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PROVIDE PROJECT

The Provincial Decision-making Enabling Project

Working Paper 2006:1

The Impact of Increasing Excise Duties on the Economy

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PROVIDE PROJECT

The Provincial Decision-making Enabling Project

Overview

The Provincial Decision-Making Enabling (PROVIDE) Project aims to facilitate policy design by supplying policymakers with provincial and national level quantitative policy information. The project entails the development of a series of databases (in the format of Social Accounting Matrices) for use in Computable General Equilibrium models.

The National and Provincial Departments of Agriculture are the stakeholders and funders of the PROVIDE Project. The research team is located at Elsenburg in the Western Cape.

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The Impact of Increasing Excise Duties on the Economy[1]

Abstract

Excise duties have increased considerably over the past few years, raising concerns on the effect this may have on the economy. However, these increases are welcomed by those concerned about the costs of externalities associated with excessive alcohol consumption, including productivity loss, foetal alcohol syndrome, liver cirrhosis, traffic accidents, etc. This study contains results on the impact of a 10% increase in excise duties on the South African economy, using a static computable general equilibrium model. The impact on gross domestic product, trade and prices, as well as changes in the factor market and the welfare of households of the Northern and Western Cape (the two major wine producing provinces in the country) are analysed. The results indicate that the majority of households in South Africa will be worse off in terms of real consumption expenditure and all households in the Northern and Western Cape will lose out. In addition, lower income households will lose out most, as they spend a larger share of their budget on beverages and tobacco. However, these results do not capture the benefits from any reduction in negative externalities following the decline in demand due to a price increase in alcoholic beverages, and hence are likely to represent an upper bound of any welfare losses. Additional analyses indicate that the gain in productivity required to offset the negative impact of increasing excise duties is rather small.

[1] The main author of this paper is Sanri Reynolds, Western Cape Project Committee member.

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Table of Contents

Executive Summary ..... **iv**
1. Introduction **1**
2. Social costs of alcohol abuse **1**
3. Increasing excise duties **3**
4. Computable general equilibrium model and data **5**
4.1. CGE model 5
Behavioural relationships 6
Price and quantity relationships 9
4.2. Data (social accounting matrix) 11
5. Policy Analysis **12**
5.1. Policy scenarios 12
5.2. Model closure rules 13
6. Model results **14**
6.1. Macro-economic results and government revenue 15
6.2. Effect on exchange rate and trade 16
6.3. Price effects 17
6.3.1. Beverages and tobacco 17
6.3.2. Selected commodities 18
6.4. Effect on producer prices of output activities and intermediate inputs 19
6.5. Effect on factor markets 24
6.6. Welfare effects 25
6.7. Accounting for productivity related externalities 27
7. Conclusion **28**
8. References **30**
9. Appendices **32**
9.1. Appendix A: SAM accounts 32
9.2. Appendix B: Classification of occupations into skill level categories 35

List of Figures

Figure 1: Excise taxes on wine and ciders (2000 prices): 1998 to 2005 4
Figure 2: Excise taxes on brandy, spirits and liqueur (2000 prices): 1998 to 2005 4
Figure 3: Year-on year increases in real excise duties: 1999 to 2005 5
Figure 4: Price relationships for a standard model with commodity exports 10
Figure 5: Quantity relationships for a standard model 11
Figure 6: Macroeconomic effects 15
Figure 7: Changes in the volume of exports, at a 10% increase in excise taxes on beverages and tobacco 16
Figure 8: Effect on selected prices of beverages and tobacco, at a 10% increase in excise taxes on beverages and tobacco 17
Figure 9: Changes in consumer prices (PQD) of selected commodities, at a 10% increase in excise taxes on beverages and tobacco 19
Figure 10: Changes in producer prices (PX) of selected activities, at a 10% increase in excise taxes on beverages and tobacco 20
Figure 11: Changes in the producer prices (PX) of agricultural output in selected regions, at a 10% increase in excise taxes on beverages and tobacco 21
Figure 12: Changes in the prices of intermediate inputs (PINT) in non-agricultural activities, at a 10% increase in excise taxes on beverages and tobacco 22

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Figure 13: Changes in the real consumption expenditure of households in the Northern and Western Cape, at a 10% increase in excise taxes on beverages and tobacco 26
Figure 14: Changes in real consumption expenditure against per capita expenditure, at 10% increase in excise taxes on beverages and tobacco (LT-neutral)..... 27

List of Tables

Table 1: Relationships for the computable general equilibrium model..... 8
Table 2: Value-added effects (Rand values for 2000), at a 10% increase in excise taxes on beverages and tobacco 23
Table 3: Changes in employment, at a 10% increase in excise taxes on beverages and tobacco 24
Table 4: Changes in factor incomes, at a 10% increase in excise taxes on beverages and tobacco..... 25

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Executive Summary

Excise duties on alcoholic beverages have increased considerably over the past few years. Real excise duties have increased by over 25% for natural and sparkling wine and by more than 10% for fortified wine, brandy and spirits and liqueur, from 2003 to 2004. These large increases raise concerns on the effect of such increases on the wine and beer industries, the broader economy and particularly employment and the welfare of households. However, these increases are also likely to reduce demand for alcoholic products and may change preferences over the longer term, which may have positive impacts on households and the economy, considering the negative externalities associated with excessive alcohol consumption. It should be noted that the model does not take account of externalities resulting from excessive alcohol consumption and therefore does not capture the benefits of reducing demand for alcoholic products. For this reason the results are likely to be an upper bound of the overall socio-economic impacts.

The analyses were conducted using a computable general equilibrium model calibrated with a social accounting matrix (SAM) and the effects on gross domestic product (GDP), trade, consumer and producer prices of selected commodity groups, employment, wages and the welfare of households were investigated. Results relating to employment, wages and households focus on the Northern and Western Cape, the two major wine producing provinces in the country. The SAM is a 209 account aggregation of the PROVIDE SAM for South Africa in 2000, with alcoholic beverages included in the account "beverages and tobacco". Increasing the excise duties on beverages and tobacco is not unrealistic as excise taxes on tobacco products have also increased considerably over the past few years.

Increasing excise duties on beverages and tobacco by 10% results in a 1.9% increase in the consumer prices of these commodities, leading to quantities demanded falling by 0.94%. An increase in the producer price of beverages and tobacco leads to a decline in supply and hence a decline in derived demand for intermediate inputs. This puts downward pressure on the prices of wine grapes, sugar products and winter cereals. The impacts on the prices of other agricultural commodities are mixed; the prices of deciduous fruit and potatoes and vegetables will increase (due to higher production prices), while the prices of livestock will decrease.

GDP declines by 0.01% with a welfare loss of over R300 million in terms of real household consumption expenditure. All households lose out, with the exception of eight, mostly white representative households, which gain marginally. All households in the Northern and Western Cape are worse off, with the lower income households most severely affected. Overall the results indicate that increasing excise duties has a regressive impact on

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the real consumption expenditure of households; this is expected as lower income households spend a larger proportion of their total budget on beverages and tobacco.

The most serious concern of raising excise duties is the resultant number of job losses. Increasing excise duties by 10% will result in almost 7 500 job losses, of which 359 and 2 048 are in the Northern and Western Cape respectively. These job losses will occur mainly in the agricultural sectors.

But lowering alcohol consumption may increase efficiency by reducing accidents at work, absenteeism, etc.; hence additional analyses were conducted to estimate the increase in productivity required to offset the negative impact of increasing excise taxes on the economy. The results showed that an increase of 0.06% in productivity will counteract the negative impact on the economy, offsetting almost half the number of job losses. This 0.06% increase is not too high a target as it represents only 1.7% of the average annual growth in labour productivity over the past ten years. However, this issue clearly deserves further research.

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1. Introduction

Excise duties on alcoholic beverages have increased considerably over the past few years, raising concerns on the effect of such increases on the beer and wine industries, the broader economy and particularly employment and the welfare of households in the Northern and Western Cape, the two major wine producing provinces in the country. On the other hand, there are concerns on excessive alcohol consumption, particularly in the rural areas of the Northern and Western Cape, and the negative externalities associated with alcohol abuse.

This study aims to provide some answers on the socio-economic impact of increasing excise duties, using a static computable general equilibrium model calibrated with a social accounting matrix. However, the model does not take account of externalities resulting from excessive alcohol consumption and therefore does not capture the benefits of reducing demand for alcohol products. For this reason the results should be interpreted with caution as it reflects an upper bound of the overall socio-economic impacts.

This study is structured as follows: Section 2 briefly discusses the argument for higher excise duties by referring to the social costs involved with alcohol abuse which is not taken into account by the model. Section 3 presents graphs showing the increases in real excise duties. Section 4 discusses the computable general equilibrium model and social accounting matrix used for the modelling. This is followed by a discussion on the policy simulations and the closure rules used. Section 6 presents the results of the tax rate simulations and include the effect of higher excise duties on the macro-economy, trade, prices, employment, wages and the welfare of households. Results relating to the factor market and households focus on the Northern and Western Cape, the two major wine producing provinces in the country. Section 6 ends investigating the increase in productivity required to offset the negative impact of increasing excise taxes on the economy. Section 8 contains some concluding remarks.

2. Social costs of alcohol abuse

Historically excise duties were levied primarily to generate government revenue as it was a fairly easy source of revenue, but in recent years awareness of the (negative) externalities[2] associated with alcohol abuse has increased, shifting the argument for excise duties to curbing consumption. Numerous studies have been conducted (see for example Van As, 2004 and Parry *et al.*, 2003) making a case for higher excise taxes, considering the social costs associated with alcohol abuse. Excessive alcohol consumption is commonly associated with

[2] Externalities occur when the actions of an individual directly affect the well-being of another individual and the costs of such externalities are borne by the third party. The social (total) cost then equals private costs plus (negative) externalities.

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national transport-related deaths, traumatic injuries resulting from violence or traffic–related incidents and crime (Parry *et al.*, 2003). For example, an estimated 48% of national transport-related deaths in 2000 had blood alcohol concentrations greater than or equal to the legal limit for driving (Burrows *et al.*, 2000, as in Parry *et al.*, 2003). Alcohol abuse is also associated with liver cirrhosis, cardiovascular diseases, cancers and foetal alcohol syndrome (FAS)[3]. Consequently there are strong reasons to believe that a reduction in the level of alcohol abuse would reduce both the direct (e.g. personal heath) and indirect (e.g. road-traffic accidents) costs associated with alcohol abuse. To the extent that increased (excise) taxes on alcohol contribute to such a reduction it is difficult to argue against them. However it is important, but difficult, to distinguish between any reductions in consumption that are caused by (real) price increases and that are driven by preference changes caused by education programmes that may or may not be reinforced by price changes. Typically however it is likely that preference changes are likely to take longer to emerge.

One source of direct costs from alcohol abuse is likely to be reductions in economic efficiency. These are likely to be manifested as increases in absence from work and work related accidents and a general decline in productive efficiency. No primary research has been conducted in South Africa to determine the cost of alcohol abuse associated with lost productivity, but according to Parry (1997) the best estimate of the cost of alcohol misuse in South Africa is 2% of gross national product (GNP), based on research in other countries. Assuming that lost productive efficiency accounts for approximately 55% of total costs associated with alcohol abuse, which was the estimate by Single *et al.* (1998), the direct productive cost of alcohol abuse would equal some 1.1% of GNP in South Africa. Consequently if increased excise taxes induce a reduction in alcohol abuse it is reasonable to expect some, albeit small, increase in productive efficiency.

In the context of a CGE model the consumer does not take the social costs associated with the above mentioned consequences (of alcohol abuse) into account and therefore the price the consumer is willing to pay does not reflect the total costs; the failure of the consumer to take into account all costs results in a market failure and therefore provides a possible case for government intervention. Taxes are a tool through which government can attempt to determine the price where the marginal social cost equals the marginal social benefit of consumption (condition for economic efficiency). Typically a CGE model will only take account of how consumers react to changes in (relative) prices with unchanging preferences; thus a CGE model will only seek to capture the (short term) response to price changes and not the (longer term) changes in preferences.

[3] The poorer areas in the Western Cape have among the highest incidence of FAS in the world, with over 7.5% of children in socially-economic disadvantaged communities affected (Department of Health, 2001).

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Though the aim of this paper is to determine the economic costs of increasing excise duties, the model used does not capture the externalities associated with excessive alcohol consumption. As the argument presented above suggests these externalities may be substantial and consequently it is desirable to provide some insight into the potential significance of these externalities. Accordingly the model is also estimated in such a way as to provide an estimate of the change in efficiency needed to maintain the original level of 'welfare' after the increase in excise taxes.

3. Increasing excise duties

Excise duties are levied on a specific basis and the amount depends on the alcohol content of the beverage, with high-alcohol products being taxed more heavily than low-alcohol products. Figures 1 and 2 show the increase in real excise duties on different alcoholic beverages. Wine and ciders are taxed per litre, while high-alcohol beverages like brandy, spirits and liqueur are taxed per litre absolute alcohol (LAA). In per litre terms sparkling wine was the highest taxed in 2005 at just over R3.00 per litre, followed by fortified wine (R2.06/litre), ciders (R1.32/litre) and natural wine (R1.10/litre).[4] Figure 2 shows that spirits and liqueur are taxed at a higher rate than brandy, R39.40/LAA and R38.64/LAA respectively.[5]

[4] In current prices, excise duties on sparkling wine, fortified wine, ciders and natural wine are R3.88, R2.63, R1.68 and R1.41 per litre respectively.

[5] In current prices, spirits and liqueur are taxed at R50.42/LAA and brandy at R49.46/LAA.

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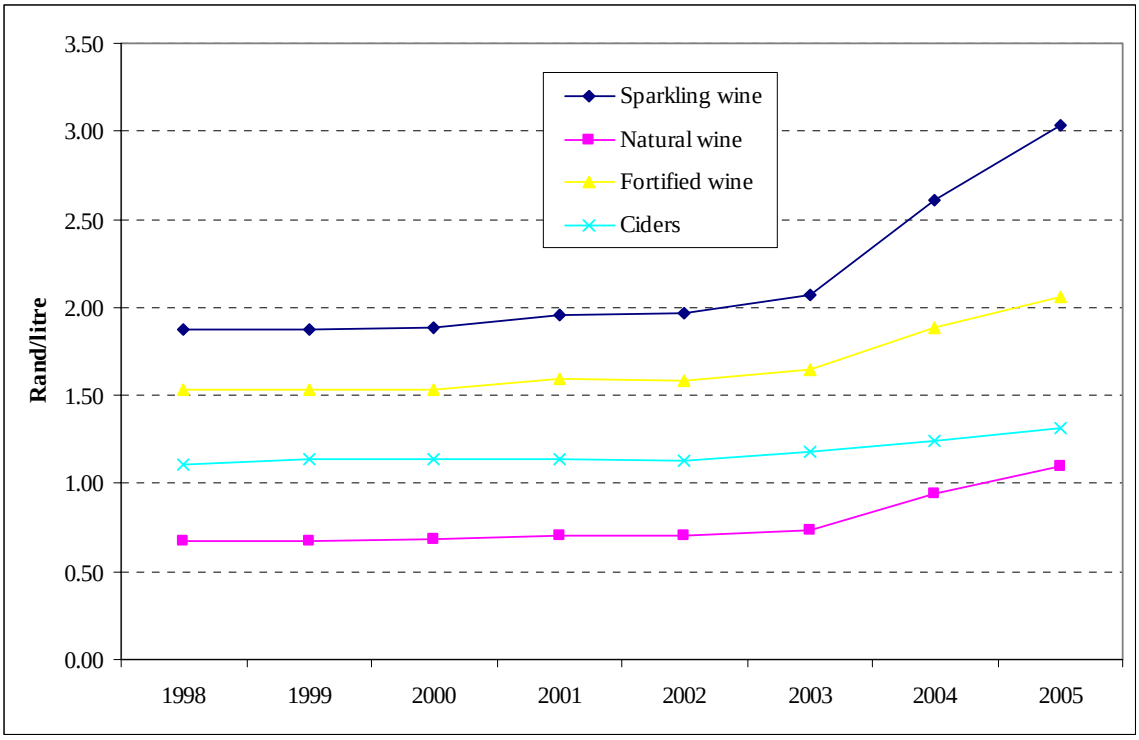
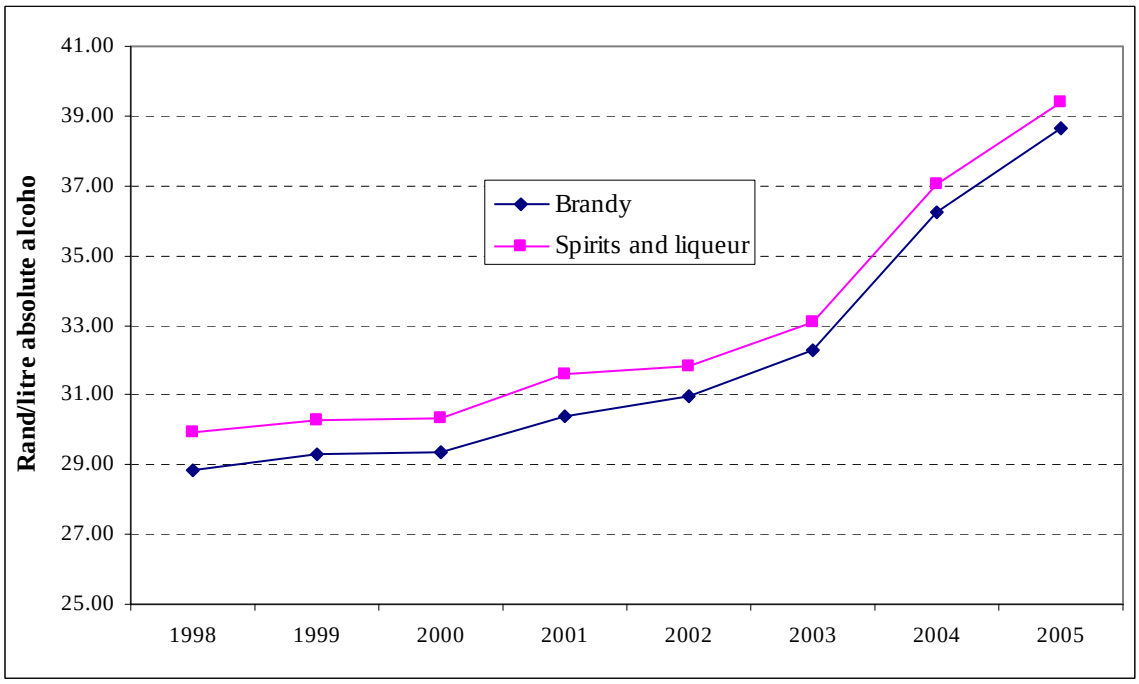
Figure 1: Excise taxes on wine and ciders (2000 prices): 1998 to 2005



Source: SAWIS, 2005
*The CPI for metropolitan areas was used to deflate excise duties from 1998 to 2004.

Figure 2: Excise taxes on brandy, spirits and liqueur (2000 prices): 1998 to 2005



Source: SAWIS, 2005
*The CPI for metropolitan areas was used to deflate excise duties from 1998 to 2004.

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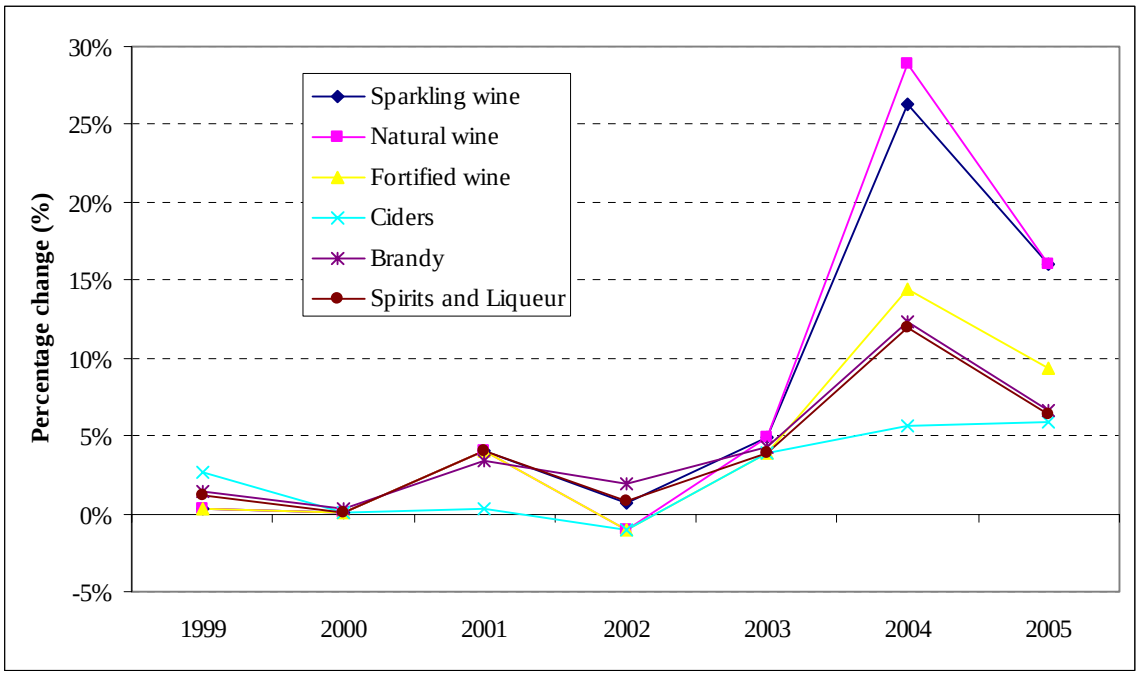
Figure 3 shows that, in 2004, excise duties on sparkling and natural wine increased year-on-year by over 25% and on fortified wine, brandy, spirits and liqueur by over 10%. The estimates' increases in 2005 are not as large, but nevertheless, excise duties on sparkling and natural wine are estimated to increase by 16%, and excise duties on fortified wine, brandy, spirits and liqueur are estimated to increase between 5% and 10%.

Figure 3: Year-on year increases in real excise duties: 1999 to 2005



4. Computable general equilibrium model and data

4.1. CGE model

The computable general equilibrium (CGE) model (see PROVIDE, 2005b) is a member of the class of single country computable general equilibrium (CGE) models that are descendants of the approach to CGE modelling described by Dervis *et al*., (1982). More specifically, the implementation of this model, using the GAMS (General Algebraic Modelling System) software, is a direct descendant and development of models devised in the late 1980s and early 1990s, particularly those models reported by Robinson *et al*., (1990), Kilkenny (1991) and Devarajan *et al*., (1994). The model is a SAM based CGE model, wherein the SAM serves to identify the agents in the economy and provides the database with which the model is calibrated. The SAM also serves an important organisational role since the groups of agents identified by the SAM structure are also used to define sub-matrices of the SAM for which behavioural relationships need to be defined. As such the modelling approach has been influenced by Pyatt's 'SAM Approach to Modelling' (Pyatt, 1988).

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The description of the model here is necessarily brief and proceeds in two stages. The first stage is the identification of the behavioural relationships; these are defined by reference to the sub matrices of the SAM within which the associated transactions are recorded. The second stage uses a pair of figures to explain the nature of the price and quantity systems for commodity and activity accounts that are embodied within the model.

Behavioural relationships

While the accounts of the SAM determine the agents that can be included within the model, and the transactions recorded in the SAM identify the transactions that took place, the model is defined by the behavioural relationships. The behavioural relationships in this model are a mix of non-linear and linear relationships that govern how the model's agents will respond to exogenously determined changes in the model's parameters and/or variables. Table 1 summarises the model relationships by reference to the sub matrices of the SAM.

Households are assumed to choose the bundles of commodities they consume so as to maximise utility where the utility function is a Stone-Geary function that allows for subsistence consumption expenditures, which is an arguably realistic assumption when there are substantial numbers of very poor consumers. The households choose their consumption bundles from a set of 'composite' commodities that are aggregates of domestically produced and imported commodities. These 'composite' commodities are formed as Constant Elasticity of Substitution (CES) aggregates that embody the presumption that domestically produced and imported commodities are imperfect substitutes. The optimal ratios of imported and domestic commodities are determined by the relative prices of the imported and domestic commodities. This is the so-called Armington assumption (Armington, 1969), which allows for product differentiation via the assumption of imperfect substitution (see Devarajan *et al*., 1994). The assumption has the advantage of rendering the model practical by avoiding the extreme specialisation and price fluctuations associated with other trade assumptions. In this model South Africa is assumed to be a price taker for all imported commodities.

Domestic production uses a two-stage production process. In the first stage aggregate intermediate and aggregate primary inputs are combined using CES technology. Hence aggregate intermediate and primary input demands vary with the relative prices of aggregate intermediate and primary inputs. At the second stage intermediate inputs are used in fixed proportions relative to the aggregate intermediate input used by each activity. The 'residual' prices per unit of output after paying for intermediate inputs, the so-called value added prices, are the amounts available for the payment of primary inputs. Primary inputs are combined to form aggregate value added using CES technologies, with the optimal ratios of primary inputs being determined by relative factor prices. The activities are defined as multi-product activities with the assumption that the proportionate combinations of commodity outputs

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produced by each activity/industry remain constant; hence for any given vector of commodities demanded there is a unique vector of activity outputs that must be produced. The vector of commodities demanded is determined by the domestic demand for domestically produced commodities and export demand for domestically produced commodities. Using the assumption of imperfect transformation between domestic demand and export demand, in the form of a Constant Elasticity of Transformation (CET) function, the optimal distribution of domestically produced commodities between the domestic and export markets is determined by the relative prices on the alternative markets. The model can be specified as a small country, i.e., price taker, on all export markets, or selected export commodities can be deemed to face downward sloping export demand functions, i.e., a large country assumption. The other behavioural relationships in the model are generally linear.

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Table 1: Relationships for the computable general equilibrium model

	Commodities	Activities	Factors	Households	Enterprises	Government	Capital	RoW	Total	Prices
Commodities	0	Leontief Input-Output Coefficients	0	Utility Functions (Stone-Geary or CD)	Fixed in Real Terms	Fixed in Real Terms and Export Taxes	Fixed Shares of Savings	Commodity Exports (CET)	Commodity Demand	Consumer Commodity Price Prices for Exports
Activities	Domestic Production	0	0	0	0	0	0	0	Constant Elasticity of Substitution Production Functions	
Factors	0	Factor Demands (CES)	0	0	0	0	0	Factor Income from RoW	Factor Income	
Households	0	0	Fixed Shares of Factor Income	Fixed (Real) Transfers	Fixed (Real) Transfers	Fixed (Real) Transfers	0	Remittances	Household Income	
Enterprises	0	0	Fixed Shares of Factor Income	0	0	Fixed (Real) Transfers	0	Transfers	Enterprise Income	
Government	Tariff Revenue Export Taxes Commodity Taxes	Indirect Taxes on Activities Factor Use Taxes	Factor Income Taxes Fixed Shares of Factor Income	Direct Taxes on Household Income	Direct Taxes on Enterprise Income	0	0	Transfers	Government Income	
Capital	0	0	Depreciation	Household Savings	Enterprise Savings	Government Savings (Residual)	0	Current Account 'Deficit'	Total Savings	
Rest of World	Commodity Imports	0	Fixed Shares of Factor Income	0	0	0	0	0	Total 'Expenditure' Abroad	
Total	Commodity Supply (Armington CES)	Activity Input	Factor Expenditure	Household Expenditure	Enterprise Expenditure	Government Expenditure	Total Investment	Total 'Income' from Abroad		
	Producer Commodity Prices Domestic and World Prices for Imports	Value Added Prices								

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The model is set up with a range of flexible closure rules. The specific choices about closure rules used in this study are defined in the Policy Analysis section below.

Price and quantity relationships

Figure 4 and 5 provide an overview of the interrelationships between the prices and quantities. The supply prices of the composite commodities (PQS_c) are defined as the weighted averages of the domestically produced commodities that are consumed domestically (PD_c) and the domestic prices of imported commodities (PM_c), which are defined as the products of the world prices of commodities (PWM_c) and the exchange rate (ER) uplifted by *ad valorem* import duties (tm_c). These weights are updated in the model through first order conditions for optima. The supply prices exclude sales, excise and fuel taxes, and hence must be uplifted by (*ad valorem*) sales taxes (ts_c), excise taxes (tex_c) and fuel taxes ($tfue_c$) to reflect the composite consumer price (PQD_c). The producer prices of commodities (PXC_c) are similarly defined as the weighted averages of the prices received for domestically produced commodities sold on domestic and export (PE_c) markets; the weights are updated in the model through first order conditions for optima. The prices received on the export market are defined as the products of the world price of exports (PWE_c) and the exchange rate (ER) less any exports duties due, which are defined by *ad valorem* export duty rates (te_c).

The average price per unit of output received by an activity (PX_a) is defined as the weighted average of the domestic producer prices, where the weights are constant. After paying indirect/production/output taxes (tx_a), this is divided between payments to aggregate value added (PVA_a), i.e., the amount available to pay primary inputs, and aggregate intermediate inputs ($PINT_a$). The factor prices paid by activities ($WF_{f,a}$) constitute the components of value added, while total payments for intermediate inputs per unit of aggregate intermediate input are defined as the weighted sums of the prices of the inputs (PQD_c).

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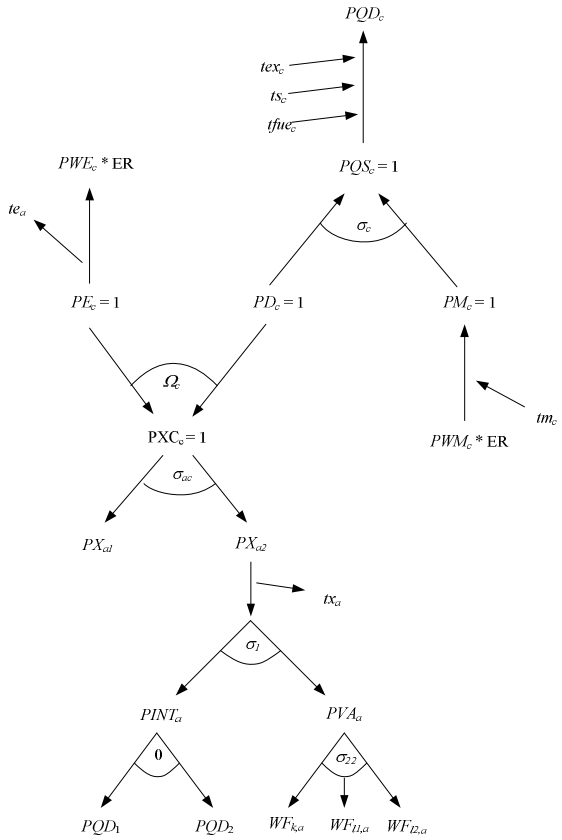
Figure 4: Price relationships for a standard model with commodity exports



Total demands for the composite commodities, QQ_c, consist of demands for intermediate inputs, $QINTD_c$, consumption by households, QCD_c, enterprises, $QENTD_c$, and government, QGD_c, gross fixed capital formation, $QINVD_c$, and stock changes, $dstocconst_c$. Supplies from domestic producers, QD_c, plus imports, QM_c, meet these demands; equilibrium conditions ensure that the total supplies and demands for all composite commodities equate. Commodities are delivered to both the domestic and export, QE_c, markets subject to equilibrium conditions that require all domestic commodity production, QXC_c, to be either domestically consumed or exported.

The multi-product activities are modelled using the assumption that commodities are differentiated by (source) activity but that activities produced outputs in fixed proportions.[6] Hence the domestic production of a commodity (QXC_c) is a CES aggregate of the quantities of that commodity produced by a number of different activities ($QXAC_{a,c}$), which are produced by each activity in activity specific fixed proportions, i.e., the output of $QXAC_{a,c}$ is a Leontief (fixed proportions) aggregate of the output of each activity (QX_a).

[6] The model allows for the imposition of the alternative assumption that the 'same' commodities produced by different activities are homogenous.

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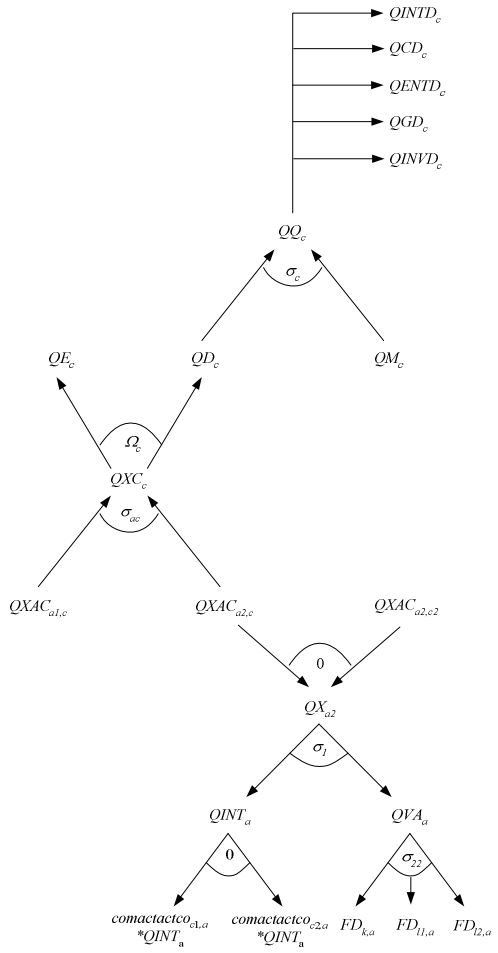
Figure 5: Quantity relationships for a standard model



Production relationships by activities are defined by a series of nested Constant Elasticity of Substitution (CES) production functions. The nesting structure is illustrated in the lower part of Figure 5, where, for illustr ation purposes only, two intermediate inputs and three primary inputs ($FD_{k,a}$, $FD_{l1,a}$ and $FD_{l2,a}$) are identified. Activity output is a CES aggregate of the quantities of aggregate intermediate inputs ($QINT_a$) and value added (QVA_a), while aggregate intermediate inputs are a Leontief aggregate of the (individual) intermediate inputs and aggregate value added is a CES aggregate of the quantities of primary inputs demanded by each activity ($FD_{f,a}$). The allocation of the finite supplies of factors (FS_f) between competing activities depends upon relative factor prices via first order conditions for optima. While the base model contains the assumption that all factors are fully employed and mobile this assumption can be relaxed.

4.2. Data (social accounting matrix)

The benchmark data are arranged in the form of a social accounting matrix (SAM), which is a system of accounts recording all transactions between agents in the economy. The SAM used for this paper is a 209 account aggregation of the PROVIDE SAM for South Africa in 2000

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(See PROVIDE 2005a for a full description of the South Africa SAM database), with special attention given to accounts relating to the Northern and Western Cape. The SAM has 15 agricultural commodities, 17 non-agricultural commodities, 24 agricultural activities, 18 non-agricultural activities, 61 factors (including capital (Gross Operating Surplus), 9 land and 51 labour factors) and 54 households. There are also accounts for enterprises, government, capital, stock changes and the rest of the world. A full listing of the accounts is provided in Appendix A.

The treatment of activities, specifically agricultural activities, is of importance in the SAM. The SAM uses a supply and use structure that allows for the possibility that activities can produce multiple products, which is the case for all activities in this SAM. In other words, each agricultural activity can produce a range of commodities, which is consistent with the fact that farms are typically multi-product firms. Agricultural activities are distinguished by province, except for the Northern and Western Cape where agricultural activities are disaggregated according to magisterial districts. Both factors and households are disaggregated according to provinces. In addition, factors are distinguished according to race and the level of skills; and households are distinguished according to race, level of education and whether the household resides in one of the former homelands.

Alcoholic beverages do not have its own account in the SAM, but are included in the "beverages and tobacco" account. Alcoholic beverages account for approximately 50% of excise duties paid by this account.

5. Policy Analysis

5.1. Policy scenarios

Since alcoholic beverages are included in the "beverages and tobacco" account, excise duties are increased on both, beverages and tobacco. Increasing excise taxes on both beverages and tobacco is not unrealistic, considering that the tobacco industry has also experienced large real increases in excise duties levied on cigarettes, cigarette tobacco, pipe tobacco and cigars in the past few years. However, the impact may be over estimated since beverages include alcoholic and non-alcoholic beverages.

Excise duties are modelled as *ad valorem* taxes, despite the fact that they are specific taxes in practice; however, it is believed that the relative changes are close approximations of what they would have been with *ad valorem* taxes. In the light of recent increases in excise duties

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on alcoholic beverages (see Figure 3), excise duties on beverages and tobacco are increased by 5 percentage increments, up to 30%[7].

5.2. Model closure rules

The model closure rules were selected with the objective of providing a realistic representation of the South African economy.

The *foreign exchange market* is assumed to clear via a flexible exchange rate and therefore the external balance (or current account balance) remains fixed. Since South Africa is a small country, it is a price taker on international markets, i.e. all prices of imported and exported goods are fixed in foreign units.

The *capital account*, which records all savings and investment related transactions, is closed by assuming that the share of investment expenditure in total final domestic demand remains constant. This allows for some variation in the volume of investment due to changes in the prices of investment goods and from any change in the total value of domestic absorption. The equilibrating variables are the savings rates of all households and incorporated business enterprises. These rates are allowed to vary equi-proportionately, which ensures that savings equal investments in the economy.

The *factor market* closure involves different treatments for different factors. Labour is divided into 'semi- and unskilled' and skilled labour for all racial groups; based on the occupation of workers[8]. The supply of semi- and unskilled African, Asian and Coloured labour is assumed to be perfectly elastic, based on the assumption that there is excess capacity (unemployment) of this labour in the economy. Activities can increase employment of these workers provided they are willing to pay the constant wage. Semi- and unskilled White labour and skilled labour of all racial groups are assumed fixed, fully employed and mobile.

The assumptions for physical capital distinguish between a short-run and a long-run approach. Over the short term, physical capital is assumed fixed, fully employed and immobile, meaning that the quantity of capital used by each activity is fixed; forcing industry-specific returns to capital to adjust. Over the long term however, physical capital is mobile across sectors (activities) in the economy, leading to another round of adjustments in employment.

Three different closures are explored for the *government account*:

[7] Reduction of up to 20 percent, in 5 percentage increments, were also investigated to identify any anomalous results.

[8] See Appendix B for classification of occupations into skill level categories.

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- "Inert": An "inert" policy response is assumed – tax rates and government consumption quantities are left unchanged, leaving government savings (the fiscal deficit) to vary to reach fiscal balance.

- "Neutral": Government consumption (as a share of final demand) and savings are held fixed while income tax rates on enterprises and households are flexible. The objective of this closure is to ensure fiscal neutrality (assuring that the welfare of future generations is not compromised for the sake of the current generation's welfare) and distributional neutrality (distributing losses and gains proportionally between government and other agents in the economy).

- "Stax": This closure rule is in essence also a neutral approach by government, but in this incidence the sales tax rates on commodities are allowed to vary equi-proportionately.

Finally, the CPI is fixed to provide the model *numéraire*, i.e., price changes are not absolute changes but have to be interpreted relative to the CPI.

In summary, six different closures were investigated for each tax rate change:

- "ST-inert" and "LT-inert";

- "ST-Stax" and "LT-Stax";

- "ST-neutral" and "LT-neutral".

6. Model results

This section is a discussion of the model results. It starts by looking at the macroeconomic results, followed by the effect on the exchange rate and trade. The direct price effects of increasing excise taxes are then discussed in section 6.3, where after the price changes are traced through the price formation system to the impact on the labour market. The impacts on the welfare of households are presented in section 6.6. Section 6 concludes by investigating the required increase in productivity to offset the negative impact in the economy.

The results focus on the neutral closure rule because this is regarded as the most reasonable choice of closure rule. The discussion about the results for other closure rules is limited, since their role is primarily sensitivity analyses and there are few differences between the results for the different government closures; the key exception is for the effects on the welfare of households, and consequently these effects are discussed in greater detail. In addition, the results emphasise the long term impact of higher excise taxes. Finally, the

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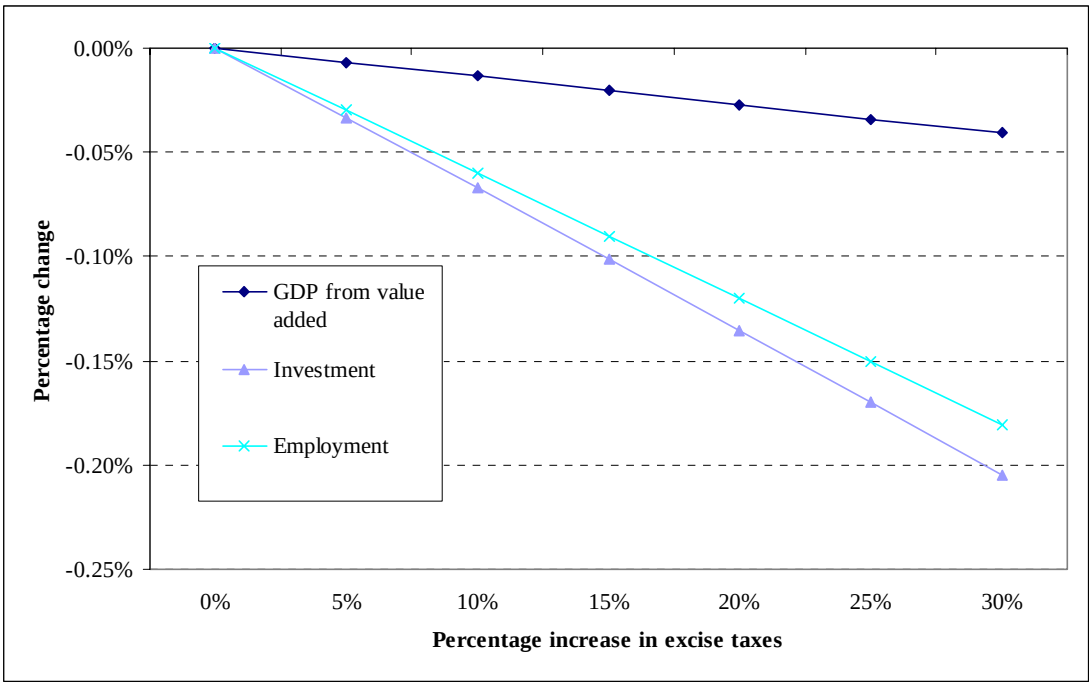
discussion concentrates on the 10% increase in excise duties as this is representative of the increase in duties in recent years; since the results change in a near linear way, as shown in Figure 6; the estimates for the 10% increase in excise duties are reasonable representations of the proportionate impact of still larger increases in excise rates.

6.1. Macro-economic results and government revenue

The beverages and tobacco industry contributes approximately 2.8% to the gross domestic product (GDP) and therefore the impact of higher excise duties on these commodities is expected to be limited; however, the effect is amplified via forward and backward linkages in the economy. Figure 6 shows the decrease in GDP, investment and employment when excise duties are increased by up to 30% in 5 percentage increments. In case of a 10% increase in excise duties, GDP will decline by 0.01%, employment by 0.06% and investment by 0.07%. These percentage changes translate into a loss of R107 million in GDP, R99 million in investment and 7 489 job losses. In the event of a 30% increase in excise duties the loss in GDP and investment amounts to R323 million and R302 million respectively, while the number of job losses equals 22 563.

Figure 6: Macroeconomic effects



Increasing excise duties by 10% results in government revenue increasing by approximately R497 million. However, there is little change in the value of government expenditure (and income) as government consumption is fixed either in volume ("inert" closure) or as a share in final demand ("neutral" and "Stax" closures). The results for the "neutral" closure show income taxes on households and enterprises declining by 0.32%;

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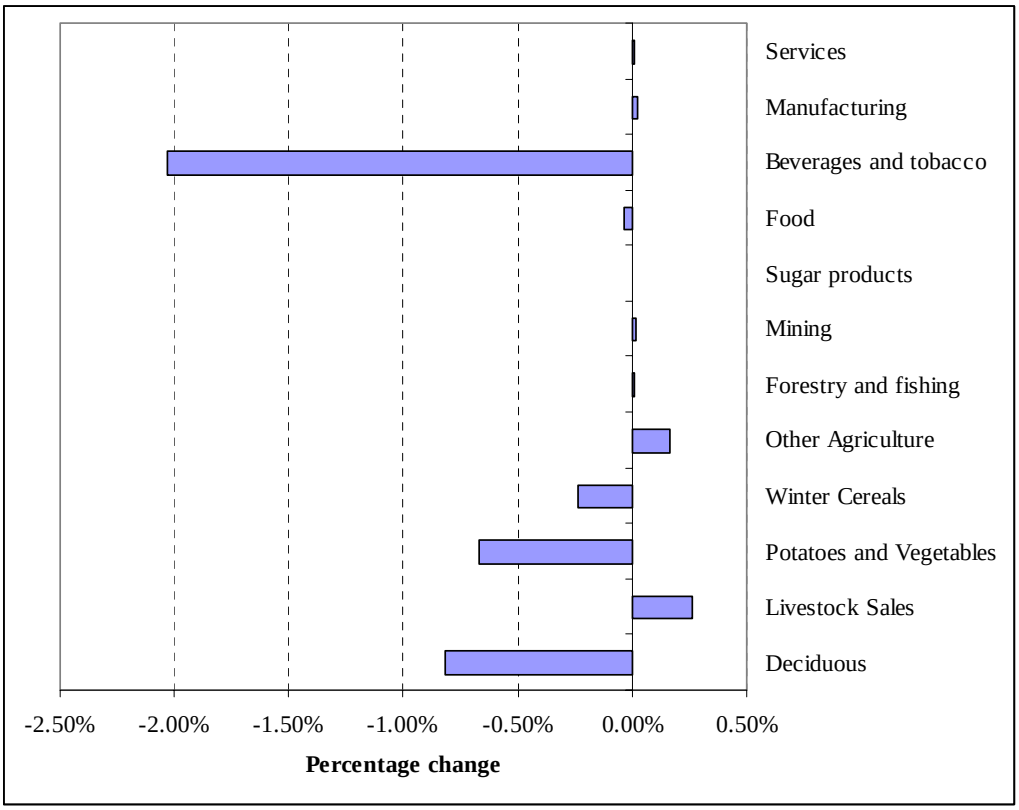
while sales taxes decline by 0.87% when such taxes are used as the tax replacement ("Stax" closure).

6.2. Effect on exchange rate and trade

The value of imports declines by R28 million (-0.01%), following the small economic contraction; this results in a 0.1% appreciation in the exchange rate. The stronger Rand[9] leads to the value of exports declining by R40 million (-0.02%). Figure 7 shows that the beverages and tobacco sectors experience the largest fall in volume exported, followed by certain agricultural sectors. The volume of beverages and tobacco exported declines by 2.03%, the volume of potatoes and vegetables exports declines by 0.67% and the volume of deciduous fruit exports declines by 0.82%. It will be seen later that it is these commodities that experience the largest price increases domestically. The volume of food exports decrease slightly, while the other commodities experience an increase in exports.

Figure 7: Changes in the volume of exports, at a 10% increase in excise taxes on beverages and tobacco



[9] South Africa is a price taker in the international market and a stronger Rand results in lower export prices.

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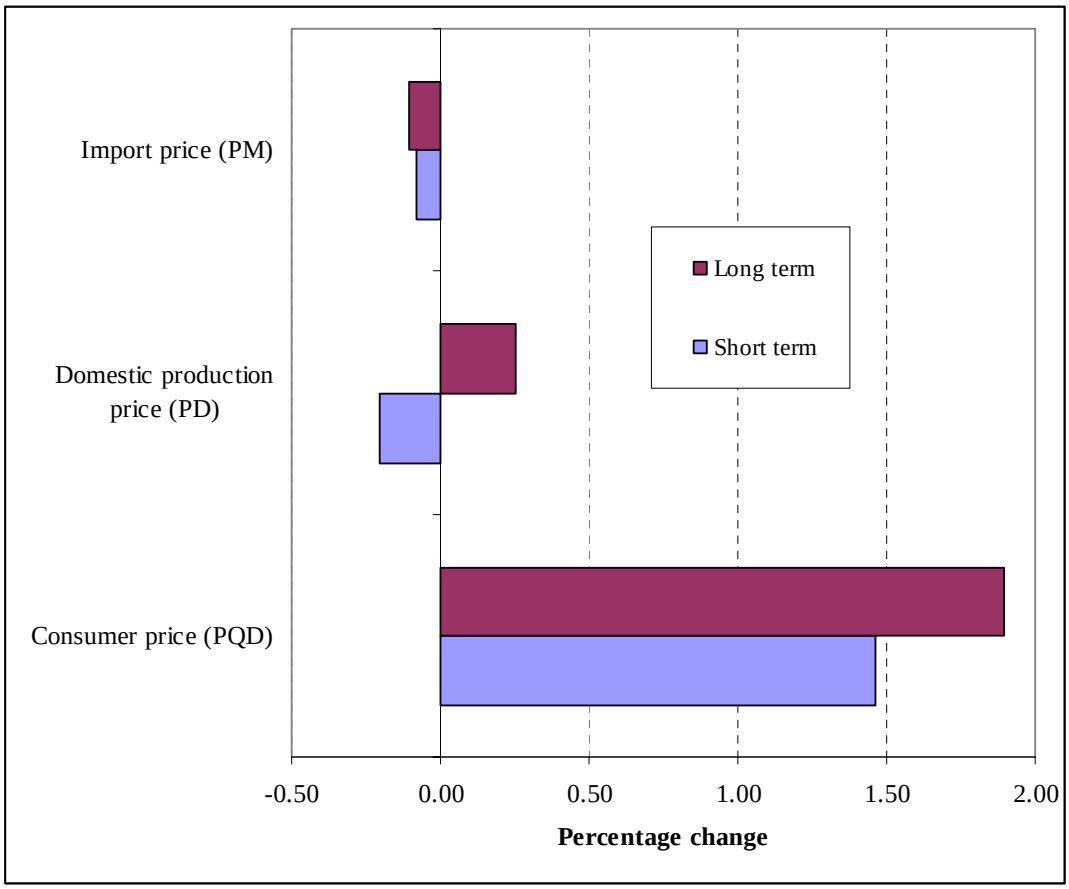
6.3. Price effects

6.3.1. Beverages and tobacco

Increasing excise taxes directly results in higher consumer prices of beverages and tobacco. See Figure 8. The initial response of domestic suppliers is to lower their production price to ameliorate the increase in the consumer price, considering the downward sloping demand curve of consumers. However, over the long term suppliers are forced to increase their domestic production prices due to increases in the prices of their intermediate inputs (see Figure 12). Figure 8 shows that, over the long term, a 10% increase in excise duties will result in a 1.9% increase in the consumer price, while the domestic production price will increase by 0.25%. The imported price falls by 0.10% due to an appreciation of the same magnitude in the exchange rate.

Figure 8: Effect on selected prices of beverages and tobacco, at a 10% increase in excise taxes on beverages and tobacco



In response to the 1.90% increase in the consumer prices of beverages and tobacco final domestic demand falls by 0.94%; while the higher domestic production prices lead to demand for domestically produced beverages and tobacco falling by 0.98%. The quantity of imported beverages and tobacco declines by 0.28%, which is less than the demand for domestically

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produced products, since imported products are now 0.1% cheaper, due to the appreciation of the Rand.

6.3.2. Selected commodities

Figure 9 shows the changes in the consumer prices of selected commodities. The increase in the domestic producer price of beverages and tobacco leads to a reduction in supply and hence a decline in derived demand for intermediates, which put downward pressure on the prices of intermediate inputs. This explains the fall in prices of wine grapes, sugar products and winter cereals.

The lower derived demand for wine grapes inevitably leads to a fall in production of wine grapes. The results show that agricultural commodities of which more than 25% are produced in the Northern and Western Cape experience a fall in production output and an increase in their final consumer prices. This explains the increase in the prices of deciduous fruit (93% of all deciduous fruit production take place in the Cape provinces) and potatoes and vegetables (27% of all potatoes and vegetables are produced in the Cape provinces) as shown in Figure 9. Other important agricultural commodities produced in the Northern Cape and Western Cape include livestock and winter cereals. Though livestock sales contribute approximately 40% of agricultural activity in the Northern and Western Cape, only 21% of total livestock sales in South Africa take place in these provinces; therefore, changes in the production of livestock in the Northern and Western Cape do not have a significant influence on the price thereof.

The impact on the prices of other agricultural commodities is marginal. Services, manufactured products, food, mining and forestry and fishing experience a decline in their prices of approximately 0.11%.

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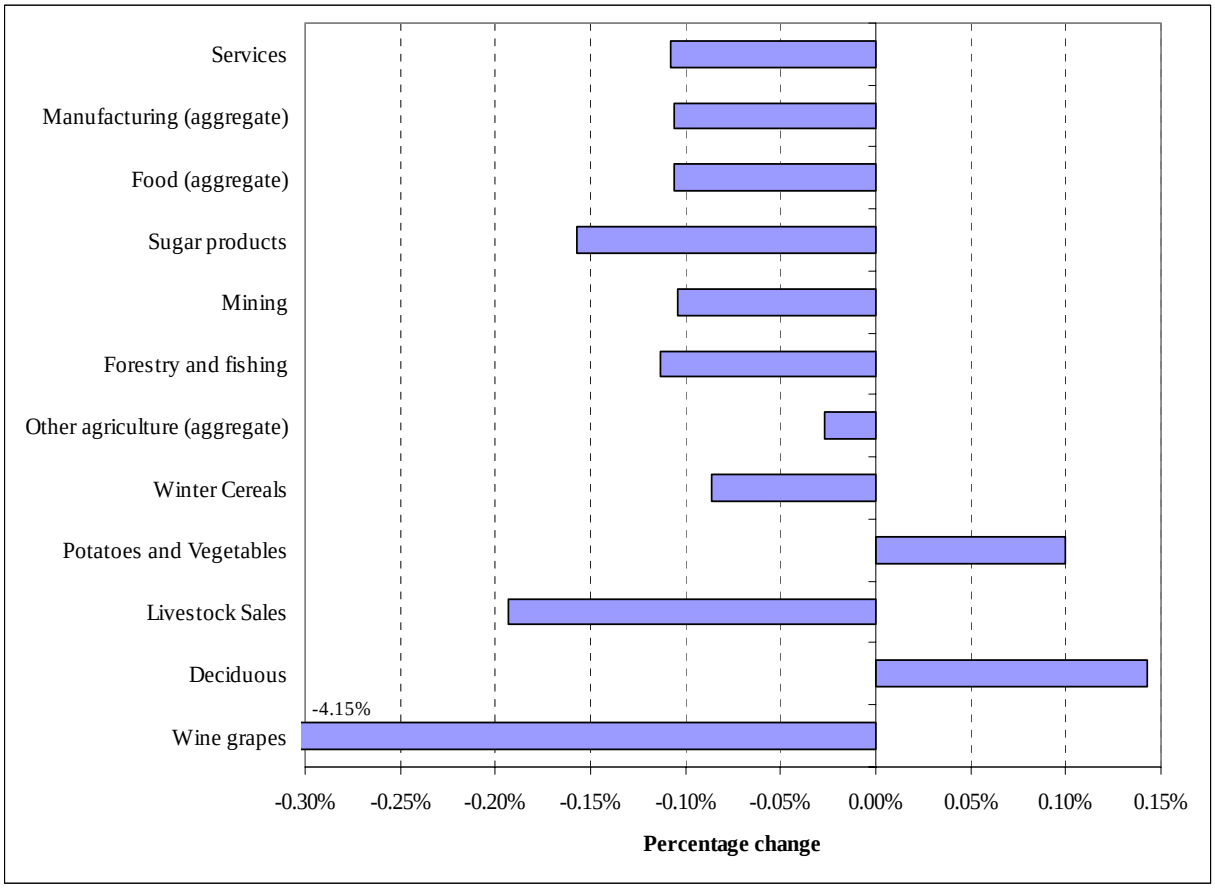
Figure 9: Changes in consumer prices (PQD) of selected commodities, at a 10% increase in excise taxes on beverages and tobacco



6.4. Effect on producer prices of output activities and intermediate inputs

The higher consumer prices of beverages and tobacco put upward pressure on the producer prices of such commodities, while lower consumer prices of the other commodities put downward pressure on domestic producer prices of those commodities. Figure 10 shows the producer prices of beverages and tobacco increase by 0.21%, while the producer prices of the other commodities fall by between 0.10% and 0.15%.

These price changes are relatively consistent within the manufacturing industries and to a lesser degree in the food industries, with the exception of sugar, grain mills (-0.14%) and dairy (-0.03%). The changes in the producer prices of agricultural output are however quite dispersed, as shown in Figure 11.

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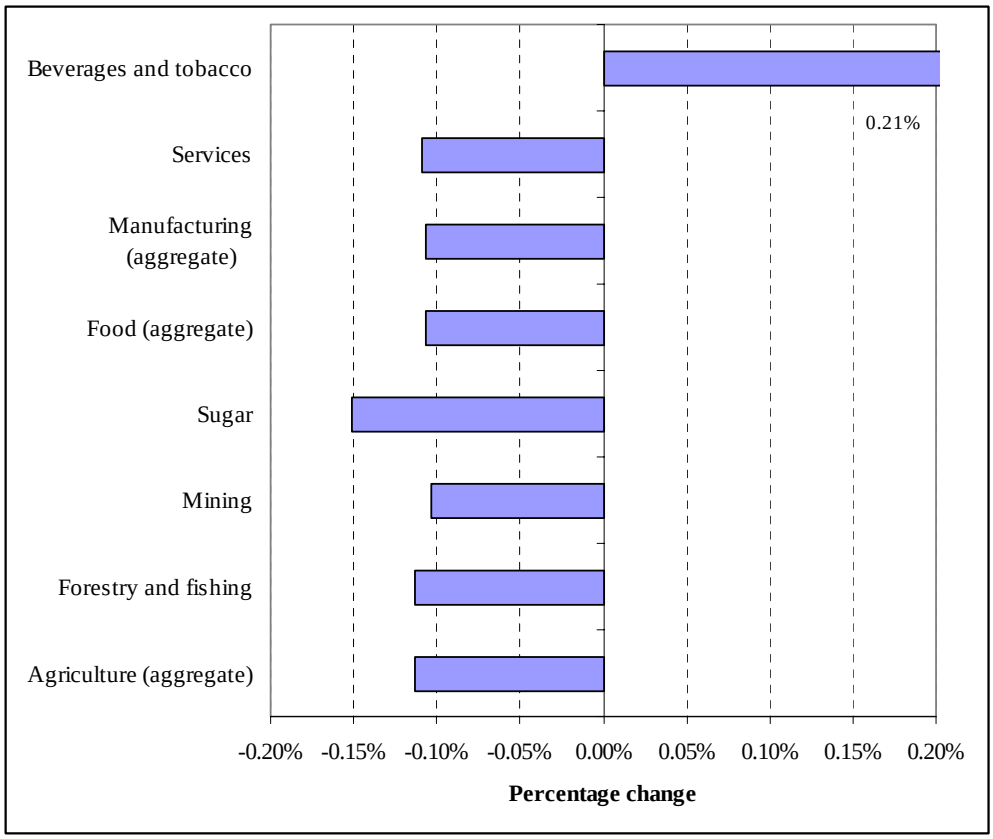
Figure 10: Changes in producer prices (PX) of selected activities, at a 10% increase in excise taxes on beverages and tobacco



The producer prices of agricultural activities decline in all regions, ranging between -0.24% and -0.06%. As expected, the output prices of the major wine grape producing areas fall the most, i.e. the Boland and West Coast in the Western Cape and Namakwaland in the Northern Cape, while the prices of agricultural output in the Eastern Cape are least affected.

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Figure 11: Changes in the producer prices (PX) of agricultural output in selected regions, at a 10% increase in excise taxes on beverages and tobacco

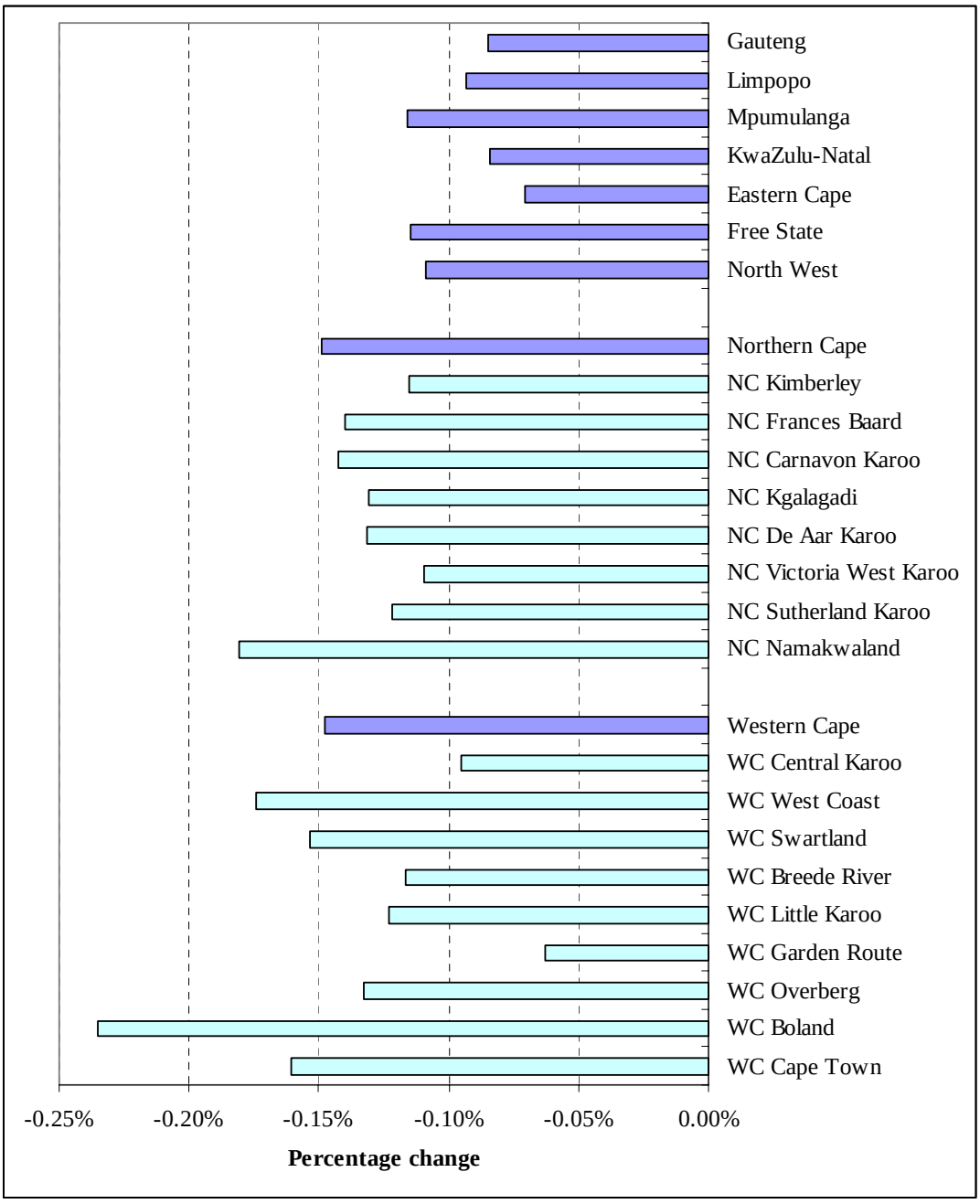

Figure 12 shows the changes in the prices of intermediate inputs for selected activities. The data indicate that beverages and tobacco products are important intermediate inputs in the production of beverages and tobacco; explaining the 0.32% increase in the prices of intermediate inputs used in the production of beverages and tobacco. Intermediate inputs used in the production of other commodities become cheaper by between 0.10% and 0.16%.

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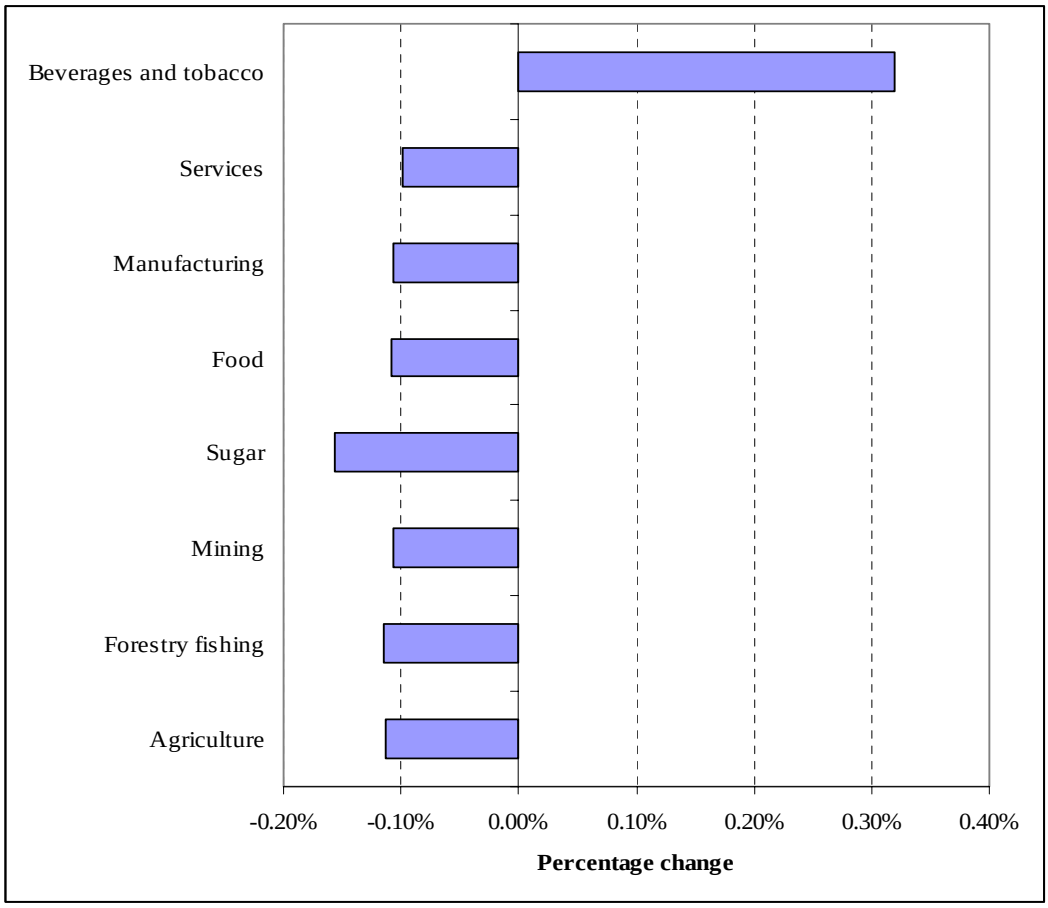
Figure 12: Changes in the prices of intermediate inputs (PINT) in non-agricultural activities, at a 10% increase in excise taxes on beverages and tobacco



Expansion or contraction of industries is primarily affected via changes in returns to factors and subsequent reallocation. The change in the price of value added (*PVA*) reported in Table 2 indicates changes in the overall return to factors in different activities. The table shows that return to factors decrease in all activities, implying a contraction of economic activity in all the regions and industries.

The agricultural sectors lose R66 million (0.21% of its original value added) while the non-agricultural sectors lose R970 million (0.12% of its original value-added). The loss in the agricultural sectors contributes 6.37% to the total loss in value-added of R1 036 million. Beverages and tobacco experience the largest percentage decline in value-added (-1.12%) within the non-agricultural sectors. The changes within the food and manufacturing sectors are more or less the same magnitude, but the changes within the agricultural sector are very much dispersed. Changes in value-added for agricultural activities in the provinces range between 0.23% (agricultural activities in Gauteng) and -0.64% (agricultural activities in the Western Cape). Agricultural activities in the Northern Cape lose 0.54% in value-added.

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Changes in the price of value-added within the wine producing provinces are also very much dispersed and vary between -1.99% (Boland) and 0.37% (Garden Route).

Finally, though the greatest losses in value-added, in terms of percentage changes, are experienced in the agricultural sector, the largest absolute loss is in the services industry, which loses over R621 million (0.12%). This loss contributes 60% to the total loss in value-added.

Table 2: Value-added effects (Rand values for 2000), at a 10% increase in excise taxes on beverages and tobacco

	Base value added (R millions)	Changes in prices (PVA) (%)	Change in quantities (QVA) (%)	Change in value-added (%)	Change in value-added (R millions)	Percentage Contribution towards total change
Agricultural	**31,918.61**	**-0.11**	**-0.10**	**-0.21**	**-65.99**	**6.37**
Agriculture: Western Cape	7,223.84	-0.16	-0.48	-0.64	-46.11	4.45
Cape Town	310.37	-0.18	-0.68	-0.85	-2.65	0.26
Boland	1,170.12	-0.30	-1.69	-1.99	-23.23	2.24
Overberg	1,420.69	-0.15	-0.31	-0.46	-6.50	0.63
Garden Route	371.68	-0.03	0.40	0.37	1.37	-0.13
Little Karoo	299.17	-0.13	-0.27	-0.40	-1.20	0.12
Breede River	2,121.69	-0.10	-0.01	-0.12	-2.45	0.24
Swartland	874.82	-0.19	-0.54	-0.73	-6.40	0.62
West Coast	559.98	-0.19	-0.71	-0.90	-5.02	0.48
Central Karoo	95.31	-0.08	0.04	-0.04	-0.04	0.00
Agriculture: Northern Cape	2,947.71	-0.17	-0.37	-0.54	-15.84	1.53
Namakwaland	1,111.42	-0.22	-0.73	-0.95	-10.56	1.02
Sutherland Karoo	172.74	-0.13	-0.11	-0.24	-0.41	0.04
Victoria West Karoo	67.59	-0.11	-0.06	-0.16	-0.11	0.01
De Aar Karoo	388.05	-0.14	-0.13	-0.28	-1.08	0.10
Kgalagadi	257.80	-0.15	-0.16	-0.31	-0.79	0.08
Carnavon Karoo	188.66	-0.16	-0.25	-0.41	-0.77	0.07
Frances Baard	617.04	-0.16	-0.20	-0.35	-2.18	0.21
Kimberley	144.40	-0.12	0.16	0.04	0.05	0.00
Agriculture: North West	2,898.66	-0.10	-0.04	-0.14	-3.96	0.38
Agriculture: Free State	3,997.89	-0.11	0.01	-0.10	-4.01	0.39
Agriculture: Eastern Cape	2,417.13	-0.04	0.23	0.19	4.47	-0.43
Agriculture: KwaZulu Natal	3,900.28	-0.06	0.05	-0.02	-0.59	0.06
Agriculture: Mpumalanga	3,335.42	-0.12	-0.04	-0.16	-5.29	0.51
Agriculture: Limpopo	3,322.02	-0.08	0.11	0.03	0.96	-0.09
Agriculture: Gauteng	1,875.67	-0.05	0.29	0.23	4.38	-0.42
Non-agricultural	**777,007.13**	**-0.11**	**-0.01**	**-0.12**	**-969.98**	**93.63**
Forestry and Fishing	4,880.28	-0.11	-0.02	-0.13	-6.31	0.61
Natural Resources	61,783.30	-0.10	0.02	-0.09	-53.06	5.12
Food	16,454.20	-0.10	-0.04	-0.14	-23.40	2.26
Industrial	166,002.89	-0.10	0.00	-0.10	-169.74	16.39
Services	519,254.41	-0.12	0.00	-0.12	-620.52	59.90
Beverages and Tobacco	8,632.05	-0.12	-1.01	-1.12	-96.94	9.36
TOTAL	**808,925.74**	**-0.11**	**-0.02**	**-0.13**	**-1,035.96**	**100.00**

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6.5. Effect on factor markets

Table 3 shows the results for the changes in employment figures in the event of a 10% increase in excise duties. Initially, the number of job losses will amount to 6 558 and this figure will increase to 7 489 over the long-run. The small difference between the short-run and long-run changes in employment suggests that there will not be major reallocation of physical capital in the economy. Agricultural activities in the Boland district lose the largest share of their capital stock (1.89%), followed by the beverages and tobacco industries (0.99%). Agricultural activities in the Garden Route district experienced the largest increase in capital stock (0.49%).

The largest number of job losses (2 048) will take place in the Western Cape. The majority of these people are semi- and unskilled Asian and Coloured workers employed in the agricultural industry. There will be 359 job losses in the Northern Cape; also mostly semi- and unskilled Asian and Coloured workers employed in the agricultural sector. Gauteng and KwaZulu-Natal will suffer 1 274 and 1 250 job losses respectively; mostly semi- and unskilled African workers. The majority of job losses in Gauteng and KwaZulu-Natal will take place in the services industries, and also in the forestry and fishing industry in KwaZulu-Natal.

Table 3: Changes in employment, at a 10% increase in excise taxes on beverages and tobacco

	Short term		Long term	
	Percentage change	**Number of job losses**	**Percentage change**	**Number of job losses**
South Africa	-0.05%	6,558	-0.06%	7,489
WC African semi- and unskilled	-0.16%	359	-0.17%	371
WC Asian and Coloured semi- and unskilled	-0.18%	1,635	-0.18%	1,677
NC African semi- and unskilled	-0.15%	99	-0.17%	113
NC Asian and Coloured semi- and unskilled	-0.19%	216	-0.22%	246

Changes in the income of under-employed factors are due to changes in employment (as the wage rate is fixed), while changes in the income of fully employed workers are due to changes in their wage rates (as factor supply is fixed). Table 4 shows the changes in the factor incomes of workers in the Northern and Western Cape. The factor incomes of White people in the Northern Cape will decrease the most (-0.24%), followed by semi and unskilled Asian and Coloured workers also in the Northern Cape (-0.20%). The factor incomes of semi- and unskilled White workers in the Western Cape will decline by 0.19% and the income of semi- and unskilled Asian and Coloured workers will decline by 0.16%.

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The income to agricultural land in the Northern and Western Cape will decline by 0.63% and 0.73% respectively.

Table 4: Changes in factor incomes, at a 10% increase in excise taxes on beverages and tobacco

Western Cape African High-skilled and Skilled	-0.12%
Western Cape African Semi- and unskilled	-0.15%
Western Cape Asian and Coloured Skilled	-0.13%
Western Cape Asian and Coloured Semi- and unskilled	-0.16%
Western Cape White High-skilled	-0.14%
Western Cape White Skilled	-0.15%
Western Cape White Semi- and Unskilled	-0.19%
Northern Cape African High-skilled and Skilled	-0.12%
Northern Cape African Semi- and Unskilled	-0.12%
Northern Cape Asian and Coloured High-skilled and Skilled	-0.12%
Northern Cape Asian and Coloured Semi- and Unskilled	-0.20%
Northern Cape White	-0.24%
Western Cape Land	-0.73%
Northern Cape Land	-0.63%

6.6. Welfare effects

The total loss to households in South Africa amounts to over R300 million, measured by real household consumption expenditure. All representative households lose out, with the exception of eight households which gain marginally[10]. Figure 13 shows that all households in the Northern and Western Cape are worse off, with African, Asian and Coloured households of which the household head is lower educated, losing out the most regardless of the tax replacement. This is not surprising since these households, which are also the households with the lowest income per capita adult equivalent, are most severely affected because they spend the largest share of their total budget on beverages and tobacco. The lower income African, Asian and Coloured households in the Western Cape spend up to 7% of their total budget on beverages and tobacco.

Up to now the closure rule used made little difference in the results, but the tax replacement measure used does affect the distribution of the loss in the economy. The cost of the excise duties is more evenly spread when sales taxes are allowed to decrease, compared to when the income tax rate is allowed to decrease. A lower income tax rate tends to benefit higher-income households (i.e. White households) more as these households pay higher income

[10] Eastern Cape African Homeland upper secondary and higher, Eastern Cape Asian and Coloured upper secondary and higher, Eastern Cape African non-homeland male upper secondary and higher, Eastern Cape White, Mpumulange White, Free State White, Limpopo White, KwaZulu-Natal White upper secondary and tertiary.

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taxes; enlarging the already regressive impact of increasing excise duties on real consumption expenditure.

Figure 13: Changes in the real consumption expenditure of households in the Northern and Western Cape, at a 10% increase in excise taxes on beverages and tobacco

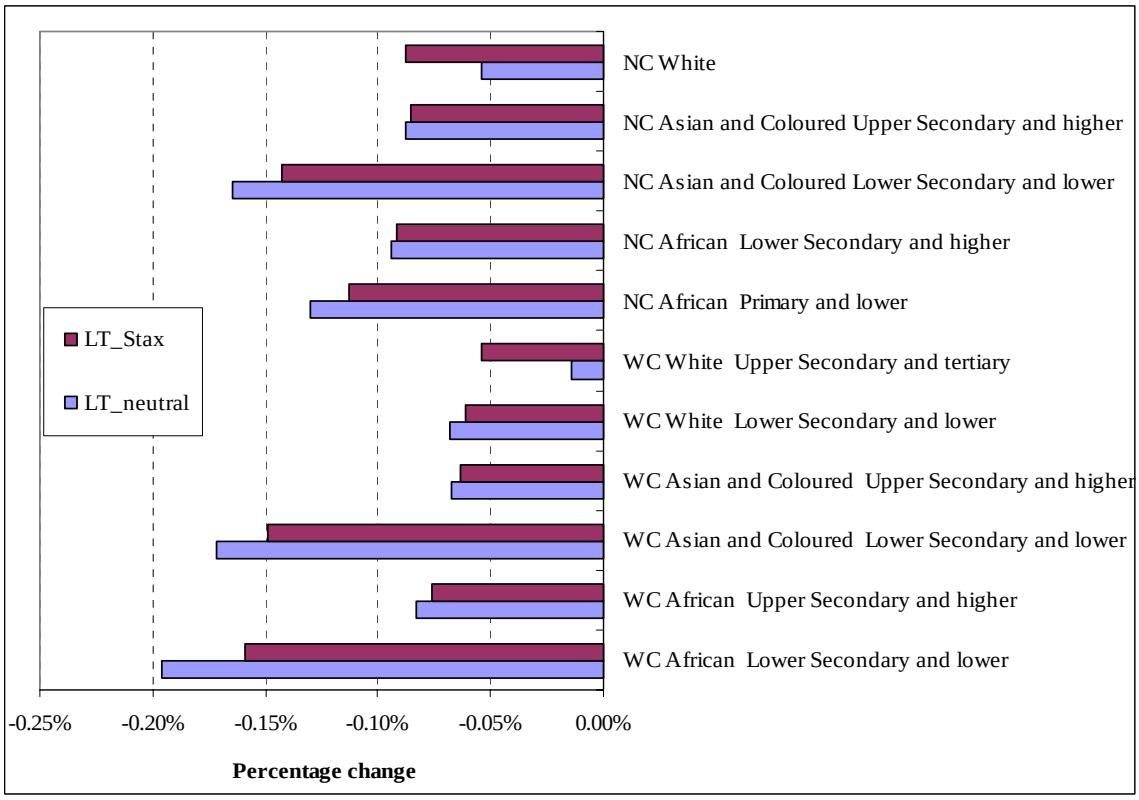

Figure 14 plots changes in real consumption expenditure of households against per capita expenditure for the "LT-neutral" closure. The results for all the households in South Africa show the same trend as those households in the Western Cape. Lower income households are more severely affected than higher income households. The positive slope of the trend line indicates that increasing excise taxes will have a regressive impact on real household consumption expenditure. Though not shown on the graph, the results indicate that using sales tax as a tax replacement lessons the regressive impact of increasing excise taxes. The long-term "inert" closure yields approximately the same results as the long-term "neutral" closure.

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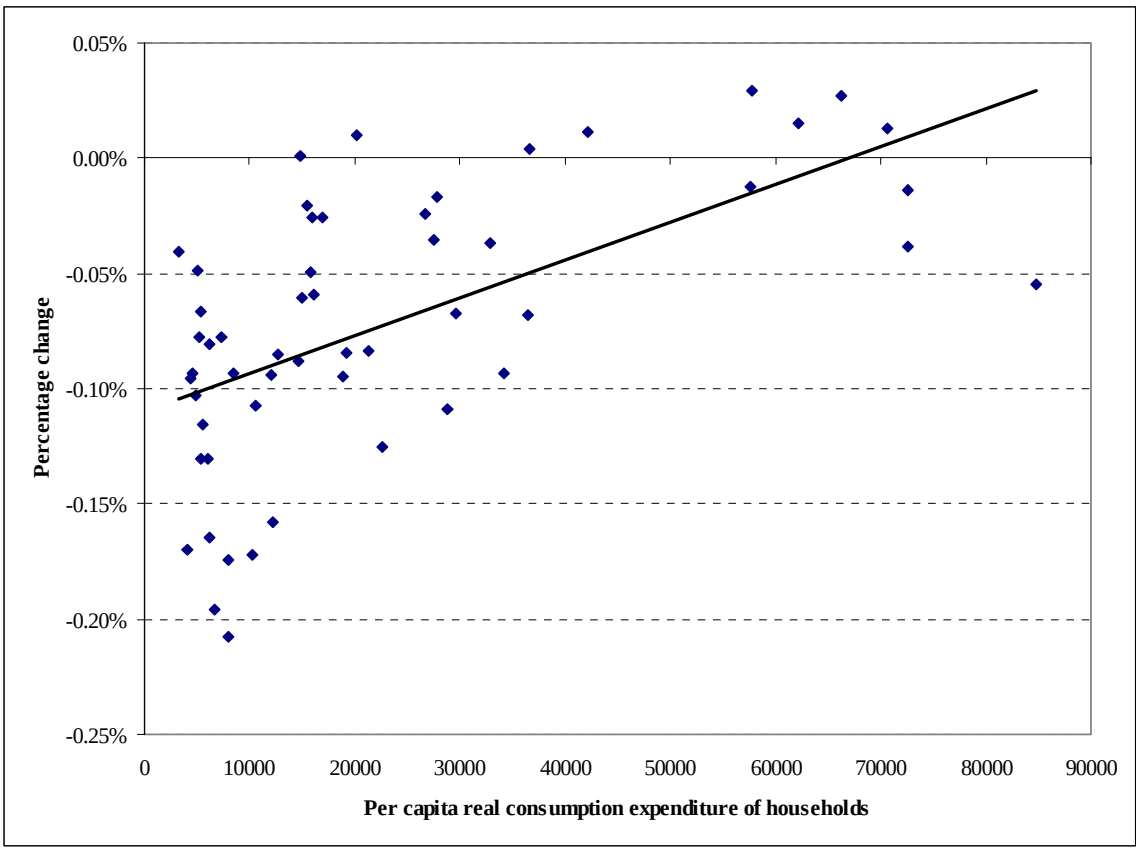
Figure 14: Changes in real consumption expenditure against per capita expenditure, at 10% increase in excise taxes on beverages and tobacco (LT-neutral)



6.7. Accounting for productivity related externalities

Section 2 briefly discussed the negative externalities associated with alcohol abuse and mentioned that the model does not capture the externalities associated with alcohol abuse. One such externality is that of lost productivity. We estimated how much productivity[11] must increase to keep constant real value of absorption (a measure of economic activity and welfare), while increasing excise taxes. The results show that, for a 10% increase in excise duties, productivity has to increase by 0.06% to maintain the level of absorption in the economy. So, if the reduced demand (consumption) for alcoholic beverages, following the price increases resulting from higher excise duties, results in a generalised increase in productivity of more than 0.06%, there will be no loss in the economy. Compared to the average annual growth rate of 3.6% in labour productivity in non-agricultural sectors over the past ten years (SARB), this is clearly not a particularly high target to achieve, especially given the fact that it ignores all other potential positive externalities.

[11] Modelled as a scale factor on the value added production nest.

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However, it is relevant to note a weakness of this conclusion is the likelihood that moderate drinkers may reduce consumption by more than heavy drinkers, who may suffer from some degree of addiction, and it is the latter that most probably cause the productivity loss. In other words, reducing total consumption will not necessarily reduce the productivity loss at a linear rate. This serves to reinforce a conclusion that further research is required to determine the socio-economic impact of excise duties on productivity loss and other externalities. Nevertheless this small increase in efficiency would offset about half of the job losses associated with the increase in excise taxes.

7. Conclusion

Increasing excise duties on beverages and tobacco results in a welfare loss of over R300 million in the economy in terms of real household consumption expenditure. All households lose out, with the exception of eight, mostly white, representative households, which gain marginally. All households in the Northern and Western Cape are worse off, with the lower income households most severely affected. Taking into account all households in South Africa, the results indicate that increasing excise duties has a regressive impact on the real consumption expenditure of households. This is expected as lower income households spend a larger proportion of their total budget on beverages and tobacco.

The most serious concern of raising excise duties is the resultant number of job losses. If excise duties are increased by 10%, the number of job losses will amount to almost 7 500, of which 359 and 2 048 will be in the Northern and Western Cape respectively. These job losses will occur mainly in the agricultural sectors. While any job losses must be of concern in the presence of the high rates of unemployment in South Africa this is a relatively small (0.06 percent) change in employment, which may be justified, at least partially, by an expected reduction in negative externalities.

Increasing excise duties on beverages and tobacco results in higher consumer prices for these commodities, which puts upward pressure on producer and intermediate input prices. The price of wine grapes, an important intermediate input in the production of alcoholic beverages, falls due to the fall in demand for beverages following the price increase. The effect on the prices of other agricultural commodities is mixed. The prices of deciduous fruit and potatoes and vegetables will increase, while the prices of livestock and winter cereals will decrease.

Though the beverages and tobacco industries are relatively small, they have extensive forward and backward linkages in the economy, which explains the number of potential job losses. Increasing excise duties on beverages and tobacco will result in GDP declining by 0.01% (R107 million) and investment declining by 0.07% (R99 million). The exchange rate

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will appreciate by 0.1% and the value of exports will fall by 0.02% (R40 million). Beverages and tobacco will experience the greatest decline in the volume of exports, followed by deciduous fruit and potatoes and vegetables.

It is necessary to recall that although the aim of the study is to determine the economic impact of increasing excise duties on alcoholic beverages, the model does not take into account negative externalities associated with excessive alcohol consumption, such as productivity loss, foetal alcohol syndrome, liver cirrhosis, traffic accidents. In other words, the results do not capture the benefits from any reduction in negative externalities following the decline in demand due to a price increase in alcoholic beverages, and hence are likely to represent an upper bound of any welfare losses. Some analyses were conducted to consider the increase in productivity required from lowering alcohol consumption in order to counteract the negative impact on the economy of higher excise taxes. The results indicate the required increase in efficiency would be small. However, this issue clearly deserves further research.

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9. Appendices

9.1. Appendix A: SAM accounts

Commodities: Agriculture

1 Summer Cereals
2 Winter Cereals
3 Other Field Crops
4 Potatoes and Vegetables
5 Wine grapes
6 Citrus
7 Subtropical
8 Deciduous
9 Other Horticulture
10 Livestock Sales
11 Milk and Cream
12 Other agriculture
13 Poultry
14 Other Animals
15 Forestry and fishing

Commodities: Other

16 Mining
17 Meat products
18 Fish products
19 Fruit and vegetables products
20 Oils and fats products
21 Dairy products
22 Grain mill products
23 Sugar products
24 Confectionary products
25 Other food products
26 Beverages and tobacco
27 Textile products
28 Paper products
29 Chemical products
30 Iron and steel products incl machinery
31 Other industrial
32 Services

Activities: Agriculture

33 WC Cape Town
34 WC Boland
35 WC Overberg
36 WC Garden Route
37 WC Little Karoo
38 WC Breede River
39 WC Swartland
40 WC West Coast
41 WC Central Karoo
42 NC Namakwaland
43 NC Sutherland Karoo
44 NC Victoria West Karoo
45 NC De Aar Karoo
46 NC Kgalagadi
47 NC Carnavon Karoo
48 NC Frances Baard
49 NC Kimberley
50 North West
51 Free State
52 Eastern Cape
53 KwaZulu-Natal
54 Mpumulanga
55 Limpopo
56 Gauteng

Activities: Other

57 Forestry fishing
58 Mining
59 Meat
60 Fish
61 Fruit
62 Oils
63 Dairy
64 Grain mills
65 Sugar
66 Confectionery
67 Other food
68 Beverages and tobacco
69 Textiles
70 Wood and paper
71 Other Chemicals
72 Iron and steel
73 Other industrial
74 Services

Factors: Capital

75 Gross operating surplus mixed income

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Factors: Land

76 Western Cape Land
77 Northern Cape Land
78 North West Land
79 Free State Land
80 Eastern Cape Land
81 KwaZulu-Natal Land
82 Mpumalanga Land
83 Limpopo Land
84 Gauteng Land

Factors: Labour

85 Western Cape African High-skilled and Skilled
86 Western Cape African Semi- and unskilled
87 Western Cape Coloured and Asian Skilled
88 Western Cape Coloured and Asian Semi- and unskilled
89 Western Cape White High-skilled
90 Western Cape White Skilled
91 Western Cape White Semi- and Unskilled
92 Eastern Cape African High-skilled and skilled
93 Eastern Cape African Semi- and unskilled
94 Eastern Cape Coloured and Asian High-skilled and Skilled
95 Eastern Cape Coloured and Asian Semi- and Unskilled
96 Eastern Cape White
97 Northern Cape African High-skilled and Skilled
98 Northern Cape African Semi- and Unskilled
99 Northern Cape Coloured and Asian High-skilled and Skilled
100 Northern Cape Coloured and Asian Semi- and Unskilled
101 Northern Cape White
102 Free State African High-skilled and Skilled
103 Free State African Semi- and unskilled
104 Free State Coloured and Asian High-skilled and Skilled
105 Free State Coloured and Asian Semi- and Unskilled
106 Free State White
107 Kwazulu-Natal African High-skilled and skilled
108 Kwazulu-Natal African Semi- and Unskilled
109 Kwazulu-Natal Coloured High-skilled and Skilled
110 Kwazulu-Natal Coloured Semi- and Unskilled
111 Kwazulu-Natal Asian High-skilled and Skilled
112 Kwazulu-Natal Asian Semi- and Unskilled
113 Kwazulu-Natal White High-skilled and Skilled
114 Kwazulu-Natal White Semi- and Unskilled
115 North West African High-skilled and Skilled
116 North West African Semi- and unskilled
117 North West Coloured and Asian High-skilled and Skilled
118 North West Coloured and Asian Semi- and Unskilled
119 North West White
120 Gauteng African High-skilled and skilled
121 Gauteng African Semi- and Unskilled
122 Gauteng Asian and Coloured High-skilled and Skilled
123 Gauteng Asian and Coloured Semi- and Unskilled
124 Gauteng White High-skilled and skilled
125 Gauteng White Semi- and Unskilled
126 Mpumalanga African High-skilled and skilled
127 Mpumalanga African Semi- and Unskilled
128 Mpumalanga Coloured and Asian High-skilled and Skilled
129 Mpumalanga Coloured and Asian Semi- and Unskilled
130 Mpumalanga White
131 Limpopo African High-skilled and skilled
132 Limpopo African Semi- unskilled
133 Limpopo Coloured and Asian High-skilled and Skilled
134 Limpopo Coloured and Asian Semi- and Unskilled
135 Limpopo White

Households

136 Western Cape African Lower Secondary and lower
137 Western Cape African Upper Secondary and higher
138 Western Cape Asian and Coloured Lower Secondary and lower
139 Western Cape Asian and Coloured Upper Secondary and higher
140 Western Cape White Lower Secondary and lower
141 WC White Upper Secondary and tertiary
142 Eastern Cape African Agricultural
143 Eastern Cape African Homeland Lower Secondary and lower
144 Eastern Cape African Homeland Upper Secondary and higher
145 Eastern Cape African Non-Homeland Lower Secondary and lower

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146 Eastern Cape African Non-Homeland Male Upper Secondary and higher
147 Eastern Cape Asian and Coloured Lower Secondary and lower
148 Eastern Cape Asian and Coloured Upper Secondary and higher
149 EC White
150 Northern Cape African Primary and lower
151 Northern Cape African Lower Secondary and higher
152 Northern Cape Coloured and Asian Lower Secondary and lower
153 Northern Cape Coloured and Asian Upper Secondary and higher
154 Northern Cape White
155 Free State African Agricultural
156 Free State African Lower Secondary and lower
157 Free State African Upper Secondary and higher
158 Free State Asian and Coloured
159 FS White
160 Kwazulu-Natal African Agricultural
161 Kwazulu-Natal African Lower Secondary and lower
162 Kwazulu-Natal African Upper Secondary and higher
163 Kwazulu-Natal Asian Lower Secondary and lower
164 Kwazulu-Natal Asian Upper Secondary and higher
165 Kwazulu-Natal Coloured
166 Kwazulu-Natal White Lower Secondary and lower
167 Kwazulu-Natal White Upper Secondary and tertiary
168 North West African Agricultural
169 North West African Lower Secondary and lower
170 North West African Upper Secondary and higher and higher
171 North West Asian and Coloured
172 NW White
173 Gauteng African Agricultural
174 Gauteng African Lower Secondary and lower
175 Gauteng African Upper Secondary and higher
176 Gauteng Asian and Coloured Lower Secondary and lower
177 Gauteng Asian and Coloured Upper Secondary and higher
178 Gauteng White Lower Secondary and lower
179 Gauteng White Upper Secondary and tertiary
180 Mpumalanga African Agricultural
181 Mpumalanga African Lower Secondary and lower
182 Mpumalanga African Upper Secondary and higher
183 Mpumalanga Asian and Coloured
184 Mpumalanga White
185 Limpopo African Agricultural
186 Limpopo African Lower Secondary and lower
187 Limpopo African Upper Secondary and higher
188 Limpopo Asian and Coloured
189 Limpopo White

Trade and transport margins

190 Trade margin
191 Transport margin

Tax accounts

192 Import duties
193 Export tax
194 Value added tax on imports
195 Value added tax on domestic go
196 Excise duty
197 Sales Tax
198 Sales subsidies
199 Production taxes
200 Production refunds or VAT
201 Production subsidies
202 Factor Tax
203 Direct income taxes

Other accounts

204 Government
205 Business Enterprises
206 Savings
207 Stock Changes
208 Rest of the World
209 Account totals

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9.2. Appendix B: Classification of occupations into skill level categories

Factor code	Description	Skill classification
0	Not applicable/not working	Not applicable
1	Legislators, senior officials and managers	High skilled
2	Professionals	High skilled
3	Technical and associate professionals	High skilled
4	Clerks	Skilled
5	Service workers and shop and market sales workers	Skilled
6	Skilled agricultural and fishery workers	Semi-skilled
7	Craft and related trades workers	Semi-skilled
8	Plant and machine operators and assemblers	Semi-skilled
9	Elementary Occupation	Unskilled
10	Domestic workers	Unskilled
11*	Not adequately or elsewhere defined, unspecified	Unskilled

*Code 11 may include semi-skilled, skilled and/or high skilled workers as well, but it is almost impossible to determine.

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