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RESEARCH ARTICLE

The Potential Impact of Exports on Pakistan's Economy: A CGE Analysis

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Abstract: This study intends to submit a quantitative assessment of Pakistan's exports in the economic welfare of the country. Using the CGE model and taking the most recent data presented in Pakistan's SAM (2010-11), three tests are operated to measure the potential effect of increasing the exports of Pakistan. Exports have been raised by 4%, 8% and 12% in simulation I, II, and III respectively. This research covers the effects of an increase in exports on almost all the key variables along with welfare, inequality, and poverty. The positive impact is found on Pakistan's macroeconomic indicators like; GDP, Household Income, Public and Private Consumption, Savings and Investment. An increase in the value of Compensating Variation is recorded, which indicates an increase in all the household's welfare. However, for non-agriculture households, it has risen more, which indicates the pro-urban effect. Inequality indices have registered a declining effect. Finally, in the light of findings, some policy recommendations regarding reducing income inequalities, poverty alleviation and economic development and growth strategies are stated.

Keywords: Computable General Equilibrium (CGE) Model, Social Accounting Matrix (SAM), Macroeconomic Indicators, Compensating Variations, Welfare, Inequality and Poverty, Economic Development and Growth, Policy Recommendations
JEL Classification Codes: C15, C68, D02, E16, F62, F63, P24

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1 Introduction

Not only the classical economists but rather today's modern ones also believe that exports are the potential instrument for increasing the country's economic growth and its rate. Policies to increase exports are implemented by the countries according to the comparative cost or advantage principle. An increase in exports results in the availability of the products at low prices in the international market. The markets expand and the scale of production tends to become large, which results in attaining the economies i.e., internal as well as external, causing a reduction in average cost, especially in the long run. Economic activity expands, the level of employment increases and hence impacts positively on income. Due to trade, developing countries like Pakistan, specializing in the production of best-fitted products. Because of the stiff competition, the quality of products improves. Trade transfer technologies encourage industrial and agricultural development, averts the monopolies, fills the products' shortage, improves the balance of payments situation, advances global relations, lessens political conflicts, etc. Subsequently, the process of economic growth opens.

The export performance of a country can be determined by several factors, both the demand and supply sides of export. The supply-side factors are the capacity of trading partners which is generally estimated by Gross Domestic Product, the growth rate of Gross Domestic Product, indirect taxes, savings, relative prices (the price of exports relative to the price of competing products), import of inputs, while the factors on demand-side are like world price, world income, foreign direct investment, real exchange rate and generalized system of preference. Researchers emphasized demand-side determinants in explaining export performance. Whereas, Iqbal et al. (2015) and Togan (1993) , etc. attribute supply-side determinants. There are few researchers like Mallick (2021) who highlight both demand and supply-side factors to explain export performance.

Generally, Pakistan exports primary or semi-manufactured products like rice, fish and fish products, fruits, vegetable, raw cotton, cotton textile products, cotton yarn, readymade garments, rugs and carpets, leather and leather products, sports goods, surgical products, chemical products, petroleum products, engineering goods, etc., whereas imports finished or manufactured products like tea, sugar, edible oil, petroleum products, fertilizers, stationery, books, art, paper board, cloth, silk yarn, dyes and colors, iron, steel, electrical machinery, apparatus, medical equipment, medicines, etc. Resultantly, payments to the rest of the world always exceed receipts and hence the balance of trade remains unfavorable. During the last four decades, BOP shows a high deficit. The main reason behind this deficit is the limited capacity of exportable items while unlimited need for imports. Pakistan's exports are focused not only on few markets but also on the limited number of commodities. So, a serious effort is needed not only to discover additional markets but also to attain diversification. For this target, the government should form policies to swing the trade from raw, and semi-processed exports to finished form international-class products, which can be viable by employing novel technology and schemes. Pakistan's exports are limited because these are not only very few low-value primary or semi-manufactured products. Moreover, inflation, the inauspicious approach of importing countries, adverse trade terms, etc., play a prominent role in creating a deficit. Similarly, unlimited need for imported products are due to the developing economic condition, debt servicing, import of invisible items, import-oriented industries, import-oriented living culture and life style of people, etc., also increases foreign payments.

The objectives of Pakistan's commercial policy is to increase exports through developing trade relations with other countries, diversification of exportable products, protecting infant industries, stabilizing internal as well as the external value of the domestic currency, and improving terms of trade. During 1960s, the countries with huge domestic markets enjoyed Import Substitution Policy (ISP). Specifically, the countries following ISP shift their maneuvers to Export Promotion Policies (EPP), because of severe economic crisis. Resultantly, these countries developed rapidly. That is why in the 1970s, Pakistan moved to Export Promotion Strategy (EPS) to enable the "potential industries" to compete with the rest of the world. For this purpose, the domestic producers had to employ advanced technology to improve their output quality. To promote exports, a considerable number of facilities and incentives have been given to the exporters. For example, Export Financing (EF), Export Credit Guarantee (ECG), Export Zero Rated (EZR), Common Bonded Warehouses Scheme (CBWS), Duty Drawback Scheme (DDS), Export House Scheme (EHS) and Export Marketing and Product Up-gradation Fund (EM UF) etc.

The world's output growth rate was 5.3% in 2010, which is declined to 3.9% in 2011, and the world's trade growth rate during 2010 was 13%, which is declined to 5.8% in 2011.Pakistan's exports growth rate increased to 28.61% (2010-11) from 9.06% (2009-10), while, import growth rate increased to 16.43% (2010-11) from -0.32% (2009-10). The share of Pakistan's export of primary products declined to 18%, which was 33% in 1971. Similarly, during the same duration, the share of semi-manufactured products declined to 12% from 24%. Export of manufactured products increased to 70% from 44% during the same period (Pakistan Economic Survey, 2011-12). According to the most recent accounts, the exports of Pakistan are recorded at $13.23 billion, whereas, imports at $ 32.49 billion during the period of July to January 2018-19. Trade deficit noticed above $2 billion reductions during this period (Pakistan Bureau of Statistics, 2019). It is recommended to manage all the hitches in the way of trade increasing in the said market. A peaceful milieu will end in raising the development of agricultural and industrial sectors and finally the exports, which eventually enable the power to correct the balance of trade deficit.

2 Literature Review

Literature reveals that different researches utilized different assessment methods and techniques like, 2SLS, 3SLS, CMSA, EB, GMM, RCA, OLS, VECM, Simultaneous Equations, CGE Modeling, etc. After applying a suitable methodology to collect data, they have advised appropriate recommendations to come over the dilemma in reconnaissance. Naqvi (1998) identified four forks of CGE models. (i) Multi-sectoral Growth Model (Johansen) emphasizes the distribution of sectoral output, and sectoral allocation of the factors, that is labor and capital. (ii) welfare models (Harberger-Scarf-Shoven-Whalley). (iii) econometric estimation models (Jorgenson), and (iv) linear programming framework (Ginsburgh and Walbrook).

The researchers employed the CGE Modeling technique to estimate the problem in several studies over the last few decades. For instance, Shoven and Whalley (1984) evaluated the literature on CGE Modeling and concentrated on the area of trade and taxation. Similarly, in 1988, Decaluwe and Martens reported a comprehensive survey of CGE Models and examined the economy's particular production formation, individual consumption, foreign trade block, and kinds of closure rules. In the same year, de Melo analyzed the role of these

Models to measure the trade policy settings in underdeveloped economies, while Devarajan reviewed energy CGE Models along with applications for the period.Bandara (1991) estimated CGE Models of the policies for development in LDCs, whereas, in the same era Robinson considered "micro-macro" CGE Models including product, factor, and asset markets. Following this Kraybill in 1993 assessed the regional CGE technique to input-output assessment and regional dilemmas. After this in 1996,Bhattacharyya considered energy and environmental CGE Models. Then, Ghaith et al. (2021) studied this technique to examine the regional matters of economies and policies. Amongst others, with the help of CGE methodology various problems like trade and tariffs, public finance and taxes, etc., were estimated.

Dorosh and Sahn (2000) advanced a unique multi-household CGE Model to estimate the impact of levying quota on imports, real depreciation along with the decrease in public expenditures, real depreciation on the distribution of income. Likewise, Iqbal et al. (2019) designed a CGI frame to inspect the welfare impact of various policies as import liberalization and changes in the domestic tax system on different types of households. During the same period, Humphreys observed the impact of a steady reduction in tariff rates on protected sectors through the CGE technique. Lofgren et al. (2001) analyzed the influence of exterior shocks as well as inland policy changes on the distribution of income. Lofgren et al. (2001) also measured poverty utilizing the consumption of households in this study. Coxhead and Jayasuriya (2004)investigated the impact of protection policy on deforestation and poverty. Fillo and Horridge, in the same year, used CGE Model to estimate poverty and distribution of income by applying the Gini coefficient and FGT poverty indices, etc.

The techniques of CGE Modeling have been applied to examine the impacts of change in policies within multi-agents and multi-sectoral economies. These models consider the interactions and interdependencies within the economy. The major issue faced by developing countries is inequality and poverty. So that these models are frequently formed to examine the impacts of internal and external shocks, exchange liberalization, trade, foreign direct investment, etc., on inequality and poverty. Moreover, these models are also applied to focus on an assortment of policy matters. Principally, these models are the latest sort of Walras' version of a competitive economy. After that, Shoven (1976); Shoven and Whalley (1972); Whalley (1975) and Miller and Spencer (1977), were the most primitive policy-oriented computable general equilibrium researchers. Later on, these methods detonated.

Nguyen (2013) used the CGE pattern for Australia to examine the trade liberalization effect on the welfare and economic performance of the economy and concluded that a decrease in tariff has favorable whereas a decrease in subsidy has an adverse effect. Recently, Moeen-ud Din et al. (2020) examined the impact of free trade on macroeconomic variables in a small open economy with special reference to Pakistan by employing CGE Model and found a positive effect of reducing the tariff on all the selected macroeconomic variables as well as cutting down effect on inequality and poverty too. The investigators suggest that the abolition of tariffs be implemented to overcome the BOT deficit. Similarly, Moeen-ud Din et al. (2020), suggested an increase in the implementation of income tax steadily to overcome Pakistan's budget deficit. In another study, Moeen et al. (2021) analyzed the impact of sales tax reduction on Pakistan study by employing the CGE model and recommend that reducing sales tax policy should gradually be applied to attain economic development and to maintain macroeconomic stability in Pakistan.

Bouët et al. (2010) employed this model to investigate SAFTA's impact on member countries and found a negative impact on tariff income whereas the positive impact on unskilled laborers' income. Utilizing CGE Model for the economy of Pakistan Naqvi et al. (2011) inspected the effect of an increase in income tax as well as sales tax and decrease in public expenditure on the deficit of budget and closed the public deficit with favorable effect as well as covered the losses arising out of tariff abolition on imports. Before this,Feraboli and Trimborn (2008) exercised this technique for Jordan's economy to focus on the gradual attenuation effect of import duties on heterogeneous households' welfare and distribution of income. The researcher instituted a positive impact on the wage rate, tax rate, transfers, assets, and preferences. Ali et al. (2019) applied CGE Methodology for Pakistan to investigate the impact of liberalization of the agriculture sector on the economic growth of the economy and finished positive effect on economic growth, the income of the households (rural as well as urban) and short-run distribution of income distribution but a negative effect in long-run. Jin et al. (2006) estimated the effects of deep trade diversion on FTA among member and non-member countries. The findings of the study indicate a negative impact on non-member economies when they employed the CGEmodeling system to find the free trade agreement effect among Japan, South Korea, and China.

Annabi et al. (2005) operated this approach for Senegal to measure total and unilateral trade liberalization's effect on poverty and inequality. The study concluded that tariff abolition results in an increase in poverty and income inequality in the short run while trade liberalization increases capital formation in the long run. Coxhead and Jayasuriya (2004) functioned the CGE model for the Philippines to observed protection policy impact on poverty and deforestation. They concluded trade liberalization leans to raise the austerity of poverty between income groups, environmental effects of poverty changes are vague. Obi applied the CGE approach in 2003 on Nigeria to compute fiscal policy effects on the income distribution of the economy and results that government expenditures are a very effective tool for income redistribution while adjustments in tariffs worsen income inequality. Thurlow and Van Seventer (2002) used the CGE model for South Africa to check the effects of an increase in public expenditures, elimination of trade restrictions and improvement in aggregate factor efficiency and pointed out that hypothesis formulated about macroeconomic adjustment systems are eminent in deciding the expected effects of policies.

3 Research Methodology

The study has employed the Computable General Equilibrium (CGE) Model. To view the possible effect of an increase in exports on the economy of Pakistan, a Social Accounting Matrix (SAM) for a specific ratio is utilized as a database to structure a CGE model, incorporated with several simultaneous equations . This experiment is based on SAM 2010-11 for Pakistan, ripened by Moeen-ud Din et al. (2020) which reflect various accounts of the economy of Pakistan; like activities and commodities (agriculture, mining, food manufacturing, yarn, textile, leather, other manufacturing, energy, and services), factors of production (labor, land, and capital), institutions (households, government, and rest of the world), and capital. Equations developed in the pattern elucidate the entire economy's interrelationship. SAM affirms real values for the equation's coefficients through the calibration operation. To confirm the imitating of the base year dataset, initially, the model is solved for equilibrium, later it is shocked with a change in the value of one exogenous variable.

Then the model is resolved not only for the equilibrium but also for the changes in the values of endogenous variables. Lastly, these values are compared with the base year's equilibrium values. Like so, the exogenous shock impact is valued.

The pattern of Lofgren et al. (2002) and Bhatti et al. (2015) is adopted to develop the CGE Model for the economy of Pakistan. The model is framed based on mathematical equations. Consequently, mathematical specification of the consumers and producers is as utility maximizers and as output maximizers and/or cost minimizers respectively. Recently, different researchers used this methodology to see the impact of fiscal policy on different macroeconomic indicators of the economy or welfare, or poverty, or inequality, etc., like Abbas et al. (2013); Bhatti et al. (2015); Moeen et al. (2021); Moeen-ud Din et al. (2020); Twaha et al. (2019) etc.

The mechanisms of the model are expounded in detail. Price block is elucidated in the system of equations, comprising export price, import price, and absorption of both, value-added price, activity price. The activity production function is clarified through the Cobb-Douglas production function to certify the factors and activity level relationship. The production function is mathematically vented. Production function states activity time yields, illustrated through a chart presented by Lofgren et al. (2001). Trade elasticity for various goods is scrounged from Iqbal et al. (2015). In this study, three tests are operated to estimate the potential effect of an increase in exports of Pakistan on different macroeconomic variables of the economy. The exports of the country have been augmented by 4% in first, 8% in second and 12% in the third simulation.

4 Findings

Dorosh and Thurlow (2015) thrived a Social Accounting Matrix (172 X 172) for the economy of Pakistan utilizing statistical figures of the economic year 2010-11. Along with given goods trade elasticity and factors reward the latest comprehensive numerical facts of this SAM are taken into account in this research. Additionally, in this analysis, the micro, as well as macrostructure of the SAM, is also assessed. SAM 2010-11 is offered in the disaggregated motif for the rural and urban households, production factors, and activities.

The question to answer here is "What is The Potential Impact of Exports on Macroeconomic Variables of the Economy of Pakistan". The SAM erected for present analysis comprises nine types of activities, nine types of respective commodities, eleven types of main factors of production, nine types of households and three types of institutions. Therefore, the SAM covers five accounts; labeled as activities, commodities, factors, institutions, and capital. Institution's account includes households, enterprises, government, and the rest of the world.

Likewise, it is delved that SAM 2010-11 is to realize the economy's base year physiognomies. The database incorporates parameters of the elasticities like import coupled with domestic substitution elasticities (Armington Elasticities). It is surmised that goods imported turn into a better alternative for the goods manufactured at home when the Armington Elasticities' values are greater, whereas the goods imported become a feeble alternate for the goods manufactured within the country when the Armington Elasticities values are smaller.

4.1 Macroeconomic Variables

Growth of Pakistan's GDP at a fixed cost in Simulation I, II, and III are found at 1.183%, 2.340%, and3.476% respectively. It has attributed a positive effect on private and government consumption, investment and exports. In all the three simulations increase in Private consumption is by 0.750%, 1.491% and 2.224%, Government consumption is by 0.562%, 1.132% and 1.707%, Investment by 0.743%, 1.570% and 2.471% and Exports by 2.968%, 5.974% and 9.017%. A negative effect on Imports and Net Indirect Tax appears in all the simulations. This increase in exports leads to an increase in household incomes, savings, investment, production, activities, exports and hence economic development and growth.

4.2 Production

Applying simulations, I, II, and III on data, the rising tendency in the production of various products except mining and manufacturing of general goods is instituted. Increase in output appeared in agriculture products by 0.318%, 0.608% and 0.873%, in food manufacturing by 0.347%, 0.680% and 1.001%, in yarn by 0.549%, 1.087% and 1.617%, in textile 0.575%, 1.150% and 1.726%, in leather goods by 0.451%, 0.910% and 1.378%, in engineering goods by 0.438%, 0.907% and 1.406% and in services it is by 0.641%, 1.291% and 1.948% while decline in mining is by 1.311%, 2.455% and 3.450% and in other manufacturing fall in production is by 1.034%, 1.941% and 2.734%. It shows the highest increase in the services sector and the highest decrease in mining. It is investigated that the output of those commodities is improved whose maker and domestic price have risen while the production of those products is decreased who's these prices have fallen (table-4). The quantity sold domestically of domestic production has fallen (table-6), while the quantity of composite goods supplied domestically has improved (table-9).

4.3 Households' Income

In all three experiments, it is investigated those income of households belong to all the sectors have positive trends. The rate of increase in income is varying from household to household (table-10). It is higher for rural non-farm non-poor (H-NFNP) households, i.e. 1.044%, 2.077% and 3.100%, similarly also for urban poor (H-URPR) households, i.e., 1.190%, 2.364% and 3.522%, while it is lower for the households related to the agriculture sector, i.e. households with a large farm (H-LF), medium farm (H-MF), small farm (H-SF), landless (H-0F), agriculture landless (H-AGW) and urban non-poor (H-URNP), as exacted in table-10. Factors' rewards increased. The rate of increase in rewards of labor (skilled and unskilled) is found more as compared to all other factors' rewards (table-3). That is, in three experiments, for unskilled labor, these are 1.507%, 2.979%, and 4.422%, while for skilled labor these are estimated at 1.445%, 2.869% and 4.247%. An increase in the price of unskilled, skilled and all other types of labor leads to an increase in demand, which will ultimately be the reason for the increase in production and supply and hence exports.

4.4 Welfare of the Households

In all three experiments, results show the overall welfare of the households has increased (table-13). An increase in income has uplifted the consumption as well as the utility of the households (table-2 and table-12). Moreover, comparing the table-3 and table-1, it can be

concluded that the rate of increase in rewards of the factors is higher than that of the prices of the commodities, therefore, households' real income has increased and as a result of the welfare also increased. In all the three experiments households' compensating variation show that all the households' classes, after an increase in exports became better-off (table-13).

4.5 Inequality

Commonly, to measure intra-group and inter-group inequality, the indices Theil-T, Theil-L, Theil-S, and Hoover Index are used by economists. Table-15 represents indices of inequality. The result of three experiments of increasing Pakistan's exports reveal a positive tendency which indicates a reduction in inequality among different groups of the households, i.e., when 4% of exports are increased (simulation-I), the inequality reduced by 0.001%, and when 8% of exports are increased (simulation-II), the inequality reduced by 0.002% and similarly when 12% of exports are increased (simulation-III), the inequality reduced by 0.003% as per Theil-T. On the same lines, the results of Theil-L, Theil-S, and Hoover can be calculated from table-15.

5 Discussion and Conclusion

The outcomes of the study are instituted by employing the CGE technique, utilizing the SAM 2010-11, as a base for Pakistan's economy. The study borrowed trade elasticities for selected commodities in Pakistan. Three experiments have been conducted to check the impact of the increase in Pakistan's exports to the US market. That is, in simulation-I, a shock of an increase in exports is tested by 4%, in simulation-II by 8%, and in simulation-III by 12% respectively. The inquiry reports that an increase in the exports of Pakistan results in positive impacts on all the macro accounts of the country like; GDP, private consumption, savings, investment, income as well as the welfare of the households. The results have determined that an increase in exports of Pakistan has a desirable impact on almost all the macroeconomic indicators like GDP, consumption in private as well as public sectors, savings, investment, domestic output, income, factors' prices, and welfare. The outcome indicates that domestic production of all the selected commodities except C-MINE, C-FMAN, and C-MANF, that is, mine, food, and other manufacturing respectively have increased in response to increases in demand for exports in the US market. The study observed a notable rise in the production of C-LEAT, that is, leather. It is registered 0.978% in simulation-I, 1.940% in simulation-II, and 2.886% in simulation-III. Textile is noted as number two.

Demand for factors increased due to a higher level of activities. Resultantly, rewards of the factors increased at a higher rate as compared to the prices of the commodities. Consequently, all the types of households' real income increased, as shown in all three experiments. Although, the rate of growth in income of the households concerned with the agriculture sector is low as compared to all other sectors' households. Hence, the increase in consumption level indicates an increase in the level of utility and welfare overall. The outcome of compensating variation (CV) shows that an increase in the exports of Pakistan to the US market will result in a higher living standard of the households of all the categories. The highest CV observed in this study is by H-URNP, H-NFNP, H-SF, and H-URPR

respectively. Though, the lowest CV is recorded for the categories like H-AGW, H-OF, and H-LF. The non-agriculture sector households are more benefitted. It is also noticed that income inequality among these categories has ebbed: Theils (L, T, and S) and Hoover indexes reveal tinier values in each sequential test.

The findings of this analysis indicate in all three experiments that an increase in exports to the US market is of great value for all the sectors of the economy of Pakistan. So, the authorities should focus on upgrading the quality and variety of products, adopting environment-friendly production techniques, registration to ISOs, and gauging up international standards. In this way, the exports of Pakistan can be increased not only to a particular country but to a desirable number of countries. Pakistan is producing far below its capacity level because of energy crises, weak law and order state, and so many socio-economic constraints. It is suggested to administrate these hiccups. A peaceful environment will result in uplift the agricultural as well as industrial sector development and hence the exports, which ultimately enable the authority to come over the adversity of the balance of trade. Exports of Pakistan are concentrated not only to very few markets but also in very few commodities. So, a serious attempt is required not only to discover new markets but also to achieve diversification. For this goal, the government should make policies to shift the trade from raw and semi-processed exports to finished form world-class commodities, which can be possible by applying modern technology and strategies.

References

Abbas, A., Naqvi, H. A., and Mirza, H. H. (2013). Impact of large ownership on firm performance: A case of non financial listed companies of pakistan. *World Applied Sciences Journal*, 21(8):1141–1152.

Ali, H., Malik, A. M., Siddique, H. M. A., and Rizwan, M. (2019). Impacts of urbanization and energy consumption on climate change in pakistan. 11(4):1–11.

Annabi, N., Cissé, F., Cockburn, J., and Decaluwe, B. (2005). Trade liberalisation, growth and poverty in senegal: A dynamic microsimulation cge model analysis. unpublished.

Bandara, J. S. (1991). Computable general equilibrium models for development policy analysis in ldcs. *Journal of economic surveys*, 5(1):3–69.

Bhatti, A. A., Batool, Z., and Naqvi, H. A. (2015). Fiscal policy and its role in reducing income inequality: A cge analysis for pakistan. *The Pakistan Development Review*, pages 843–862.

Bouët, A., Mevel, S., Thomas, M., et al. (2010). Is safta trade creating or trade diverting?: A computable general equilibrium assessment with a focus on sri lanka. Technical report, International Food Policy Research Institute (IFPRI).

Coxhead, I. and Jayasuriya, S. (2004). Development strategy and trade liberalization: Implications for poverty and environment in the philippines. *Environment and Development Economics*, 9(5):613–644.

Dorosh, P. and Sahn, D. E. (2000). A general equilibrium analysis of the effect of macroeconomic adjustment on poverty in africa. *Journal of policy Modeling*, 22(6):753–776.

Dorosh, P. and Thurlow, J. (2015). Agriculture productivity growth and rural welfare: Insights from economy-wide analysis. 13(2):133–155.

Feraboli, O. E. and Trimborn, T. (2008). Trade liberalization and income distribution: A cge model for jordan. In *International Trade and Finance Association Conference Papers*, page 8. bepress.

Ghaith, Z., Kulshreshtha, S., Natcher, D., and Cameron, B. (2021). Regional computable general equilibrium models: A review. *Journal of Policy Modeling*, 43(3):710–724.

Iqbal, N., Haider, N., Akhtar, M. R., and Karim, S. H. A. (2015). Musharaka financing for poverty alleviation in pakistan. *International Letters of Social and Humanistic Sciences*, 37(3):71–81.

Iqbal, N., Tufail, M. S., Mohsin, M., and Sandhu, M. A. (2019). Assessing social and financial efficiency: The evidence from microfinance institutions in pakistan. *Pakistan Journal of Social Sciences (PJSS)*, 39(1):149–161.

Jin, H. J., Koo, W. W., Sul, B., et al. (2006). The effects of the free trade agreement among china, japan and south korea. *Journal of Economic Development*, 31(2):55–72.

Lofgren, H., Chulu, O., Sichinga, O., Simtowe, F., Tchale, H., Teska, R., and Wobst, P. (2001). *External shocks and domestic poverty alleviation: Simulations with a CGE model of Malawi (No. 607-2016-40312).*

Lofgren, H., Harris, R. L., and Robinson, S. (2002). *A standard computable general equilibrium (CGE) model in GAMS*, volume 5. Intl Food Policy Res Inst.

Mallick, H. (2021). Do governance quality and ict infrastructure influence the tax revenue mobilisation? an empirical analysis for india. *Economic Change and Restructuring*, 54(2):371–415.

Miller, M. H. and Spencer, J. E. (1977). The static economic effects of the uk joining the eec: A general equilibrium approach. *The Review of Economic Studies*, 44(1):71–93.

Moeen, G., Naqvi, H. A., and Khan, M. A. (2021). Impact of sales tax reduction on pakistans economy. *Studies of Applied Economics*, 39(4):12–23.

Moeen-ud Din, G., Bhatti, A. A., and Naqvi, H. A. (2020). Does free trade affect macroeconomic variables in a small open economy? a cge analysis for pakistan. *Pakistan Journal of Social Sciences (PJSS)*, 40(3):1469–1483.

Naqvi, F. (1998). A computable general equilibrium model of energy, economy and equity interactions in pakistan. *Energy Economics*, 20(4):347–373.

Naqvi, H. A., Hakeem, M. M., and Naeem, R. A. (2011). Impact of agricultural income tax on household welfare and inequality: Pakistan a case-in-point. *International Journal of Business and Social Science*, 2(6):103–118.

Nguyen, V. H. (2013). *The analysis of trade liberalisation in Australia using a dynamic computable general equilibrium model*. PhD thesis, The University of New South Wales.

Shoven, J. B. (1976). The incidence and efficiency effects of taxes on income from capital. *Journal of Political Economy*, 84(6):1261–1283.

Shoven, J. B. and Whalley, J. (1972). A general equilibrium calculation of the effects of differential taxation of income from capital in the us. *Journal of public economics*, 1(3-4):281–321.

Shoven, J. B. and Whalley, J. (1984). Applied general-equilibrium models of taxation and international trade: An introduction and survey. *Journal of Economic literature*, 22(3):1007–1051.

Thurlow, J. and Van Seventer, D. E. (2002). A standard computable general equilibrium model for south africa. Technical report.

Togan, S. (1993). How to assess the significance of export incentives: An application to turkey. *Review of World Economics*, 129(4):777–800.

Twaha, K., Bhatti, A. A., and Naqvi, H. A. (2019). Impacts of oil discovery on households in uganda: A cge analysis. *Review of Economics and Development Studies*, 5(1):41–48.

Whalley, J. (1975). A general equilibrium assessment of the 1973 united kingdom tax reform. *Economica*, 42(166):139–161.

APPENDIX

A: Output of the Model (*Source: Simulations Results*)

Table 1: ***Household Consumer Price Index (% Variation)***

Households	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Large Farm (H-LF)	1.023	-0.101	-0.197	-0.289
Medium Farm(H-MF)	1.023	-0.105	-0.204	-0.299
Small Farm (H-SF)	1.02	0.066	0.127	0.183
Landless Farm (H-0F)	1.021	0.113	0.218	0.316
Rural Agriculture Landless (H-AGW)	1.02	0.165	0.319	0.462
Rural Non-Farm Non-Poor (H-NFNP)	1.022	-0.005	-0.011	-0.018
Non-Farm Poor(H-NFP)	1.023	0.115	0.222	0.321
Urban Non-Poor (H-URNP)	1.021	-0.042	-0.08	-0.115
Urban Poor (H-URPR)	1.022	0.11	0.212	0.308

Table 2: ***Consumption Expenditures of Households (% Variation)***

Households	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Large Farm (H-LF)	84554	0.643	1.264	1.866
Medium Farm (H-MF)	214882	0.657	1.292	1.907
Small Farm (H-SF)	476443	0.752	1.486	2.205
Landless Farmers (H-0F)	99374	0.726	1.433	2.121
Rural Agriculture Landless (H-AGW)	93542	0.761	1.503	2.227
Rural Non-Farm Non-Poor (H-NFNP)	360694	1.044	2.077	3.1
Non-Farm Poor (H-NFP)	127680	0.995	1.981	2.959
Urban Non-Poor (H-URNP)	1408485	0.62	1.239	1.858
Urban Poor (H-URPR)	172343	1.19	2.364	3.522

Table 3: *Average Price of Factors (% Variation)*

Factors	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Own Large Farm (LA-AGL)	1.059	0.535	1.012	1.437
Own Medium Farm (LA-MF)	1.058	0.535	1.012	1.437
Own Small Farm (LA-SF)	1.056	0.535	1.012	1.437
Agriculture Wage (LA-AGW)	1.081	0.535	1.012	1.437
Non-Agriculture Unskilled (LA-SKU)	1.058	1.507	2.979	4.422
Skilled (LA-SK)	1.037	1.445	2.869	4.274
Large Farm (LN-LG)	1.054	0.535	1.012	1.437
Irrigated Medium Farm (LN-MD)	1.063	0.535	1.012	1.437
Irrigated Small Farm (LN-SM)	1.059	0.535	1.012	1.437
Non-Irrigated Small Farm (LN-DR)	0.979	0.535	1.012	1.437
Capital (K)	1.067			

Table 4: *Producer price for Commodities (% Variation)*

Commodities	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Agriculture (C-AGRI)	1.000	0.318	0.608	0.873
Mine (C-MINE)	1.000	-1.311	-2.455	-3.45
Food Manufacturing (C-FMAN)	1.000	0.347	0.68	1.001
Cotton Lint / Yarn (C-YARN)	1.000	0.549	1.087	1.617
Textile (C-TEXT)	1.000	0.575	1.15	1.726
Leather (C-LEAT)	1.000	0.451	0.91	1.378
Other Manufacturing (C-MANF)	1.000	-1.034	-1.941	-2.734
Energy (C-ENRG)	1.000	0.438	0.907	1.406
Services (C-SER)	1.000	0.641	1.291	1.948

Table 5: *Level of Activities (% Variation)*

Activities	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Agriculture (A-AGRI)	1364731	3.412	3.412	3.412
Mine (A-MINE)	28424	-1.346	-2.579	-3.709
Food Manufacturing (A-FMAN)	673967	-0.14	-0.276	-0.407
Cotton Lint / Yarn (A-YARN)	224415	0.233	0.454	0.666
Textile (A-TEXT)	545403	0.427	0.833	1.22
Leather (A-LEAT)	35937	0.978	1.94	2.886
Other Manufacturing (A-MANF)	646118	-0.588	-1.107	-1.562
Energy (A-ENRG)	189246	0.049	0.095	0.138
Services (A-SER)	3067054	0.049	0.089	0.122

Table 6: *Quantity Sold Domestically of Domestic Output (% Variation)*

Commodities	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Agriculture (C-AGRI)	1338316	-0.046	-0.095	-0.148
Mine (C-MINE)	23132	-2.916	-5.703	-8.371
Food Manufacturing (C-FMAN)	560992	-0.472	-0.953	-1.443
Cotton Lint / Yarn (C-YARN)	163591	-0.154	-0.337	-0.544
Textile (C-TEXT)	329125	-0.207	-0.444	-0.711
Leather (C-LEAT)	20552	-0.032	-0.095	-0.185
Other Manufacturing (C-MANF)	523768	-1.99	-3.914	-5.776
Energy (C-ENRG)	189246	0.049	0.095	0.138
Services (C-SER)	2948732	0.028	0.049	0.063

Table 7: *Quantity of Exports for Commodities (% Variation)*

Commodities	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Agriculture (C-AGRI)	26415	2.32	4.793	7.415
Mine (C-MINE)	5292	5.419	10.711	15.865
Food Manufacturing (C-FMAN)	112975	1.504	3.067	4.683
Cotton Lint / Yarn (C-YARN)	60824	1.272	2.572	3.898
Textile (C-TEXT)	216278	1.389	2.767	4.135
Leather (C-LEAT)	15385	2.323	4.637	6.942
Other Manufacturing (C-MANF)	122350	5.34	10.626	15.851
Services (C-SER)	118322	0.555	1.083	1.59

Table 8: *Quantity of Imports for Commodities (% Variation)*

Commodities	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Agriculture (C-AGRI)	36087	14.228	29.58	46.058
Mine (C-MINE)	95779	0.572	1.175	1.806
Food Manufacturing (C-FMAN)	57923	11.584	23.785	36.584
Cotton Lint / Yarn (C-YARN)	7297	11.497	23.641	36.422
Textile (C-TEXT)	18918	12.378	25.593	39.644
Leather (C-LEAT)	1178	11.603	23.916	36.935
Other Manufacturing (C-MANF)	807118	2.889	5.765	8.628
Services (C-SER)	53953	10.417	21.458	33.131

Table 9: *Quantity of Composite Goods Supplied Domestically (% Variation)*

Commodities	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Agriculture (C-AGRI)	1374403	0.323	0.659	1.008
Mine (C-MINE)	118911	-0.11	-0.176	-0.201
Food Manufacturing (C-FMAN)	618915	0.64	1.295	1.963
Cotton Lint / Yarn (C-YARN)	170888	0.335	0.653	0.958
Textile (C-TEXT)	348043	0.466	0.926	1.38
Leather (C-LEAT)	21730	0.589	1.168	1.74
Other Manufacturing (C-MANF)	1330886	0.96	1.921	2.883
Energy (C-ENRG)	189246	0.049	0.095	0.138
Services (C-SER)	3002685	0.212	0.42	0.626

Table 10: *Income of Households (% Variation)*

Households	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Large Farm (H-LF)	93954	0.643	1.264	1.866
Medium Farm (H-MF)	226190	0.657	1.292	1.907
Small Farm (H-SF)	501515	0.752	1.486	2.205
Landless Farmers (H-0F)	104611	0.726	1.433	2.121
Rural Agriculture Landless (H-AGW)	98471	0.761	1.503	2.227
Rural Non-Farm Non-Poor (H-NFNP)	400770	1.044	2.077	3.1
Rural Non-Farm Poor (H-NFP)	134399	0.995	1.981	2.959
Urban Non-Poor (H-URNP)	1744122	0.62	1.239	1.858
Urban Poor (H-URPR)	181413	1.19	2.364	3.522

Table 11: *Economy Wide Compensating Variation (% Variation)*

	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Total Compensating Variation (TVC)	0.75	1.492	2.224

Table 12: *Utility of Households (% Variation)*

Households	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Large Farm (H-LF)	82670	0.745	1.465	2.161
Medium Farm (H-MF)	210039	0.763	1.499	2.213
Small Farm (H-SF)	467056	0.685	1.358	2.018
Landless Farmers (H-0F)	97329	0.612	1.212	1.8
Rural Agriculture Landless (H-AGW)	91732	0.595	1.18	1.757
Rural Non-Farm Non-poor (H-NFNP)	352910	1.049	2.088	3.118
Rural Non-Farm Poor (H-NFP)	124810	0.878	1.755	2.63
Urban Non-Poor (H-URNP)	1379794	0.663	1.321	1.975
Urban Poor (H-URPR)	168712	1.079	2.147	3.204

Table 13: *Compensating Variation of Households*

Households	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Large Farm (H-LF)	629.329	1235.94o	1822.129
Medium Farm (H-MF)	1637.036	3215.13	4740.19
Small Farm (H-SF)	3267.058	6475.937	9633.646
Landless Farmers (H-0F)	609.252	1206.823	1794.15
Rural Agriculture Landless (H-AGW)	557.732	1107.729	1651.078
Rural Non-Farm Non-Poor (H-NFNP)	3784.669	7531.359	11244.823
Rural Non-Farm Poor (H-NFP)	1122.922	2245.564	3368.372
Urban Non-Poor (H-URNP)	9327.881	18587.998	27786.78
Urban Poor (H-URPR)	1862.454	3707.913	5538.166

Table 14: *National Income Accounts (% Variation)*

Households	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
GDP at Factor Cost (GDPFC)	3377101	1.183	2.34	3.476
Govt. Consumption (GOVCON)	408940	0.562	1.132	1.707
Investment (INVEST)	534109	0.743	1.57	2.471
Exports (EXP)	677841	2.968	5.974	9.017
Imports (IMP)	1030150	-9597.853	-20241.994	-31847.86
Net Indirect Tax (NI-TAX)	251634	-0.143	-0.188	-0.145
Private Consumption (PRVCON)	3037997	0.75	1.491	2.224

Table 15: *Indices of Inequality*

Indices	Base	Simulation-I(4%)	Simulation-II(8%)	Simulation-III(12%)
Theil-T	0.318	0.317	0.316	0.315
Theil-L	0.326	0.325	0.324	0.323
Theil-S	0.322	0.321	0.32	0.319
Hoover Index	0.346	0.345	0.345	0.344