The Impact of Fiscal Policy on Poverty in Ethiopia: A Computable General Equilibrium Microsimulation Analysis[1]

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Abstract

Ethiopia has implemented various fiscal policy reforms in the past decade. Most of these reforms center on indirect taxes and pro-poor expenditure patterns. This study investigates the economy-wide impacts of these fiscal policy changes on poverty. To this effect, the study used a static computable general equilibrium (CGE) model linked to a microsimulation (MS) model. The CGE model used the 2005/06 social accounting matrix (SAM) and the MS model used the 2004/05 Household Income, Consumption and Expenditure (HICE) survey to investigate household poverty by way of the consumption expenditure changes from the CGE model. The fiscal policies simulated are domestic indirect taxes, government consumption expenditures, and government transfers to households. The findings of the study suggest that the increase in revenue from indirect taxes has worsened the poverty state of households. The results from the CGE model have all shown decline in real GDP, sectoral output, employment and welfare. In contrast, the study found improvements in the poverty state of households as a result of the introduction of various short-run expenditure measures. However, examination of the net effect revealed worsening poverty at the national level in general and for rural households in particular. On the other hand, poverty tended to decline among urban households. The major conclusion is that the tax policy has dominant adverse effect on poverty in the short-run. Thus, policy makers need to take into account these adverse effects and come up with pro-poor spending policies that would protect households from the negative strains while the financing policies go along.

Keywords: Fiscal policy, poverty, indirect taxes, government consumption expenditure, government transfers, social accounting matrix, computable general equilibrium, household income, consumption and expenditure survey, microsimulation

JEL Classification: H30, H53, I32

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1. Introduction

The state of poverty in Ethiopia is among the worst in the world measured by most socio-economic and human development indicators. Over the period 2005-2010, the Human Development Report (HDR) ranked the country as 157th, out of 169 countries, in human development index (HDI) and second highest in multidimensional poverty index (MPI)[3] next only to Niger (UNDP, 2010). Though the country is reported to have improved its HDI rank in the report, there is little doubt that a long and rough way awaits as poverty dominates the center stage in the endeavor of change in the country.

Poverty reduction is one of the principal development challenges facing low income countries. The challenges and impediments to reduce poverty are difficult in countries like Ethiopia where poverty is persistent and widespread, vulnerability to shocks is high, and income is extremely low (Abebe, 2005). Hence, addressing the problems of poverty has become the priority of development policy and Ethiopia considers poverty reduction as its primary development goal (MoFED, 2010).

Like most African countries, Ethiopia has implemented the policy directions of the World Bank and the International Monetary Fund in the 1990s and 2000s. The 1990s saw orientation of the earlier development approaches in the form of the Structural Adjustment Programs (SAPs). According to Alemayehu and Alem (2006), these policies mainly opted to the welfare improvements through the liberalization and conservative macro-policies. A series of economic reforms took place to take the country from a command to a market economy which opted to bring macroeconomic stability and workable business climate. The country also adopted the Agricultural Development Led Industrialization (ADLI) strategy which was considered as

[3] The UNDP (2010) introduced MPI for the first time to complement money-based measures by considering multiple deprivations and their overlap. The MPI is 0.582 for Ethiopia and 0.64 for Niger.

a necessary step towards economic growth, poverty reduction, and industrial development.

In the new millennium, as a way to join the Highly Indebted Poor Countries (HIPC) initiative of the World Bank, Ethiopia embarked on new policy directions by developing an Interim Poverty Reduction Strategy Paper (I-PRSP) in the year 2000 (AFRODAD, 2005). In 2002, the country launched the full-PRSP known as Ethiopia's Sustainable Development and Poverty Reduction Program (SDPRP). As the Millennium Development Goals (MDG) initiative started in 2000, the SDPRP targeted economic growth averaging 7% per annum in order to reduce poverty by half in 2015. A second phase of the PRSP process, a Plan for Accelerated and Sustained Development to End Poverty (PASDEP) was launched in 2005 as a guiding framework for the period 2005-2010. Most of its strategic directions were continuations of the SDPRP in relation to human development, rural development, food security, and capacity building, but it added new directions like intensifying agricultural commercialization, private sector participation, and scaling up the efforts to achieve the MDGs (MoFED, 2010).

Though poverty reduction is a forefront agenda, as Agenor, 2004 argued, the policies to be pursued to its attainment are complex and openly contested. Understanding the direct and indirect impacts of macroeconomic policy on poverty still remains a key policy challenge (Aziz, 2008; Mallick, 2009). IMF (2001), for instance, stated that there is a large literature on issues of poverty and poverty reduction while there is a lack of detailed understanding of the relationships between macro- policies and poverty. In Ethiopia, likewise, despite the abundant discourse on poverty, the rigorous economy-wide studies to address its link with fiscal policies are scarce. Mentions can be made of two studies. Munoz and Cho (2003) focused on the poverty impacts of the 2003 E.C. tax reform using incidence analysis and didn't find major adverse effects on the poor. Kasahun (2003), on the other hand, focused on the reductions in government consumption and import tariff, and nominal exchange rate devaluation using a CGE – MS analysis and found

out poverty reducing results. The literature, however, could be extended further by examining the economy-wide impact of fiscal policies on poverty using a recent and comprehensive data.

Fiscal policy is one of the few and most important instruments available to governments of poor nations in fighting poverty (Johannes et al., 2006; Kiringai et al., 2006). The interest of this study on fiscal policy, among the macroeconomic policies, emanates mainly from the fact that it can play a role in poverty reduction as an indirect intervention besides being one of the influential direct interventions targeting specific groups or pro-poor sectors which are vulnerable to economic or natural shocks (Damuri and Perdana, 2003).

However, fiscal policies that were designed as pro-poor might in fact have no impact on poverty or sometimes even worsen the poverty situation if the direct and indirect effects of the link are not well articulated. Ethiopia has implemented fiscal policy reforms in the past decade mainly in relation to indirect taxes and pro-poor expenditures. These policies have short-run and long-run implications on the poverty state of households. Thus, the central research question of the study is: what are the short-run impacts of fiscal policies on poverty of households in Ethiopia?

Among the variety of policy analysis tools, CGE models are widely used because of their ability to illustrate the feedback effect between different markets, and produce disaggregated results at the sectoral or microeconomic level within a consistent macroeconomic framework (Wang et al., 2010). As Cury et al. (2010) argue, formal assessments on the poverty effects of economic policies using CGE models took shape in the 1970s and 1980s. As a result, a bulk of empirical studies was conducted to examine poverty mainly by linking CGE with MS models in many developing countries (Cury et al., 2010; Wang et al., 2010).

In this line, the objective of the study is to analyze the short-run impact of fiscal policy on poverty in Ethiopia. To this effect, scenarios of changes in

domestic indirect taxes, government consumption expenditure, and government transfer expenditures were used. Policy combinations that represent the net effects are evaluated for scenarios with respect to total government recurrent expenditure (government consumption plus transfers) and combined impact of the financing (revenue) and spending schemes applied together. The remaining part of the paper is organized as follows. Section 2 reviews the literature briefly. Section 3 focuses on overview of fiscal policy in Ethiopia. Section 4 introduces the data base (SAM) and specifies the theoretical framework for the CGE and MS models. Section 5 discusses the results from the CGE and MS models. The final section concludes and provides implications for policy and future research.

2. Literature Review

The common understanding in policy making was to evaluate macro policies based on their macroeconomic objectives. But this notion was gradually replaced, mainly in developing countries, in the sense that the policies are also to be judged based on their impact on poverty and income distribution (Agenor, 2004). Much progress has been achieved in recent years in understanding the various transmission mechanisms despite the difficulties due to the multidimensionality of poverty.

The 1980s and 1990s were periods where macro adjustment policies were implemented with the intention of achieving a wide range of macroeconomic objectives. But most literature criticized the adverse impacts of adjustment policies on poverty and income distribution. Agenor (2004) identified direct and indirect channels through which macro policies could adversely impact poverty in times of such macroeconomic adjustment. The major indirect effects identified operate through aggregate demand, the rate of economic growth, distributional effects, employment and the like. Contractionary policies affect aggregate demand and employment (and thus poverty) through reductions in transfers and subsidies, and expenditure cuts (mainly capital spending). Moreover, reductions in public spending have divergent

negative effects on private spending. Rates of growth are affected as well when the poor are constrained of their public transfers which deplete economic savings. In addition, due to the complementary effects of private and public spending, decreases in public spending may lead to the same on private spending that have negative impact on the rate of growth. In relation to income distribution, the argument was that initial levels matter to the extent and nature of subsequent growth and redistribution (Agenor, 2004).

In most developing countries, the beginning years of the new millennium saw shift in policy away from structural adjustment programs. The recent approach, as Lipton and Ravallion (1993) attest, has evolved in the sense that the government could intervene to determine the pattern of growth. In other words, emphasis is evolving away from the link between economic growth and poverty reduction to explore what policies, beyond growth itself, contribute to poverty reduction and income distribution. With respect to fiscal policy, this refers to expansionary policies that target most of the expenditure to basic social services like education and health (or more elaborately) on primary education, preventive health, safety net programs (transfers to households) and the like. This approach attempts to cut overall expenditures without affecting the main entry points of such pro-poor expenditures. The expenditure reallocation came up with distinctions between levels of expenditure and composition (nature) of expenditure.

Figure 1 depicts the short run transmission mechanisms of fiscal policy on poverty. The framework in this study focuses on the transmission mechanisms of the impacts on poverty of government consumption and transfers to households on the spending side and (domestic) indirect taxes on the revenue side (Damuri and Perdana, 2003). When we look into government expenditure financed by increased indirect taxation (increase in VAT, excise or service taxes), this brings issues of who bears the tax burden since indirect taxes are mostly imposed on consumable commodities. As Gunter (2005) states, there is a broad agreement on the beneficial effects on the poor of increase in the budget share of priority sectors and better

targeting of public expenditures. But the more we come to indirect (mostly price related) effects, the more it gets blurred on how fiscal policy could lead to positive impacts on poverty. Most studies agree that the labor market constitutes the most central mechanism through which macro policies are transmitted to poverty (Islam, 2001; Mulat et al., 2003; Agenor, 2004; Heintz et al., 2008).

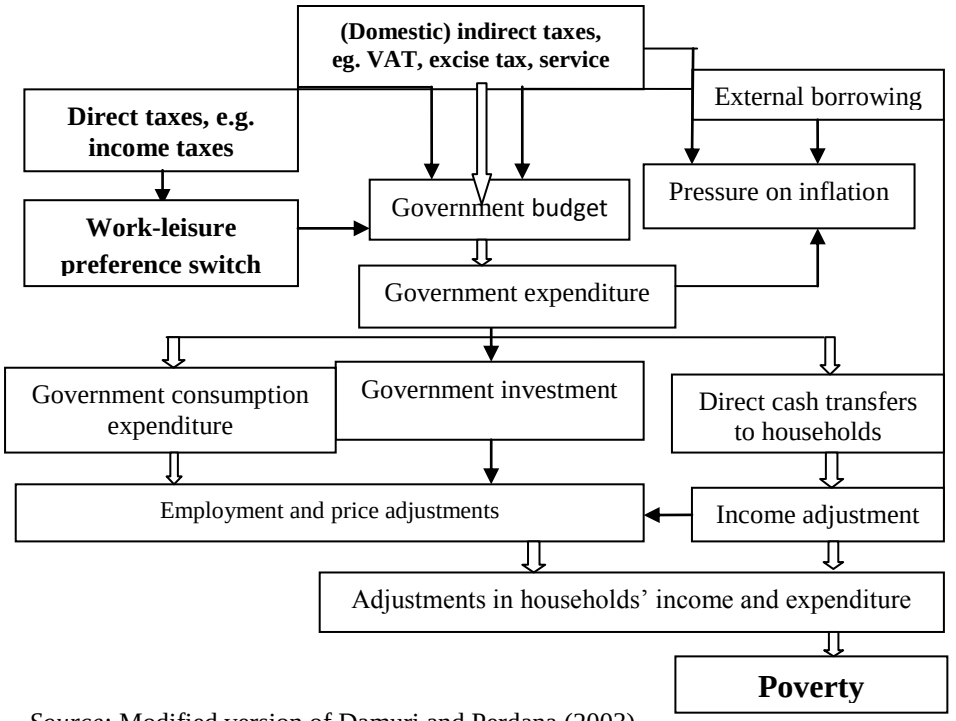
As depicted in the figure, the principal transmission mechanism envisaged in the study is pointed by the "block arrows". It starts from the indirect taxes that are the source of revenue to government budget which is spent on consumption and transfer expenditure schemes. These revenue and expenditure changes bring about employment, price, income and expenditure adjustments by households that lead to changes in poverty. The study didn't extend the analysis to government investment expenditure, effects of direct taxes, external borrowing and inflation. Damuri and Perdana, 2003 arrived at similar results with this study for Indonesia though it differs in its incorporation of government investment into the analysis.

To this effect, the study used a CGE – MS model. We can site numerous advantages of CGE modeling to analyze indirect effects. In CGE models, general equilibrium effects can be accounted for, interactions of different measures can be investigated, complex micro-macro relationships can be performed better, and constraints of linearity can be reduced to the minimum (Iqbal and Sidiqqui, 2001). Besides, such models have ability of examining variety of incidence assumptions and socioeconomic divisions including various welfare measures and behavioral responses (Gemmel and Morrisey, 2002). These models are also consistent with generally accepted microeconomic theory, have significant structural detail, and their general equilibrium nature - changes in one area of economic activity affecting the rest of the economy- elevates their influence for economic analysis (Bibi et al., 2010).

Although CGE models are among the most influential tools in applied economics and have provided unique insight into the policy-poverty debate,

they have also raised the sophistication of prediction in the policy debate (Iqbal and Sidiqqui, 2001). The literature raises various limitations of CGE models in relation to quality and intensity of data requirement, choice of parameters, choice of functional forms, calibration of the model, unrealistic assumptions of neoclassical theory, lack of sensitivity analysis, validity of predictions for policy etc. One fact that most researchers agree on is that the analysis is still evolving, incorporating new dimensions and methods in which we can see development of software packages like GAMS (General Algebraic Modeling System) in simplifying the complex model simulations. Apart from this, we find that other modeling approaches are confronted with critical limitations as well. For instance, some consider the criticisms against CGE models as part of the wide debate concerning the issue of contributions of empirical economics in general (Iqbal and Sidiqqui, 2001).

Figure 1: Transmission mechanisms of fiscal policy impacts on poverty



Source: Modified version of Damuri and Perdana (2003)

Some argue that CGE models are more appropriate than traditional partial equilibrium models as the latter do not account for the economy-wide multiplier effects (don't allow knowledge of who gained and who lost) and as they overestimate sectoral benefits ignoring the negative repercussions evident in a general equilibrium framework (Ahmed and Donoghue, 2004). The underlying cause of this is that, partial equilibrium models implicitly assume fixed-prices where as CGE models give due consideration to relative price changes in commodity and factor markets (Wobst, 2001). Advances in computer technology and numerical simulation soft-ware exercise have allowed the transformation from such partial equilibrium approach to a general equilibrium approach which can very modestly incorporate many more sectors and complex behaviors (RTI, 2008). After the 1970s, the general equilibrium approach became advanced enough to incorporate imperfect information, increasing returns, price rigidities, and many extensions addressing various markets and institutions (Sinha and Latigo, 2003).

3. Characterizing Fiscal Policy in Ethiopia (1999/00 – 2009/10)

For the decade from 1999/00 to 2009/10, MoFED and NBE reports from EEA (2009) data base show that the real GDP has grown by 129% in constant 1999/00 prices. As the reports disclose, it has shown sluggish real growth around the down of the new millennium (with a negative growth in 2002/03) but started to consistently record double digit figures after 2003/04 except 2008/09 in which a relatively lower 8.8% real growth was recorded.

Though the reports show that government revenue and expenditure have shown major increases, the fiscal balance as a proportion of GDP continued to record negative figures. In this period, fiscal policy was aimed at maintaining the deficit at a sustainable level besides increasing pro-poor expenditures. The financing aspect of these huge expenditures has been of great concern since the budget couldn't be covered from domestic revenue collection alone. To improve on this, reforms took place with the aim of

strengthening domestic borrowing, domestic revenue collection capacity, and mobilizing external aid and borrowing.

Comparing 1999/00 and 2009/10 periods, government reports claim that capital expenditure, including external assistance, has shown significant increases in comparison to the current expenditure. It has shown increases up to five times its 1999/00 levels. Capital expenditure as a ratio of GDP has risen from 3.8% to 10.3% and total expenditure as a ratio of GDP has risen from 20% to 55.3%. Capital expenditure on social development in education, health, social welfare and the like has also increased covering 2.6% of GDP in 2009/10. Current expenditure, on the contrary, has decreased as a share of GDP and total expenditure from 20.6% and 80% to 8.4% and 44.7% in the ten year period. However, in real terms, current expenditure has grown by 10% in 2009/10 from 2005/06 values whereas its basic component, final government consumption expenditure, has risen by a mere 4%. Notably, the share of social services like education and health has shown increases in 2009/10 like the growths in social development for the same sectors. Capital expenditure showed constant increases in the new millennium replacing current expenditure as the largest component of total expenditure (Annex 1).

We can resort to the 2005/06 Ethiopia SAM for data on government transfers to households as a component of general government recurrent expenditure which also includes government consumption expenditure on goods and services and government savings. Government consumption takes the lions share in this account (68.5%) where as government transfers plus external interest payments cover about (8.5%) and the remaining is government saving. Of the government transfers, transfers to households take about 6.6%.

When we come to the revenue side, tax and non-tax revenues have increased in the ten year period with larger shares recorded by the tax component compared to the non-tax component. Tax revenue as a share of total revenue and grants has increased from 54.6% to 65.4% from 1999/00 to 2009/10

where as non-tax revenue declined. In the same period, direct taxes have increased from 19.9% to 22.5% whereas indirect taxes have increased by a larger amount from 34.7% to 42.9% (Annex 2). As a ratio of total revenue and grants, the size of government revenue has recorded constant increases in which most of the changes are results of the tax reform introduced. In 2009/10, domestic indirect taxes have increased by 34% as proportions of total revenue and grants compared to the 1999/00 period.

The Ethiopian government has set out to achieve a large sum of revenue collection in aggregate during the course of a five-year Growth and Transformation Plan (GTP) from 2010/11 to 2014/15 thereby raising the country's annual domestic revenue to GDP from 14% to 17.1% and annual tax revenue to GDP from 11.3% to 15% (MoFED, 2010). On the expenditure side, resource allocation is planned towards growth enhancing (mainly agriculture and infrastructure) and social sectors (mainly education and health). In the five year GTP; increases as percentages of GDP are anticipated for total expenditure (18.6% to 23.7%), capital expenditure (10.3% to 14.4%), recurrent expenditure (8.4% to 9.3%), and total poverty oriented expenditure (12.3% to 17.3%). Expenditures in the social sectors show great increases in the plan which reveals tendency to continue from the PASDEP. Also, the GTP targets to reduce total poverty head count from 29.2% to 22.2%.[4]

When we consider poverty-oriented spending as a share of total expenditure, the trend doesn't show significant changes in the five year period from 2005/06. In fact, the trend is one of decrease in the cases of agriculture, education and social welfare, whereas it fluctuated in the case of health expenditures. Road construction is the only spending, in this case, to have constantly increasing share of the total expenditures with most of the funds allotted to construction of rural roads or roads for poor areas in general. A point to note here is that education expenditures are the largest, about a

[4] The base period for all these forecasts of the GTP is 2009/10.

quarter, whereas health and social welfare spending constitutes the smallest among the poor-related expenditures (Annex 3).

Domestic indirect taxes have been the center of focus in the past decade. Since its introduction in 2003 with the objectives of reducing distortions by other indirect taxes, VAT has been one of the principal sources of revenue for the government and yet there is a large unexploited potential in the use of this tax. The share of local and import VAT as a share of total indirect taxes and GDP has been at around 50% and 4% respectively over the five year period examined. Domestic indirect tax revenue has increased by 80% in 2009/105 from the 2005/06 values though the share to real GDP showed minor increase from 2.6% to 2.8%. Excise taxes, both domestic and foreign, have also steadily increased in the period. The share of most of the taxes has fluctuated over the period though most showed minor increases from the 2005/06 period. Total indirect tax revenue to the government, which is the sum of domestic indirect tax revenue and foreign trade tax revenue, has shown an overall 48% increase in real terms in 2009/10 compared to the 2005/06 period though share to real GDP stagnated (Annex 4).

The new five year GTP is already underway. But the huge task ahead is how to maximize overall domestic tax and non-tax revenue using tax reforms like the VAT without constraining the lives of consumers. Pro-poor spending schemes have been constrained by this issue of financing as they are dubbed to lack the financial requirements and possible (investment) sources.

4. Methodology

4.1 The Social Accounting Matrix

The benchmark data used for calibration in CGE modeling is the Social Accounting Matrix (SAM) (Thurlow, 2004). A SAM is a comprehensive and consistent, economy wide data framework or set of accounts that has detailed

[5] There was around 50% increase in domestic indirect tax revenue collected in 2009/10 compared to 2008/09.

quantification for economic flows of incomes and expenditures in an economy, usually a nation, for a given period of time, mostly a year (Decaluwe et al., 1999; Lofgren et al., 2002).

In this study, we used the 47×47 aggregated SAM prepared by EDRI (2009). In this 15 sector SAM,[6] productions and incomes of the various agro-ecological zones were aggregated into one account before further aggregations were made. The matrix has 14 activities,[7] 15 commodities, 4 factors of production (labor, land, livestock and capital), 7 institutions (an enterprise, a government, 4 households, and a rest of world or ROW), 3 tax accounts (direct tax, sales tax and import tax), transaction costs (total margins), stock changes,[8] and S – I account.

The four household categories distinguished are rural-poor, rural non-poor, urban-poor and urban non-poor. The sales tax account incorporates local VAT, domestic excise tax and service taxes whereas the import tax account incorporates import duty, sur tax, import excise tax, import VAT, and withholding tax.

[6] The production activities are for teff, maize and wheat, non-traded agriculture, exportable cash crops, livestock, food processing, chemicals, machinery, other manufacturing, construction, utility, domestic trading, private services; and government services. These activities are basically aggregations and disaggregations from the agriculture, industry and service sectors. The agricultural sector includes five production activities: teff, maize and wheat, non-traded agriculture, exportable cash crops, and livestock. The industrial sector includes five production activities: construction, food processing, other manufacturing, chemicals and machinery. And, the service sector includes four production activities: utilities, domestic trading, private services and government services. There are three activities that produce more than one commodity. These are cash crop production activity which produces cash crops for export and non-traded agricultural commodities, livestock activity which produces food products and raw materials for further production, and activities for utility which produces utilities and machinery.

[7] The commodity account for fuel (cfuel) does not have activities account as Ethiopia is non-oil producing nation. Thus, the 14 activities produce 14 commodities with some combinations, as mentioned above, but commodity fuel doesn't have domestic production activity.

[8] A stock change represents inventory investment by sector of origin (Lofgren *et al.*, 2002).

4.2 The Computable General Equilibrium Model

The static CGE model used is based on a comparative static standard neoclassical-structuralist model developed in IFPRI by Lofgren et al. (2002). It follows the neoclassical – structuralist modeling tradition with additional features included like treatment of transaction costs, household consumption of non-marketed (home) commodities, and separation between production and commodities (Lofgren et al., 2002; Thurlow and Seventer, 2002). The model incorporates both paradigms to better represent the real world features that are found in developing countries.

The standard CGE model is a system of simultaneous linear and non-linear equations. The equations of the model include non-linear first order optimality conditions for production and consumption decisions which are driven by maximizations of profit and utility respectively. The CGE model also includes equations for closures. The term 'closure' implies the way adjustment is made in the economy to ensure equilibrium or an indicator on how the model gets solved (Tadele, 2010). The choice of closures, hence, provides the macroeconomic settings to conduct the policy simulations (Damuri and Perdana, 2003). The structure of the CGE model is divided into four major blocks: price, production and trade, institutions and system constraint blocks.

The production in the economy takes place in each activity to yield the commodities produced domestically. The producer is assumed to maximize profit (subject to a production technology) which is the surplus after payments are made to (primary) factors and intermediate inputs. The production technology connotes a multi-level production function. It chooses between a constant elasticity of substitution (CES) and Leontief technology at the top level of the technology nest. In this study, the technology at the top level is a Leontief function of the quantities of value-added and intermediate inputs that yield commodity outputs in the production process. The value-added part is a CES function of primary factors. This CES specification for

value-added makes producers respond to dynamics in factor returns by substituting among available factors (Thurlow, 2004). The aggregate intermediate input part is a Leontief function of composite commodities partly domestic and partly imported (Lofgren et al., 2002).

The notion of closure rule implies equality of equations and endogenous variables which requires fixation of some variables for the model to have a solution. The choices on closures do not have impact on solutions of the base simulation but affect other simulations, and in addition, the choice per closure doesn't constrain the choice for the other closures (Damuri and Perdana, 2003). This study selected the model closures that are applicable to the Ethiopian economy.

The standard CGE model has closures for factor markets and the macroeconomic system. In this study, the factory closures are that labor is unemployed and mobile across sectors; land is fully employed and mobile across sectors, and capital is fully employed and activity specific. In our model, labor is not disaggregated into skilled, semi skilled and unskilled. A cumulative of these subdivisions is made to follow the labor market characteristics of the large proportion of the labor force in Ethiopia, unskilled labor. Land and capital are fully employed and hence have fixed supply whereas labor is unemployed and its employment is flexible. On the other hand, labor and land are mobile across sectors implying that they can be employed in different activities. But capital is activity specific as its use is usually immobile across sectors in Ethiopia.

The macroeconomic closures (balances) are based on the government balance, the external (current account) balance and the saving-investment (S-I) balance. In this study, we follow the government closure in which direct tax rates are exogenous and it is the changes in government savings that equilibrate the economy. For the external (ROW) balance, foreign saving is fixed, and thus it is real exchange rate that plays the equilibrating role. In the S-I balance; we follow a saving-driven investment closure in which we have

flexible capital formation but fixed propensities to save for all non-government domestic institutions. We follow this closure in this model in which investment adjusts to ensure equilibrium.

In our model, the DPI is the numeraire and hence is fixed whereas the CPI is made flexible. The CPI is made flexible in order to adjust the expenditures we used in the microsimulation model. Since price is normalized to one in the CGE model, the changes in CPI indicate consumer prices changes that bring about equilibrium within the model.

4.3 The Microsimulation Model

Though the frequently used measure of the extent of poverty has been the head count index, the FGT measures are considered to be the standard as they combine the head count index with the poverty gap index and the squared poverty gap index (Yesuf, 2007; MoFED, 2008).

Foster, Greer and Thorbecke (1984) lumped these measures into one formula that incorporates the three consistent and additively decomposable (by income class or region) poverty indices.

The formula for the FGT index is given as:

$$P_\alpha = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)^\alpha \quad ; \alpha \geq 0,\ y < z,\ i=1, 2,\ldots, q;\ [\, y1 < y2 < \ldots < yq < z < yq+1 < \ldots \leq yn]$$

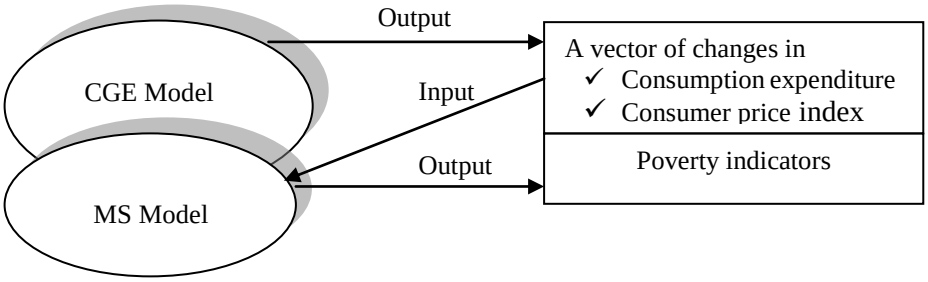
Where z is the poverty line, i is the sub-group of individuals with income below the poverty line, yi is the value of poverty indicator chosen (consumption expenditure below the poverty line in increasing order)[9], n is the total population size, q is the total number of poor people in the

[9] If $g_i = Z - Y_i$, then g_i represents income (consumption) short fall of the i^{th} individual (household) and this is assumed to be zero for those above the poverty line (Abebe, 2005).

population, and α is the poverty aversion parameter. By setting the value of α to zero, one, two respectively,[10] the FGT poverty formula delivers a set of poverty indices. Setting α equal to zero, P0, reduces to the head count index (q/n) measuring the incidence (prevalence) of poverty. Setting α equal to one, P1, becomes the poverty gap measuring the depth or intensity of poverty. Setting α equal to two, P2, will be the squared poverty gap measuring the severity of poverty (the weighted sum of the poverty gaps themselves)[11] (Yesuf, 2007).

In this study, we link the CGE and the MS models in a top-down (sequential) manner as can be seen from Figure 2. In this top-down approach, the CGE model is linked with 21,594 households in the 2004/05 HICE survey of CSA (CSA, 2008). The changes in the fiscal policies introduced in the CGE model bring about economy-wide changes in the consumer price index and consumption expenditures of households once we solve the CGE model using GAMS software. These simulation results for the before and after shock period are later fed into the MS model using distribution analysis[12] (DAD) software that yields the FGT poverty indices.

Figure 2: The Top-down (sequential) approach



Source: Modified version of Colombo (2008) and Dejene et al. (2007)

[10] Some refer to the three measures: incidence, intensity, and inequality as the "**T**hree "**I**"s of **P**overty" (Gemmel and Morissey, 2002).

[11] "α" denotes the weight given to the poorest of the poor and so the higher the value of α, the more is the concern for the poorest (Abebe, 2005).

[12] The DAD (distribution analysis) software is "designed to facilitate the analysis and the comparisons of social welfare, inequality, poverty and equity across distributions of living standards." (Duclos *et.al.*, 2010)

As per EDRI, 2009, the households in the SAM were categorized into four as rural-poor, rural non-poor, urban-poor and urban non-poor. The bottom 40% of the households are taken as poor after the households are arranged in descending expenditure levels. In other words, the bottom two quintiles (4th and 5th) were considered as poor. Based on this treatment of the HICE survey in the 2005/06 SAM, this study used the consumption expenditure level at the demarcation of the top 60% and bottom 40% of the total households to be the poverty line in estimating the FGT indices (EDRI, 2009).

5. Simulations and Results

5.1 Description of Simulations

Baseline simulation

This scenario is used as a reference point where the economy is evaluated at times of no policy change or at times where the present policy environment is maintained.

Simulation 1: Increasing sales tax rate by 80%[13]

The 15 sector SAM used has a sales tax aggregate account which includes the domestic indirect taxes of local VAT, local excise taxes and service taxes. Local VAT contributes the largest to the account followed by service and excise taxes. The 2005/06 SAM represents the early years of intensification of the indirect tax reform that come of age after January, 2003 which marked the period in which VAT was introduced. To deal with the 80% huge increases in sales tax revenue in 2009/10 compared to 2005/06, we opted to a proxy increase in the sales tax rate that would represent the revenue increase. The underlying fact of the matter is that revenue increased due mainly to changes in the tax base (not the rate). It is rather difficult to capture the (price related) impacts on the poor of this expansions of the tax

[13] This percentage is based on calculations using EEA (2009) data base as discussed in section 3 above.

base or tax collection and thus we proxied this by changes in the sales tax rate (tq_c) in the CGE model.

Simulation 2: Increasing government consumption expenditure by 4%

This simulation is in relation to government consumption expenditure policies. As discussed in section 3, the MoFED data retrieved from EEA (2009) data base shows that final government consumption expenditure has increased by close to 4% in 2009/10 compared to 2005/06 in real terms which runs in opposite direction to Kasahun, 2003 that decreased government consumption by 20% as a result of structural adjustment. In line with this, we used this 4% value to introduce the shock, with no financing changes. Government consumption expenditure is explicitly accounted for in the CGE model as QG_c and thus we look into the impacts of a 4% increase in government consumption. In the SAM, government consumption spending is reported for public administration, education and health.

Simulation 3: Increasing government transfers to households by 20%

Another fiscal policy variable of our interest is the transfers from the government to households. This simulation implies government expenditure on transfers with no financing changes. The EDRI (2009) report states that it used the 2004/05 HICE survey for the government transfers to households. An important point to note here is that we have introduced this policy change to all poor and non-poor households in the SAM as anti-poverty policies are designed to hinder households from slipping into extreme poverty and to minimize the length of the poverty spell once they fall into it (Bigsten and Abebe, 2007). Thus, based on the 2004/05 HICE survey and the static nature of our CGE analysis, we have included the non-poor into the transfer scheme as well. In the HICE survey, for example, the 3rd quintile which is just in the consumption category above the bottom two poor quintiles (4th and 5th) has households with a mere 500 birr difference in consumption expenditures with the national poverty line. Thus, we introduced the shock to each household category assuming transfer of equal percentage.

It is useful to know the transfer schemes of the government to introduce a shock to the model but these values are difficult to get and are not consistent with those in the model. Thus, we introduced an increase in these transfers to look into their importance in reducing poverty if government gives more focus on to these mechanisms. We assume a 20% DPI indexed increase in government transfers, $trnsfr_{hgov}$, to all households in the 2005/06 SAM.

Simulation 4: Sim 2 + Sim 3

This simulation is a combination of consumption expenditure (sim 2) and government transfer (sim 3) policies of the government. In the EDRI (2009) report, these two cover the largest part of government recurrent expenditure with the remaining part allotted to government savings. Thus we examine the combined impacts of increases in government consumption expenditure and government transfers by 4% and 20%, respectively.

Simulation 5: Sim 1 + Sim 2 + Sim 3

This simulation is the one that helps us to evaluate the combined impact or the net effect of the fiscal policy options employed together. Domestic indirect tax is contributing one of the largest to government revenue, but likewise, it may adversely contribute to price related impacts on the consumer. On the expenditure side, we have stated that the government has invested heavily on the poor sectors using domestic and foreign finance. As the realistic economy usually pursues simultaneous fiscal measures, the intent in this simulation is to investigate the combined (net) impacts on the revenue side of an 80% increase in the sales tax rate that proxied the revenue increase (sim 1) vis-a-vis 4% and 20% respective increases in government consumption (sim 2) and transfer expenditures (sim 3).

Analysis of Results

In this section, we analyze the results of the simulations. We give central focus to the poverty impact of the fiscal policies with three related effects:

macroeconomic, sectoral and welfare. The analysis is based on the changes brought about by the five policy simulations.[14]

Effects on Macroeconomic Indicators

In Table 1, we report the simulation results of selected macro indicators. In simulation 1, the macroeconomy has recorded negative changes in most cases. An 80% increase in government indirect tax revenue brought about a 0.67% decrease in real GDP at factor cost. Absorption has shown a 0.58% increase due mainly to the strong increases in investment (4.13%) that offsets the negative changes in private consumption by 1.75%. This decrease in private consumption could also be affirmed by the decreases in consumption expenditure of households. Also government recurrent expenditure has increased by 0.64% contributing to increases in absorption. Due to the increase in taxes, government income has increased by a huge margin of 14.03%. This explains most of the changes in investment as government investment is larger. The CPI has risen by 0.67% indicating the general increases in prices when government imposes taxes on consumers.

In simulation 2, the results are mostly opposite compared to the first simulation. Real GDP has shown a 0.18% growth at factor cost. Absorption has grown by 0.15%, like the first simulation, but in this case, the causes are 11.89% increase in government recurrent expenditure and 0.4% increase in private consumption that offset the 3.26% negative changes in investment. The major reason for the decrease in investment is the decline in government income by 0.44%. CPI has changed negatively by 0.11% which explains why private consumption has increased.

Simulation 3 results in an increase in real GDP by 0.05% at factor cost. Like the second simulation, the increase in absorption by 0.03% could be explained by the increases in government recurrent expenditure (2.58%) and private consumption (0.19%) though investment has declined by 0.58% due mainly to decreases in government income by 0.08%. The increase in private

[14] This percentage changes calculate the changes from the base year, 2005/06.

consumption of households could directly be associated with increases in purchasing power of the households as a result of the transfers. Hence, most of the increment in the GDP is related to increases in domestic absorption. In this case, CPI has increased by a small 0.07% which could be linked to the direct impact of the transfers on purchasing power of households.

In simulation 4, real GDP has grown by 0.22% at factor cost. Absorption has increased by 0.19% due mainly to increases in government expenditure and private consumption which have grown by 14.48% and 0.59%, respectively to offset the 3.88% decline in investment that is caused by decrease in government income. Since the simulation principally is a shock to recurrent expenditure in general, consumption expenditure has dominated the transfer changes in explaining the 0.05% decrease in the CPI.

Table 1: Summary of results of macroeconomic effects of simulations (% changes)

Macro Indicators	Base value (billions birr)	Sim 1	Sim 2	Sim 3	Sim 4	Sim 5
Real GDP (factor cost)	122.22	-0.67	0.18	0.05	0.22	-0.43
Absorption	162.48	0.58	0.15	0.03	0.19	0.77
Investment	28.18	4.13	-3.26	-0.58	-3.88	0.6
Private Consumption	114.75	-1.75	0.4	0.19	0.59	-1.21
Government Income	17.45	14.03	-0.44	0.08	-0.37	13.75
Government Expenditure	12.09	0.64	11.89	2.58	14.48	15.19
Consumer Price Index	1.13	0.67	-0.11	0.07	-0.05	0.65

Source: Simulation results from the CGE model

In the last simulation, we find interesting results that resemble the results of the first simulation. We find that the real GDP has decreased by 0.43% at factor cost. Domestic absorption has increased by 0.77%. Parts of domestic absorption, investment and government recurrent expenditure, have increased by 0.6% and 15.19%, respectively, though private consumption

has declined by 1.21%. The small increase in investment, unlike the first case, could be explained by the fact that government now channels most of its increased income (13.75%) to recurrent expenditure. The CPI has now increased by 0.65% which follows mainly from the increases in indirect taxes.

Sectoral Effects

For reporting purposes, we classified activities into two; agriculture and non-agriculture. Table 2 and 3 present the simulation results based on the mean growths of the agricultural and non-agricultural activities. Table 2 presents the results for sectoral growth of output.

In simulation 1, sectoral output has shown negative growth both in the agricultural and non-agricultural sectors. Domestic output in the agricultural sector has declined by 1.2% whereas non-agricultural output declined by 0.5%. The underlying reason for these changes could emanate from the price related effects when indirect taxes are imposed. For instance, factor returns have decreased in all cases and that the output purchasing power of consumers decreases as the CPI increases. A peculiar change we can appreciate in non-agriculture is the 3.6% output increase in construction services which could be associated with the increases in fixed investment as a result of increase in government income.

In simulation 2, sectoral output has increased by 0.05% and 0.003% for agriculture and non-agriculture in that order. When government consumption for goods and services increases, it could bring in producers who want to gain profits from the increase in exogenous government demand for goods and services. The very small change in level of output in non-agriculture emanated from the large decline in construction services by 2.79%.

In simulation 3, output level in agriculture has increased by 0.14% whereas output level in non-agriculture has declined by 0.04%. The transfers are

provided to both rural and urban households. Most of the rural households are expected to engage in agriculture. This exogenous increase in household income helps such households to purchase more (increasing their consumption demand) and could allow them buy more raw material for further production. But in the non-agricultural sector; production activities of machinery, construction services and other-manufacturing have shown major decreases that offset the increases in the remaining non-agricultural activities. This is probably because government has shifted the expenditure away from such industrial and service activities.

In simulation 4, similar changes have resulted whereby agricultural output has increased by 0.19% and non-agricultural output has declined by 0.05%. As this is a combined simulation to represent recurrent expenditures, it has a demand and supply side effect on output production following from the changes in government consumptions and transfers.

The last simulation has replicated the first simulation as we have seen in the behaviors of macro indicators. Production in both sectors has shown declines. Agricultural production has declined by a relatively stronger margin of 1.1%. In the non-agricultural sector, similar results of 0.5% decrease have resulted.

Table 2: Effects of simulations on sectoral output (% changes)

Sectors	Base	Sim 1	Sim 2	Sim 3	Sim 4	Sim5
Agriculture	12.9	-1.2	0.05	0.14	0.19	-1.1
Non - Agriculture	13.6	-0.51	0.003	-0.04	-0.05	-0.5

Source: Simulation results from the CGE model

The other way to approach the changes in the production activities is by evaluating the changes in the demand and supply of factors (labor). Table 3 presents the results. The simulations have only produced results for the employment (supply) of labor input combining the changes in the

agricultural and non-agricultural sectors. Labor employment has declined, especially in the first and last simulations by 1.6% and 1.3%, respectively. This might be due to decreases in returns to labor, as output production shrinks, which decreases labor supply. But when we come to the other simulations, labor employment has increased for the second (0.4%), third (0.1%), and fourth (0.49%) simulations. As we discussed in table 6, the increase in output for these simulations could be associated with the increase in labor inputs for production as a result of increases in returns.

For the demand for factors, we can examine labor as the only flexible input of production. In the first simulation, demand for labor has declined for both agriculture and non-agriculture by 1.6% and 1.09%, respectively. The decline in labor demand is mainly related to the contraction in output production as a result of the tax increases.

In the second simulation, the demand for labor has increased by 0.05% in the agricultural sector. However, demand for non-agricultural labor has declined by 0.32%. We could associate these declines to the negligible change in output production in the aggregates for agriculture and non-agriculture. In the third simulation, the increases in transfers have brought about increased demand for labor by 0.18%. In contrast, the demand for labor has decreased by 0.15% in the non-agricultural sector. The intuition is related to the use of the cash transfer in rural areas. The benefited households (most of which are farmers) could aspire to produce more which requires inputs. In agriculture, labor is a principal input of production which validates the increase. In non-agriculture, output production has declined on average which is related with shift in use of government resources. This could lead to reduction in surplus inputs. In the fourth simulation, similar patterns of change have been observed. Demand for agricultural labor has increased by 0.22%, while non-agricultural labor has decreased by 0.46%. This decline could also follow from the decreases in production of output in the non-agricultural sector.

In the fifth simulation, we also find similar results like the first simulation. Demand for agricultural labor has decreased by 1.34%. Like the case of agricultural labor, demand for non-agricultural labor has declined by 1.6% in this last simulation. The increase in tax seems to have strained the use of labor in both agriculture and non-agriculture.

Table 3: Effects of simulations on labor employment and demand by sector (% changes)

Sectoral Indicators	Base	Sim 1	Sim 2	Sim 3	Sim 4	Sim5
Changes in labor employment (both agriculture and non-agriculture)						
Labor employment	60.29	-1.33	0.4	0.1	0.49	-0.83
Changes in demand for labor by activity						
Agricultural labor	8.86	-1.6	0.05	0.18	0.22	-1.34
Non-agricultural labor	1.78	-1.09	-0.32	-0.15	-0.46	-1.6

Source: Simulation results from the CGE model

Welfare Effects

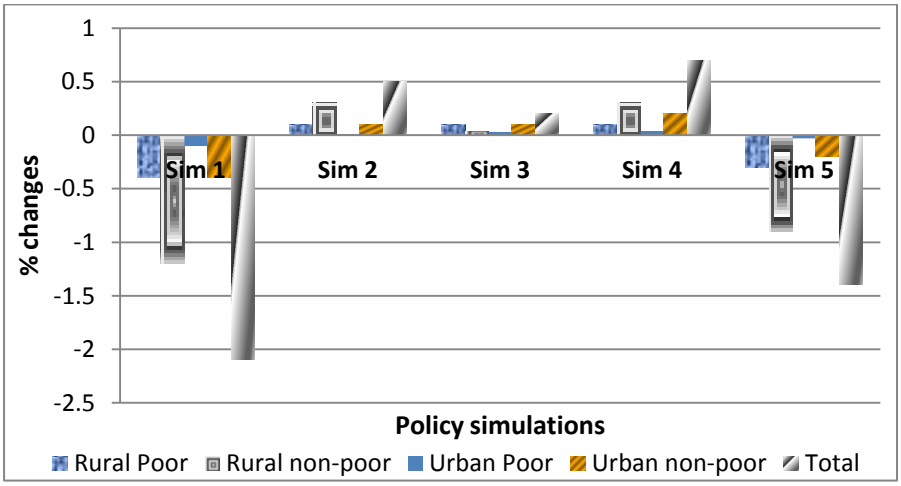
The most important welfare indicator used in the literature for CGE models is the equivalent variation (EV). Since policy shocks are usually followed by major price adjustments, the EV measures the level of income (in money terms) that the consumer needs to (presumably) pay before the shock to leave him as well off at the equivalent level of utility loss after the price increase. Since the consumer is harmed prior to the policy change by paying the price equivalent in income, negative EV changes represent welfare (utility) loss as a result of the policy shock. Figure 3 presents the welfare effects of the policy shocks.

In the first simulation, the instant increases in domestic indirect tax collected by government seems to have negatively affected both the urban and rural households as the negative values for EVs would suggest. The EVs have declined by 0.4%, 1.2%, 0.1% and 0.4% for rural-poor, rural- non-poor, urban-poor and urban-non-poor, respectively. Comparatively, the EVs

indicate that the non-poor receive much of the welfare strain in both rural and urban areas. This may be indicative of the fact that tax impositions have adversely affected these well off household groups, dragging their livelihoods downwards. Probably, the major culprit behind this is the price increasing effect of taxes which is mainly evident in urban areas in relation to VAT imposition. Comparing urban and rural households, however, we find that rural households face larger welfare loses.

In the second simulation, we see positive EVs for the increases in government consumption indicating welfare improvements. The EVs showed increases for all household groups by 0.1% (rural-poor), 0.3% (rural-non-poor), 0.01% (urban-poor) and 0.1% (urban-non-poor). The welfare of rural households improved larger than that of the urban counterparts with non-poor households reaping the relative advantage in both areas. This could mainly be because, in the SAM, recurrent government expenditure is spent on public administration, education, and health most of which constitute wage and non-wage payments that the non-poor are characterized with.

Figure 3: Effects of simulations on welfare (EV) of household groups (% changes)



Source: Simulation results from the CGE model

In the third simulation, the results show that welfare increased by 0.1%, 0.03%, 0.03% and 0.1% for rural-poor, rural-non-poor, urban-poor, and urban-non-poor, respectively. The outcomes seem to favor the rural-poor and urban-non-poor. This seems to suggest that the rural-poor will need to be targeted in such programs whereas the urban-poor may not get the benefits expected from such transfer programs. Since welfare has improved for all households, though by small amounts, transfers could be one of the policy instruments of government to improve welfare.

In the fourth simulation, we have combined sim 2 and sim 3 to have an overall impact of government recurrent expenditure on welfare. The results are improvements in welfare by 0.1%, 0.3%, 0.04% and 0.2% for rural-poor, rural-non-poor, urban-poor and urban-non-poor, respectively. The improvement in welfare is found to be larger for non-poor households in urban and rural areas. Since this simulation is a combination, the influence of government consumption looks larger as the non-poor seem more benefited from the policy shock. The welfare effects on the poor, however, are positive but small.

The last simulation shows that the effect of combined policy shocks are almost similar with the first simulation. The rural-poor, rural-non-poor, urban-poor and urban-non-poor have all recorded negative welfare changes by 0.3%, 0.9%, 0.03% and 0.2%, respectively. Household welfare seems to be strained for both urban and rural households but the non-poor seem to receive the bigger blow. These results suggest that heavy tax collection schemes of the government have brought about a net negative impact on welfare of all the household groups. Interestingly, the urban-poor are found to have the lowest decrease in welfare. The CGE results depicted in figure 3 also show total welfare changes for households in each simulation. We see that the welfare loss in the last simulation is lower than the first simulation due to the offsetting effects of the spending schemes.

Impacts on Poverty

To analyze poverty, we used the percentage changes in consumption expenditure of household groups that are taken from the CGE model. It is these economy-wide changes in consumption that we used as the source of link with the MS model in conducting the poverty analysis using the three poverty indicators. Figure 4 presents the CGE results for changes in consumption.

In the first simulation, consumption shrank for all the household groups by 1.3%, 1.2%, 1% and 0.8% for rural-poor, rural-non-poor, urban-poor and urban-non-poor, respectively. The likely explanation is that the increases in price of consumption commodities forced households to adjust their use of income. For instance, when VAT is imposed on commodities, it is imposed on the price paid by the consumer which increases the "menu price". Hence, consumption expenditure has to fall assuming fixed incomes.

For the three spending simulations, consumption expenditure increases. In the second simulation, consumption has increased by 0.3% for rural households whereas it has increased by 0.2% for urban households. The reason could be the effect of increases in wage and non-wage payments that give households more income to expend. In the third simulation, the rural-poor and non-poor experienced consumption expenditure increases by 0.3% and 0.1%, respectively. But the urban- poor and non-poor experienced higher increases by 0.8% and 0.5%, respectively. As can be seen from the figure, both rural and urban-poor have larger increases in their income compared to the non-poor mainly because the transfer covers a larger proportion of their total income. In the fourth simulation, the consumption expenditure increased for all household groups by a larger amount compared to the previous two individual simulations of government spending schemes. Consumption increased in all cases for rural-poor (0.6%), rural-non-poor (0.5%), urban-poor (1%), and urban-non-poor (0.7%). The explanations we

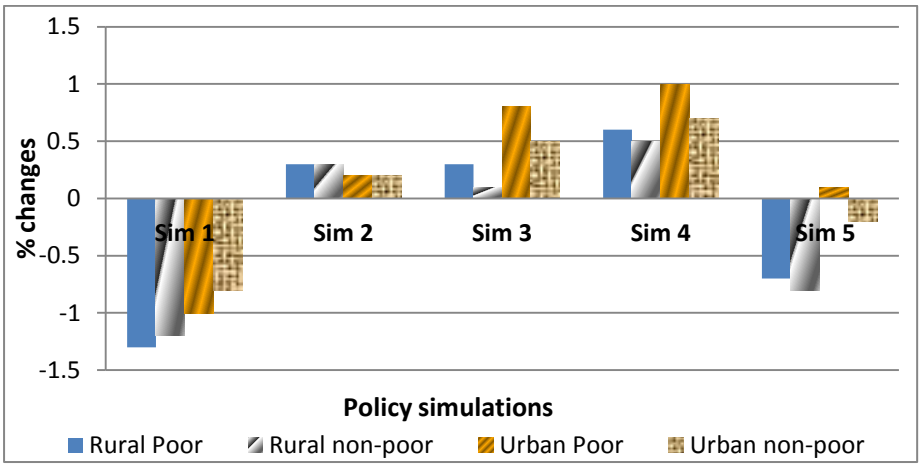
give to the previous two simulations apply in the combination when recurrent expenditure increases.

In the last simulation, consumption expenditures of rural households have decreased by 0.7% (poor) and 0.8% (non-poor). Likewise, the urban-non-poor have recorded negative consumption growths by 0.2%. In contrary, urban poor seem to have a slight increase in their consumptions (0.1%) which emerge as an interesting net impact of the fiscal policy combinations. In the welfare results from the CGE model, we also noticed that welfare losses are smallest for the urban-poor in this fifth simulation. The possible explanation could be that urban poor in the survey are less affected by the tax increases or that the government consumption and transfer expenditures have a stronger positive impact as can be seen from the results in the third and fourth simulations. The government transfers seem to have largely benefited the urban-poor. A study by Obi, 2007 for Nigeria found out different results in which transfers and subsidies to firms were found to be more productive than transfers to households.

To investigate the impacts of this consumption changes on poverty, the FGT poverty estimates are generated for households at national, rural and urban levels. Among the 21,594 households at national level; we found that 9,493 were rural and 12,101 were urban.[15] Since the SAM has delineated poor and non-poor households based on levels of consumption expenditure with the bottom 40% as poor, we needed to separate the poor and non-poor in rural and urban areas in the same manner. Rural and urban households were each divided into two categories taking the bottom 40% as poor and the top 60% as non-poor. As shown in figure 5, since consumption expenditures separately change for these four household categories, we made necessary adjustments on the consumption expenditures in the 2004/05 HICE survey using the CGE results for each policy simulation.

[15] Though the number of rural households is smaller in the survey, one point of note is that the number of people each sample rural household represents (weights) is very large compared to urban households.

Figure 4: Effects of simulations on consumption expenditure growth of household groups



Source: Simulation results from the CGE model

To elaborate more, based on additional information on adult equivalent household size for the 2004/05 survey from CSA, we changed the consumption expenditures in the survey to consumption expenditure per adult equivalent. After this, we took approximate levels of consumption expenditure at the demarcation of the bottom 40% (two quintiles) to represent cut points for national, rural and urban-poor and non-poor households. So among rural households, we got 3,861 as poor and 5,632 as non-poor whereas among urban households, we got 4,751 as poor and 7,350 as non-poor. We then introduced the consumption changes on the base values of the four households after simulations from the CGE model (Savard, 2003). The new values we calculated are the ones we used in DAD to compute the FGT indices.

An important point here is the disparity that may be created in the poverty results when we compare it with the official levels of the poverty measures gathered from the 2004/05 HICE of CSA. The main reason is that the CSA used 1075.03 poverty line that is CPI indexed to compute the FGT indices. But in this study, we are guided by the mechanism followed in the 2005/06

SAM that is to arrange the households based on expenditure in descending order and take the bottom 40% as poor. The consumption expenditure level at the demarcation of total households in the survey, 1782.98, is taken as the poverty line. This national poverty line is adjusted for the CPI in each simulation based on CPI values generated from the CGE model. After this basic ground work, we came up with the results for the poverty measures.

Table 4 presents the results for the head count index. At the base run, the proportion of the poor from total population is 40.9% at the national level. But at rural and urban levels, the index becomes 42.8% and 30.8%. In the first simulation, we see that poverty incidence has increased by 1.5%, 1.4% and 1% at national, rural and urban levels implying worsening of the poverty situation in the short-run. Since this simulation is related to tax imposition, the indication is that when government squeezes money out of the pockets of households for various purposes, it has a short-run adverse impact on their well being. Similar results were found by Wong et al., 2008 for the case of Ecuador.

In the second, third and fourth simulations, the head count poverty has shown slight decreases. In the second simulation, the national, rural and urban head counts declined by 3.2%, 3.3% and 1.6%. The explanation could be that government consumption has increased on sectors that benefit the poor. If consumption of government increases on public administration, education and health, then this may result in short-run decreases in head count poverty. In the third simulation, the results are similar with the second that are decreases in poverty incidence by 2.5% (national), 2.6% (rural) and 1.9% (urban). The likely implication is that government transfer schemes to households can be used as a policy in reducing poverty in the short-run. Also, in the fourth simulation, the proportion of poor has shown decreases by 3.4% (national), 3.5% (rural) and 2.3% (urban). These figures are relatively larger compared to the separate spending simulations. Most of these decreases in the poverty head count are related to the increases in income and real consumption that come with the government recurrent expenditures.

In the last simulation, we find that at national and rural levels, the poverty incidence increased by 0.5% and 0.7%, respectively. But for urban households, poverty incidence decreased by a slight 0.3%. From these results, we see the dominant straining effects from the first simulation which has increased the poverty head count only for total households and rural households. In case of urban households, a peculiar decrease in head count poverty is found. The explanation for this could be the increase in consumption expenditure of urban-poor that we have examined in figure 4. When we compare these values with the results from the first simulation, we find that they are moderate indicating that the welfare loss from the increases in tax collection could be overturned by government spending schemes that bring benefits to households.

Table 4: Effects of simulations on poverty head count index (P_0) (% changes)

	Base	Sim 1	Sim 2	Sim 3	Sim 4	Sim 5
National	0.409	1.5	-3.2	-2.5	-3.4	0.5
Rural	0.428	1.4	-3.3	-2.6	-3.5	0.7
Urban	0.308	1	-1.6	-1.9	-2.3	-0.3

Source: Microsimulation results

Table 5 presents the results for the poverty gap index. The results imply similar changes like the head count index in the sense that the index increases in the first simulation for all the three categories from the base. Poverty depth has increased by around 2.5%, 1.7% and 1% at national, rural and urban levels, respectively. Rural poverty gap has increased by a relatively larger margin compared to urban poverty gap. The implication is that when the increases in domestic indirect taxes press the consumption power of households downwards, the mean level of consumable goods that the households need to get out of poverty increases worsening their poverty state or pushing them down to chronic poverty.

In the second, third and fourth simulations; the poverty gap has declined by relatively higher percentages. In the second simulation, poverty gap has

declined by 3.5%, 4.3% and 3.2% for national, rural and urban households, respectively. The indication is that increase in government consumption reduces the income shortfall of poor households from the poverty line. In the third simulation, poverty gap has declined by 3.5%, 3.4% and 4.2% for national, rural and urban households, respectively. Compared to the effect of changes in government consumption, changes in transfers to households seem to have larger impact on urban households compared to rural households. In the fourth simulation, a stronger decrease in poverty depth has resulted for all the households. At national, rural and urban levels, the poverty depth declined by 4.4%, 5.1% and 5.3%. The evident explanation could be that the poverty gap decreases are a cumulative effect of the second and third simulations.

In the last simulation, we observe that the poverty gap index has shown negligible changes. Poverty gap has slightly increased by a mere 1% at national and urban levels. However, we find that poverty gap has not changed for rural households. The possible explanation is that the net impact of the fiscal policies employed together did offset each other for the poverty depth of rural households leaving the poor households unaffected.

Table 5: Effects of simulations on poverty gap index (P_1) (% changes)

	Base	**Sim 1**	**Sim 2**	**Sim 3**	**Sim 4**	**Sim 5**
National	0.113	2.5	-3.5	-3.5	-4.4	1
Rural	0.117	1.7	-4.3	-3.4	-5.1	0
Urban	0.095	1	-3.2	-4.2	-5.3	1

Source: Microsimulation results

Table 6 presents the results for the poverty severity (squared poverty gap) index. In the first simulation, we see a 4.8%, 2.3% and 2.7% increase in poverty severity at national, rural and urban levels, respectively. The implication of this is that the inequality among the poor has risen due to the imposition of the domestic indirect taxes. Poverty severity has increased by higher margins for urban households compared to rural households.

In the second, third and fourth simulations; poverty severity has declined. In the second simulation, poverty severity has been reduced by 4%, 6.8% and 5.4% at national, rural and urban levels, respectively. We can see from the result that increases in government consumption expenditure reduce the inequality among the poor. This is more pronounced for rural households compared to urban households. Likewise, for the third simulation, poverty severity has declined in all cases by 3.8%, 4.5% and 5.4% for national, rural and urban households. In this simulation, poverty severity in urban areas has declined by larger amounts compared to rural areas. Similarly, in the fourth simulation, we see stronger declines in the inequality among the poor. Poverty severity has declined by 5.2%, 6.8% and 8.1% at national, rural and urban levels, respectively. What we can infer from the results of the three FGT indices is that the combined effects of the government expenditure measures have stronger impacts on reducing poverty compared to the separate policy options.

Table 6: Effects of simulations on poverty severity index (P_2) (% changes)

	Base	Sim 1	Sim 2	Sim 3	Sim 4	Sim 5
National	0.042	4.8	-4	-3.8	-5.2	2.4
Rural	0.044	2.3	-6.8	-4.5	-6.8	0
Urban	0.037	2.7	-5.4	-5.4	-8.1	-2.7

Source: Microsimulation results

In the fifth simulation, we find mixed results. At the national level, poverty severity has shown a 2.4% increase. But it has shown no change for rural households which follows from similar results for rural poverty gap. However, urban poverty severity has declined by 2.7%. This result seems to follow from the results that we reported for changes in welfare and consumption expenditure for this simulation.

6. Conclusions and Implications

6.1 Conclusions

In this study, we set out to investigate the economy-wide impacts of fiscal policy on poverty. We looked into the impacts of government tax measures and expenditure schemes. The crux of the matter is that the Ethiopian government is intensifying domestic revenue collection usable for various spending plans.

The results of increasing domestic indirect taxes indicate negative changes in the macro economy represented by the declines in real GDP. The sectoral effects also show reductions in output production and labor employment. The results generally indicate welfare loss, decline in household consumption expenditures and worsening of poverty in the short-run when domestic indirect tax increases are imposed on commodities.

When we come to the short-run expenditure policies, we see opposite results. In these cases, real GDP has grown positively though its various components exhibited various changes across the simulations. The sectors showed increments in labor employment and output production. The expenditure schemes also revealed welfare gains to households. Moreover, household consumption expenditure has increased in all cases. Though these increases were different in magnitude, the impacts of these changes were also visible on poverty. The poverty measures revealed improvements in the poverty status of all households in the short-run.

In the last simulation, we found out that the combined tax and expenditure interventions lead to declines in real GDP. Sectoral output and labor employment were also reduced as a result of the policy combinations. The results show net welfare loss and worsening of the poverty in the case of majority of households. In this simulation, consumption expenditure has decreased for all households except the urban-poor. Due to this, the poverty state of urban households has revealed improvements though small in

magnitude. Overall, this scenario resulted in many indicators that had similar changes like the first simulation implying dominant adverse effects of changes in domestic indirect tax policies over the changes in government consumption and transfer expenditure policies.

6.2 Implications

This study has some useful implications for policy and future research in relation to the link between fiscal policy and poverty in Ethiopia. Firstly, the Ethiopian government has been expanding the tax base through improved tax collection principally from domestic sources. This trend seems to even be widened further as we can see from the Growth and Transformation plan (GTP) for the period 2010/11 to 2014/15. The results in this study, however, indicate that government policy towards domestic sources has repercussions on poverty in the specific case of domestic indirect taxes, with all other anticipated changes retained at the base level.

Secondly, the government consumption spending schemes are poverty reducing. The study results revealed that the government policy of increasing consumption expenditure does not worsen the poverty situation in the short-run though inflation in the economy was not examined.

Thirdly, government transfers to households are poverty reducing. The results from the study indicate that increasing transfers to households improves the poverty status of both poor and non-poor households. Hence, the government can use these policies as an alternative in addressing the poverty problem in the short-run. However, this argument shouldn't be taken at face value. Practically, transfer schemes require preliminary justifications. For example, given the dynamic nature of poverty, transfers can take various forms based on the type of poverty state.

Fourthly, in relation to the fiscal policy combinations, we found out that the tax policies have a dominant short-run negative impact on poverty. This

implies that in the financing plans that government formulates that use domestic indirect taxes, households could be negatively affected. So, to protect households from such unintended strains of the fiscal plans, the government has to also prepare short-run spending policies like safety nets schemes. As stated, the spending policies we examined are poverty reducing, hence policy makers need to exploit such policies that would improve the status of households while the financing policies go along.

Finally, we could raise two agenda worth investigating in future research. First, since we only focused on ex-post analysis based on the 2005/06 data, it is difficult to extrapolate to the future. Further studies in this area could extend this study by using ex-ante analysis using recent SAM to predict the poverty impacts of financing plans like the GTP. Second, it would be difficult to have a full picture of the net impact of the fiscal policy changes without in depth analysis on long term capital expenditure schemes. Poverty reduction is a principal long term development objective and the Ethiopian government has designed a number of poverty reduction strategies in which pro-poor expenditure policies are at the center. Since the study is a static analysis, it remains for future research to examine the impacts of government financing and spending policies in the long-run. Future researchers will however be faced with the implicit nature of government capital investment in the Ethiopian SAM and the IFPRI CGE model. In this regard, a suggestion is that the Ethiopian SAM should be prepared in a manner that could allow a separate analysis of private and government investment. This will be helpful in investigating the long – run effects of government and/or private investments using dynamic CGE models. Dynamic CGE analysis that examines the anticipated returns from government capital investment could add a lot to the literature in the country.

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Annexes

Annex 1: Current and Capital Expenditure as % of Total Expenditure in 1999/00 constant prices

Ethiopian fiscal year ending July 7	1999/00	2001/02	2003/04	2005/06	2007/08	2009/10
Current Expenditure	80	63.2	58.5	52.3	48.4	44.7
Economic services	4.7	6.3	6.8	6.8	6.7	5.6
Social services	12.2	16.8	16.3	17	18.5	17.4
General services	48.4	27.8	25.3	22.2	19.5	17.9
Other	14.6	12.4	9.6	6.3	3.7	4.7
Capital Expenditure	20	36.7	41.5	47.7	51.6	55.3
Economic development	12	20	24.8	35.5	37.9	38.3
Social development	3.6	6	10.4	10.5	11.6	13.8
General development	2	4.2	6.4	1.8	2.1	3.2
External assistance	2.4	6.7	5.3	7.5	8.6	7
Total Expenditure (,000 birr)	17,181	18,535	18,794	22,630	23,383	28,462

Source: Own computations based on MoFED data retrieved from EEA (2009) data base

Annex 2: Tax and Non-tax Revenue as % of Total Revenue & Grants in constant 1999/00 prices

Ethiopian fiscal year ending July 7	1999/00	2001/02	2003/04	2005/06	2007/08	2009/10
Tax Revenue	54.6	61.4	61.2	60.8	59.9	65.4
Direct Taxes	19.9	34.2	18.2	19.1	17.7	22.5
Indirect taxes	34.7	37.3	43	41.8	42.3	42.9
Domestic Indirect Taxes	12.1	11.6	12.3	13.4	12.8	16.2
Foreign Indirect Taxes	22.5	25.6	30.7	28.4	29.5	26.7
Non Tax Revenue	30.9	19.8	15.5	23.1	15.1	15.9
Total Revenue(exc. grants)	85.5	81.2	76.7	83.9	75.1	81.3
External Grants	14.5	18.8	23.3	16.1	25	18.7
Total Revenue & Grants (,000 birr)	11,872	14,337	16,214	17,865	19,853	26,495

Source: Own computations based on MoFED data retrieved from EEA (2009) data base.

Annex 3: Share of public expenditure on poverty-oriented sectors at constant 1999/00 prices

Sectors	2005/06			2007/08			2009/10		
	Current	Capital	Total	Current	Capital	Total	Current	Capital	Total
Agriculture	10.2	23.9	16.7	10.3	16.1	13.3	6.9	12.1	9.8
Education	25.4	17.7	21.7	29.2	14.1	21.4	30.3	18.4	23.7
Health	5.3	3.7	4.6	6.6	7.7	7.3	6.6	6.2	6.4
Social Welfare	0.9	0.4	0.7	0.6	0.04	0.3	0.4	0.03	0.2
Roads	1.3	24.5	12.4	1.2	33.6	17.9	1.3	36.5	20.8
Total poverty targeted spending	43.1	70.2	56.1	47.9	71.7	60.2	45.6	73.2	60.8

Source: Own computations based on MoFED data retrieved from EEA (2009) data base

Annex 4: Indirect tax revenue by component at constant 1999/00 prices (% of GDP)

Ethiopian fiscal year ending July 7	2005/06	2006/07	2007/08	2008/09	2009/10
Domestic indirect taxes	2.6	2.6	2.1	2.2	2.8
VAT and TOT on local goods	1.4	1.4	1.1	1.0	1.2
VAT and TOT on services	0.5	0.6	0.6	0.8	1.2
Excise tax	0.5	0.4	0.3	0.3	0.3
Stamp duty	0.2	0.2	0.1	0.1	0.1
Foreign trade taxes on imports	5.0	4.6	4.7	3.5	4.6
Customs duty	2.3	2	1.6	1.2	1.5
Import VAT	2.3	2.1	1.6	1.2	1.7
Excise tax	0.5	0.5	0.4	0.4	0.5
Sur tax	--	--	1.1	0.7	0.9
Total Indirect tax revenue	7.6	7.1	6.8	5.6	7.5

Source: Own aggregations and computations based on regional and federal data from MoFED.