

**ECONOMIC
IMPLICATIONS OF
CIGARETTE TAXATION
IN PAKISTAN:**

*An Exploration through
A CGE Model*

2021

Research Report

Economic Implications of Cigarette
Taxation in Pakistan:
An Exploration through a CGE Model

Social Policy and Development Centre

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The University of Illinois Chicago's (UIC) Institute for Health Research and Policy is funding a group of economists to develop evidence-based policy support for effective tobacco tax policies in low- and middle-income countries with the highest rates of tobacco consumption. The global collaboration on the economics of tobacco is facilitated through Tobacconomics, a web-based platform. UIC is a partner of the Bloomberg Initiative to Reduce Tobacco Use.

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Acronyms

ADB	Asian Development Bank
CES	Constant Elasticity of Substitution
CGE	Computable General Equilibrium
COVID	Coronavirus Disease
FBR	Federal Board of Revenue
FED	Federal Excise Duty
GDP	Gross Domestic Product
GST	General Sales Tax
HIES	Household Integrated Economic Survey
IO	Input-Output
MPIA	Modelling and Policy Impact Analysis
PIDE	Pakistan Institute of Development Economics
SAM	Social Accounting Matrix
SDGs	Sustainable Development Goals
SNA	System of National Accounts
SPDC	Social Policy and Development Centre
WHO	World Health Organization

Executive Summary

The macroeconomic impacts of tobacco taxation is an under-researched subject in Pakistan. The lack of empirical evidence often leads to an inflated perception of the size and contribution of the tobacco industry to the economy. This study analyzes the macroeconomic and distributional impacts of the change in tobacco use prevalence resulting from a change in tobacco taxes in Pakistan. Using a methodology based on computable general equilibrium (CGE) modeling, the study estimates the impact of tax increases on tax revenues, consumption of tobacco products, raw tobacco production, cigarette manufacturing, employment, and the overall economy.

Key findings of the study are the following:

- Tobacco farming and cigarette manufacturing make a small contribution to Pakistan’s economy—less than 0.5 percent of the country’s gross domestic product (GDP). The cigarette industry employs 0.2 percent of the industrial labor force.
- The excise tax rates on cigarettes as a share of retail price are much lower than the widely-accepted benchmark of 70 percent tax share of the retail price. Currently, the excise tax share of retail price on low-priced and high-priced cigarettes is 41 percent and 57.8 percent, respectively.
- To raise the effective excise tax share to 70 percent of retail price would require a tax increase of 285.1 percent, leading to a 154.9 percent increase in the price of cigarettes. Results of a simulation of this scenario suggest that, due to the proposed increase in the tax rate:
 - Consumption of cigarettes would decline by 32.5 percent. However, due to the increase in cigarette prices, household consumption expenditure on cigarettes would increase by 73.3 percent. The overall household spending is expected to increase by 0.7 percent.
 - Despite the decline in cigarette consumption, the tax revenue from cigarettes would increase by 102 percent due to higher cigarette prices, while overall indirect tax revenue from all sources would increase by 6 percent.
 - The reduction in tobacco demand would cause a decrease in raw tobacco output by 7.8 percent.
 - The output of the cigarette industry would decline by 32.4 percent, which would lead to a 41.5 percent decline in employment income in the cigarette industry. However, the overall employment income in

the economy would increase by 0.5 percent. It is also important to mention that in absolute rupee term, the decline in employment income in the tobacco sector (including tobacco growing and the cigarettes industry) is Rs 0.83 billion compared to an increase of 67.4 billion in employment income in other sectors. Therefore, the gains in employment income in other sectors would be 81 times the loss in the tobacco sector. In the same way, there would be a reduction of 13,150 jobs in the tobacco sector while 321,700 jobs will be created in the other sectors, leading to a net increase of 308,550 jobs in the economy.

- An increase in tax revenues would result in higher public savings, which in turn would lead to increased investment in the economy. As a result, the output of the other sectors would increase, leading to an increase in the value added and the household income from factors of production employed in these sectors. Overall household income, gross value added, and output would increase by 0.13 percent, 0.12 percent, and 0.03 percent, respectively.

While a reduction in cigarette consumption would result in a decline in the output of raw and manufactured tobacco—leading to a reduction in income for tobacco farmers and employees of the cigarette industry—the overall impact on the economy (in terms of income, value-added, and output) are positive, though small in magnitude. Therefore, raising excise tax to 70 percent of the retail price would not adversely affect the economy.

The inclusion of the Framework Convention on Tobacco Control of the World Health Organization (WHO) in the Sustainable Development Goals (SDGs) recognized the prevalence of tobacco use as a critical development challenge. However, in the case of Pakistan, the perceived macroeconomic benefits of tobacco—visible tax revenues, the contribution of the tobacco sector to Gross Domestic Product (GDP) and employment, and perceived foreign exchange earnings from tobacco exports—often mislead stakeholders about the aggregate macroeconomic impacts of tobacco use. The industry claims that higher taxes on cigarettes would lead to a higher unemployment level and hurt the agriculture sector by reducing the demand for raw tobacco.

In contrast to the industry's claims, a recent study on Pakistan's tobacco sector (SPDC, 2018) showed that a decrease in cigarette consumption would have a relatively small impact on the economy in terms of job losses, income levels, and output. By assuming that saved income from the reduction in tobacco consumption is fully redistributed to other sectors, the study suggests that higher taxation would lead to a net positive impact on the economy in the medium to long term. While this is a plausible assumption, the analysis did not include re-distributional impact at the household level. Since the study was based on the input-output (I-O) multiplier model, the research did not capture the channel through which changes in taxes impact income redistribution in the macroeconomic structure and welfare of the consumers and producers of tobacco and tobacco products.

Research Objectives

The overall objective of this research is to analyze the macroeconomic and distributional impacts of the change in the prevalence of tobacco use due to a change in tobacco taxes in Pakistan. The study estimates the changes in output, income, and employment for tobacco-related agriculture and industrial sectors and simulates its impact on the rest of the economy resulting from the changes in tobacco use. The study also estimates the direct impact that tobacco taxation changes would have on government revenues, household tobacco consumption, employment, and investment in the tobacco industry. Moreover, it examines the ripple effects of tobacco taxation by analyzing household consumption of other commodities, sector-wise employment, and investment patterns.

Specific objectives of the study are:

1. To investigate the impact of higher tobacco taxes on cigarette consumption and tax revenue from cigarettes.
2. To assess the impact of the decline in cigarette consumption on tobacco-related agriculture and industrial sectors along with its impacts on the macroeconomic structure of the country.
3. To analyze the distributional impacts of changes in the tax rates and cigarette consumption on households, tobacco growers, and the employees of cigarette manufacturers.

This research uses computable general equilibrium (CGE) modeling to investigate the effects of a decline in tobacco prevalence from a higher tax rate in Pakistan. The choice of a CGE framework is based on its ability to capture the entire economy to analyze the impacts of various policy choices. The holistic approach of this framework helps in understanding the trade-offs for informed policy choices.

Scope of the Research

In line with the research objectives, the scope of the study is limited to the impacts of cigarette tax changes on the consumption of the product, government revenues, broad macroeconomic structure, consumer welfare, tobacco producers, and employees of the cigarette manufacturing industry. The impact of tax changes on the level of public spending is beyond the research scope because of the defined structure of the multisector CGE.

The choice of a CGE model has three main advantages. First, CGE models are based on well-developed economic theories (Vargas et al., 1999) and are firmly founded in microeconomic theory. This allows for analysis of micro-macro linkages, which are important for distributional and welfare analysis. Second, these models consider the production linkages, economic flows, and their interactions in a flexible and theoretically consistent manner. Since a shock in one sector is likely to induce changes in other sectors of the economy, CGE automatically takes care of intersectoral implications and their impact on the overall macroeconomy. Third, CGE models are extensions of I-O multiplier models and the social accounting matrix (SAM), which have been widely used for decades to measure the effects of public policies. CGE models extend these older models to analyze substitution possibilities between the factors of production. For example, on the basis of production elasticities they highlight a possible range of labor- and capital-intensive technology choices. Also, through the circular flow of income across consuming households and producing industries, CGE models help quantify the distribution implications of such choices. Finally, they incorporate tax impacts through explicit price effects (Feltenstein et al., 2013).

For the proposed study, the flexibility of the CGE framework is vital because it provides the ability to alter specifications in response to analytical needs. The framework also allows for incorporating tax increases in explicit price effects to analyze the distributional and welfare effects.

Structure of the Report

This report consists of six sections. Section 2 presents a descriptive analysis of the tobacco sector in the context of the overall economy. Tobacco tax policy is discussed in Section 3, which presents a brief analysis of tax collection from the cigarette industry under major indirect taxes and highlights recent reforms and challenges. Section 4 discusses the structure of the SAM and the CGE model, while Section 5 presents the baseline scenario and results of policy simulations performed through the CGE model. Finally, Section 6 summarizes the main findings of the study and policy recommendations.

Raw Tobacco, the Cigarette Industry and the Macroeconomy

Pakistan is among the top ten raw tobacco producers in the world.¹ This global ranking in producing raw tobacco sometimes leads to an inflated perception of the role and size of the tobacco industry in Pakistan's economy. For instance, tobacco industry argues that tobacco farming, tobacco manufacturing, and their linkages with the macroeconomy produce a significant contribution to the economy; the tobacco industry is supposedly not only making a significant contribution to large-scale manufacturing but is also creating direct and indirect employment in the country.² Apart from this, the cigarette industry also has significant fiscal implications in terms of contributing to tax revenues.³ To set the context, this section provides a snapshot of the contribution of raw and manufactured tobacco to Pakistan's macroeconomy by using the latest-available statistics.

Value-Added of Tobacco and Cigarettes in Pakistan

While Pakistan was ranked as the ninth-largest tobacco grower in the world in 2018,⁴ tobacco remains a minor crop in the agriculture sector of the country. Tobacco crops occupied an area of 47 thousand hectares out of 23.5 million hectares in 2019–20,⁵ reflecting a meager share of 0.2 percent of the total cropped area. The production of tobacco in 2019–20 was 104 thousand tons and has fluctuated between 100 and 116 thousand tons during the last five years (Table 1).

In terms of value, raw tobacco production accounts for less than 0.5 percent of cropped value added. At a constant average harvest price of 2005–06, its value added hovered around Rs 3 billion during the last five years. The share of tobacco in the total value of the crop sector has remained at less than 0.4 percent.

As far as the trend in cigarette production is concerned, massive fluctuations have been observed during the last five years. For instance, the production of cigarettes dropped from 53.5 billion sticks in 2015–16 to just 34.3 billion sticks in 2016–17, indicating a sharp decline of almost 36 percent. In the next year, it sharply increased to more than 59 billion sticks, exhibiting a growth of almost 72 percent. The Social Policy and Development Centre (SPDC)

¹ http://www.fao.org/faostat/en/#rankings/countries_by_commodity

² See, for example, Majid et al. (2017), Ali et al. (2015).

³ Of course, cigarette consumption also has public health implications, but these are not covered in this research.

⁴ http://www.fao.org/faostat/en/#rankings/countries_by_commodity

⁵ Pakistan Economic Survey 2019–20, Statistical Supplement, Table 2.2.

(2018) has shown that fluctuation in the declared production can be linked to changes in tax policy during 2015–16 and 2017–18. However, the decline in 2019–20 may be attributed to the COVID-19 lockdown. The impact of fluctuations in production is also visible in the estimated value added of cigarettes and its share in large-scale manufacturing.

The estimated shares of the tobacco and cigarette sectors in Pakistan’s GDP⁶ are also presented in Table 1. It appears that the tobacco and cigarette manufacturing sectors contribute less than 0.5 percent of GDP. Though second-order ripple effects are not accounted for, the estimates provide a fair reflection of the tobacco sector’s contribution to GDP.

Table 1: Value added of tobacco and cigarettes in Pakistan

	Unit	2015–16	2016–17	2017–18	2018–19	2019–20
Tobacco Value-Added						
Production of tobacco	thousand tons	116	100	107	104	110
Value-added of tobacco*	billion Rs	3.33	2.88	3.07	2.99	3.17
Share in crops value-added*	%	0.40	0.35	0.35	0.36	0.37
Cigarette Value-Added						
Production of cigarettes	billion sticks	53.6	34.3	59.1	60.7	46.1
Value-added of cigarettes*	billion Rs	43.7	28.1	48.3	49.6	37.7
Share in value-added of large-scale manufacturing*	%	3.70	2.20	3.60	3.80	3.20
Share of Value-Added of Tobacco and Cigarettes in GDP						
Tobacco	%	0.03	0.02	0.02	0.02	0.03
Cigarettes	%	0.39	0.24	0.39	0.39	0.30
Combined	%	0.42	0.26	0.42	0.42	0.33

* At 2005–06 prices

Source: SPDC estimates based on Economic Survey of Pakistan 20019–20, Finance Division, Government of Pakistan

Exports of Tobacco and Cigarettes

Given that Pakistan is a trade-deficit country, another important aspect may be to look at the role of tobacco and cigarette manufacturing in foreign exchange earnings. Table 2 provides the value of exports of raw tobacco and cigarettes during the last five years. It shows that the nominal value of tobacco exports grew from Rs 1 billion in 2015–16 to almost Rs 2.9 billion in 2018–19. In 2019–20, it declined to Rs 2.6 billion. Similarly, the share of raw tobacco exports increased from 12.4 percent in 2015–16 to almost 26 percent in 2018–19 and then declined to 17.4 percent in 2019–20. Despite

⁶ GDP excluding indirect taxes and subsidies.

the growth in the share of tobacco exports, more than three-quarters of the tobacco produced is used by domestic producers of cigarettes. In dollar terms, raw tobacco exports earned US\$ 16.7 million⁷ in 2019–20, which is less than 0.1 percent of Pakistan’s total exports.

The export of cigarettes is even lower than that of raw tobacco and remains below half a billion rupees. In 2018–19, exports of manufactured cigarettes were valued at slightly more than Rs 220 million, which is about US\$ 1.6 million, or ten times less than the exports of raw tobacco. Overall, more than 99.6 percent of manufactured cigarettes are used for domestic consumption.

In summary, the exports of raw tobacco and manufactured cigarettes do not generate a significant amount of foreign exchange. Considering this situation, the structure of the CGE model in this research is based on a closed economy instead of an open economy.

Table 2: Export of tobacco and cigarettes in Pakistan

	Unit	2015–16	2016–17	2017–18	2018–19	2019–20
Tobacco Exports						
Exports of raw tobacco	million Rs	1,066	1,305	2,557	2,866	2,638
Value-added of tobacco	million Rs	8,629	8,801	10,456	11,048	15,193
Share in exports in value-added	%	12.4	14.8	24.4	25.9	17.4
Cigarette Exports						
Exports of cigarettes	million Rs	154	168	344	277	224
Value-added of cigarettes	million Rs	183,176	200,243	107,964	185,666	236,154
Share in exports in value-added	%	0.08	0.08	0.32	0.15	0.09

Source: SPDC estimates based on Foreign Trade Statistics and Pakistan Statistical Year Book, Pakistan Bureau of Statistics

Employed Labor Force

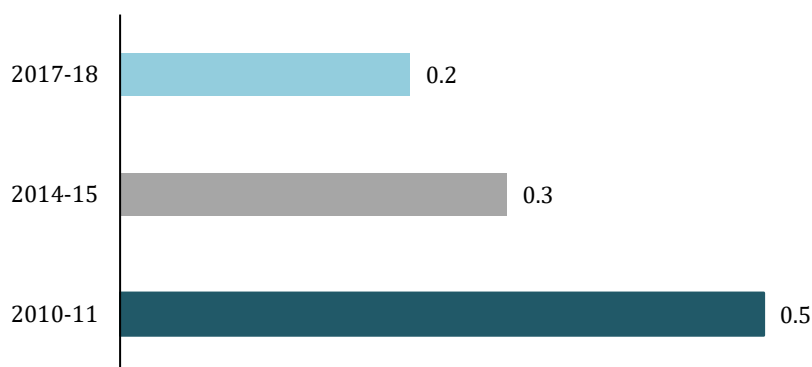
Generally, tobacco growing is considered a labor-intensive sector in Pakistan. However, detailed information about employment in tobacco cultivation (as per the industrial classification) is not available in the labor force surveys conducted by the Pakistan Bureau of Statistics.⁸ Therefore, the analysis is limited to employment in cigarette manufacturing abstracted from micro data sets of labor force surveys. The estimates show that the total number of employed persons in cigarette manufacturing was 30,400 in 2017-18. Figure 1 presents the trend in the share of the employed labor force in cigarette manufacturing in Pakistan. Cigarette manufacturing accounted

⁷ Average exchange rate is applied.

⁸ Estimates based on Pakistan Labor Force Survey 2014-15 show that a total number of 8,200 persons were engaged in tobacco farming in Pakistan. This information, however, is not available in the subsequent survey of 2017-18.

for 0.2 percent of industrial employment in 2017–18, which had declined from 0.5 percent in 2010–11. The low share of employment indicates that the cigarette industry is not labor-intensive, while the declining trend is a reflection of a decline in production in 2017–18 compared to 2010–11 and 2014–15.

Figure 1: Share of the cigarette industry in industrial employment (%)



Source: Authors' estimates based on micro data sets of Labour Force Survey of Pakistan

Consumption of Cigarettes

The average per capita annual spending on cigarettes (in current prices) was almost Rs 700 in 2018–19—the poorest 20 percent spent Rs 502 per capita, while the richest 20 percent spent Rs 941. The trend in spending at constant 2010–11 prices shows that per capita expenditures declined in 2015–16 and 2018–19 compared to 2010–11. The sharpest decline occurred in the upper-middle-income group, while there was a modest decline in the poorest 20 percent. This indicates that the per capita expenditure of the poorest quintile was relatively higher in 2018–19 in comparison with other income groups compared to 2010–11.

In summary, the descriptive analysis presented in this section provides some important insights. First of all, despite being one of the top ten tobacco-producing countries, the role of tobacco growing and manufacturing in Pakistan is rather limited. These sectors consist of less than 0.5 percent of GDP. Their contribution to exports is meager, around US\$ 20 million. Moreover, almost all manufactured cigarettes are consumed in the domestic market—a situation that sets the stage for a closed economy with limited scope for the rest of the world. The cigarette industry is not labor-intensive, as it employs 0.2 percent of industrial employment. Finally, consumers spend a sizeable amount on cigarettes. While in real per capita terms, annual expenditure on cigarettes shows a declining trend overall, this is less visible in the poorest 20 percent.

3

Tobacco Taxation Policy

Tobacco taxation policy in Pakistan has a dual objective—discouraging smoking and raising revenues. This section presents a brief overview of tobacco taxes and revenue performance, summarizes recent policy reforms, and highlights some ongoing challenges.

Tobacco Taxes in Pakistan

Taxes can be divided into direct and indirect taxes. Income and corporate taxes are largely categorized as direct taxes, while taxes on consumption, production, and imports are considered indirect taxes. With regard to tobacco taxation, income and corporate taxes are not commodity-specific taxes and, therefore, cannot be classified as tobacco taxes. Apart from direct taxes, three major indirect taxes prevail in Pakistan. These include general sales tax (GST) on domestic production and imports, Federal Excise Duty (FED) applicable on specific goods, and import duties applicable on imports.

A variety of taxes are levied on tobacco and related products (see Table 3). The FED on cigarettes is the largest source of revenue from the tobacco sector; it accounts for almost 80 percent of the revenue from the sector and is considered a major and specific tobacco tax. The second-largest revenue source is the domestic sales tax on the production of cigarettes. There is also a tobacco development cess levied by provincial governments on the output from the cultivation of tobacco. The tobacco development cess is a relatively small source of revenue due to its small production base.

Table 3: Major indirect taxes on cigarettes in Pakistan

Tax Name	Stage	Collecting Authority
Domestic Taxes		
Federal Excise Duty	Retail price	Federal Board of Revenue
Sales Tax Domestic	Retail price	
Taxes on Imports		
Import Duty	Import value	Federal Board of Revenue
Federal Excise Duty	Import value	
Sales Tax on Imports	Retail price	
Tobacco Development Cess	Tobacco crop production	Provincial Tax Authorities

Source: Federal Board of Revenue (FBR), Government of Pakistan

Revenue Performance

The revenue performance of indirect taxes collected from cigarettes is shown in Table 4. Domestic taxes account for around 99 percent of all taxes collected from cigarettes. The FED revenue collection was low in 2016–17 and 2017–18 (Rs 66.3 billion and Rs 67.1 billion, respectively) as compared to 2015–16, 2018–19, and 2019–20, where average FED revenue in these three years was almost Rs 90 billion.

Domestic sales tax, which is applied at the rate of 17 percent of the printed retail price (including FED), also followed the same trend. However, in 2019–20, while FED experienced a marginal decline of 1.7 percent, domestic sales tax showed a marginal growth of 0.5 percent. This deviation indicates an increase in cigarette prices excluding FED, despite a decrease in production (Table 2).

	2015–16	2016–17	2017–18	2018–19	2019–20
Domestic Taxes					
Federal Excise Duty	90,544	66,299	67,116	90,166	88,620
Sales Tax Domestic	23,767	17,562	20,527	23,109	23,231
Total - Domestic	114,311	83,861	87,643	113,275	111,851
Taxes on Imports					
Import Duty	165	181	357	817	
Sales Tax on Imports	344	301	285	631	
Federal Excise Duty	374	26	23	633	
Total - Imports	883	508	665	2081	
Total indirect tax on cigarettes	115,194	84,369	88,308	115,356	111,851
Share of domestic taxes (%)	99.2	99.4	99.2	98.2	
Share of taxes on imports (%)	0.8	0.6	0.8	1.8	

Source: FBR Yearbook 2018-19 & 2019-20

	2015–16	2016–17	2017–18	2018–19	2019–20
Domestic Taxes					
Federal Excise Duty	4.78	3.28	2.91	3.78	3.58
Sales Tax Domestic	1.25	0.87	0.89	0.97	0.94
Total - Domestic	6.03	4.14	3.80	4.75	4.52
Taxes on Imports					
Import Duty	0.01	0.01	0.02	0.03	
Sales Tax on Imports	0.02	0.01	0.01	0.03	
Total - Imports	0.03	0.02	0.03	0.06	
Total	6.06	4.17	3.83	4.81	4.52

Source: FBR Yearbook 2018–19 & 2019–20

As shown in Table 5, the share of taxes on imports is less than 0.1 percent of the net indirect taxes. In contrast, domestic taxes contributed more than six percent in 2015–16. However, their contribution declined to 4.1 percent in 2016–17 and dropped further to 3.8 percent in 2017–18. In subsequent years, domestic taxes on cigarettes contributed more than 4.5 percent of indirect taxes.

Recent FED Reforms

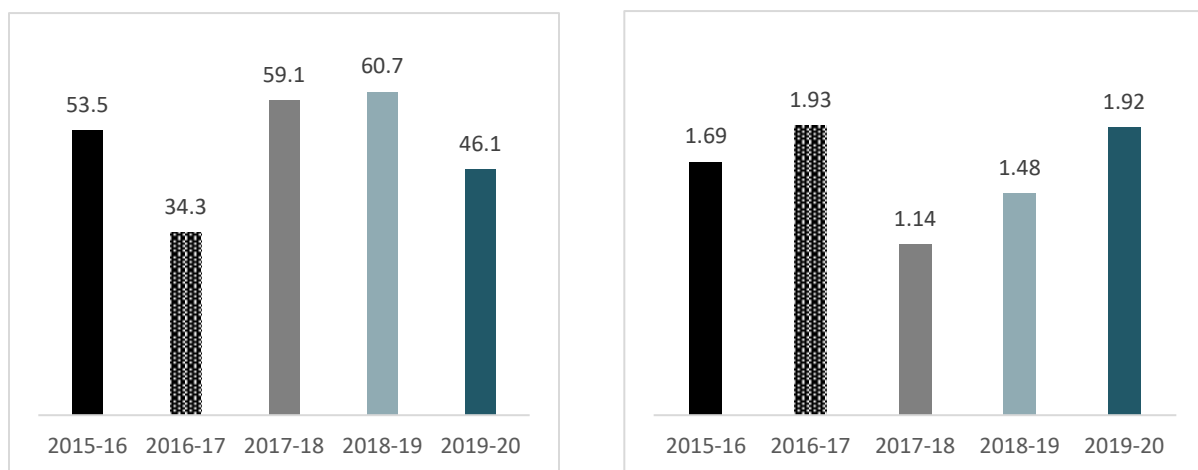
Before 2013, the structure of FED on cigarettes in Pakistan was a mix of a specific tax on low-priced brands, an ad valorem tax on high-priced brands, and a combined specific and ad valorem tax on mid-priced brands. In 2013, the ad valorem tax was withdrawn with the introduction of a two-tier structure of specific taxes based on a range of retail prices (exclusive of GST). Until 2016–17, the two-tier system remained intact, with an annual upward revision of tax rates of both tiers (Table 6). As shown in Figure 2, there was a massive drop in the declared production of cigarettes in 2016–17 (from 53 billion sticks to 34 billion sticks), which led to a decline in revenues (see Table 4). Following this, a three-tier excise duty structure was introduced in 2017–18 with a new tier for low-priced brands. The reason for this change, as stated by the government, was to combat the illicit trade in cigarettes by reducing the price differential for the lowest tier and enhancing revenue by increasing the share of duty-paid cigarettes (SPDC, 2018). However, the change in the FED structure did not meet the objective, as the production level was regained by the industry in 2017–18 but revenues from FED did not increase proportionately.

Table 6: Structure of Federal Excise Duty on cigarettes

Tier/ Price per thousand sticks	FED Rate	Tier/ Price per thousand sticks	FED Rate
2013-14		2017-18	
Tier 1: ≤ Rs 2,286	Rs 880	Tier 1: ≤ Rs 2,950	Rs 800
Tier 2: > Rs 2,286	Rs 2,350	Tier 2: > Rs 2,950 ≤ Rs 4,500	Rs 1,670
		Tier 3: > Rs 4,500	Rs 3,740
2014-15		2018-19	
Tier 1: ≤ Rs 2,706	Rs 1,085	Tier 1: ≤ Rs 2,950	Rs 848
Tier 2: > Rs 2,706	Rs 2,632	Tier 2: > Rs 2,950 ≤ Rs 4,500	Rs 1,770
		Tier 3: > Rs 4,500	Rs 3,964
2015-16		2019-20	
Tier 1: ≤ Rs 3,600	Rs 1,420	Tier 1: ≤ Rs 5,960	Rs 1,650
Tier 2: > Rs 3,600	Rs 3,155	Tier 2: > 5,960	Rs 5,200
2016-17		2020-21	
Tier 1: ≤ Rs 4,000	Rs 1,536	Tier 1: ≤ Rs 5,960	Rs 1,650
Tier 2: > Rs 4,000	Rs 3,436	Tier 2: > 5,960	Rs 5,200

Source: Federal Board of Revenue (FBR)

Figure 2: Production of cigarettes and effective FED rates



A. Production of cigarettes (billion sticks)

B. Effective FED rates (Rs per cigarette)

Source: Economic Survey of Pakistan, Government of Pakistan; FBR

To further elaborate on this point, the effective FED rates—the ratio of FED collection to the number of cigarettes—are presented in Figure 2. It appears that, despite low production, the effective FED rate in 2016–17 was Rs 1.93 per cigarette. However, due to the three-tier structure, the effective tax rate declined to Rs 1.14 per cigarette in 2017–18. While the three-tier structure prevailed in 2018–19, the government raised the statutory FED rates, which led to an increase in revenues. However, the effective FED rate did not increase enough to reach the previous level. In 2019, the government abolished the third tier and restored a two-tier structure with higher rates, which resulted in a significant increase in the effective FED rate—from Rs 1.5 per cigarette to Rs 1.9 per cigarette. However, it is important to note that total revenue from FED still remains around Rs 90 billion. Therefore, the situation calls for adopting a strategy aimed at increasing the effective FED rate across all tiers.

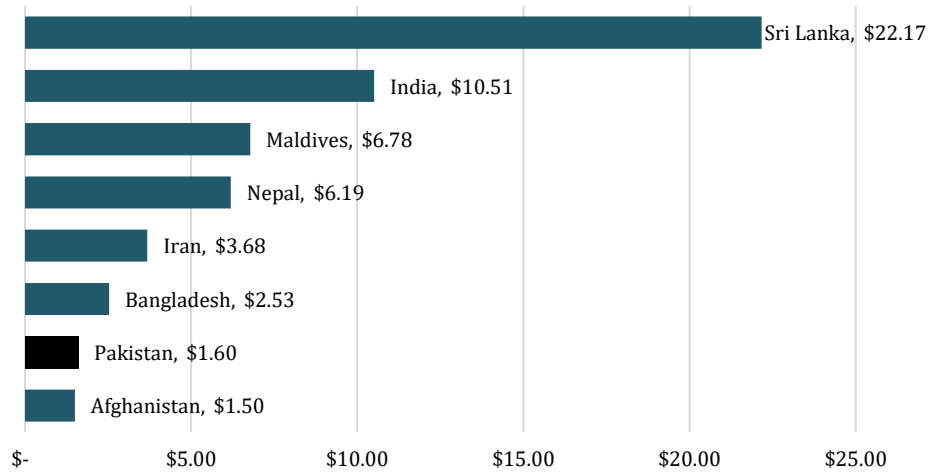
Cigarette Prices and FED Policy Choice

Cigarette prices in Pakistan are the lowest compared to the other countries in the region. The price of a 20-cigarette pack of the most-sold brand in Pakistan was US\$ 1.60 in 2018, whereas it was US\$ 10.51 in India. Sri Lanka had even higher prices compared to India and Pakistan (Figure 3).

One of the possible explanations for the relatively low price is the low excise tax rates in Pakistan, far below the widely-accepted benchmark of 70 percent of the retail price. For instance, FED is just 41 percent of the final consumer price of a pack of 20 cigarettes of Capstan—a low-priced brand that falls in

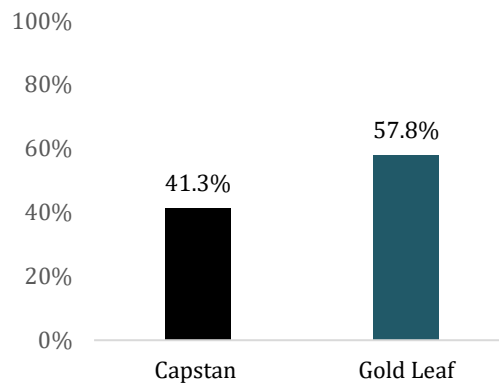
tier 1 of the FED. On the other hand, the FED on John Player—a high-priced brand that falls under tier-2—is 57.8 percent of the final consumer price (Figure 4). Therefore, there is ample room to raise prices in Pakistan by raising taxes on cigarettes.

Figure 3: Price of a 20-cigarette pack of the most-sold brands in 2018
(international dollars at purchasing power parity)



Source: WHO (2019)

Figure 4: Federal Excise Duty as a percentage of indicative consumer price in Pakistan



Source: Authors' estimates based on Indicative Consumer Price

Empirical Strategy for Policy Analysis

CGE modeling was chosen as a research tool for this study since it encompasses a general equilibrium framework, integrates income and expenditure multipliers, and is capable of simulating policy choices with welfare implications for consumers. Even though CGE modeling is a relatively recent development, a great deal of literature is available on the subject. For instance, Jangra and Narwal (2014), Feltenstein et al. (2013), Hosny (2013), and Iqbal and Siddiqui (2001) have surveyed a wide variety of CGE models and classified them into various categories. Their classification depends on the methodology used and whether the model is single-country, regional, or global.

According to these classifications, a stream of literature covers various distributional aspects of international trade on the economy of developing countries under several initiatives, including a global trade analysis program (Jha et al., 2020). Another body of CGE literature focuses on impacts of fiscal policy, including taxation and public spending, on reducing poverty and inequality (Jangra and Narwal, 2014). Feltenstein et al. (2013) also provided a review of micro-simulation and CGE literature that was used for evaluating the distributional impacts of taxation. In addition, a wide range of literature covers methodological issues and provides systematic ways to calibrate CGE models with software support (Raihan, 2015; Decaluwé et al., 2013). The following subsections present a brief overview of the literature that uses CGE models for tobacco policy prescriptions, describes the building blocks of the empirical strategy, and provides a snapshot of CGE model parameters.

CGE Models and Tobacco Tax Policy Analysis

A search of the available literature resulted in only two studies that analyze the various impacts of a tobacco tax rate increase on welfare based on CGE models. Ye et al. (2006) evaluated the impact of an increase in cigarette tax in Taiwan on the overall economy as well as the health benefits. They used a multisector model to simulate the impact of reduced cigarette consumption resulting from a new tax scheme and predicted that it would result in a marked reduction in cigarette consumption along with a notable increase in health benefits. While the reduction in cigarette consumption would result in a small decline in GDP, the value of the health benefits would exceed the GDP loss.

In quantitative terms, their estimates showed a saving of 1.2~2.4 billion New Taiwan dollars (NT\$) (where US\$ 1 = NT\$ 34.6 at the time of the study)

annually in life-threatening, cigarette-related health insurance expenses. On the other hand, a decrease of NT\$ 1.3 billion in GDP was projected, largely due to a reduction in consumption. At the same time, their results showed that the rise in cigarette prices would also lead to a NT\$ 13.1 billion increase in household welfare. This could be interpreted as an impressive tenfold counter-effect against the decrease in GDP. The study also highlights the decrease in tax revenue due to a decline in GDP and concludes that the increased cigarette tax would be beneficial in terms of both the health of the general public and the economy.

Jha et al. (2020) analyzed the economic effects of reducing tobacco consumption in Tanzania based on a multisectoral CGE model. The model contained comprehensive details on tobacco and tobacco products/sectors using the Global Trade Analysis Program environment model and database. The results indicated that a 30-percent reduction in tobacco use would lead to an employment loss of about 20.8 percent in the tobacco industry and 7.8 percent in the tobacco products sector initially. When compensated for by increases in other sectors, the overall decline in employment was very small—0.5 percent. The decline in the economy was negligible at 0.3 percent. They recommended that some assistance from the government was needed for the displaced workers from the tobacco sector to compensate for the loss as a result of the decline in smoking prevalence. However, a limitation of the study is that the analysis did not net out the economic burden of diseases caused by tobacco. If such a burden is added, the economic gains from the reduction in tobacco consumption would be far higher than the sectoral losses. The results also showed revenue gain from higher taxes to the government, which can be used to provide financial assistance to displaced tobacco farmers and workers.

A thorough search of CGE literature did not yield a single study simulating the economic impacts of higher tobacco taxes in Pakistan. To the best of the authors' knowledge, this research is the first study evaluating the economic impacts of higher tobacco taxes in Pakistan by using a CGE model.

Empirical Strategy: The Building Blocks

This study is primarily based on the methodology used by Decaluwé et al. (2013). There are two reasons for adopting this methodology. First, under the Modeling and Policy Impact Analysis (MPIA) program, they assisted developing country researchers in constructing models of their national economies, including Pakistan's, to simulate the impact of macroeconomic shocks and policies on various dimensions of poverty and welfare. The approach works well for tax analysis in developing countries, including Pakistan. Second, the open-access user guide and other supporting materials are readily available.

Decaluwé et al. (2013) offer a variety of CGE models including static and dynamic, single country and multi-country, and others. Given the research objectives, a static single-country CGE model was deemed appropriate to simulate the economic and distributional impacts of an increase in tobacco tax rates in Pakistan.

The following five-step methodology was used for the analysis:

1. Aggregate production sectors and commodities.
2. Build a benchmark equilibrium data set – the structure of SAM.
3. Set the basic behavior of institutions and choose a functional form; specify extraneous elasticity values and determine parameter values through calibration.
4. Ensure equilibrium verifying Walras' Law.
5. Conduct policy simulation.

Aggregate Production Sectors and Commodities

As defined by Decaluwé et al. (2013) and Raihan (2015), the CGE model is based on a representative firm in each industry that maximizes profits subject to its production technology. The sectoral output follows a Leontief production function. Each industry's value added consists of composite labor and composite capital, following a constant elasticity of substitution (CES) specification. Different categories of labor follow a CES technology with imperfect substitutability between different types of labor. Composite capital is a CES combination of different categories of capital. It is assumed that intermediate inputs are perfectly complementary; they are combined following a Leontief production function (Figure 5).

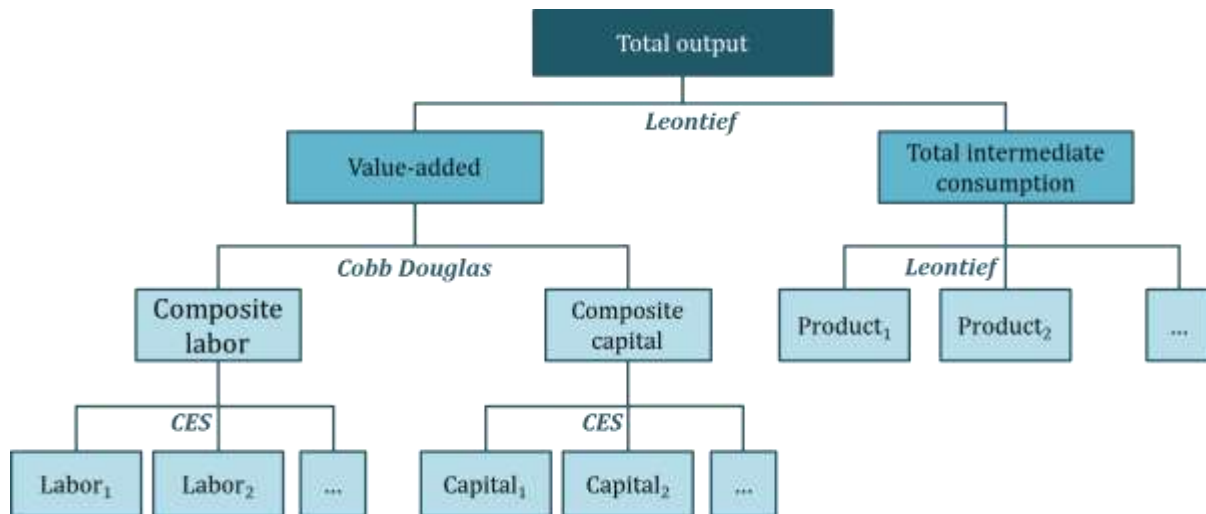
An economy-wide input-output (I-O) table contains the values of composite labor, capital, intermediate inputs and value added, and total output that serves as a base for SAM. In the case of Pakistan, two I-O tables are available; both are calibrated for the year 2010–11. The officially constructed I-O table contains 82 sectors of the economy and has been used for tax incidence analysis by the Federal Board of Revenue (FBR). On the other hand, the Pakistan Institute of Development Economics (PIDE) has developed an updated I-O table that is based on the System of National Accounts (SNA) 2008 and contains 42 sectors (Zeeshan & Nasir, 2019).

A comparison of the two I-O tables indicates vast differences in terms of labor and capital productivity due to methodological choices. PIDE's I-O table is an industry-by-industry table that does not contain products due to aggregation. For instance, the entire agriculture sector is grouped into only three industries, namely Crop and Animal Production, Hunting, and Related

Service Activities; Forestry and Logging; and Fishing and Aquaculture. Since it does not contain tobacco crop separately, it is less useful for this research where distributional impacts on raw tobacco producers are an integral part of the analytical framework.

Therefore, an attempt was made for this research to construct a product-by-product I-O table to decompose the agriculture sector by using the Supply and Use tables for Pakistan developed by the Asian Development Bank (ADB).⁹ The resulting I-O table contains 54 by 54 products with 19 categories for agriculture. However, it was found that tobacco growing is integrated into Forage Products, Fibres, Living Plants, Cut Flowers and Flower Buds, Unmanufactured Tobacco, and Natural Rubber. Further decomposition of this category required various assumptions in the absence of disaggregated data. Therefore, the FBR's I-O table (2010–11) was considered more appropriate for this study as it contains interlinkages of tobacco crop and tobacco manufacturing with other sectors. For the CGE model, the I-O table is calibrated for 2018–19.

Figure 5: Production and intermediate consumption



Source: (Decaluwé et al., 2013)

After the selection of the I-O table, the sectors are mapped into the desired number of aggregate commodities and sectors. The sectors and commodities of the I-O table are reduced to 13 sectors and commodities. In line with the scope of the research, the mapped sectors and commodities of the I-O table are linked with the major household consumption categories found in the Household Integrated Economic Survey (HIES) 2018–19. These categories include food, raw tobacco, cigarettes, household durables, clothing, energy,

⁹ <https://data.adb.org/dataset/supply-and-use-tables-pakistan>

housing, transport, public administration, education, health, leisure, and others. Table 7 shows the result of the mapping exercise that sets a foundation for SAM and CGE. These categories are also consistent with a recent SPDC study on the impact of tobacco use on household consumption patterns in Pakistan (Saleem & Iqbal, 2020). The basic objective of mapping is to include as many sectors as possible to cover all related final consumption categories and help in computing the impacts of change in tobacco consumption on consumption categories.

Table 7: Mapping of 81 sectors input-output (I-O) matrix in 13 sectors

Mapped Sectors	Description
Food	Rice, wheat, pulses, potatoes, vegetables & condiments, fruits, livestock & slaughter products, fisheries, vegetable oils etc, milled grains, bakery products, sugar, beverages, hotels & restaurants, sugar cane, oil seeds, and other food
Tobacco	Raw and manufactured (cigarettes) tobacco
Clothing	Cotton, ginned cotton, cotton yarn, cotton cloth, art silk, made-up textile goods, knitwear, carpets, garments, other textile products, leather & leather products, and footwear
Health	Health care, and pharmaceutical products
Education	Education, and Paper & Printing
Transportation	Railway, road transportation, water transportation, air transportation, other transportation & storage, and transport equipment
Energy and Utilities	Coal, crude oil, natural gas, electricity, gas supply, refined petroleum and water works & supply
Public Administration	Public administration & defence
Housing	Bricks, cement, other non-metallic mineral products, construction & land improvement, ownership of dwellings, and real estate services
Household Commodities	Forestry, wood and wood products, furniture, electrical equipment, handicrafts, jewelry, and precious metals
Recreation	Social & cultural services, and personal & household services
Others	Fertilizers & pesticides, chemical consumer products, rubber & plastic products, other chemicals, basic metal products, metal products, non-electrical machinery, surgical instruments, other manufacturing prods, business services, central monetary authority, scheduled & coop banks, other credit institutions, insurance, wholesale trade, retail trade, and other

Source: Authors' mapping in accordance with the major household consumption categories of HIES 2018-19

Construction of SAM

The CGE model is based on a social accounting matrix (SAM) of the economy. A SAM is a square matrix that provides a snapshot of the economy for a given year. In the case of Pakistan, the latest SAM was developed by Debowicz et al. (2012) for the fiscal year 2007–08. However, their SAM did not contain tobacco crop and cigarette manufacturing separately. Therefore, a SAM was constructed by using national accounts, input-output tables, family income and expenditures, trade and balance of payments, value-added data (capital income by industry and labor income by industry), and other government data sources.

The SAM constructed for this study consists of four types of institutions or agents: households, firms, government, and the rest of the world. Given the scope of this research, the SAM is limited to analyze tobacco tax policy simulations; hence, the rest of the world is dropped from the analysis. The remaining agents are further divided into appropriate groups. The factors of production are divided into labor and capital, while the land is grouped with capital. Similarly, households are divided into two broad categories: urban and rural. Other institutions include government, corporation, and capital (Table 8).

Table 8: Description of Pakistan SAM accounts

Set	Description of Elements
Sectors/Activity (13)	basic food, raw tobacco, cigarettes, household durables, clothing, energy, housing, transport, public account, education, health, leisure and others
Commodity (13)	basic food, raw tobacco, cigarettes, household durables, clothing, energy, housing, transport, public account, education, health, leisure and others
Factors of Production (2)	Labor and capital
Households (2)	Rural and urban
Other Institutions (3)	Government, corporation; and capital

Structure of the CGE Model

The CGE model contains the production block, income and saving block, demand-side utility functions, price structure, equilibrium conditions, and a set of exogenous variables.

Production block

The production block consists of a two-level nested production structure in all 13 sectors. At the first level, a Leontief fixed-proportion production function between value-added and intermediate consumption is assumed. This implies that there are no substitution possibilities between intermediate consumption and value added. On the intermediate consumption side, the Leontief production function between different inputs is assumed. At the second level, the assumption is that substitution is possible between labor and capital on the value-added side. To capture the substitution possibilities, a Cobb–Douglas production function is used in each sector, which implies that the budget share of each factor of production is fixed in the short run. A fixed wage rate for labor and fixed capital in all sectors is also assumed, which implies that input market is perfectly competitive and the factors of production are perfectly mobile in all sectors.

Income and savings block

As defined in the SAM, the income and savings block consists of the income of households, corporations, and government. Household income comes from three possible sources: labor income, capital income, and transfers received from other agents. HIES (2018–19) data are used to compute the share of labor income of rural and urban households. The same data set is used to compute dividends to rural and urban households. However, it turns out that only urban households received income from firms in the form of dividends in 2018–19. It is also assumed that dividends are exogenous to the model. To compute the share of household income from capital and savings of corporations, the share of capital income in the total income of households is applied. Apart from these incomes, households also receive income from the government in the form of fiscal transfers. The difference between household disposable income and the consumption budget constitutes household savings.

Corporate income consists of its share of capital income. It is assumed that firms receive a fixed share of capital income after the payment of dividends and corporate income tax. This income is not distributed to households and is entirely dedicated to firms' savings.

The government draws its income from household and corporate income taxes, taxes on products, and other taxes on production. These taxes can be divided into direct taxes and indirect taxes; the latter are further divided into GST and FED, which are collected on the sales of tradable commodities. It is assumed that public administration is not a tradeable commodity. It is also assumed that firms and households pay a fixed share of their income as income tax. Finally, government savings are the difference between government income and government expenditures.

Demand side

The demand for goods and services consists of household consumption demand, investment demand, and demand by the government. The Cobb–Douglas utility function is assumed to drive households' final consumption demand, which implies that households allocate a constant share of their budget to each commodity. Similar behavior of households regarding the final demand for investment purposes is also assumed. Intermediate demand is the sum of demand from each industry derived from the I-O table.

Prices

The value-added price is the weighted sum of the cost of labor and capital. Total production cost is the weighted sum of value-added price and price of intermediate consumption. Producer prices and purchaser prices are denoted by P_o and PD , while the difference between these two divided by PD

is defined as the effective indirect tax rate. The following equations show the correspondence between producer and consumer prices in the case of cigarettes.

In the case of cigarettes sold in Pakistan, there are two printed prices: the price net of GST and the final consumer price. Though FED has a two-tier structure (based on low-priced and high-priced brands), the weighted average effective tax rate of FED (txe) is used for the analysis, which allows for performing simulations by varying effective tax rates.

Equation 1 shows the relationship between the producer's price (P_o), effective FED rate (txe) and retail price excluding GST (PRT).

$$PRT = P_o * (1 + txe) \dots\dots\dots(1)$$

Equation 2 shows the relationship between retail price excluding GST (PRT) and the GST. Given that GST is a value-added tax, the final consumer price (PFT) is the product of PRT and one plus GST rate ($tgst$).

$$PFT = PRT * (1 + tgst) \dots\dots\dots(2)$$

The relationship between the producer's price, the effective FED rate, and the GST rate is presented in Equation 3, which is used in the CGE model. It is worth noting that price margins are not included in the model.

$$PFT = P_o * (1 + txe) * (1 + tgst) \dots\dots\dots(3)^{10}$$

Equilibrium conditions

Ensuring equilibrium in the system requires verification of the equilibrium between the supply and demand of each commodity in the domestic market. Similarly, it has to be ensured that an equilibrium exists between total demand for each factor and available supply. Likewise, total investment expenditure must be equal to the sum of agents' savings. The sum of supplies of every commodity by local producers must be equal to domestic demand for that commodity produced locally. In the model, equilibrium is defined

¹⁰ As per the terminology used in the finance Act, PRT is the 'printed retail price' and is equal to Producer price + FED. Final price is the price that a consumer has to pay, which is PRT + GST.

FED rate is applied on the basis of 'printed retail price'. For example:
 Price printed on a pack of Gold Leaf (20) is as follows: Retail price Rs 140.2 + GST.
 Rate of FED is R 5.2 per stick if 'printed retail price' of one stick is R5.96 or more (upper tier). In this case the 'printed retail price' is 140.2/20 = Rs 7.01 per cigarette, implying that the brand falls in the upper tier. Therefore, the FED component of the 'printed retail price' is Rs 104 (5.2*20), and the remainder (Rs 36.2) is producer price. Thus, the final consumer price would be: Rs 140.2 + 17% GST = Rs 140.2 + Rs 23.8 = Rs 164.

over all markets except one (Walras' law)—that is, the miscellaneous category.

Exogenous variables

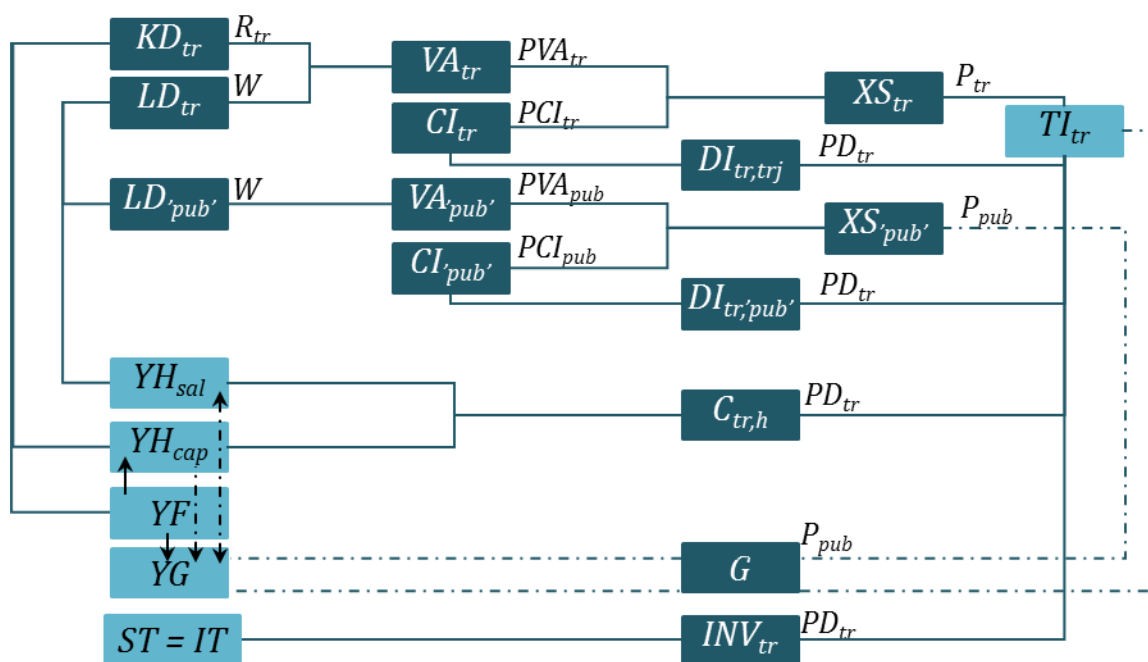
The CGE model consists of 396 variables, of which 5 are exogenous. For instance, dividends, current public expenditures, public transfers to households, total capital supply in the country, and total labor supply are treated as fixed and exogenous. The producer price of cigarettes is used as numeraire. This enables analyzing the impact of changes in cigarette prices on the economy since shock cannot be given to endogenous variables in the model. Total output/total supply of commodity tr ($XStr$) is divided into value-added ($VAttr$) and intermediate consumption ($Cltr$). Similarly, the output of public administration ($XSpub$) is divided into value added and intermediate consumption.

Transmission Channels of the Tax Rate Changes on the Economy

An increase in FED on cigarettes would increase/decrease the TI_{tr} (indirect tax receipts of the government). The direction of change depends on the change in consumption and changes in prices – that is, the price elasticity of demand. It is assumed that an increase in taxes would lead to an increase in indirect tax receipts from the cigarette industry. The increase in indirect tax receipts implies an increase in government income (YG). Since government transfers to households and government expenditure are assumed to be fixed, an increase in government income would lead to a reduced budget deficit or increase in government savings. An increase in government savings would increase the national savings, and as per the equilibrium condition (total savings = total investment), the level of investment would also increase in the economy. This implies an increase in investment demand by different sectors of the economy, which would lead to an increase in output and the total supply of the other sectors. The pattern is the same in the case of value added and intermediate consumption. Since the demand for capital and labor is flexible as per the model's assumptions, an increase in output is possible by increasing the demand for either one or both inputs in the economy. The increase in the demand for labor and capital in other sectors implies an increase in household income from both factors of production. Furthermore, it is important to note that since the cigarette sector is not labor-intensive, a decrease in labor demand would not have a large effect on household labor income.

An increase in tax rate would lead to an increase in the final consumer price of cigarettes ($PDcig$), leading to a reduction in the consumption of cigarettes in the economy. On the other hand, an increase in household income would lead to an increase in the demand for other commodities. A schematic diagram of the model is presented in Figure 6.

Figure 6: Schematic diagram of the model



CI_{pub} = Intermediate consumption by public administration	P_{tr} = Price net of taxes of commodity tr
CI_{tr} = Intermediate consumption by sector tr	PVA_{pub} = Price index of value added for public administration
$C_{tr,h}$ = Household consumption of commodity tr by household h	PVA_{tr} = Price index of value added for sector tr
$DI_{tr,pub}$ = Intermediate demand by public administration from sector tr	R_{trv} = Rate of return on capital in sector tr
$DI_{tr,trj}$ = Intermediate demand of commodity tr used by sector trj	ST = Total savings
G = Government expenditure	TI_{tr} = Total intermediate demand by sector tr
INV_{tr} = Investment by sector tr	VA_{pub} = Value-added by public administration
IT = Total investment	VA_{tr} = Value-added by sector tr
KD_{tr} = Capital demand in sector tr	W = Wage bill in sector tr
LD_{pub} = Labor demand in public administration	XS_{pub} = Total output by public administration
LD_{tr} = Labor Demand in sector tr	XS_{tr} = Total output by sector tr
PCI_{pub} = Price index for intermediate consumption in public administration	YF = Firm income
PCI_{tr} = Price index for intermediate consumption in sector tr	YG = Government income
PD_{tr} = Retail price of commodity tr (including taxes)	YH_{cap} = Urban household income
P_{pub} = Price of public administration	YH_{sal} = Rural household income

Source: Decaluwé, B et al. (2001)

A simulation is carried out to analyze the impact of the policy change in the form of an increase in FED rate on the economy of Pakistan. This section presents the results of the simulation exercise based on the CGE model developed for this research.

Key Assumption and Magnitude of Shock

In line with the objective of the study, the FED tax rate is selected as a policy variable to give the shock in the model that changes the retail price of cigarettes, while the price net of taxes is set as exogenous and numeraire. It is important to note that there are two prices in the model – the price net of taxes (ex-factory price) and the price including taxes (retail price). As per the assumption, ex-factory prices are unchanged during the policy shock, while retail prices increase due to an increase in the tax. Apart from prices, due to the static nature of the model, dividends, current public expenditures, total capital stock, total labor supply, and public transfers to households are assumed as exogenous.

The widely-accepted benchmark for excise tax is 70 percent of the retail price of tobacco products. Therefore, the simulation results are based on a hypothetical question: if the FED on cigarettes is raised to 70 percent of the retail price, what would be the impact on the overall economy as well as on the cigarette industry? To raise excise tax to 70-percent share of price, a shock of 285.1 percent is given to the effective FED, which would result in a 154.9 percent increase in cigarette price (Table 9).

Table 9: Magnitude of shock

	Price net of taxes	Effective FED	GST	Price including taxes
	Rs per cigarettes			
Base Case	1.25	1.48	0.46	3.19
Scenario 1	1.25	5.70	1.18	8.13
Magnitude of shock (%)	0.0	285.1	156.5	154.9

Simulation Results

The results of the simulation are organized in six subsections: the impact on indirect tax collection, household consumption, raw tobacco production (farmers), the cigarette industry, employment, and the overall economy.

Table 10: Simulation results—the impact of increase in FED rate to 70% of the retail price

	Base Case	Simulated Results	% Change*
Impact on indirect taxes (million Rs)			
Tax revenue from cigarettes	118,440	239,163	101.93
<i>Revenue from FED on cigarettes</i>	90,166	198,143	119.75
<i>Revenue from GST on cigarettes</i>	28,274	41,019	45.08
Tax revenues from other sectors	1,898,185	1,898,615	0.02
Overall indirect tax collection	2,016,625	2,137,778	6.01
Impact on household consumption (million sticks)			
Total consumption of cigarettes	84,487	57,067	-32.45
Consumption of licit cigarettes	60,923	34,762	-42.94
Consumption of undocumented cigarettes	23,564	22,305	-5.34
Impact on household consumption (million Rs)			
Total consumption expenditure on cigarettes	231,494	401,119	73.27
<i>Consumption Expenditure on legitimate Cigarettes</i>	194,594	282,615	45.23
<i>Consumption Expenditure on illicit Cigarettes</i>	36,900	118,504	221.15
Smokeless tobacco consumption	2,156	2,146	-0.46
Other goods and services	30,120,245	30,156,389	0.12
Overall household consumption	30,353,895	30,559,654	0.68
Impact on raw tobacco production (million Rs)			
Raw tobacco intermediate consumption	4,341	4,002	-7.81
raw tobacco value-added	11,452	10,559	-7.80
Raw tobacco output	16,722	15,417	-7.80
Impact on the cigarette industry (Million Rs)			
Intermediate consumption	88,182	59,646	-32.36
Value-added	24,872	16,823	-32.36
Total output	113,054	76,470	-32.36
Impact on employment (Million Rs)			
Employment in tobacco growing	4,270	3,950	-7.49
Employment in cigarette industry	1,233	721	-41.52
Employment in other sectors	14,004,819	14,072,214	0.48
Overall employment in the economy	14,010,322	14,076,885	0.48
Impact on overall macroeconomy (Million Rs)			
Household income	31,731,182	31,770,687	0.12
Intermediate consumption	44,527,475	44,565,178	0.08
Value added	35,813,242	35,858,009	0.13
Output	77,375,861	77,402,246	0.03

Source: Authors' estimates from CGE model

Impact on Indirect Taxes

As a result of a 285.1 percent increase in the FED, revenues (including GST) would grow by 102 percent. This is partly due to a decline in the consumption of cigarettes. However, a relatively high increase in the FED compared to the decline in consumption would result in a net increase in tobacco tax collection. The overall indirect tax revenue would increase by 6 percent.

Impact on Household Consumption

The simulated increase in tax rate would lead to a 32.4 percent decline in cigarette consumption at the household level. However, due to the increase in cigarette prices, the household consumption expenditure on cigarettes would increase by 73.3 percent. Interestingly, the CGE model predicts a decline of 0.5 percent in spending on smokeless tobacco. The overall spending of households is expected to increase by 0.7 percent.

Impact on Raw Tobacco Production

One of the arguments presented by the tobacco industry to counter tax increases is the likely negative impact on tobacco farmers. The results show that an increase in cigarette price (as per the simulated increase in tax) would reduce the demand for raw tobacco in the cigarette industry. The intermediate demand would reduce by almost 7.81 percent. The reduction in tobacco demand would cause a reduction in tobacco output. The value added in raw tobacco production would decline by 7.80 percent. Due to this reduction in value added, the output of raw tobacco would also shrink by 7.80 percent.

Impact on the Cigarette Industry

As mentioned earlier, due to an increase of 285.1 percent in the FED, the retail price of cigarettes would increase by 154.9 percent, which would lead to a reduction of 32.5 percent in the consumption of cigarettes. Due to the reduction in consumption, the industry's output would decrease by 32.4 percent. Since the output is reduced, the income from the factors of production employed in the cigarette industry would also decrease.

Impact on Employment

One of the major concerns of policy makers is the impact of higher tobacco taxes on employment. It is obvious that an increase in the retail price would result in a decline in tobacco consumption and production, which would lead to reduced employment in the cigarette industry and tobacco farming. The CGE model predicts these impacts as well as the impact on other sectors.

In the tobacco growing sector, the income of the people employed would decline by 7.5 percent due to a reduction in labor demand. Similarly, employment income in the cigarette industry would be reduced by 41.5 percent. However, the expected increase in public investment would generate a demand for labor in other sectors. As shown in Table 10, the overall employment in other sectors and in the overall economy would

increase by 0.5 percent. In absolute rupee term, the decline in employment income in the tobacco sector (including tobacco growing and the cigarettes industry) is Rs 0.83 billion compared to an increase of 67.4 billion in employment income in other sectors. Thus, there would be an overall net gain of Rs 66.6 billion in employment income. As far as employment is concerned, there would be a reduction of 13,150 jobs in the tobacco sector¹¹ while 321,700 jobs will be created in the other sectors, leading to a net increase of 308,550 jobs in the economy.

Impact on the Rest of the Economy

Despite a decline in the income and output of the cigarette industry, the impacts on overall economy are positive, though small in magnitude. The main reason for this increase is rise in the tax revenues. As explained in previous sub-section on transmission channels, an increase in tax revenues would result in higher public savings, which in turn would lead to increased investment in the economy. As a result, the output of the other sectors would increase, leading to an increase in the value added and the household income from factors of production employed in these sectors. As shown in Table 10, overall household income would increase by 0.13 percent. Similarly, the gross value added would increase by 0.12 percent. In a nutshell, raising excise tax to the widely-accepted benchmark of 70 percent of retail price would not have a negative impact on the economy.

Summary of Results

The simulations based on the CGE model provide the following insights into the impact of an increase in tobacco taxes in Pakistan on the overall economy and households:

- An increase of 154.9 percent in the average price of cigarettes through an increase in the FED would result in a 32.5 percent decline in the consumption of cigarettes.
- Despite the decline in the consumption of cigarettes, the revenues from cigarettes would increase by 102 percent. In absolute terms, this is expected to generate additional revenue of more than Rs 102.7 billion (including FED and GST). Moreover, due to the increase in the price of cigarettes and demand for other goods, total indirect taxes would increase by 6 percent.

¹¹ It includes employment in the cigarette industry and tobacco farming. The number of employed persons in the cigarette industry would decline from 30,400 to 17,784. Similarly, the number of persons engaged in tobacco farming would reduce from 7,128 to 6,594. As mentioned earlier, information on tobacco farming is not available in the Labor Force Survey 2017-18. However, estimates based on Labor Force Survey 2014-15 indicate that the share of tobacco in total agricultural employment was 0.03 percent. Therefore, the same share was applied to estimate the employment in tobacco farming for 2017-18, which is 7,128 persons.

- The reduction in tobacco demand would cause a decrease in raw tobacco output by 7.8 percent.
- The production of cigarettes would reduce by 32.4 percent, which would lead to a 41.5 percent decline in labor demand in the cigarette industry.
- Despite a decline in labor demand in the cigarette industry, the overall labor demand in the economy would increase by 0.5 percent. This is because of increased investment due to higher public savings in the economy.
- The overall impacts on the economy—in terms of income, value-added and output—are positive, though small in magnitude. Therefore, raising excise tax to 70 percent of retail price would not adversely affect the economy.

Conclusion and Policy Recommendations

A large body of evidence demonstrates that raising tobacco taxes discourages the consumption of cigarettes, particularly for new smokers. Therefore, higher tobacco taxes are recommended on health grounds. The overall macroeconomic implications of such an increase, however, depend on the economic structure of the country. An evidence base regarding these implications is generally not available to policy makers and other stakeholders, and this is particularly the case in Pakistan. The CGE model used in this study is designed to conduct policy simulations and estimate the impact of an increase in tobacco taxes on the various elements of Pakistan's economy.

For this purpose, a price shock of a 154.9 percent increase in the weighted average price of cigarettes (through raising FED) is simulated. The results show that the increase in the tobacco tax rate would result in a decline in cigarette consumption and would also lead to a first-order positive impact on revenues. Given that government current expenditure is constant (by the assumption of the model), the increase in revenues would lead to an increase in investment in the economy (crowding-in effect). This increase in investment would lead to enhanced output of the economy and increased household income and consumption. The increase in consumption and income would lead to an increase in indirect tax revenues and would generate second-order impacts.

While a reduction in the consumption of cigarettes would result in a decline in the output of raw and manufactured tobacco, leading to a reduction in income for tobacco farmers and employees in the cigarette industry, the overall impact on the economy remains positive. In short, the empirical analysis provides strong evidence to support a significant increase in tobacco taxes.

Policy Implications

Based on the empirical analysis, it is evident that tobacco taxes are an effective tool to reduce cigarette consumption and generate additional revenues. Increasing the FED rate to the widely-accepted benchmark of 70 percent of retail price would help the government of Pakistan achieve its commitment to reduce tobacco use, reduce deaths from noncommunicable diseases, and align its tobacco tax policy with global best practices.

The major recommendations in this regard are as follows:

- A substantive increase in the FED is needed to reach the widely-accepted benchmark of an excise tax share of 70 percent of the retail price. This would make cigarettes less affordable and discourage demand for cigarettes and would also result in other macroeconomic gains.
- A substantive gap exists between tax rates applied to low-priced and high-priced brands. It is recommended to move towards a uniform FED rate for all cigarette brands. This would help in reaping the benefit of the price in line with the results of the study.



References

- Ali, N., Jaffar, A., Anwer, M., Raza, M., & Ali, N. (2015). The economic analysis of tobacco industry: A case study of tobacco production in Pakistan. *International Journal of Research*, 2(3), 88–99.
- Jangra, A., & Narwal, K. P. (2014). Application of CGE models in GST: A literature review. *International Journal for Economics Practices and Theories*, 4(6), 970–978
- Debowicz, D., Dorosh, P., Haider, H., & Robinson, S. (2012). A 2007–08 social accounting matrix for Pakistan. Pakistan Strategy Support Program (PSSP) Working Paper 1, Washington, D.C.: International Food Policy Research Institute (IFPRI).
- Decaluwé, B., Lemelin, A., Maisonnave, H. & Robichaud, V. (2013). *pep-1-1 the PEP standard single-country, static CGE model*. Laval: Poverty and Economic Policy Research Network, Laval University.
- Decaluwé, B., Martens, A., Savard, L., & Aupelf-Uref. (2001). *Development economic policy and computable general equilibrium models: An introduction to the application of mesoeconomic analysis to developing countries*. Montreal: University of Montreal Press.
- Feltenstein, A., Lopes, L. T., Porrás Mendoza, J., & Wallace, S. (2013). The impact of micro-simulation and CGE modeling on tax reform and tax advice in developing countries: A survey of alternative approaches and an application to Pakistan. International Center for Public Policy Working Paper Series, at AYSPS, GSU paper1309, International Center for Public Policy, Andrew Young School of Policy Studies, Georgia State University.
- Hosny, A. S. (2013). Survey of recent literature on CGE trade models: With special reference to the case of Egypt. *Journal of World Economic Research*, 2, 9–19.
- Iqbal, Z., & Siddiqui, R. (2001). *Critical review of literature on computable general equilibrium models*. Pakistan Institute of Development Economics.
- Jha, V., Narayanan, B. G., Wadhwa, D., & Tesche, J. (2020). Economic and environmental effects of reduction in smoking prevalence in Tanzania. *Tobacco Control*, 29, 24–28.
- Majid, A., Usman, B., Usama, M., & Tariq, H. (2017). Pakistan Tobacco Company: Strategic analysis. <https://hcommons.org/deposits/item/hc:16931>
- Raihan, S. (2015). Effects of unilateral trade liberalization in South Asian countries: Applications of CGE models of Bangladesh, India, Nepal, Pakistan and Sri Lanka. *Development Papers 1505*, United Nations Economic and Social Commission for Asia and the Pacific.

- Saleem, W., & Iqbal, M. A. (2020). *The impact of tobacco use on household consumption patterns in Pakistan*. Research report. Social Policy and Development Centre (SPDC).
- SPDC. (2018). *Macroeconomic impacts of tobacco use in Pakistan*. Research report. Social Policy and Development Centre (SPDC).
- Vargas, E. E., Schreiner, D., Tembo, G., & Marcouiller, D. (1999). *Computable general equilibrium modeling for regional analysis*. Regional Research Institute, West Virginia University Morgantown, West Virginia.
- World Health Organization (WHO). (2019). *Report on the Global Tobacco Epidemic 2019*. Table 9.1.
http://158.232.12.119/tobacco/global_report/en/
- Ye, C. Y., Lee, J. M., & Chen, S. H. (2006). Economic gains and health benefits from a new cigarette tax scheme in Taiwan: A simulation using the CGE model. *BMC Public Health*, 6, 62.
- Zeeshan, M., & Nasir, M. (2019). *Pakistan input-output table 2010-11*. Working Paper No. 162, Pakistan Institute of Development Economics (PIDE).

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