

TRADE LIBERALIZATION, FOREIGN AID, POVERTY AND INCOME DISTRIBUTIONS OF HOUSEHOLDS IN GHANA

BY

DR. VIJAY K. BHASIN,
DEPARTMENT OF ECONOMICS,
UNIVERSITY OF CAPE COAST,
CAPE COAST, GHANA.
TEL: 00233-42-35560 (Office)
00233-244-364881 (Mobile)
FAX: 00233-42-37018
E-MAIL: vbhasin96@yahoo.com

AND

MR. CAMARA K. OBENG,
DEPARTMENT OF ECONOMICS,
UNIVERSITY OF CAPE COAST,
CAPE COAST, GHANA.
E-MAIL: camaraobeng@yahoo.co.uk

April 2007.

.....
Abstract: Ghana has adopted the Poverty Reduction Strategy, which emphasizes increased focus on poverty reduction in the design and implementation of its policies. Trade liberalization is defined as the elimination of import and export tariffs on goods and services. Trade liberalization is one of the ways through which poverty could be reduced. However, trade liberalization results in decreased fiscal revenue of the government, which reduces public savings. This fiscal deficit could be financed through increased foreign aid, so that the public savings do not fall. The present study uses the Computable General Equilibrium (CGE) model and examines the impact of trade liberalization; in which lost tariff revenue is compensated by an increase in foreign aid that is redistributed to households via transfers in proportion to their shares in transfer payments, on the poverty and income distributions of various categories of households. The study has shown that elimination of trade related import duties and export duties accompanied by an increase in foreign aid reduces the incidence, depth, and severity of poverty of all categories of households. It is also shown that the income distributions of agricultural households and non-working improve to a larger extent when trade related export duties are eliminated in comparison to import duties accompanied by an increase in foreign aid. On the other hand, the income distributions of public and private sector employees and non-farm self employed improve to a larger extent when trade related import duties are eliminated in comparison to export duties accompanied by an increase in foreign aid.

Keywords: Trade Liberalization, Tariff Revenue, Poverty, Foreign Aid, Social Accounting Matrix, Computable General Equilibrium, Density Function

1.0 Introduction

Developing countries have witnessed major macroeconomic shocks that have had significant impacts on the level of poverty and the distributions of incomes in these countries. In order to understand the linkages between macroeconomic shocks and their impact at the micro level, Computable General Equilibrium models are required. Computable General Equilibrium models are preferred to the partial equilibrium models because they can explain the inter linkages among the various sectors of the economy and the agents present in the model. Many multilateral agencies, such as the World Bank and the International Monetary Fund (IMF) have started to condition their funding operations in developing countries on the progress achieved nationally with respect to poverty reduction policies and measures. This requires an assessment and the quantification of the impacts of economic policies on the poor. For example, one may be asked to assess the poverty impact of trade related tax reforms and foreign capital inflows. The trade related tax reforms may include the elimination of trade related taxes on imports and exports because the optimum tariff rates are zero in a small open economy like Ghana. Moreover, one of the components of foreign capital inflows is the foreign aid and Ghana has been dependent on it because its domestic savings rates are very low.

The persistence of poverty in a large number of developing countries that have been recipients of development assistance from the international community has led to increased emphasis on poverty reduction by the international community. The increased focus on poverty reduction was further motivated by the incidence, depth and severity of poverty, especially in Sub-Saharan Africa, where a large number of countries, including those that embraced the path of economic reforms and stabilization programs, continued to face declining living standards (De Maio, Stewart and Van Hoeven, 1999; Easterly, 2001; Hillman, 2002; Fofack, 2002). A deep analysis of poverty requires a better understanding of the constraints on poverty reduction, the transmission channels through which adjustment policies may affect the poor, and the possible trade-offs that poverty reduction may entail regarding the allocation of scarce resources and sequencing of policy reforms.

It is generally believed that improved market access holds the key to prosperity for developing countries. According to this view, if the industrialised countries would eliminate their trade barriers, especially in apparel and agriculture, this would provide a basis for growth in developing countries, pulling hundreds of millions of people out of poverty. According to World Bank (2002), a reduction in world barriers to trade could accelerate growth, provide stimulus to new forms of productivity-enhancing specialization, and lead to a more rapid pace of job creation and poverty reduction around the world.

Concern over aid effectiveness has intensified since the mid-1980s mainly because of the evident failure to speed growth and reduce poverty in the most heavily aided countries, particularly those in Sub-Saharan Africa. Mosley's (1987) "micro-macro" paradox suggests that aid seems effective at the micro-level; it is harder to identify any positive

impact of aid on the macro-economy. Boone (1996) has suggested that aid does not work and is simply a waste of resources. Burnside and Dollar (1997) have shown that aid works but only in countries with so-called “good policy”. Collier (2002) has suggested that aid should be directed to “good policy” countries to improve aid’s impact on poverty alleviation. Dalgaard, Hansen, and Trap (2002) has suggested that it is now time to move on to consider how the effectiveness of aid can and should be improved – rather than focusing on whether aid works. According to Roland-Holst and Tarp (2002) a primary impetus of aid is real and social investment and its mission can generally be characterized as an effort to facilitate human living standards by direct transfers, investments and overcoming institutional and market failures. Aid can be used to reduce poverty and promote international integration. Aid can reduce poverty through its impact on growth as well as pro-poor public expenditure. The target beneficiaries of aid intended for poverty alleviation are microeconomic institutions: small enterprises, households, and individuals.

The elimination of trade taxes will cause a fall in the revenue of the government. This decrease in the revenue will reduce the public savings. It is necessary for government to find other avenues to compensate for the decrease in revenue. The government can consider various options. The first option is to increase the lump-sum taxes as suggested by Baker and Weisbrot (2001). If the lump-sum taxes are already very high then this option becomes infeasible. The second option is to combine the elimination of trade taxes with a corresponding reduction in public consumption, so that the public savings do not fall. This type of reform is unlikely to be implemented because of its adverse effects on the economy. The third option is to combine elimination of trade taxes with increase in foreign savings. Foreign aid is considered as one of the components of foreign savings. It is assumed that foreign aid is redistributed to households via transfers in proportion to their shares in the transfer payments. All these reforms are likely to affect the poverty and income distribution of households. Since the government is most likely to implement the third type of fiscal reform, it will be interesting to assess the impact of such type of reform on the incidence, depth, and severity of poverty and income distributions of various categories of households. This is achieved by considering two alternative fiscal policy regimes. In the first fiscal policy regime, trade taxes on all imported goods are eliminated and a reduction in the tax revenue is compensated with an increase in foreign aid that is redistributed to households via transfers in proportion to their shares in the transfer payments. In the second fiscal policy regime, taxes on all exported goods are eliminated and a reduction in the tax revenue is compensated with an increase in foreign aid that is redistributed to households via transfers in proportion to their shares in the transfer payments.

2.0 Fiscal Policy, Foreign Aid and Poverty Alleviation in Ghana

The fiscal position of the Ghanaian economy has been the major concern of both the immediate past government and the current government. The underpinning issue to contend with is the nation’s ability to restrict its expenditure within the limits of its revenue capacity. The tax revenue comes from direct taxes, indirect taxes, and international trade taxes. Direct taxes are levied on income and property of individuals and businesses. In 1999, direct taxes contributed about 29.72% to the total tax revenue.

The major source of direct tax revenue was corporate tax followed by income tax. Indirect taxes comprise Value added tax (VAT) on both domestic and imported products, petroleum tax and other indirect taxes. In 1999, indirect taxes contributed 44.12% to the total tax revenue. The major source of indirect tax revenue was VAT followed by petroleum tax. International trade taxes are levied on imports and exports. In 1999, international trade taxes contributed 26.16% to the total tax revenue. The major source of international trade tax revenue was import duties followed by export duty. Import duties contributed 26.61% and export duties contributed 6.91% towards the total revenue of the government. The elimination of trade taxes will reduce the revenue of the government by more than one-third (if tax base is not enlarged) and as a result, public savings will be reduced. This is also going to reduce the investment, which is not good for the economy. The government of Ghana is unlikely to implement such type of tax reform. In that case, trade liberalization can be combined with increased flow of foreign aid. The foreign aid was the third largest source of foreign capital in Ghana for the year 1999. The foreign aid was U.S.\$ 451.7 million in 1999 that declined to U.S. \$194.3 million in 2002. Given the importance of foreign aid in Ghana, the government of Ghana can eliminate trade taxes and at the same time design policies to attract more foreign aid.

Taking the upper poverty line of 900, 000 cedis per annum, the percentage of the Ghanaian population defined as poor fell from almost 52% in 1991-92 to just under 40% in 1998-99. The incidence of poverty in Ghana is still very high and there is a need to alleviate poverty. In the present study, the monetary poverty line of 665,300 cedis per annum was obtained from the consumption basket of the bottom 20% of the distribution of individuals by their standard of living, which provided 2900 kilocalories per equivalent adult per day. The commodities that were included in this consumption basket were about 120 that belong to agricultural, industrial and services sectors. Using the information from Social Accounting Matrix (SAM) for Ghana for 1999, the Ghana Livings Standard Survey 4 (GLSS 4), and this poverty line, we assessed the impact of this fiscal reform on the incidence, depth, severity of poverty; and income distributions of five categories of households' chosen according to their main economic activity.

3.0 Literature Review

Some country studies examine the impact of trade liberalization on poverty and income distributions. Sahn, Dorosh and Younger (1997), and Dorosh and Sahn, (2000) examined the impacts of trade and exchange rate liberalization on income distribution and poverty in Cameroon, Gambia, Madagascar and Niger, using SAMS for the period 1989 – 93. In the model, the authors disaggregated households into the urban non-poor, urban poor, rural non-poor and the rural poor. Four simulations were carried out in this study: simulation one consisted of setting an implicit tariff on imports high enough to keep real exchange rate fixed. The second simulation was real exchange rate depreciation. The third was exchange rate depreciation and a reduction in government spending. The fourth simulation was maintaining government revenue through increased taxes. The finding of the studies indicates that trade and exchange rate liberalisation benefits poor households in urban and rural areas. Bautista and Thomas (1997) also investigated the impacts of import liberalization on poverty in Philippines using Social Accounting Matrix (SAM)

for the period 1979. Five households were considered in this model – three were rural and the remaining two were urban. Experiments carried out in the study include import rationing, uniform surcharge on imports, tariff liberalisation, tariff reduction and 50% reduction in current account deficits. The results indicate favourable effects of import liberalisation on income and poverty in Philippines.

Decaluwe, Patry, Savard, and Thorbecke (1999) have used a Computable General Equilibrium (CGE) model for an archetype African developing economy to analyse the impact of a fall in the price of the export crop and an import tariff on poverty and income distribution. The model considered six sectors, six categories of households, and five primary factors of production. They have shown that the reductions in import tariffs are beneficial to the alleviation of social poverty. On the other hand, the three measures of poverty for the society rise with a decline in the world price of the country's export crop.

Aka (2003) has used a CGE model to analyze the effects of fiscal adjustment required to compensate for the drop in fiscal receipt because of the trade liberalization and adoption of external common tariff in West Africa Economic and Monetary Union (WAEMU) countries on income distribution and poverty in Cote d'Ivoire. The author has used an aggregated SAM with 3 tradable branches and a non-tradable branch, nine groups of households based on the 1998 survey data and 1993 Cote d'Ivoire national accounts. Three simulations were carried out in this study; the first consisted in the elimination of taxes on agricultural exports; the second consisted of elimination of taxes on agricultural imported goods and the third simulation consisted of elimination of taxes on industrial exports. The elimination of agricultural exports and import taxes leads to more poor households than in the pre-shock situation. The elimination of taxes on industrial exports reduces the number of households that are poor in comparison to the pre-shock situation.

Obi (2003) has used a CGE model to examine the potency of fiscal policy as a tool for redistributing income in Nigeria. The model consists of five sectors, two factors of production and six categories of households. The author has used the SAM for 1999 and 1996 household survey data. Three counterfactual scenarios are examined: transfers to the poor household, targeting of government expenditure and import tariff adjustment. The study observed that targeting of government expenditure seems to be the most potent tool for effective redistribution of income. Moreover, tariff adjustment tends to aggravate income disparity among households.

Emini, et al (2005) have used the 2001 SAM for Cameroon to investigate the impact of the Doha round on poverty. Four broad categories of production activities were considered in this study, namely, agriculture, industry, services and non agricultural. The classification of households was based on location, gender and poverty status. Three scenarios were considered, namely, complete elimination of import tariffs, first for the rest of the world and then Cameroon, and then in both the rest of the world and Cameroon. To compensate for lost tariff revenue, a neutral production tax was evenly levied on locally sold production and import substitutes. Elimination of import tariffs in the rest of the world strongly alleviated poverty, at least at the national level. Cameroon's

unilateral trade liberalization worsened poverty and inequality. When the multilateral trade liberalization and Cameroon's unilateral trade liberalization were combined, the adverse impacts of the latter strongly outweighed the favourable outcomes of the former. Poverty worsened when an imperfect VAT was used instead of a neutral replacement tax to compensate for the lost tariff revenue, and got even worse when consumption tax was used.

Cororaton et al. (2005) have examined the impact of the Doha round and trade reforms on poverty in the Philippines, using a CGE model. Classification of households was based on location, education and occupation. Five scenarios were simulated. The first experiment involved Doha-specified reductions in world and domestic tariff rates, export subsidies and domestic support and indirect tax as replacement tax. The second experiment consisted of free trade in the rest of the world (ROW) and the Philippines, and indirect tax as replacement tax. The third experiment involved free trade in both these regions and income tax as replacement tax. In the fourth experiment, the authors looked at ROW free trade, no domestic liberalization and indirect tax as replacement tax. In the fifth and final experiment, the authors looked at full domestic liberalization, no ROW trade reform, and indirect tax as replacement tax. It was observed that poverty increased slightly with the implementation of the expected Doha agreement, especially among rural households and the agricultural self employed and unemployed. Full liberalization involving ROW and domestic liberalization with a compensatory indirect tax reduced the incidence of poverty marginally, but increased the poverty gap and poverty severity substantially. When an income tax is used instead of an indirect tax, poverty increased more in both rural and urban areas. The results further showed that whereas ROW liberalization favoured rural households and actually increased urban poverty, domestic liberalization favoured urban households and was poverty-increasing in the Philippines.

Chitiga, et al (2005) have used a CGE model and SAM for 1995 to study the impact of trade liberalization on poverty in Zimbabwe. The model contained 16 production sectors, four factors of production namely, skilled labour, unskilled labour, capital and land and 14006 households categorized by location and skill. The authors employed a micro-simulation approach where household data was incorporated into the CGE model and simulated the model with individual households. The simulation that was conducted involved total removal of import tariffs. The complete removal of tariffs reduced overall poverty in the economy, falling more in the urban than in the rural areas, while inequality hardly changed.

There are very few studies that relate foreign aid to poverty reduction and income distribution using the general equilibrium approach. The study by Anderson and Evia (2003) looks at the macroeconomic and distributional impacts of foreign aid in Bolivia. Using the 1997 SAM for Bolivia, 6 households and 13 productive sectors, the authors carried out two main simulations. In the first scenario, the government spends all the extra money from aid on current spending and in the second simulation; the government invests all the money in public capital. One implicit assumption of the model is that public capital i. e. roads, electricity networks, justice system, research centres, etc., make

private capital more productive. In both cases a positive impact of foreign aid on GDP growth rate was found, but in the case of pure current spending, the advantage is temporary, and the longer the influx of aid is maintained, the smaller the impact.

In terms of income distribution, the impacts differ considerably between the two extreme cases. In the case where more aid is used exclusively for current spending, the ones who benefit most are the skilled workers in urban areas, since these accounts for most of government spending. Those who lose most are rural workers and employers. Rural workers lose because they work in modern agriculture, an export sector that gets hurt by the real appreciation of the exchange rate following the influx of aid. The employers lose because their enterprises become less competitive due to the appreciation. In the case where foreign aid is converted fully into public capital, the distributional impact is completely different. The main winners are urban informals, employers, and skilled workers who are typically employed in public investment projects. The only group that loses in this scenario is rural workers, but they benefit in the end due to the higher level of productivity and incomes in the economy.

Bussolo and Round (2003) have used a CGE model and the 1993 SAM for Ghana to investigate the possible effects of a range of budget-neutral redistributive income transfers on poverty. In this study, four financing schemes for the short run and long run factor market adjustment rules were simulated. The results of the study indicated that poverty outcomes were different according to which of the four rules i.e. income taxation, corporate taxation, indirect taxes, and tariffs, were chosen and the period under consideration. In this respect, the authors found tariffs as the financing scheme with the largest impact on poverty, followed by indirect taxes, corporate taxes and household direct taxes in that order under the long run factor market closure rule. The short run outcomes were not very clear, except that there appeared to be an increase in overall poverty under the corporate tax financing rule.

Arbenser (2004) has examined the impact of FDI on incomes of households in Ghana using the 1993 SAM. In the model, the author disaggregated households into four groups, namely, household urban skilled, household urban non-skilled, household rural agriculture and household rural non-agriculture. Three counterfactual simulations were carried out in this study. Simulation 1 consisted of 50% increase in FDI inflows with endogenous foreign exchange rate and fix current account balance. The second simulation involved 50% cut in tariffs with flexible government savings and mobile factors. The third simulation was mixture of simulations one and two. The study shows that increase in FDI inflow raises the household income by more than 1.3%; household urban skilled registers the highest percentage increase in income followed closely by household rural agriculture, and the least income gain accrues to household urban non-skilled. It also establishes that increase in FDI inflow and reduction of tariff levels is complementary policies that enhance household welfare.

The above mentioned studies will enable us to develop an appropriate CGE model for Ghana that is consistent with the Ghana Living Standard Survey 4 and Social Accounting Matrix for Ghana, to adopt the appropriate technique of estimation, e.g. top-down

approach where we use the CGE model on one side (the top dimension) and the household survey on the other (the down dimension) to figure out what are the consequences of a change in prices and factor returns on the household's income and poverty line, and to analyse the results, e.g. the theoretical framework linking trade liberalization, foreign capital inflows and poverty.

The studies of Bussolo and Round (2003) and Arbenser (2004) have used the 1993 SAM for Ghana, whereas the present study proposes to use the 1999 SAM for Ghana. The present study classifies households on the basis of economic activity that differs considerably from the previous studies on Ghana. The study of Arbenser (2004) considered the Foreign Direct Investment, whereas the present study examines the impact of Foreign Aid on poverty. The CGE model of the present study differs from that of Bussolo and Round (2003) and Arbenser (2004) and is more comprehensive.

4.0 Structure and Data of the SAM

The macro SAM for Ghana for the year 1999 is based on the SAM of Ghana for 1993. Since the structure of the Ghana economy is unlikely to change dramatically in the short or medium term, the SAM of Ghana for 1993 was updated for 1999 using the fixed proportion method. Since we are interested in the behavior of different categories of household, there was a need to integrate the GLSS 4 data with the SAM for 1999. The categories of households are identified on the basis of economic activity and these are Agricultural Farmers, Public Sector Employees, Private Sector Employees, Non-farm Self Employed and Non-working. The contribution of each category of household in the total income and expenditure was determined from the GLSS 4 data set (available on CD-rom). These proportions were used to reconstruct the household sector within the SAM of 1999. The integrated SAM for 1999 is adopted from Bhasin and Annim (2005). The data for other endogenous variables, which cannot be tracked from SAM, and exogenous variables are collected from International Financial Statistics, the State of the Ghanaian Economy, Annual Budget, and World Development Indicators.

5.0 Methodology

The general equilibrium model is presented in Appendix A and is based on Bhasin and Annim (2005) and Bhasin and Obeng (2005a, 2005b, 2006). In the CGE model, there are 48 basic equations, comprising 10 equations for production and trade block; 16 equations for Income, Taxes, Savings, and Investment block; 8 equations for demand for commodities block; 9 equations for prices; and 5 equations for equilibrium conditions and macroeconomic closures. Since there are three production activities and five categories of households, the total numbers of equations to be solved are 142. There are 142 endogenous variables and 34 exogenous variables. The model is just identified containing as many endogenous variables as equations.

The model is calibrated to 1999 data set. The GAMS software is used to check for the consistency of the data with the equilibrium conditions and to perform the simulations. The benchmark equilibrium must be replicated with the use of calibrated parameters and

base year data. The pre-shock values for the variables are obtained from the solution of the specified model. The post shock effects of these simulations are used to find the effects on poverty line and the incomes of households. The DAD software is used to evaluate the poverty measures and PCGIVE software is used to plot the income distributions of households before and after the exogenous shocks. The pre-shock and post-shock poverty levels are obtained using Foster, Greer and Thorbecke (FGT) poverty measures

$$POV_{k,h} = \int_0^z [(z - y_h)/z]^k f(y_h) dy_h, \quad k=0,1,2$$

where y_h is the income of household h , k is a poverty-aversion parameter, z is the endogenously determined poverty line. The incidence of poverty is indicated by $k=0$. The depth of poverty is indicated by $k=1$, and the severity of poverty is indicated by $k=2$.

Since CGE models are fully calibrated on the basis of an initial year SAM that provides a set of consistent initial conditions and the SAM does not contain information on intra socio-economic household group income distribution, it is advisable to generate the intra group income distributions in the same base year as that of the SAM to calibrate the general equilibrium model. Several approaches have been used in the literature to describe and define intra group distribution of income in a CGE framework. For example, de Janvry et al. (1991) have used both a lognormal and a Pareto distribution function to depict income distribution. Decaluwe, Patry, Savard, and Thorbecke (1999) and Aka (2003) have used the Beta distribution to represent the intra group income distributions. Unlike the lognormal, the Beta function is much more flexible when it comes to the asymmetric forms it can adopt. However, since we know very little about the probability density functions of the incomes of households, density functions may be interpolated to give a clearer picture of the implied distributional shape. To estimate the density functions without imposing too many assumptions about its properties, a non-parametric approach is used in PCGIVE based on a kernel estimator of density function $f(Y_h)$.

The Kernel estimator of the density f is defined by:

$$f(Y_h) = (1/Tu) \sum_{t=1}^T K\{(1/u)(Y_h - y_{ht})\}$$

where $K\{\}$ is the kernel function and u is a 'window width' or smoothing parameter and corresponds to the width of histogram bars. The kernel K used is the Normal or Gaussian kernel.

6.0 Simulation Results

In the first simulation, we eliminate the trade related import tariff on all imports that is compensated by an increase in foreign aid by 4.0%. In the second simulation, we eliminate the export tariff on all exports that is compensated by an increase in the foreign aid by 10.84%. Table 1 indicates the effects of these simulations on macro economic variables.

Table 1: Simulation Results

Variables	Base level	Simulation 1: Elimination of import tariff and 4% increase in foreign Aid	Percentage Increase or Decrease	Simulation 2: Elimination of export tariff and 10.84% increase in foreign Aid	Percentage Increase or Decrease
Output of agricultural sector	1725.64	1696.33	-1.70	1935.87	12.18
Output of industrial sector	1817.12	1841.56	1.34	1601.50	-11.87
Output of service sector	849.82	852.79	0.35	866.27	1.94
Government income	729.15	685.75	-5.95	607.36	-16.70
Agricultural Household Income	338.74	357.54	5.55	368.41	8.76
Public Sector Household Income	306.88	319.54	4.13	318.84	3.90
Private Sector Household Income	266.74	276.30	3.58	273.46	2.52
Non-farm Household Income	285.76	297.39	4.07	296.39	3.72
Non-working Household Income	293.40	307.87	4.93	312.02	6.35
Export of agricultural output	645.85	629.05	-2.60	737.04	14.12
Export of Industrial Output	990.07	1004.25	1.43	834.92	-15.67

Export of Services	0.481	0.478	-0.62	0.497	3.33
Import of agricultural output	192.92	216.7	12.33	199.22	3.27
Import of industrial output	519.21	548.33	5.61	506.49	-2.45
Import of services	646.13	650.46	0.67	648.93	0.43
Demand for labour in the agric sector	3.26	3.21	-1.53	3.64	11.66
Demand for labour in the Industrial sector	2.73	3.73	36.63	1.95	-28.57
Demand for labour in the services sector	1.35	1.36	0.74	1.34	-0.74
Demand for capital in the agric sector	3.96	3.84	-3.03	5.01	26.52
Demand for capital in the industrial sector	83.74	84.10	0.43	79.63	-4.91
Demand for capital in the services sector	3.18	3.16	-0.63	3.58	12.58
Composite prices of agric goods	0.63	0.61	-3.17	0.609	-3.33
Composite prices of industrial goods	0.72	0.69	-4.17	0.717	0.42
Composite prices of services	0.850	0.852	0.24	0.835	-1.76
Wage rate	187.66	190.80	1.67	181.45	-3.31
Rental rate	4.89	5.05	3.27	4.18	-14.52

The first simulation leads to a reduction in the prices of imported goods and services. As a result, imports become cheaper and consumers substitute imported goods for domestic goods. Depending on the elasticity of substitution and imports' share in total consumption, demand for all imports increase. The reduction in domestic costs caused by the import tariff cut increases the profitability of the export sectors. This leads to the increase in investment, output and exports in the industrial sector. However, the increased inflow of imports is by no means enough to eliminate the import competing sectors, investment, output and exports decline in the agricultural sector, whereas investment and exports decline in the services sector. Factors of production move from inefficient sectors towards sectors that are more productive. As a result, both returns to labor and capital increase. The incomes of all types of households increase because of increase in factor prices, reallocation of resources, and transfer payments that arise due to additional foreign aid. The cut in import tariffs reduces the prices of composite goods in agricultural and industrial sectors considerably. The fall in the prices of composite goods reduces the poverty line by 2.66%.

The second simulation makes exports more competitive and as a result exports of agricultural goods and services increase. The output and investment in these sectors increase. Since the industrial sector is not very competitive on the internal market, the output, employment and investment in this sector decline. Since the relative prices of industrial imports have increased, this makes the imports of industrial goods to decrease. As there is a movement of labor and capital from inefficient industrial sector to efficient export oriented agricultural and services sectors, factor prices fall. However, the fall in the factor prices is offset by reallocation of resources and increased transfer payments due to foreign aid that cause the incomes of all categories of households to increase. The cut in export tariffs reduces the prices of composite goods in agricultural and services sectors. This fall in prices reduces the poverty line by 2.32%.

Table 2. Poverty Measures for the Base Year and Simulations

	Agricultural households	Public Sector Employees	Private Sector Employees	Non-farm Self-Employed	Non-Working
Incidence of Poverty					
(alpha=0) base	17.29%	19.28%	25.36%	21.04%	20.00%
Simulation 1	15.77%	18.39%	23.68%	19.22%	18.30%
	(-1.52%)	(-0.89%)	(-1.68%)	(-1.82%)	(-1.70%)
Simulation 2	14.86%	18.39%	24.10%	19.28%	18.09%
	(-2.43%)	(-0.89%)	(-1.26%)	(-1.76%)	(-1.91%)
Depth of Poverty					
(alpha=1) base	7.15%	9.02%	9.85%	8.56%	7.99%
Simulation 1	6.37%	8.33%	8.92%	7.78%	7.12%
	(-0.78%)	(-0.69%)	(-0.93%)	(-0.78%)	(-0.87%)

	Simulation 2	6.13% (-1.02%)	8.40% (-0.62%)	9.13% (-0.72%)	7.86% (-0.70%)	7.00% (-0.99%)
Severity of Poverty						
	(alpha=2) base	4.16%	5.30%	5.41%	4.96%	4.30%
	Simulation 1	3.71% (-0.45%)	4.86% (-0.44%)	4.88% (-0.53%)	4.51% (-0.45%)	3.78% (-0.52%)
	Simulation 2	3.57% (-0.59%)	4.90% (-0.40%)	5.00% (-0.41%)	4.56% (-0.40%)	3.71% (-0.59%)
Mean	base (Cedis)	2,765,729	2,534,159	2,206,561	2,360,109	2,398,446
Income	Simulation 1	2,919,233 (5.55%)	2,638,667 (4.12%)	2,285,966 (3.60%)	2,456,029 (4.06%)	2,516,635 (4.93%)
	Simulation 2	3,007,912 (8.76%)	2,632,599 (3.88%)	2,262,488 (2.53%)	2,447,984 (3.72%)	2,550,877 (6.36%)
Poverty	base (Cedis)	665,300	665,300	665,300	665,300	665,300
Line	Simulation 1	647,603 (-2.66%)	647,603 (-2.66%)	647,603 (-2.66%)	647,603 (-2.66%)	647,603 (-2.66%)
	Simulation 2	649,865 (-2.32%)	649,865 (-2.32%)	649,865 (-2.32%)	649,865 (-2.32%)	649,865 (-2.32%)

Table 2 presents information on the incidence, depth, and severity of poverty for the base year and variations in these measures after the shocks. In the base year, the incidence, depth, and severity of poverty is the highest among the private sector employees. The least incidence, depth, and severity of poverty is prevalent among the agricultural households. In the first simulation, reduction in consumer prices reduces the poverty line and incomes of all households increase. This causes the incidence, depth, and severity of poverty for all categories of households to be reduced. The maximum reduction in the incidence of poverty is noticed for the non-farm self-employed, whereas the maximum reduction in the depth and severity of poverty is observed for the private sector employees. The least reduction in the incidence, depth and severity of poverty is noticed for the public sector employees. This shows that elimination of trade related import taxes accompanied by an increase in foreign aid could reduce the incidence, depth, and severity of poverty in Ghana.

In the second simulation, reduction in consumer prices reduces the poverty line to a less extent and incomes of all households increase. These changes cause the incidence, depth, and severity of poverty for all categories of households to decrease. The maximum reduction in the incidence, depth and severity of poverty is observed for the agricultural households. The least reduction in the incidence, depth and severity of poverty is

observed for public sector employees. The study shows that elimination of export taxes accompanied by an increase in foreign aid could also be used as a tool to reduce poverty in Ghana.

The income distributions of the various categories of households for the base year and two simulations are presented in Figures 1 to 5 (see Appendix B). In both the simulations, the density functions for all the categories of households shift to the right, with higher mean incomes and lower poverty lines. This causes a reduction of the population below the poverty line in each household group. The income distributions of agricultural households and non-working improve to a larger extent when trade related export duties are eliminated in comparison to import duties accompanied by budget neutral increase in foreign aid. On the other hand, the income distributions of public and private sector employees and non-farm self employed improve to a larger extent when trade related import duties are eliminated in comparison to export duties accompanied by an increase in foreign aid.

8.0 Conclusion and Policy Implications

To analyze the impact of elimination of trade taxes accompanied by a budget neutral increase in foreign aid on the incidence, depth, and severity of poverty and income distributions of households, the study has used the CGE framework. The study has analyzed the impact of two policies on poverty and income distributions. The first policy takes the form of elimination of trade related import taxes accompanied by an increase in foreign aid by 4.0%. The second policy involves the elimination of export taxes accompanied by an increase in foreign aid by 10.84%. The elimination of trade related import duties and export duties accompanied by an increase in foreign aid reduces the incidence, depth, and severity of poverty of all categories of households. Both the shocks improve the income distributions of households. However, the income distributions of agricultural households and non-working improve to a larger extent in the second shock, whereas the income distributions of public and private sector employees and non-farm self employed improve to a larger extent in the first shock.

The government of Ghana should try to eliminate trade related import taxes to reduce the incidence, depth and severity of poverty of all categories of households because it involves less inflow of foreign aid. Keeping in view the Multi-Donor Budgetary Support to implement the Ghana Poverty Reduction Strategy, the increased inflow of foreign aid by 4.0% is sustainable. Since the incidence of poverty is the highest among the private sector employees, the government should first concentrate on this group of households. The government of Ghana can use the findings of this study to elicit more support from the Multilateral Donor agencies. The government of Ghana should design district level schemes to distribute the additional foreign aid to households.

References

Aka, B. F. (2003). "Fiscal Adjustment, Poverty, Inequality and Welfare in Cote d'Ivoire: A CGE Model Analysis", Final Report, AERC, Nairobi, Kenya.

- Anderson, L. E., and J. Evia. (2003). "The Effectiveness of Foreign Aid in Bolivia", Research Paper, No. 10, Instituto de Investigaciones Socio Economicas, Documento de Trabajo, Bolivia.
- Arbenser, L.(2004). " A General Equilibrium Analysis of the Impact of Inward FDI on Ghana: The Role of Complementary Policies", Eco Mod Net, September 2-4, Brussels.
- Baker, D., and M. Weisbrot. (2001). "Will Trade Gains Make us Rich? An assessment of the Prospective Gains from New Trade Agreements", Centre for Economic and Policy Research, Washington, D.C.
- Bautista, R. and M. Thomas. (1997). "Income Effects of Alternative Trade Policy Adjustments on Philippine Rural Households: A General Equilibrium Analysis", TMD Discussion paper No. 22, International Food Policy Research Institute.
- Bhasin, V. and S. Annim. (2005) "Impact of Elimination of Trade Taxes on Poverty and Income Distribution in Ghana", International Monetary Fund: Macroeconomic Policy Challenges in Low Income Countries, 1-42.
- Bhasin, V. and C. Obeng. (2006). "Trade Liberalization, Foreign Borrowing, Poverty and Income Distributions of Households in Ghana, ICFAI Journal of Applied Economics, July 2006, Vol 5, No. 4.
- Bhasin, V. and C. Obeng. (2005a). "Trade Liberalization, Remittances, Poverty and Income Distributions of Households in Ghana. In Judith Shaw (Ed): Remittances, Microfinance and Development: Building the Links. Volume 1: A Global View, The Foundation for Development Co-operation, Brisbane, Australia, 2005, 33-45. (ISBN 0-9586728-7-3).
- Bhasin, V. and C. Obeng. (2005b). "Globalization, Technology, Poverty and Income Distributions of Households in Ghana" in World Association for Sustainable Development: World Sustainable Development Outlook 2005 Global Competitiveness: a common goal in a digital society, Emerald Group Publishing Limited (ISBN: 1-903721-00-8).
- Boone, P. (1996). "Politics and the Effectiveness of Foreign Aid", European Economic Review, Vol. 40, No. 2, 289-329.
- Burnside, C. and D. Dollar. (1997). "Aid, Policies and Growth". Policy Research Working Paper 1777. World Bank, Development Research Group, Washington, D.C.
- Bussolo, M. and Round, J. (2003). "Poverty Reduction Strategies in a Budget-Constrained Economy: The Case of Ghana". OECD Development Centre Working Paper No 220.
- Chitiga, M., Kandiero, T., and R. Mabugu. (2005) "Computable General Equilibrium Micro simulation Analysis of the Impact of Trade Policies on Poverty in Zimbabwe". PEP Working Paper, No.1.
- Collier, P. (2002). "Making Aid Smart: Institutional Incentives facing Donor Organisations and their Implications for Aid Effectiveness", USAID Forum Series, Washington, D.C.
- Cororaton, B., Cockburn, J., and E. Corong. (2005). "Doha Scenarios, Trade Reforms, and Poverty in the Philippines: A CGE Analysis". PEP Working Paper, No. 3.
- Dalgaard, C.,H. Hansen. And F. Tarp. (2002). " On the Empirics of Foreign Aid and Growth". Centre for Research in Economic Development and International Trade Working Paper 02/08, University of Nottingham, U.K.

- Decaluwe, B., Party, A., Savard, L. and E. Thorebecke. (1999). "Poverty Analysis Within a General Equilibrium Framework", CREFA, Working Paper 99-09, Department of Economics, University of Laval, Quebec, Canada.
- De Janvry, A., E. Sadoulet, and A. Fargeix. (1991). "Adjustment and Equity in Ecuador", OECD Development Center, Paris.
- De Maio, L., Stewart, F., and R. Van Der Hoeven. (1999). "Computable General Equilibrium Models, Adjustment and the Poor in Africa", World Development, Vol. 27, No. 3, 453-70.
- Dorosh, P. A. and D. E. Sahn. (2000). "A General Equilibrium Analysis of the Effect of Macroeconomic Adjustment on Poverty in Africa", Journal of Policy Modelling, Vol. 22, No. 6, 753-76.
- Duclos, Jean-Yves, Araar, A. and Fortin, C. "DAD: A Software for Distributive Analysis/Analyse Distributive", MIMAP Programme, International Development Research Centre, Government of Canada and CREFA Universite Laval.
- Easterly, W. (2001). The Elusive Quest for Growth: Economist's Adventures and Misadventures in the Tropics, MIT Press, U.S.A.
- Emini, A., Cockburn, J., and B. Decaluwe. (2005). "The Poverty Impacts of the Doha Round in Cameroon: The Role of Tax Policy". PEP Working Paper, No.4.
- Fofack, H. (2002). "The Nature and Dynamics of Poverty determinants in Burkina Faso in the 1990s", World Bank Policy Research Working Paper, No. 2847.
- GAMS Development Corporation, 1217 Potomac Street, NW, Washington, DC 20007, U. S. A. www.gams.com
- Ghana Statistical Service (1997). A Social Accounting Matrix for Ghana 1993. Accra, Ghana.
- Ghana Statistical Service (2000). Poverty Trends in Ghana in the 1990s. Accra, Ghana.
- Hillman, A. (2002). "The World Bank and the Persistence of Poverty in poor Countries", European Journal of Political Economy, Vol. 18, 783-95.
- Mosley, P. (1987). Overseas Aid: Its Defense and Reform, Brighton, Wheat sheaf Books.
- Obi, B. P. (2003). "Fiscal Policy and Income Distribution: Some Policy Options for Nigeria". Final Report, AERC, Nairobi, Kenya.
- PcGive, Timberlake Consultants, 47 Hartfield Crescent, West Wickham, Kent BR4 9DW, U. K. www.pcgive.com
- Roland-Holst, D. and Tarp F.,(2002). New Perspectives on Aid Effectiveness, Annual Bank Conference on Development Economics, Oslo, Norway.
- Sahn, D. E., Dorosh, P. A. and S.A.Younger.(1997). Structural Adjustment Reconsidered: Economic Policy and Poverty in Africa, Cambridge University Press, Cambridge.
- World Bank. (2002). Global Economic Prospects and the Developing Countries, Washington, D.C.

Appendix A : Computable General Equilibrium Model for Ghana

I Sets definition

$i \in I = \{AGR, IND, SER\}$, Goods (AGR: Agriculture, IND: Industry, SER: Services).

$j \in J = \{AGR, IND, SER\}$, Production Sectors

$h \in H = \{AGRF, PUBE, PRIE, NFSE, NW\}$, Households
(AGRF: Agricultural Farmer, PUBE: Public Sector Employee,
PRIE: Private Sector Employee, NFSE: Non-farm Self Employed,
NW: Non-Woking).

II Parameters

A_j	<i>Share of Value Added in Total Output</i>
c_j	<i>Scale Coefficient of Cobb-Douglas Function</i>
a_{ij}	<i>Quantity of Good i used in the Production of Good j</i>
α_j	<i>Elasticity Parameter of Cobb-Douglas Function</i>
\sqrt{i}	<i>Scale Coefficient of CET Function</i>
γ_i	<i>Distributive Parameter of CET Function</i>
R_i	<i>Transformation Parameter of CET Function</i>
η_i	<i>Elasticity of Transformation</i>
λ_i	<i>Scale Coefficient of CES Function</i>
δ_i	<i>Distributive Parameter of CES Function</i>
ρ_i	<i>Substitution Parameter</i>
σ_i	<i>Elasticity of Substitution</i>
Ω_1	<i>Firms Share in Total Capital Income</i>
Ω_2	<i>Govt. Share in Total Capital Income</i>
s_h	<i>Share of household h in Labor Income</i>
k_h	<i>Share of household h in Total Capital Income</i>
ty_h	<i>Tax Rate on Household h Income</i>
dvr_h	<i>Dividend Rate for household h</i>
Ψ_h	<i>Marginal Propensity to Save of h Household</i>
Ψ_f	<i>Marginal Propensity to Save of Firms</i>
Ψ_g	<i>Marginal Propensity to Save of Government</i>
ty_f	<i>Tax Rate on Firm Income</i>
tm_i	<i>Tax Rate on Import of good i</i>
te_i	<i>Tax Rate on Export of good i</i>
tx_i	<i>Value Added Tax Rate on good i</i>
β_{ih}^c	<i>Share of Good i in household h consumption</i>
β_i^f	<i>Share of Good i in Firm consumption</i>
β_i^g	<i>Share of Good i in Government consumption</i>
$C_{i,h}^{MIN}$	<i>Household Minimum Consumption of Good i</i>
ϕ_j	<i>Share of Sector j in Total Investment</i>

μ_i *Share of Good i in Value added*

III Endogenous Variables

XS_j	<i>Production of Sector j</i>	3
VA_j	<i>Value Added of Sector j</i>	3
PV_j	<i>Value Added Price of Sector j</i>	3
LD_j	<i>Labor Demand of Sector j</i>	3
KD_j	<i>Capital Demand of Sector j</i>	3
r_j	<i>Rate of Return to Capital in Sector j</i>	3
$DI_{i,j}$	<i>Intermediate Demand for Good i in Sector j</i>	9
DI_i	<i>Intermediate Demand for Good i</i>	3
E_i	<i>Export Supply of Good i</i>	3
DS_i	<i>Domestic Supply of Good i</i>	3
PE_i	<i>Domestic Export Price of Good i</i>	3
PL_i	<i>Producer Price of Domestic Good i</i>	3
Q_i	<i>Demand for Composite Good i</i>	3
PC_i	<i>Price of Composite Good i</i>	3
M_i	<i>Import Demand of Good i</i>	3
DD_i	<i>Domestic Demand of Good i</i>	3
PD_i	<i>Domestic Price of Good i</i>	3
PM_i	<i>Domestic Import Price of Good i</i>	3
YH_h	<i>Income of Household h</i>	5
YDH_h	<i>Disposable Income of Household h</i>	5
DTH_h	<i>Direct Taxes on Household h Income</i>	5
SH_h	<i>Savings of Household h</i>	5
$CTFH_h$	<i>Current Transfers from Firms to Household h</i>	5
SH	<i>Savings of Households</i>	1
YF	<i>Income of Firms</i>	1
DTF	<i>Direct Taxes on Firms Income</i>	1
YDF	<i>Disposable Income of Firms</i>	1
SF	<i>Savings of Firms</i>	1
TIM_i	<i>Indirect Taxes on Imports of Good i</i>	3
TIE_i	<i>Indirect Taxes on Exports of Good i</i>	3
$TIVA_i$	<i>Value added Taxes on Good i</i>	3
P_i	<i>Price of Aggregate Output of Good i</i>	3
YG	<i>Government Income</i>	1
SG	<i>Savings of Government</i>	1
CTH_h	<i>Total Consumption of Household h</i>	5
$C_{i,h}$	<i>Consumption of Good i of Household h</i>	15

CT_i	Total Consumption of Good i	3
CF_i	Firm Consumption of Good i	3
GC_i	Government Consumption of Good i	3
I	Total investment	1
S	Total Savings	1
I_j	Investment of Sector j	3
P_{INV}	Investment Price Index	1
$PINDEX$	Price Index	1
B	Balance of Payments	1
z	Poverty Line	1

Number of Endogenous variables **142**

IV Exogenous Variables **Number**

LS	Labor supply	1
KS	Capital Supply	1
w	Average Wage Rate	1
e	Nominal Exchange Rate	1
PWE_i	World Price of Exports of Good i	3
PWM_i	World Price of Imports of Good i	3
$CTGH_h$	Current Transfers from Govt. to Household h	5
$CTWH_h$	Current Transfers from ROW to Household h (Foreign Remittances)	5
$CTHF_h$	Current Transfers from Household h to Firms	5
$CTHW_h$	Current Transfers from Household h to ROW	5
$CTGF$	Current Transfers from Govt. to Firms	1
$CTWF$	Current Transfers from ROW to Firms	1
FB	Foreign Borrowing	1
FA	Foreign Aid	1

Number of Exogenous Variables 34

V Equations

Production and Trade **Number**

1	$XS_j = VA_j / A_j$	3
2	$VA_j = c_j LD_j^{\alpha_j} KD_j^{1-\alpha_j}$	3

$$\begin{aligned}
3 \quad DI_{i,j} &= a_{ij} XS_j & 9 \\
4 \quad DI_i &= \sum_j DI_{i,j} & 3 \\
5 \quad LD_j &= \alpha_j PV_j VA_j/w & 3 \\
6 \quad KD_j &= (1 - \alpha_j) PV_j VA_j/r_j & 3 \\
7 \quad XS_i &= \sqrt[\rho_i]{\gamma_i E_i^{\rho_i} + (1 - \gamma_i) DS_i^{\rho_i}} & 3 \\
8 \quad E_i &= DS_i \left[(PE_i/PL_i) \left\{ (1 - \gamma_i)/(\gamma_i) \right\} \right]^{\eta_i} & 3 \\
9 \quad Q_i &= \lambda_i \left[\delta_i M_i^{-\rho_i} + (1 - \delta_i) DD_i^{-\rho_i} \right]^{-1/\rho_i} & 3 \\
10 \quad M_i &= DD_i \left[(PD_i/PM_i) \left\{ \delta_i/(1 - \delta_i) \right\} \right]^{\sigma_i} & 3
\end{aligned}$$

Income, Taxes, Savings and Investment

$$\begin{aligned}
11 \quad YH_h &= s_h \sum_j w LD_j + k_h \sum_j r_j KD_j + CTGH_h + CTFH_h + CTWH_h & 5 \\
12 \quad CTFH_h &= dvr_h YF & 5 \\
13 \quad DTH_h &= ty_h YH_h & 5 \\
14 \quad YDH_h &= YH_h (1 - ty_h) & 5 \\
15 \quad SH_h &= YDH_h - \sum_i PC_i C_{ih} - CTHF_h - CTHW_h & 5 \\
16 \quad SH &= \sum_h SH_h & 1 \\
17 \quad YF &= \Omega_1 \sum_j r_j KD_j + \sum_h CTHF_h + CTGF + CTWF & 1 \\
18 \quad DTF &= ty_f YF & 1 \\
19 \quad YDF &= YF (1 - ty_f) & 1
\end{aligned}$$

$$20 \quad SF = YDF - \sum_h CTFH_h - \sum_i PC_i CF_i \quad 1$$

$$21 \quad TIM_i = tm_i e PWM_i M_i \quad 3$$

$$22 \quad TIE_i = te_i PE_i E_i \quad 3$$

$$23 \quad TIVA_i = tx_i PC_i Q_i \quad 3$$

$$24 \quad YG = \Omega_2 \sum_j r_j KD_j + \sum_i TIM_i + \sum_i TIE_i + \sum_i TIVA_i \\ + \sum_h DTH_h + DTF + FB \quad 1$$

$$25 \quad SG = YG - \sum_h CTGH_h - CTGF - \sum_i PC_i GC_i \quad 1$$

$$26 \quad S = SH + SF + SG + FKI \quad 1$$

Demand for commodities

$$27 \quad CTH_h = YDH_h - SH_h \quad 5$$

$$28 \quad PC_i C_{i,h} = PC_i C_{i,h}^{MIN} + \beta^c_{j,h} (CTH_h - \sum_i PC_i C_{i,h}^{MIN}) \quad 15$$

$$29 \quad z = \sum_i PC_i C_{i,h}^{MIN} \quad 1$$

$$30 \quad CF_i = \beta^f_i (1 - \Psi_f) YDF / PC_i \quad 3$$

$$31 \quad GC_i = \beta^g_i (1 - \Psi_g) YG / PC_i \quad 3$$

$$32 \quad CT_i = \sum_h C_{i,h} + CF_i + GC_i \quad 3$$

$$33 \quad I_i = [\phi_i I] / P_{INV} \quad 3$$

$$34 \quad I = \sum I_i \quad 1$$

i

Prices

$$35 \quad PV_i = [P_i XS_i - \sum_j PC_i DI_{i,j}] / VA_i \quad 3$$

$$36 \quad PM_i = PWM_i (1 + tm_i) (1 + tx_i) e \quad 3$$

$$37 \quad PE_i = (PWE_i e) / (1 + te_i) \quad 3$$

$$38 \quad PC_i = (PD_i DD_i + PM_i M_j) / Q_i \quad 3$$

$$39 \quad PD_i = (1 + tx_i) PL_i \quad 3$$

$$40 \quad P_i = (PL_i DS_i + PE_i E_j) / XS_i \quad 3$$

$$41 \quad r_j = (PV_j VA_j - wLD_j) / KD_j \quad 3$$

$$42 \quad P_{INV} = \prod_i [PC_i / \phi_i]^{\phi_i} \quad 1$$

$$43 \quad PINDEX = \sum_i \mu_i PV_i \quad 1$$

Equilibrium Conditions and Macroeconomic Closure

$$44 \quad Q_i = DI_i + CT_i + I_i \quad 3$$

$$45 \quad LS = \sum_j LD_j \quad 1$$

$$46 \quad KS = \sum_j KD_j \quad 1$$

$$47 \quad I = S \quad 1$$

$$48 \quad B = e \sum_i PWM_i M_i - e \sum_i PWE_i E_i + \sum_h CTHW_h - \sum_h CTWH_h - CTWF$$

$$-FB - FA = 0 \quad 1$$

Appendix B: Income Distributions of Households

Figure 1 Density Functions (Agricultural Farmers)

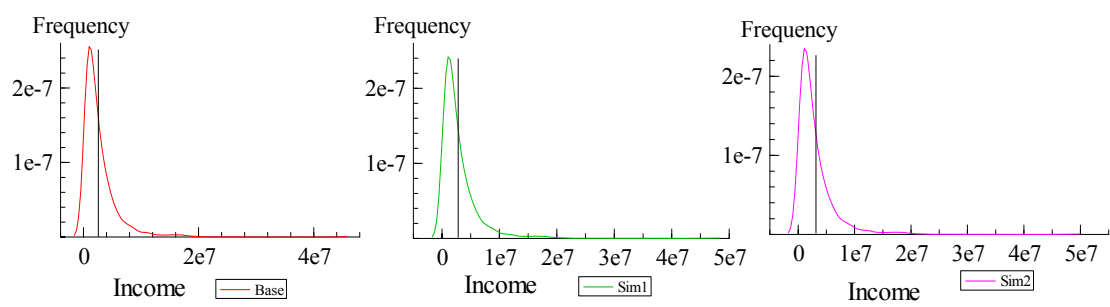


Figure 2 Density Functions (Public Sector Employees)

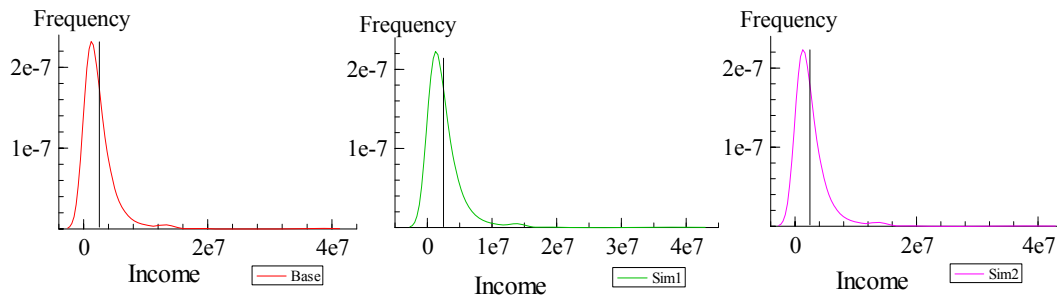


Figure 3 Density Functions (Private Sector Employees)

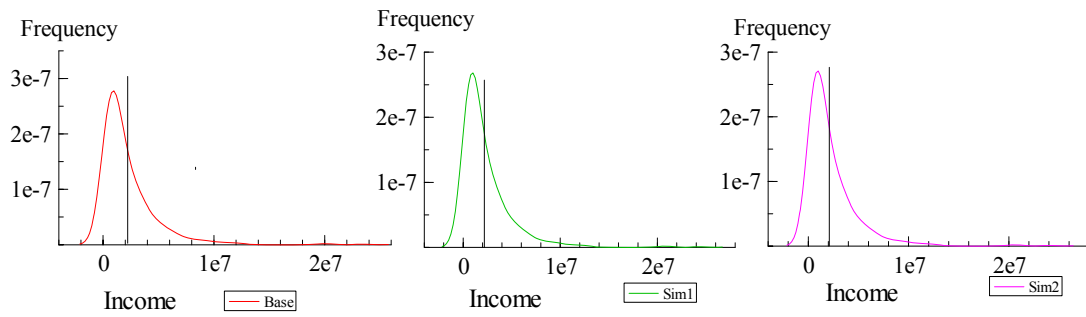


Figure 4 Density Functions (Non-farm Self Employed)

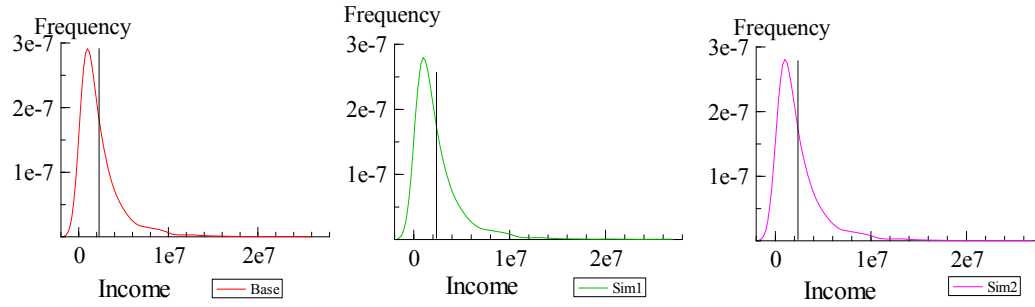


Figure 5 Density Functions (Non-Working)

