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RESEARCH ARTICLE

# Impact of Goods and Services Tax (GST) on Income Inequality in Pakistan: A CGE Approach

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**Abstract:** The current GST regime in Pakistan is characterized by various tax exemptions, reduced tax rates, and zero ratings. It creates inefficiency, supports tax fraud, and encourages rent-seeking activities. The net effect is the high tax rates and tax evasion, undermining the potential indirect tax revenues. There are various recommendations from public economists, international agencies, and the industrial sector to reduce the current GST from 17% to single-digit and abolish all kinds of tax exemptions and zero ratings to make it dynamically efficient and pro-growth. With this backdrop, we quantify the likely impacts of uniform GST on macroeconomic aggregates, households' income, and income inequality of Pakistan by employing a global computable general equilibrium (CGE) model. CGE models are standard models for economy-wide empirical analysis, and it is widely employed to analyze tax reform and development planning. We have applied 5%, 10%, and 15% uniform GST on the broader base (i.e., leather, textile, carpets, surgical goods, and agriculture sector) instead of a non-uniform GST regime. The simulation results show that uniform GST has a positive impact on economic growth and tax revenue. The sectoral analysis also indicates that the reduction in GST helps develop the domestic industries leading to an increase in the exports of the manufacturing sector. However, the export of agriculture-related products has fallen. Moreover, these policy reforms negatively impact low-income households, especially labor and capital associated with the agriculture sector, thus worsening income inequality. Based on empirical investigation, this paper suggests the implementation of uniform GST in Pakistan. However, to ameliorate the income distribution, the government should increase the reliance on progressive taxes such as wealth, income, and corporate taxes.

**Keywords:** GST, CGE model, GTAP, Inequality, SAM, Pakistan

The 1970 stagflation led neoclassical economics to dominate in the policy circle advocating pro-growth policies. At the end of the century, most analysts and policymakers believe that high tax rates not only discourage and distort economic activities but are also ineffective in the redistribution of income and wealth (Bird & Zolt, 2005; Piketty & Saez, 2014). Earlier it was presumed that economic progress would be shared by all groups in the society, and growth should be at the center of public policy (Rodrik, 2008). Still, the efficiency consideration of government intervention has been thoroughly studied in the economic literature in the recent past (Ballard et al., 1985; Chandoevwit & Dahlby, 2007; Chetty, 2009; Feldstein, 1999;

Padda, 2014). Although the associated inefficiency of government intervention in the economy in the form of taxes is a very important issue, the high-income inequality also creates doubt on the effectiveness and legitimacy of the fiscal policy and its effect on welfare and income distribution (Giraldo & García , 2018; Piketty, 2015). The persistence of inter and intra high-income inequality in both developed and developing countries has compelled economists to turn their tools of study towards the redistribution aspect of taxation (Atkinson, 2015; Giraldo & García , 2018).

Fiscal policy plays a pivotal role in income distribution and welfare. Many empirical studies show that through an appropriate mix of taxation, resources of an economy can be distributed equally (Bhatti et al., 2015; Bird & Zolt, 2005). The distributional impact of taxes on various households has been studied from the very beginning (Bentley et al., 1974; Dodge, 1975; Head, 1980; Pechman & Okner, 1974; Reynolds & Smolensky, 1977). Despite earlier studies, most of the recent empirical studies only concentrated on the distributional aspect of income tax and government transfers. The availability of tax rates, government transfers, and income of individuals and households make this kind of study relatively easy. However, in the case of indirect taxes, there is no consensus on how to model the incidence of indirect taxes on households, and secondly, the data requirement of such studies also compounds the problem (Aaberge et al., 1995; Martorano, 2018). The tax revenue of developed countries is tilted towards direct taxes such as personal income tax, wealth, and corporate taxes. However, due to weak tax institutions, easy collection, and less tax evasion, developing countries rely on indirect taxes such as Good and Services Tax (GST), excise, tariffs, and custom duties to finance their high government expenditures (Besley & Persson, 2014; Thaçi & Gërxhaliu, 2018).

Like other developing countries, the composition of Pakistan's tax revenues is also skewed towards more regressive indirect taxes. A recent empirical study shows that in 2007–2008, the 10% richest Pakistani population merely paid 5.9% of total indirect taxes, while in the same year, the 10% poorest Pakistani population contributed 9.3% of indirect taxes (Khan, 2015). In the 2018–2019 budget, approximately 60.9% of the total revenues are collected from indirect taxes. Within the indirect taxes, GST in value-added tax (VAT) mode contributes 63.0% to the total indirect taxes (Federal Board of Revenue, 2020). GST, being the major contributor to the indirect taxes, has become the least efficient tax system in the world, having tax collection efficiency (C- efficiency) around 22.3% in 2010–2011, although it was around 32.3% in 2002 and a fairly respectable 39% in 1990 (Hassan & Sarker, 2012). However, other comparable countries such as Sri Lanka and Organisation for Economic Co-operation and Development (OECD) countries have C- efficiency of 45% and 58% on average, respectively (Khan, 2015).

Pakistan's economic woes are self-inflicted wounds that are caused by the pro-elite nature of the tax system. The elites in the agricultural, industrial, and service sectors have not contributed their fair share for many decades in the tax system, and the poor people have been bearing the cost of their incompliance (Ahmed et al., 2015; Khan, 2015). The elites have special provisions for tax avoidance and tax fraud. The Federal Board of Revenue (FBR) of Pakistan has a right to offer statutory regulatory orders (SROs) to reduce the GST rates and even declare any sector or commodity zero-rated. In that case, not only is the GST reduced, but also the GST paid on the inputs is also refunded (Hassan, 2015). Pakistan's current tax system is characterized by various tax exemptions, reduced tax rates, and zero ratings. The net effect is the high tax rates and tax evasion, which undermine the potential indirect tax revenues. A substantial literature has indicated that non-uniform taxes create inefficiency, tax frauds, have high administrative and compliance costs, and encourage rent-seeking activities (Ahmed & Stern, 1991; Bye et al., 2012; Creedy, 2001; Stern, 1990). These exemptions and reduced rates in GST yield a significant tax loss to the exchequer (Ahmed et al., 2015; Khan, 2015).

With this backdrop, this study contributes to the literature in two ways. Firstly, we employ the uniform GST (no refund, no adjustment, and no zero ratings) on all goods and services instead of the highly selective GST system. The empirical and theoretical studies confirm that the uniform GST system is simple, less costly, and also welfare improving. Secondly, most of the empirical studies on tax and inequality are based on partial equilibrium analysis (Bird & Zolt, 2005; Luebker, 2014). In the case of taxes, the general equilibrium analysis better captures the behavior of economic agents and policy shocks on both micro and macroeconomic indicators (Boughanmi & Khan,

2019; Burfisher, 2017; Shoven & Whalley, 1984). The conventional or partial equilibrium analysis overlooks the importance of tax changes with respect to income and expenditure of different types of households, as well as the second-round impact on the prices of commodities. Moreover, it also overlooks the interconnection of different countries and their tax system that might affect the domestic price and investment level. So keeping in mind the interlinkage of domestic and global economies, the change in tax rates would not just be limited to the income distribution but would affect the whole economy (Boughanmi & Khan, 2019; Burfisher, 2017; Khan et al., 2021; Shoven & Whalley, 1984). Therefore the results of conventional approaches do not provide enough guidance in tax reforms for the policymakers. Considering these limitations in a conventional model, this paper is built on the literature of uniform taxation by employing a computable general equilibrium (CGE) model. This is the first study up to our knowledge that finds the impact of uniform GST on the income level of various households, overall income inequality, and its impact on macroeconomic aggregates of Pakistan.

***Overview of Tax Regime in Pakistan***

From the very beginning, Pakistan has had difficulties in establishing the modern tax system. In Pakistan, democracy never prevails due to one or other reasons. Therefore, the weak democracy is never inclined to mobilize the internal resources for political popularity, whereas the military regimes seeking political justification and legitimacy restrain to make tax reforms (Ahmad & Mohammed, 2012; Kemal, 2016). All previous governments have been maintaining the status quo, rent-seeking behavior, and extractive system by resorting to internal and external financial loans and aids. Moreover, the geopolitical situation also allowed getting aids from the United States (U.S.), International Monetary Fund (IMF), and World Bank on soft conditions (Ahmad & Mohammed, 2012; Ahmed, 2018). Unfortunately, all previous governments, irrespective of civil or military, did not use the fiscal opportunity at their disposal during the cold war period and post-9/11 environment to carry out much-needed structural reforms for Pakistan's economy. So far, no reliable and consistent efforts were made to broaden the tax base, modernizing the tax administration, simplify tax laws, investment in energy, and other infrastructure development. The end results of massive inflow of foreign funds with high remittances fueled consumption led growth (Ahmad & Mohammed, 2012; Khan, 2015).

However, serious tax reform in Pakistan was initiated in late 1970 when the U.S. imposed sanctions for nuclear weapons proliferation. The National Tax Commission was made in 1985 to give recommendations and suggestions on taxation to the government of Pakistan. According to the commission report, corruption, tax evasion, lack of institutional capacity, and smuggling were the main problems of the tax department of Pakistan. In order to increase the tax to GDP ratio from 9% to 20%, the said problems must be addressed. Unfortunately, lack of political will, strong lobbies, military regimes, and resumption of U.S. aid, that report was not implemented (Ahmed, 2018; Khan, 2015; Zulfiqar, 2019).

Pakistan's economic reforms started in early 1990 with the support of the IMF and World Bank, stressing on the reduction of a tariff as a revenue-generating instrument and shifting on other instruments for revenue generation, such as more reliance on GST and income tax. The latter taxes are less distortionary and have more revenue potential than the import tariff. Therefore, GST was imposed in 1990 under pressure from the IMF and World Bank (Ahmad, 2010; Jamal & Javed, 2013). After the end of the Cold War and nuclear explosion in 1998, U.S. again imposed sanctions on Pakistan under the Glenn amendment (Morrow & Carriere, 1999). Pakistan has to mobilize its internal resources to finance the high government expenditures. A project of $130 million was initiated with the financial support of the World Bank under the umbrella of Tax Administration Reform Project (TARP). However, the commission's report was again not implemented due to lack of political ownership, loose donor oversight, and massive inflow of funds from the U.S. in the global war against terrorism. The TARP loan was reused in the construction of offices and purchasing new vehicles for staff (Ahmad & Mohammed, 2012; Ahmed, 2018; Kemal, 2016).

The recent government has also envisaged reforming the tax system due to the high revenue-expenditures gap and current account deficit. According to the Pakistan Economic Survey, 2018–19, the total expenditures, including development and non-development, equals 21.2% of GDP. However, in the same year, the total revenue, including tax revenue plus non-tax revenues, is about 15.3% of GDP.

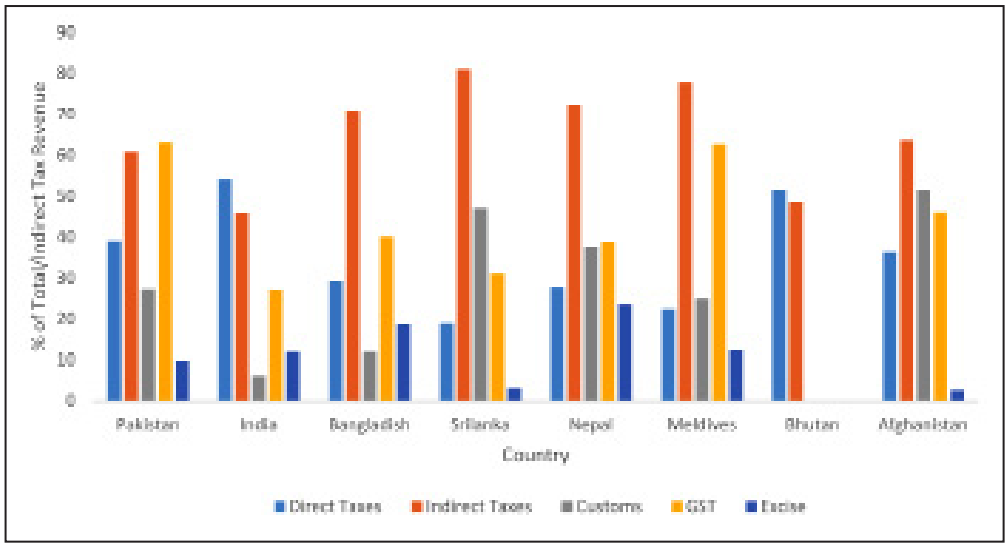
This revenue-expenditures gap is financed from both internal and external borrowing, which is not sustainable in the long run. This high budget and current account deficits compelled the government to knock on the door of IMF repeatedly. Instead of relying on loans, the government has to implement structural reforms to bridge the fundamental revenue-expenditure gap. Pakistan can raise the tax to GDP ratio from 11.6 % to 36% through an efficient and fair tax system to generate ample revenue to finance the high public expenditures (Akram et al., 2007).

The major tax issues of Pakistan include a low tax to GDP ratio (11.6%), a narrow tax base, sectoral imbalances, and an undocumented economy. Moreover, structural flaws in FBR such as incompetent tax officers, trade liberalization, trust deficit between citizen and government, tax exemptions, more reliance on tax amnesties, and SROs regimes also undermine the tax potential of Pakistan. The country's low and declining revenue yield has been attributed to a wide range of concessions and exemptions, large-scale tax evasion, and a slack and corrupt tax administration. This has led to the perception of a virtual breakdown of tax compliance (Burki et al., 2015; Kleven & Waseem, 2013; Martinez-Vazquez & Cyan, 2015).

Figure 1 shows the regional comparison of tax revenue composition in the fiscal year 2018–2019. In all regional countries except India, indirect taxes (GST, excise, and customs duty) are the major contributors to the total tax revenue. The total contribution of indirect taxes to the FBR revenue is 60.9% of the budget 2018–2019 (FBR, 2020). Within the indirect taxes, the GST contributes 63.0% to the total indirect taxes (see appendix A for FBR tax revenue composition). A huge proportion of indirect tax revenues are collected from the manufacturing sector. Here too, the taxation is biased towards few commodities. Seventy percent of indirect taxes are obtained from petroleum products, automobiles, edible oil, and tobacco (Burki et al., 2015).

GST, being the major contributor to the tax revenue, is a consumption tax levied by the government on goods and services. It is collected by the retailers at the point of sale and pass on to the tax authority. Pakistan's tax system is very complex, and multiple GST rates are applied on various commodities and sectors under the Sale Tax Act of 1990, and it still remains intact till now with mild modification. GST is currently 17% and retailers are also exempted from the sale tax based on a certain turnover ratio. There are more than 10 sale tax rates in the present tax regime. Moreover, a considerable number of sectors and activities are exempted from the sale tax in 6th schedule of the Sale Tax Act 1990.

Despite having tax exemptions for various sectors and commodities, the culture of SROs by the government on political affiliation not only undermines the revenue potential of FBR but also creates incentive




Note: Data are taken from the economic surveys of the respective countries

***Figure 1.*** Tax Revenue Composition: Regional Comparison of Tax Revenue Composition

of corruption, rent-seeking activities, and inefficiency in the economy (Ahmed et al., 2015; Khan, 2015). For the fiscal year 2018–2019, the loss of GST only due to tax exemptions and concessions was Rs 597.7 billion, whereas the total estimated tax loss is around Rs 972.4 billion. The reduction in exemptions will increase economic efficiency and improve the allocation of resources. Moreover, it also helps broaden the tax base leading to an increase in tax revenue (Boccanfuso et al., 2011; Bye et al., 2011). In a nutshell, Pakistan has a complex and inefficient collection of tax systems having high indirect tax rates, especially GST with high tax exemptions and concessions given to certain sectors and commodities, leading to an increase in the tax gap.

## Literature Review

The impact of taxes on various households has been studied in the U.S., Australia, and Canada (Bentley et al., 1974; Dodge, 1975; Pechman & Okner, 1974; Reynolds & Smolensky, 1977) and more recently in other countries (Akram et al., 2007; Luebker, 2014). These empirical studies were based on partial equilibrium analyses that measured the impact of pre and post-tax change on the households' income and income distribution. These models cannot account for the second-round impact of taxation on other markets or sectors; therefore, they cannot capture the aggregate economic activity (Ballard et al.,1985; Burfisher, 2017). Such constraints of partial equilibrium are bridged by general equilibrium models that capture the aggregate economic activity, thus providing enough guidance in tax reforms for the policymakers (Boughanmi & Khan, 2019; Khan et al., 2021; Burfisher, 2017).

There are a plethora of empirical studies focusing on the general equilibrium impact of tax reforms on income distribution and other macroeconomic aggregates (Amir et al., 2013; Khan et al., 2015 ;Jangra & Narwal, 2014; Khan et al., 2018). Amir et al. (2013) examined the impact of income tax reform on poverty and income distribution in Indonesia employing a CGE model. The results indicated that reducing income and corporate taxes increases economic growth under a balance budget condition. However, the policy reforms also lead to an increase in income inequality as the tax cut has benefited high-income households. This study suggests that future tax reform should target the urban and rural poor households instead of high-income households.

Llambi et al. (2016) examined the major tax reform on the economy of Uruguay using a CGE model. The general equilibrium effect of reduction in the rate of indirect taxes and increasing the marginal rate of direct taxes, leading to increased economic growth and employment by 1% and 2%, respectively. Further, the results also indicated that the said tax reform had reduced the income disparity. Similarly, Chiripanhura and Chifamba (2015) investigated the impact of the 2013 tax policy reform on the economy of Namibia through the CGE approach. The results indicated that due to a decrease in the effective tax rate, the disposable income of urban households has increased. However, this policy reform has no significant impact on the income of rural households due to the agrarian nature of the economy. Further, the tax cut enhanced the income inequality between the skilled and unskilled laborers. The sectoral analysis also indicates that the tax cut has increased the manufacturing sector's output and export.

Filho et al. (2009) investigated the impact of indirect tax reform on income inequality and poverty in Brazil. They designed three policy scenarios: (a) 50% reduction in indirect taxes on households' consumption commodities, (b) halved the indirect tax rates on agriculture intermediate inputs, and (c) a 10% reduction in indirect taxes of all goods and services in São Paulo State. In the first simulation, poverty has reduced by 0.19% (headcount ratio), whereas it has no significant impact on income inequality. The second simulation experiment has a more significant impact on income inequality. The reduction of indirect taxes on the inputs used in the agriculture sector has significantly reduced income inequality. Lastly, the third simulation experiment positively impacts the macroeconomic aggregates, but it has worsened income inequality.

Some recent empirical studies have focused on the VAT reform. Boccanfuso et al. (2011) examined the impact of VAT reform on poverty and income inequality in Nigeria using the CGE model. The empirical findings declared that broadening the tax base with increasing the VAT rate leads to increased poverty and income inequality. However, lowering the rate and giving exemption on agriculture products have decreased the poverty level. Similarly, Sajadifar et al. (2012) studied the impact of VAT reform on Iran's economy employing the CGE approach. The results

of various simulation trees indicated that increasing the VAT from 3%, 4%, and 10%, respectively, has a positive impact on the revenue, but it has an adverse effect on the welfare and income inequality.

In Pakistan, Iqbal and Siddiqui (1999) and Siddiqui et al. (1999) investigated the impact of fiscal and tariff reforms on income distribution and other macroeconomic variables. They employed the CGE model taking the 1989–1990 Social Accounting Matric (SAM). The simulation results showed that reduction in consumption subsidy, as well as expenditures on education and health, adversely affect the income distribution in the country. Moreover, it also indicates that the reduction of tariff rates has worsened the income distribution. The reduction in the import tariff increases the demand for imported goods and changes the relative prices of domestic commodities. Hence, it changes the factors of income, leading to an increased gap between the rich and poor in both rural and urban areas. Similarly, Naqvi et al. (2012) analyzed the effect of the implementation of agriculture income tax on households' welfare and income inequality. The simulation experiment showed that the implementation of agriculture income tax increases government revenue and also improves income distribution.

Ahmed et al. (2011) examined the possible tax reform in Pakistan's tax system to broaden the tax base. They proposed various simulation scenarios for GST and bringing the exempted agriculture sector under the tax net. The results indicated that increasing the GST rate, bringing the service sector under the tax net, and abolishing a zero-rated tax regime coupled with the flat 5% agriculture income tax lead to increased tax revenue. However, it has a negative impact on the incidence of poverty, investment, and consumption. They suggested gradual tax reform that can make the reform less painful for the poor. Similarly, Bhatti et al. (2015) also studied the impact of various tax simulation experiments on the income distribution of Pakistan taking the SAM 2001–2002. The first simulation experiment indicated that a 35% increase in transfer payment decreases all indices of income inequality, leading to an increase in the budget deficit. In simulation 2, a 6% reduction in GST also leads to a decrease in the level of income inequality but increases the budget deficit. This study concludes that there is a mix of fiscal policy to achieve the desired level of the income distribution. The reduction in GST and government expenditures by 7% and 3.625%, respectively, and an increase in income tax by 3.65% is the best policy mix to gain fair distribution of income.

Some recent studies have focused on uniform indirect taxes instead of non-uniform indirect taxes with exemptions and adjustments. The former tax system is relatively simple, efficient, and has fewer administrative costs (Bye et al., 2012; Forbes, 2005; Keen & Smith, 2006; Piggott & Whalley, 2001). Bye et al. (2012) examined the implementation of uniform VAT on the Norwegian economy by employing a small dynamic CGE model. The results indicated that the uniform system of VAT covering all goods and services is superior to the non-uniform system characterized by reduced rates, exemptions, and zero ratings. The former has more welfare-improving as compared to the latter. Similarly, Bonga-Bonga & Perold (2014) investigated the impact of uniform tax on the economy of South Africa applying dynamic CGE modeling. The results show that a 10% reduction in the VAT rate is associated with a positive impact on household welfare, inequality, and employment level. The finding of this study indicates that the uniform VAT has a slight edge over the current VAT regime in South Africa.

## Methods

In this study, we examine the impact of uniform GST on the income inequality and other macroeconomic indicators of Pakistan using a computable general equilibrium model as the partial equilibrium analysis is only concerned with a single market, and it cannot capture the aggregate economic activity. Therefore CGE models are considered suitable for economy-wide analysis of tax reform (Burfisher, 2017; Shoven & Whalley, 1984).

### *Computable General Equilibrium Model*

CGE is a neo-classical model of an economy, and it is mostly employed for the economy-wide analysis of change in government policies, technological innovation, and environmental changes using actual data. This model tries to incorporate the behavior of all economic agents of all markets, factors, and commodities. It is based on micro-foundations, and hence consumers are maximizing their utilities, and firms are minimizing theirs costs of production and inputs combination (Burfisher, 2017; Shoven & Whalley, 1984).

CGE model is composed of a system of equations having sectoral linkages. Therefore, it is particularly important for the distributional impact of policy changes across sectors and households (Winters et al., 2004). Moreover, CGE modeling is a powerful tool for the analysis of government policy changes on welfare, income inequality, and poverty. The CGE modeling has two very important attributes; firstly, it incorporates a large number of distinct sectors, and secondly, it also employs a large number of behavioral equations representing the response of households and firms relative to government policy changes (Savard, 2003).

The CGE model is the model of a single economy, whereas the global CGE model is the economy-wide model of the whole world. The global version of the CGE model is called the global trade analysis project (GTAP) model, which provides the modeling framework and database to run the global CGE model. GTAP is a network of researchers and policymakers, centered at the Purdue University of Agriculture Economics, U.S. It records the annual flow of goods and services within a year in a GTAP database. This database is internally consistent and commonly used to study the impact of policy changes on a specific country as well as rest of the world (Aguiar et al., 2016).

***MyGTAP Model***

This paper uses the global applied CGE model linking Pakistan's economy with the rest of the world using the newly developed MyGTAP model (Walmsley & Minor, 2013). This model is an extension of the standard GTAP model (Hertel & Tsigas, 1997). In the MyGTAP model, the single regional household is replaced by private households and government households. Private households receive income from their endowments and remittances and then partly is consumed and partly saved. The government receives her income from taxes and net foreign aids and then uses this income on various expenditures. The difference between government expenditures and income is the government budget deficit/surplus. This MyGTAP model has more attributes than the standard GTAP model, such as it gives more flexibility in the treatment of government saving and spending. Secondly, it also incorporates the inter-regional transfers of remittances and foreign capital income, and thirdly, it also allows the model to analyze the impact of policy changes on different households and factors in an economy or economies (Walmsley & Minor, 2013; Khan et al., 2021).

***Dataset***

Two types of data sets are used in this study: GTAP database version 10 and recent SAM 2010-11. The GTAP database contains the data on the bilateral trade, transport, and protection data characterizing the economic linkages among the regions. The GTAP database version 10 released in 2020 has three reference years (2004, 2007, and 2011). In this study, we use reference 2011. It covers 140 regions, 119 countries, and 57 commodities for every country. For the computation purposes, the 119 countries are divided into 30 regions and 57 commodities into 12 aggregated sectors: (a) Grain crops, (b) Vegetable fruit, (c)Meat and livestock, (d)Extraction, (e)Processed food, (f)Textile and wearingapparel, (g) light/heavy manufacture, (h) Transport and communication, (i)Utility andconstruction, and (j) Services sector.

SAM 2010-11 is developed by International Food Policy Research Institute (IFPRI). It is economy-wide data capturing the real economy of a country. It is a consistent data framework representing the information on the national income, products accounts, and monitory flows between institutions. It captures all the transactions, production, and other economic activities among consumers, producers, and government during a year. The SAM 2010-11 consists of five main accounts: activities, commodities, factors of production, households, and other accounts. Appendixes C and D show the households and factors disaggregation.

***Research Scenarios***

The GST rate of Pakistan (17%) is among the highest in developing countries, as the average GST in Asia is 12%. Moreover, certain sectors such as health, education, textiles, leather, and surgical goods are either exempted from GST or enjoying lower rates, thus undermining the potential indirect tax revenues (Pasha, 2018; Ahmed et al., 2015). In the fiscal year 2018–2019, the revenue loss due to GST exemptions and concessions was Rs 597.7 billion. The major GST exemptions and concessions in the form of SROs are given in Appendix B. In this study, we propose three policy reforms for the GST of Pakistan: 5%, 10%, and 15% uniform GST on all sectors and commodities. In

other words, we propose to reduce the current non-uniform GST from 17% to uniform GST with 5%, 10%, and 15%, respectively.

**Table 1**

*Simulation Design*

| SIM 1 | SIM 2 | SIM 3 | Description |
|---|---|---|---|
| 5% | 10% | 15% | Uniform GST on a broader base; leather, textile, carpets, surgical goods, agriculture, education/health, and other sectors |

***Model Closure***

In our MyGTAP model, tax and tariff rates, elasticities of supply and demand, and shift and share coefficients used in supply and demand equations are exogenous. Economy-wide, welfare, GDP, sectoral and households' income, and inequality are the endogenous variables. We also assume that there is perfect competition and no transaction cost. Labor and capital are perfectly mobile across sectors, whereas land and natural resources are sluggish. Moreover, foreign income flows depend on the relative price change of the factor incomes, and investment depends on the expected return, just like the standard GTAP model.

***Inequality Measures***

To find the impact of tax reform on income inequality, we use the Gini coefficient and Hover and Theil indices. The Gini coefficient is derived from the Lorenz curve. It is a statistical measure to represent the dispersion of income or wealth in a nation's residents. It is the ratio of the area between the two curves (Lorenz curve and 45 line) to the area beneath the 45 line. It ranges between 0 (perfect equality) and 1 (perfect inequality). It can be measured as;

$$Gini = \frac{2}{n^2 \overline{y}} \sum_i^n i\left(y_1 - \overline{y}\right) \tag{1}$$

Here  is the mean income and =1 to n,

Hoover's index is equivalent to the maximum vertical distance between the Lorenz curve and the equal line of income. In other words, the value of the index approximates the share of total income that has to be transferred from households above the mean to those below the mean to achieve equality in the distribution of incomes. Higher values indicate more inequality and that more redistribution is needed to achieve income equality (Atkinson et al., 1994; Boughanmi & Khan, 2019). It can be calculated as

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

Here  is the household income, N is the population, and  is the number of households.

Theil's T index can be decomposed into inequality within groups (Theil L) and inequality between groups (Theil S). A key feature of these inequality measures is that they are fully decomposable; that is, inequality may be broken down by population groups, income level, or other attributes that are useful for policymakers (Anand, 1983; Naqvi et al., 2012)H</author></authors></contributors><titles><title>Rees, R.(1992. It ranges from zero to Ln (N) having lowest inequality and highest inequality, respectively. So Theil T index:

$$TT = Ln\left( \frac{\sum_h N_h}{\sum_h YH_h} \right) - \frac{\sum_h In\left( \frac{N_h}{YH_h} \right)}{\sum_h YH_h} \tag{3}$$

And Theil L index can be calculated as;

$$TL = Ln\left( \frac{\sum_h YH_h}{\sum_h N_h} \right) - \frac{\sum_h In\left( \frac{YH_h}{N_h} \right)}{\sum_h N_h} \tag{4}$$

Here  is the total income of population,  is the income of subgroup, and  is the population in the subgroup. Theil T index uses the expenditure's share as a weight, whereas the Theil L index uses the share of the population as weights; therefore, they are sensitive to the upper and lower expenditures categories, respectively (Akita et al., 1999).

The Theil symmetrized (TS) index is simply the average of both indices. Unlike the former indices,

Theil S is symmetric; therefore, it avoids the above-mentioned drawbacks. So, the TS will be:

$$TS = \frac{1}{2}\left[TT + TL\right] \quad (5)$$

By substituting the values of TT and TL in Equation 5 we get:

$$TS = \frac{1}{2}\sum_h In\left(\frac{YH_h}{N_h}\right) - \left(\frac{YH_h}{\sum_h YH_h} + \frac{N_h}{\sum_h N_h}\right) \quad (6)$$

## Results

### *Impact of GST Reform on Macroeconomic Aggregates of Pakistan*

Table 2 shows the impact of 5%, 10%, and 15% uniform GST on the macroeconomic indicators of Pakistan. In simulation 1, real GDP and tax revenue increased by 0.06% and 71.39%, respectively. The real exports reduced by 11.29%, whereas the real imports are increased by 4.21%, thus slightly worsening the Terms of Trade (ToT). In the case of simulation 2, the real GDP and tax revenue increased by 0.12% and 142.78 %, respectively. Further, it also shows a reduction of real export (22.59%) and an increase in the real import (8.42%) along with worsening the ToT (0.04%). Similarly, simulation 3 indicates that the real GDP and tax revenue increase 0.18 % and 214.17%, respectively. The real exports reduced by 33.88%, and the real imports increased by 12.63%. These simulation results indicate that uniform GST on the broader base has a positive effect on the real GDP and tax revenues. Abolishing exemptions and zero ratings increase economic efficiency, improve the allocation of resources, and also increase tax collection. However, the tax reforms have a negative impact on the exports of Pakistan. As Pakistan mostly exports textile, leather, sports, and agriculture-related products, bringing these sectors under uniforms GST regime has reduced the exports in all three simulation experiments.

### *Impact of GST Reform on Households' Income*

Table 3 reports the impact of 5%, 10%, and 15% uniform GST on the level of households' income in Pakistan. The results show that in all three policy scenarios, the real income of farmers, landless farmers, rural farmworkers, and urban residents (quartile-1) have experienced a fall in their income. Although, the real income of rural non-farm workers and urban households (quartile-234) have benefited from these policy experiments. Among the three simulation cases, the 5% simulation has the smallest positive/negative effect on the households' income. The highest reduction in income (in all three simulation scenarios) are from rural medium +farmer (quartile-1) and rural medium +farmer (quartile-234), which are 24.22% and 23.74%, respectively. The highest increase in the income of rural non-farm (quartile-3), rural non-farm (quartile-2), and rural non-farm (quartile-4) are reported as 1.76 %, 1.27%, and 1.5%, respectively. Bringing textile, leather, sports, health, and other sectors under a uniform GST regime adversely affect the households associated with these sectors. Moreover, the findings also indicate that the small and medium landowners and farmers are also affected by the broadening of GST to these sectors; therefore, their incomes are also reduced. However,

**Table 2**

*Impact of GST Reform on the Macroeconomic Aggregate*

| Macro Variable | 5 % | 10 % | 15 % |
|---|---|---|---|
| Real GDP (qgdp) | 0.06 | 0.12 | 0.18 |
| Tax Revenue | 71.39 | 142.78 | 214.17 |
| Terms of Trade (ToT) | 0.02 | 0.04 | 0.05 |
| Real Exports (qxwreg) | -11.29 | -22.59 | -33.88 |
| Real Imports (qiwreg) | 4.2131 | 8.42 | 12.63 |

Source: Authors' own simulation

these policy scenarios have a positive impact on the income of non-farm workers and urban workers. The reduction of GST has directly increased the disposable income of urban households, which are obtained either from manufacturing or service sector. Similarly, the simulation 2 and 3 have the same but larger impacts on the lower households' income showing the regressivity of the GST in Pakistan.

***Impacts of GST Reform on Real Factor Rewards***

Table 4 shows the impact of GST reform on the real factor rewards. It shows that uniform GST on all domestic goods and services primarily affects the labor involved in agriculture, farms, lands, as well asand the capital used in agriculture sector. The highest reduction in rewards occurs in the livestock sector (23.72%), labor-farm workers (20.15%), labor small/ medium farmer (19.11% each), and capital- agriculture (18.53%), respectively. The reason is likely attributed to the broadening of the tax base to agriculture, textile, leather, sports, and other sectors. The reduction in export reduces the rewards for the workers involved in these sectors. Moreover, the uniform GST has increased the rewards for the low and high skilled laborers and capital (formal and informal). In the case of simulation 1 (5%), the highest increase is recorded in the rewards of non-form high-skilled labor (10.63 %),) capital informal (6.88 %), and capital formal (4.95%), respectively.

**Table 3**

*Impact of GST Reform on Households' Income (% Change)*

| GTAP Code | Household's Description | 5 % | 10 % | 15 % |
|---|---|---|---|---|
| hhd_rs1 | Rural Small Farmer (quartil[1]e-1) | -19.38 | -38.76 | -58.13 |
| hhd_rs234 | Rural Small Farmer (quartile-234) | -20.13 | -40.25 | -60.38 |
| hhd_rm1 | Rural Medium +Farmer(quartile-1) | -24.22 | -48.44 | -72.66 |
| hhd_rm234 | Rural Medium +Farmer(quartile-234) | -23.74 | -47.48 | -71.22 |
| hhd_rl1 | Rural Landless Farmer (quartile-1) | -19.33 | -38.67 | -58 |
| hhd_rl234 | Rural Landless Farmer (quartile-234) | -17.83 | -35.65 | -53.48 |
| hhd_rw1 | Rural Farm Worker (quartile-1) | -12.33 | -24.65 | -36.98 |
| hhd_rw234 | Rural Farm Worker (quartile-234) | -8.8 | -17.6 | -26.4 |
| hhd_rn1 | Rural Non-Farm (quartile-1) | 0.89 | 1.78 | 2.66 |
| hhd_rn2 | Rural Non-Farm (quartile-2) | 1.5 | 3.01 | 4.51 |
| hhd_rn3 | Rural Non-Farm (quartile-3) | 1.78 | 3.57 | 5.35 |
| hhd_rn4 | Rural Non-Farm (quartile-4) | 1.27 | 2.54 | 3.81 |
| hhd_u1 | Urban (quartile-1) | -0.64 | -1.28 | -1.92 |
| hhd_u2 | Urban (quartile-2) | 0.57 | 1.14 | 1.71 |
| hhd_u3 | Urban (quartile-3) | 1.04 | 2.08 | 3.12 |
| hhd_u4 | Urban (quartile-4) | 0.7 | 1.4 | 2.11 |

Source: Authors' own simulation

**Table 4**

*Impacts of GST Reform on Real Factor Rewards (% Change)*

| Factor Codes | Factor Description | 5 % | 10 % | 15 % |
|---|---|---|---|---|
| flab_s | Labor- Small-Farmer | -19.11 | -38.22 | -57.33 |
| flab_m | Labor-Medium+ farmer | -19.59 | -39.15 | -58.75 |
| flab_w | Labor-Farm Worker | -20.15 | -40.31 | -60.40 |
| flab_l | Non-Form Low-Skilled | 4.65 | 9.31 | 13.97 |
| flab_h | Non-Form High-Skilled | 10.63 | 21.26 | 31.89 |
| flnd_s | land-Large | -17.45 | -34.90 | -52.36 |
| flnd_m | land-medium | -17.97 | -35.90 | -53.87 |
| flnd_l | Land-Small | -18.48 | -37.06 | -55.55 |
| Fliv | Livestock | -23.72 | -47.45 | -71.18 |
| fcap_a | Capital- Agriculture | -18.53 | -37.05 | -55.58 |
| fcap_f | Capital-Formal | 4.95 | 9.92 | 14.87 |
| fcap_i | Capital Informal | 6.88 | 13.77 | 20.67 |

Source; Authors' own simulation

The uniform GSTs have positive effects on the manufacturing and service sectors, thereby leading to an increase in the employment of the factors, subsequently increasing the real factor's rewards. Similarly, simulations 2 and 3 have the same but larger impacts on the factor's returns.

### *Impacts of GST Reform on the Sectoral Export of Pakistan*

Table 5 reports the impact of the proposed GST reform on the sectoral exports of Pakistan. All three simulation scenarios have negative effects on the export of grain crops, vegetables, fruits, meat/livestock, extraction, and construction. However, these policy scenarios positively impact the textile and wearing apparel, heavy manufacturing, transport/communication, and other services. The export sectors that will benefit the most include processed food (0.03%), service sector (0.02%), transport/communication, manufacturing, and textile/wearing apparel (0.01% each). The reduction in GST will help to develop the domestic industries leading to an increase in exports. Moreover, the reduced rates of GST also increase the competitiveness of Pakistani industrial products in the international market, thus increasing the exports of the manufacturing sectors.

### *Impacts of GST Reform on Sectoral Imports of Pakistan*

Table 6 shows the proposed policy reforms of GST on the import sector of Pakistan. In all three simulation scenarios, the import of grains crops, vegetables, fruits, meat and livestock, extraction, and construction-related goods have reduced, but the import of heavy manufacturing, transport/communication, and other services have slightly increased. The reduction in GST on domestic goods will help to develop the domestic industries leading to a decrease in the reliance on imports. Moreover, simulations 2 (10%) and 3 (15%) indicate that increasing GST increases the domestic prices leading to an increase in the import of textile and wearing apparel. Due to changes in the relative prices, people will increase the demand for imported textile and wearing apparel.

**Table 5**

*Impacts of GST Reform on Sectoral Export of Pakistan*

| Sectoral Export | 5% | 10% | 15% |
|---|---|---|---|
| Grains Crops | -0.14 | -0.27 | -0.41 |
| Vegetable Fruit | -0.07 | -0.15 | -0.22 |
| Meat & Livestock | -0.02 | -0.04 | -0.06 |
| Extraction | -0.03 | -0.06 | -0.09 |
| Process Food | 0.03 | 0.05 | 0.08 |
| Textile & Wearing Apparel | 0.01 | 0.02 | 0.03 |
| Heavy Manufactures | 0.01 | 0.02 | 0.03 |
| Utility & Construction | -0.01 | -0.03 | -0.04 |
| Transport & Communication | 0.01 | 0.02 | 0.03 |
| Other Services | 0.02 | 0.04 | 0.06 |

Source: Authors' own simulation

**Table 6**

*Impacts of GST Reform on Sectoral Import of Pakistan*

| Sectoral import | 5% | 10% | 15% |
|---|---|---|---|
| Grains Crops | -0.11 | -0.21 | -0.32 |
| Vegetable Fruit | -0.06 | -0.12 | -0.18 |
| Meat & Livestock | -0.02 | -0.04 | -0.06 |
| Extraction | -0.03 | -0.06 | -0.08 |
| Process Food | 0.03 | 0.06 | 0.08 |
| Textile & Wearing Apparel | 0 | 0.01 | 0.01 |
| Heavy & Manufactures | 0.01 | 0.02 | 0.03 |
| Utility & Construction | -0.01 | -0.03 | -0.04 |
| Transport Communication | 0.01 | 0.02 | 0.03 |
| Other Services | 0.02 | 0.04 | 0.06 |

Source; Authors own simulation

***Impacts of GST Reform on Inequality***

Table 7 shows the impact of GST reforms on income inequality within households. It shows that in all three policy scenarios, all income inequality indices have increased. These findings are mainly attributed to the broadening of GST to agriculture, textile, leather, sports, education, and health sectors because the disposable income of most poor households is affected. The results indicate that GST is regressive in Pakistan, and it hurts the low-income groups, especially labor and capital associated with the agriculture sector, thus increasing the income inequality in the county. Due to the regressivity of GST, the low-income groups are burdened with more tax as compared to middle

**Table 7**

*Impacts of GST Reform on Income Inequality*

| GST Reform Scenario | Gini Index | Hoover Index | Theil-L | Theil-T | Theil-S |
|---|---|---|---|---|---|
| Base Level | 0.48 | 0.38 | 0.41 | 0.42 | 0.41 |
| 5% | 0.49 | 0.39 | 0.43 | 0.44 | 0.44 |
| 10% | 0.50 | 0.41 | 0.45 | 0.47 | 0.46 |
| 15% | 0.52 | 0.42 | 0.47 | 0.50 | 0.48 |

Source: Authors' Simulation

and higher-income groups. Secondly, the reduction of GST from 17% to uniform rates ( 5%, 10%, 15%) has also increased the disposable income of higher-income households leading to a further increase in the income disparity in the country.

## Discussion

This study quantifies the likely impacts of broad-based uniform GST on macroeconomic aggregates, households' income, and income inequality in Pakistan by employing a global CGE model. In general, the findings reflect the suppositions of uniform tax literature. The broad-based uniform tax is superior over the selective higher rate taxes due to its simplicity and efficiency (Bye et al., 2011; Creedy, 2001; Piggott & Whalley, 2001; Stern, 1990).

The findings show that the uniform GST has a positive impact on the economic growth and tax revenue in all three simulation scenarios. The tax exemption and concessions yield a significant tax loss to the exchequer. In the fiscal year 2018–2019, the revenue loss due to GST exemptions and concessions was Rs 597.7 billion, whereas the total estimated tax loss is around Rs 972.4 billion (FBR, 2020). So the reduction in exemptions and zero ratings increase the FBR tax revenues. Moreover, it also increases economic efficiency and decreases resource misallocation. The uniform GST will also improve the sectoral imbalances, reduce tax evasion, and distortion, thus having a positive impact on both economic growth and tax collection (Boccanfuso et al., 2011; Bye et al., 2012; Narayan 2003). Moreover, the reduction of GST in the manufacturing sector has a positive impact on economic growth, leading to a further increase in tax collection. These results are supported by other empirical studies both in developed and developing countries (Ahmed et al., 2011; Giraldo & García, 2018; Bonga-Bonga & Perold, 2014).

The findings also indicate that these policy reforms have negative impacts on low-income households, especially laborers and capital associated with the agriculture sector, thus worsening the income inequality. Moreover, the small and medium landowners and farmers are also affected by these policy reforms, leading to an increase in income inequality indices. Due to the regressivity of GST, the low-income groups are burdened with more taxes as compared to middle and higher-income groups, validating other empirical studies (Bhatti et al., 2015; Guerra et al., 2020; Sajadifar et al., 2012). Similarly, the results also indicate that these policy experiments primarily affect the labor involved in agriculture, farms, lands as well as the capital used in the agriculture sector. Bringing textile, leather, sports, and other sectors under a uniform GST regime adversely affect the export sector. As Pakistan's exports are mostly agriculture and textile-related products, most of the rural workers are directly affected due to these policy reforms. The share of agriculture in the GDP of Pakistan is 19.8%, but it provides livelihood to more than 40% population (Khan et al., 2020; Naqvi et al., 2012).

Further, the results also show that these policy scenarios have a positive impact on the income of non-farm workers and urban workers. The reduction of GST has directly increased the disposable income of urban households, which is likely obtained from the manufacturing and service sectors. Moreover, the uniform GST has increased the rewards for the low and high skilled laborers and capital (formal and informal). The reduction in GST will not only

benefit the manufacturing and service sectors but also increases the competitiveness of industrial products in the international market, thus increasing the exports of the respective sectors (Ahmed et al., 2011; Boccanfuso et al., 2011; Bonga-Bonga & Perold, 2014).

However, these policy experiments increase the imports of Pakistan. This is likely attributed to the increase in real GDP and an increase in the prices of domestic commodities relative to imported commodities, thus increasing the demand for imported goods. Similarly, the sectoral analysis also indicates that the import of grain crops, vegetables, fruits, meat, livestock, extraction, and construction-related goods have reduced while the import of heavy manufacturing, transport, communication, and other services have increased. The reduction in GST on domestic sales will help develop the domestic industries, leading to a decrease in the reliance on imports (Ahmed et al., 2011; Bye et al., 2012; Narayan, 2003).

## Conclusion

Pakistan has not been able to establish a well-disciplined tax system. All previous efforts of tax reforms were not able to increase the tax base to finance the whopping government expenditures. Moreover, it also has an "anti-growth" bias as a significant portion of GST is collected from the manufacturing sector and petroleum products (Burki et al., 2015). The current GST regime in Pakistan is characterized by various tax exemptions, reduced tax rates, and zero ratings. It creates inefficiency, tax frauds, and encourages rent-seeking activities (Piggott & Whalley, 2001; Stern, 1990). The net effect is the higher tax rates on a narrow tax base and large tax expenditures. That is why public economists, tax experts, and industrial stakeholders propose to reduce GST from 17% to single digits and abolish all kinds of tax exemptions to make it dynamically efficient and pro-growth. Thus, this study has proposed to impose a uniform proportionate GST by abolishing all kinds of tax exemptions, zero-rating, and reduced rates given to various sectors and commodities.

We find the impact of uniform GST on macroeconomic indicators, households' income, and income inequality by employing an extended version of general equilibrium, MyGTAP model taking SAM, 2010-2011. The simulation results show that (a) uniform GST has a positive impact on economic growth and tax revenue. Abolishing all exemptions and zero ratings increase the economic growth and tax collection. Moreover, the reduction of GST in the manufacturing sector has a positive effect on the GDP, leading to a further increase in tax collection. The sectoral analyses also indicate that (b) the reduction in GST helps develop the domestic industries leading to an increase in the exports of the manufacturing sectors. However, the export of agriculture-related products has fallen due to these policy reforms. Moreover, the findings also indicate that (c) these policy reforms have negative effects on the low-income households, especially labor and capital associated with the agriculture sector, thus worsening the income disparity in the county.

This study has some policy implications, such as (a) the uniform GST has a positive impact on economic growth and tax collection; therefore, the government should implement broad-based taxation. Moreover, the government has to abolish all kinds of tax exemptions and concessions given to the textile, sports, surgical goods, and agriculture sectors to increase the tax base and improve economic efficiency. However, to compensate for the increasing income inequality and lighten the burden of uniform GST on low-income households, the government (b) should increase the reliance on progressive taxes such as personal income tax, wealth, and corporate taxes.

This study has some limitations. Firstly, this study is based on a comparative static CGE model. It does not account for the behavioral changes over time. Future studies can be carried out by employing a dynamic CGE model to trace each variable through time. Secondly, we have used the available SAM 2010-11, nine years old. An updated SAM will give the true picture of Pakistan's economy and will be more useful in policy-oriented results.

## Declaration of ownership:

This report is our original work.

## Conflict of interest:

None.

## Ethical clearance:

This study was approved by our institution.

## Footnote

[1] Quartile 1 represents the largest province in Pakistan, Punjab; while Quartile 234 represents Sindh, Khyber Pakhtunkhwa and Baluchistan provinces.

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# Appendix A

***Trend and Structure of FBR (Rs Billion)***

| Year | Total (FBR) | Tax Rev as % of GDP | Direct Taxes | Indirect Taxes | | | |
|---|---|---|---|---|---|---|---|
| | | | | Customs | Sales | Excise | Total |
| FY2009 | 1161.1 | 8.8 | [38.2] | {20.7} | {62.9} | {16.4} | [61.8] |
| FY2010 | 1327.4 | 8.9 | [39.6] | {20.0} | {64.4} | {15.6} | [60.4] |
| FY2011 | 1558.2 | 8.5 | [38.7] | {19.3} | {66.3} | {14.4} | [61.3] |
| FY2012 | 1882.7 | 9.4 | [39.2] | {19.0} | {70.3} | {10.7} | [60.8] |
| FY2013 | 1946.4 | 8.7 | [38.2] | {19.9} | {70.0} | {10.1} | [61.8] |
| FY2014 | 2254.5 | 9 | [38.9] | {17.6} | {72.3} | {10.0} | [61.1] |
| FY2015 | 2589.9 | 9.4 | [39.9] | {19.7} | {69.9} | {10.4} | [60.2] |
| FY2016 | 3112.7 | 10.7 | [39.1] | {21.3} | {68.8} | {9.9} | [60.9] |
| FY2017 | 3367.9 | 10.6 | [39.9] | {24.5} | {65.7} | {9.8} | [60.1] |
| FY2018 | 3843.8 | 11.1 | [40.0] | {26.4} | {64.4} | {9.3} | [60.0] |
| FY2019 | 4435 | 11.6 | [39.1] | {27.2} | {63.0} | {9.8} | [60.9] |

# Appendix B

***Tax Expenditures (exemption) in GST for the Fiscal Year 2018-19***

| Statutory Regulatory Orders (SROs) | Rs in Billion |
|---|---|
| SRO 1125(1)/2011, dated 31.12.2011 (leather, textile, carpets, surgical goods etc.) | 0.786 |
| Import under 5th Schedule 0.59 | 0.59 |
| Local supply under 5th Schedule | 53.5 |
| Imports under 6th Schedule. | 53.7 |
| Local supply under 6th Schedule | 247.3 |
| Imports under 8th Schedule | 62.7 |
| Local supply under 8th Schedule | 93.3 |
| Gross total | 597.7 |

Source: Economic Survey of Pakistan, 2018-19

# Appendix C

***Disaggregation of Factors: SAM 2011***

| No | Code | Description |
|---|---|---|
| 1 | LAB-S | Labor - small farmer |
| 2 | LAB-M | Labor - medium+ farmer |
| 3 | LAB-W | Labor - farm worker |
| 4 | LAB-L | Labor - non-farm low skilled |
| 5 | LAB-H | Labor - non-farm high skilled |
| 6 | LN-SM1 | Land - Irrigated, small, Punjab |
| 7 | LN-SM2 | Land - Irrigated, small, Sindh |
| 8 | LN-SM3 | Land - Irrigated, small, Other |
| 9 | LN-MD1 | Land - Irrigated, medium, Punjab |
| 10 | LN-MD2 | Land - Irrigated, medium, Sindh |
| 11 | LN-MD3 | Land - Irrigated, medium, Other |
| 12 | LN-LG1 | Land - Irrigated, large, Punjab |
| 13 | LN-LG2 | Land - Irrigated, large, Sindh |
| 14 | LN-LG3 | Land - Irrigated, large, Other |
| 15 | LN-DR1 | Land - Non-Irrigated, Punjab |
| 16 | LN-DR2 | Land - Non-Irrigated, Sindh |
| 17 | LN-DR3 | Land - Non-Irrigated, Other |

Source: Pak SAM 2011 by IFPRI, 2018

# Appendix D

***Household Disaggregation SAM 2011***

| | Code | Description |
|---|---|---|
| 1 | HHD-RS1 | Rural small farmer (quartile 1) |
| 2 | HHD-RS234 | Rural small farmer (quartile 234) |
| 3 | HHD-RM1 | Rural medium+ farmer (quartile 1) |
| 4 | HHD-RM234 | Rural medium+ farmer (quartile 234) |
| 5 | HHD-RL1 | Rural landless farmer (quartile 1) |
| 6 | HHD-RL234 | Rural landless farmer (quartile 234) |
| 7 | HHD-RW1 | Rural farm worker (quartile 1) |
| 8 | HHD-RW234 | Rural farm worker (quartile 234) |
| 9 | HHD-RN1 | Rural non-farm (quartile 1) |
| 10 | HHD-RN2 | Rural non-farm (quartile 2) |
| 11 | HHD-RN3 | Rural non-farm (quartile 3) |
| 12 | HHD-RN4 | Rural non-farm (quartile 4) |
| 13 | HHD-U1 | Urban (quartile 1) |
| 14 | HHD-U2 | Urban (quartile 2) |
| 15 | HHD-U3 | Urban (quartile 3) |
| 16 | HHD-U4 | Urban (quartile 4) |

Source: Pak SAM 2011 by IFPRI, 2018