An Evaluation of Different Tax Reform Proposals in Pakistan using CGE Model

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Taxes are an important tool of fiscal policy. However, the taxation system of a country also affects its economic growth and the welfare of the people. Since a change in tax policy has far-reaching consequences for various interconnected economic agents, computable general equilibrium model is used to quantify the impact of changes in direct and indirect tax rate policies on various economic indicators. For this, first a social accounting matrix based on 2017 data is also developed. The results show that in the long run under the unbalanced budget condition, reducing personal income tax rates results in increased consumption, government expenditures, and incomes of various types of labour, but decreased economic growth and exports. However, introducing a flat and low-income tax rate along with decreasing corporate tax, sales tax, and customs duties results in higher economic growth, exports, consumption expenditures, and household income. On the other hand, a balanced budget condition produces better economic results.

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1. INTRODUCTION

To provide people with public goods, infrastructure, and foster economic activities, governments need funds which are collected through various means including taxation, foreign aid and borrowing. However, after the Global Financial Crisis of 2008, it was realised that domestic resource mobilisation is the only sustainable and reliable way to finance such public expenditures (Fossat & Bua, 2013; Gordon, 2010; Keen, 2012). In this context, taxes of various kinds become important fiscal policy tools that are also used for stabilising the economy and income redistribution (Wawire, 2017).

There is rich literature available on the relationship between taxation and economic growth (see Engen & Skinner, 1996; Gemmell, 1988; Goulder & Summers, 1989; Lee & Gordon, 2005). These studies reach different conclusions while

investigating the relationship. According to Auerbach (1996) and Eicher, et al. (2003), these contradictory results are because of different socioeconomic and political systems prevailing in different countries. Therefore, while developing a comprehensive, efficient, and equitable taxation system, governments must take a proper account of the system's macroeconomic and distributional impacts (Sahn & Younger, 2000).

In the literature, the taxation—economic growth nexus and the impact of tax reforms is usually analysed using the general equilibrium approach by considering the interrelationships between all the sectors of the economy. Such an analysis shows the complete picture of the economy and gauges the effects of any tax policy change on all the sectors of the economy. Unfortunately, there is no such study on Pakistan that discusses the relationship between various kinds of taxes and macroeconomic indicators to evaluate various tax reform proposals by studying their impact on economic growth, fiscal deficit, exports, and income. Previous studies are limited in scope, such as Cororaton & Orden (2009) studied the impact of trade liberalisation, Ahmed, et al. (2011) and Iqbal, et al. (2019) investigated the impact of changing general sales tax (GST) only, whereas Naqvi, et al. (2011) examined the impact of agriculture income tax only. Moreover, these studies are based on quite old social accounting matrices (SAMs).

The study aims to identify and quantify the direction and magnitude of impacts of reducing the marginal income tax rate, decreasing the number of slabs, and introducing flat income and corporate tax rates with a reduction in sales tax and customs duties on the economy at both macro and micro levels. This includes the effects of such changes on economic growth, private consumption, investment, government budget, sectoral impacts, and labour income.

This is the first study in Pakistan that uses the computable general equilibrium (CGE) model to analyse the proposed tax reforms, especially in the income tax system. We utilised the latest input-output (IO) table, an updated social accounting matrix (SAM) based on 2017 data from the Labour Force Survey (LFS) and the Household Integrated Economic Survey (HIES). This study hopes to add to the debate on income tax issues in developing economies and reforming taxation systems in developing countries.

The results show that with decreasing personal income tax only, by lowering marginal tax rates and reducing the number of slabs, the size of the economy as measured by real GDP may not increase in the long run though there will be an increase in private and government expenditures, but exports will decline. However, if there is a reduction in all the taxes across the board, then GDP, private consumption, government consumption and exports will increase in both short as well as in long run. The income of the people will increase in both scenarios across all occupations as well. However, comparing the conditions of allowing for fiscal deficit or keeping budget balance, the simulations show that overall economic results are better when budget is kept in balance. The results favour for a cut in taxes across the broad for better economic outcomes.

The plan of the study is as follows. Next subsection gives a brief overview of the tax structure in Pakistan. Section 2 presents a brief review of the literature. Section 3 is on the methodology and the next section presents the results and discusses the findings, followed by the concluding section.

1.1. Tax Structure in Pakistan

The structure of taxes in Pakistan is quite complex. There are multiple taxes in two broader categories of direct and indirect taxes. Direct tax includes income tax, which is further divided into income and corporate tax, wealth tax, corporate value tax (CVT), workers' welfare fund (WWF), and Workers' Profit Participation Fund (WPPF). Similarly, the broad categories of indirect taxes include customs duties, federal excise duty (FED), and sales tax (ST) from domestic production and imports. The broader categories are further subdivided into many sub-categories and the frequency of these taxes is also different. The sales tax on services falls in the domain of provinces and, therefore, its rates are decided by provinces and the revenue is collected by provincial tax authorities. Moreover, the share of indirect taxes is higher (60 percent or above) in the total revenue collection and out of it, most of the taxes are collected from the international trade of goods and services. Therefore, this has additional effects on productivity, resource utilisation, balance of payments, and economic growth (Jamal & Javed, 2013; Pasha & Ghaus-Pasha, 2015). Moreover, a part of taxes is collected through withholding tax, which is by nature an indirect tax and has additional compliance costs. The revenue collected through different kinds of taxes is given in Table 1 below:

Table 1

Breakdown of Federal Tax Revenues (Rs. in Billion)

	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22
Fed. Tax Revenue (a + b)	2,255	2,590	3,112	3,368	3,844	3,828	3,997	4,745	6,148
a. Direct Tax	877	1,034	1,217	1,344	1,537	1,446	1,523	1,731	2,285
I. Income Tax	855	1,007	1,192	1,324	1,515	1,426	1,502	1,711	2,270
II. Wealth Tax	0	0	0	0	0	0	0	0	0
III. CVT	1	1	2	2	5	5	2	0	0.104
IV. WWF/WPPF	21	26	23	18	16	14	19	20	15
b. Indirect Tax	1,377	1,556	1,895	2,024	2,307	2,383	2,474	3,014	3,866
I. Custom Duty	243	306	405	497	608	686	627	748	1,011
II. FED	138	162	188	198	213	238	250	277	321
III. ST (Import)	495	553	678	703	824	810	876	1,116	1,741
IV. ST (Domestic)	501	535	624	626	661	649	721	872	792

Source: FBR Revenue Division Year Book 2021-22.

Moreover, the tax to GDP ratio in Pakistan is also low in comparison with the regional economies. Figure 1 below shows Pakistan's Tax to GDP ratio with the countries in the same region, we see that the ratio was at 10.28 percent which was just lower than Nepal in the region till 2004. But other regional economies improved their tax to GDP ratio and Pakistan deteriorated it until it came down to 8.96 percent, the lowest in the region in year 2013. In year 2017, the ratio reached 10.6 percent and it was higher than of Bangladesh only. Tax to GDP ratio of India was lower than Pakistan in early 2000s but it surpassed Pakistan in 2005 and since then it is higher. Similarly, Bhutan's tax to GDP ratio surpassed Pakistan in 2009. This figure shows that as per tax to GDP ratio, Pakistan is lagging in the region.

Fig. 1. Tax to GDP Ratio of South Asian Economies
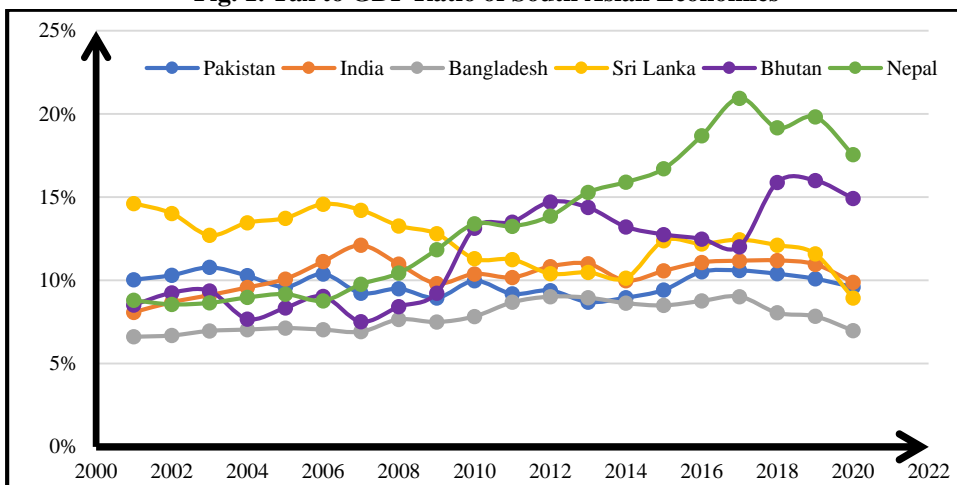
Source: Various issues of Pakistan Economic Survey, WDI and respective countries' financial reports.

An overview of the fiscal indicators shows that Pakistan's fiscal issues are severe. Low tax-to-GDP ratio and greater reliance on indirect taxes are making it difficult for the government to finance public expenditures. As a result, expenditures on human resources, law and order, and important infrastructure projects are low. This low spending may compromise future GDP growth as well. Therefore, there is a need to reform the tax structure to increase tax collection. In the recent past, the government attempted to experiment with decreasing the number of slabs and personal income tax rates. However, most of the changes introduced were undone after a few months only. Therefore, we do not have actual outcomes to study the impact of the changes. Moreover, a group of tax experts proposed to limit the number of taxes to four only, a flat income tax rate, a low corporate income tax rate, and flat and low sales tax and customs duties. According to the experts, the simplified and low rate-based system will help to boost economic activity and, ultimately, result in higher tax collection and increase national wealth.

2. REVIEW OF LITERATURE

The recent literature has concentrated on studying the effects of fiscal stimulus through tax cuts and increases in government expenditures on economic and social indicators. Hamilton & Whalley (1989) evaluated the outcomes of various changes in the Canadian indirect taxation system using a general equilibrium tax model. The results showed an improvement in both welfare and revenue collection by adopting a broad-based sales tax instead of federal or provincial sales taxes. Fortin, et al. (1997) examined the impact of taxation and wage-setting in a developing economy with an informal sector. Analysis using the CGE model showed that an increase in corporate taxes, payroll taxes, and minimum wage rate led to growth in the informal sector, an increase in unemployment, and efficiency costs. Diao, et al. (1998) used a dynamic general equilibrium model to study various debt management policies in the Turkish economy and concluded that although reliance on indirect taxes had distortionary effects and resulted in the loss of welfare, fiscal targets were achieved.

Knudsen, et al. (1998) studied the Danish tax reforms of 1993 using a dynamic CGE model. The simulations showed that reducing taxes, the progressivity of labour income taxation, and a restructuring of capital income taxation resulted in the accumulation of wealth and increased consumption. The reforms brought Pareto improvement. Damuri & Perdana (2003) studied the effect of a 20 percent increase in government spending under different financing conditions on income distribution and poverty in Indonesia using a comparative static CGE model. They found that an increase in spending had a significant and large positive impact on the GDP if it was not followed by an increase in taxes and financed through an increase in loans. However, Begg, et al. (2003) found the opposite results as an increase in spending financed by an increase in income taxes showed an improvement in GDP through the balanced budget multiplier effect. On the same lines, Mabugu, et al. (2013) studied the impact of a 6 percent increase in government spending on South Africa's economy using the dynamic CGE model. They concluded that an increase in government spending resulted in higher GDP no matter if it was financed through a higher income or output tax, or all the taxes.

Mountford & Uhlig (2009) analysed the impact of changes in tax on the economy and concluded that unanticipated deficit-financed tax cuts stimulated the economy in the short term. However, the growing deficit might have consequences in the long run which overweigh the short-term gains. Cororaton & Orden (2010) evaluated the effects on poverty reduction of trade liberali station when tariff revenue was replaced with either direct or indirect taxes to keep the government budget balanced, with a greater reduction in poverty when a direct tax was imposed. Romer & Romer (2010) found that tax changes had very large effects on output and investment. Particularly, they showed that an exogenous tax increase of one percent of GDP lowered real GDP by approximately three percent. Amir, et al. (2013) identified and quantified the impacts of income tax reforms on the Indonesian economy using key macroeconomic and socioeconomic indicators. The results of the CGE model showed that reducing income tax and introducing a low and flat tax rate for corporate tax led to higher economic growth and poverty reduction.

Gale & Samwick (2014) suggested that though the tax cuts may encourage individuals to work, save, and invest more, such policy must be backed by spending cuts to avoid large deficits. Otherwise, it may result in reducing national savings, increasing interest rates and, thus, a drop-in investment in the long run. Hasudungan & Sabaruddin (2016) investigated the impact of choosing between increasing borrowing to support increased government expenditures or simultaneous increase in both borrowing and exogenous output tax rates or a reduction in subsidies on the Indonesian economy using the CGE model. The simulations showed that the first proposal improved GDP but also increased the fiscal deficit, whereas the other two alternatives resulted in lowering the GDP because both resulted in increasing the cost of production and thereby increasing inflation and decreasing consumption.

Huang & Rios (2016) derive the framework for optimal taxation when households are involved in tax evasion. The paper derives the mix of linear optimal consumption and non-linear optimal income tax for redistribution purposes. It is assumed that consumption taxes are enforceable, while income taxes can be evaded. To achieve the goal of income redistribution in economies with low compliance, the two tax instruments are

complementary. As the social planner puts more weight on the lower-ability households, the income tax becomes more progressive, but the optimal consumption tax rate also increases because of higher evasion at higher marginal tax rates.

Hussain & Malik (2016) investigated the asymmetric response of output to changes in average marginal tax rates using Romer & Romer's (2010) data and found that only a tax decrease resulted in a significant and permanent increase in output whereas the tax increase had no significant impact. Using a simple model, it was shown that this asymmetry was derived from the asymmetric response of individual consumption to change in taxes as households face asymmetric consumption adjustment costs. Bhattarai & Trzeciakiewicz (2017) developed a DSGE model and analysed the fiscal policy in the UK. The findings showed that public consumption and capital income tax were the most effective fiscal tools in the short and long runs, respectively, whereas public investment was effective in both short and long runs and transfer payments were the least effective tool. On the other hand, when the interest rate fell to a zero lower bound, the effectiveness of consumption taxes and public expenditures increased, and the income taxes became the least effective. The analysis also showed that non-Ricardian households make fiscal policy more effective and nominal rigidities enhance the effectiveness of public spending and consumption taxes and decrease the effectiveness of income taxes.

Giraldo & García (2018) examined the effects of changes in the tax system on economic growth, welfare, and income distribution in the Colombian economy using a CGE model. Considering three alternatives of increasing the VAT, extending the VAT to all products, or decreasing the corporate income tax by 20 percent and a progressive income of the tax rate on wealthy people, they found that an increase in indirect taxes did not have a large significant impact on the welfare of low-income households and taxing production. Mertens & Montiel Olea (2018) provided empirical evidence that a cut in marginal tax rates increased output and decreased unemployment. Belayneh (2018) examined the impacts of a cut in direct taxes on macroeconomic variables, fiscal balance, income distribution, and the welfare of households using the dynamic CGE model. The simulations showed that such a reform would result in increasing the income of the households. However, non-poor urban households would enjoy more benefits. The manufacturing sector would receive more benefits from such reform than any other sector of the Ethiopian economy.

Abdisa (2018) studied the effect of tax reforms on major macroeconomic indicators in the Ethiopian economy of tax reforms using the dynamic CGE model. The results showed that reducing direct tax or increasing the sales tax would boost overall economic activity, whereas reducing tariffs would have negative consequences. Lin & Jia (2019) analysed the impact of taxes on energy production sectors energy, CO_2, and the Chinese economy using a dynamic recursive CGE model. They found that the tax rate in the ad valorem tax system affected the GDP negatively, while the tax rate in a specific and fixed tax regime had a limited positive relationship with the GDP. Switching to a fixed tax system would also result in decreasing inflation. Nandi (2020) proposed and calibrated a DSGE model for the Indian economy to study the impact of fiscal policy shocks. The results showed that the GDP and employment were positively related to government spending, negative consumption tax reduced inflation and induced consumption, while negative labour income tax had an asymmetric effect on the

economy. Results also showed that an increase in public investment did not crowd out private investment.

The US Senate approved a new tax plan that reduced almost all kinds of taxes. The supporters of this move argued the workers would enjoy higher wages, while the opponents argued that a reduction in government expenditure because of this would be costly for workers. Using Romer & Romer's (2010) average marginal tax rate data, Berisha (2020) studied the effect on middle-class workers' earnings of these changes. The results suggested that a one percentage point increase in tax liabilities (relative to the GDP) led to about a 1.5 percent decrease in real GDP growth and a 0.5 percent decrease in median weekly earnings. However, the direct effect of decreasing taxes on median weekly earnings was not statistically significant. The outcomes also suggested that deficit-driven tax increases contributed to lower median weekly earnings.

This review of selected literature shows that most economists view that a fiscal stimulus results in higher GDP and poverty. However, the choice of mechanism is critical, and the optimal choice depends on a particular economy's conditions. Moreover, we find only a few studies on Pakistan and even those are very limited in scope. For example, the study of Iqbal et al. (2019) looked at the impact of the GST only on household consumption patterns. Similarly, the focus of Ahmed, et al. (2011) was on the GST only and it is conducted by using SAM for 2004, which is quite old now. Naqvi et al. (2011) covered agricultural income tax by using SAM 2001-02. A comparative study of different income tax rate proposals that examines the impact on key economic variables of Pakistan's economy is missing and the current study aims to fill this gap.

3. METHODOLOGY

Computable General Equilibrium (CGE) model has been used in this study to investigate the impact of tax reform proposals. CGE models are based on Input-output (IO) tables data or Social Accounting Matrix (SAM) data. In this section, we first discuss Social Accounting Matrix 2017 developed for this study and then shed light on CGE model.

3.1. Social Accounting Matrix 2017

A social accounting matrix (SAM) is based on a single-entry accounting system, which assigns values to incomes and expenditures in a circular flow and records all the transactions in an economy (Breisinger, et al. 2009; Dorosh, et al. 2004). Mathematically, a SAM is a square matrix each row and column of which represents an account and each cell shows an expenditure made by the sector/agent (column) to purchase the goods or services of the sector/agents (row). The income-expenditure equality is maintained in the SAM. Thus, on one hand, macroeconomic consistency is maintained and, on the other, details of the income of the factors, expenditures of the households, and production of various goods and services are also recorded. Rich multisectoral data helps policymakers to quantify the impact of change in a policy on various sectors of the economy (Robinson, et al. 2001).

Building a SAM requires collecting data from various sources such as input-output (IO) tables, national accounts, the desegrated balance of payment, fiscal account, household income and expenditures surveys, and labour force surveys. The rich information gathered from all these resources captures the heterogeneity of production activities, incomes and expenditures. This strongly interconnected information helps policymakers to perform structural analysis, and allows the study of the distributional impact of a change in a policy parameter.

In the current SAM, unlike previous ones, mining and food, beverages, and tobacco sectors were introduced separately because they are treated differently for tax purposes. Similarly, manufacturing sector was split into various categories, such as electrical and optic equipment, rubber and plastic, chemical and chemical products, paper, printing and publishing, etc. Besides common public and private services, such as education, healthcare, and public administration, hotel and restaurant services were also introduced as these represent a growing tourism and hospitality industry. For most of the disaggregations described above, the IO 2017 Table was used. The final 2017 SAM included 34 commodities produced by 34 activities with detailed disaggregation of industries and services sectors, but limited disaggregation of the agriculture sector. Detailed interconnections between various industries help gauge the impact of change in any such policy on various sectors and, thus, on the overall economy.

Next, we introduced 24 factors. Two basic economic factors of production, labour and capital, were divided into three categories, namely, low-skilled labour, high-skilled labour and capital. These three categories were further split into rural and urban geographies of all four provinces. Likewise, we introduced 8 categories of households based on the rural-urban divide in each province. The households earned an income equal to the value-added of the factors of production they own. Remittances from foreign and transfer payments from the government were the other sources of income for these households. Out of their income, they paid direct tax to the government, paid firms for consuming their goods and services and the leftover income s saved.

The government earns income by collecting tax revenue, in terms of the renumeration of the capital it owns and in terms of loans, aids and grants. While developing the current SAM, we considered various direct and indirect taxes such as income tax on individuals, firms and associations of persons etc. On the expenditure side, the government provides public goods to the general public which needs various commodities as inputs. Similarly, the government needs services of various factors of production to enable itself to produce and supply public administration. It makes transfer payments and gives subsidies to households and firms. Along with all these, some of the government expenditures are on debt servicing. The information on all such incomes and expenditures was obtained from the FBR Yearbook 2017, National Income Accounts, and Handbook of Statistics on Pakistan Economy 2020.

The rest of the world account records the flow of funds from and to foreign countries. These include payments made against imports, payments received against exports, the flow of remittances, capital payments and the flow of savings and loans, grants, and aid. The information on all these was obtained from the Balance of Payment (BOP) account published by the State Bank of Pakistan (SBP), National Income

Accounts published by the Finance Ministry, and trade statistics published by SBP and Pakistan Bureau of Statistics (PBS). While developing the SAM, this account was not disaggregated, but it can be done using the IO table and information from the sources cited above.

After cross-checking each value from multiple sources and minimi sting row-column sum differences, we used the cross entropy approach following Golan, et al. (1994, 1997); Judge & Mittelhammer (2011); Robinson, et al. (2001).

3.2. Computable General Equilibrium (CGE) Model

To study the impact of various policy interventions on Pakistan's economy, researchers have utilised different CGE models. Siddiqui and Iqbal (2001) developed the CGE model for Pakistan and used it to analyse the impact of tariff reduction. The same model was used by Siddiqui, et al. (2008) for studying the impact of fiscal and trade policy changes on poverty. Ahmed, et al. (2011) used the CGE model developed by Poverty and Economic Policy (PEP) Research Network to examine the impact of changes in indirect taxes in Pakistan. Khan, et al. (2018); Shaikh (2009); Shaikh & Rahpoto (2009) used the Global Trade Analysis Project (GTAP) model to investigate the effects of various trade-related policies on Pakistan's economy. Robinson & Gueneau (2013) used the basic CGE model developed by International Food Policy Research Institute (IFPRI) and extended it for exploring the impact of changes in water resources in the Indus River, especially focusing on the impact of water shocks on Pakistan's economy.

The main inspiration for developing a CGE model for this study was based on ORANI-G (Horridge, 2000; Horridge, 2003), Applied General Equilibrium Model for Fiscal Policy Analysis (AGEFIS) by Yusuf, et al. (2007), Amir, et al. (2013), Siddiqui & Iqbal (2001) and Siddiqui, et al. (2008). However, the main differences between the CGE model developed for this study and one earlier developed by Siddiqui & Iqbal (2001) is that in the previously developed model, domestic production is divided into five sectors, whereas in the current model, we divide it into 34 sectors, labour is assumed to be homogenous in the model of Siddiqui & Iqbal (2001), whereas in our model we introduce 16 different types of labour based on geographical local and skill level and 8 categories of capital. Similarly, we also introduce eight different types of households based on rural-urban localities of each province whereas the older study included only one household. Because of these additions, we believe that the current model is more flexible as it can show mobility of labour and capital between different areas and sectors, the kind of labour, i.e., low skilled or high skilled, being chosen by different industries, the labour-capital intensity of various sectors, rate of unemployment, and wage rigidities. Since labour income is a major share of household earnings, the ability to study these labour market adjustments is an important addition to the model.

Following other CGE models, such as Dixon (2006); Dixon, et al. (1982; 1992), Dixon & Rimmer (2002), the equations of the model are linearised using percentage changes based on the Johansen approach instead of the levels of variables. Moreover, for each component of demand, the price formation process is described in various factors such as basic value, margin, taxes, etc.

Fig. 2. Structure of the Production Block
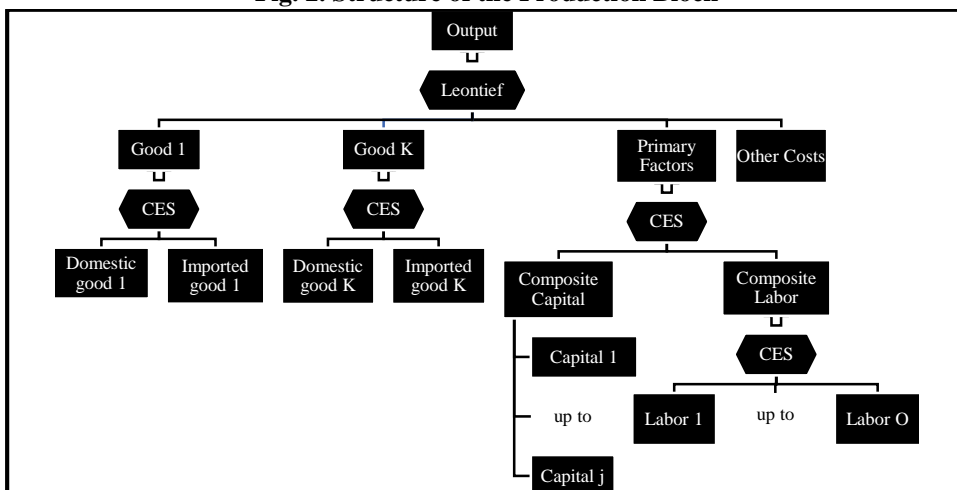
Source: Adopted from Horridge (2003) with some modifications.

In the present mode, the short-run closure is achieved by assuming that capital is fixed capital, which implies no new investment. The rate of return on capital adjusts to equate the demand for and the supply of capital. Similarly, short-run closure also assumes that the real wage rate is predetermined. These are all assumed to be fully flexible in the long run. However, the tax rates, technological change, and transfer between institutions are assumed to be exogenous in both the short and the long run. The exchange rate is assumed to be numéraire.

It is also worth mentioning that the model does not generate a recursive dynamic path of the results from the short run to the long run; rather the two results are generated because of the difference coming from the model closure.

3.3. Policy Scenarios and Impacts

To widen the scope of the model, corporate income tax and indirect tax were also added. The following are the alternative scenarios that were tested against the baseline scenario.

3.3.1. *Simulation 1*

Income Tax Rate Brackets

Table 2

Proposed Personal Income Tax Rate

Income	Tax Rate
≤ 400,000	0
400,001 – 800,000	Rs. 1,000
800,001 – 1,200,000	Rs. 2,000
1,200,001 – 2,400,000	5%
2,400,001 – 4,800,000	Rs. 60,000 + 10%
4,800,001 and above	Rs. 300,000 + 15%

3.3.2. *Simulation 2*

In this scenario, a flat income tax rate of 10 percent for households having a taxable income of Rs. 400,000, a corporate tax rate of 20 percent, a sales tax rate of 5 percent, and a custom duty of 5 percent across all commodities and no other tax as proposed by Bukhari & Haq (2016, 2020) was assumed.

Both scenarios were simulated for two conditions, i.e., the unbalanced budget condition and the balanced budget condition.

4. RESULTS AND INTERPRETATION

Modelling the policy changes requires changing the marginal income tax rate. However, the equations of the model are not based on marginal income tax rates, but rather on average tax rates. Therefore, average tax rates were calculated based on new marginal tax rates and these values were used as new tax rates.

In this section, first, the simulation results of changes in marginal tax rates on key macroeconomic indicators are presented followed by sectoral impacts and impacts on labour income. The two simulation scenarios were decreasing the personal income tax rate along with a smaller number of slabs (SIM 1) and introducing fixed personal income, and a reduction in corporate tax, sales tax, and customs duties and abolishing all other taxes (SIM 2).

4.1. Key Macroeconomic Indicators

Simulation results on key macroeconomic indicators such as real gross domestic product (GDP), private consumption expenditures, investment expenditures, government consumption expenditures, exports, imports, and consumer price index (CPI) are presented in the table below. The results show that reducing personal income tax rates left households with higher disposable income. As a result of which, in the long run, the consumption expenditures of the households would increase by 0.4 percent and investment by 0.006 percent. This increase in household disposable income would lead to more demand, which is reflected by an increase in imports by 0.069 percent and a reduction in exports by 0.389 percent. Government expenditures would also rise by 0.032 percent and the consumer price index would rise by 0.119 percent. An increase in government expenditures would result in increasing the budget deficit and, hence, future interest and capital payments by the government. Together, all these components of demand would result in reducing the real GDP by 0.102 percent.

Table 3

Simulation Results for Key Macroeconomic Indicators

Macroeconomic Indicators	Unbalanced Budget				Balanced Budget			
	Short Run		Long Run		Short Run		Long Run	
	SIM 1	SIM 2	SIM 1	SIM 2	SIM 1	SIM 2	SIM 1	SIM 2
GDP	0.024	0.031	− 0.102	0.158	− 0.008	− 0.019	0.014	0.213
Private Consumption	0.422	0.455	0.4	0.417	0.121	0.119	0.391	0.402
Investment	0.001	0.002	0.006	0.019	0.000	0.000	0.037	0.128
Govt. Cons	0.041	0.059	0.032	0.029	− 0.311	− 0.513	− 0.229	− 0.278
Exports	− 0.189	0.015	− 0.389	0.162	0.015	0.102	0.0412	0.197
Imports	0.130	0.131	0.069	0.098	− 0.018	0.006	0.061	0.058
CPI	0.298	0.137	0.119	− 0.079	− 0.020	− 0.123	− 0.029	− 0.126

Notes: Simulation Results.

The reduction in the personal income tax rate, adds more income to the economy. However, most of this income is used to finance increased consumption expenditures. As savings grow slowly, which was reflected by smaller growth in investment, domestic production fails to match the higher domestic demand. This is also fuelled by higher government expenditures and in the case when balancing the budget is not binding, leads governments to accumulate more debt, leaving little for the private sector. As the model was built to account for the sale of goods produced both in domestic and foreign markets based on the prices producers receive, exports reduce and demand for imported goods increases. This would result in decreasing the GDP. This suggests that along with decreasing income tax, the government should also cut down its expenditures so that government would borrow less to make more funds available to the private sector to increase production. This would also moderate increased aggregate demand, which would reduce the demand for imports and increase exports, resulting in a lower trade gap, which could result from the reduced personal income tax.

The results of Simulation 2 can also be interpreted along the same lines. In this case, real GDP would increase because of positive growth in private consumption, investment, government consumption, and higher trade. A significant difference can be noted in exports which showed an increase of 0.162 percent compared to a decline of 0.389 percent in the case of lower PIT only. This could be because of the low financial cost under the simplified tax system with lower taxes, which encourages more investment and also leads to improving competitiveness as noted by Cororaton & Orden (2010).

Short-run results are also reported which can be interpreted along the same lines. In the short run, GDP growth was positive even in Scenario 1 when there was a decrease in income tax only. The other difference is that there was a price increase even in the case when all the taxes were lower. This shows that a decrease in the cost of production due to lower taxes is not passed through to the consumers in the short run. This is possible, according to economic theory, because of some of the frictions in the economy, which may lead to some kind of market power that results in delaying passing the benefit of the decrease in cost to the consumers. The model also incorporates these frictions. As mentioned above, the sources of friction in the model are margins and transportation costs.

The reduction in the personal income tax rate would add more income to the economy. However, most of this income would go into financing the increased consumption expenditures. As savings grow slowly, which was reflected by smaller growth in investment, domestic production would fail to match the higher domestic demand. This is also fuelled by higher government expenditures and, therefore, in the case when balancing the budget is not binding, this would lead the government to accumulate more debt leaving less for the private sector. As the model was constructed in a way that goods produced could be sold in domestic as well as in foreign markets based on the prices producers receive, exports would reduce and demand for goods produced in foreign countries would increase, which would lead to a decrease in the GDP. This suggests that, along with decreasing income tax, the government should also cut down its expenditures so that the government has to borrow less and more funds are available to the private sector for increasing production. Moreover, this might also moderate the increased aggregate demand leading to reduced import demand and increased exports. This would improve the trade gap which resulted from the reduced personal income tax.

The results of Simulation 2 can also be interpreted along the same lines. In this case, real GDP would increase because of positive growth in private consumption, investment, government consumption, and higher trade. A significant difference can be noted in exports which showed an increase of 0.162 percent compared to a decline of 0.389 percent in the case of lower PIT only. This is primarily because lower taxes would reduce financial costs resulting in higher profit and, thus, encouraging more investment.

The short-run results show that in the short run, GDP growth would be positive even in Scenario 1 when there was a decrease in income tax only. The other difference is that there was a price increase even in the case when all the taxes were lower. This shows that a decrease in the cost of production due to lower taxes would not be passed through to the consumers in the short run which is an indication of some kind of friction in the system.

The results of simulations for both scenarios under balanced budget condition show that in the long run, the GDP would grow at a higher rate under both kinds of tax reforms when the balanced budget condition is binding. However, in the short run, GDP growth is negative in both scenarios. This shows that under the balanced budget condition, the government would have to cut its expenditures, which would negatively affect economic growth in the short run. However, in this condition, the financial needs of the government would not create more debt leaving more liquidity for households and firms, which may be the key to economic growth in the long run.

4.2. Sectoral Impacts

Long-run sectoral impacts in terms of percent changes in output and prices are reported below. These impacts suggest that decreasing income tax rates and slabs only, as for simulation 1 (Sim 1), would result in decreasing the output of mining and related activities, textile, machinery, manufacturing, and construction sectors, whereas it would increase the output of electricity, trade at various levels, hotelling, rent, financial services, education, and health. The prices of almost all the items would increase because of higher demand driven by an increase in the take-home income of the households. However, there would be a prominent increase in the prices of mining, textile, leather, agricultural goods, machinery, transportation services, and real estate services.

Analysing the impacts of cuts in both direct and indirect taxes across the board, we can observe that the output would increase and the price of the output of most of the sectors would decrease. This shows that with a decrease in income tax, households would increase their consumption but most of the additional supply would come from the increase in imports rather than from the increase in local production. This may be because only households were given tax relief which resulted in increasing the demand but firms were not given any incentive or additional benefit that could have resulted in decreasing their cost of production. Therefore, domestic firms had little margin to increase their supply and, hence, the additional demand was fulfilled largely from the imported goods. Therefore, significant growth in the output of the firms was not observed. On the other hand, if we look at the second scenario where a flat personal income tax rate was combined with a decrease in corporate income tax, sales tax, customs duty and abolishing all

other taxes, it would result in decreasing the financial cost of the firms. Therefore, the firms could earn higher profits and look forward to expanding their production capacity. This is observed in increasing the output level as well as a decrease in the price of several commodities which may be the result of decreasing the indirect taxes which are passed on to consumers.

Short-run sectoral impacts are reported for both simulation conditions in the last two columns of Table 4. Overall, short-run impacts are quite similar to long-run outcomes, but there are slight differences between the two cases, such as wood, paper making, chemicals, and construction sector in terms of output and textile, coke and public administration in terms of prices.

Table 4

Sectoral Impacts of Tax Reforms Under Unbalanced Budget Condition

Commodities/ Industries	Long-Run Impact				Short-Run Impact			
	SIM 1		SIM 2		SIM 1		SIM 2	
	Output	Price	Output	Price	Output	Price	Output	Price
Agriculture	0.096	0.205	0.107	0.012	0.101	0.199	0.103	0.013
Mining	− 1.023	0.283	0.210	0.016	− 0.233	0.263	0.119	0.019
Food	0.062	0.124	0.114	− .103	0.132	0.167	0.122	− 0.094
Textile	− 0.413	0.249	0.179	− .002	− 0.019	0.255	0.154	0.001
Leather	− 0.104	0.201	0.246	− .011	0.043	0.198	0.260	− 0.019
Wood	− 0.219	0.103	− 0.097	0.037	− 0.037	0.110	0.008	0.042
Paper	0.023	0.021	− 0.107	0.011	0.040	0.073	0.067	0.013
Coke	− 0.017	0.107	0.109	− .005	0.001	0.113	− 0.013	0.001
Chemicals	0.132	0.128	0.140	− 0.01	0.122	0.129	0.144	− 0.007
Rubber	0.097	0.094	0.107	0.004	0.101	0.100	0.121	0.010
Nonmetallic Minerals	− 0.521	0.066	− 0.877	− .016	− 0.239	0.072	− 0.767	− 0.008
Metals	0.012	0.100	0.093	0.009	0.107	0.106	0.104	0.012
Machinery	− 0.059	0.223	0.108	− .031	0.011	0.230	0.112	− 0.024
Electric Equipment	0.394	0.195	0.455	0.009	0.104	0.202	0.461	0.011
Transport Equipment	− 0.021	0.197	− 0.122	0.003	− 0.009	0.214	− 0.013	0.004
Manufacturing	− 0.031	0.182	0.140	− .011	0.016	0.186	0.140	− 0.017
Utility Supply	0.173	0.132	− 0.061	0.004	0.214	0.129	− 0.003	0.005
Construction	− 0.109	0.114	− 0.002	0.001	− 0.021	0.130	0.010	0.004
S&M of Vehicles	0.104	0.092	0.113	0.003	0.022	0.099	0.142	0.090
Wholesale Trade	0.098	0.057	0.102	− .017	0.100	0.070	0.079	− 0.009
Retail Trade	0.084	0.103	0.084	0.008	0.069	0.111	0.103	0.010
Hotels	0.102	0.034	0.214	0.011	0.092	0.053	0.200	0.012
Inland Transport	− 0.034	0.192	0.098	0.009	− 0.043	0.199	0.106	0.008
Water Transport	0.117	0.279	0.216	0.010	0.124	0.286	0.223	0.009
Air Transport	0.097	0.226	0.100	− .017	0.103	0.233	0.099	− 0.012
Transport Services	0.037	0.198	0.049	0.007	0.078	0.201	0.063	0.014
Telecom	0.010	0.154	0.021	− .006	0.031	0.193	0.101	− 0.001
Financial Institutions	0.242	0.245	0.249	− .011	0.098	0.267	0.216	− 0.003
Real Estate	0.131	0.271	0.102	0.018	0.129	0.290	0.113	0.012
Renting Business	0.034	0.109	0.021	− .007	0.029	0.111	0.016	− 0.003
Public Administration	− 0.140	0.112	0.138	− .010	− 0.024	0.109	0.171	0.002
Education	0.152	0.158	0.168	0.001	0.155	0.169	0.201	0.009
Health	0.126	0.151	0.159	− .005	0.121	0.162	0.189	− 0.001
Communication Services	− 0.042	0.023	0.003	0.008	− 0.019	0.030	0.021	0.012
Average Impact	−0.012	0.151	0.076	−0.002	0.044	0.161	0.093	0.003

Note: Simulation Results.

As different sectors of an economy have strong forward and backward linkages, the effects of changes in the cost of production through prices transmit from one firm to another and the transmission mechanism is stronger for input–producing industries. According to Carvalho et al. (2021), the effects of change in the price of a good, produced by an industry impact all industries that use this good as input especially when the elasticities of substitution between various intermediate inputs or between intermediate goods and factors of production are not equal to one. Blöchl, et al. (2011), Fadinger, et al. (2016), and McNerney, et al. (2013) document that the distribution of sectoral impacts is highly heterogeneous. The magnitude of the impact on other industries also depends on the size of the industry. Carvalho, et al. (2021) and Bernard, et al. (2019) report that large firms in terms of sales and employment also have a large number of buyers and suppliers and, therefore, have deeper effects on the input suppliers and output buyers. According to Barrot & Sauvagnat (2016) and Boehm et al. (2019), these effects may have a significant impact on the overall economy.

Both alternatives that this study tested, focussed on decreasing the tax burden. In Scenario 2, only the tax burden on individuals was decreased, whereas in Scenario 2 the tax burden on both the individuals and the firms was decreased. An increase in disposable income of the households following the decrease in income taxes would lead to an increase in consumption demand and savings. The increased savings then would lead to higher investment and, therefore, higher production. As a result, firms would hire more factors of production, which would decrease unemployment and increase labour income and the GDP. Similarly, a decrease in corporate income tax and customs duties led to lowering the cost of production and increasing the output produced. Moreover, since, at present, the different sectors are treated differently as a part of protection policies through various kinds of indirect taxes, such as tariffs, customs duties, and regulatory duties, opting for similar tax treatment for all the sectors would result in impacting different sectors differently. For example, in our case, we observed a resource shift from the textile sector to other sectors, like the manufacturing of electric equipment and financial institutions as a result of the change in the tax treatment. However, lowering taxes would also decrease government revenue collection, at least in the short run, which might affect the provision of public goods or lead to debt accumulation.

Sectoral impacts of tax reforms under balanced budget conditions are presented in the Table 5.

4.4. Effects on Labour Income

Lastly, the effect of changes in tax rates on the income of different kinds of labour used in the model is discussed. The long-run and short-run results reported in the table below show that all the various categories of labour would experience an increase in income under both scenarios of a tax rate decrease. However, the increase in labour income would be higher in the case of Scenario 2 in which there was a decrease in the rate of all kinds of taxes which would benefit not only households and result in increasing their demand for the product but would also reduce the cost of production for the firms making it more profitable for corporations to increase their production.

Table 5

Sectoral Impacts of Tax Reforms under Balanced Budget Condition

Commodities/ Industries	Long-Run Impact				Short-Run Impact			
	SIM 1		SIM 2		SIM 1		SIM 2	
	Output	Price	Output	Price	Output	Price	Output	Price
Agriculture	0.090	0.113	0.101	0.101	0.087	0.028	0.080	0.031
Mining	− 2.287	0.213	0.011	0.022	− 0.013	0.067	0.011	− 0.009
Food	0.071	0.083	0.193	0.009	0.117	0.122	0.113	0.003
Textile	0.132	0.034	− 0.149	− 0.010	− 0.012	− 0.03	− 0.045	0.010
Leather	− 0.122	0.029	− 0.021	0.102	0.003	0.022	− 0.002	0.013
Wood	0.109	0.017	− 0.013	0.021	− 0.021	− 0.11	− 0.101	− 0.002
Paper	− 0.031	− 0.011	0.102	− 0.002	0.029	− 0.04	0.031	− 0.022
Coke	− 0.013	0.011	0.212	− 0.006	0.000	0.026	0.004	− 0.003
Chemicals	0.210	− 0.025	0.140	− 0.010	− 0.013	0.014	− 0.013	0.002
Rubber	− 0.013	0.008	0.197	0.004	0.032	− 0.10	− 0.021	0.010
Nonmetallic Minerals	− 0.112	0.056	− 0.110	− 0.012	0.002	0.025	0.015	− 0.002
Metals	0.013	− 0.070	0.032	0.002	− 0.091	0.016	− 0.011	0.012
Machinery	− 0.031	− 0.002	− 0.013	− 0.017	0.022	− 0.03	0.101	− 0.04
Electric Equipment	0.344	− 0.079	0.155	0.009	− 0.033	− 0.17	0.076	− 0.03
Transport Equipment	− 0.002	− 0.011	− 0.122	0.003	− 0.017	0.130	− 0.011	0.002
Manufacturing	0.010	0.151	0.224	− 0.009	0.012	0.092	0.121	− 0.02
Utility Supply	0.105	− 0.012	0.013	− 0.001	0.101	0.091	0.004	0.004
Construction	− 0.011	0.101	0.230	− 0.011	− 0.043	− 0.01	− 0.009	0.004
S&M of Vehicles	0.101	0.071	0.111	0.006	− 0.006	0.023	− 0.111	0.079
Wholesale Trade	0.066	0.023	0.153	− 0.002	0.120	− 0.05	0.021	− 0.009
Retail Trade	0.079	0.107	0.082	− 0.003	0.051	0.111	− 0.001	− 0.003
Hotels	0.098	0.029	0.323	0.020	0.065	− 0.05	0.018	0.011
Inland Transport	− 0.003	− 0.010	0.082	0.001	− 0.031	0.170	0.009	− 0.002
Water Transport	0.124	0.283	0.229	0.011	0.122	0.201	0.021	0.010
Air Transport	0.092	0.199	0.137	− 0.012	− 0.009	0.023	0.069	− 0.002
Transport Services	0.040	0.168	0.051	− 0.002	− 0.101	0.102	0.041	0.021
Telecom	0.018	0.133	0.043	0.013	0.009	0.112	0.100	− 0.013
Financial Institutions	0.199	0.234	0.244	0.009	0.031	0.037	0.127	− 0.010
Real Estate	0.170	0.310	0.112	0.019	0.132	− 0.02	− 0.101	0.011
Renting Business	0.043	0.009	0.041	− 0.011	0.030	− 0.01	− 0.009	− 0.001
Public Administration	− 0.009	0.110	− 0.013	0.107	− 0.106	0.012	− 0.054	0.021
Education	0.133	0.065	0.209	0.021	0.103	0.113	0.131	0.0010
Health	0.134	0.130	0.189	0.002	0.079	− 0.03	0.138	− 0.003
Communication Services	− 0.014	− 0.006	0.019	0.010	− 0.008	0.020	− 0.018	0.008
Average Impact	−0.008	0.072	0.094	0.011	0.019	0.027	0.021	0.002

Note: Simulation Results.

Table 6

Impact on Labour Income under Unbalanced Budget Conditions

Labour Classification	Long-Run Income Effect		Short-Run Income Effect		Average Impact
	SIM 1	SIM 2	SIM 1	SIM 2	
Punjab Rural Low-Skilled	0.245	0.297	0.099	0.313	0.239
Punjab Rural High-Skilled	0.341	0.439	0.162	0.492	0.359
Punjab Urban Low-Skilled	0.279	0.301	0.103	0.381	0.266
Punjab Urban High-Skilled	0.358	0.513	0.217	0.599	0.422
Sindh Rural Low-Skilled	0.242	0.289	0.064	0.294	0.222
Sindh Rural High-Skilled	0.281	0.357	0.103	0.401	0.286
Sindh Urban Low-Skilled	0.299	0.348	0.199	0.481	0.332
Sindh Urban High-Skilled	0.446	0.792	0.342	0.829	0.602
KP Rural Low-Skilled	0.241	0.331	0.197	0.367	0.284
KP Rural High-Skilled	0.34	0.392	0.223	0.396	0.338
KP Urban Low-Skilled	0.282	0.310	0.203	0.344	0.285
KP Urban High-Skilled	0.353	0.412	0.299	0.396	0.365
Balochistan Rural Low-Skilled	0.221	0.299	0.193	0.334	0.262
Balochistan Rural High-Skilled	0.253	0.398	0.210	0.402	0.316
Balochistan Urban Low-Skilled	0.25	0.351	0.144	0.377	0.281
Balochistan Urban High-Skilled	0.316	0.443	0.231	0.476	0.367

Note: Simulation Results.

Table 7

Impact on Labour Income Under Balanced Budget Conditions

Labour Classification	Long-Run Income Effect		Short-Run Income Effect		Average Impact
	SIM 1	SIM 2	SIM 1	SIM 2	
Punjab Rural Low-Skilled	0.251	0.304	0.101	0.340	0.249
Punjab Rural High-Skilled	0.356	0.453	0.170	0.499	0.370
Punjab Urban Low-Skilled	0.291	0.322	0.121	0.393	0.282
Punjab Urban High-Skilled	0.339	0.499	0.209	0.624	0.418
Sindh Rural Low-Skilled	0.239	0.297	0.099	0.323	0.240
Sindh Rural High-Skilled	0.292	0.361	0.100	0.370	0.281
Sindh Urban Low-Skilled	0.297	0.386	0.210	0.253	0.287
Sindh Urban High-Skilled	0.460	0.799	0.4012	0.843	0.626
KP Rural Low-Skilled	0.270	0.437	0.210	0.388	0.326
KP Rural High-Skilled	0.279	0.282	0.283	0.312	0.289
KP Urban Low-Skilled	0.268	0.299	0.229	0.371	0.292
KP Urban High-Skilled	0.365	0.423	0.308	0.399	0.374
Balochistan Rural Low-Skilled	0.200	0.264	0.198	0.254	0.229
Balochistan Rural High-Skilled	0.231	0.299	0.252	0.456	0.310
Balochistan Urban Low-Skilled	0.248	0.362	0.160	0.401	0.293
Balochistan Urban High-Skilled	0.280	0.490	0.245	0.489	0.376

Note: Simulation Results.

CONCLUSION AND POLICY RECOMMENDATIONS

This study was conducted to quantify the impact of changes in tax rates on the overall economy of Pakistan. For changing the tax rates, we tested two scenarios. In the first scenario, the marginal tax rate and the number of slabs for the individuals paying personal income tax were decreased but kept the taxes progressive. In the second scenario, a flat personal income tax rate was introduced, corporate income tax, sales tax, and customs duties were decreased, and all other direct and indirect taxes were abolished.

Both of these scenarios simplified the tax structure and reduced the tax burden, leaving the agents with higher after-tax income. We used the CGE model to study the sectoral and macroeconomic impacts of the said changes. However, we first developed an updated SAM based on the 2017 data taken from the 2017 IO table, national accounts data, HIES and LFS for the corresponding year. The SAM developed for this study consisted of 34 industries, all producing one commodity, multiple types of labour, capital, and households and incorporated direct and indirect taxes paid by the households and firms to the government. It presented a useful picture of the economy using the double-entry system in which each entry in a cell represents the flow of income from one agent to another. After that, ORANI-G modifications of the CGE were made to make it better applicable to Pakistan's economy and the objectives of the study.

Our analysis shows that decreasing the personal income tax rate applied to individuals would only result in increasing the disposable income of the households, which, in turn, would result in increasing household consumption expenditures and decreasing government income, consequently increasing the fiscal deficit. The increased demand would be mostly fulfilled by imports, which would also widen the trade deficit. On the other hand, reducing rates of all the taxes, as modelled in Scenario 2, would enable firms to reap higher profits increasing the demand due to higher after-tax income, which would be matched by higher supply resulting from higher production motivated by lower financial and psychic costs of production and higher profits. However, the rate of growth in output and prices would be different for different sectors. Scenario 2 especially suits the export industry as it would reduce its cost making the exports more competitive. This was noted by an increase in the exports reflected in the analysis. Both these scenarios would result in increasing the take-home income of various categories of labour and the income of the households. Higher consumption due to higher income would increase the welfare of the households and improve their living standards. The expenditures on health and education would also increase. The results also show that the overall positive impact of tax reforms on the economy would be more pronounced when the balanced budget condition is binding.

This analysis leads to some simple but important policy recommendations. One of the policies that can be recommended based on the analysis is that simplifying the tax regime and lowering taxes will result in higher income of the citizens and corporations, a sectoral shift in favour of competitive and efficient sectors and, resultantly, higher economic growth. This higher growth will result in increased tax revenue without overburdening the citizens and businesses. Therefore, if the government wants to raise the living standard of the people, it should introduce a simplified tax system which is broad-based with a low tax burden. Secondly, reducing rates of only one or few taxes will not work as effectively as lowering all the tax rates, reducing the total number of taxes to be paid by firms and individuals, and letting various sectors compete based on productivity and efficiency rather than using tax as a tool for creating favourable grounds for a few sectors. The results of the study also show that reducing tax rates will result in increasing the fiscal deficit when the balanced budget condition is not binding. However, if the government is restricted to keeping the budget balanced or the deficit under control, it will compel the government to cut down or abolish unnecessary expenditures and reduce its footprint on the economy, which will result in lowering labour demand in the

public sector and release it for private firms, which will result in reducing market distortions. Therefore, we recommend that the government should be restricted to keep the fiscal deficit within the target. Although this study did not extend to that area, the literature suggests that combining a simplified tax regime based on low tax rates benefits higher-income groups more than lower-income groups. Such a situation, on the one hand, encourages wealth creation but, on the other hand, it increases inequalities which need to be taken care of using suitable policies.

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