TMD DISCUSSION PAPER NO. 92

THE IMPACT OF DOMESTIC AND GLOBAL TRADE LIBERALIZATION ON FIVE SOUTHERN AFRICAN COUNTRIES

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March 2002

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MACRO
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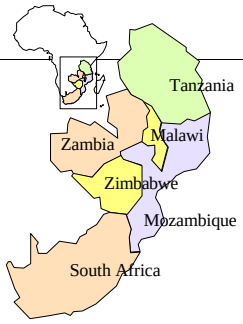

ABSTRACT

We compare the impact of alternative domestic and global trade liberalization scenarios on five economies in Southern Africa. The study applies a computable general equilibrium model that employs standardised 12-sector social accounting matrices for Malawi, Mozambique, Tanzania, Zambia, and Zimbabwe. The approach incorporates stylised features such as own-household consumption and marketing margins that are of particular importance when a majority of agricultural producers are not sufficiently integrated into formal markets and thus rely on own production to meet their daily diets. Hence, improved infrastructure implies lower marketing costs and better market integration, which translates to increased production opportunities. The comparison of the results across all five countries reveals that common policy measures have different impacts depending on the underlying economic structures.

The author is grateful for helpful comments by Hans Löfgren and Sherman Robinson, as well as two anonymous referees. However, the author alone accepts all responsibility for errors or omissions.

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THE IMPACT OF DOMESTIC AND GLOBAL TRADE LIBERALIZATION ON FIVE SOUTHERN AFRICAN COUNTRIES

by

PETER WOBST

INTRODUCTION

While it is widely accepted that foreign trade in general and trade liberalization in particular generate overall welfare gains for an economy as a whole, there are always winners and losers from changes in domestic and foreign trade policies. In the Southern African context, these considerations are of particular importance as countries are not only extremely poor on average, but also show high inequality in income distribution. Although some trade measures may favour exports and, consequently, producers of agricultural export commodities, at the same time small-scale farmers producing non-traded food crops may be negatively affected by these measures, because of a decline in their relative prices.

The role of the agricultural sector in overall economic development has been discussed extensively [*e.g. Mellor, 1966; Timmer, 1988*]. More specific applications considering African economies address the issue of agricultural productivity gains, increased surpluses, and related transfers to the non-agricultural sector, such as Winters et al. [*1998*].[1] However, Winters et al. [*1998*] consider an archetypal, net-food-importing African country, featuring a highly stylised sector disaggregation that only distinguishes the agricultural and non-agricultural market segments, neglecting any further sectoral detail. Moreover, the data applied in their exercise are artificial, as the main purpose of the analysis is the development of an appropriate theoretical accounting framework and not the analysis of a particular country case.

This paper investigates the impact of alternative domestic and global trade liberalization scenarios on intersectoral changes, foreign trade opportunities, economy-wide growth, and household welfare in the Southern African region. The study applies a computable general equilibrium (CGE) model that employs standardized 12-sector social accounting matrices (SAMs) for five countries (Malawi, Mozambique, Tanzania, Zambia, and Zimbabwe). The analyses focus on country-specific features such as different levels of own-household consumption and marketing margins, as well as different sector compositions of production and foreign trade. The former features are of particular importance when a majority of domestic agricultural producers are not sufficiently integrated into formal markets and consequently (a) do not fully participate in domestic (or international) transactions and (b) primarily rely on own production to meet their food demand. Improved infrastructure implies lower marketing costs and better market integration that lead to increased marketing and production opportunities for small-scale farmers. Consequently, the livelihoods of the most disadvantaged (economically most disintegrated) producers can be improved considerably. The actual impact on income distribution is a matter of debate that only can be resolved with empirical analysis. The

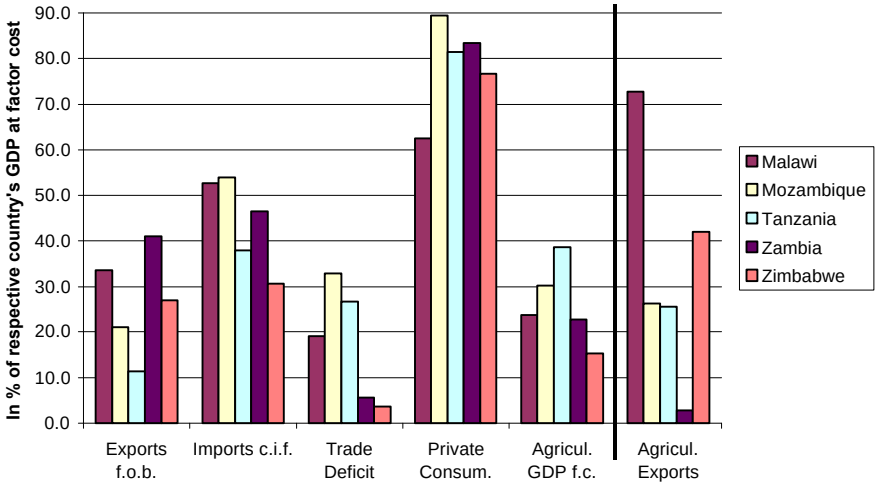
datasets available allow comparison of five Southern African economies that differ in their (a) degree of integration into world commodity markets, (b) GDP share of aggregate agriculture, (c) stage of economic development in general and infrastructure development in particular, as well as (d) degree of equity in the distribution of income.

Section 2 introduces the country-specific SAM datasets, highlights similarities and differences in economic structure across the five economies investigated, and explains some specific features of the CGE model applied in this analysis. Motivation and design of the policy simulations carried out are provided in section 3, while section 4 presents selected results of the simulation series for all five countries. Conclusions are given in section 5 of the paper.

II. DATASETS, ECONOMIC STRUCTURE, AND MODEL DESCRIPTION

The 12-sector SAM datasets used in this study are aggregations of more detailed SAMs developed under the project *Macroeconomic Reforms and Regional Integration in Southern Africa*.[2] As the original disaggregations of the five country SAMs were dependent on county-specific features and data availability, aggregation was necessary to achieve SAMs with identical sector detail.[3] While both activity (industries) and commodity (product) accounts of the original SAMs have been sectorally aggregated to common 12 sectors, the country-specific institutional detail of each SAM has been preserved, i.e. the original factor markets and households are *not* aggregated.[4] Each database features three agricultural sectors, distinguishing an export sector (exports over production greater than 5%), an import sector (imports over absorption greater than 5%), and a mostly non-traded sector (both exports over production and imports over absorption less than 5%). Non-agricultural sectors include mining, food processing, manufactures for mainly final consumption, manufactures for mainly intermediate demand, construction, trade and transportation, business services (including utilities), public administration, and other private services (including tourism, hotels and restaurants, as well as real estate services). This sectoral breakdown allows us to distinguish between major export, import, and non-traded commodities in agriculture and non-agriculture, capturing their differences in input intensity, import dependency of production, factor intensity, and market integration (marketed *versus* non-marketed consumption). The 12-sector disaggregation is broad enough to accommodate the original sector breakdowns of all five county SAMs and sufficiently detailed to permit a comparison among the five economies that captures their country-specific differences.

FIGURE 1
COMPARISON OF ECONOMIC STRUCTURE IN THE BASE



Note: Agricultural Exports = Total agricultural exports as share of total exports f.o.b. *Source*: SAM database

A comparison between the shares in GDP at factor cost of aggregate agriculture in the five countries shows a significant difference in their respective stage of development from rather agricultural-based to more industrialized economies (column 5 in Figure 1), ranging from about 15% aggregate agriculture in total GDP at factor cost in Zimbabwe to almost 40% in Tanzania.[5] Total exports as a share of GDP at factor cost (column 1 in Figure 1) cover a wide range from 11.4% (Tanzania) to 41.0% (Zimbabwe), reflecting countries' different sector compositions (especially with respect to their share of non-agricultural exports) that influenced their respective vulnerability to the prolonged deterioration in international agricultural terms of trade. Total imports as a share of GDP at factor cost (column 2 in Figure 1) are more concentrated, ranging from 30.6% (Zimbabwe) to 53.9% (Mozambique), reflecting the high import dependency of all the economies under consideration. Trade deficits of goods and non-factor services vary substantially from 3.7% of GDP at factor cost (Zimbabwe) to 32.9% of GDP at factor cost (Mozambique), although for all five countries imports are larger than exports.

The foreign trade patterns of these countries reveal even larger differences in their respective export specialization (column 6 in Figure 1). While Malawi's export earnings predominantly result from agriculture (tobacco exports account for about 75% of agricultural and 60% of total export earnings), Zambia's export earning almost exclusively result from copper exports (mining). The other countries' relatively high non-agriculture exports result in part from service sectors, in particular tourism. As opposed to these significant differences in export shares, the import shares for aggregate non-agriculture in all five countries range at equally high levels from 87% to 99% of total import value.

Comparing these basic economic data of the five Southern African countries suggests that there are no clear correlations between the stage of industrial development and/or GDP per capita and other main indicators. Imports as share of GDP seem to decline as GDP per capita increases. *Marketed* private consumption (not shown) seems positively correlated with GDP per capita, but *total* private consumption (including own-household consumption), as share of GDP at factor cost (column 4 in Figure 1), does not show a correlation with GDP per capita. Total exports as share of GDP, trade deficits as share of GDP, and the share of agricultural exports in total exports also do not correlate with GDP per capita.

The five countries are rather different with respect to their economic situation and consequent economic pattern. The economies differ greatly in:

- Overall economic structure including share of agriculture in GDP, employment pattern, and total trade shares (openness of the economy);
- Being landlocked or not;
- Importance as transit countries for broader interregional trade;
- Population density and share of rural population;
- Social indicators like school enrolment and total health expenditure; and
- Political systems and developments since independence.

The CGE model applied in this study reflects Chenery's [*1975*] view of 'neoclassical structuralism' and follows a tradition of models for development policy analysis established and further developed at the World Bank and the International Food Policy Research Institute.[6] This class of models can be characterised by their treatment of: (a) the macroeconomic environment; (b) production sectors, factor markets, and commodity markets at any desired level of disaggregation; as well as (c) the microeconomic behaviour of sectoral production (profit maximization) and household consumption (utility maximization). Any single good in the model may appear in a variety of states, namely as domestic produce, export, domestic supply, import, and commodity for domestic use. The CGE model incorporates this product differentiation through different (endogenous) prices that are associated with different goods markets. In addition to its detailed product differentiation for the domestic economy, the model also features market linkages with the rest of the world through its foreign trade specification. The diverse sectoral and commodity structure and the related intersectoral linkages support a wide range of policy analyses with respect to their macroeconomic, sectoral, and microeconomic (e.g. income distribution) effects. Besides the underlying neoclassical foundation, the model also accommodates stylised and country-specific features to capture structural rigidities and market imperfections that cause distorted (regulated) economic behaviour [*cf. Wobst, 2001*].

The model used for these analyses incorporates two country-specific features that capture particular regional and national economic conditions in the group of countries under consideration. The first feature is own-household consumption, which considers the production of non-marketed food crops and their contribution to total household consumption and nutrition. In economies where most of the population lives in rural areas and is mainly engaged in food cropping, the appropriate specification of own-household consumption behaviour is essential for household-specific welfare analysis. The

second feature is explicit marketing margins for domestic supply, export, and import commodities that capture the (often large) differences between producer and consumer prices due to high transportation and other marketing costs in economies with poor infrastructure and/or long transit distances.

While in general, the choice of macro and factor market closures of a CGE model influence the simulation results substantially and thus are important, they are even more important when dealing with five different datasets. Unless stated otherwise, foreign savings in the model are fixed and exports and imports adjust through changes in the real exchange rate. Government consumption and investment demand are fixed shares of absorption, where the government account balance is achieved through adjusting flexible direct tax rates and the savings-investment balance is achieved through adjusting marginal propensities to save (investment-driven closure). As government consumption and investment demand are fixed relative shares of total absorption, the relative share of private consumption is implicitly fixed as well. This 'balanced' closure causes an exogenous shock that impacts economy-wide consumption to spread evenly across all final demand categories [*cf. Löfgren, Harris, and Robinson, 2001*]. This closure rule is preferable when analysing five economies that feature different institutional characteristics and consumption patterns as it prevents diverse macro reactions to the same kind of economic shock. The factor market closures of the model are also chosen to prevent unrealistic reactions of the different economies to exogenous shocks of the same nature. While sectoral land and capital demand are fixed at their additional levels, labour may shift across different agricultural or non-agricultural sectors within each labour category. Consequently, the model permits intersectoral shifts in production though optimal labour allocation, reflecting short-term structural adjustment, but does *not* permit reallocation of long-term capital stocks. On the one hand, these factor market closures also prevent unreasonably large and diverse reactions across the different economies and, on the other hand, reflect the short to medium-term interest when analysing the impact of trade policies.

Another important factor that influences modelling results substantially is the choice of elasticity parameters. While shift and share parameters of production and foreign trade functions are computed during the calibration process, elasticities of substitution for production and foreign trade functions are specified exogenously. To avoid divergence in the behaviour of the five economies that are merely due to different (exogenously specified) elasticities for factor substitution and foreign trade (CES and CET elasticities), we calculate average values across countries. Thus, elasticities vary across sectors, but not across the five economies.[7]

The choice of macro closures, factor market closures, and elasticity parameters described above defines a common model that is applied to the five different country datasets. Consequently, differences in the model behaviour are driven exclusively by differences in the economic structure across the five countries rather than empirical estimates (or guesstimates) of their country-specific behavioural parameters.

III. SIMULATION DESIGN AND MOTIVATION

We carry out a series of five simulations to compare the effects of different trade liberalization measures and the improvement of domestic trade and transportation operations across the five countries. The choice of simulations is policy-driven reflecting common shocks for the five economies, where 'common' is defined as 'often proposed'. For example, a proportionate reduction in existing tariff rates or a revenue-neutral tariff reform achieving uniform rates. By no means does that translate into equiproportionate incentives across the five economies for any of the simulations as the relative size of the shock depends on the respective underlying economic structure—e.g. sectoral tariff rates and total tariff collection as a share of GDP or total government revenue. The motivation for this choice of simulations is to compare the effects of typical (*not* 'the same' or 'equal') structural adjustment policy measures across a variety of countries. The underlying assumption is that common structural adjustment measures, like a 50 per cent reduction of the existing tariff rates or the implementation of a uniform tariff rate, can imply very different sectoral adjustment given the differences in country-specific economic structures.

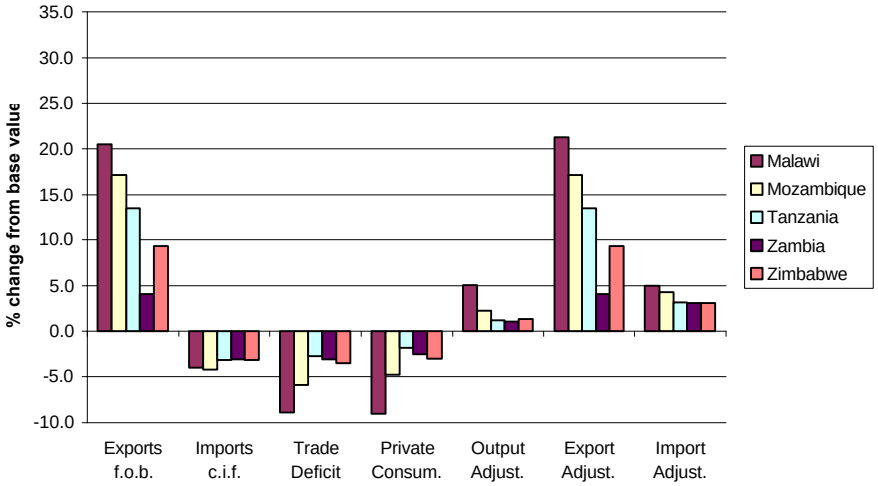
As most developing economies experienced (and keep experiencing) severe devaluations of their real exchange rates, resulting from both export-led growth and import-substituting strategies, the *first simulation* imposes a 5% devaluation for each country. Such a 'clean' and basic simulation also provides an excellent opportunity to check how the underlying datasets behave given the respective model conditions. The *second simulation* imposes a reduction of all existing imports tariff rates by 50% that translates to an uncompensated loss in government revenues from tariff collections, which represents an extreme case of trade liberalization. However, to avoid a decrease in tax collection and to reduce the administrative burden for the customs department, governments seem to prefer tariff rate harmonization, i.e. to choose a uniform tariff on all import commodities that will generate the same revenue from tariff collections as before, which is analysed by the *third simulation*. Besides import tariffs and export taxes, trade and transportation costs are probably the single most important component of a country's competitiveness in world markets. Hence, the *fourth simulation* imposes a 25% reduction in export, import, and domestic marketing margins that are explicitly incorporated in the respective price equations of the applied CGE model.[8] However, while the reduction of the related coefficients is meant to mirror an improvement in transport and telecommunication infrastructure, the required government investment in these areas is not explicitly modelled, but merely assumed. The *last simulation* is a combination of simulations one and four, demonstrating to what extent the negative effects of a devaluation of the real exchange rate can be mitigated through a decreasing level of domestic trade and transportation costs—comparing the results of simulations one and five.

IV. COMPARATIVE SIMULATION RESULTS

As the data characteristics of the different countries already suggest, we expect quite diverse effects of the policy simulations carried out. This expectation is fully confirmed by the simulation results. The five countries under consideration represent a diverse group of economies with different structure that cause different reactions to the same set of policy interventions.

RESULTS FROM THE FIRST EXPERIMENT—a 5% devaluation of the exchange rate, which was carried out to test the general behaviour of the economies under a clean trade shock—show some common behaviour, however, at a fairly wide range.

FIGURE 2
FOREIGN TRADE AND ECONOMIC ADJUSTMENT UNDER DEVALUATION



Note: Trade Deficit = Change in trade deficit as percent of GDP at factor cost; Output Adjust. = Total absolute adjustment in sectoral production; Export Adjust. = Total absolute adjustment in sectoral exports; Import Adjust. = Total absolute adjustment in sectoral imports. *Source*: Simulation results

The increases in total export values (f.o.b.) in real terms (column 1 in Figure 2) range from 4.1% (Zambia) to 20.5% (Malawi), which is positively correlated with the countries' respective share of agricultural exports in total exports (column 6 in Figure 1). The decreases in total import values (c.i.f.) in real terms are, first of all, much smaller and, secondly, within a much closer range from 3.1% to 4.2% (column 2 in Figure 2). We observe as a tendency that the higher the value of total imports as a share of GDP at factor cost, the higher the percentage drop in total imports (compare column 2 in Figure 1 and Figure 2). However, the relatively lower decrease of imports throughout all five countries indicates the general import dependency of the economies under consideration. The major part of the overall change in the trade deficit is due to better export performance and not due to cutting imports, with an exemption of Zambia, where export and imports contribute equally to the

improvement of the trade deficit (column 3 in Figure 2).[9] Moreover, the changes in trade deficits (computed in percent of GDP at factor cost) are negatively correlated with the initial trade deficits in percent of GDP at factor cost—small trade deficits accompany large changes, while large trade deficits accompany small changes. Consequently, economies that are starting out from the relatively favourable situation of having just a small trade deficit are likely to experience a large improvement, while economies that are burdened by large existing trade deficits experience only moderate improvements of their situations. The change in trade deficit is immediately reflected in the change in total private consumption, as can be seen from column 4 in Figure 2. Given the full employment specification of the model that fixes each productive factor's economy-wide supply this is hardly surprising. Although the model allows for factor shifts across sectors causing changes in sectoral outputs (structural adjustments), overall GDP at factor cost will remain almost constant throughout most policy simulations due to the fixed total factor supply.[10] Thus, from a macroeconomic perspective, total production remains largely constant, exports increase, and imports decrease, which translates to a decrease in total domestic absorption. Given constant domestic production, the change in the trade deficit is reflected in the decrease in domestic absorption, which in turn is reflected in total private consumption—all of which are determined through the choice of macro closures.[11]

Besides the overall changes in the total values of trade and production, we are also interested in the absolute sectoral changes, i.e. the actual structural adjustment, which takes place due to a change in the policy environment. The measures 'Export Adjust.' and 'Import Adjust.' in Figure 2 represent the sums over all weighted absolute sectoral changes for exports and imports respectively, i.e. the sum over absolute increases and decrease without offsetting each other. For the current simulation these measures of structural change are very similar to the overall changes in total export and import values (column 1 and 2 in Figure 2). The similarity of the two export measures signifies that few intersectoral shifts among sectoral export production are necessary to achieve the overall change in total export value—some or all export sectors increase their exports, but no export sector decreases its exports significantly. The same applies to the changes in imports: some or all sectors decrease their imports and no sector increases its imports significantly (except for Malawi, which decreases its total import value by 4%, but requires an average change in its import structure of 5%).[12] However, on the production side it looks quite different. Although overall GDP at factor cost remains almost constant (max. 0.1% increase), all five economies have to achieve some structural adjustment with respect to their sectoral production in order to cope with the 5% devaluation of the exchange rate. All countries except Malawi experience a relatively modest change in their relative sectoral composition of production, ranging from 1.1% to 2.2%, whereas Malawi restructures 5.1% of its entire production to cope with the imposed policy shock (see 'Output Adjust.' in Figure 2).

THE SECOND SIMULATION considers a 50% cut in all existing tariff rates without any compensatory measure to adjust for the government's loss in revenue collection. The effects on the various countries are quite different (although in general of the same direction). This reflects the diversity in structure and ability to cope with this trade liberalization measure, as well as the initial magnitude and importance of the respective tariff scheme. Table 1 shows initial average tariff rates for the five countries and the contribution of total tariff collections to government income. While the average tariff rates range from 4.4% to 13.5%, the contribution of total tariff collection to government income differs dramatically, ranging from 6.9% to 30.0%. Therefore, the simulation results have to be interpreted in the light of the relative importance of tariff rates and tariff collection across economies.

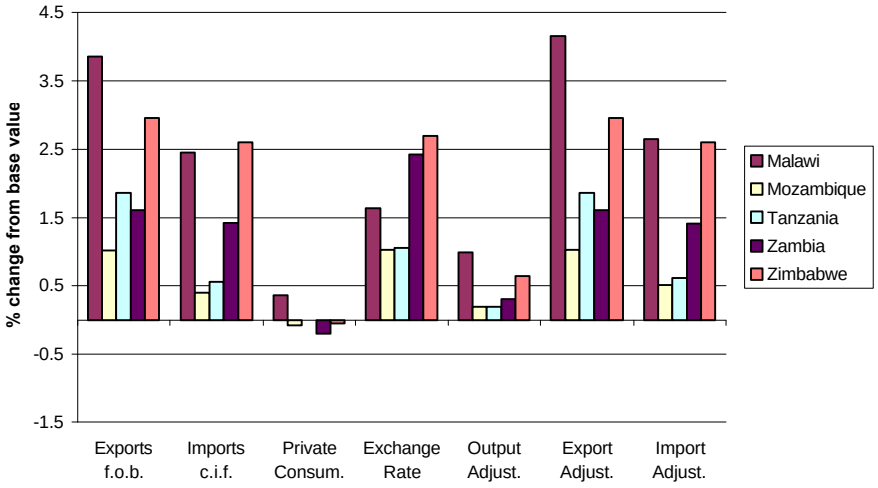
TABLE 1
AVERAGE TARIFF RATES AND TOTAL TARIFF COLLECTIONS
IN % OF TOTAL GOVERNMENT INCOME

	Malawi	Mozambique	Tanzania	Zambia	Zimbabwe
Average tariff rates	10.4	10.4	7.3	4.4	13.5
Tariff collections	12.7	12.7	12.9	6.9	30.0

Source: Calculations based on country SAMs

Figure 3 shows that the overall economic effects of the 50% cut in all tariff rates are much lower than the effects of the 5% devaluation in the first simulation.[13] While the devaluation affects exports and imports likewise, causing opposed effects on them and, consequently, strong changes in the (flexible) trade balance, the tariff cut works only on the import side, forcing the exports to move along the nominal change in imports as the trade balance is fixed and the exchange rate adjusts in this scenario. Hence, one has to look at the changes in imports first to determine the causality of effects in this simulation.

FIGURE 3
FOREIGN TRADE AND ECONOMIC ADJUSTMENT UNDER TARIFF CUTS OF 50%



Note: Exchange Rate = Change in exchange rate. Source: Simulation results

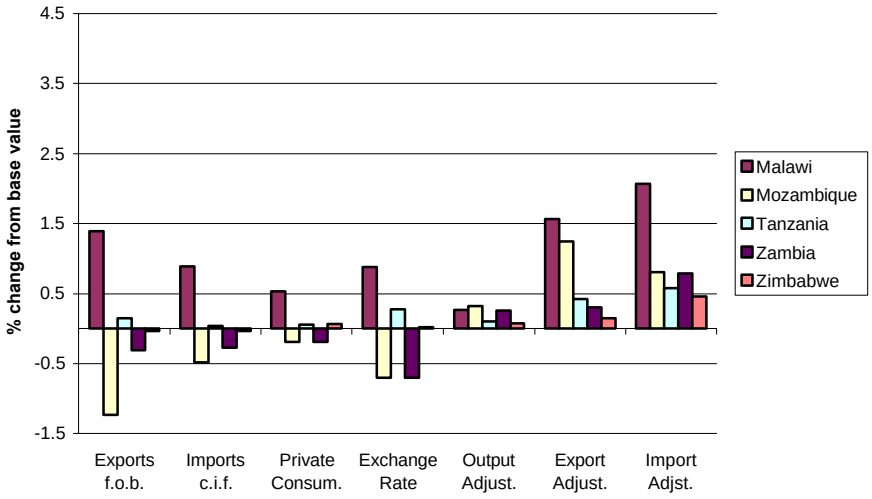
The relative change in total import values seems opposed to the initial magnitude of the trade deficit—economies with small trade deficits experience large changes in imports, and *vice versa*. In the case of Mozambique and Tanzania, the large trade deficits are related to rather low export to GDP shares, which hampers the ability of these economies to react to foreign trade shocks.

Consequently, economies with a (nearly) balanced foreign trade situation are more flexible in their reactions to foreign trade shocks and, hence, more likely to further adjust and improve than economies that are highly unbalanced in their foreign trade positions. Column 4 ('Exchange Rate') in Figure 3 shows that low trade adjustment is associated with low adjustment of the exchange rate. However, changes in the exchange rates do not vary as much as the increases in total imports, a sign that even high exchange rate adjustments cannot induce major changes if trade patterns are highly distorted.[14] Economies with large trade deficits that highly depend on imports (see imports as share of GDP in Figure 1) and whose export base is too small to allow for significant adjustment are in a trap.[15] Hence, equal changes in relative incentives will *not* cause equal relative adjustment and improvement for these disadvantaged economies when compared with economies that show balanced foreign trade situations.

Total final private consumption varies slightly in diverse directions as it depends not only on total absorption effects, but also on shifts between final marketed consumption and non-marketed own-household consumption, which are of different importance across the five countries.[16] The total adjustment of the trade values ('Export Adjust.' and 'Import Adjust.') are again in accordance with the overall total changes in export and import values ('Exports f.o.b.' and 'Imports c.i.f.'), reflecting the same direction of sectoral changes resulting from the uniform reduction of all tariff rates. The sectoral changes, however, vary according to the relative size of sectoral tariff reduction and the associated relative domestic price changes of import and export commodities. Given the intersectoral linkages in production and consumption of the multi-sectoral modelling framework applied, a uniform reduction of sectoral tariff rates will *not* cause a uniform sectoral behaviour. Therefore, up to 1.0% of structural adjustment in production is taking place, following the same pattern across countries as the increase in total imports and the devaluation of the exchange rates (see 'Output Adjust.' in Figure 3).

RESULTS FROM THE THIRD SIMULATION are very different in comparison to the uniform reduction of tariffs in the second simulation. The harmonization of all tariff rates—here finding the uniform rate that generates exactly the same revenue collection as was raised under the initial non-harmonized tariff scheme—causes (a) much less overall changes—due to low Armington elasticities that are a general feature of developing countries; (b) very diverse and even opposed behaviour across countries; and (c) a more distinct difference between overall changes in trade values and the respective total sectoral adjustments.

FIGURE 4
FOREIGN TRADE AND ECONOMIC ADJUSTMENT UNDER TARIFF HARMONIZATION



Source: Simulation results

Hence, tariff harmonization with maintenance of total tariff revenues has much smaller effects on the overall macroeconomic performance than a uniform relative reduction of all tariff rates, but requires higher levels of intersectoral shifts and structural adjustment. In other words, the economy has 'to work harder to achieve less', which is accompanied by different and opposed sectoral behaviour generating winners and losers from the adjustment process and, therefore, has to be designed more carefully than a pure reduction in tariff rates. These results are in vein with arguments by Falvey and Kim [*2000*] on timing and sequencing of trade liberalization.

The opposed effects of tariff harmonization on the change in total import values across countries seems unrelated to their initial trade conditions (import dependency, magnitude of trade balance, etc.). They are rather related to their initial scheme of tariff rates across sectors (variance of rates). If sectoral rates are spread across a wide range, the harmonization to a uniform rate will cause some rates to drop and others to increase substantially. Consequently, some import sectors will be favoured as they were in the case of a uniform cut of all tariff rates, while other import sectors will be adversely affected through an increasing tariff rate that will hamper their import volume. Depending on the particular mix of import sectors, the relative importance of the respective sectors, the import dependency of the economy (with respect to some imports, as well as some production sectors), and potential other factors, the economies under consideration react quite differently. This is especially true when comparing Malawi and Tanzania, whose reactions are almost diametrically opposed, when facing the same change in policy environment.

THE FOURTH SIMULATION aims at linking traditional trade liberalization measures—like the tariff reforms analysed above—that effectively function as border protection, with policy measures that

concern the domestic economy. Besides trade taxes, marketing margins are the most important component (wedge) between border prices and domestic prices of exports and imports. The Southern African countries analysed in this paper display a variety of geographical and economic characteristics that cause high marketing costs, like country size, poor infrastructure (roads and telecommunication), lack of transportation capacity, under-utilisation of existing capacities, high operation and maintenance costs, being land-locked, weak contractual security, and corruption. The datasets in this analysis feature explicit marketing costs for imports, exports, and domestic produce sold domestically. To demonstrate the positive effects of the improvement of the domestic infrastructure (physical and/or legal) on national production and foreign trade, we simulate a 25% cut in all three margins.

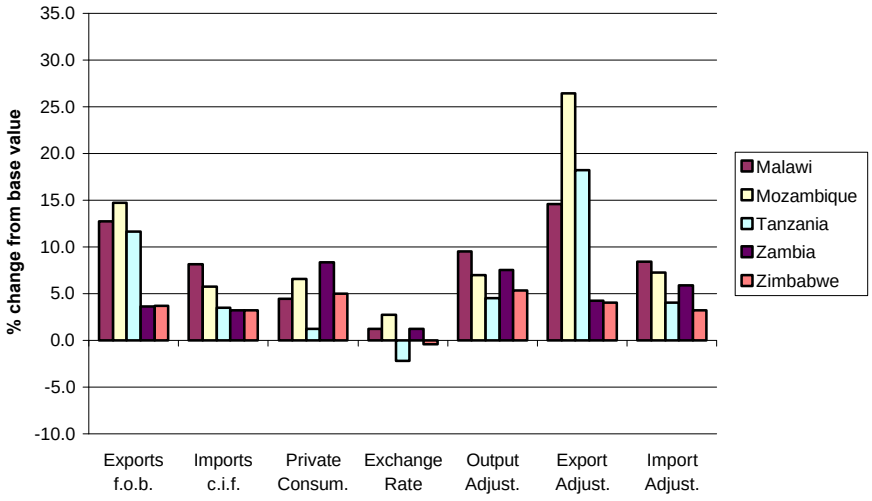
TABLE 2
AVERAGE MARKETING MARGINS AS SHARE OF
TOTAL DOMESTIC SUPPLY, EXPORTS, OR IMPORTS

	Malawi	Mozambique	Tanzania	Zambia	Zimbabwe
Domestic marketing margins	12.4	9.8	5.9	11.2	7.6
Export marketing margins	15.3	8.9	12.4	22.7	16.2
Import marketing margins	11.0	20.6	9.3	14.8	14.6

Source: Calculations from model base runs

The initial domestic, export, and import marketing margins for all countries provided in Table 2 show that they vary across countries and according to the nature of the goods traded, i.e. the relative marketing cost associated with domestic and international trade differ substantially. Moreover, marketing costs are typically diverse across different commodity sectors, a fact that is not reflected by Table 2, but has to be kept in mind when interpreting the modelling results. The mix of domestic and foreign marketing costs and their sectoral distribution determine the relative price changes induced by a reduction of the marketing margins and thus the economies ability to adjust.

FIGURE 5
FOREIGN TRADE AND ECONOMIC ADJUSTMENT
UNDER DECREASING MARKETING COSTS



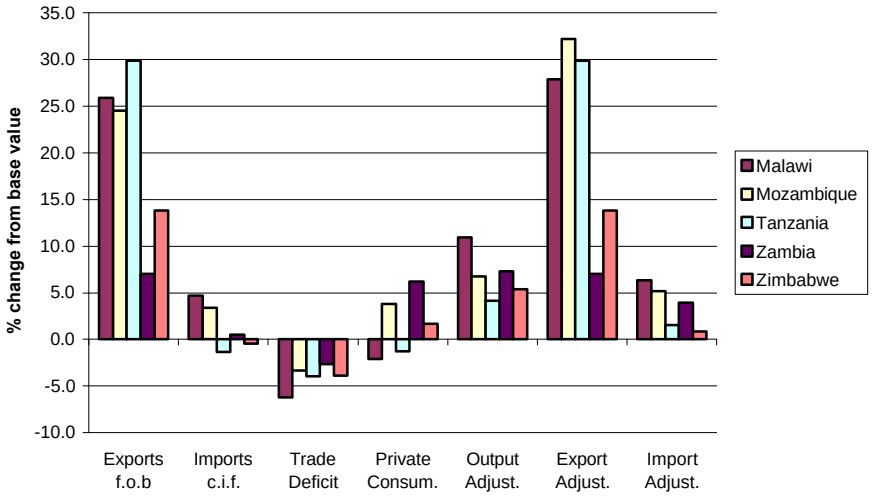
Source: Simulation results

The improvement in infrastructure stimulates foreign trade considerably at modest changes of the exchange rates. The increases in total export values ('Exports f.o.b.' in Figure 5), once again, follow the pattern of the initial trade deficits across countries ('Trade Deficit' in Figure 1) and require substantially higher sectoral adjustment ('Export Adjust.' in Figure 5), especially in the case of Mozambique and Tanzania. Aggregate imports are also substantially stimulated through the 25% cut in their marketing costs and the actual magnitude in the changes of imports and exports depends on the relative size of their respective margins. The higher the margins on the import or export side of a country's foreign trade activities, the more this particular trade category will influence the overall change in trade. Total changes in exports and imports are directly linked through the assumption of a fixed trade balance and an adjusting exchange rate at constant world prices—consequently, the level of aggregate imports moves together with the level of aggregate exports. Compared to the uniform cut in tariff rates, we observe more structural change in the case of the uniform cut in marketing costs. Besides the larger magnitude of the policy intervention, the decline in demand for marketing services causes extensive intersectoral factor shifts, as labour is released from the trade service sector seeking employment in other sectors of the economy (at declining marginal productivity). Intersectoral shifts in production amount to 4.5% (Tanzania) to 9.5% (Malawi) across all countries—'Output Adjust.' in Figure 5. While we observe large sectoral adjustments in export production, overall import adjustment, once again, stays closer to the actual changes in total import values, following our earlier discussion of low substitution opportunities within the given sectoral import structure. On the final private consumption side, most countries gain considerably in real terms along the increase in output that is stimulated through the lower cost structure of production. Lower aggregate demand for marketing services (25% decrease of marketing margins) causes a lower price

for these services at national level and thus lowers the cost of production in all sectors that now require less marketing services at lower prices.

THE FIFTH SIMULATION analyses a combination of an outward-oriented trade liberalization measure (5% devaluation as in simulation one) and a domestic-oriented measure of improved infrastructure (25% decrease in unit marketing costs as in simulation four).

FIGURE 6
FOREIGN TRADE AND ECONOMIC ADJUSTMENT
UNDER DEVALUATION AND DECREASING MARKETING COSTS



Source: Simulation results

The objective is to determine the effects of a devaluation given a more favourable infrastructure environment as compared to the effects under the initial infrastructure. Comparing the results of simulation five (Figure 6) with those of simulation one (Figure 2), while keeping the effects of simulation four (Figure 5) in mind, shows that the effects of devaluation and decrease in marketing costs are not quite cumulative, but that a better marketing environment improves the effects of a devaluation substantially. With respect to household welfare, three out of the five countries turn from a negative to a positive consumption effect and Malawi reduces its negative consumption effect of simulation one by 75% (comparing column 4 in Figure 2 and 6). This improvement reflects the positive change in total absorption (efficiency gain), resulting from a relative increase in imports that overcompensates the devaluation-induced increase in exports. However, trade deficits fall less in the combined simulation, as the improved marketing environment allows for more flexible restructuring of the economy, i.e. imports can also increase (although not as much as exports), despite the devaluation of the exchange rate. From a production point of view, the sectoral adjustment more than doubles for all countries when comparing the measure 'Output Adjust.' of simulation one (Figure 2)

and simulation five (Figure 6). In other words, a more cost efficient marketing process guarantees more flexible intersectoral adjustment and also releases resources to be employed in other sectors.

CONCLUSIONS

The comparative analysis of trade liberalization policies, such as devaluation, tariff cuts, and tariff harmonization, in conjunction with increased cost-efficiency of the domestic marketing system across five Southern African economies suggests the following conclusions:

- There is no such a thing as a 'typical' or 'archetypal' African economy. Even within a rather concentrated geographical area, we observe substantial differences in countries' economic structures and, therefore, expect and indeed observe either different intensity in economic response to the same policy changes or even opposite behaviour.
- Comparing different policy scenarios shows that uniform measures, which effect all sectors more or less equally, show (a) more similar effects across countries; (b) larger effects compared with 'non-uniform' measures that influence sectors differently; and (c) higher overall effects on a national basis.
- Uniform measures, such as equal relative cuts in tariff rates across all sectors, also require much less intersectoral shifts (structural adjustment) than measures that influence sectors differently and thus may cause opposed behaviour across sectors.
- If economies face policy measures with differential impacts on different sectors—such as a harmonized tariff rate—we observe much more intersectoral adjustment, which, however, results in smaller effects and may also be of opposite direction across countries, depending on their initial situation.
- In the case of a large variance in the initial tariff structure, a uniform tariff cut causes higher efficiency gains in production, foreign trade, and national welfare and requires less sectoral adjustment than a tariff harmonization with uniform tariff rate at constant revenue from tariff collection.
- For strongly distorted economies with a high variance in tariff structure, low (Armington) import substitutability, and high import dependency tariff harmonization is *not* optimal. Although easier to administer (e.g. the corruption aspect), economically harmonization is less efficient than general tariff cuts. Related losses in tariff collection should be sought from other revenue sources.
- In addition, complementary domestic measures that improve the cost-efficiency of the marketing system, support foreign trade policies (here a devaluation of the exchange rate) and either dampen their negative consequences or even compensate for them.

The results of our comparative analyses and the conclusions drawn above imply to exercise caution when dealing with trade liberalisation policies that aim at structural adjustment. There is no 'one size fits all' strategy that would *per se* satisfy the needs of a particular class of developing countries. However classified, any group of countries still shows heterogeneity in economic structure that matters with respect to country-specific reactions to a common set of policy measures.

REFERENCES

Chenery, H.B., 1975, 'The structuralist approach to development policy', *American Economic Review*, Vol.65, No.2, pp.310-16.

Löfgren, H., Harris, R.L. and S. Robinson, 2001, 'A Standard Computable General Equilibrium (CGE) Model in GAMS', Trade and Macroeconomics Division Discussion Paper No.75, Washington, DC: International Food Policy Research Institute.

Mellor, J.W., 1966, *The Economics of Agricultural Development*, Ithaca and New York: Cornell University Press.

Timmer, C.P., 1988, 'The Agricultural Transformation', in H. Chenery and T.N. Srinivasan (eds.), *Handbook of Development Economics*, Vol.1, North Holland: Amsterdam and New York.

Falvey, R.E. and C.-D. Kim, 2000, 'Timing and Sequencing Issues for Trade Liberalization in Africa', in D. Bevan, P. Collier, N. Gemmell and D. Greenaway (eds.), *Trade and Fiscal Reform in Africa*, London: Macmillan Press.

Winters, P., de Janvry, A., Sadoulet, E. and K. Stamoulis, 1998, 'The Role of Agriculture in Economic Development: Visible and Invisible Surplus Transfers', *The Journal of Development Studies*, Vol.34, No.5, pp.71-97.

Wobst, P., 1999, 'Devaluation Under Decreasing Marketing Margins Through Infrastructure Investment', paper presented at the XXIV IAAE Symposium in Berlin (2000), Germany.

Wobst, P., 2001, 'Structural Adjustment and Intersectoral Shifts in Tanzania: A Computable General Equilibrium Analysis', Research Report No.117. Washington, DC: International Food Policy Research Institute.

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[1] The paper extends a concept developed by Morrisson and Thorbecke [*1990*].

[2] This IFPRI project was carried out jointly with the University of Copenhagen (Mozambique), the University of Kiel (Zambia), the University of Harare (Zimbabwe), and the University of Malawi (Malawi). For detailed descriptions of all SAMs applied, please refer to the Trade and Macroeconomics Division Discussion Paper Series at IFPRI's web site www.ifpri.org. All original SAMs can be downloaded from IFPRI's web site. The 12-sector aggregations of the SAMs used here can be obtained from the author (p.wobst@cgiar.org).

[3] All SAMs feature activity (industries) and commodity (product market) accounts. Although the CGE model applied allows multiple activities to produce for the same commodity market as well as one activity to produce for multiple commodity markets, as a result from the SAM aggregations we mostly see a one-to-one mapping of activities and commodities in all five datasets. Hence, there is no secondary production.

[4] The five country SAMs show substantial differences in their factor market and household breakdown due to country-specific characteristics, capturing the structural distinctions across this group of economies. For example, the distinction between large-scale *versus* small-scale agricultural households and/or factors only occurs in distinct dichotomous economies like Malawi and Zimbabwe.

[5] Countries are arranged in alphabetical order from left to right, which also represents the order of increasing 1995 per capita GDP at factor cost—base years of the SAMs range from 1992 to 1998.

[6] A full description of this model can be found in Löfgren, Harris, and Robinson [*2001*].

[7] The model is calibrated to replicate the initial SAM database in its base run. Hence, the shift and share parameters computed during the calibration process are country-specific and reflect the underlying structure of the SAM

databases, while exogenously specified elasticities that are difficult to estimate and thus are highly uncertain—especially in development economies—are kept equal across the five economies.

[8] Marketing margins are incorporated into the respective domestic price equations as additive terms of physical quantities multiplied with the final consumer price for marketing services, i.e. each commodity unit is associated with a certain fraction of marketing services. The simulation here reduces the physical quantities that are required to facilitate the marketing of a certain commodity by 25%. This model feature is explained in detail in Wobst [*1999*].

[9] Note that the trade deficits in Figure 1 are calculated as imports minus exports, resulting in positive numbers. Hence, decreases in trade deficits are actual improvements.

[10] A short to medium run specification is used for factor market closures: land and capital demand are fixed by sector and only the two labour types are free to move within aggregate agriculture and aggregate non-agriculture respectively. This specification guarantees better comparability among countries with different factor market set-ups and remarkably different capital intensities.

[11] The macro closures of the model specify the change in aggregate investment and total government expenditure as fixed shares of total absorption (which implicitly determines total private consumption as a fixed share of total absorption. Consequently, government consumption and investment demand will experience the same relative decrease as private consumption does. This 'balanced closure' aims at distributing the burden of policy changes equally among all final demand aggregates (adjustments in absorption are spread across all of its components).

[12] Note that the adjustment measures 'Output Adjust.', 'Export Adjust.', and 'Import Adjust.' are defined over *absolute* sectoral changes and, therefore, are always positive, whereas the actual total change may be well negative. Whether a sector increases or declines its output, imports, or exports, it contributes to the overall structural adjustment in the economy as the reaction to a policy. Part of the adjustment measures computed here is the overall change in the respective economic aggregate (e.g. increase of total exports by a certain percent), which makes them immediately comparable to these general trends. Alternatively, one can compute measures that are net of the general trend and, consequently, interpret them as *additional* adjustment necessary to achieve the overall change.

[13] Note that the scale in Figure 3 ranges from –1.5 to 4.5 instead of –10.0 to 35.0 in Figure 2. The scales of Figures 2, 5, and 6 and Figures 3 and 4 are immediately comparable, respectively.

[14] This observation relates to the conventional wisdom that high tariff rates cause an overvaluation of the exchange rate, which translates to a bias against exports. The scope of the bias is determined by the values of the relevant import elasticities of substitution.

[15] A situation, which demands the development of *new* export markets rather than expansion of or shifts across existing export categories.

[16] Non-marketed own-household consumption as share of total consumption ranges from 3.8% in Zimbabwe to 30.6% in Mozambique.

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