Evaluating Inclusive Growth Scenarios: Case for Pakistan

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Abstract:

The study aims to develop a sustainable growth model by assessing the impact of liberal and socioeconomic policies on macro indicators and households in Pakistan. The country has experienced uneven growth, with high-income inequality during periods of rapid growth and slowed growth when social spending was prioritized. Three policy scenarios were tested using the CGE model within the MYGTAP framework: increased social spending, higher business output, and a combination of both. Simulations showed that business-friendly policies mainly benefited the upper and upper-middle class, exacerbating inequality and leading to unsustainable growth. The study concludes that policymakers must consider household-level dynamics for effective poverty reduction and sustainable development.

Keywords: Social spending, CGE, Sustainable development, Inclusive Growth

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Introduction:

The concept of development has been linked with numerous meanings, theories and inferences. It is defined as the continuous process in which human beings develop their structural capability to manage new problems, acclimatize to change, and struggle persistently to set new goals (Pisani, 2006). The process of development is closely related to a social condition in which people's basic needs are satisfied through the sustainable use of naturally available resources (Reyes, 2001). Todaro and Smith (2006) further explain the concept of development as a multi-dimensional process in which various changes are involved. These changes occur in social dimensions, attitudes, organizations, income inequality, and alleviation of absolute poverty. This process of development is further transformed into another concept of sustainable development. It is defined as an idea in which the present population must fulfill their own needs without conceding the ability of future generations to satisfy their own needs. In simple terms, it is simply managing the social structures of the population so that it can survive in the long run. Hence, it is fair to state that sustainable development consists of three characteristics of development, economic growth, social development, and environmental protection. Poverty and income distribution determine the sustainability of a developmental process. The main objective of any government policy is poverty eradication and reduction in income inequality. Economic development will only be regarded as sustainable if its impact is distributed evenly through the population.

Accessible and quality public services, including healthcare and education, provide a foundation for human capital development and economic productivity. Poverty and income inequality often limit access to public services and financial services, such as healthcare, education, banking and credit. By reducing poverty and inequality, more individuals can gain access to financial services and participate in the formal economy. Increased financial inclusion allows individuals to invest, save, and access credit, empowering them to start businesses, invest in education, and build assets, thereby contributing to economic growth. Reducing poverty and income inequality creates a more inclusive and equitable society that fosters sustainable economic growth. It expands the consumer base, promotes human capital development, encourages entrepreneurship and innovation, reduces social and political instability, enhances productivity and efficiency, enables investment in infrastructure and public services, promotes social and economic inclusion, and facilitates financial inclusion. These factors collectively contribute to sustainable economic growth and development.

Pakistan has witnessed volatile economic growth for the last 20 years. Despite handsome growth rates and industrialization income distribution remains a problem of concern Ali (2007). Government policies have failed to induce inclusive growth as top-line growth remained their foremost concern Tirmazee and Haroon (2015). Unequal income distribution due to weak tax structure had created distortions among various classes of society Hussain (2009). Flawed policy initiatives have created a bulge of income inequality in the last 20 years. The following table presents the trend of socio-economic indicators over the last 20 years. Real GDP growth has remained inconsistent. From 1997-98 to 2001-02 average real GDP growth was 3.1 percent, from 2001-02 to 2007-8 it was 6.5 percent, from 2007-08 to 2013-14 it was 2.8 percent, and from 2013-14 to 2018-19 it was 4.3 percent. Despite of inconsistent growth poverty has declined from 32 percent in 2001-02 to 22 percent in 2018-19. However, due to a lack of a data-driven policy framework income inequality has increased over the years. Gini Index increased from 0.428 in 2001-02 to 0.458 in 2018-19 respectively. The problem of persistent increase in income inequality has created a social divide, decreased household welfare, and reduced the possibilities of the long-term aim of sustainable socio-economic development Jamal (2006).

Key Indicators	2001-02	2007-08	2013-14	2018-19
Headcount Poverty	32%	18%	26%	22%
Gini Index	0.428	0.455	0.461	0.458
Real GDP growth(last 5 yrs. avg)	3.10%	6.50%	2.80%	4.30%
Source: Economic Survey, HIES, Authors estimation,				

The trickle-down model that Pakistan has used over the years has failed to deliver. The model named trickle-down theory was proposed by Milton Friedman's Chicago School of Thought in the early 1970s. The theory professed to focus on privatization, government deregulation, and cuts to social spending. This economic model has increased Pakistan's economic size to USD 300 billion in the last seven decades but the size remains negligible considering the population of 250 million. In this environment, even an average annual growth rate of 7 to 8% is worthless due to the country's enormous infrastructure gaps in the physical and social spheres, as well as its stagnant export volume and constantly rising import volumes. Poverty, inequality, and unemployment have increased due to the adoption of neo-liberal policies with high inflation and stagnant GDP growth (Zaidi, 2005). Trickle-down economics has failed to deliver its promises in Pakistan due to various reasons. One of the main criticisms is that the benefits of economic growth, tax cuts, and deregulation have remained concentrated in the hands of the already wealthy, exacerbating income inequality. This has been evident in Pakistan, where the gap between the rich and poor has widened over the years. While proponents of trickle-down economics argue that tax cuts and incentives for businesses improved job creation, however, the job growth has not been sufficient to address the high unemployment rate and to uplift the masses from poverty. Trickle-down economics have led to a reduction in government spending and social welfare programs, which negatively impacted the well-being of vulnerable populations (Atif et al., 2012). Policies have to prioritize tax cuts and incentives for businesses, at the expense of investing in essential infrastructure and social services, which are crucial for sustainable development and poverty reduction.

The objective of the study is to develop a sustainable growth model by evaluating the impact of liberal policies and socioeconomic policies on macro indicators and households. Pakistan has seen uneven growth patterns for many years. In the era of high growth income inequality was seen elevated. On the other hand, when the focus was given to social spending, growth was found to be hurt. To evaluate the impact three types of scenarios were created. In the first scenario, the government's social spending was increased by 10 percent. In the second scenario business output was increased by 10 percent and in the third scenario business output along with social spending was increased simultaneously by 5 percent and 15 percent. The CGE model was employed through the MYGTAP framework. Three different policy shocks were given to assess the impact on macro variables.

Literature Review:

Sung Hee Jwa (2016) explained various reasons to achieve sustained indigenous and inclusive growth. The author discussed the role of markets, corporations, and government in achieving inclusive growth. She further explained the political economy and the impact of ideology on achieving growth and development. Social order was divided into three major categories such as liberal democracy, authoritarian, and egalitarianism. The author finally concluded that economic inequality was necessary for economic development while economic equality could lead to stagnation. Haq and Farooq (2017) analyzed the impact of CPEC on social welfare in Pakistan. They used Pakistan standard living measurement survey data for 2014-15. They construct a social welfare index from social welfare indicators for various districts in Pakistan. Welfare indicators include enrolment rate, health indicators, housing, drinking water, and fuel for cooking. These indexes were forecasted through the use of the mean model. The study concluded that due to CPEC social welfare would grow by 5.21 percent. Province-wise growth would be achieved by 6.4 percent in Baluchistan, 6.31 percent in Sindh, 5.19 percent in KPK, and 3.5 percent in Punjab. Net growth in social welfare in education would be education at 3.85 percent, health at 4.74 percent, and housing at 8.6 percent Tirmazee and Haroon (2015) analyzed the inclusiveness of growth in Pakistan. They estimate inclusive growth with the use of the social welfare index and mobility index. The social welfare index was measured on the basis of average per capita income and distribution of income. Data was obtained from the Pakistan Living Standard Measurement Survey 2008-09 and 2010-11. The results of the study revealed that Pakistan's income grew efficiently but without equity. However, when wealth is taken as an indicator there was neither efficiency nor equity, therefore growth in Pakistan was not inclusive. Ali et al. (2015) analyzed the nexus between trade openness and welfare in Pakistan. The study assessed the relationship between trade openness and social expenditure which includes education, health and social safety nets. Trade openness has been estimated using sum of exports and imports as percentage of GDP. Log of Gini coefficient have been used as a dependent variable and a proxy for welfare. Annual time series data was obtained starting from 1975 to 2012. Vector autoregressive approach has been used to estimate the long and short run impact. The results of the study revealed that trade openness does not affect income distribution and it's the policies of the government that can decrease income inequality. Haq and Zia (2006) evaluated the linkage between good governance and pro poor growth in Pakistan. They used data from 1996 to 2005. Different indicators were taken as a proxy of governance such as political stability, govt effectiveness, regulatory quality, rule of law, control of corruption and voice and accountability. OLS regression technique was used for the estimation. The results indicated that governance indicators had low score as compared to other countries. The poverty and income inequality had increased during the study year. The linkage between good governance and pro poor growth was found to be negative and highly significant. It was suggested that good governance can reduce poverty and inequality and can create pro poor growth in the long run. Zaidi (2006) discussed the nature of growth in Pakistan during the 2004-05. He analyzed the trend and assessed the issues related to high growth rate during the era of military government in Pakistan. He pointed out high inequality, increasing trade deficits and inflation as some of the few indicators in a high growth economy. He was of the opinion that higher trade deficits would lead to external borrowings, devaluation of the currency or curbs on imports that would hamper the sustainability of growth. Social expenditures have remained to be lower as percentages of

GDP whereas military expenditure continues expand. Lechheb et al. (2019) analyzed the relationship among economic growth, poverty and inequality. The study employed econometric technique to analyze the relationship. Panel data was obtained of low middle income countries starting from 1970 to 2018. Per capita Gross Domestic Product, Poverty gap and Gini Coefficient was taken as the variables. The results revealed that increase in inequality could decrease GDP per capita. One percent increase in Gini index and poverty gap would reduce GDP per capita by 3.8% and 6.8% respectively. Therefore, it was concluded that sustainable economic growth could be achieved through the decrease in income inequality. Siddiqui and Kemal (2006) analyzed the impact of trade liberalization and decline in remittances on poverty in Pakistan. The study used data from 1989 90 obtained from Input-Output table Pakistan 1996, from Household Integrated Economic Survey 1993 and SAM 1989 90 was constructed. CGE Model was applied for the study with simulations to study the impact of shock of one variable on other variables. Sectors were divided into subsectors such as agriculture was segregated in to crop and non-crop sector. Manufacturing was segregated in to food, textiles, chemicals, machinery, and other manufacturing. Services were further segregated in to tradeable and non-tradeable sectors such as government services, education and health care. The result of the study revealed that in spite of reduction in tariffs by 55 percent in 90s poverty remained higher. During 90s remittances was further declined which decreases the exchange rate and imports. The simulations results showed that decline in remittances eroded the benefits of trade liberalization. However, in the rural areas gain in trade liberalization dominates the loss due to decline in remittances which causes the poverty to increase. This further cemented the fact that remittances had a strong effect in poverty reduction.

Methodology:

General Equilibrium Model[3]:

General equilibrium theory is based on the Walrasian model of equilibrium. The Walrasian model can be stated as an exchange economy without production. The economy contains finite agents and finite commodities. A bundle of commodities is awarded to every agent. Assuming that before consuming all the commodities, there may exist an opportunity for trade at an established price. The given situation raises the desire to understand the price at which trade may take place, whether the demand equals supply, how efficient will the process be, and how preferences and endowments affect the circular flow.

The model is then simplified as an economy with I agents I ε I = {1, ..., I} and L commodities l ∈ L = {1, ..., L}. $x \in$ RL + is a vector of a bundle of commodities. Endowment $e^i \in R_+^L$ is distributed to each agent i with a utility function u^i. The exchange economy is highly dependent on endowments and utilities, therefore it can be written as $\in = \left(\left(u^i, e^i\right)_{iel}\right)$. Market prices are based on the assumption, that agents are price takers of goods and the vector of the market price is presented as $p \in R_+^L$ and all prices are non-negative.

Maximizing utility for every agent as per the budget constraints can be written as

$$\max u^i(x) \quad s.t.\ p.x \leq p.e^{i.}$$

[3] Introduction to Computable General Equilibrium Models. Mary E. Burfisher 2011 & Aguiar, A., Narayanan, B., & McDougall, R. (2016)

Walrasian Equilibrium:

A Walrasian equilibrium for an exchange economy could be that equilibrium consists of a vector of prices, a bundle of consumption for each agent with utility maximization at stated prices. The process also includes market clearing in such a way that aggregate endowment is equal to the demand of each commodity. The process can be written as:
Utility maximization by agents $i \in I, x^i \in \arg \underbrace{max}_{x \in B(p)} u^i(x)$

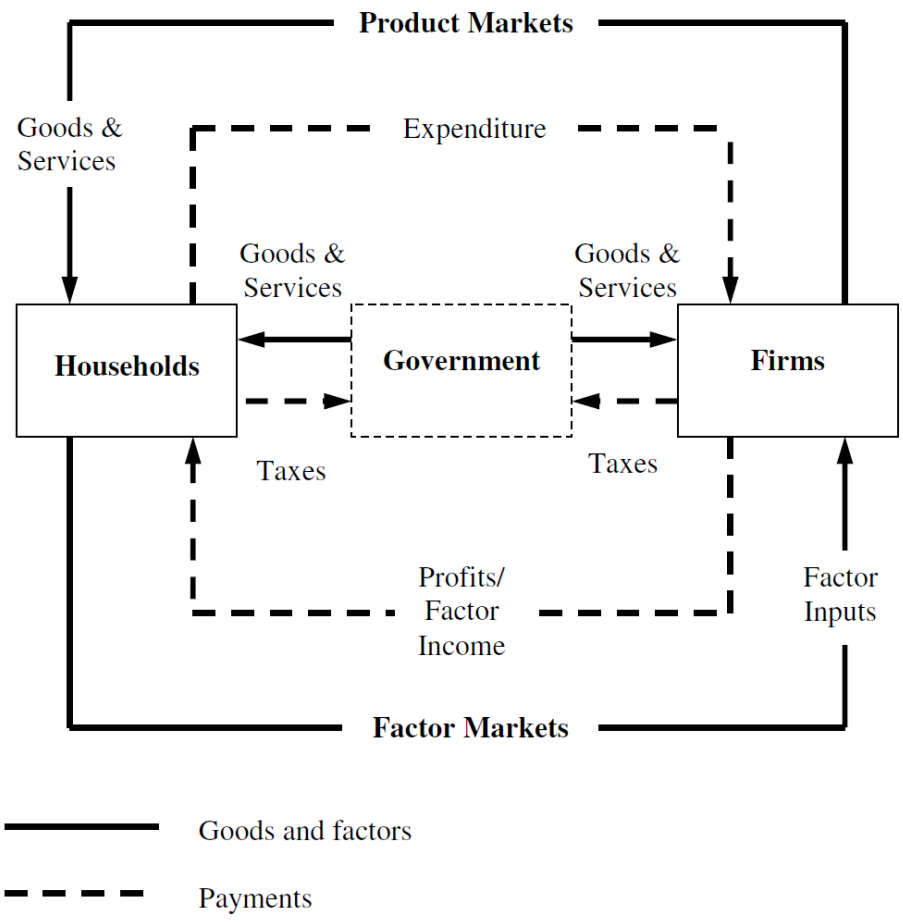
Market clearing for all $I \in L$, $\sum_{i \in I} x^i = \sum_{i \in I} e^i$.

The Walrasian equilibrium takes effect when demand and supply balance out each other in an interconnected market of an economy. Arrow and Debreu developed an abstract general equilibrium structure to perform numerical functions using realistic economic data. Computable General Equilibrium Models are simulations that use those structures with different prices, demand, and supply levels to reach equilibrium in various sets of markets. CGE models are used for empirical analysis and to evaluate various impacts of economic shocks on welfare, household income, and economic growth. Uses of computable general equilibrium models can be found in diverse fields such as fiscal reforms, planning, and international trade (Perry et al. 2001, Gunning and Keyzer 1995, Shields and Francois 1994, Martin and Winters 1996, Harrison et al. 1997).

The Circular Flow and Walrasian Equilibrium:

Computable General Equilibrium models are based on the circular flow of commodities in a closed economy. There are two main actors in the circular flow, households who are the final owners of factors of production and are also involved in the consumption of goods produced. The other actor is the firms that hire factors of production from households to produce goods that are then consumed by the households. The equilibrium model also considers the government's role in the form of taxes and expenditures on households as subsidies and direct transfers. Circular flow can be analyzed starting from factor inputs to the firms to produce goods and supplied to households that control the supply of factor services. Circular flow can also be analyzed through payments received by households for providing labor services to firms. Labor services are then used as a primary factor to produce goods that are consumed by households through income received from labor services.
The equilibrium in the economic circular flow process is due to the preservation of both product and value. Preservation of product is the absorption of all quantities by firms and households originating through factors endowed to households or produced by firms. Preservation of value is based on the accounting assumptions that for every activity, the value of expenditure and the value of income should be balanced out. Accounting rules are the basis of Walrasian general equilibrium. Production and consumption activities in the economy absorb the flow of goods and factors, such that the output of firms is fully consumed by households, and firms employ primary factors of the household endowment. Therefore the quantities produced of a given commodity must be demanded by other firms and households in an economy. This condition once achieved

is known as market clearance. The value in the circular flow process is defined as the total sum of revenue of the production of goods that are distributed to households as an income, intermediate inputs to other industries, and to the government in the form of taxes.
The value of output produced in the economy must be equal to inputs purchased in the economy as well as the payments to the primary factors employed in the production process. The condition for the equilibrium to set in is the producers make zero profits. The other condition in equilibrium is that the household income in the form factor rentals must be exhausted on goods purchases. This condition is similar to the accounting principle of balancing the budget and is known as income balance. The computable General Equilibrium Model estimates a set of prices using three conditions market clearance, zero profit, and income balance and thus these conditions define Walrasian general equilibrium.



Equilibrium and Social Accounting Matrix:

The effect of the circular flow on the CGE model and economic data can be presented in an algebraic framework. Consider a closed free market economy having N industries, producing its type of commodity with an undetermined number of households owned endowment of F primary factors. This framework is based on three assumptions. First, trade is without any restrictions, tax, or subsidy alterations. Second, households are single representative agents who receive income against factors rented out to firms. Households spend income on N commodities to gratify D demands. Third, every industry uses F primary factors and quantities of N commodities as inputs to produce y quantity of output.

Therefore, I = {1,…..N} is set of commodities, j ={1,…..N} is set of number of sectors, f = {1,…..N} is set of primary factors and d = {1,…..N} is the set of final demand. The circular flow is further extended through 3 different matrices. N x N input-output matrix of industries which uses different commodities as intermediate inputs stated as $\bar{\bar{x}}$, primary factor input F x N stated as $\bar{V}$, and final demand of commodities presented by N x D matrix and denoted by $\bar{G}$.

The circular flow process can be written as the gross output which is the supply must be equal to the intermediate uses along with the final demand which absorbs that commodity.

$$\bar{Y}\imath = \sum_{j=1}^{N} \overline{x_{\imath J}} \; + \sum_{d=1}^{D} \overline{g_{\imath d}}$$

Factor market assumption states that firms must fully employ the endowments by agents of a particular factor.

$$\bar{V}_f = \sum_{i=1}^{N} \overline{V_{fJ}}$$

It is assumed that firms make zero profit, therefore the value of output Y must be equal to the value of intermediate inputs and the primary factors employed by the firm.

$$\bar{y}_J = \sum_{i=1}^{N} \overline{x_{\imath J}} \; + \sum_{i=1}^{F} \overline{V_{fJ}}$$

Another assumption states that the income received by the agent from the rental of primary factors must be equal to the expenditure on commodity demand. Altogether, income must equal the sum of $\bar{V}$ which must be equal to the sum of $\bar{G}$

$$\bar{m} = \sum_{i=1}^{F} \overline{V_{fJ}} \; = \sum_{i=1}^{N} \; \sum_{d=1}^{D} \overline{g_{\imath d}}$$

The relationship between equations 1 to 4 defines the circular flow process in which matrices $\bar{X}$ $\bar{V}$ $\bar{G}$ can be arranged according to the figure below.

		← j →			← d →			Total
		1	...	N	1	...	D	
↑	1							$\bar{y}_1$
i	⋮		$\bar{\mathbf{X}}$			$\bar{\mathbf{G}}$		⋮
↓	N							$\bar{y}_N$
↑	1							$\bar{V}_1$
f	⋮		$\bar{\mathbf{V}}$					⋮
↓	F							$\bar{V}_F$
Total		$\bar{y}_1$	...	$\bar{y}_N$	$\bar{G}_1$	...	$\bar{G}_D$	

The above diagram is known as a Social Accounting Matrix which provides a brief snapshot of industrial activity flows of an economy that is in an equilibrium state. The SAM represents the input-output accounts composed of rows and columns. The matrix represents the flow of payments from rows towards columns and the other way around. The rows account for income and the columns account for expenditures.

SAM to a CGE Model:

CGE models are based on the SAM framework which is modified by the use of the Cobb-Douglas economy. The model is illustrated by denoting households to have C-D preferences and industries are assumed to have C-D production technologies. The C-D function creates a relationship between household utility U and the consumption c of N commodities.

$U = A_c C_1^{\alpha 1} C_2^{\alpha 2} \dots \dots . C_N^{\alpha N} = A_c \prod_{i=1}^{N} C_i^{\alpha i} =$

α^i are the shares of goods in expenditure on consumption and A_c is a scaling factor. It can further be stated as an output consisting of input of N commodities and varieties of primary factors per the C-D function.

$y_j = A_j \left(x_1^{\beta 1} x_2^{\beta 2} \dots \dots x_N^{\beta N}\right)\left(V_1^{\gamma 1} V_2^{\gamma 2} \dots \dots V_F^{\gamma N}\right) = A_j \prod_{i=1}^{N} x_{ij}^{\beta ij} \prod_{F=1}^{F} V_{fj}^{\gamma ij}$

Parameters βi and γi denote the shares of each input in the cost of production and A_j is the scaling parameter.

Households:

Assuming a household that chooses the N commodities to consume and maximizes utility, subject to budget constraints, and demands goods and services other than consumption through savings thus the problem can be represented as:

$$\max U\ (C_1 \dots\dots, C_N)\ \ subject\ to\ m = \sum_{i=1}^{N} pi\ \ (C_i + \ S_i)$$

The household has C-D preferences; therefore the problem can be redesigned as household production. In this condition, the profit is maximized by the production of utility goods with the output generated through consumption having price as a marginal utility of aggregate consumption. Thus the equation can be rewritten as:

$$\max Pu\ U - \ \sum_{i=1}^{N} pi\ C_i$$

Therefore, the demand function for the consumption is denoted by

$$ci = \ \alpha i\ \frac{(m - \ \sum_{i=1}^{N} Pi\ Si)}{Pi}$$

The above expression can be rearranged

$$\alpha i = \ \frac{CiPi}{(m - \ \sum_{i=1}^{N} Pi\ Si)}$$

The above equation represents the exponents of the utility function which are shares of the commodity in value of consumption. Savings or investments are related to demand functions that integrate the household preferences of other expenditures.

Producers:

Producers aim to maximize profit by utilizing the level of inputs and primary factors to generate an output with different levels of technology. Thus the equation can be presented as

$$\max \pi_j = Pj\ Yj - \sum_{i=1}^{N} Pi\ x_{ij} - \sum_{f=1}^{F} Wf\ V_{fj}\ \ subject\ to\ y_j = \ \emptyset_j(\ x_{1j} \dots\dots, x_{Nj}\ , V_{1j} \dots\dots, V_{Fj})$$

Producer's demand for intermediate inputs and primary factors combined with C-D production technology can be presented as

$$x_{ij} = \beta_{ij} \frac{P_j y_j}{P_i}, and\ primary\ input\ demand \quad V_{fj} = \gamma_{fj} \frac{P_j y_j}{W_f}$$

The above equations can be rearranged to show the Cobb-Douglas production function which shows shares of their inputs to production in the value of output.

$$\beta_{ij} \frac{P_j x_{ij}}{P_j y_j} \ and \ \gamma_{fj} \frac{w_j V_{fj}}{P_j y_j}$$

General Equilibrium:

The above equations are the building blocks of the CGE model. These equations work under specific conditions that were discussed earlier. These conditions are reformulated for the Cobb-Douglas economy. Equations are substituted into them to generate actual equations that a CGE model uses to solve for the equilibrium. Conditions for general equilibrium in a C-D economy are as follows:

The condition of market clearance states that the quantity produced in an economy must be equal to the sum of the quantities demanded by the producers. These quantities are used as an intermediate input to produce. Representative agents also used these quantities for input to consumption and saving activities. The relationship can be represented as:

$$y_i = \sum_{j=1}^{N} x_{ij} + C_i + S_i$$

The primary factors used by producers must be equal to the endowment offered by the representative's agent of that factor. The condition implies as:

$$V_f = \sum_{j=1}^{N} v_{fj}$$

The condition of Zero profit states that output generated by producers must be equal to the sum of the value of inputs of intermediate goods and primary factors employed in the production. The condition is transformed into the equation:

$$P_j Y_j = \sum_{i=1}^{N} P_i x_{ij} - \sum_{f=1}^{F} W_f V_{fj}$$

The condition of income balance implies that income received by households on account of services provided to producers must be equal to the producer's payment to households for the use of primary factors. Thus the equation can be written as:

$$m = \sum_{f=1}^{F} w_f V_f$$

The above four equations can be used to specify the core of the CGE model. The equations are combined to generate demand vectors representing deviations between supply and demand of commodities and between supply and demand for primary factors. The differences in both equations are minimized to zero in general equilibrium. The demand equations for the commodity market are

$$\Delta_i^c = \sum_{j=1}^{N} \beta_{ij} P_j y_j + \alpha_i \left(\sum_{f=1}^{F} W_f V_f - \sum_{j=1}^{N} P_j S_j \right) + P_i S_i - P_i y_i$$

Equations for the factor market can be written as:

$$\Delta_f^F = \sum_{j=1}^{N} \gamma_{fj} \frac{P_j y_j}{w_f} - V_f$$

The condition for zero profit states that the producer's profits are minimized to zero in general equilibrium. Therefore, combining equations into production functions will generate pseudo-excess demand functions that specify per unit excess profit.

$$\Delta_j^{\pi} = P_j - A_j \prod_{i-1}^{N} (p_i / \beta_{ij})^{\beta ij} \prod_{f=1}^{F} (w_f / \gamma_{fj})^{\gamma fj}$$

The income balance condition can be rewritten in the following form

$$\Delta^m = \sum_{f=1}^{F} W_f V_f - m$$

General Equilibrium is thus achieved by joint minimization of $\Delta_i^c, \Delta_f^F, \Delta_j^{\pi}, \Delta^m$

Results and Discussion:

The inclusive sustainable growth model has been evaluated through the general equilibrium methodology. The general equilibrium models are based on the Walrasian model of equilibrium. A Walrasian equilibrium for an exchange economy could be that equilibrium consists of a vector of prices, a bundle of consumption for each agent with utility maximization at stated prices. The process also includes market clearing in such a way that aggregate endowment is equal to the demand for each commodity. The Walrasian equilibrium takes effect when demand and supply balance out each other in an interconnected market of an economy. Arrow and Debreu developed an abstract general equilibrium structure to perform numerical functions using realistic economic data. Computable General Equilibrium Models are simulations that use those structures with different prices, demand, and supply levels to reach equilibrium in various sets of markets. CGE models are used for empirical analysis and to evaluate various impacts of economic shocks on welfare, household income, and economic growth. Uses of computable general equilibrium models can be found in diverse fields such as fiscal reforms, planning, and international trade (Perry et al. 2001, Gunning and Keyzer 1995, Shields and Francois 1994, Martin and Winters 1996, Harrison et al. 1997).

The computable general equilibrium model is based on neo-classical theory and it is used to analyze policy effects such as technological changes, tax policies, government spending, and environmental changes. CGE models absorb all behaviors of all market forces and factors along with commodities. The model assumes that consumers would maximize their utilities and firms would minimize their costs of production and inputs (Bhurfisher, 2017; Shoven and Whalley, 1984). The model consists of various systems of equations with strong sectoral linkages. Policy changes would create a distributional impact across sectors and households (Winters et al. 2004). CGE models have been regarded as a powerful tool for the analysis of policy shocks on welfare, inequality, and poverty. Computable general equilibrium connects large numbers of sectors together and links various behavioral household equations incorporating the response of households to policy change (Savard 2003). The CGE model consists of the single-country model as well as the global model. The global version of the model is known as the global trade analysis project (GTAP) model. The GTAP model provides the database and the framework to run the CGE model.

My GTAP Model:

My GTAP model is an extension of the standard GTAP model linked with Pakistan's economy (Hertel and Tsigas 1997). In this model single household has been replaced by private households and government households. Endowments and remittances are received by private households and are consumed or saved. Income is received by the government in the form of tax revenues and foreign aid which is then spent on various expenditures. The difference between the income and expenditures of the government is recorded as surpluses or deficits. My GTAP model also has the attributes of incorporating government spending and saving, inter-regional remittances, foreign capital income, various policy impacts on households, and factors in an economy.

My GTAP model uses a database of 2015 as a base year including GTAP version 10 and SAM 2010-11. It covers 150 regions/countries, 65 commodity sectors, and rural and urban households divided into quintiles. SAM 2010-11 was developed by International Food Policy Research Institute. It provides a broad framework of the real economy, product accounts, and monetary

flow between institutions. It gives an account of all transactions, production, and economic activities between consumers, government, and producers.

Research Scenarios:

The objective was to analyze the impact of poverty alleviation and income distribution policies on sustainable economic development. Pakistan had seen uneven growth patterns for many years. In the era of high growth income inequality was seen elevated. On the other hand, when the focus was given to social spending, growth was found to be hurt. To evaluate the impact three types of scenarios were created. In the first scenario government's social spending was increased by 10 percent. In the second scenario business output was increased by 10 percent and in the third scenario business output along with social spending was increased simultaneously by 5 percent and 15 percent.

Model Closure:
My GTAP model would consist of exogenous and endogenous variables or a system of equations. Exogenous variables would include tax, tariff rates, elasticities of supply and demand, and shift and share coefficients used in equations. Endogenous variables would be welfare, GDP, sectoral output, household income, and inequality. The model is based on the assumptions that labor and capital are mobile, land and natural resources are sluggish, foreign incomes are dependent on the price change of factor incomes and investments are dependent on the rate of return.

Macroeconomic Results:
Table 1 below shows the output obtained by employing a computable general equilibrium model. The CGE model was employed through the GTAP framework as explained above. Three different policy shocks were given to assess the macroeconomic impact on macro variables.

Simulation-1:
10 percent increase in social spending keeping all other policy shocks constant, decreased gross domestic product by 0.01 percent, increased exports by 0.31 percent, decreased imports by a negligible 0.069 percent, household income would decline by negative 0.054 percent, government expenditure would also decline by 0.017 percent but private expenditure would increase by 0.03 percent.

Simulation -2:
10 percent increase in business output keeping all other policy shocks constant, increased gross domestic product by 2.4 percent, exported declined by negative 0.17 percent, imports increased by 3.4 percent, household income increased by 3 percent, government expenditures increased by 2 percent and private expenditure increased by 3 percent respectively.

Simulation -3:
5 percent increase in business output along with 15 percent increase in social spending resulted in gross domestic product to increase by 1.2 percent, exports by 0.34 percent, imports by 1.6 percent, household income by 1.35 percent. However, government expenditure to decline by 0.8 percent and private expenditure increased by 1.52 percent respectively.

Table 1 Policy Impact CGE Analysis

Policy Impact on Macroeconomic Variables - % change			
Macro Variable	**Social spending**	**Business Output**	**Social spending + Output**
	10%	**10%**	**15%/5%**
GDP	-0.010	2.360	1.210
Exports	0.310	-0.170	0.340
Imports	-0.069	3.370	1.620
Household income	-0.054	2.810	1.350
Government expenditure	-0.017	1.950	-0.810
Private expenditure	0.031	2.890	1.520
source: Author's simulation			

Impact on Household Income:

Table 2 below showed the output obtained by employing a computable general equilibrium model. The CGE model was employed through the GTAP framework as explained above. Three different policy shocks were given to assess the macroeconomic impact on household income.

Simulation – 1:
10 percent increase in social spending has increased the household income of rural small farmer present in the first quantile by 0.78 percent. Rural medium farmer present in the first quantile income increased by 5 percent. The majority of the households have experienced an increase in income by less than 1 percent. Rural non-farm households present in the third and fourth quartiles would experience a decline in income.

Simulation – 2:
10 percent increase in business output has increased the income of the majority of the households by more than 3 percent. Rural small farmer present in first and second quartile experienced increase in income by 0.67 and 0.55 percent. However, income of rural farm worker present in first quartile had declined by 2.6 percent.

Simulation- 3:
5 percent increase in business output along with 15 percent increase in social spending has stabilized the increase in income within 2 percent. Rural small farmer present in first quartile experienced an increase in income by 9.6 percent. However, the income of rural farm worker present in first quartile had declined by 0.29 percent.

Table 2 Policy Impact on Household Real Income CGE Analysis

Policy Impact on Household's Real Income - % change				
Codes	**Household's description**	**Social spending**	**Output**	**Social spending + Output**
		10%	**10%**	**15%/5%**
hhd_rs1	Rural small farmer (quartile_1)	0.78	0.67	1.40
hhd_rs234	Rural small farmer (quartile_2,3,4)	0.38	0.55	0.73
hhd_rm1	Rural medium farmer (quartile_1)	5.14	3.91	9.62
hhd_rm234	Rural medium farmer (quartile_2,3,4)	0.54	0.91	1.15
hhd_rl1	Rural farmer landless (quartile_1)	0.87	2.52	2.51
hhd_rl234	Rural farmer landless (quartile_2,3,4)	0.39	1.76	1.40
hhd_rw1	Rural farm worker (quartile_1)	0.80	-2.61	-0.29
hhd_rw234	Rural farm worker (quartile_2,3,4)	0.29	-0.50	0.09
hhd_rn1	Rural non farm (quartile_1)	0.10	3.88	2.15
hhd_rn2	Rural non farm (quartile_2)	0.00	3.69	1.91
hhd_rn3	Rural non farm (quartile_3)	-0.06	3.58	1.77
hhd_rn4	Rural non farm (quartile_4)	-0.10	3.49	1.67
hhd_u1	Urban (quartile_1)	0.27	3.34	2.12
hhd_u2	Urban (quartile_2)	0.01	3.43	1.78
hhd_u3	Urban (quartile_3)	-0.09	3.45	1.65
hhd_u4	Urban (quartile_4)	-0.14	3.49	1.60
source Author's simulation				

Impact on Real Factor Rewards:

Table 3 below showed the output obtained by employing a computable general equilibrium model. The CGE model was employed through the GTAP framework as explained above. Three different policy shocks were given to assess the real factor rewards.

Simulation – 1:
10 percent increase in social spending has increased the real factor rewards various factors by less than 1 percent. Non-farm low and high-skilled factor had negative real returns. Formal and informal capital also had negative real returns.

Simulation – 2:
10 percent increase in business output has decreased real returns of labor for a small farmer, medium farmers, and farm workers by an average of 22 percent. Non-farm low-skilled and high-skilled real factor returns have also remained negative. Other real returns of factor of production had increased by an average 4 percent.

Simulation- 3:
5 percent increase in business output along with 15 percent increase in social spending had decreased real returns of labor for a small farmer, medium farmers, and farm workers by an average of 11 percent. Real returns of non-farm low skilled and high skilled factor estimated to be negative by an average 2.8 percent. Other real returns of factor of production had increased by an average 2 percent.

Table 3 Policy Impact on Household Real Factor Rewards CGE Analysis

Policy Impact on Real Factor Rewards - % change				
Factor codes	**Factor Description**	**Social spending**	**Output**	**Social spending + Output**
		10%	**10%**	**15%/5%**
flab_s	Labor small farmer	0.424	-21.918	-11.377
flab_m	Labor meduim farmer	0.438	-21.646	-11.208
flab_w	Labor farm worker	0.442	-22.834	-11.89
flab_l	Non farm low skilled	-0.091	-5.057	-2.718
flab_h	Non farm high skilled	-0.206	-5.14	-2.927
flnd_s	land small	0.415	5.36	3.33
flnd_m	land medium	0.436	5.142	3.243
flnd_l	land large	0.459	4.901	3.147
fliv	livestock	0.422	-0.694	0.163
fcap_a	capital-agriculture	0.458	4.954	3.174
fcap_f	capital-formal	-0.099	2.706	1.276
fcap_i	capital-informal	-0.137	2.383	1.057
source Author's simulation				

Inequality measure:

Table 4 below showed the output obtained by employing a computable general equilibrium model. The CGE model was employed through the GTAP framework as explained above. Three different policy shocks were given to assess income inequality through Gini Index.

The policy impact on income inequality stated that an increase in social spending by 10 percent would decrease inequality by 0.15 percent. An increase in business output by 10 percent would increase inequality by 0.49 percent, however, if social spending increased by 15 percent and business output increased by 5 percent then income inequality would increase by a negligible 0.05 percent. Therefore, it can be deduced that an increase in social spending along with the increase in business output would control the increase in inequality in the long run.

Table 4 Policy Impact on Inequality Index CGE Analysis

Policy Impact on Inequality Gini Index - % change				
Inequality Index	**Base**	**Social spending**	**Output**	**Social spending + Output**
		10%	**10%**	**15%/5%**
Gini Index	0.450	-0.151	0.49	0.05
source Author's simulation				

Conclusion

The objective of the study is to develop an inclusive growth model which increases GDP without increasing income inequality. Pakistan has seen uneven growth patterns for many years. In the era of high growth income inequality was seen elevated. On the other hand, when the focus was given to social spending, growth was found to be hurt. To evaluate the impact three types of scenarios were created. In the first scenario government's social spending was increased by 10 percent. In the second scenario business output was increased by 10 percent and in the third scenario business output along with social spending was increased simultaneously by 5 percent and 15 percent. The CGE model was employed through the MYGTAP framework. Three different policy shocks were given to assess the impact on macro variables.

The results of the simulation suggested that a 10 percent increase in social spending keeping all other policy shocks constant, decreased gross domestic product by 0.01 percent, increased exports by 0.31 percent, decreased imports by a negligible 0.069 percent, household income would decline by negative 0.054 percent, government expenditure would also decline by 0.017 percent but private expenditure would increase by 0.03 percent. 10 percent increase in business output keeping all other policy shocks constant, increased gross domestic product by 2.4 percent, exported declined by negative 0.17 percent, imports increased by 3.4 percent, household income increased by 3 percent, government expenditures increased by 2 percent and private expenditure increased by 3 percent respectively.5 percent increase in business output along with 15 percent increase in social spending resulted in gross domestic product to increase by 1.2 percent, exports by 0.34 percent, imports by 1.6 percent, household income by 1.35 percent. However, government expenditure declined by 0.8 percent and private expenditure increased by 1.52 percent respectively.

10 percent increase in social spending has increased the household income of rural small farmers present in the first quantile by 0.78 percent. Rural medium farmers present in the first quantile income increased by 5 percent. The majority of the households have experienced an increase in income by less than 1 percent. Rural non-farm households present in the third and fourth quartiles would experience a decline in income. A 10 percent increase in business output has increased the income of the majority of the households by more than 3 percent. Rural small farmers present in the first and second quartiles experienced increases in income by 0.67 and 0.55 percent. However, the income of rural farm workers present in the first quartile had declined by 2.6 percent. A 5 percent increase in business output along with a 15 percent increase in social spending has stabilized the increase in income within 2 percent. Rural small farmers present in the first quartile experienced an increase in income by 9.6 percent. However, the income of rural farm workers present in the first quartile had declined by 0.29 percent.

10 percent increase in social spending has increased the real factor rewards various factors by less than 1 percent. Non-farm low and high-skilled factors had negative real returns. Formal and informal capital also had negative real returns. A 10 percent increase in business output has decreased real returns of labor for small farmers, medium farmers, and farm workers by an average of 22 percent. Non-farm low-skilled and high-skilled real factor returns have also remained negative. Other real returns of a factor of production had increased by an average of 4 percent. A 5 percent increase in business output along with a 15 percent increase in social spending had decreased real returns of labor for small farmers, medium farmers, and farm workers by an average of 11 percent. Real returns of non-farm low-skilled and high-skilled factors are estimated to be negative by an average of 2.8 percent. Other real returns of a factor of production had increased by an average of 2 percent.

The policy impact on income inequality stated that an increase in social spending by 10 percent would decrease inequality by 0.15 percent. An increase in business output by 10 percent would increase inequality by 0.49 percent, however, if social spending increased by 15 percent and business output increased by 5 percent then income inequality would increase by a negligible 0.05 percent. Therefore, it can be deduced that an increase in social spending along with the increase in business output would control the increase in inequality in the long run. The model would provide a testing framework to create an inclusive growth model through which sustainable growth can be achieved along with improving income distribution.

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