TRADE POLICIES AND POVERTY IN ZIMBABWE-
A Computable General Equilibrium Micro Simulation Analysis.

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1. MAIN RESEARCH QUESTION AND CORE OBJECTIVE

Poverty has been on the increase in Zimbabwe, particularly since the implementation of the structural adjustment program in 1991. It has been difficult to pinpoint those policies, which have an adverse effect on poverty and income distribution. This is because a wide range of policies ranging from trade, to exchange rate to monetary to fiscal and other social policies have been implemented, often at the same time. Since it is difficult to pinpoint specific policies as the culprits for the growing suffering of Zimbabweans, it is difficult for policy makers to react to these increasing problems. Isolating the impact of policy effects has the advantage of enabling researchers and policy makers to know how serious an impact a policy has on income distribution and poverty and thus, will facilitate informed policy making. This paper aims to evaluate the impact of trade policy shocks on the incidence of poverty and on the distribution of income.

Because of the current growing concern about unequal income distribution and poverty in Zimbabwe, and because of the central role being played by trade and external policies in the liberalization process, it is important to establish the direct links among these issues. Trade policies have made up a large part of policy in the nineties and have contributed significantly to changes in growth, employment and ownership of resources. These policies affect terms of trade between agriculture and industry, wages, resource ownership, economic performance and employment within the economy.

The main trade policies to be tackled in this paper are terms of trade changes and tariff reforms. The approach used to handle these issues is to include individual data from a national survey directly in a computable general equilibrium model (CGE) according to the principles of microsimulation. The advantage of this approach is that it allows us to break down the contribution of income variations, the poverty line and income distribution in the evolution of the main poverty indicators emanating from trade policy.

2. THE CONTRIBUTION OF THE RESEARCH

Some studies on the impact of trade policies on the economy have been done. These studies are based on a traditional form of a CGE and only observe inter group income differences. Studies often emphasise the effects of trade policies on the economy without directly connecting trade and external policies to poverty. If a link is made between these issues it is often indirect. Researchers have recently increasingly been interested in the impact of policies on poverty and income distribution. It has also been increasingly realised that there is much variation in the way people are impacted on by policy even if they may belong to the same income distribution group. Thus, there is within group variation that can mean that the impacts of policies are not uniform within a given group. Therefore changes in income distribution that result from policy changes may change the extent of poverty in a group. Thus, the use of CGE models that aggregate over households and work with a representative household per each group assume that there are no variations in these different groups and thus the impact of policies on one household is the same for all households in a group. This is clearly not a realistic assumption for poverty studies and thus researchers have tried to bridge the gap between these types of CGEs and poverty analysis.
Recent efforts to integrate two datasets, the one used for CGE analysis and the one used for poverty analysis, have managed to enable researchers to find out the impact of policies on poverty in the detail that can not be provided by archetype CGE models. (see Decaluwe et al, 1999). This type of modelling gives an integrated micro simulation model. This paper proposes to do a computable general equilibrium micro simulation analysis of trade issues on Poverty in Zimbabwe. To our knowledge, this will be the first study of its kind in Zimbabwe.

The paper will contribute to the debate on the impact of trade policies on poverty in developing countries using this sharper tool. It will also contribute to the micro simulation CGE model literature on Zimbabwe and Africa. The results of the paper should inform policy makers of the consequences of some of their policies on poverty. At this time when most of the world is “opening up” and implementing structural adjustment and liberalisation policies, the government of Zimbabwe has announced several times that it is moving away from this approach. The policy stance seems to be that of having government controls in most spheres of economic activity. It is important to understand what exactly the damage from trade liberalisation is, if any, to incomes and to the poor people since it is one of the main components of adjustment packages. Policy makers will then be able to make informed decisions.

3. COUNTRY BACKGROUND

3.1. Introduction
Between the Unilateral Declaration of Independence (UDI) in 1965 by Southern Rhodesia and independence in Zimbabwe in 1980, the country was relatively isolated from the rest of the world. International sanctions against Rhodesia reduced the export-earning capacity of the economy and made imports both harder to source and more expensive. This created import-substituting industrialization, which was further, stimulated and reinforced by the regime’s response to sanctions of wide-ranging controls on foreign trade and capital movements, to avert a possible balance of payments crisis. This strategy continued well after independence since the new government believed itself to be socialist, therefore controls fitted well with this idea.

In the post-independence boom, both the private-sector and the public sectors had deficits; the private-sector as it attempted to invest after sanctions and because of a consumer boom resulting from minimum wages, relaxation of import restrictions and general post-independence euphoria; the public sector as it attempted to implement its expansionary education and health programmes. The large domestic gap to which this gave rise could be accommodated by a current account deficit since foreign aid and soft loans were coming in.

By the end of 1982, however, government became concerned about the longer-term debt implications of the boom and began to pay more attention to macroeconomic balance. Tightening foreign exchange rationing was the main instrument for doing this. Government also entered into its first stand-by agreement with the IMF, as part of which the Zimbabwe dollar was devalued. The Reserve Bank of Zimbabwe subsequently followed a policy of avoiding real appreciation.

Thus, in most of the eighties, the government of Zimbabwe followed a system of tight import controls because of foreign currency shortages (see Elbadawi et al (1991) and Pakkiri and Moyo (1986). By the end of the eighties the tight system of controls had become progressively difficult
to administer and deemed inefficient by all concerned parties. Pressure from the Breton Woods institution to open up trade was also mounting at that time. These reasons and the general stagnation of the economy and increasing unemployment led to a decision by the government to adopt a World Bank/IMF supported structural adjustment program launched in 1991. The reform programme referred to as “ESAP” was documented in a publication: *Zimbabwe: A Framework for Economic Reform 1991-95* (GOZ, 1991), in early 1991. A major component of the structural adjustment was trade liberalisation. The two other components were macroeconomic policy reform and deregulation.

3.2. Trade Liberalisation policies in Zimbabwe

Trade liberalisation meant a shift from the rationed allocation of foreign currency to market based access. The purpose of this was to extend the growth opportunity provided by international markets from the enclave, of agriculture and mining, during the eighties, to other activities in which Zimbabwe might have a competitive advantage. This would create a high level of export growth and also open the economy to external competition. This would earn the country foreign currency, increase productivity promote growth and employment and thus reduce poverty. The move has greatly changed the allocation of resources and thus income distribution. The relocation of resources in response to the liberalisation was to be guided by the signals provided by trade and tax policies and these in turn have implications on income distribution and poverty.

Reforms in trade policy were gradually undertaken after the implementation of the structural adjustment programme. The import control, industrial licensing and fixed exchange rate of the previous regime were dismantled. The measures taken to gradually liberalise trade were many and include those discussed below.

The government introduced an Open General Import Licence (OGIL) list of goods to which foreign exchange rationing did not apply. At the beginning of the reforms in October 1990, a restricted OGIL system was introduced mainly to enable cement; packaging, textile and mining industry to source imported inputs. More and more goods were added to the list and by 1994, with the exception of a small amount of goods, most goods were on that OGIL. The implication of OGIL was that no import licence was required to import those goods on the list, as was the case in the eighties. Foreign currency allocation was phased off and only tariffs remained as the only direct protection to local industry.

An export retention scheme (ERS) was introduced, in July 1990, under which exporters could retain foreign exchange to pay for imports of goods not on the OGIL. The retention was raised from as low as 5% in mining and 7.5% in agriculture to 50% for all sectors between 1990 and 1993. By 1994, exporters were allowed 100% retention. In October 1990 an export support facility (ESF) was established for those who did not have enough ERS to import raw materials. Other measures to facilitate investment and export were implemented. Full dividend remitability was allowed for foreign investors. Private exporters were also allowed to source some funding from external banks through their local banks. Since the cost of finance was generally lower in these external banks, this move greatly reduced costs for exporters.

In 1992, an import processing Rebate Scheme was introduced under which an exporter did not have to pay duties on imported inputs, provided they could post a bond and store inputs. This measure was meant to overcome the burden to exporters of duty drawbacks system in force and
thus offer export incentives. Export subsidies were removed and domestic and world prices of primary commodities and manufactured consumer goods were allowed to converge. This move has reduced the incentives available to exporters.

During most of the eighties the government managed the foreign exchange rate. Mini devaluations were carried out from time to time between 1983 and 1990. These devaluations were about 5% per year. In 1992 there had been a major devaluation of 20% due to mounting pressure on the external account. This policy and other restrictions helped to keep the Balance of payments in check, although as the government soon realised, was unsustainable.

With the shift from the system of administered foreign exchange allocations and import licensing there was a transition period in which a dual exchange system operated. The exchange rate was allowed to depreciate in real terms in order to encourage a shift of resources to the export sector and sustain exports. One rate was reserved for payment of commitments such as debt servicing and oil imports while authorised dealers used another rate determined by the market. The former was deemed the official rate. Until June 1994 when the exchange rate was unified, a dual exchange rate thus existed in Zimbabwe with an official rate and a market rate. There was minimal interference from the reserve bank. In conditions of overvalued exchange rate, the exporters bought foreign exchange at the official rate. However, in January of 1994, in order to enhance export competitiveness, the dollar was devalued by 17%. This left the Reserve bank rate at Z$8.1258 per US dollar and the market rate at Z$8.5196 per US dollar. During this period the dollar traded within a stable and narrow band, with the market rate appreciating against major currencies by about 3% in the first quarter of 1994. The main reason for the appreciation was the substantial inflow of foreign currency through the interbank market. As liberalisation continued the two rates converged and in 1994 a single rate determined in an interbank market remained. This effectively meant raising export retention levels to 100%. After this the reserve Bank’s role remained that of influencing demand and supply conditions only.

Foreign currency bureaux were allowed to operate. Before 1997 they were not formally allowed to trade on the interbank market but this was changed since then, so as to allow more foreign currency into the market. The government also introduced foreign currency denominated accounts in 1993 allowing free participation in the market for foreign currency. However, this measure was subject to a reversal in the late nineties. Foreign currency account deposits increased from 2.6% of M2 between 1993 and 10.5% in 1996 but fell slightly to 8.2% in 1997.

In 1998 the Reserve Bank closed most of these accounts and converted deposits rapidly to local currency to curb speculation by account holders. The policy was reintroduced in 1999 and still received fairly high response from corporations and individuals. There was a depreciation of 14.3% against the US dollar in the first ten months of 1997. In November of 1997 with continued pressure, the Zimbabwe dollar “crushed” with the Reserve Bank not being able to defend it anymore. It then reverted to a policy of managing the exchange rate with small devaluations in 1999 and 2000. Overall the exchange rate has since 1998 been maintained at an overvalued rate. This has reintroduced two rates, an official one and a parallel market rate.

The problems of foreign currency shortages continued in most of 1998. The late disbursement of the IMF stand by arrangements did not help matters. Although the government had promised to continue to allow the Zimbabwe dollar to float, they, as a temporary measure converted to a
managed float of the currency in January 1999. This was done so as to restore competitiveness of exports. The depreciation of the dollar that was so obviously necessary did not come as the government argued that any more devaluations would fuel inflation. The shortages of fuel and electricity, among many, are glaring evidence of some of the problems of such a policy in an economy like Zimbabwe.

Before the liberalisation period, tariffs were used mainly as an instrument to raise revenue with the role of protection of industry being assigned to other import and exchange controls. This however changed after liberalisation because of the abolition of quantitative trade restrictions. Pressure on the balance of payments led government to turn to tariffs for reducing import demand. During this period the tariff was seen to provide three services: protecting the local industry, raising revenue and managing import demand.

The tariff structure adopted from 1967 was in use until 1983. In 1983, Zimbabwe adopted the Customs Co-operation Council Nomenclature, which increased the number of headings, which had to be allocated duty rated from 331 items to over 5000. There were some problems of inconsistencies encountered due to this move. In 1988 the move to Harmonised Commodity Description and coding System with over 7000 headings worsened the problem. Duty rates were raised in this year in order to meet the increased demand for revenue from the government. Between the implementation of ESAP in 1991 and 1996 there were frequent amendments to the tariff structure to the extent that it became obvious that a major revision was required. An average tariff of 16 percent plus a surcharge of 15% on most goods was applicable during this period.

In 1997 the new tariff structure was launched (see Table 1). The major contribution there was a reduction in the rates and a rationalisation of band structures. The other aim was to lower duties on raw materials and other inputs in an effort to eliminate or reduce tariff evasions that had been rife before that period. A major policy reversal though occurred in 1998 when tariffs on goods considered luxuries were hiked to rates between 70-100% in order to reduce import demand. Surtax on almost all imports was increased from 10% to 15% by 1999. In 2000 some tariff lines and some maximum tariff rates were reduced but in March 2001 the government raised tariffs on certain processed items that have domestically produced substitutes, such as food. At the same time they reduced rates on some raw material and capital goods such as machinery. There are a few non-tariff barriers in the agricultural sector.

Table 1: Structure of tariff rates

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<tr>
<td>Finished goods</td>
<td>40%</td>
<td>85%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Intermediates</td>
<td>20-30%</td>
<td>20-30%</td>
<td>20-40%</td>
<td>15-30%</td>
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<tr>
<td>Raw materials</td>
<td>0-5%</td>
<td>0-5%</td>
<td>0-5%</td>
<td>0-5%</td>
</tr>
<tr>
<td>Capital equipment</td>
<td>0-5%</td>
<td>0-5%</td>
<td>0-5%</td>
<td>0-5%</td>
</tr>
<tr>
<td>Surtax rates</td>
<td>5%</td>
<td>20%</td>
<td>10%</td>
<td>10%</td>
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Source: Chaitezvi, 1999.

The major sources of revenue are customs duties levied on CIF values of imports, surtax and import tax charged on CIF value plus duty. The revenue collected by the government rose slightly in real terms between 1992 and the end of the nineties. The largest contributor to revenue has
been the surtax contributing between 25 and 30% of total revenue. Customs duties and excise taxes have contributed an average of 20% to total government revenue since 1992. The government has put in place a complete tax reform. The tax system is to be changed to a VAT system. It has in place a new revenue authority that synchronises all tax revenue in the economy unlike in the past where there was no coordination in the different tax revenue systems.

The question of interest in this proposal is how far some of these trade liberalisation policies influenced income distribution and poverty in Zimbabwe during this period. We are interested too in finding out how far such trade policies can be used in future to try and influence the allocation of resources between various groups and sectors of the economy with a view to reducing poverty. The model used allows us to test the effects of alternative policies on income distribution and poverty in Zimbabwe.

3.3. Outcomes of the reforms
Relative manufacturing output declined since the start of the reforms. In 1990, the manufacturing sector contributed 22.8% of GDP. By the end of the ESAP period this had declined to 20.7% and to 17.1% by 1998. In the ESAP period, overall real GDP declined by 3.8%. The decline in the manufacturing sector alone accounted for most of this. If it were not for positive growth in Finance and other sectors, GDP would have fallen by more than 3.8%. After 1994, although there was positive growth in GDP (11.9% increase up to 1998), with most sectors growing, the manufacturing sector continued its decline. This suggests that the falling share of manufacturing can be interpreted as de-industrialization rather than simply relative shifts in sector sizes.

Major changes have occurred in the agricultural sector since the implementation of the reforms. Guaranteed markets for agricultural produce through the state marketing parastatals characterized the pre-ESAP era. This was liberalized after 1991. The centralized crop purchasing system of the early eighties was diversified, but the majority of smallholders generally received low prices. The declining trend of real producer prices in the eighties was reversed in the nineties. The eighties saw impressive growth of farmer extension services; this was curtailed due to reduced resources in the nineties. The nineties also saw a substantial reduction in the subsidies on farm inputs, which had existed in the eighties. The growth in farmer credit of the pre-reform period was also reversed in the nineties.

Because farmer training, and research and extension resources have declined in the nineties and this together with the fact the farm inputs such as fertilizers become expensive implies that rural incomes also fell. The poor found themselves getting poorer during this period. The success of the 1980s was to increase sales from communal farmers.

Reform of Zimbabwe’s financial sector was one of the key elements of ESAP. Although it was relatively more advanced and diversified than that in most African economies, it suffered from the same financial repression found in many other countries. The Reserve Bank of Zimbabwe (RBZ) fixed interest rates. The credit rationing which this induced, coupled with an oligopolistic banking sector, made the system very supportive of the status quo. It was particularly difficult for new indigenous firms to obtain credit.

The major institutional change in the financial sector has been the liberalization of entry into what had been, from this point of view, a stagnant sector. Between 1990 and 1998, seven
merchant banks, four discount houses, two commercial banks, two building societies and one finance house were created, as well as a number of insurance companies and other specialized institutions including foreign exchange bureaus, unit trusts and money market corporations. However, although the numbers have grown, the new institutions remain relatively small players in the market, and it is not clear how much competition they have injected. Also a few of these have already collapsed.

The trade liberalization measures have not always provided necessary incentives for export promotion. The government failed to coordinate and sequence trade liberalization with other policy changes under ESAP (e.g. exchange rate adjustment). For example, trade liberalization was implemented but not fiscal policy reforms. Continued high fiscal deficit and high interest rates hindered industrial expansion and exports. The official development assistance to finance ESAP had the effect of raising the relative prices of non-tradable and thus taxing tradable and exports (Collier and Gunning, 1992).

Trade liberalization caused a fall in output and employment in the short run. By 1993, GDP had not risen to the level of 1990 (see Rattso and Torvik, 1998). A consumption boom led to a substantial increase in imports and a growing trade deficit. However, one cannot be certain that all these adverse effects were attributable to trade liberalization. The situation is complicated by the severe droughts, which occurred in 1992 and 1994-95. Rattso and Torvik (1998) isolated the effects of trade liberalization and concluded that ‘the deficit and the de-industrialization associated with it are the high short-run price of liberalization, even if the long-run effects may be favorable’ (p. 336). They believe that trade liberalization may have created uncertainty, which could have reduced further investment (including FDI) and accelerate the process of de-industrialization.

A broad analysis at the performance of exports in the regulated, transition and liberalized periods suggests that the reforms may have stimulated export growth. During the pre-adjustment period (1981-90) the US$ value of exports grew by only 2.4 per cent per annum. In the early nineties period this fell to an average decline of −2.6%. Between 1994 and 1998 export growth has averaged 5% per year. However, this latter figure masks a sharp downturn in later years. The rate of growth was reversed in 1997 and there was a substantial decline in 1998. This downturn continues through the new millennium.

The government deficit increased relative to GDP in both the post-reform periods. But the proximate source of the changes is different. In the first three years of reform, both revenue and expenditure fell relative to GDP, but the fall in revenue was more drastic. The interpretation is that although government was succeeding in reducing its expenditure (albeit minimally), there was a problem of maintaining revenues. After 1994 however, the situation reversed. Now revenue rose relative to GDP. However, expenditure rose much more dramatically. Thus, over the whole reform period, ‘the’ reason for the deficit changed. The initial decline in revenue was perhaps to be expected. It was brought about by a combination of cuts in tax rates and reduced efficiency in tax collection, both of which could be attributed to the reforms themselves. The reduced tax rates were an intended policy objective of the reforms. The reduced efficiency was an unintended consequence of the attempts to cut the size of the civil service and to keep wage costs down, both of which led to a drain of manpower from the tax department.
In summary we can say the following about the budget developments:

- In the transition period, government did make some progress towards the targets it had set for itself under ESAP. Expenditures on both wages and salaries and on complementary recurrent expenditures were reduced in a way that would have reduced the deficit.
- However, these positive moves were more than offset by failure to maintain revenue generation and by rising interest payments and other transfers. The latter rose despite a reduction in subsidies on goods, mainly because of increasing grants to loss-making parastatals.
- After the first few years of the nineties, the progress made on reducing expenditures by cutting the wage bill was reversed. Although interest payments continued to contribute to rising expenditures, these were related to the rising domestic debt service rather than – as in the previous period, the consequences of devaluations for foreign debt service.

This assessment of macroeconomic indicators after the reforms shows that although there were initially some positive responses, the performance since the mid-nineties has been disappointing.

There are a number of ways in which liberalization and globalization can impact on poverty and income inequalities in Zimbabwe: (i) increase in domestic food prices relative to world prices after liberalization, (ii) increase in inflation rates which hurts the poor particularly badly, (iii) fall in real wages following increased domestic and global competition and labor market flexibility. After liberalization (e.g. deregulation of maize marketing and removal of subsidies on basic commodities) food prices shot up. Since the poor (especially the very poor) spend the bulk of their income on food (for the very poor food consumption is nearly 60 per cent of total consumption), substantial increases in food prices worsen their economic situation. Prices of such essential food items as bread and sugar are estimated to have increased by 40 per cent and 50 per cent respectively in 1993 after the withdrawal of subsidies. In addition, prices of such other goods and services as clothing and footwear, rent rates and fuel and power and medical care also increased substantially. But there were also favorable effects of liberalization on poverty alleviation: shift from the formerly subsidized roller meal to the more nutritious straight-run meal (see MPSLSW, 1996, pp. 10-11).

Real wages have been declining in practically all sectors since liberalization. The decline in the real wages in construction, public administration, education and health has been particularly significant. Declining real wages explain greater urban poverty and lowering of living standards, especially since per capita incomes and industrial productivity have not risen. There is a general agreement that poverty has grown worse since liberalization. The main reasons for this have been public and private retrenchments discussed below, pressures of global competition and high degree of capital intensity in manufacturing and decline in real formal-sector wages, and declining public expenditures on social services (Killick et al., 1998; UNDP, 1999; World Bank, 1998). CSO (1998) notes that extreme poverty is concentrated mainly in rural areas where over 50 per cent of the households cannot meet the minimum food requirements. In urban areas poverty is much less acute, with only about 10 per cent of the households below the poverty line. The headcount ratios of poverty between 1990-91 and 1995, however, show that poverty increase was more significant in urban areas compared to the rural; also the increase was greater for males than for females (PASS, 1995).

The reduction in real wages led to an income distributional shift away from low-income households to profit earners. The share of GDP going to salaries and wages, which averaged just
over 57 per cent in the 1980s, fell sharply to 45 per cent between 1990 and 1996. By contrast, profit share has risen from 41 per cent in the 1980s to about 55 percent in the 1990s. Since the ESAP period, there has been declining employment (company closures and retrenchments), which would have contributed to worsening of poverty indirectly.

4. BRIEF RELEVANT LITERATURE REVIEW

The common analysis of income distribution using CGEs when the data set is a SAM is to implicitly assume that the variance of income within a group is zero, because intra-group income distribution is not considered. This type of analysis assumes that the households within a given group are the same and can be represented by a representative household. Although there have been many attempts to try and pay attention to as much income distribution and poverty data as possible by greatly disaggregating the household types, (see for example Piggott and Whalley (1985)), there still is some intra group variation that remains.

Work on Trade liberalisation in CGEs has been done in Zimbabwe by among others Davies et al, Bautista (2000), Mabugu (2001) and Chitiga-Mabugu (2001). In their CGE model Rattso and Torvik 1998, found that, in the short run there was a contraction of output and employment after trade liberalisation. However there was a consumption boom as people consumed previously forced savings, there was an increase in imports and a rising trade deficit. They used four income distribution groups and generally found that liberalisation favoured the richer groups. In Chitiga-Mabugu 2001, there were seven income distribution groups and the results by the above authors were confirmed that there was a reduction of incomes of lower income groups such as rural and unskilled workers while there was an increase in that of profit earners. Bautista et al (1998) on the other hand found that trade policy reform led to significant income gains for households but not as much for the communal farmers.

However, to our knowledge there is no work yet that looks at poverty and trade in a CGE model. Currently, this author is in the process of doing research looking at trade and CGEs using inter-group parametric distribution. However, still this type of analysis assumes people to belong to certain groups. In this case the CGE estimates changes in average incomes of each household but the variance is assumed fixed. Thus, its is assumed that all but the first moment is fixed and unaffected by a shock. In may usually be the case that intra-group variation matters. In Zimbabwe there are wide differences between people who live in the rural areas for example. Chipika et al argue that the farmers that contribute to bumper harvests in the communal areas are only a small group of people who tend to be much richer than the rest of the group. Further, the types of crops grown in these areas are so varied among households that we expect very different impact on households from policies.

The inequality in urban areas is more than in rural areas. In Zimbabwe, consumption distribution was in the nineties as follows: all Zimbabwe, 0.55, rural areas, 0.45 and urban areas, 0.49. World Bank (1998). This shows greater inequality in urban areas than in rural areas but significant differences in each. It is also the case that, in terms of percentage share of consumption by percentiles of population, inequality is quite high. The highest 20 percent of the population accounts for over 62 percent of consumption whereas the lowest 20 percent accounts for only 4 per cent (World Bank, 1998). The above data relate to 1990-91. There are indications that since then income inequalities have grown worse. These differences between groups suggest
that the analysis must be done at the household level if possible. It is expected that a comparison of results from the two methods should yield some important insights as to the importance of intra-group variations. Comparisons that have been done so far do tend to suggest that there are important differences masked in grouping households (see Cockburn, 2001).

Attempts to include poverty explicitly into the model formulation are not many. This study is one that makes such an attempt. The common forms used in most studies thus far are to assume a log normal distribution of income and then use this form to construct poverty measures for the model, for example Demery and Demery (1991) and Adelman and Robinson (1979). This form however is not usually justified, as there are other forms that are more flexible and more suited to economies of developing countries. Alternatively, Decaluwe et al (1999) have used a Beta function as opposed to the lognormal distribution because it is more flexible as it can be skewed to the right, or to the left or be symmetric. However, the problem is still that there is an assumption that all the moments, except the first is fixed and will not change due to a shock. As a result, we cannot compare relative impacts of a policy on households within a given category. In reality though within group variations and across group variations are very important. Further, the characteristics of each group can be so different that they make a difference in terms of responses to policies. For poverty issues, these differences occur and should be taken into account. This suggests that we must take into account in the model, intra-group distributions which allow for an in depth analysis of poverty. The heterogeneity in income sources and consumption patterns is such that one would like to look at each household separately if possible. The best that has been done so far is to include all households captured in a national survey in the CGE data set and then make simulations with the inclusion of all these households after rebalancing the SAM (see Decaluwe et al 1999 and Cockburn 2001).

The model to be developed in this paper is based on Decaluwe et al 1999, and will use the structure of the economy of Zimbabwe and a dataset from Zimbabwe. It is in the class of models known as CGE micro simulation models. The advantage of the micro simulation approach is that heterogeneity of household expenditure patterns and income sources can be captured directly in the model. Thus, one can essentially capture the impact of policies on most of the different individual households in the economy.

5. THE MODEL AND METHODOLOGY

The model will have ten sectors as follows:

Production
Production of output (X) is to be modelled via multi-level CES, Cobb-Douglas (CD) and Leontief functions. Labour and capital and land are the factors of production and intermediates are made up of domestic and foreign inputs. Land is used only in the agricultural sector and both land and capital are fixed in the short run. Firms are profit maximizers so they hire labour until its marginal revenue product equals the wage. There are different labour types, that is, unskilled
labour which includes informal, formal and agricultural labour), and skilled labour. There are limited possibilities for substitution between skilled and unskilled labour in the industrial sectors and between unskilled agricultural labour and skilled agricultural labour. The model distinguishes between two different types of labour skills, that is, skilled labour and unskilled labour. The combination of labour in production is determined as a CES function as in the tree diagram above.

The government
The government receives its total income from direct taxes, indirect taxes, import taxes and the transfers from the rest of the world. Government expenditure is on consumption of goods and services, on transfers and on savings. It is from these equations that we will be able to simulate the effects of fiscal policy on income distribution and poverty. Specifically, changes in tariff policy and in terms of trade will be of importance in this paper.

Households
For the micro simulation data set, one has to reconcile the data in the national accounts with data from a national survey. One has to have clear sources of household income from the survey and these have to be linked to the information in a Social Accounting Matrix (SAM). There must also be a clear link of consumption information in the survey to that in the SAM. Both these data are available in the survey. These must be made to fit with the selected aggregation of industries in the SAM. The SAM will most likely be unbalanced. This can be due to sampling errors or to data collection errors of household data. It can also be due to the fact that the gathering of national data may have to rely on approximate and unrefined data sources. One thus has to rebalance the new SAM. This entropy process can be done by, for example, fixing all the new income and expenditure vectors and then changing all other values in the SAM until the SAM balances, (see for example, Cockburn (2001)). This process can be performed in the software GAMS.

Sectoral consumption demand is determined via a Linear Expenditure System (LES), which permits the inclusion of different marginal budget shares for different households, thereby showing household utility as below:

\[ C_{hc} = \frac{PQ_c \cdot nb_{hc} + \sum c \beta_{hc} \left( CDH_h - \sum c \cdot bnb_{hc} \cdot PQ_c \right)}{PQ_c} \]

where: \( C_{hc} \) is household h consumption of commodity c; \( PQ_c \) is price of composite commodity; \( bnb_{hc} \) is quantity of basic needs basket (minimum subsistence); \( \beta_{hc} \) is share of commodity c in household h consumption.

Using the Foster-Green-Thorbecke (FGT), indices, we can incorporate the poverty measures into the analysis after a simulation. With different values of alpha we are able to tell how the relationship between individual poverty and the standard of living varies (see Ravallion (1994), and Decaluwe et al (1999)). When alpha is equal to zero, the headcount ratio is derived from that equation. In this case, the poverty measure yields the proportion of the population within a group below the poverty line. With alpha equal to one, the relative importance accorded to all individuals below the poverty line is proportional to their incomes and we have the income poverty gap. As alpha increases, more importance is given to the shortfalls of the poorest
households and the measure becomes more distributionally sensitive, that means, society becomes more averse to poverty. (Decaluwe et al 1999). The poverty income distribution analysis will be done using the software DAD.

A poverty line can also be defined as the nominal value of a basket of commodities reflecting basic needs as in Ravallion (1994). The basket does not change as policy changes and is the same for all households in the different groups. The prices for the respective commodities in the basket change as policy changes and so the monetary poverty line also changes. This formulation ensures that the poverty line is endogenous since commodity prices will be endogenously determined within the model. Such a model can now produce results of changes in the poverty line due to a policy change so that we are able to tell how households are relative to the poverty line after a simulation. Thus, from this kind of study we can see the effect of policies on poverty from different angles, the FGT measures and the poverty line.

Trade
Foreign and domestic goods are assumed to be imperfect substitutes and the Armington function is used to make them into a composite good, (Armington P (1969). In line with the Armington function, the aggregate domestic good will be made up of domestically produced and imported goods combined to form a CES aggregate as below:

\[ QQ_c = \text{arm}^g \left[ \delta^q QM_c^{-\rho^q} + (1 - \delta^q) QD_c^{-\rho^q} \right]^{\frac{1}{\rho^q}} \]

Where: \( QQ_c \) is quantity of goods in the domestic market; \( \text{arm}^g \) is Armington function shift parameter; \( \delta^q \) is Armington function share parameter; \( QM_c \) is quantity of import; \( QD_c \) is domestic output sold domestically; and \( \rho^q \) is Armington function exponent.

Imports demand is defined as: \( QM_c = QD_c \left( \frac{PDD_c}{PM_c} \cdot \frac{\delta^q}{(1 - \delta^q)} \right)^{\frac{1}{1 + \rho^q}} \)

Where: \( PM_c \) is domestic export price; \( PDD_c \) is supply price for commodity produced and sold domestically.

Firms produce a homogeneous output, which can either be sold domestically (as final or intermediate consumption) or exported, with the composition of output determined by the CET function. Transformation of the domestically produced good into the domestic market and the export market good is via a constant elasticity of transformation as below:

\[ QX_c = \text{cet}^t \left[ \delta^t QE_c^{-\rho^t} + (1 - \delta^t) QD_c^{-\rho^t} \right]^{\frac{1}{\rho^t}} \]

Where: \( QX_c \) is aggregate quantity of domestic output of commodity; \( \text{cet}^t \) is CET scale parameter; \( \delta^t \) is CET elasticity of transformation; \( QE_c \) is quantity of exports; \( QD_c \) is domestic output sold domestically; and \( \rho^t \) is CET transformation parameter.

With export supply defined as: \( QE_c = QD_c \left( \frac{PE_c}{PDS_c} \cdot \frac{(1 - \delta^q)}{\delta^q} \right)^{\frac{1}{\rho^t-1}} \)

Where: \( PE_c \) is domestic export price; \( PDS_c \) is supply price for commodity produced and sold domestically.
We also assume that there is an export demand function of the following nature for some products:

$$QE_c = BQE_c \left[ \frac{PWE_c}{PE_c^F} \right]^\eta$$

Where $BQE_c$ is the initial level of exports, $PWE_c$ is the world price of exports and is exogenous while $PE_c^F$ is the FOB price of the exported good and is endogenous. The elasticity of demand for exports is given by $\eta$. To our knowledge, an econometric estimate of export elasticity for Zimbabwe was done in 1989 by the World Bank (Chhibber et al (1989). The absolute figure found for Zimbabwe then was 0.3 for the short run. Part of the data and literature search for this project will be to find any recent studies on this issue. This elasticity is very important because it strongly determines simulation results of, for example, changes in tariffs, (see Mabugu 2001).

The exchange rate will be exogenously determined to maintain the current account balance. It represents the relative price between imports and domestic goods. The model will be closed in various markets by assumptions appropriate in those markets.

6. DATA

The most convenient way of working with such a model as the one just described is by using a Social Accounting Matrix (SAM). A SAM for 1995 will be modified and used (Chitiga et al 2000). The survey to be used is a national survey carried out by the Ministry of labour and social welfare in 1995, and is known as the Poverty Assessment Survey Study (PASS) data set. This data set is available and has covered more households than those normally covered by the national surveys. As mentioned earlier, the two data sets are reconciled and the software GAMS will be used to balance the new SAM (see: Cloutier M and J.Cockburn (2002). The model will then be solved in the GAMS software using the new balanced dataset.

The final paper should be publishable in a refereed journal and whenever possible, used as reading material for teaching purposes. It is also intended that the paper be presented to as many appropriate conferences as possible.

7. REFERENCES


Chaitezvi C (1999) “Study on the tariff Policy of Zimbabwe in view of its obligations under the WTO and other regional trade arrangements” Paper prepared for Zimbabwe national consultative Conference on WTO.


8. PRIOR TRAINING EXPERIENCE OF THE RESEARCHER

Margaret Chitiga holds a PhD from Gothenburg University, Sweden, obtained in 1996. Her thesis was entitled “Computable general equilibrium analysis of income distribution policies in Zimbabwe”. She has, in October 2002, attended a course on CGE training by AERC and given by Professor Decaluwe from University of Laval. She has also attended a course by the AERC in 2001 on Stata and DAD software use and another two-week course on Stata at the University of Cape Town in January 2003 (The household survey data for Zimbabwe is organized in Stata or SPSS). She is fairly experienced in the use of the proposed techniques to be used. The researcher is a senior lecturer and teaches trade policy at the postgraduate level and expects to use the model and its output for training purposes. She will also engage four of her postgraduate students as research assistants for this work and thus, build their capacity. Although these students are not very experienced in CGE modeling, they will be engaged as a way of training them. The researcher also works with a group of civil servants from government departments who are interested in CGE modeling. This model and its output will be used to train them as well.

9. ARE THERE ANY ETHICAL, SOCIAL, GENDER OR ENVIRONMENTAL ISSUES OR RISKS, WHICH SHOULD BE NOTED?

None that we are aware of.