 Real GDP at factor cost for North West Province – short run

Real GDP at factor cost (Percentage change from base)		
	10% with investment	10% with government consumption
<b>Investment</b>		
<b>Commodity tax</b>	-22.398	105.739
<b>Activity tax</b>	-46.923	80.988
<b>Export tax</b>	-54.925	72.960
<b>NW Corporate</b>	-0.525	127.363
<b>NW Household</b>	-11.022	117.043
<b>Increased ES</b>	0.652	128.501

#### GDP Impact by Industry

The impact on the industries, when the taxes are imposed and invested, in the North West Province is shown in Figure 5 below and the impact on industries in the rest of South Africa in **Error! Reference source not found.:**

- When the tax is imposed as a commodity tax, industries that use the mining products as intermediate goods will be adversely affected, as well as industries supplying to the mining industries affected. The industries in the North West Province as well as the rest of South Africa, that are the most affected include iron and steel, glass products, and chemicals. It is mostly rest of South Africa's industries that benefit from the increase in investment spending; the North West Province's industries benefit only marginal.

- Gold mining and other mining are adversely affected when an activity tax or an export tax are levied. The output of both industries decline, however it declines to a larger extent if the export tax is imposed as both industries exports a large share of their output. In the rest of South Africa, industries that sells mostly to households are also adversely affected. The industries that benefits are those industries that sell investment goods, this is mostly industries in the rest of South Africa. The industries in the rest of South Africa therefore benefits more compared to the industries in the North West. Exporting firms (such as iron and steel) also benefit from a real exchange rate depreciation (0.087 percent and 0.108 percent for activity and export taxes) respectively.
- When corporate taxes or household taxes are levied in the North West Province the impact is very marginal in the North West province. Most of the impact is seen in the industries in the rest of South Africa. Industries producing consumer goods are adversely affected, while industries that sell investment oriented goods are better off. This is also the case for when the tax is levied nationally.

Figure 5 The impact on Real GDP at an industry level in the North West Province – 10 percent increase in revenue – additional revenue is invested – short run

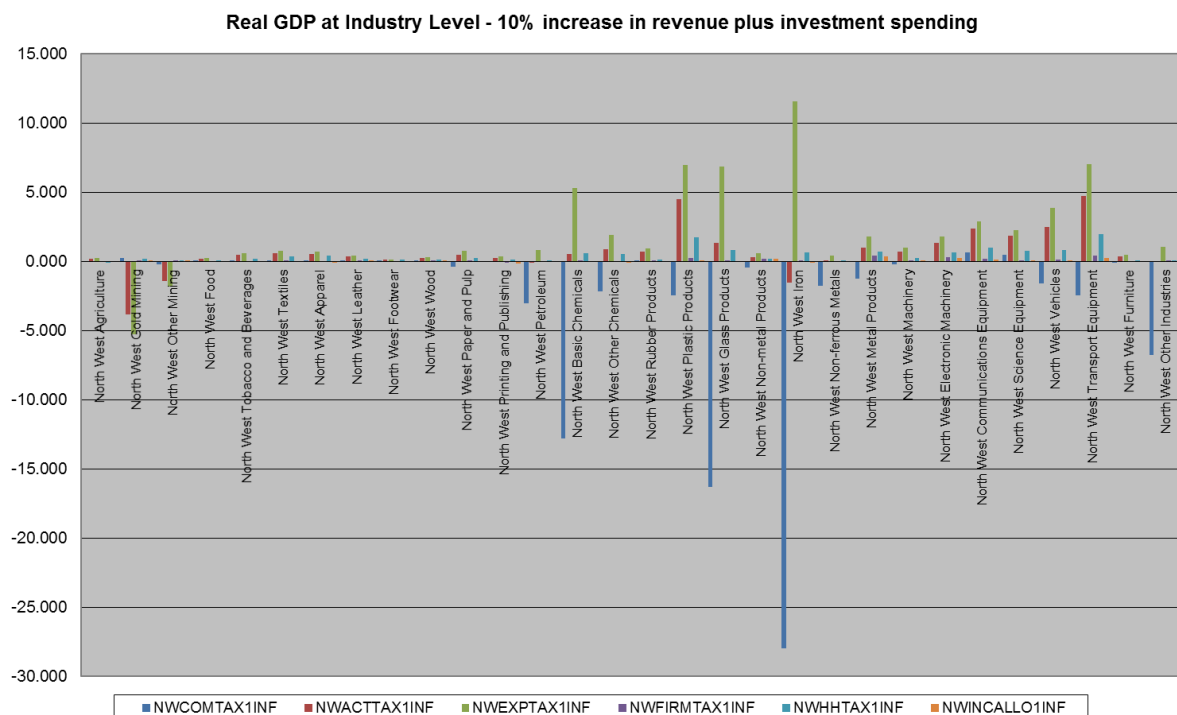
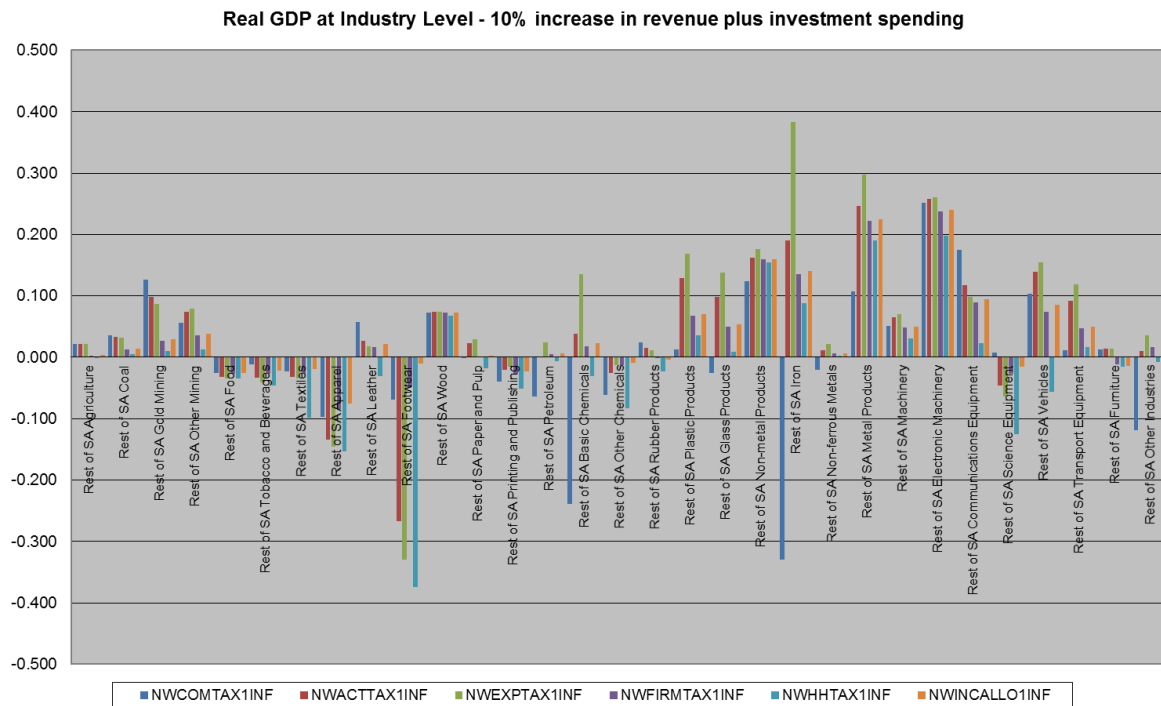


Figure 6 The impact on Real GDP at an industry level in the rest of South Africa – 10 percent increase in revenue – additional revenue is invested – short run



The impact of the scenarios where the additional revenue is allocated to government consumptions are shown in Figure 7 and Figure 8:

- The impact in the North West Province is comparable to when the additional revenue is invested, the same industries are adversely affected and the same industries tend to benefit.
- The main difference between the two sets of scenarios may be seen in the industries in the rest of South Africa. The industries that benefit are the industries supplying to government services. In general, more industries benefit, but again most of the benefits are in the rest of South Africa.

Figure 7 The impact on Real GDP at an industry level in the North West Province – 10 percent increase in revenue – additional revenue is allocated to government consumption – short run

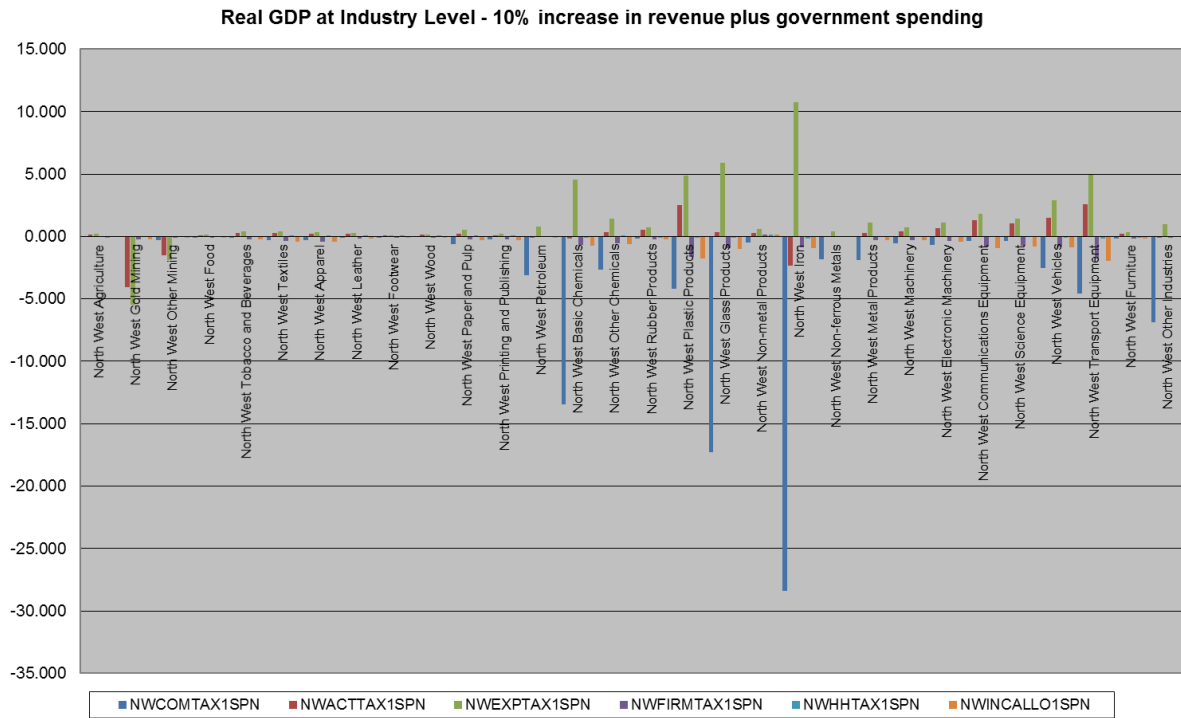
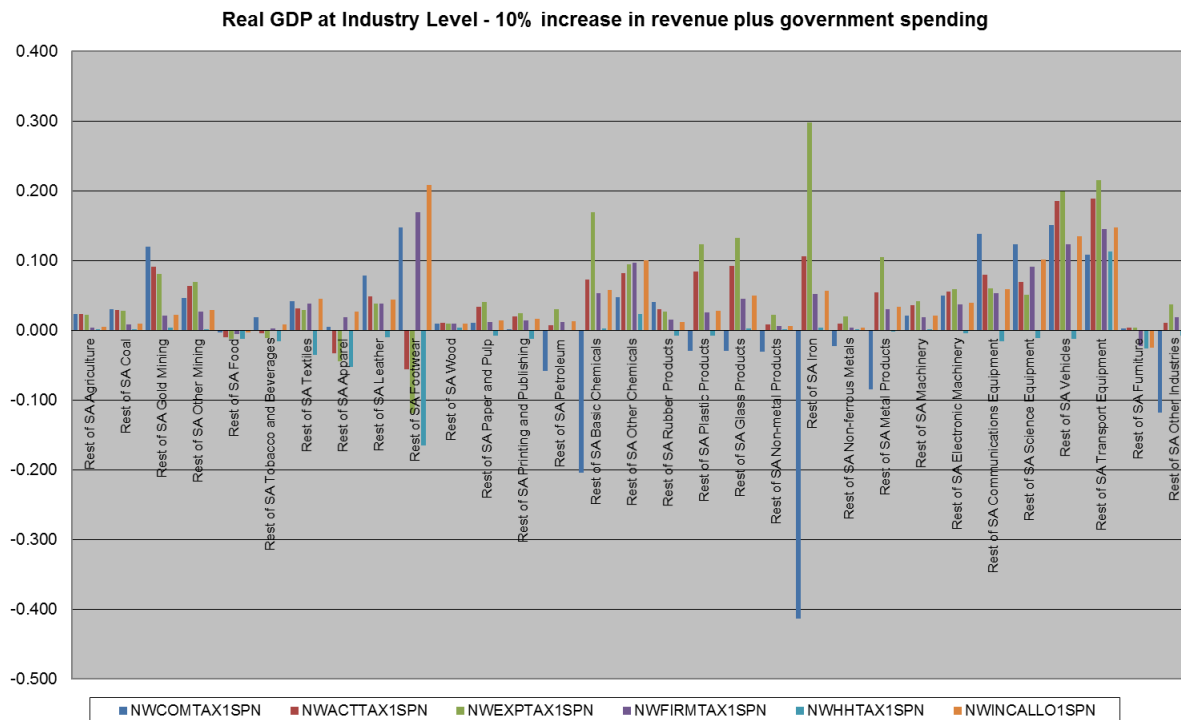


Figure 8 The impact on Real GDP at an industry level in rest of South Africa – 10 percent increase in revenue – additional revenue is allocated to government consumption – short run





## Employment impact

The impact of the scenarios on employment are shown in Table 10. The assumption is that high-skilled labour is fully employed, meaning the number of employed for high-skilled labour will not change, only its industry specific wage. The rest of the labour categories are assumed to be unemployed.

- When the additional revenue is invested, formal employment in the North West decreases for almost all the scenarios. Employment decreases for all labour categories when a commodity, activity or export tax is levied, or when a corporate or household tax is levied in the North West Province only. The employment benefits from the additional investment when these taxes are levied are seen only in the rest of South Africa as employment in the rest of South Africa increases as a result. It is only when the revenue in the North West Province are increased through an increase in its equitable share (financed via a general increase in household taxes) that the North West province's employment increases.
- When the additional revenue is allocated to government consumption employment in the North West increases. This is then mostly employment in government services. The employment results in the rest of South Africa is mixed. Employment in the rest of South Africa declines, when a commodity tax is levied in the North West Province on mining goods as the large decline in employment in sectors such as iron and steel and chemicals outweighs any employment gains in the government sector.
- When an activity tax is levied the fewer industries in the rest of South Africa is adversely affected so that overall employment in the rest of South Africa also increases. This is also the case for when an export tax is levied or when household taxes in the North West Province are increased.
- When corporate taxes in the North West are raised employment in the rest of South Africa will decrease, although employment in the North West Province increases. The decrease in employment in the rest of South Africa is as a result of industries selling consumption goods not benefiting from the reduction in consumption. The reduction in consumption is again as a result of the increase in household savings required to maintain investment at its initial level.
- Employment in the rest of South Africa also declines when household taxes are raised nationally. This is due to a decrease in consumption expenditure by household as a result of lower disposable income.

Table 10 The employment impact of the 10 percent increase in revenue scenarios

Employment							
10% increase in revenue plus increase in investment							
Labour Categories	BASE	Percentage Change from Base					
		Commodity tax	Activity tax	Export tax	NW Corporate	NW Household	Increased ES
North West High-skilled	315.677						
North West Semi-skilled	226.447	-0.587	-1.311	-1.541	-0.015	-0.408	0.027
North West Unskilled	96.865	-0.621	-1.549	-1.837	-0.041	-0.583	0.015
North West Informal	208.669	-0.453	-0.496	-0.512	0.028	-0.635	0.098
Rest of South Africa High-skilled	1664.077						
Rest of South Africa Skilled	4031.219	0.000	0.064	0.083	0.026	0.056	0.021
Rest of South African Unskilled	3657.386	0.044	0.103	0.121	0.053	0.086	0.046
Rest of South Africa Informal	2107.773	0.084	0.143	0.160	0.104	0.149	0.095
Employment							
10% increase in revenue plus increase in government spending							
Labour Categories	BASE	Percentage Change from Base					
		Commodity tax	Activity tax	Export tax	NW Corporate	NW Household	Increased ES
North West High-skilled	315.677						
North West Semi-skilled	226.447	2.137	1.371	1.129	2.715	2.303	2.758
North West Unskilled	96.865	4.396	3.395	3.085	4.991	4.416	5.049
North West Informal	208.669	-0.002	-0.059	-0.080	0.479	-0.204	0.549
Rest of South Africa High-skilled	1664.077						
Rest of South Africa Skilled	4031.219	-0.053	0.012	0.032	-0.026	0.005	-0.031
Rest of South African Unskilled	3657.386	-0.038	0.022	0.040	-0.030	0.005	-0.037
Rest of South Africa Informal	2107.773	-0.068	-0.008	0.009	-0.049	-0.002	-0.058

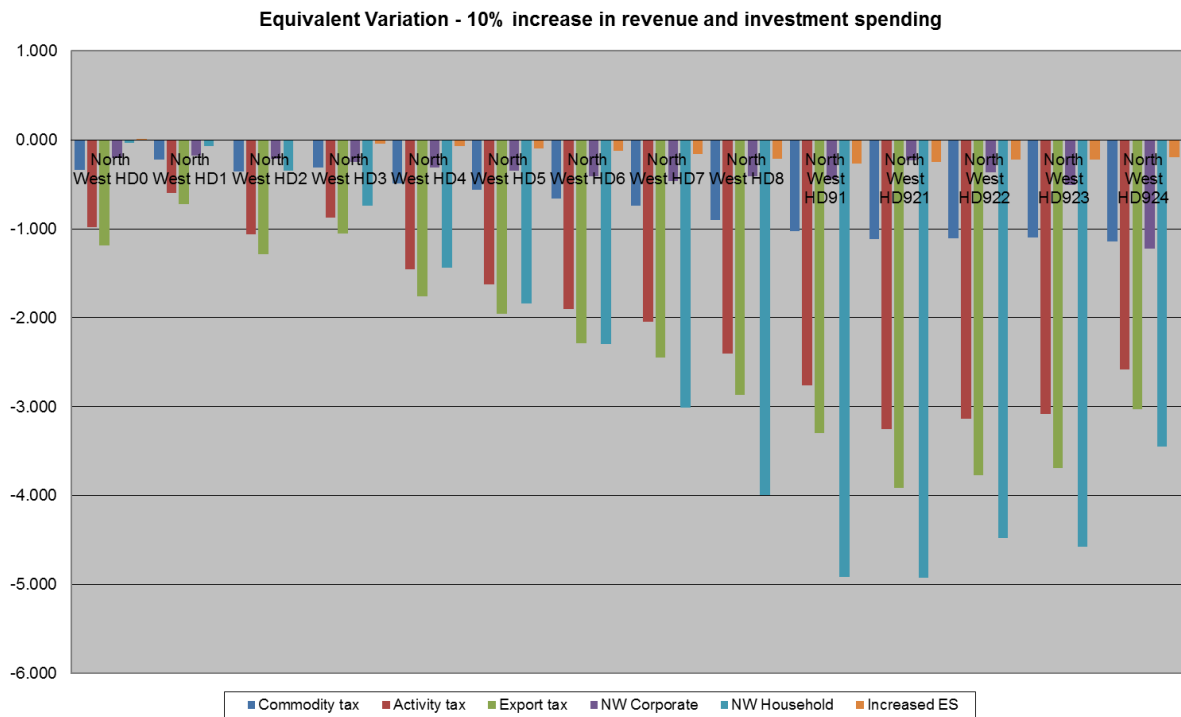
## Welfare impact

An equivalent variation measure is used to estimate the welfare impact of the scenarios imposed. The equivalent variation measure provides a combined impact of the scenarios on utility, income and prices. The graphs below show the percentage change in the equivalent variation from the base scenario due to impact of the taxes imposed.

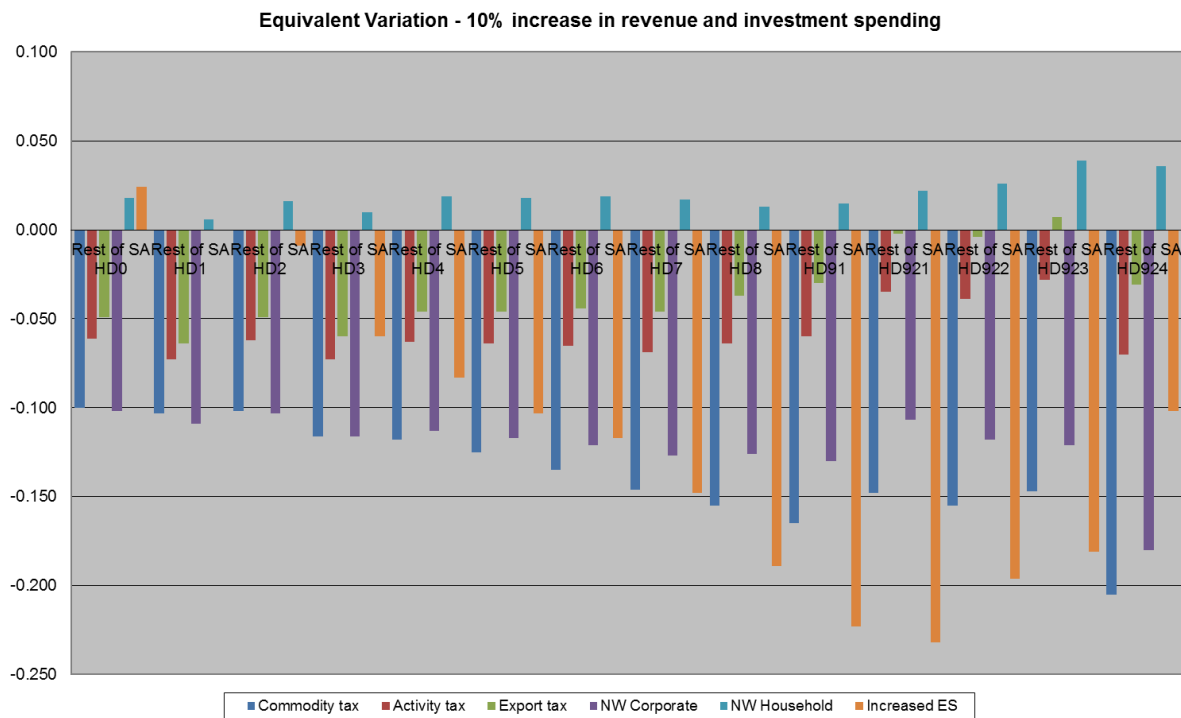
The welfare effect when the additional revenue is invested is given in Figure 9 and Figure 10:

- In the North West Province, the welfare of all households' decline as a result of the combined impact of a decline in employment, and therefore income, utility and prices. The negative impact is the smallest when the province's equitable share is increased via household taxes, although the impact from higher household taxes also has a negative impact on welfare.
- The welfare impact in the rest of South Africa is also negative for most of the scenarios, the impact is only positive when households are taxed in the North West Province and investment spending increase, as the incidence of the investment spending is in the rest of South Africa. It is higher income households that benefit to the greatest extent.

**Figure 9** The welfare impact on North West Province households following a 10 percent increase in revenue with additional investment – short run



**Figure 10** The welfare impact on rest of South Africa households following a 10 percent increase in revenue with additional investment – short run



The welfare effect when the additional revenue is allocated to government spending is given in Figure 11 and Figure 12:

- Households in the North West Province benefits when corporate profits or household taxes are increased in the North West Province only, or when household taxes are raised nationally. Again it is mainly higher income households that benefits. This is mostly due to an increase in government employment of higher skilled labour.
- In the rest of South Africa most households are worse off. It is only when households are taxes in the North West Province that the rest of the South African households are marginally better off.

Figure 11 The welfare impact on North West Province households following a 10 percent increase in revenue with additional government spending – short run

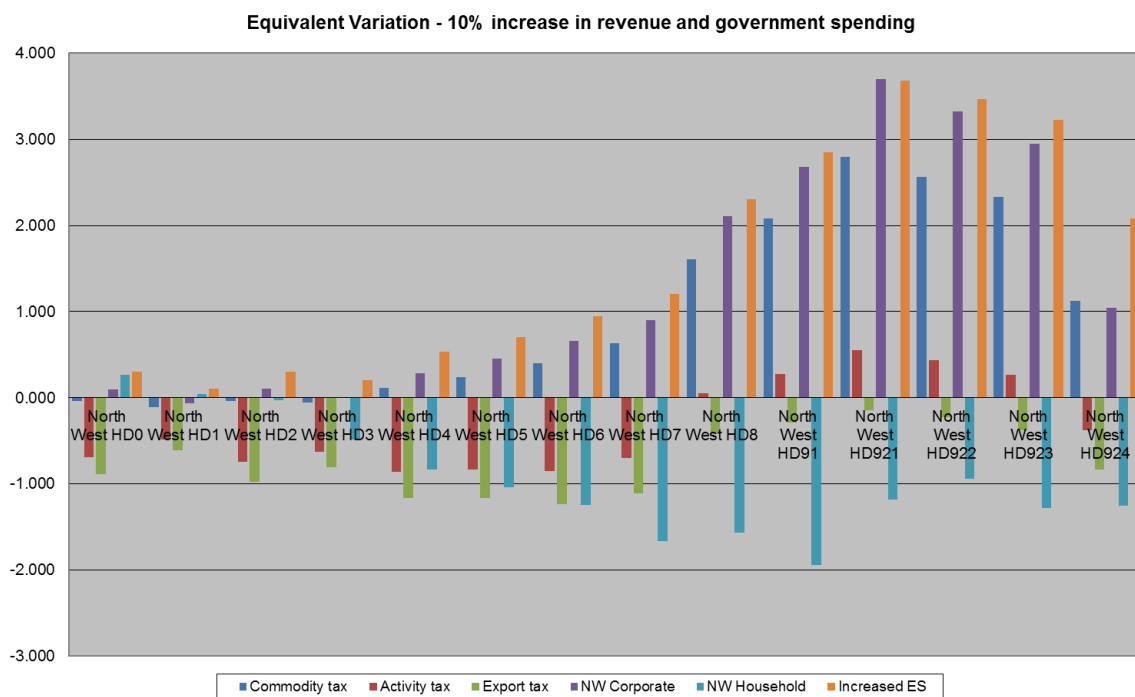
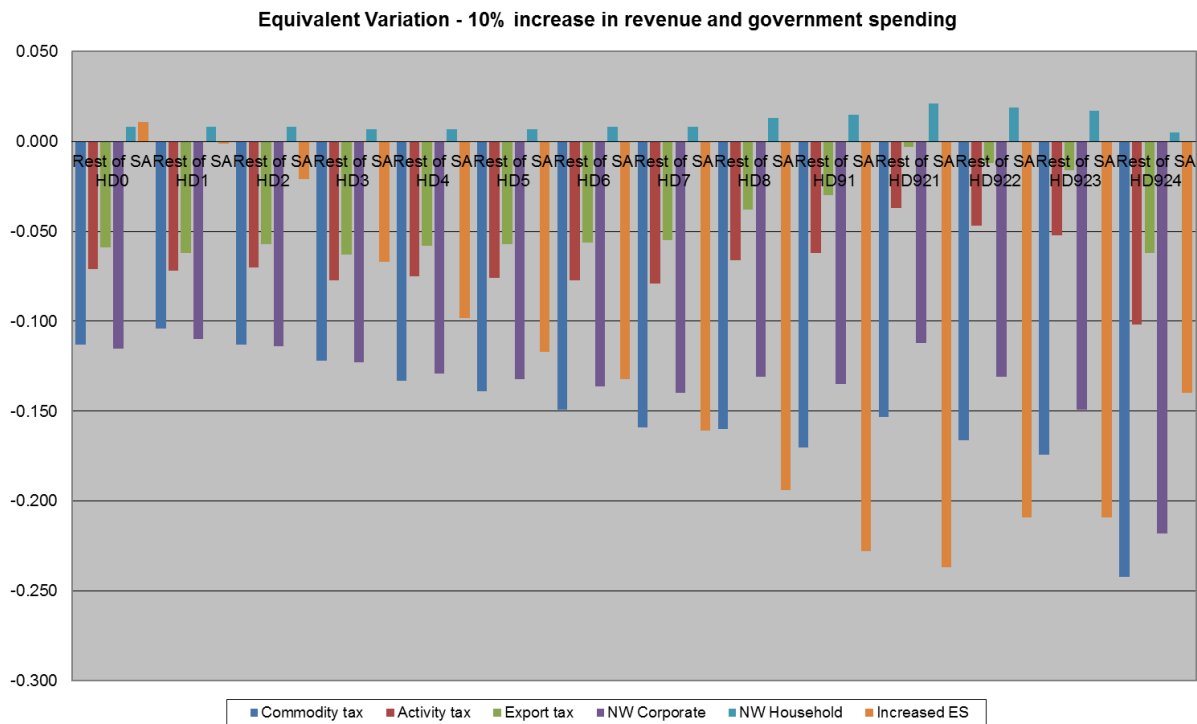


Figure 12 The welfare impact rest of South Africa households following a 10 percent increase in revenue with additional investment – short run



### Impact on Government Accounts

The taxes imposed directly impacts government revenue, however the loss in economic activity will also indirectly affect revenue. The net revenue of government increase in all the scenarios even though collection from other tax sources decline. When a commodity, activity, or export tax is levied institutional taxes will decline as a result of the decline in household income and firm profits. When the additional tax is levied via direct taxes, commodity taxes decline as a result of the decline in consumer spending.

**Table 11 The impact on government balances of the 10 percent increase in revenue scenarios – short run**

Government Accounts							
10% increase in revenue plus increase in investment							
	BASE	Percentage Change from Base					
		Commodity tax	Activity tax	Export tax	NW Corporate	NW Household	Increased ES
Institutional taxes	507.8	-0.1304	-0.1176	-0.0927	0.6791	0.7144	0.7224
Import tariffs	35.1	0.0059	-0.0243	-0.0143	-0.0332	-0.0820	-0.0283
Export taxes	0.0			3.4762			
Activity taxes	55.9	-0.0288	6.3306	-0.0146	0.0018	-0.0056	0.0022
Commodity taxes	326.3	1.2306	-0.0397	-0.0137	-0.0446	-0.0527	-0.0435
Net revenue collected from taxes	925.0	0.0036	0.0031	0.0032	0.0036	0.0037	0.0038
North West Province							
Equitable share	38.7	9.9571	9.9559	9.9783	9.9596	9.9519	9.9605
Own revenue	0.4	0.0000	1.0000	2.0000	3.0000	4.0000	5.0000
Government Savings (net of imposed tax)	13.4	2.2655	1.0211	1.4103	-0.7362	0.7631	1.0601

Government Accounts							
10% increase in revenue plus increase in government spending							
	BASE	Percentage Change from Base					
		Commodity tax	Activity tax	Export tax	NW Corporate	NW Household	Increased ES
Institutional taxes	507.8	-0.0588	-0.0477	-0.0234	0.7588	0.8070	0.7956
Import tariffs	35.1	0.0381	0.0077	0.0175	-0.0010	-0.0509	0.0039
Export taxes	0.0			3.4709			
Activity taxes	55.9	0.0234	6.3723	0.0362	0.0544	0.0462	0.0549
Commodity taxes	326.3	1.2529	-0.0163	0.0099	-0.0216	-0.0297	-0.0204
Net revenue collected from taxes	925.0	0.0041	0.0036	0.0037	0.0041	0.0043	0.0043
North West Province							
Equitable share	38.7	9.9850	9.9843	10.0067	9.9876	9.9798	9.9885
Own revenue	0.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Government Savings (net of imposed tax)	13.4	-2.8023	-3.3934	-2.8020	-5.6717	-3.4333	-4.1476

### Impact of changes in economic conditions

Table 12 shows the impact on the GDP results of the different scenarios when changes in the world prices of exports of mining commodities occur. A 10 percent increase or decrease in the world price of gold and other mining products are imposed, respectively.

- The results show that, when the additional revenue is reinvested, an increase in the world price of mining products outweighs any negative impact from the tax, while a decline in the world price of mining products will in turn outweigh any positive impact from reinvesting the additional revenue.
- When the additional revenue is allocated to government spending, and increase in the world price of exports of mining products will outweigh the negative impact of the taxes imposed except for activity taxes. When activity taxes are used to generate additional revenue and is combined with higher world prices of exports of mining the net impact is now negative. The combined impact of the higher world prices of exports, and a real exchange rate appreciation has a negative impact on all exports. The opposite results are shown when the world price of exports decrease.

Table 12 The real GDP impact of the 10 percent increase in revenue scenarios compared to changes in world prices of the mining commodities – short run

Real GDP at market prices (Percentage change from base)			
	Investment	pwe increase	pwe decrease
Commodity tax	-0.015	0.214	-0.348
Activity tax	-0.009	0.224	-0.347
Export tax	-0.007	0.227	-0.349
NW Corporate	0.010	0.239	-0.325
NW Household	0.005	0.235	-0.330
Increased ES	0.011	0.240	-0.324
Real GDP at market prices (Percentage change from base)			
	Government spending	pwe increase	pwe decrease
Commodity tax	0.045	0.273	-0.287
Activity tax	0.051	-0.286	0.051
Export tax	0.053	0.287	-0.288
NW Corporate	0.070	0.298	-0.264
NW Household	0.065	0.294	-0.269
Increased ES	0.070	0.299	-0.263

### Long run Impact

In the long run it is assumed that investment levels adjust. The impact of the scenarios over the long run is shown in Appendix A. In the long run, all the impact on GDP are lower (more negative or less positive) as investment spending is lower. Now savings are no longer required to increase to keep investment levels constant. The level of investment is therefore in general lower as a result of the taxes imposed.

### Issues not investigated and caveats

The following issues are not investigated in this paper:

- The efficiency of the tax instrument chosen.
- The design of the tax. A simple design was used for the purpose of this paper.
- The suitability of the tax. The export tax is used as an example. The World Trade Organization does not necessarily prohibit export taxes, but does not favour them in general terms.
- This paper does not take into account whether or not the South Africa legal system makes provision for collection of these taxes provincially or locally.

## Conclusions and recommendations

- Commodity based taxes (including an export tax) are distortionary as they raise the price of the mining commodities relative to the other commodities; reduce demand for these and ultimately are negative for growth. The same conclusion applies to activity based taxes.
- The direct taxes on households and corporate firms more neutral; however most of the benefits derived from the additional revenue accrue to industries in the rest of South Africa especially when the additional revenue is invested.
- In almost all cases employment in the North West Province is negatively impacted when additional revenue is invested; it is only when revenue increase from the increase in its equitable share that employment increase. When the additional revenue is spent within the North West Province through higher government spending the employment impact is positive in the North West Province.
- The welfare impact on households is positive in the North West Province only when more neutral instruments such as household and corporate taxes are used.
- The increase in revenue from the additional tax represents 0.4 percent of total tax revenue. However, government revenue increase on average with only a 10<sup>th</sup> of that due to the net decline in economic activity and other tax revenue sources being negatively affected. Changes in consumer prices also has an impact on all transfers (including the equitable share allocation).
- The benefit of increased revenue to the North West Province depends on where and how the revenue was sourced and the incidence of the spending of the additional revenue. Commodity, activity or export based taxes levied within the province may not be beneficial to the province itself. It is better for the province when most of the revenue is sourced elsewhere, such as when its equitable share allocation is increased via a general increase in household taxes. It is also better for the province when the incidence of the spending is within the province; the incidence of the government spending accrues more to the province compared to investment spending. However, if investment spending within the province generates productivity improvements it may be more beneficial to the province compared to government spending.

The recommendations from this study is that the North West Provincial Government should

- (1) Focus on the equitable share allocation to see if there is any possibility of increasing the Province's share.
- (2) Use the environmental levy as a possible additional source of revenue. The environmental levy is a production tax and its imposition is estimated (as in this



study) to have a negative impact on the economy of South Africa and the rest of South Africa. However, the negative impacts may be reduced by the multiplier effect the additional spending generate within the province. The environmental levy should rather be levied at a national level and the pro-rata levy transferred to the North West Province. However, further modelling in this regard may be required to confirm the potential impact of this. The design of such a levy should also be studied.

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## Appendix A – Long run impact

### GDP impact

**Table 13 The impact on Real GDP – a 10 percent increase in revenue – additional revenue is invested**

Real GDP							
10% increase in revenue plus increase in investment							
GDP Components	BASE (R billion)	Percentage Change from Base					
		Commodity tax	Activity tax	Export tax	NW Corporate	NW Household	Increased ES
Private Consumption	2143.215	-0.078	-0.066	-0.063	-0.011	-0.125	-0.131
Gross Fixed Investment	708.357	0.122	0.118	0.114	0.035	0.393	0.444
Change in Inventories	47.117	0.000	0.000	0.000	0.000	0.000	0.000
Government Consumption	715.959	0.000	0.000	0.000	0.000	0.000	0.000
Exports	1094.771	-0.096	-0.032	-0.022	0.002	0.020	0.040
Imports	-1175.091	-0.089	-0.030	-0.021	0.002	0.019	0.037
GDP at Market Prices	3534.328	-0.023	-0.016	-0.015	0.000	0.003	0.009
Net Indirect Taxes	417.615	-0.052	-0.013	0.002	-0.002	-0.019	-0.012
GDP at Factor Cost	3116.713	-0.018	-0.017	-0.017	0.001	0.006	0.012

**Table 14 The impact on Real GDP – a 10 percent increase in revenue – additional revenue channeled to government consumption**

Real GDP							
10% increase in revenue plus increase in government spending							
GDP Components	BASE (R billion)	Percentage Change from Base					
		Commodity tax	Activity tax	Export tax	NW Corporate	NW Household	Increased ES
Private Consumption	2143.215	-0.012	-0.002	0.001	0.055	-0.062	-0.065
Gross Fixed Investment	708.357	-0.279	-0.276	-0.278	-0.367	0.003	0.043
Change in Inventories	47.117	0.000	0.000	0.000	0.000	0.000	0.000
Government Consumption	715.959	0.505	0.505	0.505	0.505	0.505	0.505
Exports	1094.771	-0.114	-0.051	-0.041	-0.017	0.002	0.021
Imports	-1175.091	-0.106	-0.048	-0.039	-0.016	0.002	0.020
GDP at Market Prices	3534.328	0.039	0.046	0.047	0.062	0.066	0.071
Net Indirect Taxes	417.615	-0.040	0.000	0.014	0.011	-0.007	0.000
GDP at Factor Cost	3116.713	0.051	0.052	0.052	0.069	0.075	0.081

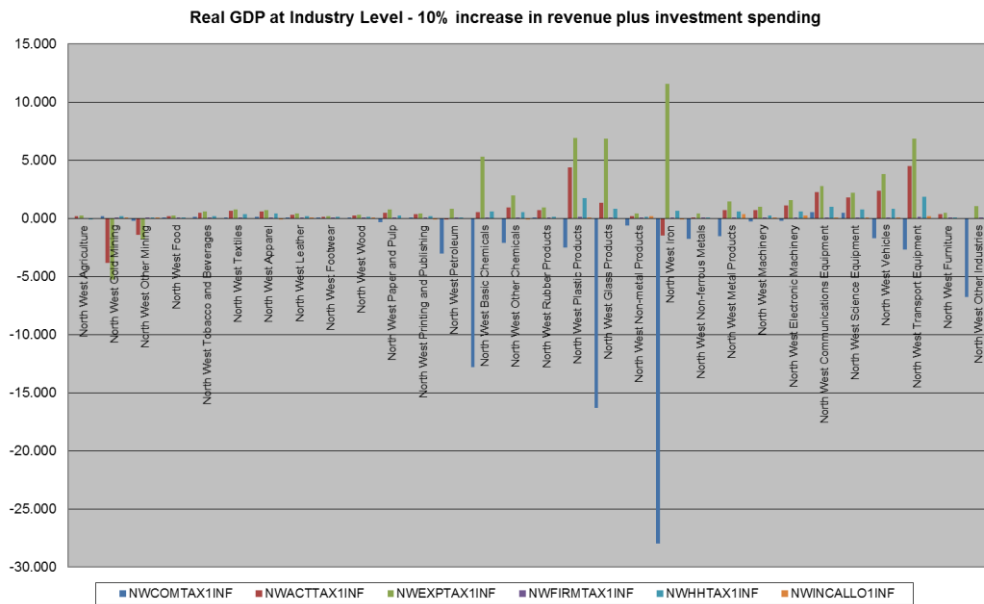
### North West Provincial GDP impact

**Table 15 Real GDP at factor cost for North West Province**

Real GDP at factor cost (Percentage change from base)		
	10% with investment	10% with government consumption
<b>Investment</b>		
Commodity tax	-22.712	105.493
Activity tax	-47.258	80.732
Export tax	-55.276	72.694
NW Corporate	-0.922	127.029
NW Household	-11.114	117.046
Increased ES	0.599	128.539

## GDP impact by industry

**Figure 13** The impact on Real GDP at an industry level in the North West Province – 10 percent increase in revenue – additional revenue is invested



**Figure 14** The impact on Real GDP at an industry level in the rest of South Africa – 10 percent increase in revenue – additional revenue is invested

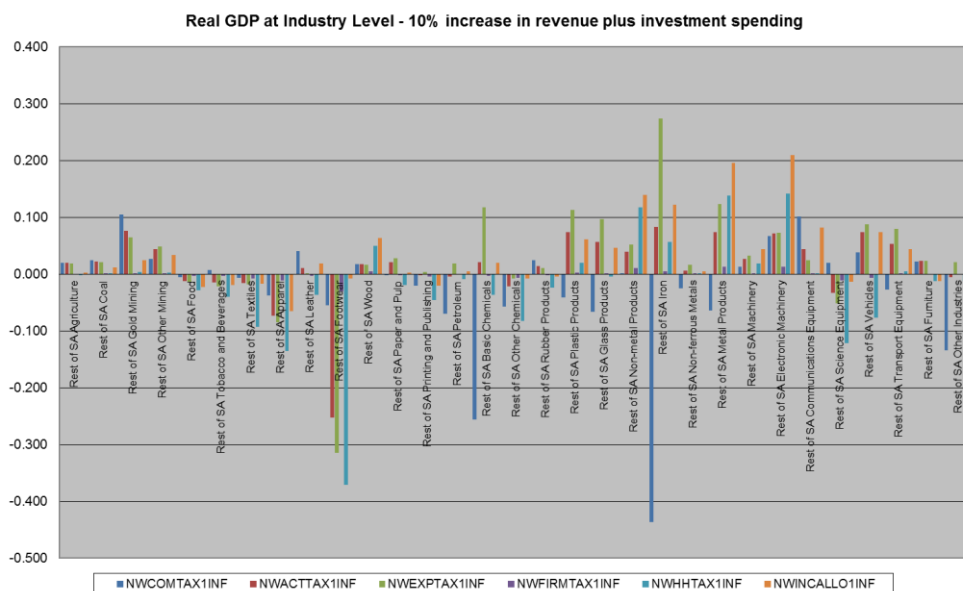


Figure 15 The impact on Real GDP at an industry level in the North West Province – 10 percent increase in revenue – additional revenue is allocated to government consumption

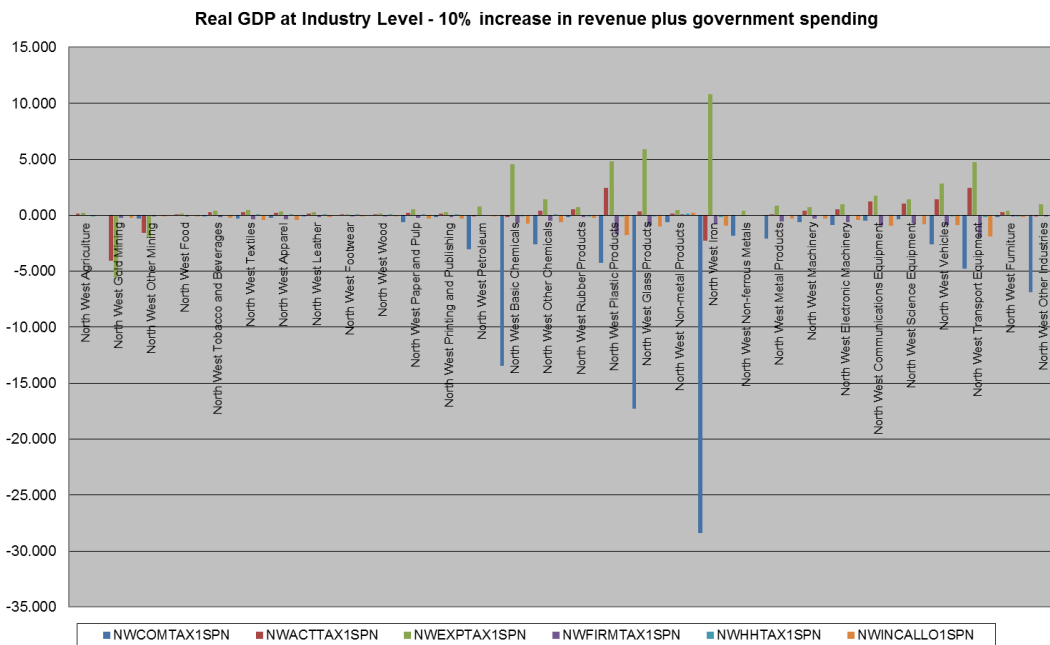
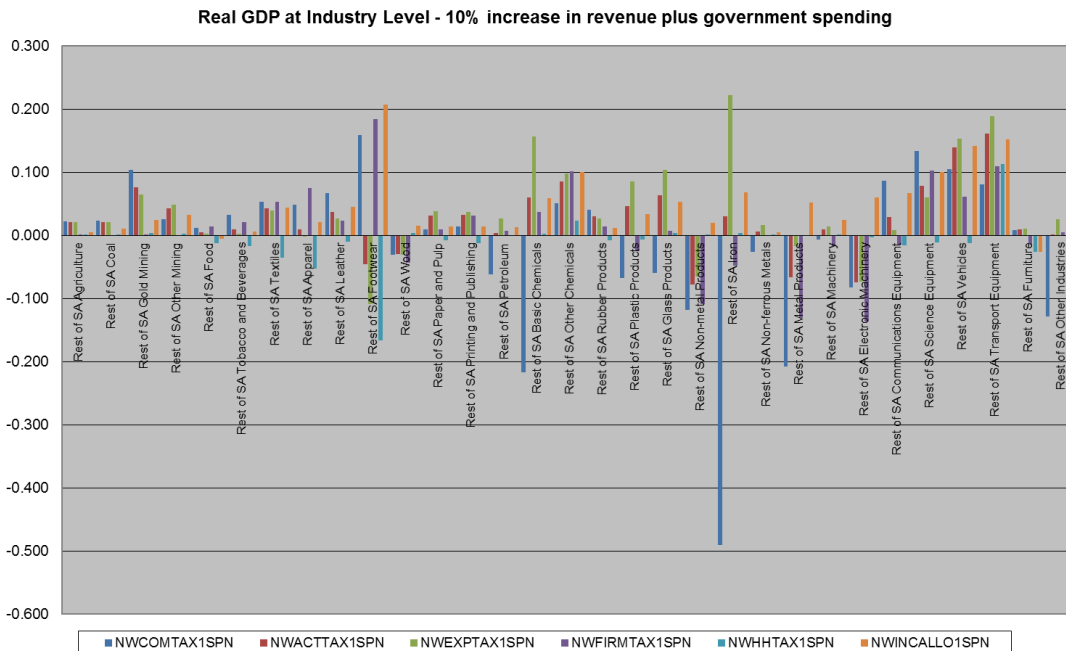


Figure 16 The impact on Real GDP at an industry level in the rest of South Africa – 10 percent increase in revenue – additional revenue is allocated to government consumption



## Employment impact

**Table 16 The employment impact of the 10 percent increase in revenue scenarios**

Employment							
10% increase in revenue plus increase in investment							
Labour Categories	BASE	Percentage Change from Base					
		Commodity tax	Activity tax	Export tax	NW Corporate	NW Household	Increased ES
North West High-skilled	315.677						
North West Semi-skilled	226.447	-0.603	-1.326	-1.556	-0.034	-0.413	0.024
North West Unskilled	96.865	-0.626	-1.554	-1.843	-0.047	-0.585	0.014
North West Informal	208.669	-0.519	-0.563	-0.580	-0.054	-0.655	0.087
Rest of South Africa High-skilled	1664.077						
Rest of South Africa Skilled	4031.219	-0.018	0.045	0.064	0.004	0.050	0.018
Rest of South African Unskilled	3657.386	0.007	0.065	0.083	0.007	0.075	0.039
Rest of South Africa Informal	2107.773	0.009	0.067	0.083	0.012	0.126	0.082

Employment							
10% increase in revenue plus increase in government spending							
Labour Categories	BASE	Percentage Change from Base					
		Commodity tax	Activity tax	Export tax	NW Corporate	NW Household	Increased ES
North West High-skilled	315.677						
North West Semi-skilled	226.447	2.126	1.360	1.118	2.700	2.303	2.760
North West Unskilled	96.865	4.392	3.391	3.081	4.985	4.416	5.049
North West Informal	208.669	-0.049	-0.106	-0.127	0.416	-0.203	0.556
Rest of South Africa High-skilled	1664.077						
Rest of South Africa Skilled	4031.219	-0.066	0.000	0.019	-0.043	0.005	-0.029
Rest of South African Unskilled	3657.386	-0.065	-0.005	0.013	-0.065	0.005	-0.033
Rest of South Africa Informal	2107.773	-0.122	-0.061	-0.044	-0.120	-0.001	-0.049

## Welfare impact

**Figure 17 The welfare impact on North West Province households following a 10 percent increase in revenue with additional investment**

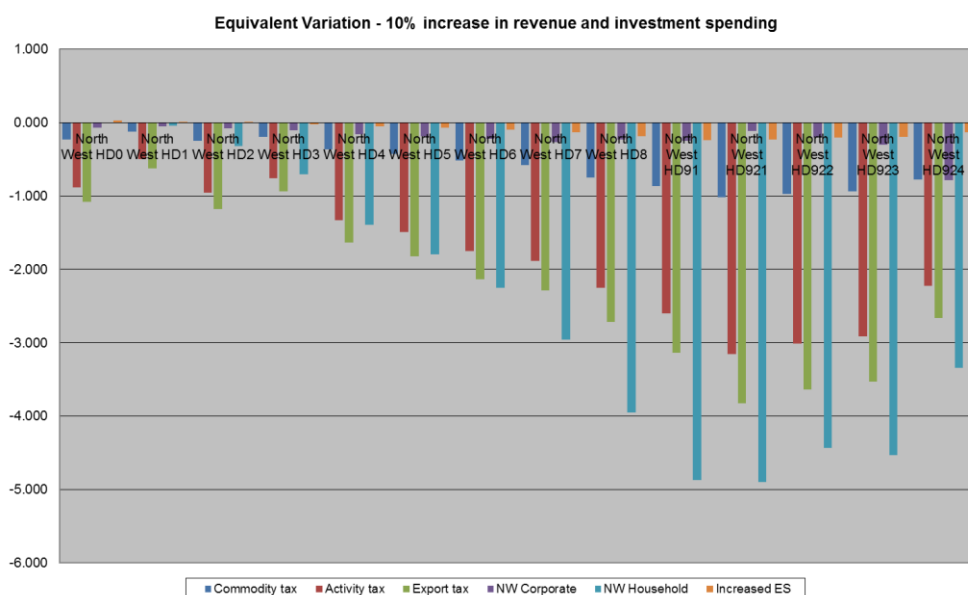
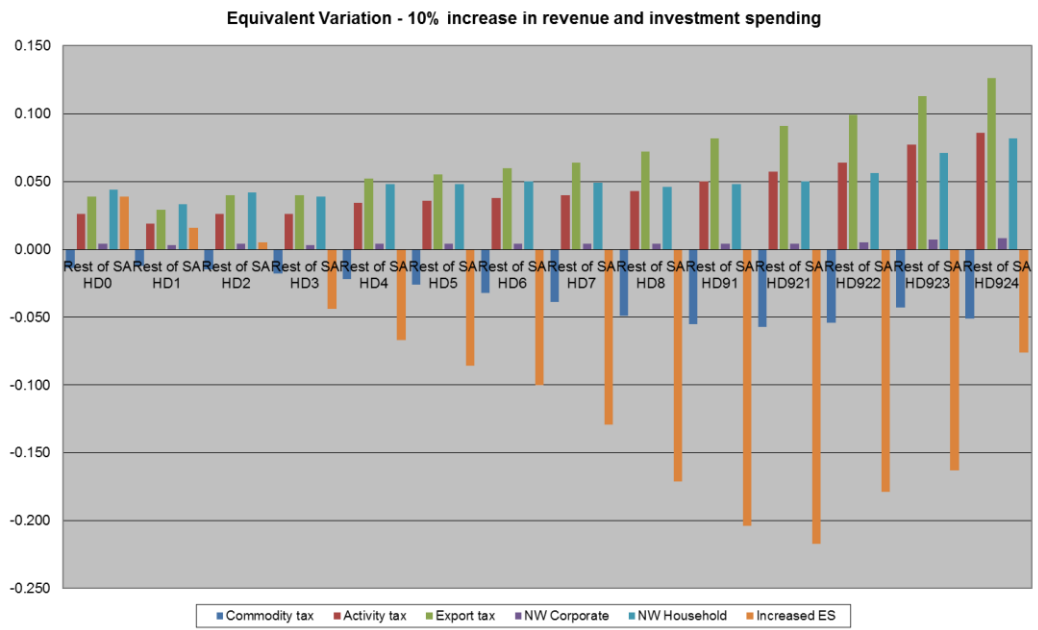
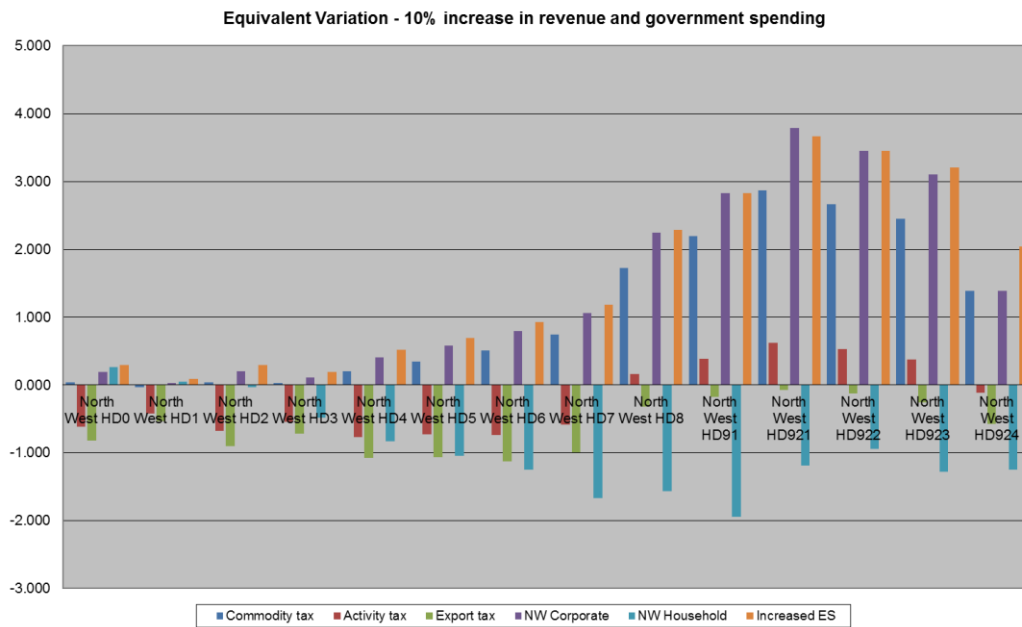


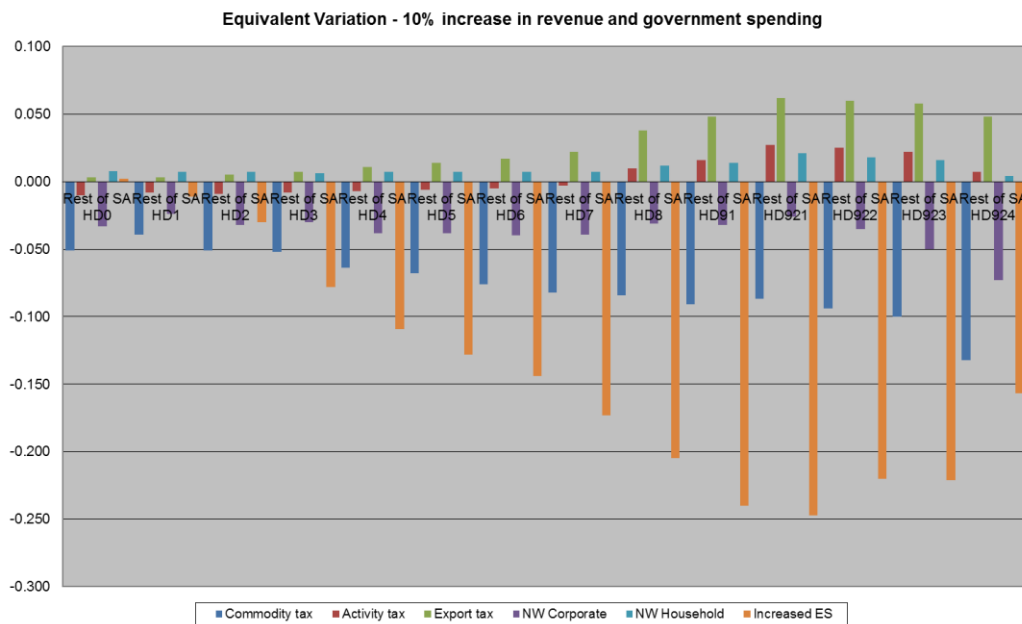
Figure 18 The welfare impact the rest of South African households following a 10 percent increase in revenue with additional investment



**Figure 19 The welfare impact on North West Province households following a 10 percent increase in revenue with additional government spending**



**Figure 20 The welfare impact on the rest of South African households following a 10 percent increase in revenue with additional government spending**



Impact on government accounts



Table 17 The impact on government balances of the 10 percent increase in revenue scenarios

Government Accounts							
10% increase in revenue plus increase in investment							
	BASE	Percentage Change from Base					
		Commodity tax	Activity tax	Export tax	NW Corporate	NW Household	Increased ES
Institutional taxes	507.8	-0.1116	-0.0986	-0.0736	0.7024	0.7203	0.7256
Import tariffs	35.1	0.0282	-0.0018	0.0084	-0.0059	-0.0752	-0.0245
Export taxes	0.0			3.4759			
Activity taxes	55.9	-0.0308	6.3265	-0.0166	-0.0006	-0.0062	0.0019
Commodity taxes	326.3	1.2631	-0.0059	0.0205	-0.0037	-0.0425	-0.0378
Net revenue collected from taxes	925.0	0.0038	0.0033	0.0034	0.0038	0.0038	0.0038
North West Province							
Equitable share	38.7	9.9874	9.9865	10.0092	9.9966	9.9611	9.9656
Own revenue	0.4	0.0000	1.0000	2.0000	3.0000	4.0000	5.0000
Government Savings (net of imposed tax)	13.4	2.5689	1.3433	1.7427	-0.3218	0.8716	1.1178

Government Accounts							
10% increase in revenue plus increase in government spending							
	BASE	Percentage Change from Base					
		Commodity tax	Activity tax	Export tax	NW Corporate	NW Household	Increased ES
Institutional taxes	507.8	-0.0452	-0.0343	-0.0099	0.7769	0.8068	0.7935
Import tariffs	35.1	0.0540	0.0234	0.0333	0.0199	-0.0511	0.0015
Export taxes	0.0			3.4707			
Activity taxes	55.9	0.0219	6.3694	0.0347	0.0525	0.0463	0.0551
Commodity taxes	326.3	1.2760	0.0074	0.0337	0.0098	-0.0300	-0.0241
Net revenue collected from taxes	925.0	0.0043	0.0037	0.0038	0.0043	0.0043	0.0043
North West Province							
Equitable share	38.7	10.0066	10.0056	10.0283	10.0160	9.9795	9.9851
Own revenue	0.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Government Savings (net of imposed tax)	13.4	-2.5801	-3.1623	-2.5644	-5.3450	-3.4362	-4.1857

Table 18 The real GDP impact of the 10 percent increase in revenue scenarios compared to changes in world prices of the mining commodities

Real GDP at market prices (Percentage change from base)			
Investment		pwe increase	pwe decrease
Commodity tax	-0.023	0.254	-0.402
Activity tax	-0.016	0.265	-0.401
Export tax	-0.015	0.268	-0.403
NW Corporate	0.000	0.278	-0.380
NW Household	0.003	0.281	-0.378
Increased ES	0.009	0.287	-0.371

Real GDP at market prices (Percentage change from base)			
Government spending		pwe increase	pwe decrease
Commodity tax	0.039	0.316	-0.339
Activity tax	0.046	-0.338	0.046
Export tax	0.047	0.330	-0.340
NW Corporate	0.062	0.339	-0.317
NW Household	0.066	0.343	-0.314
Increased ES	0.071	0.348	-0.308

Table 19 The real GDP impact of a 10 percent change in revenue with investment compared to a 1 percent increase in productivity

Real GDP at market prices			
GDP Components	BASE (R billion)	Percentage change from base	
		Commodity tax	Commodity tax with productivity
Private Consumption	2143.215	-0.078	-0.018
Gross Fixed Investment	708.357	0.122	0.237
Change in Inventories	47.117	0.000	0.000
Government Consumption	715.959	0.000	0.000
Exports	1094.771	-0.096	-0.018
Imports	-1175.091	-0.089	-0.017
GDP at Market Prices	3534.328	-0.023	0.036
Net Indirect Taxes	417.615	-0.052	0.005
GDP at Factor Cost	3116.713	-0.018	0.042