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Economy-wide impact of tax reform in Ethiopia: A recursive dynamic general equilibrium model

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This paper examined the macroeconomic influence of tax reform on the Ethiopian economy using the Dynamic Computable General Equilibrium model. It utilized the updated 2009/2010 Ethiopian Social Accounting Matrix (SAM) from 2005/2006 developed by Ethiopian Development Research Institute (EDRI). To investigate the impact of tax reform on the Ethiopian economy, different simulations were made turn by turn. First, a reduction in direct tax by 30% is introduced to see the impacts of direct tax reduction on the economy. As a result, macroeconomic variables such as GDP, absorption, private consumption, government expenditure, import, export, government income, investment, and aggregate output show a considerable improvement. Additionally, there is an increase in factor income and welfare gain for households though the factor supply of labor and land is fixed compared to base case scenarios. On the second simulation, an increase in sales tax by 67% was introduced to examine at the impact of sales tax on the economy. Thus, increases in sales tax improve the overall economic performance compared to direct reduction. However, under the third simulation decrease in import tariff by 24% worsened the general economic performance by encouraging import and depressing domestic output. Based on the finding, encouraging consumption tax reform, protecting the home country from external sector influence to encourage domestic production is the major policy option recommended to bring a good economic performance with lower distortion since we cannot abolish distortion when we conduct tax reform.

Key words: Ethiopia, tax reform, tax revenue, macroeconomics performance, dynamic computable general equilibrium.

INTRODUCTION

Economic development is the principal and overall objective of all countries in the world especially the issue of improving the living standard of society. In developing countries, apart from the untapped resource accessibility of resources taxation the most important tool of resource mobilization and social development through the implementation of an effective tax policy (Roy and Richard, 2008; Workineh, 2016; Chaudhry and Munir,

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2010; Wawire et al., 2011).

In most of the developing economies, tax reform and administration are characterized by inefficiency and ineffectiveness which is marked by mal-administration, inability to collect sufficient tax revenues or collecting whatever taxes they are capable of raising for their political advantage without worrying about the economic distortions, economic instability against optimal tax theory (Auerbach, 1996; Abdurrahman and Muzainah, 2016; Brosio, 2000; Tanzi and Zee, 2000).

Tax policy in developing countries is a puzzling topic and has attracted increasing attention in the last two decades and the challenges are serious in least developed countries, where the persistent need to increase revenue for improved investment in public services and infrastructure (David et al., 2016; anzi and Zee, 2000). As empirical literature reveals, the tax revenue performance of developing countries, very poor and far less than developed countries. For example, Ghirmai (2016) indicated that in 2014 the standard tax share of developed countries as a proportion of GDP fall between 29 and 32%, while the corresponding range for developing countries in the medium-income category was from 17 to 22%. The typical tax share in the poor countries falls between 13 and 16%. Tax revenue (% of GDP) in Ethiopia was last measured as 13.5% (NBE 2015/2016). This figure is even less than the 16% average value of SSA countries tax revenue can only finance about 70% of government expenditure on average with 30% of government expenditure financed through grants and borrowings. To overcome this problem Ethiopia, similar to other countries in Africa, made extensive efforts in recent years to reform its tax system to increase tax revenue as well as reduce distortions in the economy. As a result, the country was subjected to numerous tax reforms at different times starting from the 1940s where modern taxation started in Ethiopia (Wogene, 1994; Alemayehu and Abebe, 2005; Fantahun, 2013). Among the measures taken by the government are: direct tax adjustment, administrative reform, increase in tax base and rate, adjusting the exemption of commodity, and other important reform to increase public revenue. However, the basic question is that of whether the tax reforms have produced the required results? Some empirical investigations have been conducted into the performance of these tax reforms in Ethiopia. For instance, Endeg and Wendaferahu (2016), Delesa (2014), Tegegn (2008), and Alemayehu and Abebe (2005) gave special focus to optimal tax theory and implemented partial equilibrium methods unsuccessful to evaluate the complete effects of tax policy as the model they adopted cannot capture general equilibrium concept. Therefore, there is the need for a more all-inclusive method that accounts the various interrelationships between all actors in the economy, to more realistically estimate the economic effects of any

tax policy variations. Current study looks at the economy wide impact of tax reform such as a reduction in direct tax by 5% increase in sales of tax by 67%, and reduction in import tariffs by 24% on the Ethiopian economy by using the dynamic Computable General Equilibrium Modeling to fill the gap identified in the previous literature and to capture the economy-wide impact of tax reform and since tax is the fundamental instrument of government to fine-tune the overall economic condition of the country, researching this area is more productive in developing appropriate tax policy which takes into consideration all actors in the economy.

REVIEW OF LITERATURE

The problem of fiscal imbalance is everywhere in the world as general and developing countries are predominantly disposed to such problem because of inability to generate sufficient revenue for government expenditure (Tanzi and Zee, 2000). In emerging economies, the formation of a sound tax system challenged by problems due to the structure of their economy, which is characterized by a huge portion of traditional agriculture, large informal sector activities, and by lack of decent tax administrations. Hence, many emerging states end up with very small tax sources, substantial reliance on foreign trade taxes, and comparatively deficient use of personal income taxes (Yakita, 2001; Yoonseok and Sunghyun, 2013; Tadele, 2015; Macek, 2015; Mascagni, 2016; Endeg and Wondaferahu, 2016).

Additionally, in several countries, local governments collect whatever taxes level, regardless of the distortions and distribution effects (Brosio, 2000; Birk and Michaelis, 2004; Feltenstein et al., 2013). However, sound tax reforms necessitate time as well as the obligation of the country's administration to bring about changes in the system, and a solid tax system that encourages the business community and reduces the risk in their financial and investment decisions by establishing business confidence (Odd and Lise, 2003).

All countries face challenges in scheming and operating sound tax system. These challenges are particularly serious emerging economies, where the tenacious need to surge revenue for increased investment in public services for rapid and sustainable economic growth (David et al., 2016, WB, 1990). Many empirical kinds of literature also support this argument. Willi et al. (1997) examined the role of taxation on economic growth in OECD countries. The result reveals that, taxes affected economic performance via their effects on capital and labor markets, and human capital formation.

Sigtas and Igor (2008) evaluated, the economic impact of the 2006 to 2008 personal income tax (PIT) reform in

Lithuania using Computable General Equilibrium (CGE) model-based simulations. They found that the undertaken PIT reform leads to permanent government budget deficits and ever-increasing public debt. Giovanni and Juha (2008) studied Tax Reforms, "Free Lunches", and "Cheap found that both income and consumption unilateral tax rate reductions do not constitute a "free lunch".

Gerali et al. (2016) evaluated the macroeconomic effects of simultaneously implementing fiscal consolidation and competition-friendly reforms in a country of the euro area by simulating a large-scale dynamic general equilibrium model. They found that the combined application of reforms had additional expansionary effects on long-run economic activity. Cecelia et al. (2016), assessed the impacts of a major tax reform in Uruguay by using computable general equilibrium modeling-microsimulation analysis and assessed the combined influence of tax fluctuations on macroeconomic and labor outcomes, poverty, and inequality using a top-down static computable general equilibrium modeling microsimulation approach. They found full implementation of the reform that tends to strengthen the reduction of poverty.

Amir et al. (2013) studied the effects of the tax reforms on key macroeconomic variables found that, reductions in the income tax of individuals and that of companies might affect economic growth. Sajadifaret al. (2012) measured the impact of tax reform on the Iranian economy by using a computable general equilibrium modeling and proved that government revenue was increased and household well-being and GDP deteriorated due to the implementation of VAT. Chiripanhura and Chifamba (2015) used a CGE model to evaluate equity and distributional impacts of Namibia's tax policy reforms introduced in 2013. The result showed that, a decrease in the effective tax rate directly resulted in higher disposable incomes and households benefited from falling consumer prices, thus experiencing improvements in their consumption patterns.

Moses and Eliud (2003), a study on tax reform and revenue mobilization in Kenya and evidence suggests that reforms had a positive impact on the overall tax structure and the individual tax handles.

Bhasin and Kobina (2005), examine the impact of alternative fiscal reforms in Ghana, and found the removal of trade-related import taxes accompanied by an increase in VAT reduces the incidence, depth, and harshness of household poverty, and progress the income distributions of households. Elbushra et al. (2012), evaluated the effects of agricultural tax changes on Sudan's economy by using the computable general equilibrium model. The model results showed that decrease of wheat import tariff increases wheat imports, output, and export of cotton, sesame, industrial and services sectors. Tegegn (2008) evaluated the productivity of the tax system in Ethiopia

for the period 1961-2005 and the analysis showed that tax revenue tends to be inelastic to changes in the tax base. The relatively low tax-to-base elasticity may be explained by the inefficient and poor tax administration and the existence of exemptions.

Alemayehu and Abebe (2005) measured tax and tax reform in Ethiopia from 1990 to 2003 and found the distributional impact indicates certain commodities subject to some kind of tax turned out to be progressive whereas some of them tend to be reverting. Even though much empirical evidence is available, the model they used is a partial equilibrium model, which cannot fully capture the full impact of tax reform on all sectors. Therefore, this study addressed the literature gap by applying a dynamic computable general equilibrium model that estimates full impact of tax reform on all economic sectors.

METHODOLOGY

Source and types of data

Data for the completion of the study were collected from EDRI, CSA, and IFPRI. Secondary data were used for the completion of the study which is a national SAM developed for the Ethiopian economy in 2005/2006 and updated for 2009/2010 Ethiopian economy, from Ethiopian Research Development Institute (EDRI). A social accounting matrix (SAM) is a complete, macro and micro data frame; normally demonstrating the economy of a nation. SAM is a square matrix in which each account is represented by a row and a column. Each cell shows the payment from the account of its column to the account of its row. Thus, the incomes of an account appear along its row and its expenditures along its column, and total revenue (row total) equals total expenditure (column total) (Lofgren and Robinson, 2008).

Mostly, the standard SAM has four key accounts. Firstly, activities account reviews production in the domestic economy. Secondly, commodities account, in its row, represents the demand for commodities, and in the column side; it denotes supply of the commodities. Thirdly, factor account, the row side signifies the payment to factors from different sources (it could be from production sectors of the local economy and the rest of the world) whereas the column side signifies the distribution of factor incomes to various institutions. Fourthly, institutional account, all incomes, and expenditures of institutions are shown in the institutions' account. As a sub-account to this account, we have the government, enterprise, household, and the ROW account. When we come to the ROW sub-account, the source of income could be the sale of imports and factors (this represents the outflow of foreign exchange). The inflow of foreign exchange could be expressed by the payment made for exports, factors, transfers (to households and government), and foreign savings.

Also, we have the S-I account, which summarizes the savings of different institutions (it could be from the government, households, and foreign) in the row section, and expenditure for investment on capital goods in the column section. Furthermore, there are accounts for taxes and margins, which signify cost incurred about the flows of trade and transportation (this could be serviced concerning domestic, import, and export marketing). The rationale behind the dissection of this account from the government account is to avoid ambiguity whenever economic interpretation of some payments is made (Wing, 2004).

This study uses the 2009/2010 Ethiopia Social Accounting Matrix

which is produced by the Ethiopian Development Research Institute in 2005/2006 and adjusted for the Ethiopian economy of 2009/2010 (EDRI, 2009/2010). It is disaggregated into 113 activities, 64 commodities, 16 factors, and 13 institutions, 17 different taxes, saving-investment, and rest of the world account show the interaction of different economic agents. Furthermore, for the completion of this study further aggregation of SAM has been done. We have seventeenth aggregated activities (cereal, non-cereal, livestock, mining, agricultural processing, chemical and pharmacy, machine and vehicle, manufacturing electric and water (utility), construction, trade, hotels, administration), education, healthy and another service commodity, four factors, four type of household, enterprise, government, three tax category, saving-investment balance and rest of the world.

Method of data analysis

To examine the influence of tax reform on the macroeconomic variable, the researcher used a dynamic CGE model. Mostly, CGE model are grouped into two categories: intertemporal and successive (recursive). An intertemporal dynamic model is based on optimal growth theory where the behavior of economic agents is characterized by perfect foresight (Robinson, 2004). On the other hand, the recursive model's agents make their decisions based on past and current information with no role for forward-looking expectations that means the agents have myopic behavior (Lofgren and Robinson, 2008).

In this study by considering Ethiopian people, a recursive dynamic CGE model for Ethiopia is used for analysis purposes because Ethiopia is one of the developing countries in which perfect foresight cannot hold. The reason why the researcher uses the dynamic computable general equilibrium model is: *firstly*, the static computable general equilibrium model has a problem of an analytical inconsistency between within-period decision and between-period decision, leads to the contradictory optimization problem. *Secondly,* the static model does not generate different effects when lowering import tariff on capital goods and consumer goods, and in the calculation of optimal tariff, the highest level of tariff is associated with capital-goods imports, lowering investment and no welfare effects since the capital stock was fixed. *Lastly,* the static model also does not capture dynamic gain from policy intervention and reveals unrealistic results (Keshab and Emmanuel, 2005).

CGE model is a widely used model for policy analysis both in developing and developed countries specifically, on the impact of tax reform. The advantage of using the Dynamic CGE model is that it models the whole economy explicitly, and interlinking between sectors and transactions between economic agents despite being under restrictive assumptions (Burfisher, 2011).

Additionally, the model explains the flows of payment recorded in the SAM. Production and consumption behaviors are captured by first-order optimality conditions; the system includes producers' profit and consumers' utility maximization subject to technology and income constraints, respectively. A technology specified in the model by a constant elasticity of substitution (Lofgren and Robinson, 2008). It shows the movement of a sole product from being supplied to the market to its final demand. The aggregate commodity is governed by a CES function, which allows demanders to substitute between the different producers supplying a particular commodity, to maximize consumption subject to relative supply prices. The decision of producers is governed by a constant elasticity of transformation (CET) function, which distinguishes between exported and domestic goods, and by doing so, captures any time or quality differences between the two products. Domestically produced commodities that are not exported are

supplied to the domestic market.

Substitution possibilities exist between imported and domestic goods under a CES Armington specification and it takes place both in final and intermediates. The Armington elasticities vary across sectors, with lower elasticities reflecting greater differences between domestic and imported goods.

Equation of the model

The equation of the model follows the SAM disaggregation of factors, activities commodities, and institutions. The equations in the model constitute prices, production and trade, institutions, and system constraints block. The price block specifies equations for the endogenous model prices that are connected to other endogenous or exogenous prices and non-price model variables. The production block contains production in the economy carried out by activities, which assumed to maximize profit subjected to their technology taking prices as given and act in a perfectly competitive setting. The production technology chosen from two specifications permitted in the model, these are the constant elasticity of substitution and Leontief function. In this study, Leontief technology is at the top level of the technology nest. The production function for activity is a function of the quantities of aggregate value-added and intermediate inputs that yield commodity outputs in the production process. The institutional block contains the income and expenditure of the four major institutions (households, government, enterprises, and ROW). Household and enterprises obtain their income from payment of factors made by each activity and transmissions from extra organizations. Households expend their revenue for consumption, saving, directs tax, and transfer to other households and institutions. Except for consumption and tax, the expenditure pattern of the enterprises is similar to that of the households. Government revenue is collected from taxes, factors payment, and transfers from the ROW. Its expenditure is confined to consumption, saving, and transfers to a domestic institution. The total income of each factor is defined as the sum of activity payments.

System block constitutes formulation of the system closures, which equilibrate the model. These are factor market and macroeconomic closure (commodity market, current account balance, and government balance). The choice of closure affects all simulations other than the base simulation. The selected closures in this study are those applicable to the country under the study. The first closure in the standard CGE model is for factor markets. It equalizes the total quantity demanded and supplied for each factor in the factor market.

Dynamic model (between the period models)

Previously, we have defined the within-period or static component of the model. But, the influence of policy-variations contains dynamic features, such as the inter-temporal effects of changes in investment and the rate of capital accumulation. To explore detail, the relationship between policy changes and factor accumulation, the static model is extended to a dynamic recursive model. In the extended part of the model, labor supply will be determined exogenously while capital accumulation is determined endogenously. Then, novel capital will spread amongst sectors based on each sector's initial share of aggregate capital income (Thurlow, 2004).

RESULTS AND DISCUSSION

In this part, we presented the influence of tax modification

Table 1. Summary of macroeconomic variables % change from baseline simulation.

Variable	Initial	Base	Dtax_Dec	Stax_Inc	Impor_Dec
Absorption	0.587134	13.51894	0.294054	0.261379	-1.11601
Government expenditure	0.02342	4.077724	0.147264	0.099212	0.627477
Private consumption	0.400199	11.79605	0.141819	0.124718	-1.27489
Output	0.66	11.82	0.22	0.19	-1.13
Fixe investment	0.143253	18.34741	0.508234	0.453879	-0.96953
Exports	0.086368	7.848967	0.255122	0.231153	-0.65153
Imports	-0.16325	17.3368	0.433622	0.40614	-0.74358
GDP at market price	0.510247	10.93993	0.197454	0.162078	-1.32287
Net indirect tax	0.03959	8.83959	0.225264	0.068579	-5.81136
GDP at factor cost	0.470657	11.09501	0.195694	0.168097	-1.10425
Government revenue	0.10017	17.5321	0.817928	0.549384	3.59181
CPI	0.612639	-2.19218	-1.1933	-0.30472	-0.81486

Dtax_Dec = Direct tax decreased by 30%, Stax_Inc = Sales tax increased by 67% and Impor_Dec = Import Tax decreased by 24%.
Source: Own computation from simulation result, 2020.

on the economy of Ethiopia. To look at the impact, we state different scenarios to assess the impacts of policy shocks on macroeconomic tax reform in Ethiopia and the experiment results. The baseline simulation established to serve as a reference in an absence of any policy shock and serves as a benchmark for policy evaluation. Thus, in this scenario, all macroeconomic variables show their value without any policy shock to the economy. Therefore, the baseline simulation used as the benchmark value to compare the values of different variables after the policy shocks. Here, we look at the proposed policy option by the researcher to look at the overall impact of tax reform on the Ethiopian economy. Accordingly, three possible policy option were proposed such as reduction of indirect tax by 30%, increase in sales tax by 67%, and reduction in import tariffs by 24% were simulated turn by turn to scrutinize the influence of all policy scenarios on the macroeconomic performance, factory utilization and welfare of households. The researcher introduced a 30% direct tax shock because the government of Ethiopia in 2017 reformed the income tax-free threshold and adjusted the tax bracket. Accordingly, it increases the tax-free threshold on personal income tax from 150 to 600 and from 1800 to 7200 for business profit tax, and due to increase in tax-free threshold the marginal tax rate shows a 5% reduction for all taxpayers. On average it can be calculated as follows 54%+5%/2 = 29.5% ≅ 30%. Secondly, 67% shock introduced since the sales tax average growth from 2003 to 2017 is 66.27% yearly and we assumed this situation continues until 2025 and we introduce the shock by this amount for looking at the impact of tax reform. Lastly, a reduction in import tariffs

by 24% was introduced since WTO's maximum tariff cut for the agricultural items that developing countries required is 24%.

Impact of tax reform on macroeconomic variables

In this part, we look at the impact of tax reform on all macroeconomic variables as a whole for each simulation in turn. Accordingly, Table 1 shows the summary of the results of the three simulations focusing on absorption, private consumption, fixed investment, government expenditure, export, and import, gross domestic product at market price, net indirect tax, and real GDP at factor cost (GDPFC), government income and CPI. Table 2 summarizes the impact of tax reform on all macroeconomic variables.

According to Table 1, all macroeconomic variables show some improvement compared to the baseline simulation excluding the third simulation and the consumer price index for which we can observe the negative value for all scenarios. As can observe from Table 1 on the first 2 simulations, the macroeconomic variables have shown positive changes.

Absorption indicates that there is a 0.29, 0.26, and -1.48% increases in scenario 1, scenario 2 and decrease in scenario 3 as compared to the baseline scenario. Absorption increased due to an increase in investment, private consumption, and government expenditure. In simulation 1, private consumption reveals a 0.14% increase from baseline simulation because of decrease in direct tax increase the disposable income which boosted

Table 2. Sectoral impact of tax reform % change from baseline simulations.

Variable	Base	Dtax_Dec	Stax_Inc	Impor_Dec
GDP growth	11.91	0.28	0.25	-1.1
Agricultural growth	9.64	0.12	0.13	-1.76
Industrial growth	16.93	0.4	0.36	-0.91
Service growth	9.94	0.23	0.21	-1.01

Dtax_Dec = Direct tax decrease by 30%, Stax_Inc = Sales tax increase by 67% and Impor_Dec = Import Tax decrease by 24%.
Source: Own computation from simulation result, 2020.

Table 3. Summary of Factor Income % Change From Baseline Simulation.

Variable	Initial	Base	Dtax_Dec	Stax_Inc	Impor_Dec
Labor	0.180062	15.35896	0.22423	0.211058	-1.01768
Land	0.061101	12.32482	0.033015	0.057381	-1.65712
Livestock	0.014318	14.40802	0.249735	0.231056	-1.28692
Capital	0.214715	11.25132	0.252727	0.16509	-1.45797

Dtax_Dec = Direct tax decreased by 30%, Stax_Inc = Sales tax increase by 67% and Impor_Dec = Import Tax decrease by 24%.
Source: Own computation from simulation result, 2020.

private consumption. In simulation 2, private consumption reveals a 0.12% increase from baseline simulation but the increment is less than in simulation 1. This is because when the government increases the sales tax, the price of product increases, which results in a reduction in purchasing power parity of consumer, who then failed to consume more additional goods as before. But in simulation 3, apart from the reduction in import tariffs, private consumption shows a massive reduction and it is also an unexpected result for us. When we come to the aggregate output there are overall improvements in output in simulations 1 and 2 and reduction in the third simulation because reduction import tariffs result in an increase in import and hurt domestic production.

The gross fixed investment shows a relatively good improvement in simulations 1 and 2, which is 0.50, 0.45 and a huge reduction in simulation 3, which is -0.92. This may be because Ethiopia is an emerging economy in which the private sector is not well developed; reduction in direct tax increases the real income of the society than private investment. But for simulation 3, reductions in import tariffs increase imports and discourage investment for an unknown reason.

On other hand, government expenditure shows a positive change in all simulations which is 0.14, 0.09 and 0.62 in simulations 1, 2 and 3, respectively. These imply that on simulation 1, increase in tax-free threshold is government expenditure and then increases government expenditure. On simulation 2, rise in VAT surge revenue of government to fund an increase in tax-free threshold and government expenditure is reduced compared to simulation1 as a result of VAT used to recover budget

loss in the reduction of direct tax. On simulation 3, government expenditure shows, merely growth in government expenditure due to the fact that reduced import tariffs opens the country to the world increase and government expenditure increase to make domestic producer competitive. Even though there is an increase in export, still external balance is deteriorated in all scenarios compared to the baseline simulation due to a further increase in import. In simulations 1 and 2, the growth rate of imports is double of growth rate in export which worsens the negativity of trade balance.

Both total production (GDP) at factor cost and GDP at market price show increment as a result of a decrease in direct tax and increase in sales tax but reduced simulation 3 due to reduction in import tariffs. In simulation 1, reduction in direct tax, encourages production and consumption as well as saving then GDP.

Moreover, reduction in tariffs encourages import and hampered domestic production by depressing the price of imported goods. Net indirect tax shows some improvement in the first two simulations and a huge reduction on the third simulation. In simulation 1, indirect tax increases since production increased and in simulation 2, increase in VAT tax by 67% improves the level of indirect tax because of increase in consumption also increase the VAT. However, on the third simulation, the impact on the net indirect tax is very critical which is – 5.81 due to a reduction in tariffs, which accounts for the lion share for indirect taxes.

Government income shows huge improvement when compared with baseline simulation as a result of tax reform. The value of government saving from baseline is

Table 4. Summary of factor supply (percentage change from baseline simulation).

Variable	Initial	Base	Dtax_Dec	Stax_Inc	Impor_Dec
Labor	0.18	2.4	0	0	-2.4
Land	0.06	3.1	0	0	-3.1
Livestock	0.06	18.11	0.29	0.32	-0.14
Capital	0.86	15.66	0.31	0.27	-0.28

Dtax_Dec = Direct tax decreased by 30%, Stax_Inc = Sales tax increase by 67% and Impor_Dec = Import Tax decrease by 24%. Source: Own computation from simulation result, 2020.

0.81, 0.54, and 3.59, respectively for simulations 1, 2, and 3.

In simulation 1, reducing indirect tax by 30% improved the government income by creating voluntary tax compliances.

In simulation 2, government income showed some improvement compared to simulation 1 due to an increase in sales tax by 6.7%. Overall, the result from the third simulation, which is the reduction of import tariffs, reveals an implausible result apart from researcher expectation and for which there is no justification because it is against the basic economic theory.

Lastly, the other important issue is the concept of price effect. From the simulation price, which shows reduction on the three simulations but the decrement is less than baseline simulation, which is -2.19, and among the three simulations, reduction in direct tax is more successful in reducing the price of goods and services.

Sectoral impact

When we observe the sectoral impact of tax reform, all sectors show an improvement in simulations 1 and 2 but with a huge reduction in simulation for unknown cases. GDP increase by 0.28 and 0.25 in simulations 1 and 2 show 1.1 reductions in simulation 3. The agricultural sector improved by 0.12 and 0.13 in simulations 1 and 2 and the service sector shows good improvement in simulations 1 and 2 followed by the service sector. Table 2 shows the summary of the sectoral impact.

Impact of tax reform on factor utilization

The simulation result revealed that factor income of households show improvement when compared with the base case scenario. This is because lowering the tax rates for households, results in higher factor income for them. This might be because the reduction in direct tax is directly linked to the production level, which shows improvement in the simulation period. On the other hand, government income, which is the source of factor income improved income, which is the source of factor income improved during the simulation period, causes an increase in factor income of the household.

On simulation 3, reduction in import tariffs discourages domestic production, initiates import form rest of the world, which result in a contraction in domestic production. When we compare the three-simulation impact on factor income, factor income highly showed improvement in simulations 1 and 2 and show a reduction in simulation 3. Table 3 is the summary of factor income from simulation results.

As can be observed from Table 3, income of all factors of production shows a considerable improvement in simulations 1 and 2. But simulation 3 shows a reduction, because factor income generated during the production process reduces import tariffs and discourages production then factor income.

When we consider factor supply, labor and land supply were constant as base case scenario. For all tax reform by reducing the factor supply, workers will perceive rise in the discretionary income with the lower tax rate, they would keep more of their gross income; therefore, they have more money to spend. Table 4 summarizes the factor supply result from the simulation.

According to Table 4, there is no improvement in factor supply due to the impact of tax reform in simulation 1. Additionally, income tax rates may encourage people to work long time and overtime to keep more of their income and due to the substitution effect, work is more attractive with lower tax rates as well as with lower tax rates it is easier to get their target income by working fewer hours. On simulation 2, increase in sale tax results in no change in labor and land. However, in simulation 3, there is a severe reduction in factor supply due to reduction in import tariffs encourage import by reducing price which causes a reduction in domestic production than factor supply. When we come to the livestock and capital, there is a little improvement in capital and livestock supply. This is because decrease in direct tax rate increases real income and the saving which promotes investment. Increase in demand of capital and livestock increases supply of capital and livestock.

Impact of tax reform on household income, expenditure, and consumption

The principal sources of revenue for families are factor

Table 5. Summary of Household Income % Change from Baseline Simulation.

Variable	Initial	Base	Dtax_Dec	Stax_Inc	Impor_Dec
Household rural- poor	0.1	14.61	0.21	0.2	-1.12
Household rural-non-poor	0.19	13.31	0.17	0.18	-1.37
Household urban -poor	0.01	13.61	0.21	0.22	-1.17
Household urban non-poor	0.13	12.28	0.2	0.2	-1.07

Dtax_Dec = Direct tax decreased by 30%, Stax_Inc = Sales tax increase by 67% and Impor_Dec = Import Tax decrease by 24%. Source: Own computation from simulation result, 2020.

Table 6. Summary of household expenditure percentage change from baseline simulation.

Variable	Initial	Base	Dtax_Dec	Stax_Inc	Impor_Dec
Household rural-poor	0.099281	15.62776	0.116098	0.138666	-1.2227
Household rural non-poor	0.178953	14.32447	0.069682	0.111658	-1.47938
Household urban poor	0.007627	14.57787	0.210251	0.542856	-0.897
Household urban non-poor	0.113909	13.27531	0.110318	0.151927	-1.14713

Dtax_Dec = Direct tax decreased by 30%, Stax_Inc = Sales tax increase by 67% and Impor_Dec = Import Tax decrease by 24%. Source: Own computation from simulation result, 2020.

payments produced throughout production and obtain transmissions from other institutions like government, other domestic institutions, and the rest of the world. As observed from Table 5, rural and urban households would experience an increase in their real incomes compared to the base case. This is due to an increase in overall production as a result of tax reform. Table 5 summarizes the household income from the simulation result.

Tax reform results increase expenditure for both poor and non-poor rural households in all simulation scenarios. This because reduction in direct tax increases real income of household which enables them to spend more to meet their basic need. On other hand for wealthier households in the urban reduction, indirect tax increases their real income and initiates the saving to spend on luxury good by reducing current consumption. Simulation 2 increases sales, tax reduces the real income of the society and then their purchasing power parity. Table 6 represents the household disaggregated consumption expenditure of the household from the simulation result.

The result from simulations 1 and 2 show a good improvement as compared to the baseline simulation except for simulation 3 for which we do not have any justification. The consumption pattern in urban poor is far better than the other household group. Similarly, the consumption pattern for rural areas is better than the urban area. The poor household benefits as shown in Table 6 which summarized the impact of tax reform on all household categories. Accordingly, on the first simulation,

that is, simulation 1 based on a decrease in direct tax highly affects the urban poor households; all other household category is not affected by the tax reform as the urban poor households. This might be due to the fact that agricultural outputs of rural households are less prone to the market transaction most of the time (Table 7).

Impact of tax reform on the welfare of households

The welfare of society indicated using equivalent variation, which is the most important indicator of the welfare effects of policy reform. As policy shocks followed by major price adjustments, the EV measures the level of income that the consumer needs to pay before the shock to leave him as well off at the equivalent level of utility changes after the price changes. From any policy change, a consumer harmed or benefited before the policy change by paying or receiving the price equivalent in income, negative or positive equivalent of variation changes represent welfare (utility) loss or gain because of the policy shock. Table 8 in simulation 1, due to reduction in direct tax EV reveals positive change for all household category compared to baseline scenario. An urban poor household is highly benefited followed by rural non-poor households from the reduction in direct tax by increasing their real income. Table 8 summarizes the change in the value of equivalent variation from the base case scenario.

While the rural poor household less benefited from a

Table 7. Household consumption % change from baseline simulation.

Variable	Initial	Base	Dtax_Dec	Stax_Inc	Impor_Dec
Household rural-poor	0.099281	15.62776	0.116098	0.138666	-1.2227
Household rural non-poor	0.178953	14.32447	0.069682	0.111658	-1.47938
Household urban poor	0.007627	14.57787	0.210251	0.542856	-0.897
Household urban non-poor	0.113909	13.27531	0.110318	0.151927	-1.14713

Dtax_Dec = Direct tax decreased by 30%, Stax_Inc = Sales tax increase by 67% and Impor_Dec = Import Tax decrease by 24%. Source: Own computation from simulation result, 2020.

Table 8. Summary of welfare impact of tax reform % change from baseline simulation.

Variable	Initial	Base	Dtax_Dec	Stax_Inc	Impor_Dec
Household rural-poor	0.099839	22.81377	0.331999	0.299398	-6.20286
Household rural non-poor	0.180033	20.08572	0.187103	0.20927	-5.9868
Household urban poor	0.007679	23.72185	0.794301	1.964567	-4.82819
Household urban non-poor	0.114487	22.82349	0.47884	0.447275	-4.6508

Dtax_Dec = Direct tax decreased by 30%, Stax_Inc = Sales tax increase by 67% and Impor_Dec = Import Tax decrease by 24%. Source: Own computation from simulation result, 2020.

reduction in direct tax compared to other types of household; this may be due to the fact that rural poor households depend on agricultural activities. In simulation 2, increase in sales tax by 67% results in severe reduction in welfare of all categories of household compared to the first simulation. When we come to simulation 3, the welfare loss is high apart from a reduction in import tariffs which results in a price decrease then increase the welfare of the society and results in the expectation of researcher and opposite basic welfare theory. When we compare the three simulations together, there is a considerable welfare gain in the first simulation and high welfare loss in the third simulation while simulation 2 reveals the moderate impact on welfare loss and gain.

CONCLUSION AND RECOMMENDATIONS

This paper examined the macroeconomic impact of tax reform applying a recursive dynamic computable general equilibrium model. The study used 2009/2010 EDRI Social Accounting Matrix 2005/2006. Different scenarios were done to evaluate the economy-wide impact such as a reduction in direct tax, increase in sales tax, and reduction in import tariffs. Our current analysis shows that following the tax reform, there is an overall improvement in economic activity in simulations 1 and 2 but not for simulation 3 and there is no justification that can support the result of simulation 3. On the other hand, factor supply remains constant apart from a change in tax

policies though there is an improvement in factor income because of an overall increase in economic performance, which is witnessed by growth in GDP at factor cost. There is an increase in household income and consumption in simulations 1 and 2, but not in simulation 3. Lastly, the impact of tax reform on household welfare is considered. There is welfare improvement raised from a good economic performance from simulations 1 and 2. Urban poor household is highly benefited from the welfare gain because of direct reduction tax results in short-term increase in real income that increases consumption of urban poor and then welfare.

Based on the finding, the researcher forwarded the following policy implication. Since tax one element macroeconomic variable that can link micro and macro aspect of the economy, a little bit modification on tax to change some macro and microeconomic variable results in the overall disturbance of the economic system. The deep and careful investigation should intensively and extensively be conducted on immediate and long-run effects before conducting tax reform since the intervention of the government has both positive and negative implications on the economic activities. In our analysis, reduction in direct tax and increase in sales tax improved overall economic performance and reduction in import tariffs were not successful deed. Therefore, the best way to improve economic performance would be conducting a comprehensive direct tax reform and general tax on consumption, which would eliminate tax distortions on inter-temporal decisions, labor supply decisions, savings, and investment. Additionally, the

economic reputation of duties tariffs for emerging country is very crucial for public revenue generation, infant industry protection, the balance of payment protection, and attraction of investors are the major benefits of imposing customs tariffs. As a result, tariff reduction in Ethiopia where infant industry is abundant is not recommended rather than protecting the country from external sector influence to encourage domestic production since it adversely affects output and another sector of the economy.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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