INDIRECT EFFECTS OF DIFFERENT AGRICULTURAL TRADE SCENARIOS: A SOUTH AFRICAN CASE STUDY

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One of the most important policy measures used by government to influence agricultural production and trade patterns are tariffs. A substantial depreciation in the exchange rate will not be enough to compensate for the negative effects of removing tariffs if the playing field is not level for producers in South Africa. Although the import multiplier show that less inputs will be imported, this saving on foreign exchange is not big enough to outweigh the total impact of imports on the balance of trade. The value-added multiplier clearly indicate that reinvestment and consumer spending (buying power) in agriculture will receive a severe blow. Employment will be reduced, thus increasing the supply of labour into other sectors.

INDIREKTE EFFEKTE VAN VERSKILLENDE LANDBOUHANDELSCENARIOS : 'N SUID-AFRIKAANSE GEVALLE STUDIE

Tariewe is een van die belangrikste beleidsinstrumente wat deur die owerheid gebruik word om landbouproduksie en handelspatrone te beïnvloed. 'n Substansiële depresiasie van die wisselkoers sal nie genoeg wees om te kompenseer vir die negatiewe effekte wat gepaard gaan met 'n verwydering van tariewe indien die speelveld in Suid-Afrika nie gelyk is nie. Alhoewel die invoervermenigvuldiger toon dat minder insette ingevoer sal word, is die besparing aan buitelandse valuta nie genoeg om te kompenseer vir die impak van totale invoere op die betalingsbalans nie. Die waarde-toegevoegde-vermenigvuldiger toon duidelik dat herinvestering en verbruikersbesteding (koopkrag) in die landbou negatief beïnvloed sal word. Indiensname sal verlaag wat sal lei tot 'n groter aanbod van arbeiders in ander sektore.

1. INTRODUCTION

Although agriculture's contribution to the Gross Domestic Product (GDP) has been less than five per cent over the past five years, agriculture can certainly claim to have been the cornerstone for economic development in South Africa. This is especially evident when one look at what happened to GDP growth in years when agriculture performed poorly. According to Van Rooyen (1996) agriculture's direct and indirect contribution to the rest of the economy is around 35 per cent. This emphasises agriculture's role in creating both

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consumer and producer welfare, especially in rural areas. Policies that will affect the performance of the agricultural sector thus holds important implications for the socio-economic welfare of South Africa.

Notably one of the most important policy measures used by government to influence agricultural production and trade patterns are tariffs. Tariffs have become the main policy instrument to alter production and trade patterns since the signing of the Uruguay Agreement now being governed by the World Trade Organisation (WTO). Tariffs have an effect on the prices of certain food items to consumers and hence on consumption levels. It also has an effect on the price producers receive for their produce, their profitability and the level of production and hence also on the level of employment in the farm sector. Cognisance should also be taken on the affect that changes in the exchange rate have on consumer and producer welfare. Recent years have seen the relaxation of currency controls in South Africa that contributed to the devaluation of the rand against the US Dollar. Hogendorn and Brown (1979) state that, apart from monetary and fiscal policy, exchange rate policy is the third macro-economic tool available to governments to influence a country's economy. According to Houck (1986), variations in the exchange rate can easily swamp or obscure the desired price, trade and production effects of any specific agricultural policy.

This paper investigates the indirect effects of different agricultural trade scenarios, made up by different tariff and exchange rate levels.

2. METHODOLOGY AND DATA USED

In order to simulate the affects of different tariff regimes and the devaluation of the rand on selected agricultural products a multi-commodity model was developed. The areas the model is designed to elicit predictions about are numerous: effects of trade regime on domestic consumers; gross geographical product in agriculture; domestic trans-shipment patterns; and employment and multiplier effects.

The model accounts for the interaction of the spatially separated economic units, i.e. flows and use of primary or intermediate products, production, flows and consumption of final products. The model was, more specifically, formulated to ascertain the level of location of processing for primary or intermediate commodities and the volume and direction of all primary, intermediate and final product flows so as to minimise South Africa's consumer expenditure on final commodities, while maximising export revenues for those agricultural commodities that South Africa can export. The method of approximation and

procedure followed is largely based on that followed by Takayama & Judge (1971) in their approximation of mathematical models applicable to the analysis of spatial price and allocation problems. Various assumptions underlie this model, but due to limited space they are not mentioned here (A detailed description of the model and the underlying assumptions can, however, be obtained from the authors).

Production and consumption data for 1996 were obtain from various sources, namely the Meat Board (1997), Maize Board (1996), Wool Board (1997), Wheat Board (1996) and the National Department of Agriculture (NDA) (1997). In the light of the deregulation and liberalisation process it was decided to use the most recent data available. Although 1996 was favourable with respect to agricultural production the model can easily be calibrated to examine severe drought conditions.

3. LINKAGES AND MULTIPLIERS

Agriculture has important forward and backward linkages with the rest of the economy. Van Zyl *et al.* (1988) state that it is important to take into account that the overall impact of a change in agriculture production, for example as a result of drought, is almost twice as great as its direct impact on the rest of the economy. The farming sector and the industrial sector are not separate economic entities merely having a buyer-seller relationship. They are interdependent in such a way that one must regard them jointly for there to be sensible economic planning with respect to either one or the other (Faux, 1990).

Changes in the pattern of crop and livestock production have implications for other segments of the economy, both agricultural and non-agricultural. These effects are conceptualised as linkages, of which there are two basic sorts: 'production linkages' and 'consumption linkages'. Production linkages - which are the focus here - can be further broken down into backward and forward linkages.

When a firm increases its output, it will generally also increase its demand for inputs, i.e. if a farmer increases his cattle output he will also purchase more animal feed. This constitutes a backward linkage. On the other hand, increased output of cattle means that inputs for the processing sector will increase, i.e. more beef will be available for processing. This interaction is commonly referred to as a forward linkage.

One of the principal approaches to the quantification of these linkage effects is multiplier analysis based upon input-output tables. Multiplier analysis allows

one to discern both the direct and indirect (i.e. linkage) effects of changing production patterns. The purpose in this study is not to determine or measure new multipliers, but rather to draw on existing empirical work on multipliers, so as to quantify some of the broader economic effects that may take place due to the changing pattern of South African agricultural production and trade. Where possible, these multiplier effects are localized, so as to understand the regional as well as national economic implications of changing trade and production patterns.

Three types of multipliers are used, namely import multipliers, value-added multipliers, and labour multipliers. An in depth explanation of the meaning and interpretation of the different multipliers can be found in Faux (1990). Values for the first two are taken from the Input-Output Table for Agriculture by Sub-Regions of the former Department of Regional and Land Affairs (1992). (The Input-Output Table reports commodity-specific multipliers for some 79 different 'statistical regions'; for the purposes of our exercise provincial averages were taken.) Those for the labour multipliers are taken and adapted from data on labour intensity in different farm enterprises, collected from a number of sources.

In general, it is important to note that there is no guarantee that the potential stimulus implied by these multipliers will be translated into actual growth in all cases. Rather, unless certain conditions are met, the stimulus may simply be absorbed as increased imports, higher prices or under-utilised capacity (Faux 1990). These conditions are the existence of a minimum market size, consistency with capacity extension, availability of inputs and government policies consistent with the expanding sectors. However, the multipliers are probably more reliable when used to gauge the wider effects of economic contraction.

4. INDIRECT EFFECTS OF DIFERENT TRADE SCENARIOS

The impact of having no tariffs and changes in the exchange rate on consumer and producer welfare, the gross geographical product and different linkages are investigated by means of different scenarios. The different scenarios are contrasted principally to a base scenario. The base scenario consists of the status quo for 1996, where as the second scenario entertains the extreme circumstances whereby South Africa's import tariffs are removed completely. The third and fourth scenarios, respectively, entertain the possibility that international prices are equal to domestic prices, and the effects of a 10 per cent depreciation of the Rand in isolation from any changes in the tariff regime. The fifth scenario considers the countervailing effects of total tariff reduction and a 10 per cent

exchange rate depreciation. The sixth scenario is the same as the fifth, except that the depreciation is 25 per cent.

Partial gross geographical agricultural product

Table 1 summarises the effect of the different trade regimes on the total value of agricultural product of each province, as well as the national total. This is only a partial measure, since it reflects only those agricultural commodities included in the model. Also, it includes only the value of intermediate agricultural commodities produced (plus white meat and wool), since including both intermediates and finals would have resulted in significant double counting. The purpose here is to gauge the effect on the farming community, which is most directly reflected in the pattern of production of intermediates. The percentage change relative to the base scenario is indicated for scenarios 2 to 6. Table 1 illustrates the magnitude of the negative effects on the agricultural sector of removing all of the tariffs.

Table 1: Partial gross geographical products (Rand billions)

Province	1. Base scenario	2. Zero tariff	3. Equal prices	4. 10% depre-ciation	5. zero tariffs, 10% depre-ciation	6. zero tariffs, 25% depre-ciation
Western Cape	1.21	0.92	1.89	2.02	0.93	1.06
Northern Cape	1.39	1.10	1.26	1.41	0.76	1.07
Free State	4.28	2.64	4.38	4.34	2.71	3.39
Eastern Cape	2.77	0.61	2.68	2.85	0.63	2.72
KwaZulu/Natal	1.37	0.53	3.09	3.18	0.54	1.29
Mpumalanga	2.53	1.32	2.69	2.57	1.37	2.43
Northern Province	1.59	0.21	1.54	1.59	0.21	0.50
Gauteng	1.97	0.43	1.97	1.98	0.44	0.52
Northwest	3.20	1.75	3.65	3.31	1.84	3.19
Total RSA	20.31	9.51	23.15	23.25	9.43	16.17
Change relative to base		-53.2%	+14.0%	+14.5%	-53.6%	-20.4%

In all the scenarios where tariffs were assumed to be zero, notwithstanding a depreciation in the value of the rand in scenarios 5 and 6, the value of agricultural production dropped substantially. For instance, the value of agricultural production dropped by 53,2 per cent in scenario 2 compared to the base scenario. Scenarios 5 and 6 is indicative of the fact that a substantial

depreciation in the exchange rate will not be enough to compensate for the negative effects of removing tariffs if the playing field is not level for producers.

Consumer expenditure

Bearing in mind that the model treats consumer demand as fixed rather than sensitive to changing prices, the results in Table 2 are indicative of the impacts on domestic consumers. These impacts include all expenditure on final commodities among domestic consumers, including transport costs, tariffs, and cif charges.

That consumers benefit from tariff removals is indisputable, provided the price advantages due to more openness to imports are indeed passed on to them, as is assumed here. In scenarios 2, 5 and 6 consumers spend less money on the products investigated in this study, mainly because of cheaper imports. The coin has two sides, namely that on the one side they will have more money to spend on other consumables and on the other side expenditure on imports will increase which will have a negative affects on the balance of payments. In scenarios 3 and 4 consumers will spend marginally more to sustain their level of demand. What is striking, however, is how much less the advantages to consumers are than the disadvantages to producers. This is consistently the case for scenarios 2, 5 and 6. In other words, the negative affect of the removal of tariffs outways the advantages associated with the exchange rate depreciation for the commodities investigated here.

Table 2: Consumer expenditure by province (Rand billions)

Province	1. Base scenario	2. Zero tariff	3. Equal prices	4. 10% depre-ciation	5. zero tariffs, 10% depre-ciation	6. zero tariffs, 25% depre-ciation
Western Cape	2.68	2.34	3.05	2.98	2.42	2.58
Northern Cape	0.68	0.53	0.68	0.68	0.55	0.67
Free State	2.28	1.77	2.28	2.28	1.83	2.02
Eastern Cape	5.02	3.93	5.03	5.02	4.06	4.90
KwaZulu/Natal	6.33	5.41	7.06	7.04	5.61	6.16
Mpumalanga	2.16	1.69	2.16	2.16	1.75	2.11
Northern Province	4.01	3.10	4.01	4.00	3.21	3.53
Gauteng	5.97	4.61	6.03	5.98	4.79	5.29
Northwest	2.58	2.00	2.53	2.54	2.06	2.48
Total RSA	31.71	25.38	32.83	32.68	26.28	29.74
Change relative to base		-20.0%	+3.5%	+3.1%	-17.1%	-6.2%

Multiplier effects

Table 3 to 5 summarizes the effects on all the scenarios, but for sake of brevity results per sub-sector is admitted. Table 3 shows the import multiplier from which it can be seen that the indirect effect on the trade balance is the greatest for scenarios 2 and 5. What these results show is that due to losses in market share because of imports, the loss in production in the aforementioned scenarios implies R240,43 million and R242,76 million less spending on imported inputs, respectively. The direct effect on the trade balance for these scenarios were estimated to be around -R6 billion. Taking this into account the indirect effects in Table 3 are rather trivial. What this demonstrates is that countervailing effects through adjustments in input imports should not be counted upon to diminish the negative effects of surges in agricultural imports.

Table 3: Import multiplier effects (Rand million)

Province	2. Zero tariff	3. Equal prices	4. 10% depre-ciation	5. Zero tariffs, 10% depreciation	6. Zero tariffs, 25% depreciation
Western Cape	-3.58	15.53	18.03	-3.58	-1.59
Northern Cape	-7.04	-1.90	0	-12.37	-5.39
Free State	-28.15	-0.11	0	-28.15	-19.86
Eastern Cape	-52.44	-2.70	0.82	-52.44	-0.96
KwaZulu/Natal	-21.96	42.67	45.02	-21.96	-1.50
Mpumalanga	-26.08	0	0	-23.08	-2.14
Northern Province	-34.34	-1.61	0	-34.34	-26.95
Gauteng	-33.33	0	0	-33.33	-32.02
Northwest	-33.51	0	0	-33.51	-2.31
Total RSA	-240.43	51.88	63.87	-242.76	-92.72

By contrast, the induced effects on value-added are hugely significant (Table 4). The results, for example, show that the contraction in production due to flooding of imported products on the domestic market, results in a drop of R2 101,79 million and R4 179,40 in wages and profits, respectively, for scenarios 6 and 5. Improvements in the value-added effects are realised under scenarios 3 and 4, though the benefits are concentrated almost exclusively for the Western Cape and KwaZulu/Natal.

Table 4: Value-added multiplier effects (Rand million)

Province	2. Zero tariff	3. Equal prices	4. 10% depreciation	5. Zero tariffs, 10% depreciation	6. Zero tariffs, 25% depreciation
Western Cape	-189.14	304.27	320.65	-189.14	-127.23
Northern Cape	-96.93	3.52	0	-319.32	-225.12
Free State	-738.82	-7.38	0	-738.82	-447.47
Eastern Cape	-760.62	37.69	44.32	-760.62	-51.79
KwaZulu/Natal	-244.78	558.85	573.62	-244.78	-55.10
Mpumalanga	-445.82	0	0	-445.82	-111.61
Northern Province	-465.87	-7.12	0	-465.87	-373.11
Gauteng	-623.49	0	0	-623.49	-593.99
Northwest	-391.54	0	0	-391.54	-116.37
Total RSA	-3 957.01	889.83	938.59	-4 179.40	-2 101.79

Finally, the direct effects on employment are shown in Table 5, with the worse case scenarios (2 and 5) resulting in the loss of almost 25 per cent of total employment in the agricultural sector. The effect on employment in the Northern Cape in scenario 5 seems anomalous, and accounts for all of the difference observed between scenarios 2 and 5.

Table 5: Employment multiplier effects (full time equivalents)

Province	2. Zero tariff	3. Equal prices	4. 10% depreciation	5. Zero tariffs, 10% depreciation	6. Zero tariffs, 25% depreciation
Western Cape	-10 900	1 104	6 125	-10 900	-3 757
Northern Cape	-8 549	-3 200	0	-16 181	-7 742
Free State	-46 167	-273	0	-46 167	-14 607
Eastern Cape	-52 348	-4 693	1 383	-52 348	-1 617
KwaZulu/Natal	-48 028	7 996	12 714	-48 028	-1 788
Mpumalanga	-30 302	0	0	-30 302	-4 387
Northern Province	-25 704	-3 023	0	-25 704	-7 716
Gauteng	-14 267	0	0	-14 267	-10 250
Northwest	-36 626	0	0	-36 626	-5 415
Total RSA	-272 891	-2 089	20 222	-280 523	-57 279

5. CONCLUSION

The paper showed that a total reduction of tariffs when the playing fields are not level will have a negative impact on producers and consumers alike, as well as on the economy as a whole.

- Although the import multiplier show that less inputs will be imported, this saving on foreign exchange is not big enough to outweigh the total impact of imports on the balance of trade;

- The value-added multiplier clearly indicates that reinvestment and consumer spending (buying power) in agriculture will receive a severe blow. This will of course have repercussions throughout the economy, especially in rural areas where the welfare of rural towns are based on the prosperity of agriculture; and

- Employment will be reduced, thus increasing the supply of labour into other sectors. These labourers are seldomly skilled enough to be taken up in the industrial sector. A loss of employment opportunities could further aggrevate the social economic problems of rural regions in South Africa, and it may also cause the rate of urbanisation to increase with the minimal job opportunities.

The evidence presented is a forceful demonstration that policies affecting agriculture should be evaluated thoroughly before implementation. It is clear that South Africa cannot afford the legacies of wrong policies or the right policies that are administered ineffectively. Careful consideration should be given by policymakers in regards to what they aim to achieve through different policies. It must be noted that although the effects of different trade agreements were not simulated in this paper its possible effect can be translated back to the results of this study.

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