Costs and benefits of higher tariffs on wheat imports to South Africa

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Abstract

Low international wheat prices, caused by tariffs and subsidies in developed countries, have been blamed for causing financial difficulty to South African farmers. While indignation at unfair trade practices may be valid, it does not necessarily follow that protection of the local industry is the best response. This study uses a static general equilibrium model to describe and quantify the effects of increased tariffs (by up to 25 percentage points) on the local wheat industry, other affected industries – particularly downstream industries – and the economy at large. The effects on factors, households and the government are also analysed. The results show that the benefits to the wheat industry are highly concentrated and smaller than the loss of income caused in other sectors. Welfare is negatively affected, especially for low-income households, for whom the effects are exacerbated by increases in relative food prices.

Keywords: Computable general equilibrium (CGE); wheat; import tariffs

1. Introduction

Over the past decade the wheat industry in South Africa has been under increasing financial pressure. During times of low international prices, producers tend to blame this primarily on tariff protection and production subsidies in developed countries. South Africa imports substantial quantities of wheat to make up for the difference between domestic consumption and production. There is popular belief that subsidies and other forms of protection in developed countries distort world trade and that the withdrawal of these subsidies will result in an increase in international prices of most agricultural products. Consequently, South African wheat producers have argued that subsidies and protection in developed countries are unfairly affecting their relative competitiveness and have lobbied government to

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impose protective tariffs on the industry. While this argument may be valid, it does not necessarily imply that tariff protection is the best course of action from a national welfare point of view. Standard (static) neoclassical trade theory predicts higher welfare even if trade liberalisation is one-sided (unilateral), which suggests that the imposition of a tariff may result in an overall loss in welfare.

In this study the possible effects of higher tariffs on wheat imports in South Africa are simulated using comparative static analyses based on results from a computable general equilibrium (CGE) model. A CGE model is particularly useful in this context because it can be used to look at the effects on wheat as well as on other industries, particularly downstream industries, such as grain millers and bakeries. In addition, the effects on other agents in the model, such as households (who are consumers of food) and the government (who obtains tariff revenue), can be investigated.

2. Computable general equilibrium model

The PROVIDE project CGE model (PROVIDE, 2005) is a member of the class of single-country CGE models that are descendants of the approach to CGE modelling described by Dervis *et al*. (1982). More specifically, the model, implemented using GAMS (General Algebraic Modelling System) software, descends from and builds on 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 reflects Pyatt's (1998) social accounting matrix (SAM) approach to modelling. The SAM not only identifies the agents in the economy and provides the database with which the model is calibrated, it also defines the accounting identities and associated price relationships. It addition, it 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. Its implementation in this study is as a comparative static model.

Domestically produced commodities are produced by **activities**, where all activities can potentially produce multiple commodities. This is arguably a realistic representation of agricultural activities. Production is modelled as a two-stage process: aggregate value added and aggregate intermediate inputs are modelled as imperfect substitutes. Aggregate value added is modelled as constant elasticity of substitution (CES) aggregates of the primary **factors** of production - land, labour and capital, while intermediate inputs are combined by Leontief technology over (composite) commodity inputs to produce aggregate intermediate inputs. For this study, the Leontief technology assumption for the aggregation of winter and summer cereals is relaxed by

introducing CES substitution between winter cereals (mainly wheat – see section 0) and summer cereals (mainly maize) in the grain milling industry. The bundle of these intermediate inputs is then combined with other intermediate inputs using a Leontief specification. This allows a reasonable degree of interdependence between demand and supply of wheat and maize, which is arguably a more realistic representation of the operations of the milling industry.

Trade is modelled following the Armington insight. Commodities are either supplied by domestic activities or imported. Exports are sold to the **Rest of the World (ROW)**, with domestic production allocated between the domestic and export markets using a constant elasticity of transformation (CET) specification. For the majority of commodities, South Africa is modelled as a small country or price taker; however, for certain mining commodities South Africa faces downward sloping export demand curves. These include gold, coal and other mining – comprising important export commodities such as diamonds, natural gas and many other minerals and chemical substances. Imported commodities are assumed to be imperfect substitutes for domestic commodities, and these are aggregated to form composite commodities that are consumed by domestic institutions using constant elasticity of substitution (CES) functions.

Factor incomes are distributed to the domestic institutions – **households**, incorporated business **enterprises** and **government** – that ultimately own the factors. Various inter-institutional transactions are modelled; these include transfers, for example, dividend payments by enterprises to households, and income taxes paid to the government. The government also receives income from the taxes levied on commodities (sales tax and import duties), activities (production) and factors. The savings by domestic institutions are accumulated in the **Savings-Investment** account, to which the balance on the current account also contributes.

Households maximise utility subject to Stone-Geary utility functions. These functions allow for subsistence consumption expenditure, which is arguably a realistic assumption when there are substantial numbers of very poor consumers.

3. Data

3.1 The Social Accounting Matrix (SAM)

The SAM for this study is a 404 account aggregation of the PROVIDE SAM for South Africa in 2000 (PROVIDE, 2006), which has 65 commodity accounts (17

agricultural), 71 activity accounts (24 agricultural), 90 factor accounts (GOS [capital], land and 88 labour factors) and 162 household accounts. These accounts are listed in Appendix A.

Agricultural commodities are differentiated by type. Wheat is part of the winter cereals account in the SAM, but the more detailed data from the Agricultural Census of 2002 (Statistics SA, 2004) indicates that wheat is by far the largest component (94.3%) of winter cereals, with the remainder accounted for by barley (4.3%) and other unspecified winter cereals (1.4%). It is therefore reasonable to treat winter cereals as a proxy for wheat. Agricultural activities are distinguished by region, meaning that a given agricultural activity represents all farming activities within that region and has a fixed total supply of land. Those provinces where the majority of wheat is produced – Free State, Northern Cape, North West and Western Cape – are disaggregated into a number of regions to distinguish the main wheat producing regions within a province (see Appendix B for details on the regions used in the model).

There is provincial disaggregation for both factors and households. Besides the geographical dimension, factors are further disaggregated on the basis of race and occupation or skills level. Households are further disaggregated according to one or more of the following criteria: gender of the head of household, level of education and whether the household resides in one of the former homelands.

3.2 Structural description

The SAM database embodies certain structural economic relationships, which partly determine how the model will respond to a particular shock. A brief structural analysis that focuses on winter cereals is therefore useful to help explain particular model results and to ensure a common point of departure for interpretation.[2] Figures 1 and 2 show a decomposition of the value of supply and (final) demand for winter cereals in 2000 as portrayed by the SAM. When comparing provinces in South Africa, the Western Cape and Free State are the main producers of winter cereals and they account for 59.7% of the total supply of winter cereals in South Africa (measured at basic prices), while imports account for a further 13.0%. More detailed information on wheat production in the model regions is listed in Appendix B.

[2] *Note that the structural information in the SAM is based on a variety of sources. The data have been adjusted to satisfy accounting constraints using cross-entropy methods (PROVIDE, 2006). The pertinent information therefore forms part of a consistent set of accounts, but it may differ from alternative sources.*

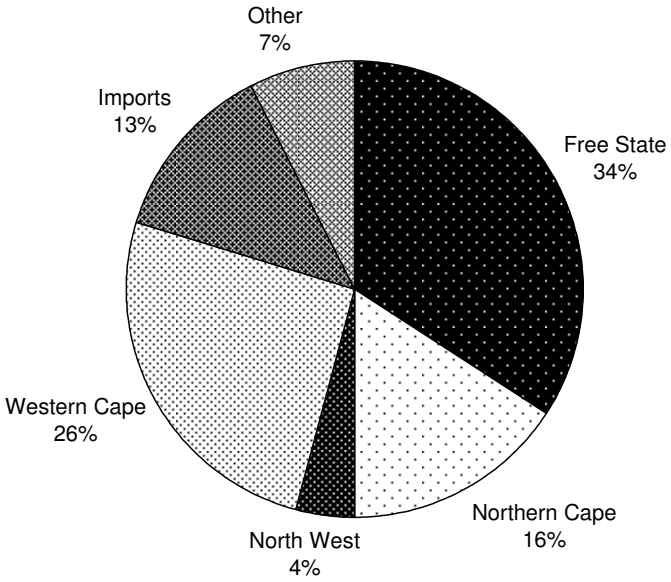

Figure 1: Structure of supply of winter cereals (2000)
Source: PROVIDE SAM (PROVIDE, 2006)

In terms of the value of demand (measured in consumer prices), the largest part of winter cereals (82%) is used by the grain milling industry, while a significant portion (6%) is used by the animal feeds industry. There is no direct final demand for winter cereals by households, but despite being a net importer of winter cereals, some 3% of total supply and approximately 3.5% of domestic production of winter cereals, is exported.

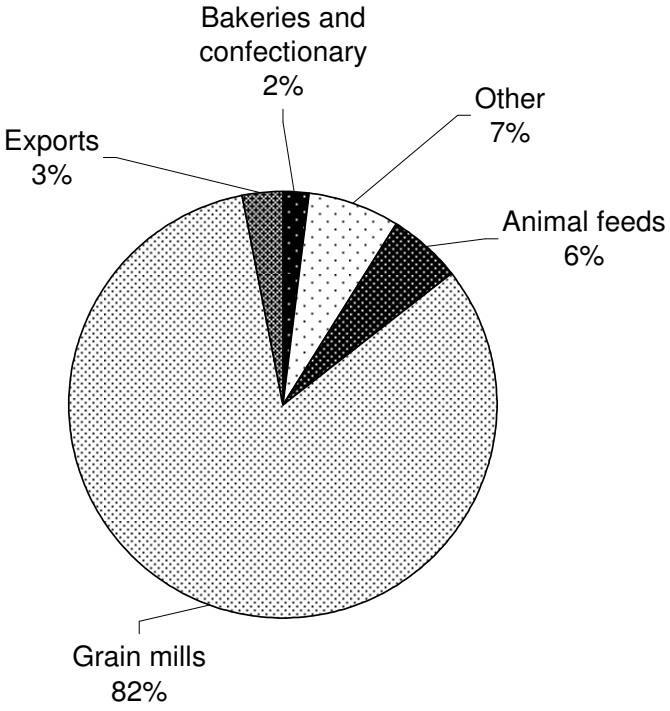

Figure 2: Structure of demand for winter cereals (2000)
Source: PROVIDE SAM (PROVIDE, 2006)

The import tax revenue from winter cereals was R145.13 million in 2000, representing an import tariff of 34.5% of the carriage insurance and freight paid (cif) value of imported winter cereals. This is the base import duty rate in the model, and is the main policy instrument under consideration in this study.[3]

3.3 Elasticities

A high Armington elasticity for winter cereals (value = 5) is selected in order to achieve a close correlation between import and domestic prices. This follows the observation that historically import parity prices and SAFEX wheat index prices are very closely matched (BFAP, 2005; Meyer *et al*., 2006). A relatively high elasticity is also sensible in light of the observation that wheat is a relatively homogenous product and easily traded.[4] Other elasticities are

[3] *It is worth noting that CGE models are homogenous of degree zero in prices, which means that the results generated by simulations are predominantly driven by the relative changes from the base and not the absolute value of the import duty rate.*

[4] *The presence of other products in the winter cereals commodity and the degree of complementarity between different grades of wheat in the South African milling industry are both arguments for an Armington elasticity that is not excessively high. The particular choice of elasticity is the result of informal econometric analysis and model calibration: the elasticity was adjusted until the achieved ratio between price changes in final demand and imports of winter cereals roughly equalled the relevant coefficient (0.63) of a regression of SAFEX prices on import parity prices. Hence we achieve a similar effect in the model, namely a shock to import prices of X is reflected in a price change in the final demand price of 59% of X. See also section 0, which reports model results.*

standard values that have been used in other studies, selected on the basis of reasonableness.

4. Experiments and model closures

4.1 Set-up of experiments

For the reported experiments, import tariff rates on winter cereals are increased in increments of 5 percentage points, up to 25 percentage points higher than the base case. The maximum tariff rate simulated is therefore 34.5% (the base tariff rate) + 25% = 59.5%, and there are six price simulations starting with a replication of the base case. Note that the implied tariff levied per ton of imported wheat will differ depending on prices. Throughout this study, percentage-point changes in tariff rates are good approximations for percentage-point changes in tariffs per ton imported because import prices vary only with endogenous exchange rate fluctuations, which are small.[5]

4.2 Model closures

The model contains certain conditions that must be satisfied – government account, external account, and factor market balances and savings-investment equality. These closure rules represent important assumptions about the way institutions operate in the economy and can influence model results substantially. As specified, the model allows a wide range of different model closure rules that can be used to adapt the model to the specific conditions relevant to a particular study. In most cases the closure rules for this application have been chosen for their suitability to the South African context, while bearing in mind the choice of experiments. The closures are generally realistic, that is, they are chosen to approximate our beliefs of what might actually happen assuming other aspects of policy are maintained. They are not necessarily welfare-neutral.

Results are generally reported for a single set of closure rules, except where government finances are discussed, in which case the results are compared to an alternative specification.

4.2.1 Government closure

Changes to import taxes involve fiscal implications (directly, and indirectly via economic expansion or contraction), and the response of the government to these can be expected to play an important role.

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[5] *However, if other experiments, such as international price changes, were to be conducted using the same model, varying tariffs per ton would result (specifically, high tariffs per ton when international prices are high).*

Constant tax rates are assumed throughout, which means the shocks will affect government income. Two alternate closures were explored:

- GC1: Under this closure, government maintains its expenditure levels in volume terms despite revenue shocks. Adjustment falls to the government deficit, so that an economic contraction (at constant tax rates) will put pressure on the savings-investment balance.
- GC2: In this 'balanced' scenario, government makes reasonable adjustments to its expenditure levels. Specifically, the proportion of government consumption expenditure to total final demand in the economy is fixed. It allows economic expansion or contraction without substantially altering the role government plays. On the other hand, it means that changes in government expenditure can take place, and this has implications when we assess welfare effects.

Under either closure, all tax rates are fixed and government savings (the fiscal deficit) adjusts endogenously in order to achieve fiscal balance. Note that the burden of financing government expenditure will fall on households through savings, since tax rates and total investment are fixed (see section 0). Since all experiments were conducted using both closures and it was found that the results were not sensitive to the two different government closures, only the results for closure GC2 are emphasised.

4.2.2 External balance

It is assumed in this study paper that South Africa's foreign savings remains constant at the base level; hence balance is achieved through a flexible exchange rate. Changes in tariffs have an effect on the exchange rate, but since wheat trade is small compared to total trade for the economy, this effect is relatively minor.

4.2.3 Savings-Investment closures

A balanced investment-driven savings configuration is used whereby the share of investment in absorption is fixed, and savings rates will adjust in order to balance the identity. It was mentioned above that the external balance (net foreign savings) is fixed and that the government balance can vary, therefore changes in government finances will impact on firms and households by affecting their savings rates.

As with the government closure, this closure is chosen for realism rather than for neutrality with regard to welfare, because changes in investment can occur,

which will affect the future earning potential of the economy and therefore future welfare.

4.2.4 Factor market closures

Unskilled labour is specified as not being fully employed, while skilled labour and capital, which are scarce factors, are assumed to be fully employed and are mobile between industries. This means that, following a negative shock to a particular sector, these factors will partially relocate to more profitable industries. The implications of this closure are particularly important when the effects of shocks on the wheat industry are considered. Land, on the other hand, is held fixed in each agricultural activity since the agricultural activities are disaggregated by region.

4.2.5 Numéraire

The consumer price index (CPI) is used as the numéraire; all price changes are therefore relative to the CPI, which is held fixed.

5. Results

Reporting of the results begins with the direct price effects on the domestic wheat market. Then the implications for activities and hence factor employment and incomes are considered via the impacts on other commodity markets. The discussion of the results concludes with the impacts on domestic institutions – first on the government and then on the welfare implications for households.

5.1 Winter cereals market effects

Prices of imports are affected directly by the changes in tariff rates, while the composite commodity price (the weighted average of the price of imports and the price of domestically produced commodities) is affected indirectly through the Armington specification of imperfect substitutability between domestic and imported commodities. As import prices rise, so do domestic producer prices; in all cases domestic prices increase as the tariff rate increases, but by less than the import prices (see Figure 3). All of the price changes have an almost linear relationship with the changes in the tariff rate. The import price increases by 18.6% for a 25-percentage-point increase in the import tariff on wheat. The composite commodity price changes by a factor of 0.6 of the change in the import price, while the domestic output price, received by domestic producers, increases by a factor of 0.5 of the change in the import price. This relationship reflects three things: (a) the share of imports versus domestic production in the SAM, (b) the Armington elasticity selected for this model,

and (c) the effective elasticity of (total) demand for winter cereals in the model.[6] Exchange rate fluctuations are also embodied in the price changes shown, but these are very small: a 0.3% appreciation for a 25-percentage-point increase in the tariff rate.

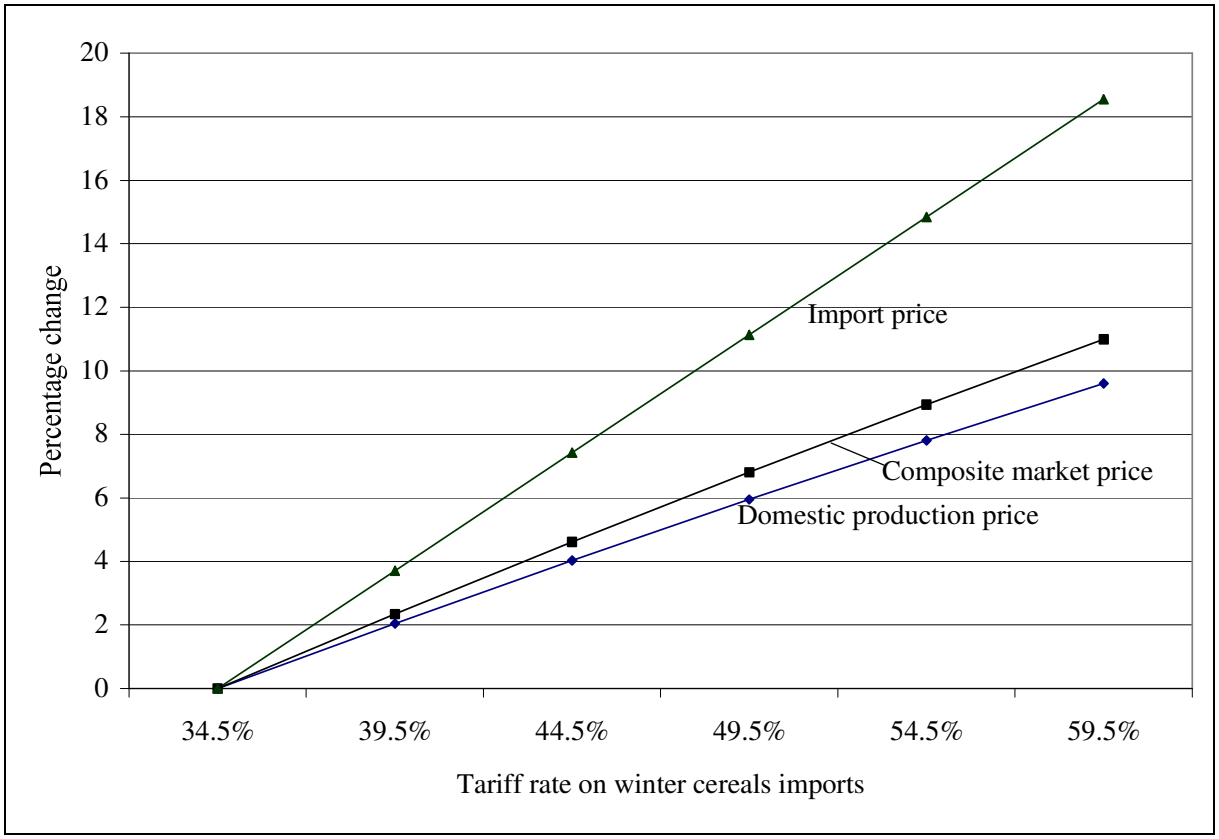

Figure 3: Winter cereals price effects
Source: model simulation results.

The increase in import prices of winter cereals leads to a strong decline (29.8% at the highest tariff rate) in the quantity of winter cereals imported (see Figure 4).[7] Some of this shortfall is compensated for by increased domestic production (2.5%) while the rest is countered by lower domestic market demand (2.5%), which is consistent with a higher domestic market price. The combination of an increase in the quantity of domestic production (2.5%) and a price increase (9.3%) means that the value of domestic winter cereal production increases by 12.1% or R 384.4 million.

[6] *See also section 0 on the choice of Armington elasticity.*

[7] *The balance of payment is assumed to be fixed as part of the closure conditions; hence adjustment is via minor changes in the exchange rate: a 0.3% appreciation for a 25-percentage-point increase in the tariff rate.*

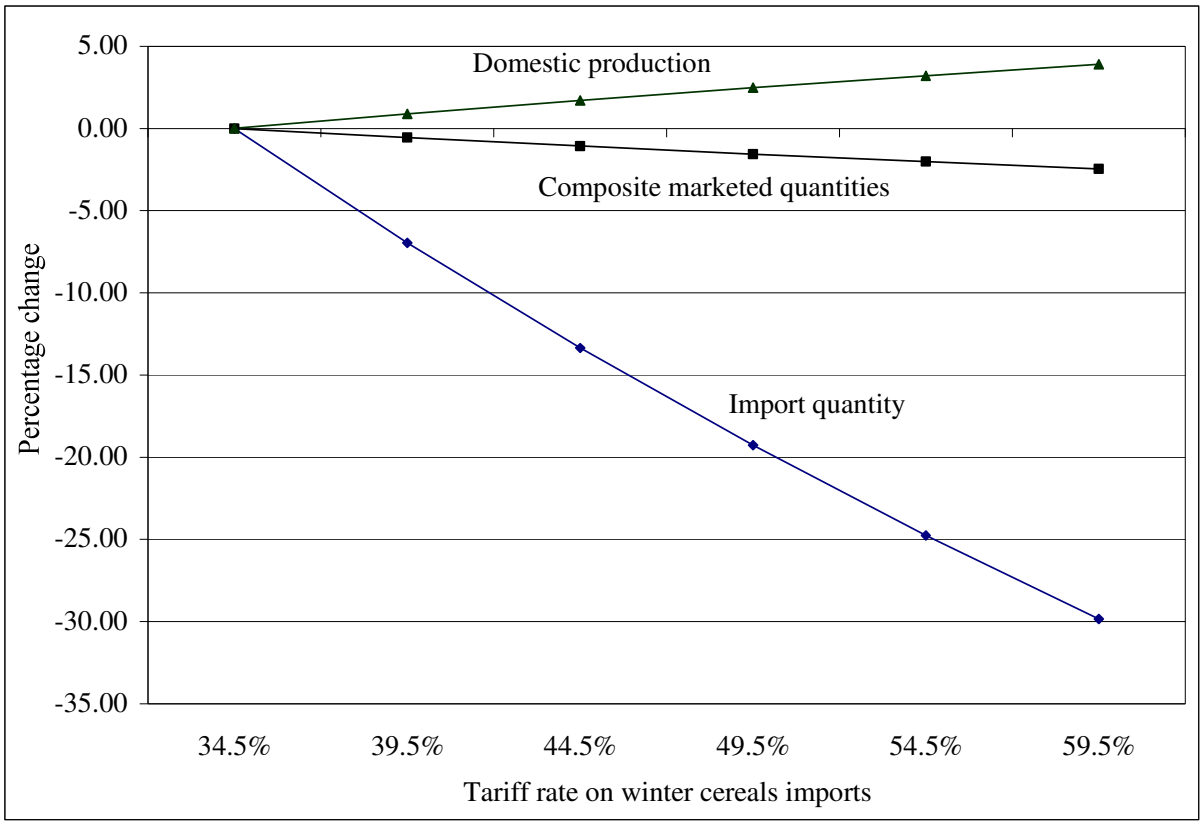

Figure 4: Winter cereals quantity effects
Source: model simulation results.

5.2 Other commodity market effects

Other commodity markets are also affected by these changes, and since the results generally follow a near linear pattern, only the results for the 25-percentage-point increase in the tariff rate are discussed. Figure 5 shows final composite (imported and domestically produced) commodity price changes for selected commodities and aggregates in the model. Detailed results for individual commodities combined into aggregates, show price changes ranging between −2% and +2%. Products dependent on winter cereals show price increases – grain mills (2.3%), animal feeds (0.7%), and bakeries and confectionary (0.4%) – while the effects on prices of other commodities are mixed. The results are partly driven by the behavioural assumption that the output composition of each agricultural activity remains the same as in the base case; hence the increase in production of wheat in main wheat producing areas would also cause a proportionate increase in production of other agricultural products, driving down the price of these products. Results are also influenced by reallocation of factors used in the production process. Overall, the weighted average food price increases by 0.3%, which indicates that food prices on average rise relative to other prices (specifically, the consumer price index or CPI). This suggests possible adverse effects to low-income households who spend proportionally more on food.

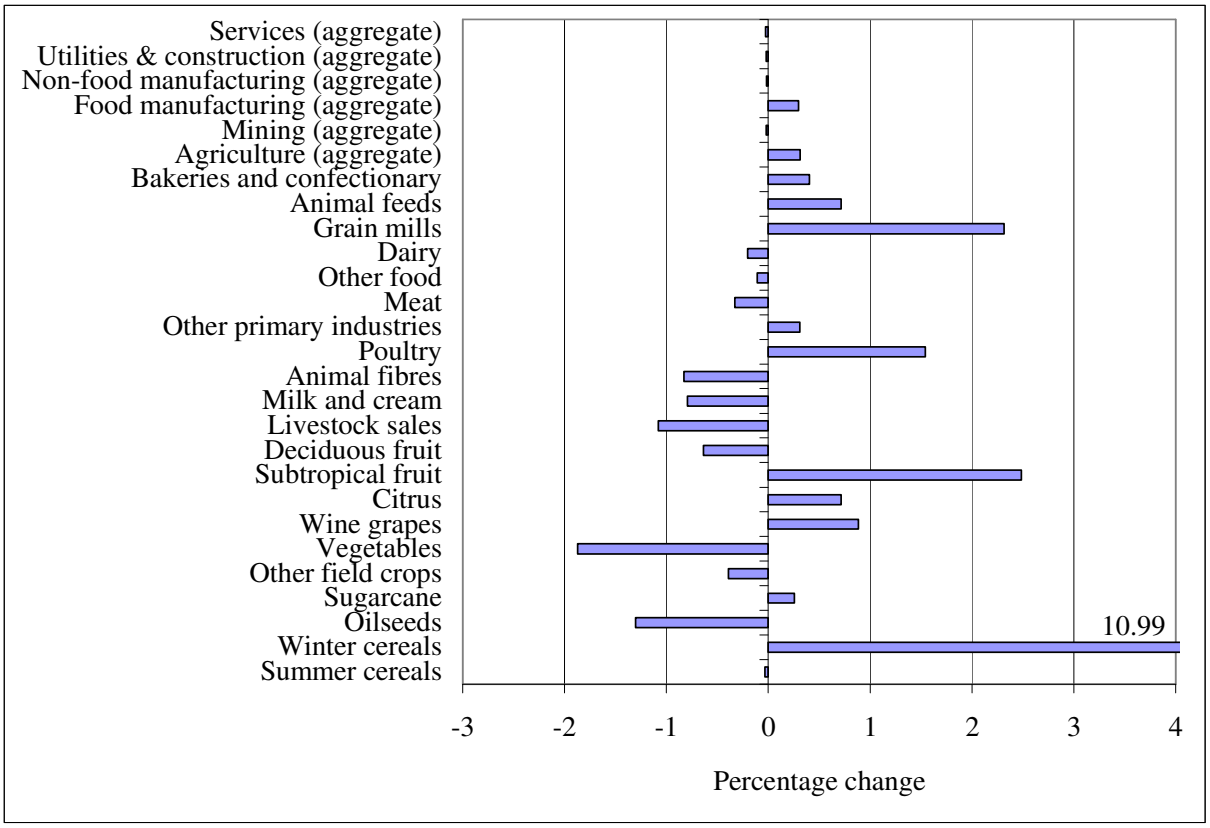

Figure 5: Purchaser price of composite commodity (PQD)
Source: model simulation results.

Figure 6 shows another important trade-related effect of imposing tariffs on wheat: imports of downstream products, namely grain mill products, animal feeds, and bakery and confectionary products will increase. This happens primarily because these products have become more expensive to produce locally, given that the price of winter cereals has increased. In the context of increased protection for wheat, these industries could argue that their products should also receive increased tariff protection because this is necessary merely to maintain their base level of effective protection.

The changes in purchaser prices induce changes in the quantity of commodities demanded as intermediate goods. Winter cereals show a marked decline (-2.5%) due to their price increase, whereas summer cereals do not show a decrease because of the substitution allowed between them in the grain milling industry. Grain mill products, bakery and confectionary products, and animal feeds show small decreases in demand as a result of their cost increases; pesticides and fertilizers show increases due to the expansion of agricultural activity in areas producing winter cereals. Other commodities, typically used as intermediates, suffer slight declines mainly due to a general economic contraction.

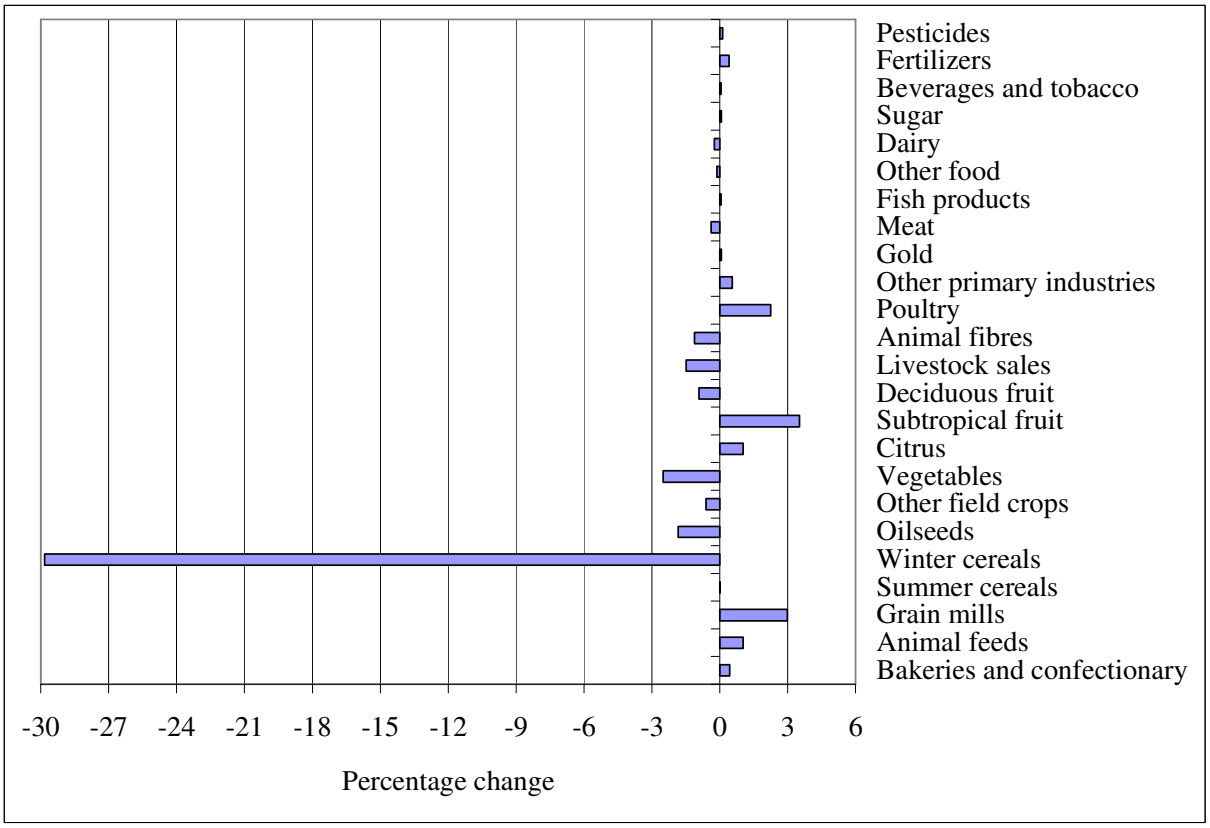

Figure 6: Quantity of commodity imports (QM)
Source: model simulation results.

5.3 Impact on industries

5.3.1 Intermediate input costs

Figure 7 shows the prices of aggregated bundles of intermediate inputs to selected industries (the effects are very small for industries not shown). Winter cereals are mostly used by the grain mill activity, which accounts for 82% of demand for winter cereals, explaining the increase in costs in that industry. A smaller part is also used by the animal feed industry (6% of demand). Bakeries and confectionaries use winter cereals (2% of demand), but mainly grain mill products, which include wheat flour (29% of demand); consequently, the wheat price changes impact on bakeries and confectionaries indirectly through their impact on the price of grain mill products.

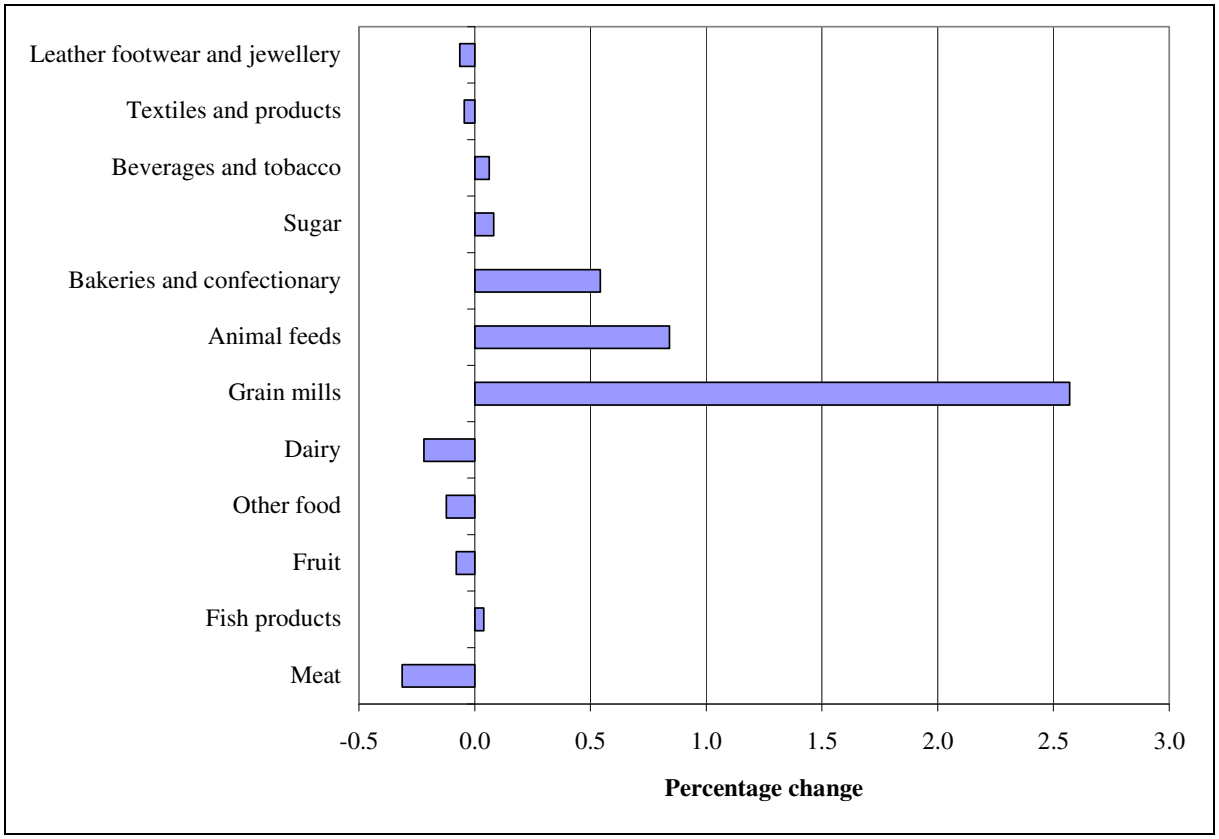

Figure 7: Price of aggregate intermediate inputs to activities (PINT)
Source: model simulation results.

5.3.2 Activity price and quantity effects

These price effects are reflected in the prices that activities receive for their aggregate production (see Figure 8). The output prices for winter cereal producers increase because the increase in the import prices induces an increase in the demand for domestically produced winter wheat, despite the overall decline in domestic demand. The impact on the average output price for each regional agricultural activity is primarily determined by the share of winter cereals in the production of a particular region. The output prices of activities that use winter cereals increase as a consequence of the economic adjustments initiated by increases in their input costs.

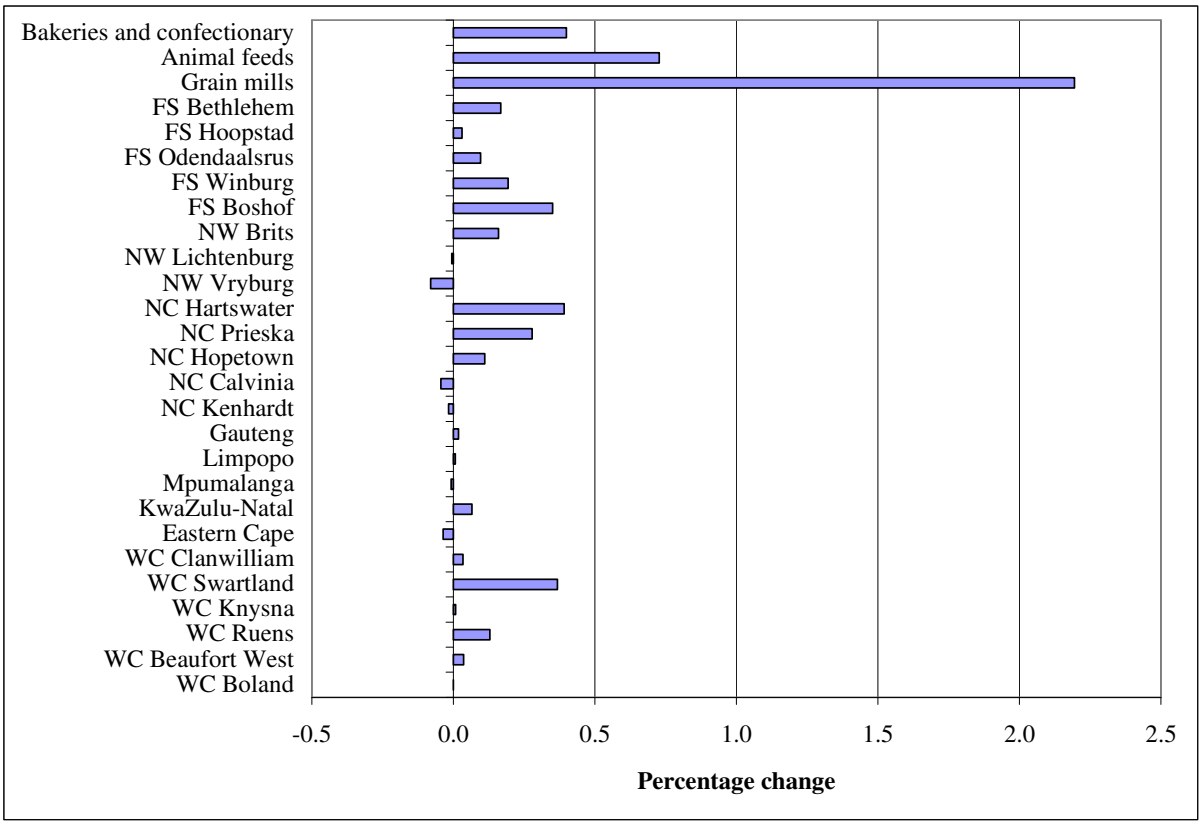

Figure 8: Producer prices by activity (PX)
Source: model simulation results.

While the output prices of both winter cereal producers and users increase, they do so for different reasons, and different quantity responses can therefore be expected. Winter cereal producers increase production in response to higher demand for their output, but wheat users decrease production in response to increased input costs. However, the expansion or contraction of industries is primarily affected by changes in returns to factors and subsequent reallocation. The change in the price of value added (*PVA*), reported in Table 1, indicates changes in the returns to factors in different activities; these follow changes in the quantities of production (not shown) that are determined by changes in output prices. As stated in section 5.1, total winter cereal production increases by 2.5% and the price at which it is produced increases by 9.3%; this is also reflected in Figure 8.

Table 1: Value added effects (Rand values for 2000)

Sector[8]	Base value added (R millions)	Price (PVA) change	Quantity (QVA) change	Value change	Value change (R millions)
Agriculture (average)	36 815.28	0.00%	0.22%	0.22%	81.1
Western Cape (average)	7 926.22	0.04%	0.70%	0.74%	58.8
WC Boland	3 587.65	-0.09%	-0.90%	-0.99%	-35.6
WC Beaufort West	439.98	-0.03%	-0.10%	-0.13%	-0.6
WC Ruens*	1 707.23	0.15%	2.13%	2.28%	39.0
WC Knysna	564.15	-0.03%	-0.15%	-0.18%	-1.0
WC Swartland*	1 133.55	0.37%	4.28%	4.67%	52.9
WC Clanwilliam	493.66	0.05%	0.80%	0.84%	4.2
Free State (average)	4 981.89	0.14%	1.56%	1.70%	84.6
FS Boshof*	482.25	0.46%	4.92%	5.40%	26.1
FS Winburg	757.67	0.24%	2.39%	2.64%	20.0
FS Odendaalsrus	223.43	0.01%	0.32%	0.33%	0.7
FS Hoopstad	1 928.11	-0.01%	0.14%	0.13%	2.5
FS Bethlehem*	1 590.43	0.19%	2.03%	2.22%	35.3
Northern Cape (average)	3 023.70	0.11%	1.56%	1.67%	50.5
NC Kenhardt	1 406.19	-0.04%	-0.31%	-0.35%	-4.9
NC Calvinia	530.75	-0.15%	-1.55%	-1.70%	-9.0
NC Hopetown*	345.92	0.16%	2.29%	2.45%	8.5
NC Prieska*	179.26	0.42%	6.02%	6.47%	11.6
NC Hartswater*	561.58	0.58%	7.27%	7.89%	44.3
North West (average)	3 189.60	-0.05%	-0.18%	-0.23%	-7.2
NW Vryburg	637.81	-0.16%	-1.44%	-1.60%	-10.2
NW Lichtenburg	1 789.92	-0.09%	-0.69%	-0.78%	-14.0
NW Brits	761.86	0.14%	2.08%	2.23%	17.0
Eastern Cape	2 560.27	-0.13%	-1.28%	-1.40%	-35.9
KwaZulu-Natal	4 497.73	-0.01%	0.11%	0.10%	4.5
Mpumalanga	4 847.15	-0.08%	-0.58%	-0.66%	-31.9
Limpopo	3 187.98	-0.07%	-0.65%	-0.71%	-22.8
Gauteng	2 600.75	-0.09%	-0.67%	-0.76%	-19.6
Non-agricultural sectors	739 797.89	-0.03%	-0.02%	-0.05%	-335.5
Grain mills	2 306.16	-0.03%	0.80%	0.77%	17.9
Animal feeds	682.78	-0.03%	0.48%	0.45%	3.1
Bakeries and confectionary	2 611.76	-0.02%	0.04%	0.03%	0.7
Other	734 197.19	-0.03%	-0.02%	-0.05%	-357.1
TOTAL	77 6613.17	-0.02%	-0.01%	-0.03%	-254.4

* Winter cereal's share in region's production > 10%

5.3.3 Effects on income earned in activities

To show how these effects translate into changes to income in the economy, see the effects on 'value of value added' for the various activities in the final two columns of Table 1. Because of increased import tariffs, some additional

[8] *The town names are an indication of the region. See Appendix B for details on all towns and surrounding areas, including agricultural regions.*

value is created in the winter cereal producing regions, such as the Swartland (R52.9 million), Hartswater area (R44.3 million), Ruens/Southern Cape (R39.0 million), Boshof area (R26.1 million) and areas surrounding Winburg (R20.0 million). However, this positive impact must be seen in the light of other effects on the economy. All agricultural regions with limited winter cereal production (i.e. those denoted by province names) show lower value added (except KwaZulu-Natal). Agriculture as a whole experiences an increase in value added of R81.1 million, which is made up of an increase in value added in regions with more than 10% winter cereals of R217.7 million and a decrease in valued added of R136.6 million. In addition, the negative effect on value added in the rest of the economy is some R335 million, which although only a small proportionate decrease, more than outweighs the (mixed) benefit to agriculture. Overall, there is a loss of R254 million of value added in the economy.

The industries that use wheat show slight increases in the value of value added. This is due to substitution of value added (primary factor use) for intermediate inputs (recall that total production quantities in these sectors decline), which suggests a movement of production towards higher-value output components within their respective categories. Where technically feasible, this is a rational response to the incentive effects identified.

5.4 Factor impacts

5.4.1 Employment

In the light of the modelling assumption that unskilled labour categories are not fully employed, it is possible to determine changes in employment from the model results for these categories. Figure 9 reports changes in employment for the Free State, Northern Cape and Western Cape at a 25-percentage-point increase in the import tariff rate. Introducing higher tariff rates on winter cereals has the predictable effect of increasing employment for some of the factors directly involved in the production of winter cereals in the Northern Cape, Free State and Western Cape. However, employment in all other sectors decreases, which strongly suggests that the result would be an increase in unemployment overall. For the majority (31) of categories the effect is quite small, with a decrease in employment of less than 0.1%. Of the 48 labour factors affected, the picture is negative for 41 and positive for the remaining 7. Note that these labour categories represent labour in all economic sectors, not only in agriculture.

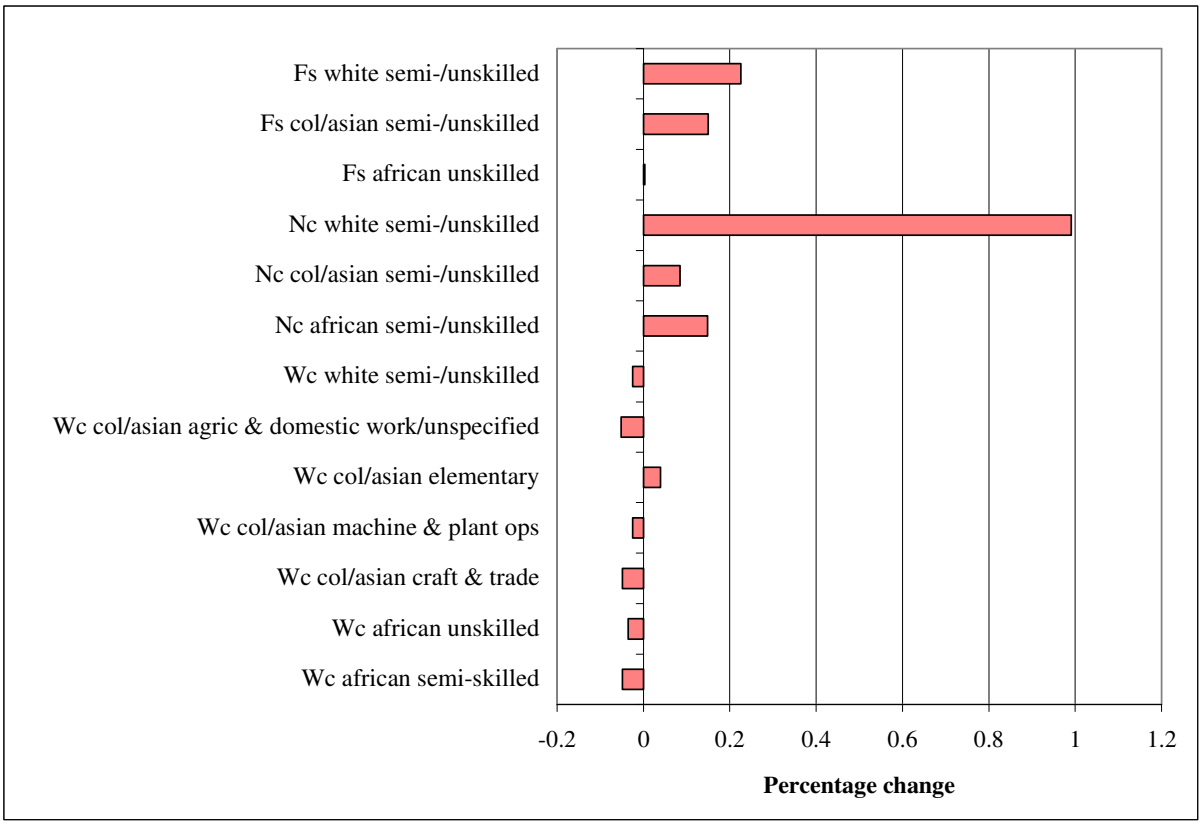

Figure 9: Employment (FS) – Free State (Fs), Northern Cape (Nc) and Western Cape (Wc)

Source: model simulation results.

5.4.2 Factor income

In the case of the 48 unemployed factors mentioned above, income changes are due to changes in employment levels because the wage rate remains constant. Factors which are assumed to be fully employed, i.e. skilled labour, land and GOS, experience a change in wage rate that drives the changes in factor incomes for these factors. The decline in factor incomes for all skilled labour is, on average, 0.04%. The returns to capital (factor income of gross operating surplus [GOS]) decrease slightly, by 0.03%. GOS and skilled labour are mobile across sectors, so they experience decreases in their incomes because of the overall decline in economic activity. This is observed even after partially relocating to sectors that might offer higher returns because of the increased tariff rates, such as the agricultural regions with significant winter cereal production.

5.4.3 Return to land

The rate of return on land as a primary production factor increases by 0.2%. Underlying this are diverging trends in different regions – Figure 10 provides the details. There are large increases in returns to land in the winter cereal

producing regions, but these are almost completely offset by declines in all other regions.

Why do rates of return to land in non-winter cereal producing regions suffer? There is, of course, the general economic decline that affects all sectors negatively and the slight exchange rate appreciation that tends to harm trade-focussed sectors such as agriculture. However, there is a more fundamental reason: the total area of land per agricultural activity recorded in the SAM is fixed because these agricultural activities are classified according to agronomic regions (see Appendix B), while other scarce factors are free to relocate. When capital and skilled labour relocate from sectors, e.g. the non-winter cereal producing regions, there is more land relative to capital (and other factors) in these sectors, thus the return to land is lower. By the same reasoning, the ratio in the main winter cereal producing regions decreases, hence the particularly large increases in returns to land in those regions. This emphasises the importance of allocative efficiency in the economy, demonstrating one of the costs of 'artificially' raising returns in some sectors relative to others.

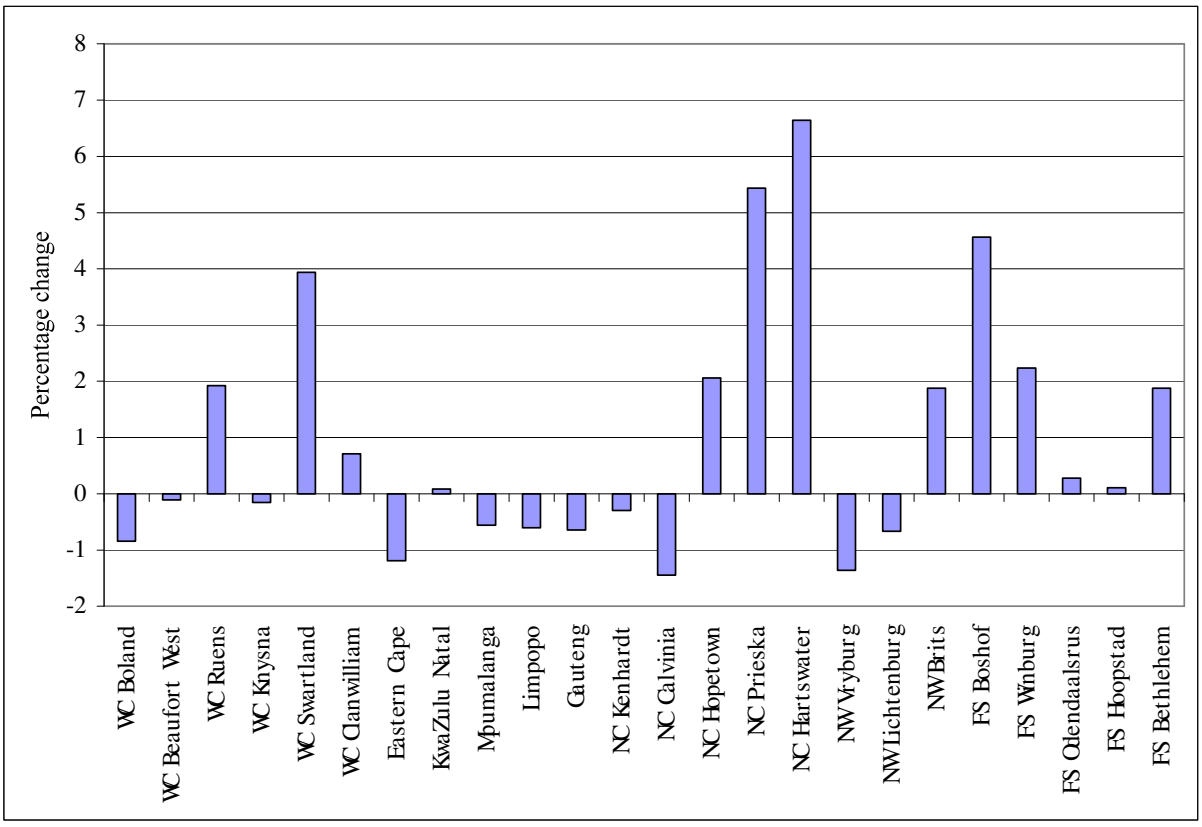

Figure 10: Returns to land
Source: model simulation results.

5.5 Government effects

Figure 11 reports the percentage changes in government related variables. All of the changes are small (less than 0.04%). Revenues from direct income tax on households and enterprises decrease as a result of the decreases in enterprise income and aggregate household income, since the tax rates are held constant. The decrease in revenue from sales tax is the result of a decrease in the value of final demand for commodities. The import duty revenue shows an increase for increases in the duty rate up to a 20-percentage-point increase over the base value, after which the revenue starts to decline. The increase in the import tariff rate causes a decline in the value of imports, therefore for additional import tariff rate increases the decrease in revenue – as a result of the decline in the value of imports – outweighs the increase in the tax revenue brought about by the increase in the tax rate.

Government (dis)savings decrease over the entire range considered, but the decrease is the greatest at a tariff rate of a 15-percentage-point increase over the base value. Government savings is the difference between government income and expenditure, and a decrease in this instance signifies a decrease in the government deficit. As is illustrated in Figure 11, the rate of decrease in government income is lower than that of government expenditure. The initial (small) improvement in the deficit dissipates as the tariff rate is further increased, which suggests that increasing import tariffs is not necessarily a robust means of improving the fiscal balance. Furthermore, the fiscal balance improves while the value of government expenditure declines – a situation not necessarily to the advantage of social welfare.

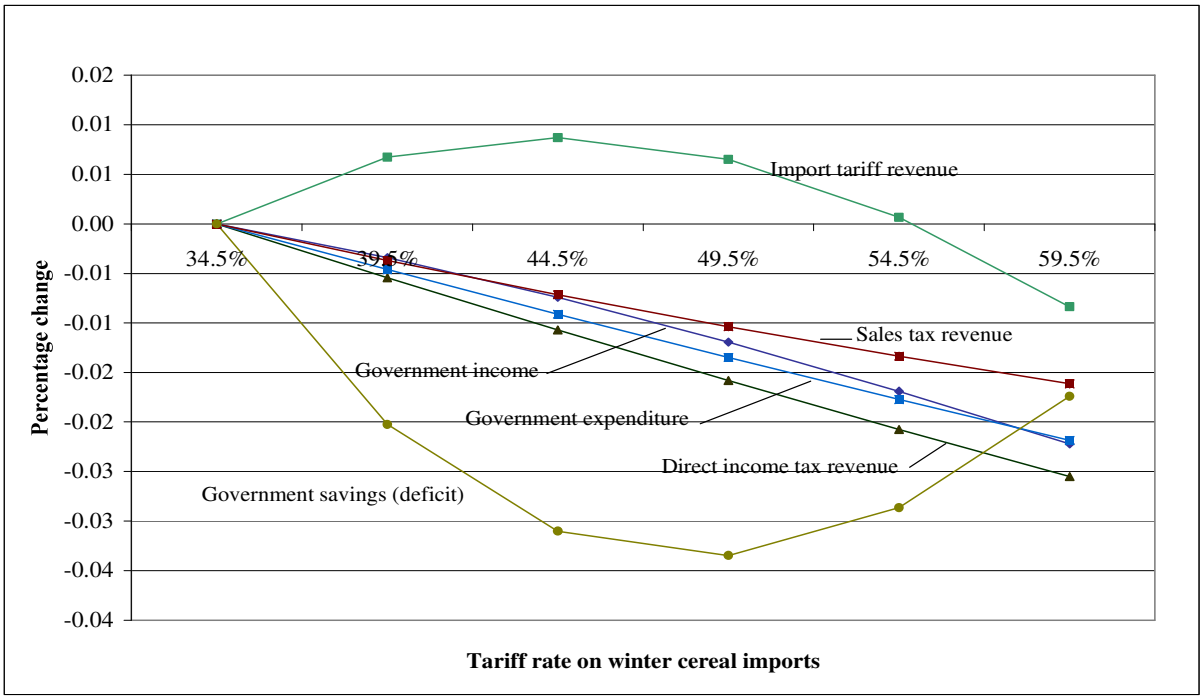

Figure 11: Government finance
Source: model simulation results.

For this experiment, we have also looked at the results produced when using a different government closure rule, GC1, where government consumption volumes are held fixed. The results are virtually identical for the two closures, because there is a slight decrease in the price of government goods, which allows the constant volume expenditure to practically coincide with a constant ratio of government expenditure to value of total demand.

5.6 Household impact

Changes to household expenditure are shown in Figure 12 for the Free State and in Figure 13 for the Western Cape and Northern Cape, classified by the education level and gender of the head of household. These changes are mainly driven by changes in income accruing to the factors owned by households. Out of 162 household groups, only seven show increases as a result of the increase in tariffs on winter cereals. Five of these are in the Northern Cape and two in the Free State. No household groups in the Western Cape increase their expenditure. This is indicative of the fact that the net welfare impact in the Western Cape is negative, bearing in mind that these household groups are representative of all households and not only rural- or agricultural-related households. This suggests that the beneficiaries are those directly involved in winter cereal production – farmers and, in some instances, farm workers – with little or no benefits to other households. Furthermore, several household groups do not benefit overall despite their involvement in winter cereal production.

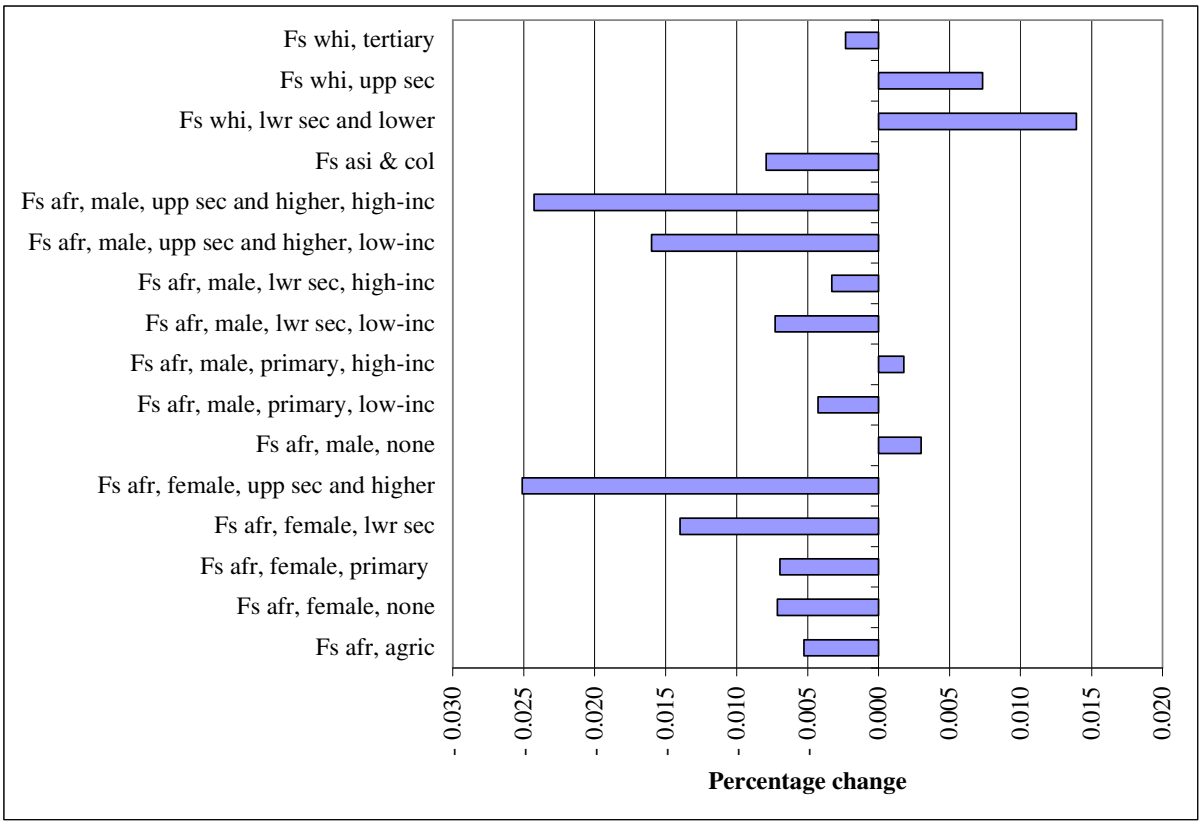

Figure 12: Household consumption expenditure (HEXP) – Free State
Source: model simulation results.

Figure 14 plots weighted (by inverse of base expenditure) changes in an equivalent variation (EV) welfare measure against base per capita income for the households. The pattern is not entirely clear, but there is considerable variation in the effects of the experiment on low-income households. The overall result suggests that tariff protection on winter cereals both reduces welfare and is regressive, i.e. the negative impacts increase as income declines. This is mostly due to the relative increase in food prices (see section 0).

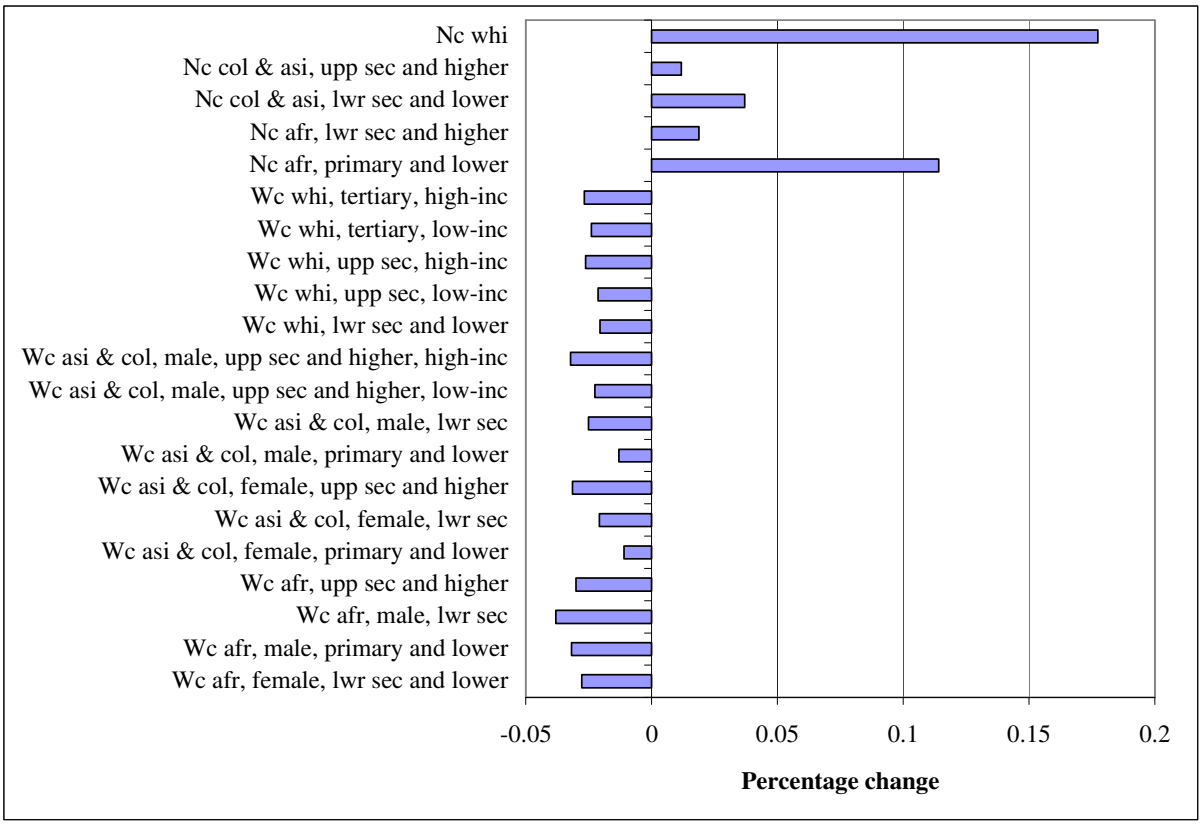

Figure 13: Household consumption expenditure (HEXP) –Northern Cape (Nc) and Western Cape (Wc)

Source: model simulation results.

If household expenditure is used as a proxy for welfare, it is important to keep in mind that there are other factors that may affect household welfare. In particular, these are government expenditure, which affects the availability of social services, and investment, which affects the future potential of the economy. 'Realistic' closures were used, implying that changes to these items can occur in the model.[9] To put the household expenditure effects in perspective, it is useful to consider the changes in the components of domestic final demand. For a tariff increase of 25 percentage points, these are (in 2000 values):

- Total household expenditure decreases by R170 million;
- Government expenditure decreases by R52 million;
- Total investment decreases by R44 million.

Since all components decrease, it can be concluded that the total (current and future) negative welfare effect is at least as great as that measured using a welfare measure based on household consumption expenditure.

[9] *The foreign account closure uses a fixed balance, implying that the foreign account is in fact welfare-neutral.*

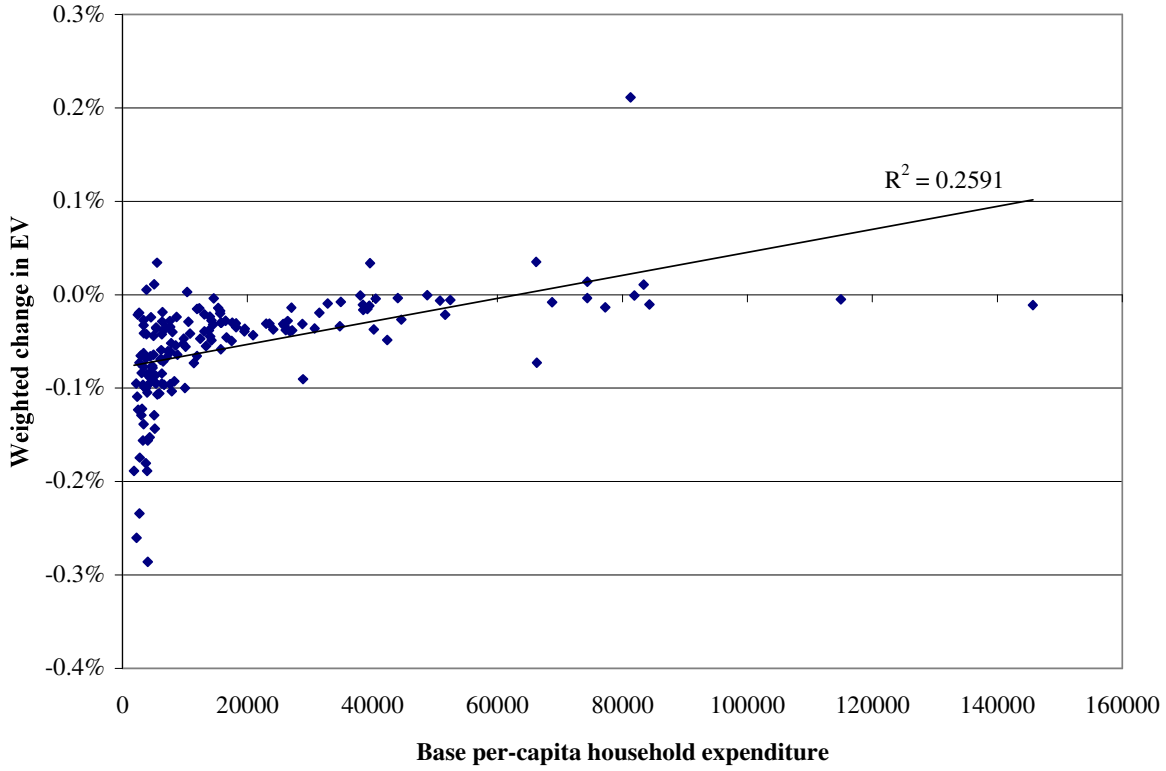

Figure 14: Change in equivalent variation (EV) welfare measure vs. per capita income

Source: model simulation results.

6. Conclusion

The impact on the economy of a 25-percentage-point increase in the tariff rate on wheat, when compared to the base case, translates into a small decrease of 0.03% in gross domestic product (GDP) in net terms, i.e. after accounting for the benefits to farmers and farm workers involved in the production of winter cereals. This represents a cost of R257.4 million (2000 values) to the economy.

The direct effects of imposing higher import tariff rates on winter cereals are price increases for winter cereals and a substantial substitution in favour of domestic winter cereal production. Higher prices for winter cereals affect downstream industries (grain mills, animal feeds, and bakeries and confectionary), increasing their input costs, lowering production and increasing final prices for their output goods. There is also a slight currency appreciation (0.03%) and an accompanying decline in levels of trade.

The general contraction of the economy as indicated by changes in GDP is the result of different changes taking place at an industry level. Most industries are affected negatively, except the winter cereal producers themselves. The main winter cereal producing agricultural regions tend to expand, and this

expansion is sufficient to cause a net increase in value added (comparable to GDP) in agriculture as a whole. However, this is outweighed by the negative effects in non-agricultural sectors and other agricultural regions. Furthermore, there is a reallocation of scarce factors from other sectors towards winter cereal production. This is an important consideration in terms of allocative efficiency in the economy because the returns from winter cereal production are raised 'artificially' when tariff rates are increased.

The reallocation of resources towards winter cereal production is also reflected in the results for factors and households, where only those closely involved in winter cereal production benefit. This is especially the case in the Free State and Northern Cape. However, in the Western Cape, despite the fact that it has two main winter cereal producing areas, it was found that the anticipated benefits of the increased tariff on wheat imports is not sufficient to outweigh the negative impacts on employment and factor incomes because of the general contraction in the economy. The effects are also mildly regressive, i.e. they tend to harm low-income households more than high-income households. This is largely explained by the increase in some food prices.

These results illustrate the likely economic costs, should policymakers wish to apply tariffs for strategic, humanitarian or any other purpose.

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Appendix A: SAM accounts

This section contains a complete listing of SAM accounts used in the model for this study, organised by type.

Commodities: agriculture
1. Summer cereals
2. Winter cereals
3. Oilseeds
4. Sugarcane
5. Other field crops
6. Potatoes and vegetables
7. Wine grapes
8. Citrus
9. Subtropical
10. Deciduous
11. Other horticulture
12. Livestock sales
13. Milk and cream
14. Animal fibres
15. Poultry
16. Other primary industries
17. Forestry

Commodities: other
18. Coal
19. Gold
20. Crude oil
21. Other mining
22. Meat
23. Fish products
24. Fruit
25. Other food
26. Dairy
27. Grain mills
28. Animal feeds
29. Bakeries and confectionary
30. Sugar
31. Beverages and tobacco
32. Textiles and textile products
33. Leather footwear and jewellery
34. Wood and Furniture
35. Paper and paper products
36. Publishing and broadcasting
37. Petroleum
38. Basic chemicals
39. Fertilizers
40. Primary plastics
41. Pesticides
42. Other chemicals and chemical products
43. Tyres
44. Other manufacturing
45. Glass and plastic products
46. Ceramics
47. Cement
48. Other non-metallic
49. Iron and steel
50. Non-ferrous metals
51. Other metals
52. Other transport, engines and vehicle parts
53. Electric equipment and machinery
54. Machinery
55. Motor Vehicles
56. Electricity
57. Water
58. Construction
59. Trade
60. Other Services
61. Transport Services
62. Communications
63. Financial services indirectly measured (FSIM)
64. Business Activities and Insurance
65. General Government health and social work

Activities: agricultural
(Western Cape)
66. WC Boland
67. WC Beaufort West
68. WC Ruens
69. WC Knysna
70. WC Swartland
71. WC Clanwilliam
72. Eastern Cape
73. KwaZulu-Natal
74. Mpumalanga
75. Limpopo
76. Gauteng

(Northern Cape)
77. NC Kenhardt
78. NC Calvinia
79. NC Hopetown
80. NC Prieska
81. NC Hartswater

(North West)
82. NW Vryburg
83. NW Lichtenburg
84. NW Brits

(Free State)
85. FS Boshof
86. FS Winburg
87. FS Odendaalsrus
88. FS Hoopstad
89. FS Bethlehem

Activities: other
90. Coal
91. Gold

92. Other mining
93. Meat
94. Fish products
95. Fruit
96. Other food
97. Dairy
98. Grain mills
99. Animal feeds
100. Bakeries and confectionary
101. Sugar
102. Beverages and tobacco
103. Textiles and products
104. Leather, footwear and jewellery
105. Wood and furniture
106. Paper and paper products
107. Publishing and broadcasting
108. Petroleum
109. Basic chemicals
110. Fertilizers
111. Primary plastics
112. Pesticides
113. Other chemicals and chemical products
114. Tyres
115. Other manufacturing
116. Glass and plastic products
117. Ceramics
118. Cement
119. Other non-metallic
120. Iron and steel
121. Non-ferrous metals
122. Other metals
123. Other transport, engines and vehicle parts
124. Electric equipment and machinery
125. Machinery
126. Motor vehicles
127. Electricity
128. Water
129. Construction
130. Trade
131. Other services
132. Transport services
133. Communications
134. Business activities and insurance
135. Government health and social services
136. Domestic services

Households

137. Wc afr, female, lwr sec and lower
138. Wc afr, male, primary and lower
139. Wc afr, male, lwr sec
140. Wc afr, upp sec and higher
141. Wc asi & col, female, primary and lower
142. Wc asi & col, female, lwr sec
143. Wc asi & col, female, upp sec and higher
144. Wc asi & col, male, primary and lower
145. Wc asi & col, male, lwr sec
146. Wc asi & col, male, upp sec and higher, low-inc
147. Wc asi & col, male, upp sec and higher, high-inc
148. Wc whi, lwr sec and lower
149. Wc whi, upp sec, low-inc
150. Wc whi, upp sec, high-inc
151. Wc whi, tertiary, low-inc
152. Wc whi, tertiary, high-inc
153. Ec afr, agric
154. Ec afr, homeland, female, none
155. Ec afr, homeland, female, primary
156. Ec afr, homeland, female, lwr sec
157. Ec afr, homeland, female, upp sec and higher, low-inc
158. Ec afr, homeland, female, upp sec and higher, high-inc
159. Ec afr, homeland, male, none
160. Ec afr, homeland, male, primary
161. Ec afr, homeland, male, lwr sec
162. Ec afr, homeland, male, upp sec and higher, low-inc
163. Ec afr, homeland, male, upp sec and higher, high-inc
164. Ec afr, non-homeland, female, none
165. Ec afr, non-homeland, female, primary
166. Ec afr, non-homeland, female, lwr sec
167. Ec afr, non-homeland, female, upp sec and higher
168. Ec afr, non-homeland, male, none
169. Ec afr, non-homeland, male, primary
170. Ec afr, non-homeland, male, lwr sec
171. Ec afr, non-homeland, male, upp sec and higher
172. Ec asi & col, primary and lower
173. Ec asi & col, lwr sec
174. Ec asi & col, upp sec and higher
175. Ec whi, lwr sec and lower
176. Ec whi, upp sec
177. Ec whi, tertiary
178. Nc afr, primary and lower
179. Nc afr, lwr sec and higher
180. Nc col & asi, lwr sec and lower
181. Nc col & asi, upp sec and higher
182. Nc whi
183. Fs afr, agric
184. Fs afr, female, none
185. Fs afr, female, primary
186. Fs afr, female, lwr sec
187. Fs afr, female, upp sec and higher
188. Fs afr, male, none
189. Fs afr, male, primary, low-inc
190. Fs afr, male, primary, high-inc
191. Fs afr, male, lwr sec, low-inc
192. Fs afr, male, lwr sec, high-inc
193. Fs afr, male, upp sec and higher, low-inc

194. Fs afr, male, upp sec and higher, high-inc
195. Fs asi & col
196. Fs whi, lwr sec and lower
197. Fs whi, upp sec
198. Fs whi, tertiary
199. Kz afr, agric, homeland
200. Kz afr, agric, non-homeland, low-inc
201. Kz afr, agric, non-homeland, high-inc
202. Kz afr, homeland, female, none
203. Kz afr, homeland, female, primary
204. Kz afr, homeland, female, lwr sec
205. Kz afr, homeland, female, upp sec and higher
206. Kz afr, homeland, male, none
207. Kz afr, homeland, male, primary
208. Kz afr, homeland, male, lwr sec
209. Kz afr, homeland, male, upp sec and higher
210. Kz afr, non-homeland, female, none
211. Kz afr, non-homeland, female, primary
212. Kz afr, non-homeland, female, lwr sec
213. Kz afr, non-homeland, female, upp sec and higher, low-inc
214. Kz afr, non-homeland, female, upp sec and higher, high-inc
215. Kz afr, non-homeland, male, none
216. Kz afr, non-homeland, male, primary
217. Kz afr, non-homeland, male, lwr sec, low-inc
218. Kz afr, non-homeland, male, lwr sec, high-inc
219. Kz afr, non-homeland, male, upp sec and higher, low-inc
220. Kz afr, non-homeland, male, upp sec and higher, high-inc
221. Kz asi, female, lwr sec and lower
222. Kz asi, male, lwr sec and lower, low-inc
223. Kz asi, male, lwr sec and lower, high-inc
224. Kz asi, male, upp sec and higher, low-inc
225. Kz asi, male, upp sec and higher, high-inc
226. Kz col
227. Kz whi, lwr sec and lower
228. Kz whi, upp sec, low-inc
229. Kz whi, upp sec, high-inc
230. Kz whi, tertiary
231. Nw afr, agric
232. Nw afr, female, none
233. Nw afr, female, primary
234. Nw afr, female, lwr sec
235. Nw afr, female, upp sec and higher
236. Nw afr, male, none, low-inc
237. Nw afr, male, none, high-inc
238. Nw afr, male, primary, low-inc
239. Nw afr, male, primary, high-inc
240. Nw afr, male, lwr sec, low-inc
241. Nw afr, male, lwr sec, high-inc
242. Nw afr, male, upp sec and higher, low-inc
243. Nw afr, male, upp sec and higher, high-inc
244. Nw asi & col
245. Nw whi, lwr sec and lower
246. Nw whi, upp sec and higher
247. Gt afr, agric
248. Gt afr, non-homeland, female, none
249. Gt afr, non-homeland, female, primary
250. Gt afr, female, lwr sec
251. Gt afr, non-homeland, female, upp sec, low-inc
252. Gt afr, non-homeland, female, upp sec, high-inc
253. Gt afr, non-homeland, female, tertiary
254. Gt afr, non-homeland, male, none
255. Gt afr, non-homeland, male, primary
256. Gt afr, non-homeland, male, lwr sec
257. Gt afr, non-homeland, male, upp sec
258. Gt afr, non-homeland, male, unknown
259. Gt afr, non-homeland, male, tertiary, low-inc
260. Gt afr, non-homeland, male, tertiary, high-inc
261. Gt col, lwr sec and lower
262. Gt col, upp sec and higher
263. Gt asi, lwr sec and lower
264. Gt asi, upp sec and higher
265. Gt whi, lwr sec and lower, low-inc
266. Gt whi, lwr sec and lower, high-inc
267. Gt whi, upp sec, low-inc
268. Gt whi, upp sec, high-inc
269. Gt whi, tertiary, low-inc
270. Gt whi, tertiary, high-inc
271. Mp afr, agric
272. Mp afr, female, none
273. Mp afr, female, primary
274. Mp afr, female, lwr sec
275. Mp afr, female, upp sec and higher
276. Mp afr, male, none
277. Mp afr, male, primary, low-inc
278. Mp afr, male, primary, high-inc
279. Mp afr, male, lwr sec, low-inc
280. Mp afr, male, lwr sec, high-inc
281. Mp afr, male, upp sec and higher, low-inc
282. Mp afr, male, upp sec and higher, high-inc
283. Mp asi & col
284. Mp whi
285. Lp afr, agric
286. Lp afr, female, non & pre-primary

287. Lp afr, female, primary
288. Lp afr, female, lwr sec
289. Lp afr, female, upp sec and higher, low-inc
290. Lp afr, female, upp sec and higher, high-inc
291. Lp afr, male, none
292. Lp afr, male, primary, low-inc
293. Lp afr, male, primary, high-inc
294. Lp afr, male, lwr sec
295. Lp afr, male, upp sec and higher, low-inc
296. Lp afr, male, upp sec and higher, high-inc
297. Lp asi & col
298. Lp whi

Factors: labour

299. Wc afr skilled/high-skilled
300. Wc afr semi-skilled
301. Wc afr unskilled
302. Wc col/asi high-skilled
303. Wc col/asi clerks
304. Wc col/asi service & shops
305. Wc col/asi craft & trade
306. Wc col/asi machine & plant ops
307. Wc col/asi elementary
308. Wc col/asi agric & domestic work/ unspecified
309. Wc whi high-skilled
310. Wc whi skilled
311. Wc whi semi- & unskilled
312. Ec afr high-skilled
313. Ec afr skilled
314. Ec afr agric & fishery
315. Ec afr craft & trade
316. Ec afr machine & plan ops
317. Ec afr elementary
318. Ec afr domestic & unspecified
319. Ec col/asi high-skilled/skilled
320. Ec col/asi semi-/unskilled
321. Ec whi high-skilled
322. Ec whi skilled
323. Ec whi semi-/unskilled
324. Nc afr high-/skilled
325. Nc afr semi-/unskilled
326. Nc col/asi high-/skilled
327. Nc col/asi semi-/unskilled
328. Nc whi high-skilled/skilled
329. Nc whi semi-/unskilled
330. Fs afr high-/skilled
331. Fs afr semi-skilled
332. Fs afr unskilled
333. Fs col/asi high-/skilled
334. Fs col/asi semi-/unskilled
335. Fs whi high-/skilled
336. Fs whi semi-/unskilled
337. Kz afr high-skilled
338. Kz afr skilled
339. Kz afr agriculture & fisheries
340. Kz afr craft & trade
341. Kz afr machine & plant ops
342. Kz afr elementary
343. Kz afr domestic & unspecified
344. Kz col high-/skilled
345. Kz col semi-/unskilled
346. Kz asi high-skilled/skilled
347. Kz asi semi-/unskilled
348. Kz whi high-skilled/skilled
349. Kz whi semi-/unskilled
350. Nw afr high-/skilled
351. Nw afr semi-skilled
352. Nw afr unskilled
353. Nw col/asi high-/skilled
354. Nw col/asi semi-/unskilled
355. Nw whi high-/skilled
356. Nw whi semi-/unskilled
357. Gt afr high-skilled
358. Gt afr clerks
359. Gt afr service & shops
360. Gt afr craft & trade
361. Gt afr machine & plant ops
362. Gt afr elementary
363. Gt afr domestic/agric/unspecified
364. Gt col high-/skilled
365. Gt col semi-/unskilled
366. Gt asi high-/skilled
367. Gt asi semi-/unskilled
368. Gt whi high-skilled
369. Gt whi skilled
370. Gt whi semi-/unskilled
371. Mp afr high-skilled
372. Mp afr skilled
373. Mp afr semi-skilled
374. Mp afr unskilled
375. Mp col/asi high-/skilled
376. Mp col/asi semi-/unskilled
377. Mp whi high-/skilled
378. Mp whi semi-/unskilled
379. Lp afr high-skilled
380. Lp afr skilled
381. Lp afr semi-skilled
382. Lp afr unskilled
383. Lp col/asi high-/skilled
384. Lp col/asi semi-/unskilled
385. Lp whi high-/skilled
386. Lp whi semi-/unskilled

Factors: other

387. Gross operating surplus mixed income (capital)
388. Land

Trade and transport margins

389. Transport margin

390. Trade margin

Tax accounts

391. Import duties (IMPTAX)
392. Production rebates (INDREF)
393. Production taxes (INDTAX)
394. Production subsidies (INDSUB)
395. Value added taxes in imports (VATM)
396. Value added taxes on domestic goods (VATD)
397. Sales subsidies (SALSUB)
398. Excise duty (ECTAX)
399. Other accounts
400. Enterprises
401. Government
402. Savings
403. Stock Changes
404. Rest of World
405. Account Totals

Appendix B: Agricultural regions in SAM

Region name	Magisterial regions	Value of winter cereal production (R million)	Share of region's production in total winter cereal production	Share of winter cereal in region's production
FS Bethlehem	Bethlehem, Harrismith, Vrede, Frankfort, Reitz, Lindley, Senekal, Fouriesburg, Ficksburg	450.5	15.9%	15.4%
WC Swartland	Malmesbury, Hopefield, Piketberg, Vredenburg, Moorresburg	427.5	15.1%	20.1%
WC Ruens	Caledon, Hermanus, Bredasdorp, Swellendam, Heidelberg (Cape)	283.6	10.0%	10.7%
NC Hartswater	Herbert, Barkly West, Warrenton, Hartswater	274.6	9.7%	27.7%
FS Hoopstad	Kroonstad, Ventersburg, Hennenman, Parys, Vredefort, Koppies, Heilbron, Viljoenskroon, Bothaville, Wesselsbron, Hoopstad, Bultfontein, Theunissen	240.8	8.5%	7.2%
FS Winburg	Bloemfontein, Botshabelo, Bethulie, Rouxville, Smithfield, Zastron, Brandfort, Winburg, Marquard, Clocolan, Excelsior, Ladybrand, Wepener, Dewetsdorp, Reddersburg, Edenburg, Trompsburg, Jagersfontein, Philippolis	202.6	7.2%	14.7%
FS Boshof	Boshof, Fauresmith, Jacobsdal, Koffiefontein, Petrusburg	182.7	6.5%	23.4%
NC Hopetown	Hopetown, Britstown, De Aar, Philipstown, Richmond, Hanover, Colesberg, Noupoort	75.3	2.7%	13.7%
Limpopo	Entire Limpopo Province	72.3	2.6%	1.4%
NC Kenhardt	Namakwaland, Kenhardt, Gordonia, Kimberley	67.6	2.4%	3.4%
NW Brits	Rustenburg, Brits	66.5	2.3%	5.2%
NC Prieska	Prieska, Carnarvon	61.9	2.2%	23.3%
WC Boland	Cape, Wynberg, Simon's Town, Goodwood, Bellville, Mitchells Plain, Stellenbosch, Kuils River, Somerset West, Strand, Paarl, Wellington, Worcester, Ceres, Tulbagh, Robertson, Montagu	60.4	2.1%	1.0%

Region name	**Magisterial regions**	**Value of winter cereal production (R million)**	**Share of region's production in total winter cereal production**	**Share of winter cereal in region's production**
Eastern Cape	Entire Eastern Cape	54.1	1.9%	1.3%
Mpumalanga	Entire Mpumalanga	52.0	1.8%	0.6%
NW Lichtenburg	Potchefstroom, Ventersdorp, Coligny, Koster, Lichtenburg, Delareyville, Wolmaransstad, Schweizer-Reneke, Bloemhof, Christiana	51.4	1.8%	1.6%
Gauteng	Entire Gauteng	37.9	1.3%	0.8%
NC Calvinia	Calvinia, Sutherland, Williston, Fraserburg, Victoria West, Kuruman, Postmasburg, Hay	37.8	1.3%	4.2%
FS Odendaalsrus	Odendaalsrus, Welkom, Virginia, Sasolburg	34.3	1.2%	8.6%
WC Knysna	Knysna, George, Mossel Bay, Riversdale	34.3	1.2%	4.0%
KwaZulu-Natal	Entire KwaZulu-Natal	25.5	0.9%	0.3%
WC Clanwilliam	Clanwilliam, Vredendal, Vanrhynsdorp	20.7	0.7%	2.7%
NW Vryburg	Vryburg, Klerksdorp, Marico, Swartruggens	13.0	0.5%	1.2%
WC Beaufort West	Oudtshoorn, Calitzdorp, Ladismith, Uniondale, Beaufort West, Laingsburg, Murraysburg, Prince Albert	3.3	0.1%	0.5%
		2 830	100%	