# Fiscal policy and its role in reducing income inequality: A CGE analysis for Pakistan

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***Abstract***

*This Study aims at analyzing the link between fiscal policy and income distribution. The model adapted was the simple Computable General Equilibrium model (CGEM-Pak) which was developed in accordance with the static model structure constructed by Lofgren et al. (2001). CGE model takes into account market interaction, that is, the effects of pricing outcomes of one market in other markets, and its effects, in turn, creating ripples throughout the whole economy, perhaps even to the extent of affecting the price-quantity equilibrium in the original market. Due to some miscalculations in Social Accounting Matrix (SAM) 2007, this study uses SAM 2002 developed by (Dorosh et al, 2006). To explore the impact of fiscal policy measures on income inequality, simulation exercises are performed while the budget deficit is not allowed to increase in the set of simulations. Inequality effects are investigated using Theil T, Theil L, Theil S and Hoover's Index. Results have shown that a policy mix of sales tax, income tax and government expenditure help to reduce income inequality while at the same the lessen economy's financial dependency.*

***Key Words: Computable General Equilibrium (CGE), Social Accounting Matrix (SAM), Fiscal Policy, Income inequality, Budget Deficit.***

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## 1. Introduction

Income inequality is one of the critical barriers in most of the developing countries including Pakistan for growth and development. Every third man in Pakistan falls in the category of poor, that is, one third of the whole population exists below the poverty line[4]. Moreover, the budget deficit has also been a serious issue throughout the history of Pakistan's economy. This persistent deficit is the constant source of increasing poverty and deterioration of income distribution. Hence, it is a dire need of the economy to have a good public policy such that it could reduce budget deficit, alleviate poverty and redistribute income. While discussing the role of fiscal policy in income distribution, Alauddin and Bilquess (1981) and Malik and Saqib (1985) suggest that only through appropriate changes in the tax system, resources of the economy can be distributed equally; while, Schaultz (1963), Saint Paul and Vedier (1993) and Ralph (1996) believe that the public expenditures have a strong impact in reducing the degree of income inequality. Fiscal policy can have a significant influence on removing the gap between haves and have-nots both directly and indirectly. The direct effect lies in effecting the disposable income of individuals and indirectly by effecting future earning capacities. The progressive tax system is needed to reduce the gap between rich and poor, but in Pakistan, the ratio of sales tax is high which is regressive in nature. Both the pattern of public expenditures and tax system can be structured efficiently to reduce income inequality.

It is important to note that there is an obvious and significant trade-off between equity and efficiency. The policies focusing on equity, by hitting the current and future income of investors, may discourage them from investment. For example, income transfers may reduce inequality which results in diversification of scarce resources from investment to subsidization of consumption; consequently, it reduces economic growth by negatively affecting investment. Therefore, it is necessary to consider that how much cost, the economy has to bear in the form of decrease in economic growth.

International Monetary Fund (IMF) and other financial institutions stress Pakistan on reducing fiscal deficit. In 2012-13, the fiscal deficit remained more than 8.5% of GDP while the target was 4.7 % of GDP. With reference to income distribution, an IMF

[4] SDPI's study (2012)

policy paper[5] highlights that high income inequality results in impeding macroeconomic stability. Thus, policies related to tax and expenditure should be made in such a way that the economy could achieve both the distributional and efficiency objectives during fiscal consolidation. This study is an attempt to find a policy which could reduce income inequality whereas at the same time achieving the objective of reducing the fiscal deficit.

Therefore, in the light of significance of good governance, the focus of this study is to

a. Analyze the impact of fiscal policy (taxes, transfers and government expenditure) on income distribution, that is, whether it decelerates income inequality or not.
b. Verify the existence of trade-off between income distribution and economic growth, since the application of fiscal policy may involve the issue of trade-off between equity and efficiency[6].
c. Recommend the most feasible mixture of taxes and transfers.

**Plan of Study:**

This chapter introduces the problem. The review of literature is given in second chapter. Third chapter discusses the methodology. Chapter four provides results and discussion. Finally, conclusion and policy implications are provided in chapter five. References are also provided at the end of this study.

[5] IMF Policy Paper, "Fiscal policy and income inequality" January 23, 2014.
[6] "Equity versus efficiency: The elusive trade-off" by J. Le Grand (1990)

## 2. Literature Review

Income inequality remains a core issue in designing an effective fiscal policy. In case of Pakistan, Suleman (1973) observes the income inequalities to be increasing over the period of 1963-69, whereas Khandkar (1973) shows that the trend in income inequality is decreasing over the period of 1963-69. In 1980s, most of the studies focused only on measuring income inequality using different indices (Mahmood, 1984), while merely few studies were based on making redistribution strategies (Cheema and Malik, 1985). Ayub (1977) and Khandkar (1973) show that in Pakistan the inequalities in income are significantly higher than the inequalities in consumption. There are many factors which can affect income distribution. Many studies have been done in developed and developing countries to find out the effective policy measures to reduce the inequality in income distribution

### 2.1 Tax and Transfer for the Reduction in Income Inequality

A fine policy mix of tax and transfers can significantly improve the distribution [Leubker (2011)]. Cubero and Hollar (2010) prove in their study that government can give any shape to the income distribution pattern by using tax and transfers. The nature of tax plays a very critical role in policy making. Joumard *et al* (2012) work on the same ground and find that a country having relatively small tax and transfer scheme attains the same redistribution effects as a country with higher tax rate and transfers if they rely on income tax which are progressive in nature. Engel *et al.* (1999) measure the direct effect of taxation on the income of households and thus its effect on the distribution of income. Further, they suggest that, to achieve equal distribution, proportional tax system must be introduced instead of low-yield progressive taxation. Martinez-Vazquez *et al.* (2011) studies that if an economy prefers direct taxes to indirect taxes, then income distribution improves gradually over time. Alesina and Ardagna (1998) and Park (2012) observe that a fiscal adjustment mainly based on increases in tax rate is short-lived while reduction in government wages and public employment transfers is long-lived.

There is also a lot of discussion on the effectiveness of government spending over tax on income distribution. Martinez-Vazquez (2008), Bird and Zolt (2005) and Harberger (2006) argue that fiscal adjustment based on tax system does not affect the distribution pattern. Cubero and Hollar (2010) analyze the impact of tax and spending decision on the distribution of income and find that government spending has more potential in correcting

distribution, but progressive tax system combined with increased social spending may further improve the distribution.

## 2.2 Trade-Off between Equity and Efficiency

In evaluating the impact of fiscal policy, many researchers find a visible trade-off between equity and efficiency due to which many policy makers and politicians are seen reluctant in using fiscal policy for fair distribution of income. Bertola and Allan (1993), Dollar and Aart (2000), Perugini and Martino (2008), Mulas-Granados (2005**)** and Lambert (1990) discuss the trade-off issue and conclude that any change in fiscal policy requires a detail analysis of its effect on both equity and efficiency. Alesina, and Rodrik (1984) show that the growth oriented policies are favored by a government that concerns capitalists only. Their empirical findings show that there exists a negative relationship between economic growth and Income distribution. Afonso *et al*. (2005), Moreno-Dodson (2008) and Bayraktar and Moreno-Dodson (2010) analyze the impact of public spending on growth and conclude that public spendings negatively affects the quality and quantity of economic growth which consecutively affects the income distribution. While, Deininger and Squire (1996) and Ravallion and Chen (1997) see no relationship between growth and inequality.

## 2.3 Analysis of Fiscal Policy Using CGE

Computable General Equilibrium (CGE) model has a distinguishing feature: it identifies the impact of any small exogenous change on the overall economic system. Adelman and Robinson (1978) and McLure (1977) argue that the general equilibrium models can assess the economic behavior in an interesting dimension that cannot be viewed in partial equilibrium studies. Lofgren *et al*. (2003) while explaining the merits of CGE examine that it lacks denseness because in addition to SAM, only estimated set of parameters for within-group distribution is required to run the exogenous simulations. On the other hand, this approach has a drawback that it assumes that within-group distribution is fixed. Lofgren, Robinson *et al*. (2003) further suggest that to overcome this drawback, the households in the CGE model can be disaggregated into more sections. Thus in this way we can find out the within group difference in income. While Dahl *et al*. (1986), Dahl and Mitra (1989) and Mitra (1992) used CGE approach to study the macroeconomic impacts of fiscal change without considering sectoral details that is they did not disaggregated households and other accounts into large groups. Using CGE model for the economy of

Canada, Cury, Pedrozo and Coelho (2010) confirm the effective role of government transfers in reducing income inequality.

In Pakistan, Iqbal and Siddique (1999) undergo a complete and descriptive study using CGE approach to analyze the impact of fiscal adjustments on income distribution and it is shown that reduction in consumption subsidies and expenditures on health and education adversely affect income distribution. In their study, Iqbal and Siddique (1999) observe that earnings of factors of production from production activities are an important factor of income distribution because poor households obtain their share from wage income and rich class gets most of their share from income of capital. Siddique and Iqbal (2001), in their later work, examine the impact of tariffs on income distribution using CGE model and conclude that reduction in tariff helps to reduce the gap between rich and poor. Kemal *et al.* (2001) use CGE model and SAM for 1989-90 and analyze the impact of reduction in import tariffs on income distribution. They suggest that reduction in tariff causes the prices of imported commodities to decrease, which in turn affects the forces of demand and supply in the commodity market. These changes in the forces of demand and supply further worsen the distribution pattern because such policies affects the consumption as well as income of rich more positively than that of poor. Naqvi *et al.* (2011) use CGE model for Pakistan to study the impact of agriculture taxes on income distribution and welfare of households. They use SAM 2001 and conclude that a combination of reduction in sales tax and imposition of taxes on agriculture is an effective distribution policy tool. It is observed that agriculture tax corrects the distribution pattern and causes the government revenue to increase in such a way that government has a situation of budget surplus. On the other hand, budget surplus enables government to make reduction in sales tax, due to which production activities increase and at the same time, the welfare of the households also improves.

Overall, the above literature shows that fiscal policy can play an effective role in reducing income inequality. However, in the framework of computable general equilibrium (CGE) model, the above literature ignores the deterioration in budget deficit while analyzing the impact of different tools of fiscal policy on the distribution of income. In this study, we take up this issue and considering the budget deficit, investigate the impact of household income tax and subsidies on the distribution pattern using CGE framework.

## 3. Estimation Methodology

In order to assess the impact of fiscal policy measures on income distribution, computable general equilibrium model of Pakistan (hereinafter CGEM-Pak) is used. This model is in accordance with the static model structure constructed by Lofgren *et al.* (2001). CGE is a quantitative model in which all the factors and sectors which can affect the economy are incorporated. The CGEM-Pak is a domestic model and it captures the economic activities of country. This model follows the SAM[7]2001 (Dorosh et al, 2006), segregation of activities, commodities, factors and institutions. Equations in the model are constructed in such a way that it could satisfy micro and macroeconomic constraints. With few amendments in the model, different scenarios are presented to show the net impact of fiscal adjustments on the economy under consideration. These amendments include the desegregation of agriculture activities and services. Table 3.1 demonstrates the disaggregation of activities, institution, factors of production and households.

**TABLE 3.1: Sets and Elements of CGEM-Pak Model**

| Set | Element | Disaggregation |
|---|---|---|
| Institutions | - | Household, Government, Entrepreneur, Rest of the world |
| Household | Rural | Large, medium, small and landless farmer, poor non-agricultural labor, poor non-farm labor, rich non-farm labor |
| | Urban | poor labor, rich labor |
| Activity | Agriculture | - |
| | Non-agriculture | Mining, Food manufacturing, yarn, Textiles, leather, Other Manufacturing. |
| | Services | - |
| Factors of Production | - | Own large farm labor, own medium farm labor, own small farm labor, agriculture wage labor, non-agriculture unskilled labor, skilled labor, large farm land, irrigated medium farm land, irrigated small farm land, non-irrigated small farm land and capital. |

There are four blocks of equations in the model.

### 3.1.1 Price Block

The model is constructed with the framework that each activity produces one commodity only. Export price (PE) is calculated by multiplying commodity's producer price by exchange rate and then subtracting the export tax from it.

[7] Social Accounting Matix

$$PE_c = PWE_c(1-te_c)\,EXR \tag{3.1}$$

where PE is domestic price of exported goods, *te* is export tax rate, EXR is nominal exchange rate, PWE World price of Exports (Foreign currency units), subscript c is commodities.

Domestic consumers pay price of the imports to the rest of the world. They pay tariff on these imports, so import price (PM) is determined by adding the tariff in the import price.

$$PM_c = (1+tm_c)\,PWM_c\,EXR \tag{3.2}$$

Where
$PM_c$=domestic price of imported goods
$tm_c$= Import tariff rate
EXR=exchange rate (nominal)
$PWM_c$=World price of imports (Foreign currency units)

The demand price of domestic goods (PX) is determined by adding the domestic supply price and cost of trade inputs per unit of domestic sales. The final supply price (Ps) for the domestic commodity is obtained by the interaction of producer and export price.

$$PX_c\,QX_c = PD_c\,QD_c + PE_c\,QE_c \tag{3.3}$$

$PD_c$= Domestic price of domestic output
$QD_C$= Domestic sales quantity
$PE_c$=domestic price of exported goods
$QE_C$ =Quantity of exported commodities

The final supply price (Ps) for the non exported commodity is

$$PX_c\,QX_c = PD_c\,QD_c \tag{3.4}$$

Composite commodity's price (PQ) is determined by adding import and domestic prices. The final market price is then determined by adding sales tax to the Composite commodity's price.

$$PQ_c = (PD_c\,QD_c + PM_c\,QM_c)(1+tq_c) \tag{3.5}$$

$PD_c$= Domestic price of domestic output
$QD_C$= Domestic sales quantity
$PM_c$=domestic price of imported goods
$QM_C$ =Quantity of imported commodities
$tq_c$= Rate of sales tax

The final market price of composite non-imported commodity's price is

$$PQ_c\, QQ_c = PD_c\, QD_c(1+tq_c) \tag{3.6}$$

Gross revenue per activity (activity price) is calculated as

$$PA_a = \sum_{c\in C} \theta_{a,c}\, PX_c \tag{3.7}$$

Where $\theta_{a,c}$ is Yield of output *c* per unit of activity *a*

Price of value added (factor income per unit of activity) is determined by

$$PVA_a = PA_a - \sum_{c\in C} ir_{c,a}\, PQ_c \tag{3.8}$$

Where $ir_{c,a}$ is Quantity of *c* as intermediate input per unit of activity *a*

### 3.1.2 Production and Commodity Block

The model includes nine production activities[8] using primary and intermediate inputs. These activities collect their revenue from selling the products they produce. They then use the revenue for the purchase of the required inputs to carryout production. Eleven factors are involved in production which includes six labor types, four types of land and capital. Primarily income distribution is determined by measuring how much value added flows from the sector of production to factors of production. This distribution depends on the household's ownership of different factors of production. Households differ in skills so they get different income accordingly. Constant elasticity of substitution (CES) function is used to capture the production pattern at different level. Subject to constant returns to scale, the producers are assumed to maximize their profit. This implies that the factors of production receive their income, where marginal cost equals marginal revenue. Leontief technology is used to combine factors with fixed share intermediates.

Thus, the output from these activities using primary factor under Cobb-Douglas function is measured as

$$QA_a = ad_a \prod_f QF_{f,a}^{\alpha_{f,a}} \tag{3.9}$$

$QA_{a=}$ Quantity (level) of activity *a*
$QF_{f,a}$ = Quantity demanded of factor *f* from activity *a*
$ad_a$= Activity parameter of production function

[8] Details of activities and factors of production is given in table1

$\alpha_{f,a}$= Value added share for factor *f* in activity *a*

These activities also use intermediate inputs

$$QINT_{c,a} = ir_{c,a}\, QA_a \tag{3.10}$$

Where $ir_{c,a}$ is Quantity of *c* as intermediate input per unit of activity a.

Thus, each domestic commodity can be defined as

$$QX_c = \sum_{a \in A} \theta_{a,c}\, QA_a \tag{3.11}$$

$\theta_{ac}$= Yield of output *c* per unit of activity *a*

Model includes the foreign trade with the assumption that this trade is based on imperfect substitutability between domestic and imported goods. This substitution is governed by CET[9] function. Thus, when the commodity is exported it takes the following form;

$$QX_c = ax_c[(1-\delta x_c)QD_c^{\rho x_c} + \delta x_c\, QE_c^{\rho x_c}]^{1/\rho x_c} \tag{3.12}$$

The optimal combination of these two goods must satisfy

$$QD_c / QE_c = [(\delta x_c / 1-\delta x_c)(PD_c / PE_c)]^{\sigma x_c},$$
$$\sigma x_c = 1/(\rho x_c - 1) > 0 \tag{3.13}$$

Energy is the only product in this model which is produced and consumed domestically that is production of energy sector is neither exported nor imported. Thus, the non-exported commodity is defined as

$$QX_c = QD_c \tag{3.14}$$

The final composite good which is the combination of imported and domestic goods is supplied to meet the final and intermediate demand. Thus the quantity of composite commodity supplied to domestic commodity demander is

$$QQ_c = aq_c[(1-\delta q_c)QD_c^{-\rho q_c} + \delta q_c\, QM_c^{-\rho q_c}]^{-1/\rho q_c} \tag{3.15}$$

The optimal combination of these two goods must satisfy

$$QM_c / QD_c = [(\delta q_c / 1-\delta q_c)(PD_c / PM_c)]^{\sigma q_c}$$
$$\sigma q_c = 1/(1+\rho q_c) > 0 \tag{3.16}$$

The quantity of non-imported commodity supplied to domestic commodity demander is

[9] Constant elasticity of transformation

$$QQ_c = QD_c \tag{3.17}$$

### 3.1.3 Institution Block

Institutions obtain their income from factors of production after their involvement in the value added. Nine household groups[10] are included in the model. Income of capital is distributed among the nine types of households, enterprises and government. Thus

$$YF_{i,f} = shry_{i,f} \sum_{a \in A} FPD_{f,a} PF_f QF_{f,a} \tag{3.18}$$

$shry_{i,f}$= Share for institutions *i* in income of factor *f*
$FPD_{f,a}$= Factor price distortion for factor *f* in activity *a*
$PF_f$= Rate of return to factor *f*
$QF_{f,a}$ =Quantity demanded of factor *f* from activity *a*

Household's income is calculated as

$$YH_h = \sum_{f \in F} YF_{h,f} + TR_{h,g}\, CPI + EXR \cdot TR_{h,r} + TR_{h,s} \tag{3.19}$$

$YF_{h,f}$= Transfers of factor income to household
$TR_{h,g}$= transfer payment from government to households
$TR_{h,r}$= transfer payment from rest of the world to households
$TR_{h,s}$= transfer payment from firm to households
CPI=consumer price index

Transfers of government to households are CPI indexed, that is, they can be fixed in nominal terms. After tax saving of these households can be written mathematically as

$$HTS = \sum_h MPS_h (1 - ty_h) YH_h \tag{3.20}$$

Where marginal propensity to save of any household is

$$MPS_h = MPSIN_h (1 + MPSADJ \cdot MPSDUM_h) \tag{3.21}$$

$MPSIN_h$= Initial marginal propensity to save
MPSADJ= MPS adjustment factor
$MPSDUM_h$= 0-1 dummy: 1= for those H whose saving changes, 0 otherwise

The households' utility function can be written as

$$UH_h = \prod_c \left( \frac{QH_{c,h}}{\beta_{c,h}} \right)^{\beta_{c,h}} \tag{3.22}$$

[10] Large farm, Medium farm, Small farm, Landless farmers, Rural agriculture landless, Rural non-farm non-poor, Rural non-farm poor, Urban non-poor, Urban poor

$QH_{c,h}$= quantity consumed of commodity c by households h

$\beta_{c,h}$= share of consumption spending of household h on commodity c

Where

$$QH_{c,h} = \frac{\beta_{c,h} EH_h}{PQ_c} \tag{3.23}$$

$EH_h$= consumption expenditure of household h.

And

$$EH_h = (1 - MPS_h)(1 - ty_h) YH_h \tag{3.24}$$

$ty_h$= household income tax rate.

The quantity of investment demand for commodities is calculated by multiplying base year investment demand by investment adjustment factor which is exogenous.

$$QINV_c = INV_c \, IADJ \tag{3.25}$$

The government sector collects income from direct (income tax from households) and indirect taxes and also from capital ($YF_{g,f}$) and uses it on consumption expenditure and transfers to households. Both of these payments are fixed in real terms. In this model, Government is considered as a consumer and its consumption for each of the commodity is exogenously fixed. Thus, the government budget surplus (GBS) is determined by subtracting government expenditures from government revenue.

$$\begin{aligned} GBS = & \sum_{h \in H} ty_h YH_h + EXR \cdot TR_{g,r} + \sum_{c \in C} tq_c PD_c QD_c + \sum_{c \in CM} tq_c PM_c QM_c + YF_{g,f} \\ & + \sum_{c \in CM} tm_c EXR \cdot PWM_c QM_c + \sum_{c \in CM} te_c EXR \cdot PWE_c QE_c \\ & - \left[ \left( TR_{s,g} + \sum_{h \in H} TR_{h,g} \right) CPI + \sum_{c \in C} PQ_c QG_c \right] \end{aligned} \tag{3.26}$$

Where

$ty_h$=income tax
$tq_c$=sales tax rate
$tm_c$=import tariff rate
$te_c$=sales tax rate on exports

Entrepreneurs receive their income only from capital. They then make transfers to households and savings. Their saving is calculated as the difference between their income

and expenditures. It is also assumed that they do not consume commodities. Thus, income of entrepreneurs is written mathematically as

$$YFRM = YF_{s,k} \tag{3.27}$$

And their saving is

$$YFRMTS = YF_{s,k} - TR_{h,s} \tag{3.28}$$

Rest of the world is taken because the model assumes open economy. Thus, country exports its product to and imports product from rest of the world.

### 3.1.4 System Constrained Block

This block contains the equations showing the constraints in the model. In factor market, the quantity of factors supplied must be equal to the sum of quantity demanded from activities and the unused supply of factor f ($QFU_f$). Thus

$$\sum_{a \in A} QF_{f,a} + QFU_f = QFS_f \tag{3.29}$$

Market of composite commodity also involves the constraint that quantity supplied must be equal to the quantity demanded. Thus mathematically

$$QQ_c = \sum_{a \in A} QINT_{c,a} + \sum_{h \in H} QH_{c,h} + QG_c + QINV_c \tag{3.30}$$

$QQ_c$=supply of composite commodity
$QINT_{c,a}$=quantity of commodity c used as intermediate input
$QH_{c,h}$= quantity consumed of commodity c by households h
$QG_c$= quantity of consumption of commodity *c* by government *g*.
$QINV_c$= base year investment demand

The constraint related to current account balance expressed in foreign currency imposes that there must be equality between foreign exchange earnings of the country and its spending

$$FS + \sum_{c \in CE} PWE_c QE_c + \sum_{i \in I} TR_{i,r} = \sum_{c \in CM} PWM_c QM_c + \sum_{i \in I} TR_{r,i} \tag{3.31}$$

FS= foreign saving

$PWE_cQE_c$=Export revenue

$TR_{i,r}$=transfer payment from rest of the world to other institutions

$PWM_cQM_c$=Import Revenue

$TR_{r,i}$=transfer payments from institutions to rest of the world

Finally saving of institution must be equal to the quantity of investment demand for commodities. Thus

$$\left[\sum_{h\in H} MPS_h(1-ty_h)YH_h + YFRMTS + GBS + EXR\cdot BOP\right] = \sum_{c\in C} PQ_c\, QINV_c \tag{3.32}$$

## 3.2 Model Closure

The closure presents the macroeconomic assumptions to conduct simulations which are usually done by changing the value of policy variables that are exogenous. Then the impact of these simulations on equilibrium values of endogenous variable is measured.

The closure in this model assumes fixed Foreign Savings (FS) and hence a flexible exchange rate (EXR) clears the current account. For savings/investment account, savings-driven investment is assumed, therefore savings are fixed, and Investment adjustment factor (IADJ) is flexible, permitting investment to adjust. For capital market, it is assumed that capital is activity-specific and fully employed. This means that the price of capital is fixed and factor price distortion adjusts to clear the market. Note that capital is the only factor which is used in all types of activities. There are four types of land in our model[11] and all types are being used in agriculture sector, which has only one activity (agriculture). For land market, it is assumed that all types of land are fully employed and hence price of land will clear the market. There are four types of agriculture[12] and two types of non-agriculture labor[13] in the labor market of the model. They are mutually exclusive and there is no mobility of labor across these sectors. The assumption of four types of agriculture labor is that they are fully employed and hence price of labor (wage rate) will clear the market. In CGEM-Pak, non- agriculture sector has eight types of activities and each type of activity uses two types of labor (non-agriculture labor; skilled and unskilled). Full

[11] Large farm land, irrigated small farm land, irrigated medium farm land, non-irrigated small farm land
[12] Own large farm labor, own medium farm labor, own small farm labor, agriculture wage labor
[13] Skilled labor, non-agriculture unskilled labor

employment is assumed for non-agriculture labor. Moreover, labor is fully mobile within the sector and a unique wage clears the labor market.

### 3.3 Inequality Measures

Due to the limitation of our data, only inequality between household groups is captured. To calculate inequality, Theil-L, Theil-T and Theil-S indices are used. The Range of Theil-T index from 0 (lowest inequality) to 'ln(N)' (highest inequality). Conversely, the Theil-L index ranges from 0 to infinity and the higher the value of Theil-L, the higher the inequality is. Mathematically, the indices are written as

$$TT = \ln\left(\frac{\sum_h N_h}{\sum_h YH_h}\right) - \frac{\sum_h YH_h \ln\left(\frac{N_h}{YH_h}\right)}{\sum_h YH_h} \tag{3.34}$$

and Theil-L can be written as:

$$TL = \ln\left(\frac{\sum_h YH_h}{\sum_h N_h}\right) - \frac{\sum_h N_h \ln\left(\frac{YH_h}{N_h}\right)}{\sum_h N_h} \tag{3.35}$$

Where

$\sum_h YH_h$ = Total income of the population

$YH_h$ = Income of subgroup

$\sum_h N_h$ = Total population

$N_h$ = Population in the subgroup

"symmetrized" Theil index can be calculated as:

$$TS = \frac{1}{2}[TT - TL].$$

Substituting values of *TT* and *TL* in above equation

$$TS = \frac{1}{2}\sum_h \ln\left(\frac{YH_h}{N_h}\right)\left(\frac{YH_h}{\sum_h YH_h} - \frac{N_h}{\sum_h N_h}\right) \tag{3.36}$$

## 3.4 Data and Model Calibration

Due to some miscalculations in SAM 2007-08, it is not used in this study. This study uses the available Social Accounting Matrix (hereinafter SAM) developed by Dorosh, Niazi and Nazili (2006), for the year 2001-02 as benchmark dataset. SAM represents all the transaction between the agents of the economy within a particular period. The SAM used in this study was developed for the year 2001-02. This square matrix (SAM) reflects the receipts and payments of different transactions done by different agents of the economy and satisfies all equilibrium conditions and properties of CGEM-Pak.

### 3.4.1 Structure of SAM (2001-02)

SAM 2001-02 consists of 5 major accounts, namely activities, commodities, factors of production and institutions and savings. Institution account includes household, enterprises, government and rest of the world. The basic structure of macro SAM is presented in Table 3.2 which explains the features of macro SAM, while Table 3.3 presents the macro SAM of Pakistan for the year 2001-02. Micro SAM explains the disaggregation of accounts in macro SAM. The original micro SAM includes 34 activities, 33 commodities and 27 factors. The account households have been disaggregated into 9 sub-accounts, out which 7 are rural type and 2 urban types.

The original SAM has many categories of agriculture and service sector as the objective was to check the impact of agriculture growth on poverty. But in this study, a modified micro SAM is used which aggregates the service and agriculture activities into only one category each because there is no need to include details of agriculture and service sectors. The remaining activities are aggregated into 6 categories that is mining, food manufacturing, yarn, textiles, leather, other manufacturing. This SAM consists of 9 commodities, 11 factors of production, 9 households and three other institutions.

Ideally, trade elasticities should be estimated econometrically from cross section and time series data. Given limited resources as well as data constraints, it is not possible to estimate elasticity parameters for this study. Therefore, elasticity parameters employed by different studies examining similar questions for comparable developing economies have been used. These trade elasticities are shown in Table 1 in Appendix.

**TABLE 3.2: Structure of Macro Social Accounting Matrix 2001-02**

| | **Activity** | **Commodity** | **Factor** | **Households** | **Govt.** | **Enterprise** | **ROW** | **Saving** | **Total** |
|---|---|---|---|---|---|---|---|---|---|
| **Activity** | | Gross output | | | | | | | Gross output |
| **Commodity** | Intermediate Demand | | | Household's Consumption | Govt. consumption | | Exports | Invest. Expenditures | Agg. Demand |
| **Factor** | Value added | | | | | | | | Factor income |
| **Households** | | | Factor Income $Y_f$ | | Govt. transfers To household | Operating surplus | Remittances From abroad | | Household Income |
| **Govt.** | | Tariff, direct and indirect tax | | Income Tax | | Profit tax $TR_{EG}$ | | | Govt. Revenue |
| **Enterprise** | | | Factor income $Y_{KE}$ | | Interest payment ($TR_{GE)}$ | | | | Enterprise income |
| **ROW** | | Imports | | Transfers to ROW ($TR_{HR}$) | | $TR_{ER}$ | | | Foreign Exchange outflow |
| **Saving** | | | Depreciation | Household Saving | Govt. Saving | Enterprise Saving | Foreign saving | | Saving |
| **Total** | Cost of Production | Agg. Supply | Factor Expenditure | Household Expenditure | Govt. Expenditure | Enterprise expenditure | Foreign Exchange Expenses | Investment | |

Source: Derived from transforming macro SAM structure developed by Nielsen (2001) for Vietnam.

**TABLE 3.3: Macro SAM Pakistan 2001-02 (Million Rs)**

| | ACTIVITY | COMMODITY | FACTOR | HOUSEHOLD | GOVT | ENTERPRENUER | ROW | SAVING | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| **ACTIVITY** | 0 | 22525207 | 0 | 0 | 0 | 0 | 0 | 0 | 12527165 |
| **COMMODITY** | 10709923 | 0 | 0 | 7439429 | 0 | 817880 | 1057903 | 1049023 | 14933492 |
| **FACTOR** | 9678120 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5466875 |
| **HOUSEHOLDS** | 0 | 0 | 5711329 | 0 | 663581 | 33595 | 239097 | 0 | 4510186 |
| **GOVT** | 0 | 0 | 1474624 | 0 | | | | | 737312 |
| **ENTERPRENUER** | 0 | 466741 | 64018 | 146152 | | | | | 429795 |
| **ROW** | 0 | 1939586 | 0 | 0 | | | | | 1030152 |
| **SAVING** | 0 | 0 | 0 | 357242 | 73731 | -8457 | 167539 | | 534109 |
| **TOTAL** | 12527165 | 14933492 | 5466875 | 4510186 | 737312 | 429795 | 1030152 | 534109 | |

Source: SAM 2001-02 for Pakistan

The equations of the model explained above show activities of macro economy, while through the calibration process the SAM gives actual values for the coefficients in these equations. The model is solved primarily for equilibrium to make sure that the base year dataset is reproduced. Afterwards, we give a shock to the model by changing the value of one of the exogenous variables. The model is then re-solved for equilibrium (as before) and changes in the values of the endogenous variables. These values are then compared with the base-year equilibrium to establish the impact of exogenous shocks. The distributional impact of exogenous shocks (macro variable) is determined by the indicators, that is, Theil T, Theil L, and Theil S. At the same time, the impact of these policy measures on economic growth and other macroeconomic variables such as exports, imports, investment etc. is analyzed to check the trade-off between equity and efficiency, which is supposed to be involved in the implementation of fiscal policy.

### 3.5 Simulation Design

Different simulations are designed to run on the model of study, CGEM-PAK. These simulation exercises are carried out by increasing or decreasing the values of suggested policy tools until the income inequality measures show a decline in inequality. For the simulation exercise any percentage number can be taken, but should be attested with various sensitivity analysis [Israel (2006)]. The proposed simulation strategies are shown in Tables 3.4 and 3.5 Simulations in Table 3.4 test the significance of government transfers to households, income tax and sales tax in reducing inequality without suggesting any measure to increase revenues to cover the resulting budget deficit. Simulation 1 tests the impact of an increase in government transfers to households on income distribution. As sales tax has a regressive nature, simulation 2 discusses the impact of a decrease in sales tax and simulation 3 discusses the impact of an increase in income tax with the assumption that it has a progressive nature.

Simulations in table 3.5 include different policy mix in order to reduce the gap between haves and have-nots by considering its impact on budget deficits. These simulations are designed in such a way that we could have a significant reduction in budget deficit. Simulation 4 introduces tax and transfer scheme. In this simulation, sales tax is reduced to decrease the economic burden of poor and transfers from

government to households are increased to increase the welfare of households. On the other hand, the resulting deficit in budget is financed by raising income tax. Simulation 5 and 6 test the effect of different mixtures of sales tax, income tax and government expenditure on income equality and overall economy. In each of these simulations, we reduce the sales tax to correct the income distribution while to cover the resulting deficit in budget we cut the government expenditures and increase the income tax rate.

**TABLE 3.4: Simulation Scenarios (Budget deficit is allowed to change)**

| Simulation | Base scenario |
|---|---|
| 1 | 35% increase in government transfers to households |
| 2 | 6 % decrease in sales tax |
| 3 | 5.81% increase in income tax |

**TABLE 3.5: Simulation Scenarios (Budget deficit is not allowed to increase)**

| Simulation | Base scenario |
|---|---|
| 4 | 4.14% decrease in sales tax, 26.2% increase in government transfers to households and 10.25% increase in income tax. |
| 5 | 3.62% cut in government expenditures, 7% reduction in sales tax and 3.65% increase in income tax |
| 6 | 3.99% cut in government expenditures, 7.01% reduction in sales tax and 2.5% increase in income tax |

# 4. Results and Discussion

Our main simulation results of assessing the impact of different fiscal policy instruments are shown in Tables 4.1 through 4.4. In these tables, negative sign with government budget surplus shows government budget deficit. GDPFC shows GDP at factor prices, GDPMP1 shows GDP from spending side at market price while GDPMP2 presents income side GDP at market price. GDPMP1 and GDPMP2 must be equal. GOVCON shows government consumption and PRVCON presents private consumption.

## 4.1 Simulation Results Allowing the Change in Budget Deficit.

These simulation exercises are carried out by increasing or decreasing the values of suggested policy tools until the inequality measures show a decline in inequality while we did not suggest any measure to cover the resulting deficit in budget.

### 4.1.1 Government Budget Surplus, Income distribution

Economic policies affect income distribution through three mechanisms. Firstly, they directly affect the income of households by changing the return to primary factors. Secondly, a change in income tax or subsidies affect the disposable income of households and lastly these economic policies affects the price level thus the price effect bring changes in the household's real income. Simulation 1 examines the impact of 35 % increase in transfers on income inequality. The transfers from government to households are made to reduce the inequality. In Table 4.1, the income inequality index Theil T shows a decrease in its value interpreting an improvement in income distribution. Theil T responds to variations in the upper expenditure category. This policy of increasing transfers to household causes budget deficit to increase from 8457 to 18208.037 millions in Pakistani Rupees. This is because in this policy, transfers cause an increase in expenditure and no measure has been taken to raise revenue to cover the costs. Simulation 2, in which sales tax is reduced by 6%, presents a similar result. The value of Theil T decreases to 0.317 but, other inequality indicators remain unchanged. A drastically negative effect on budget deficit is observed which causes -11591.964% change in deficit when compared to its benchmark value, that is, budget deficit increases from 8457 to 20048.964 million Rupees.

**TABLE 4.1: Government Budget Surplus and Inequality**

| Variables | Base | SIM1 | SIM2 | SIM3 |
|---|---|---|---|---|
| **Government budget surplus** | -8457 | -18208.037 | -20048.964 | 1.985 |
| **Theil T** | 0.318 | 0.317 | 0.317 | 0.318 |
| **Theil L** | 0.326 | 0.326 | 0.326 | 0.326 |
| **Theil S** | 0.322 | 0.322 | 0.322 | 0.322 |

Result of Simulation 3 shows the impact of 5.81% increase in income tax. An increase of more than 5.9% in the income tax rate leaves an adverse effect on income distribution. In developing countries, income tax is shouldered by middle class and the tax acts are full of tax exemptions and the corruption factor makes tax evasion easy for rich[14]. In Pakistan, majority of tax payers belong to middle or upper middle income group[15]. Therefore, a 5.81% increase in the tax rate does not affect the income distribution pattern. At the same time, the revenue raised by income tax causes budget deficit to reduce and a surplus of Rs. 1.985 million is observed. Thus, in Pakistan's economy income tax policy fails to serve as a tool for reducing inequality.

### 4.1.2 Macroeconomic Effects of Policies

Table 4.2 presents the macroeconomic effects of distribution policies as discussed above. The 35% increase in transfers causes the GDP at factor price to decline. GDP at market prices (both from expenditure and income side) shows a decline. A little improvement in equity is achieved at the cost of 0.016% (Rs. 530.904 million) reduction in GDP at factor price and 0.023% reduction in GDP at market price. It is because the government transfers to households leave fewer funds with the private investors, therefore investment decreases that cause the economic growth to slow down. Further, investment decreases by 1.720 %, imports by 0.23%, and exports by 0.29%. We calculate net indirect taxes by subtracting subsidies and transfers from the total tax collections. As in this simulation transfers have been made, therefore the index of net indirect tax presents a decline in its value relative to the base year that is

[14] Tapan, K.S (2006).
[15] 1. "Contrary to claims: Tax burden grows heavier for salaried people" Report by Shahbaz Rana in The Express Tribune.
2. Murtaza, N (2012).

by 0.123%. These transfers on the other hand induce an increase in private consumption.

Simulation 2 (cut in sales tax by 6%) shows a different effect on overall macro economy. It makes GDP at factor cost to increase from Rs. 3377101 million to Rs. 3388049.648 millions. This change is recorded because a reduction in sales tax (by affecting price) induces more consumption that causes the demand as well as output to increase. An increase in GDP is translated into more exports; raising the later by 4.816 million Rupees. While, GDP at market prices indicate a decrease in its value which confirms the tradeoff between equality and economic growth. When GDP is calculated at market prices, it includes the taxes and subsidies (taxes enter in the equation of GDP with positive and subsidies with negative signs). A decrease in sales tax reduces the GDP measured at market prices. The existing literature shows that an increase in the sales tax brings a boom in real investment,[16] thus a decrease in investment is observed. Further, government consumption, imports and private consumption also increase because reduction in sales tax causes the prices to fall and increases the purchasing power whilst decreasing the value of net indirect taxes. Moreover, reduction in sales tax induces more consumption.

Results of simulation 3 (increased by 5.81%) show that GDP at factor prices as well as at market prices increases. Table 4.1 shows that this policy doesn't affect the distribution pattern but shows an increase in economic growth rate. As the government's revenue from tax collection increases, more expenditure can be made thus government consumption increases. Further, this policy doesn't affect the investment decisions of investor class, the revenue raised may be used to increase the investment level and thus the exports increases by 0.24% while imports also increase by 0.19%. On the other hand, increase in income tax causes disposable income to reduce so the private consumption shows a decline that is it decreases by 0.23%.

[16]1. Jorgenson, D.W. (1996), "the impact of taxing consumption," testimony before the committee on ways and means, U.S House of Representation, March 27.
2. Kotlikoff, Laurence J.(1993), "The Economic Impact of Replacing Federal Income Taxes with a Sales Tax," Cato Institute Policy Analysis No. 193, April 15.

**TABLE 4.2: Macroeconomic Indicators**

| Variable | BASE | SIM1 | SIM2 | SIM3 |
|---|---|---|---|---|
| **GDP FC** | 3377101.00 | 3376570.096 | 3388049.648 | 3377511.310 |
| **GDPMP1** | 3628735.00 | 3627895.253 | 3627908.565 | 3629411.061 |
| **GDPMP2** | 3628735.00 | 3627895.253 | 3627908.565 | 3629411.061 |
| **GOVCON** | 408940.000 | 408457.226 | 409099.283 | 409317.945 |
| **INVESTMENT** | 534109.00 | 524921.390 | 525993.189 | 541870.157 |
| **EXPORTS** | 677841.00 | 675845.816 | 677845.621 | 679444.626 |
| **IMPORTS** | 1.03015E6 | 1.02776E6 | 1.03623E6 | 1.03208E6 |
| **NITAX** | 251634.000 | 251325.157 | 239858.917 | 251899.750 |
| **PRVCON** | 3037997.00 | 3046427.438 | 3045196.794 | 3030854.284 |

**Notes:** GDPFC (GDP at factor cost),GDPMP1 (GDP at market price form expenditure side), GDPMP2 (GDP at market price form income side), GOVCON (government consumption), NITAX (net indirect tax) and PRVCON (private consumption)

## 4.2 Simulation Results Considering Budget Deficit.

These simulation exercises are carried out to find the policy measures which are helpful in reducing inequality while not deteriorating the existing deficit in budget. Policies which address only distributional issue may cause a huge gap in revenue and expenditures. It is already discussed in the literature review that distribution measures involve efficiency cost, therefore policy packages should be introduced in such a way that these measures could remove or reduce the efficiency costs while correcting income distribution.

### 4.2.1 Government Budget Surplus and Income Distribution

Table 4.3 shows the impact of policy mix (tax and transfers) on inequality. Simulation 4 (SIM4) discusses the impact of 4.14% decrease in sales tax, 26.2% increase in government transfers to households and 10.25% increase in income tax. A decrease in sales tax and increased government transfers to households cause inequality to reduce which is evident from a decrease in the value of Theil T. The resulting deficit in budget is covered by increasing the income tax rate. The overall increase in budget deficit is 336.255 million which is much less than what is observed in simulations 1 through 3.

**TABLE 4.3: Government Budget Surplus and Inequality**

| Variables | Base | SIM4 | SIM5 | SIM6 |
|---|---|---|---|---|
| **Government budget surplus** | -8457 | -8793.255 | -1.708 | 4.612 |
| **Theil T** | 0.318 | 0.317 | 0.317 | 0.317 |
| **Theil L** | 0.326 | 0.326 | 0.326 | 0.325 |
| **Theil S** | 0.322 | 0.322 | 0.321 | 0.321 |

In simulation 5, Theil T and Theil S indices of inequality indicate improvement in income distribution due to 7% reduction in sales tax and 3.65% increase in income tax. These two inequality indices are sensitive to the changes in upper and lower expenditure categories respectively. This policy reduces the budget deficit from 8457 million to 1.708 million Rupees, where 3.62% cut in government expenditures combined with the increase in income tax rate is used to reduce the budget deficit. Simulation 6 includes 3.99% cut in government expenditures, 7.01% reduction in sales tax and 2.5% increase in income tax. The distributional effect of this policy is more significant than the policy discussed in simulation 5. All the Theil indices point out a reduction in the gap between rich and poor. This simulation results in a considerable surplus of 4.612 million Rupees in the budget.

### 4.2.2 Macroeconomic Effects of Policies

Table 4.4 shows the macroeconomic effects of simulated policies. Simulation 4 positively affects the GDP at factor price. This policy involves a reduction in sales tax which affects the GDP at market price positively but at the same time increase in government transfers to households offsets this positive effect, thus a slight decline in the value of GDP (at market price) is observed. The government transfers cause government consumption and private investment to increase. A decrease in sales tax causes the price of goods to decrease which results in increased demand for goods. This increasing demand stimulates the investment, thus increasing its level. The increase in private investment further induces an increase in the exports as well. A decrease in sales tax leaves a positive effect on income, thus private consumption and consumption of imported goods also increases. A cut in the sales tax rate reduces the net indirect taxes, and at the same time must have a positive impact on private consumption; but increase in income tax by 10.25% offsets this positive effect on consumption.

In simulation 5 and 6 (cut in sales tax and government spending and increase in income tax), we can observe an increase in the value of GDP at factor price and a decrease in the value of GDP at market price. This happens because these simulations include sales tax which causes GDP (at market price) to shrink. Further, due to a cut in the government expenditures, a decline in the value of government consumption is observed which helps to recover the deficit in budget caused by decrease in sales tax. On the other hand, with the decrease in government expenditures, private investors will have enough funds to invest thus investment level increases. Increase in investment leads to more output, thus having a positive effect on exports which causes real GDP to increase. This policy involves the income and substitution effect (caused by sales tax ), which leaves a positive effect on the income of households due to which some households switch to imports, causing an increase in level of imports. Moreover, sales tax reduction results in a decrease in the net indirect tax collection and encourages private consumption but this part of this effect is offset by increase in income tax.

**TABLE 4.4: Macroeconomic Indicators**

| VARIABLE | BASE | SIM4 | SIM5 | SIM6 |
|---|---|---|---|---|
| **GDP FC** | 3377101.00 | 3384971.352 | 3388119.461 | 3387852.664 |
| **GDPMP1** | 3628735.00 | 3628710.249 | 3627397.022 | 3627187.423 |
| **GDPMP2** | 3628735.00 | 3628710.249 | 3627397.023 | 3627187.424 |
| **GOVCON** | 408940.000 | 409356.334 | 393806.816 | 392148.658 |
| **INVESTMENT** | 534109.00 | 535352.956 | 546653.578 | 546852.588 |
| **EXPORTS** | 677841.00 | 679175.111 | 684146.815 | 684370.381 |
| **IMPORTS** | 1.03015E6 | 1.03180E6 | 1.03765E6 | 1.03790E6 |
| **NITAX** | 251634.000 | 243738.898 | 239277.561 | 239334.76 |
| **PRVCON** | 3037997.00 | 3036625.77 | 3040438.586 | 3041717.522 |

## 4.3 Sensitivity Analysis

In CGE models, the selection of parameters takes the paramount importance. As there is no readily available method to estimate the parameters and elasticities of the model, therefore it is important to employ sensitivity analysis to check the influence of elasticities and parameters used in the model[17]. The key idea is to replace the value of elasticities with the values used in some other studies or make changes within a specified interval. If the changes in elasticities do not bring a significant change in the

[17] Domingues, E.P. and E.A. Haddad (2005)

result, we can conclude that our results are reliable. In order to conduct the sensitivity analysis, this study uses +50% to -50% changes in the armington elasticity and export elasticity used in the model. Different combinations of these elasticities are made which are shown in Table 4.5.

**TABLE 4.5: Simulation parameters for Sensitivity analysis**

| Experiment | Change in elasticity |
|---|---|
| **S0** | Original Armington and CET elasticities |
| **S1** | 50% increase in Armington elasticity |
| **S2** | 50% increase in CET elasticity |
| **S3** | 50% decrease in Armington elasticity |
| **S4** | 50% decrease in CET elasticity |
| **S5** | 50% increase in Armington and CET elasticity |
| **S6** | 50% decrease in Armington and CET elasticity |
| **S7** | 50% increase in Armington and 50% decrease in CET elasticity |
| **S8** | 50% decrease in Armington and 50% increase in CET elasticity |

The effect of changes in these parameters on macroeconomic analysis is not significant, leading to the conclusion that results are reliable. The result of sensitivity analysis is shown in Table 2 and 3 in Appendix.

## 4.4 Concluding Remarks

A brief analysis of simulations 1 through 3 is presented in Table 4.6. Theil T is more sensitive to changes in expenditure than the other inequality indices, therefore only Theil T is shown in the table. To address the problem of inequality, it is important to show that these policies do not affect budget adversely. GDP at market price measures money value of all goods and services considering the government's role (tax and subsidies) thus, to discuss the tradeoff issue, GDP at market price is used. The positive sign with these indicators shows an increase in their value and the negative sign shows a decrease.

As in simulation 3, Theil T doesn't record any change, therefore the idea of increasing income tax to solve the problem of inequality doesn't work here. Both the simulations 1 and 2 verify the existence of a strong trade-off between equity and efficiency. In simulations 1 and 2, inequality is reduced but in both the scenarios, it is observed that budget deficit increases and economic growth (GDPMP) decreases. The government

budget deficit increases drastically in simulation 2, whereas simulation 1 shows more adverse effect on economic growth when compared to simulation 2. Thus, as cost involved in these two policies is more than the benefit, efficiency requires that these two policies should not be employed to correct the distribution pattern.

**TABLE 4.6: Change in Inequality, Budget deficit and economic growth**

| | SIM 1 | SIM 2 | SIM 3 |
|---|---|---|---|
| **Theil T** | -0.001 | -0.001 | No change |
| **GBD** | +9751.037 | +11591.964 | -8455.015 |
| **GDPMP** | -839.747 | -826.435 | +676.061 |
| **GDPFC** | -530.904 | +10948.648 | +410.31 |
| **Note:** GBD (Government budget deficit), GDPMP (GDP at market price), GDPFC (GDP at factor price) | | | |

Table 4.7 discusses the changes in inequality, budget deficit and economic growth due to policy packages discussed in simulation 4 to 6. The GDP records a positive change for all of these simulations. Except simulation 4, other simulations show a decrease in budget deficit. In simulation 4, a negative change is observed in economic growth. While in simulation 5, equality is achieved with Rs. 8455.292 million reductions in the deficit and at the cost 1337.978 million decrease in GDP. In simulation 6, GDP decreases more than what is recorded in simulation 5.

**TABLE 4.7: Change in Inequality, Budget deficit and Economic Growth**

| | SIM 4 | SIM 5 | SIM 6 |
|---|---|---|---|
| **Theil T** | -0.001 | -0.001 | -0.001 |
| **GBD** | +336.255 | -8455.292 | -8461.612 |
| **GDP MP** | -24.751 | -1337.978 | -1547.577 |
| **GDP FC** | +7870.352 | +11018.461 | +10751.664 |

On the basis of above discussions, we can conclude that among budget deficit and economic growth if we are more concerned towards budget deficit then simulation 5 presents the best policy package to overcome inequality whereas simulation 4 is favorable only if we want equality with minimum efficiency cost together with a little positive change in budget deficit

# 5. Conclusion and Policy Implication

## 5.1 Conclusion

Income inequality is one of the critical barriers in most of the developing countries including Pakistan for growth and development. These countries have low incomes accompanied by sky rocketing cost of living and unemployment rate that lead to increased poverty level and unequal distribution of income. The persistent deficit in the economy's budget is also one of the causes of increasing poverty and deterioration of income distribution. This study aims at analyzing the role of fiscal policy in reducing budget deficit, alleviating poverty and redistribution of income fairly.

This study investigates the impact of fiscal instruments on income inequality in Pakistan using CGEM-Pak. Like other developing countries, a fall in income of Pakistan accompanied by high budget deficits, corruption and political unrest causes a widening gap between the rich and poor. This study shows that fiscal instruments have a potential role in correcting income distribution. In this research, it is found that the use of sales tax or transfers alone can affect income distribution but it causes the budget deficit to deteriorate. Thus, it is concluded that a mix of fiscal instruments can have a positive effect on income distribution, GDP at factor cost, and budget surplus, while GDP at market price shows a slight decline.

As in the current scenario, the focus of politicians and economists is to reduce the financial dependency, therefore among simulation 4 and 5, simulation 5 (3.62% cut in government expenditures, 7% reduction in sales tax and 3.65% increase in income tax) is the best possible policy to reduce the increasing inequality. Reduction in sales tax causes an income and substitution effect on all households, except the urban non-poor households who are the richest class of this country. These effects on households' income make them better-off and reduce inequality.

## 5.2 Policy Implication and Suggestions

It is important to note here that government policies implemented to remove income inequality need a strong political will and support to promote progressive scales in income tax and to reduce the government expenditures particularly the non-development expenditures so that the reduction in sales tax could be made possible. A responsive government is needed to have a proper check and balance to make sure the

implementation of policies in their true sense. Thus, a corruption free economy and good governance are needed to get the desirable outcomes from these policies.

There are some limitations of this research. Like most of the CGE models, CGEM-Pak is a comparative-static model, that is, the results are interpreted as "the condition expected to happen in the future after the specific policy is undertaken, compared with the situation without the adaptation of policy". Thus, the future research should use Dynamic CGE model which traces each variable through time. Secondly, due to limitation of data, only between household inequalities can be determined, while within group inequalities are not possible to find here. We can overcome this problem by disaggregating the households into more groups while making SAM.

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# APPENDIX

**Table 1: Trade Elasticities**

| Commodities | Armington Elasticity | CET Elasticity |
|---|---|---|
| **C-AGRI** | 4.0 | 4.0 |
| **C-MINE** | 3.0 | 3.0 |
| **C-FMAN** | 3.5 | 3.0 |
| **C-YARN** | 3.2 | 3.0 |
| **C-TEXT** | 3.5 | 3.0 |
| **C-LEAT** | 3.5 | 3.0 |
| **C-MANF** | 3.2 | 3.0 |
| **C-ENRG** | 3.0 | 3.0 |
| **C-SER** | 2.7 | 2.0 |

**Table 2: Effect of sensitivity experiments on National income Accounts (% change from base)**

| Variables | S0 | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 |
|---|---|---|---|---|---|---|---|---|---|
| **GDPFC** | 1.43 | 1.50 | 1.49 | 1.36 | 1.3 | 1.6 | 1.29 | 1.4 | 1.4 |
| **GDPGAP** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 0.00 | 0.05 | 0.0 |
| **GDPMP1** | 0.03 | 0.13 | 0.07 | -0.1 | 0.0 | 0.2 | -0.1 | 0.05 | -0.04 |
| **GDPMP2** | 0.03 | 1.33 | 0.07 | -0.1 | 0.0 | 0.2 | -0.1 | 0.05 | -0.05 |
| **GOVCON** | 1.08 | 1.51 | 1.08 | 0.58 | 1.07 | 1.5 | 0.5 | 1.5 | 0.6 |
| **INVEST** | -5.3 | -4.9 | -5.6 | -5.8 | -4.9 | -5.1 | -5.7 | -4.5 | -6.0 |
| **EXP** | 11.5 | 15.1 | 12.3 | 6.84 | 10.4 | 16.6 | 6.6 | 12.9 | 7.0 |
| **IMP** | 8.9 | 11.6 | 9.2 | 5.32 | 8.47 | 12.4 | 5.4 | 10.5 | 5.3 |
| **NITAX** | -18 | -18 | -19 | -19 | -18 | -19 | -19 | -17 | -19 |
| **PRVCON** | 1.26 | 1.38 | 1.28 | 1.13 | 1.2 | 1.4 | 1.1 | 1.3 | 1.1 |

**Table 3: Effect of sensitivity experiments on Household Income (% change from base)**

| Variables | S0 | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 |
|---|---|---|---|---|---|---|---|---|---|
| **H-LF** | 1.267 | 1.085 | 1.283 | 1.51 | 1.25 | 1.109 | 1.508 | 1.067 | 1.506 |
| **H-MF** | 1.265 | 1.094 | 1.282 | 1.494 | 1.244 | 1.12 | 1.49 | 1.072 | 1.492 |
| **H-SF** | 1.365 | 1.294 | 1.383 | 1.468 | 1.339 | 1.321 | 1.456 | 1.263 | 1.473 |
| **H-0F** | 1.321 | 1.22 | 1.341 | 1.465 | 1.295 | 1.249 | 1.454 | 1.189 | 1.468 |
| **H-AGW** | 1.338 | 1.267 | 1.36 | 1.445 | 1.307 | 1.298 | 1.43 | 1.229 | 1.451 |
| **H-NFNP** | 1.544 | 1.754 | 1.579 | 1.303 | 1.485 | 1.8 | 1.257 | 1.677 | 1.332 |
| **H-NFP** | 1.57 | 1.741 | 1.598 | 1.372 | 1.525 | 1.778 | 1.336 | 1.68 | 1.396 |
| **H-URNP** | 1.095 | 1.312 | 1.099 | 0.837 | 1.085 | 1.319 | 0.826 | 1.291 | 0.845 |
| **U-URPR** | 1.511 | 1.82 | 1.565 | 1.163 | 1.416 | 1.889 | 1.091 | 1.701 | 1.206 |