CISDI
CENTER FOR INDONESIA'S STRATEGIC DEVELOPMENT INITIATIVES

The Macroeconomic Impacts of Tobacco Taxation in Indonesia

Adrianna Bella
Arya Swarnata
Dhanie Nugroho
Usman
Yurdhina Meilissa
Teguh Dartanto

Center for Indonesia's Strategic Development Initiatives 2021

(This page is intentionally left blank)

The Macroeconomic Impacts of Tobacco Taxation in Indonesia

Adrianna Bella
Arya Swarnata
Dhanie Nugroho
Usman
Yurdhina Meilissa
Teguh Dartanto

Center for Indonesia's Strategic Development Initiatives
2021

Acknowledgement

CISDI is funded by the University of Illinois Chicago's (UIC) Institute for Health Research and Policy to conduct economic research on tobacco taxation in Indonesia. UIC is a partner of the Bloomberg Initiative to Reduce Tobacco Use. The views expressed in this document cannot be attributed to, nor do they represent, the views of UIC, the Institute for Health Research and Policy, or Bloomberg Philanthropies.

Suggested citation:

Center for Indonesia's Strategic Development Initiatives. (2021). *The macroeconomic impacts of tobacco taxation in Indonesia.* Jakarta: CISDI.

Design Cover: Bagus Fachrudi
Document Layout: Bagus Fachrudi and Lara Rizka

Jakarta, October 2021

Table of Contents

List of Tables

List of Figures

Executive Summary

Why this research matters

Despite Indonesia's high smoking prevalence and the associated health burden, the tobacco control policy in the country has not been adequate to markedly reduce tobacco consumption. The recurring argument of the crucial role of tobacco industry in generating tax revenue and creating jobs, and the adverse impact tobacco taxation would have on the industry and the economy have created a formidable barrier to the implementation of effective tobacco control measures.

This study aims to provide updated evidence on the macroeconomic impacts of cigarette taxes, specifically estimating the impact on total output, income, and employment due to rising excise taxes on kretek and white cigarettes.

This study contributes to the tobacco control discussion in two ways. First, the study simulates the net economic impact of cigarette tax, not only through reduced cigarette demand and reallocation of household spending but also incorporating the impact of additional government spending generated from cigarette tax revenues. Thus, the research provides a complete picture of the economic impact of cigarette taxes in Indonesia. Second, this research simulates how cigarette tax increases affect the economy under different government spending structures. As the government could earmark cigarette tax revenue to fund targeted sectors, which have different multiplier impacts, understanding the optimal expenditure allocation is critical to optimize the economic effect of tobacco taxation.

Approach

The study simulates three scenarios of tax increases. The first is the 2020 level of tax increases, in which kretek and white cigarette excise taxes increase by 23.78 and 27.15 percent, respectively. The second and third scenarios assume that cigarette excise taxes increase by 30 and 45 percent, respectively.

In simulating the impact of increased cigarette tax on cigarette price, the study assumes that the tax is fully passed on to consumers (full tax pass-through).[1][2] Furthermore, to simulate the impact of increased cigarette price on cigarette demand, cigarette own-price and cross-price elasticities are estimated using pooled data from the National Socioeconomic Survey (Susenas) 2017–2019 and following Deaton's method (1988).

[1] Full pass-through refers to a scenario where the consumers bear all the burden of the tax, as opposed to tax under-shifting (less than 100-percent pass-through rate) and tax over-shifting (more than 100-percent pass-through rate).

[2] The estimated impact in case of tax over-shifting (as it happened in 2020) is presented in the Appendix.

The impact of the cigarette tax increase is simulated through three pathways: 1) decreased cigarette spending 2) reallocation of consumer spending from cigarettes to other commodities; and 3) government spending from additional cigarette tax revenue. This study simulates different scenarios of government spending, such as spending to mandated sectors, targeted sectors, or spending business-as-usual. The net effect is the combination of impact from all the three simulations.

To estimate the macroeconomic effect of the simulations, this study employs an input-output (IO) analysis which calculates the multiplier effect of change in one industry's output to the overall output, employment, and income in the economy. The Indonesia's 2010 IO Table, which consists of 55 industries including three type of cigarette industries, is used for the analysis. The table is updated to represent the structure of the economy in 2019 with gross domestic product (GDP), employment, and household spending data.

There are some limitations to the analysis which are mainly related to the IO model. First, the model does not allow substitution between input in the production which may result in the failure to fully capture firms' behaviours and overestimate results. Second, IO analysis is a static model that cannot capture the long-term impacts of tobacco consumption. Third, the analysis is unable to incorporate non-economic effects of the shocks, such as the health benefit due to reduced smoking or human capital investment due to increased public spending on education and health care.

Key findings

The results show that a higher tax would lead to a greater reduction in cigarette consumption. Assuming the tax is fully transferred to the consumer and all else remains constant, including no change in income, a tax increase similar to that in 2020 would reduce the quantity of consumed kretek and white cigarettes by 17.32 percent and 12.79 percent, respectively. Meanwhile, increasing the cigarette tax by 30 percent would decrease consumption by 20.62 percent of kretek cigarettes and 14.24 percent of white cigarettes. Furthermore, increasing the cigarette tax by 45 percent would reduce the demand for kretek cigarettes by 27.74 percent and would reduce demand for white cigarettes by 19.50 percent.

A higher cigarette tax would generate higher tax revenue. The 2020 rates of increase would generate an additional Rp 4.68 trillion (2.41 percent) in tax revenue from kretek and white cigarette sales. Meanwhile, increasing the cigarette tax by 30 percent and 45 percent would generate an additional tax revenue by Rp 5.72 trillion (2.95 percent) and Rp 7.92 trillion (4.08 percent), respectively.

Additionally, a cigarette tax increase would result in a net positive impact in terms of aggregate economic output, employment, and income to the economy. The net positive impacts are largely from government spending as effects from reduced cigarette consumption and households' spending reallocation merely offset each other. It is also simulated that the current structure of government spending, in which most of the additional tax revenue is spent in a business-as-usual fashion, would generate the largest impact (i.e., optimal spending allocation) compared to the other proposed spending scenarios.

It is estimated that a tax increase similar to that in 2020 under the optimal spending allocation would increase the total output by Rp 15.14 trillion (0.05 percent), while the 30 and 45 percent tax increases would increase it by Rp 18.70 trillion (0.06 percent) and Rp 26.24 trillion (0.08 percent), respectively. In terms of employment and income, the 2020 tax increase would generate over 75.89 thousand (0.06 percent) additional jobs and Rp 4.07 trillion (0.08 percent) more income to the economy. Meanwhile, increasing tax by 30 percent would add over 99.14 thousand (0.08 percent) new jobs (Rp 4.89 trillion or 0.09 percent of additional income) and a 45 percent tax increase would result in over 148.81 thousand (0.12 percent) additional jobs (Rp 6.61 trillion or 0.12 percent of additional income).

The bottom line for policy

The results of this study add to a substantial body of evidence demonstrating the effectiveness of using price measures to reduce cigarette consumption. The simulation suggests that a significant tax hike that increases cigarette prices would substantially reduce cigarette consumption and cigarette spending. Therefore, considering that smoking prevalence in Indonesia is among the highest in the world, and consumers in the country enjoy relatively affordable cigarettes, the Indonesian government should adopt and implement the longstanding consensus to "go big, go fast" in increasing cigarette taxes to reduce cigarette smoking and its associated harms.

A major tax hike should also be accompanied simplification of the tax tiers, which would reduce price variation, thereby reducing opportunities for substitution. Substitution to cheaper cigarettes would undermine the effectiveness of cigarette taxes in reducing tobacco consumption. This is particularly the case in Indonesia, which currently has ten tiers of cigarette excise taxes, where consumers can easily find lower-priced brands. Therefore, the Ministry of Finance should follow through on their roadmap to simplify cigarette taxes to five tiers by 2021.

Increasing cigarette tax is not only effective in influencing smokers' behaviour but also beneficial to the economy. This study builds the case for supporting a cigarette tax hike, as it would generate net positive impacts in terms of total output, employment, and income. The study finds that negative shocks attributed to reduced cigarette demand would be fully compensated for by the positive impact of consumers' spending reallocation. Moreover, the economic stimulus generated by government expenditures from cigarette tax revenue would substantially stimulate the economy. Therefore, public spending from tobacco taxes should be spent in a manner that optimizes public payoff, particularly to address the negative externalities of smoking or to compensate the sector(s) most adversely impacted by reduced cigarette demand.

1. Introduction

Indonesia has one of the highest rates of tobacco use in the world: approximately 38 percent of the country's adult population consumed tobacco products in 2018 (World Bank Group (WBG), 2021). Smoking prevalence is substantially higher among adult males, at 70 percent, and that rate has been rising steadily over the past decade. This significant prevalence of tobacco use has imposed adverse health problems and economic burdens on the country. In terms of health, tobacco use contributes to 21 percent of all chronic illnesses and around 14.7 percent of deaths in Indonesia (WHO, 2018; WBG, 2018). Recent estimates of treatment costs for tobacco-attributable diseases in 2019 were Rp 10.5 trillion—about 59 percent of the total hospital treatment costs (Meilissa et al., 2021). Moreover, smoking cost the economy Rp 597 trillion in 2015, 35 percent of which was attributed to direct spending on cigarette while the other 63 percent was due to disability-adjusted life years (DALY) lost, disability, and premature death (Kosen et al., 2017).

Indonesia's high smoking rate can be attributed partly to the relative affordability of cigarettes, which is linked to the low tax rate. In 2016, the excise tax on the most-sold cigarette brand accounted for 44.3 percent of the selling price, which is below the government's tax ceiling of 57 percent and significantly lower than the WHO-recommended minimum tax rate of 70 percent (WBG, 2018). Moreover, Indonesia's complex tax structure allows cigarettes from smaller manufacturers to be taxed at a lower rate. From 2010 to 2017, cigarette excise taxes for larger manufacturers increased by 35 to 46 percent in real terms, while taxes for smaller firms only increased by 15 to 24 percent (WBG, 2018). Meanwhile, over this same period cigarette affordability only decreased by 10.2 percent (Zheng et al., 2018), indicating that higher taxes could have been imposed to reduce cigarette consumption further.

Aggressive tax hikes and simplification of the tax tiers have long been championed as measures to improve Indonesia's tobacco taxation. Barber et al. (2008) advocated for imposing the maximum legally allowable cigarette tax, at 57 percent of the selling price, estimating that such a policy would prevent 1.7 to 4 million tobacco-related deaths, increase government revenues, and increase employment. On a similar note, WBG (2018) argued for the WHO-recommended minimum tax level of 70 percent and simplified tax tiers, which would together reduce cigarette demand by an estimated 1.89 percent and increase government revenue by 6.42 percent.

While previous research has called for major cigarette tax reforms, a significant tax increase remains a challenge due to the pervasiveness of the tobacco industry argument that it would negatively impact the economy. Therefore, research investigating the macroeconomic impacts of cigarette taxes is warranted to test these claims. By updating the 2010 input-output (IO) tables with 2019 data and disaggregating the cigarette industry into kretek and white cigarettes, this study seeks to better understand how different tax-increase scenarios would affect the overall economic output, net employment, and aggregate income.

This study contributes to tobacco control discussions in the following ways: first, it simulates the economic impact of cigarette taxes not only through reallocation of household spending—from cigarette consumption to other commodities—but also from additional government spending generated from cigarette tax revenues. By including the effects of government spending, this study

provides, to the authors' knowledge, the first complete picture of the economic impact of cigarette taxes.

Second, this study investigates how cigarette taxes affect the economy under different government spending structures. This is particularly important as government could allocate cigarette tax revenue to the public health sector to subsidize universal health care, or to provide social assistance. As each economic sector has a different multiplier impact, understanding the optimal expenditure allocation is critical to optimize the economic effect of tobacco taxation. Third, this study updates the input-output tables with recent data to represent the current structure of the economy. Furthermore, the cigarette industry is disaggregated into kretek and white cigarettes to obtain a more precise estimate by simulating the impact of tax changes on respective cigarette sectors. Lastly, to estimate the change in cigarette demand due to price changes, own- and cross-price elasticities are estimated from multiple nationally representative consumption surveys to provide a robust estimate.

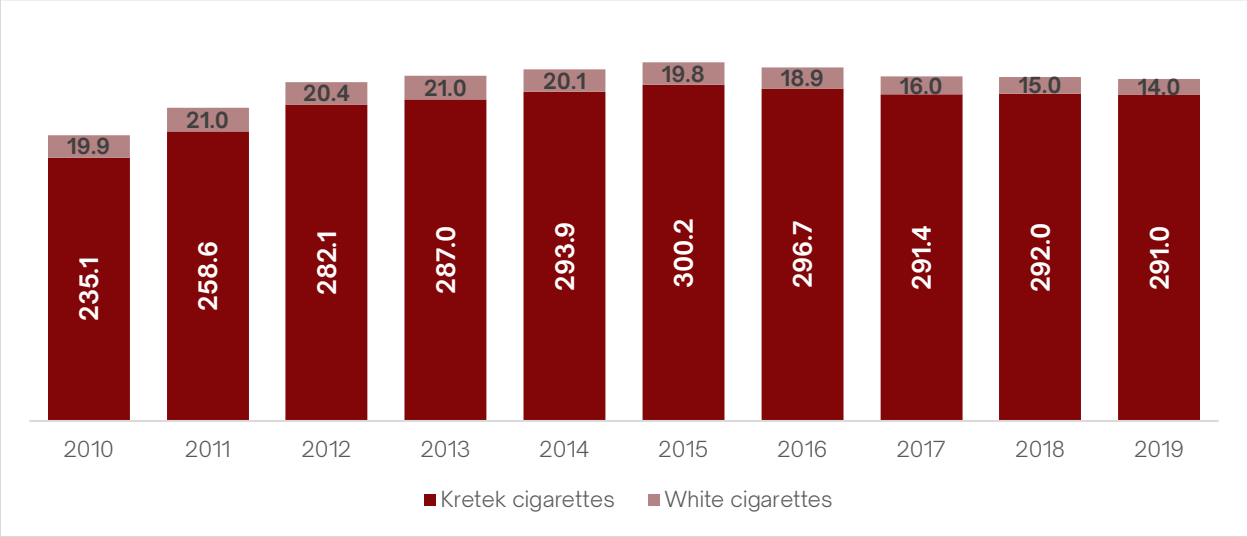
The report is organized as follows: Section 2 discusses the context of Indonesia's cigarette industry and reviews past literature on the economic impact of cigarette taxes. Section 3 outlines data used in this study, and Section 4 presents the analytical framework. Section 5 discusses the interrelation of the cigarette industry and the simulation results, while Section 6 concludes with policy recommendations.

2. Policy Context and Literature Review

2.1 Cigarette industry in Indonesia

Despite the declining trend of global cigarette consumption, the cigarette manufacturing industry continues to flourish in Indonesia. Coupled with increasing smoking prevalence, particularly among young smokers, the cigarette industry in Indonesia has successfully sustained high production levels and achieved high profits every year. As seen in Figure 1, cigarette sales in the country are sustained at the range of 255–315 billion sticks per year in the last ten years. Despite the gradual increase in cigarette tax each year, the cigarette industry has enjoyed relatively sustained sales over the last decade, which indicates that the imposed tariff has not been effective at significantly reducing cigarette consumption.

Figure 1. Cigarette sales in Indonesia 2010–2019 (in billion sticks)



Source: GlobalData (2019)

The profits of the largest cigarette producers in Indonesia have continued to grow. In 2019 Gudang Garam Tbk., which holds a 25.2 percent market share, made Rp 10.8 trillion in net profits—even higher than the Rp 7.79 trillion it made in 2018. Meanwhile HM Sampoerna, which holds a 28.3 percent market share, had sustained a net income of Rp 13.72 trillion in 2019. The central government also gains revenues from taxes and excises paid by tobacco companies. The tobacco excise is, in fact, the major contributor of excise revenue to the Indonesian government. In 2019, revenue from tobacco excise was Rp 164.87 trillion, accounting for around 95.6 percent of total excise revenues. Overall, the tobacco excise contributed 8.4 percent of total government revenue in 2019 (APBN Kita, MoF 2020). In 2020, the tax revenue dropped by 19.7 percent due to economic slowdown during the COVID-19 pandemic. Nevertheless, revenue from excises was relatively stable during this period. In fact, revenue from tobacco excise in 2020 rose by 3.26 percent from the previous year to Rp 170.34 trillion.

2.2. Cigarette tax system in Indonesia

Historically, excise taxes have been levied on tobacco products in Indonesia since the early 1900s (Barber et al., 2008). Since then, the tariff structure has changed numerous times: from the uniform tariff applied to all types of tobacco products in the early periods to the application of tariff based on the type of product (kretek or white cigarette), mode of production (hand-rolled or machine-made), and firm production levels in the subsequent periods. Currently, each legal cigarette stick is subjected to three taxes: 1) cigarette excise, 2) subnational cigarette tax, and 3) value added tax (VAT). There is also a minimum selling price (HJE). The excise and HJE are typically updated annually by the Ministry of Finance (MoF). The subnational cigarette tax is charged at ten percent of the excise, while the VAT accounts for 9.1 percent of the minimum selling price (HJE).

Since 2007, after the implementation of Law No. 39 Year 2007 on excise, specific excise tariff (per stick) is applied on each cigarette tier, decided in the annual MoF regulation. The minimum selling price (per stick) is also included in the MoF's regulation documents each year (Table 1).

Table 1. Tobacco excise tiers and tariff in 2020

No	Excise tiers	Excise tariff (per stick)	Minimum selling price (HJE) (per stick)	Excise share of HJE
1	SKM Gol. I	740	1,700	43.5%
2	SKM Gol. IIA	470	1,275	36.9%
3	SKM Gol. IIB	455	1,020	44.6%
4	SPM Gol. I	790	1,790	44.1%
5	SPM Gol. IIA	485	1,485	32.7%
6	SPM Gol. IIB	470	1,015	46.3%
7	SKT/SPT Gol IA	425	1,460	29.1%
8	SKT/SPT Gol IB	330	1,015	32.5%
9	SKT/SPT Gol II	200	535	37.4%
10	SKT/SPT Gol III	100	450	22.2%
	Average	**446.5**	**1,174.5**	**37%**

Source: Ministry of Finance Regulation No. 152/PMK.010/2019

Currently, there are ten tiers of cigarette excise in Indonesia, simplified from 12 tiers in 2018. The tariff tiers were supposed to be further reduced based on a simplification road map in MoF's regulation No. 146/PMK.010/2017, but the road map was cancelled in the following year. If the road map had been implemented, by 2021 there would be no distinction between machine-made kretek (SKM) cigarettes and machine-made white cigarettes (SPM). Machine-made cigarettes would have only two tiers based on the firm production level, while hand-rolled cigarettes would still be categorized in three tiers. The complex taxation system makes tariff increases ineffective at reducing the affordability of cigarettes. This is because a multi-tier tax structure provides incentive for tobacco firms to produce cigarettes that have a lower rate applied (Prasetyo & Adrison, 2018). In addition, tariff increases in previous years were not uniform across all tiers, which further exacerbated the price differential among brands, providing opportunities for smokers to "switch down" opting to a cheaper brand.

2.3. The impact of cigarette tax/excise increase on macroeconomic indicators

It is now well established from a variety of studies that increasing cigarette taxes reduces smoking consumption and smoking prevalence in both developed and developing countries (Azagba et al., 2015; Barber et al., 2008; Barkat et al., 2012; Hidayat & Thabrany, 2010; Hu & Mao, 2002; Lee et al., 2005; Lee, 2008; Yeh et al., 2017). For example, a study in Indonesia estimated that a 13-percent increase in cigarette taxes would reduce the number of smokers by around four percent (Barber et al., 2008). The studies found various magnitudes of how much a unit or percentage increase in cigarette tax would lower cigarette consumption, as well as how different groups would be affected by the policy. For instance, several studies found that cigarette tax increases are more effective for low-income smokers than their high-income counterparts (Choi, 2016; Goldin & Homonoff, 2013), or only for smokers with certain levels of smoking intensity (Maclean et al., 2014; Saenz-de-Miera et al., 2010; Yu et al., 2020). It is also possible that cigarette tax increases may not be as effective as expected due to consumers switching to lower-priced cigarettes (Callison & Kaestner, 2014; Chen et al., 2014; Husain et al., 2017). Even though the effects of cigarette tax increases may vary among countries and groups, increasing cigarette taxes would still have remarkable benefits on public health and the economy.

Increasing cigarette taxes would have a direct impact on government revenues as well as indirect impacts on health and economic outcomes. The reduction of cigarette consumption and smoking prevalence in Indonesia as a result of increased cigarette taxes leads to the amelioration of smoking impacts on health. Several lines of evidence suggest that cigarette tax increases significantly decrease prevalence of smoking-related diseases, smoking-attributable hospitalization rates, and the number of premature deaths (Alpert et al., 2014; Ma et al., 2013; Yeh et al., 2017). A great deal of previous research has also considered the potential advantages of cigarette tax increases on raising government revenues and reducing smoking-attributable health expenditures (Barber et al., 2008; Gilmore et al., 2010; Goodchild et al., 2016; Lee et al., 2005; Ross et al., 2012; Salti et al., 2015). Even though cigarette tax increases may reduce the production and profits of the cigarette industry, it would ultimately result in a net benefit for the government budget (Hu & Mao, 2002).

The increase in government revenues due to a cigarette tax increase may also stimulate economic activity. Previous studies have explored the potential positive influence of cigarette tax increases on economic output and employment due to increased government revenues and increased consumer spending in non-cigarette sectors (Nguyen et al., 2020; WBG, 2018). In the case of Indonesia, several studies have analyzed these issues, mostly using an IO analysis (Ahsan et al., 2013; Ashar & Firmansyah, 2015; Hadi & Friyatno, 2008).

3. Data

This study utilizes the 2010 IO table published by Statistics Indonesia. The table comprises 185 economic sectors, which have been aggregated into 52 sectors. The aggregation is done by summing up the transaction values of sub-sectors into a larger sector group. For instance, transaction of rice, corn, soybean sectors are aggregated into the agriculture sector. As more recent IO tables are not yet available, the 2010 tables were updated for this study to reflect the country's more recent economic structure. In doing so, the sectoral GDP and a series of data are used to update various indicators such as labor income, consumption, and employment. Table 2 presents each data source and its utilization for updating the 2010 IO tables.

Table 2. Data sources for updating the 2010 IO tables

No.	Data	Year	Source	Utilization
1	GDP by sector (52 sectors) at current market prices	2019	Statistics Indonesia	Updating the value added by sector
2	GDP by expenditure at current market prices	2019	Statistics Indonesia	Updating the total import and final demand values
3	Indonesian National Labor Force Survey (Sakernas)	2019	Statistics Indonesia	Updating the income and employment data
4	Indonesian National Socioeconomic Survey (Susenas)	2019	Statistics Indonesia	Updating the household consumption data
5	Manufacturing Industrial Statistics	2017	Statistics Indonesia	Disaggregating tobacco sector

Source: Authors' compilation

In addition, the output of the cigarette sector is disaggregated into three subsectors representing kretek cigarettes, white cigarettes, and other cigarettes based on manufacturing industrial statistics published by Statistics Indonesia in 2017 (Table 3). This disaggregation allows for simulating the impact of change in final demand for each type of cigarette. This fills a gap in the literature, as previous studies in Indonesia have only analyzed tobacco or the cigarette industry in general (Ahsan et al., 2013; Ashar & Firmansyah, 2015; Hadi & Friyatno, 2008). The final number of sectors included in the analysis after disaggregation of the cigarette sector is 55 sectors: 51 sectors coming from the simplified IO table, 3 sectors coming from the cigarette sector's disaggregation, and 1 sector for the National Health Insurance (JKN).[3]

[3] The IO table comprising 55 sectors employed in this study is presented in Appendix 1.

Table 3. List of cigarette industries in Manufacturing Industrial Statistics

No.	ISIC code	Year	Items
1	12011	2017	Manufacture of kretek (clove) cigarette
2	12012	2017	Manufacture of white cigarette
3	12019	2017	Other types of cigarette industry (including cigars)

Source: Manufacturing Industrial Statistics, 2017

To calculate the impact of tax on cigarette price and government revenue, data from the Ministry of Finance's regulation that states the specific cigarette excise (tax) and the minimum cigarette price (HJE) for each cigarette group are used. For the quantity of domestic cigarette sales, data from GlobalData 2019 are used. Table 4 summarizes the cigarette excise and the HJE in 2020 compared to previous years as well as domestic cigarette sales.

Table 4. Cigarette data (price, tax, and sales)

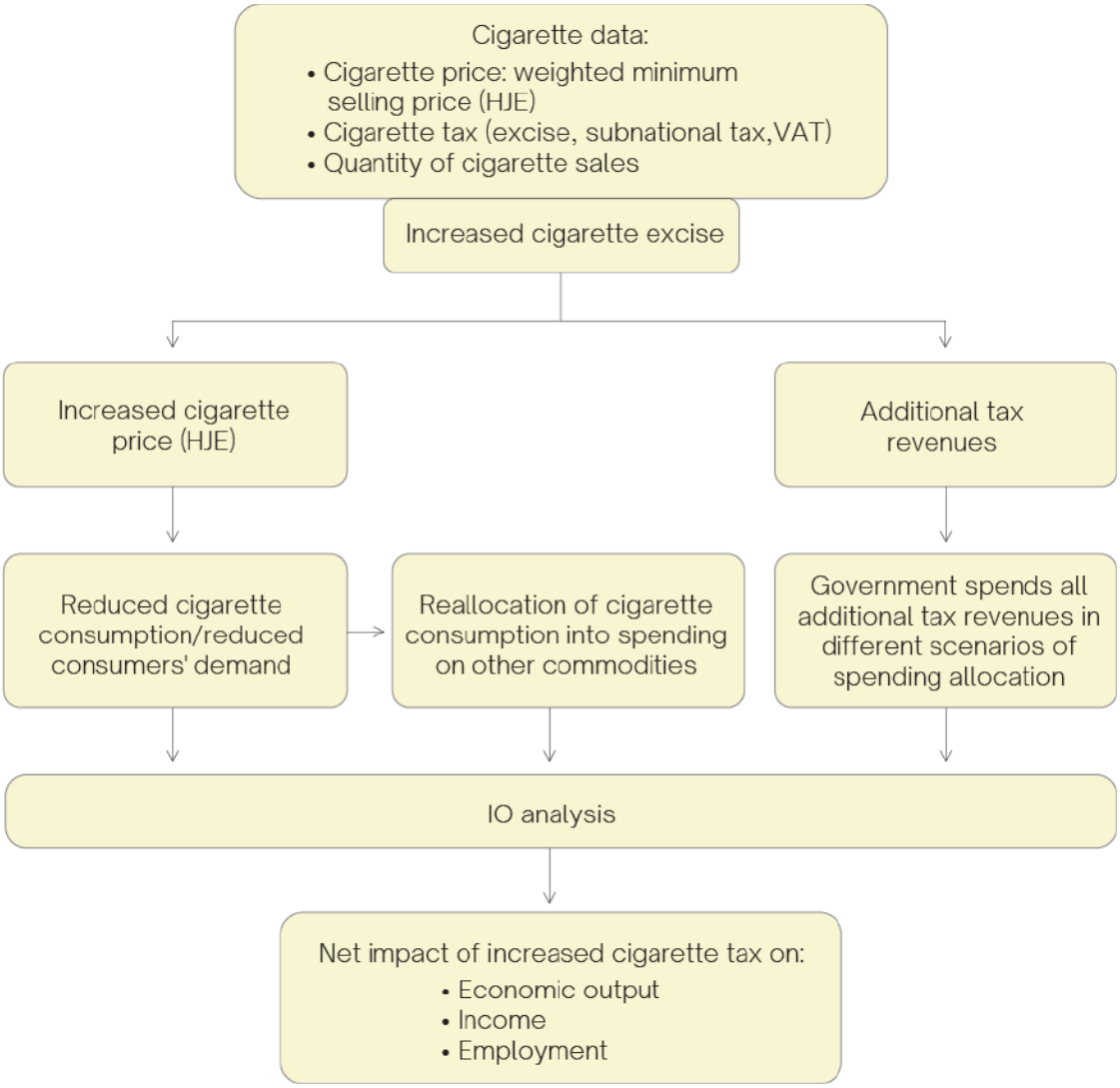
	Type	Group	2018–2019 cigarette tax MoF regulation 146/ PMK.010/2017		2020 cigarette tax MoF regulation 152/PMK.010/2019		Domestic cigarette sales (Billion sticks)
			HJE (Rp)	Excise (Rp)	HJE (Rp)	Excise (Rp)	
Kretek cigarettes	Machine-rolled kretek (SKM)	I	1120	590	1700	740	291
		II	895	385	1275	470	
			715–895	370	1020–1275	455	
	Hand-rolled kretek (SKT)	I	1260	365	1460	425	
			890–1260	290	1015–1460	330	
		II	470	180	535	200	
		III	400	100	450	110	
White cigarettes	Machine-rolled white cigarettes (SPM)	I	1130	625	1790	790	14
		II	935	370	1485	485	
			640–935	355	1015–1485	470	

Source: MoF's regulations (2017 & 2019) and GlobalData (2019)

4. Analytical Framework

This study aims to estimate the impact of cigarette tax increases on economic output, income, and employment. Figure 2 illustrates the analytical framework, which contains several steps. The first step is calculating a weighted average cigarette price and tax for kretek and white cigarettes. This is essential to obtain the average value that represents the price and tax rate from the multitiered cigarette market in Indonesia. As only data on the government minimum selling price (HJE) are available, this information is used as a proxy for price. The next step is simulating cigarette price under the new proposed tax rates, assuming the tax is fully transferred to consumers.

Figure 2. Analytical framework



Source: Authors' compilation

After calculating the weighted average price and tax, its effect on cigarette sales and cigarette demand is estimated employing cigarette price elasticity and cross-price elasticity of demand, previously estimated using a nationally representative consumption survey. This step generates information on decreased cigarette demand and cigarette sales after the tax increase. It is assumed that consumers allocate all savings generated from reduced cigarette consumption into other non-cigarette commodities.

The increase in cigarette tax has three main consequences: 1) reduced cigarette demand, 2) reallocation of household consumption from cigarettes into other commodities, and 3) additional government revenues, which will be spent back into the economy. Each of these events affects the entire economy, as it changes the demand for industries' products. For instance, reduced cigarette demand may negatively affect the cigarette industry and other sectors linked to the industry, such as agriculture and retail. At the same time, increased consumer spending on non-cigarette commodities and increased government spending would increase demand for other industries' products. The interrelation between industries and the impacts on the overall economy are analyzed using an IO analysis. These impacts are analyzed for three different scenarios of government spending allocation.

4.1. Cigarette price and tax

This study refers to the minimum selling price (HJE) regulated by MoF as the cigarette price. The HJE includes the producer price and all taxes imposed on cigarettes, namely cigarette excise, subnational tax (ten percent of the cigarette excise), and the VAT. Note that this analysis only simulates changes in cigarette excise, while assuming that the rate of the subnational tax and the VAT remain unchanged. Therefore, for the rest of this report, a change or increase in cigarette tax refers to a change in cigarette excise.

The data on HJE and excise from MoF's regulations are available for each tier of kretek and white cigarettes: four groups of hand-rolled kretek, three groups of machine-rolled kretek, and three groups of white cigarettes. To follow the structure of the cigarette industry in the IO table, the HJE and excise of these groups are merged into two main types of cigarettes, namely kretek (seven merged groups of kretek cigarettes) and white (three merged groups of white cigarettes). Based on the MoF data, the weighted average HJE and excise for kretek and white cigarettes in 2019 and 2020 are calculated using the 2019 data as the baseline. Note that, in calculating the weighted average, this study utilizes the adjusted cigarette market share based on domestic cigarette sales in 2019 from GlobalData and the latest available data of cigarette market share from MoF.

Based on the weighted average HJE and excise, the new HJEs after the tax increase are simulated, assuming that the tax is fully transferred to the consumers (i.e., full pass-through).[4] The cost of production and the amount of margins of cigarette producers (i.e., producer's price) are assumed to

[4] The estimated impact under the assumption of under- or over-shifting is presented in the Appendix 5.

remain the same across different excise scenarios.[5] The calculation of the cigarette price after the tax increase for all scenarios of excise level is presented in the formula below.

$$Price_{simulated} = \frac{(new\ excise + subnational\ tax + producer\ price)}{(1 - VAT\ rate)} \quad (1)$$

Table 5 presents simulated HJE and tax for the baseline and after the tax increase for three tax scenarios. The first scenario follows the 2020 excise level, while the second and third scenarios are the simulated excise increase by 30 and 45 percent, respectively. Note that HJEs presented in Table 5 already incorporate all taxes including excise, subnational tax, and VAT. The tariff for the subnational cigarette tax is ten percent of the excise, and tariff for VAT is 9.1 percent of the HJE. The information on excise, subnational tax, and VAT per stick of cigarette are used to calculate government revenue from cigarette sales.

Table 5. Simulated price and excise per cigarette stick

Scenarios	Price (HJE) (% increase from the baseline)		Excise (% increase from the baseline)	
	Kretek	White	Kretek	White
2019 tax level (baseline)	1,040	1,071	488	569
2020 tax level	1,255 (20.72%)	1,321 (23.42%)	604 (23.78%)	723 (27.15%)
30% tax increase	1,292 (24.25%)	1,341 (25.24%)	635 (30.00%)	739 (30.00%)
45% tax increase	1,381 (32.77%)	1,444 (34.89%)	708 (45.00%)	825 (45.00%)

Source: Authors' calculations

4.2. Cigarette demand

In simulating demand changes of kretek and white cigarettes due to increased price, the study estimates own- and cross-price elasticities for kretek and white cigarettes. Own-price elasticity measures the percentage change of demand due to one percentage change in the price of the product, while cross-price elasticity measures percentage change of demand due to one percentage change in the price of the other product. To estimate the elasticities, this study employs the Deaton (1988) method. The method adjusts the model of Almost Ideal Demand System (AIDS) introduced by Deaton & Muellbauer (1980) by allowing zero purchases of tobacco (cigarettes) into the equation, hence providing better estimation to cover the entire population should any tobacco tax increase affect tobacco consumption.

[5] To estimate the HJE for 2020 in case of a full pass-through, the producer's price (i.e., net-of-tax price) was calculated for 2019 by subtracting all taxes from 2019 HJE. It is then assumed that the producer's price increased at the same rate as the nominal GDP (to account for the increase in the cost of production) but the percent of net margin is assumed to remain constant. The HJE in 2020 is estimated by adding the actual excises and subnational tax and estimated VAT to the estimated 2020 producer's price.

The source of data for calculating price elasticity is the pooled data of the National Socioeconomic survey (Susenas) from 2017–2019. Susenas is a nationally representative survey conducted by Statistics Indonesia to capture individual demographic characteristics and household consumption. Following Deaton's approach, the missing value of cigarette spending for non-smoking households is replaced with zero. The detailed calculation of price elasticities for kretek and white cigarettes is shown in Appendix 2.

Table 6 presents the estimated price elasticities, which suggests that a ten-percent increase in the price of kretek cigarettes would reduce demand by 10.20 percent and would reduce the demand for white cigarettes by 2.36 percent. On the other hand, an increase in the price of white cigarettes by ten percent would reduce demand by 3.38 percent, while it would increase demand for kretek cigarettes by 1.63 percent. This indicates that consumers tend to substitute consumption of white cigarettes with kretek cigarettes when the price of white cigarettes is increased.

Table 6. Own- and cross-price elasticity of cigarettes

	Changes of kretek cigarette demand (%)	Changes of white cigarette demand (%)
Price of kretek cigarette increased by 10%	-10.20	-2.36
Price of white cigarette increased by 10%	1.63	-3.38

Source: Authors' calculations

The calculation of potential changes in the demand for kretek and white cigarettes, determined by change in the product's own price (own-price elasticity) and change in the price of the other cigarette product (cross-price elasticity), assuming no changes in income, is illustrated in the formula below:

$$\%\,\Delta\, cigarette\ demand_i = (\%\,\Delta price_i * own\ price\ elasticity) + (\%\,\Delta price_j * cross\ price\ elasticity) \quad (2)$$

The changes in cigarette demand calculated using Equation 2 are presented in Table 7. It shows that the higher tax leads to a higher drop in cigarette demand. It is estimated that the 2020 tax increase would reduce kretek and white cigarette demand by 17.32 percent (50.39 billion sticks) and 12.79 percent (1.79 billion sticks), respectively. Meanwhile, increasing tax by 30 and 45 percent would reduce kretek cigarette demand by 20.62 percent and 27.74 percent, and would decrease white cigarette demand by 14.24 percent and 19.50 percent, respectively.

Table 7. Changes in cigarette demand (sticks)

Scenarios	Changes in demand (% of sticks)		Changes in demand (Billion sticks)	
	Kretek cigarettes	White cigarettes	Kretek cigarettes	White cigarettes
2020 tax level	-17.32	-12.79	-50.39	-1.79
30% tax increase	-20.62	-14.24	-60.01	-1.99
45% tax increase	-27.74	-19.50	-80.73	-2.73

Source: Authors' calculations

While Table 7 presents the changes in cigarette demand by the number of sticks, changes in demand should be quantified in monetary terms. Therefore, changes in cigarette spending due to the increased cigarette tax are calculated using the following formula:

$$\Delta\, cigarette\ spending\ (Rp) = \left(P_{after\ tax}\ x\ \ Q_{after\ tax}\right) - \ \ (P_{baseline}\ x\ \ Q_{baseline}) \qquad (3)$$

Table 8 presents the changes in cigarette spending calculated using Equation 3. It is estimated that spending for kretek cigarettes would decrease after the tax increase, where higher tax would lead to higher drop in cigarette spending. On the other hand, spending on white cigarettes would increase after the tax rise. This is partly contributed to the inelastic demand of white cigarettes where percentage decrease in quantity demanded tend to be lower than percentage of price increase. Overall, the simulation suggests that the 2020 cigarette tax increase would increase total cigarette spending by Rp 582.64 billion. Meanwhile increasing tax by 30 and 45 percent would reduce total cigarette spending by Rp 3.04 trillion and Rp 11.00 trillion, respectively. Changes in cigarette spending create shocks to final demand in two ways: first, they change cigarette demand for both the kretek and white cigarette industries; second, they affect household's spending allocation on other non-cigarette commodities.

Table 8. Changes in cigarette spending

Scenarios	Changes in cigarette demand (Rp billion)		
	Kretek cigarettes	White cigarettes	Total
2020 tax level	-561.70	1,144.35	582.64
30% tax increase	-4,148.08	1,111.29	-3,036.79
45% tax increase	-12,289.93	1,286.67	-11,003.26

Source: Authors' calculations

4.3. Government revenue

The increased cigarette tax would generate changes in government revenue. Tax revenue from cigarette sales is calculated from three sources: cigarette excise, subnational tax, and VAT. The changes in tax revenues are calculated by subtracting revenue after the tax increase with revenue at the baseline.

$$\Delta\ tax\ revenue\ (Rp)\ = \left(Tax_{new}\ x\ Q_{after\ tax}\right) - \left(Tax_{baseline}\ x\ Q_{baseline}\right) \quad (4)$$

Table 9. Additional government revenue from cigarette tax

(Rp billion)	Kretek cigarettes			White cigarettes		
	2020 tax level	30% tax increase	45% tax increase	2020 tax level	30% tax increase	45% tax increase
Excise	3,338.36	4,537.20	6,780.91	867.68	915.20	1,331.81
Subnational tax	333.84	453.72	678.09	86.77	91.52	133.18
VAT	-51.11	-377.48	-1,118.38	104.14	101.13	117.09
Total additional revenue	3,621.09	4,613.44	6,340.61	1,058.58	1,107.85	1,582.07

Source: Authors' calculations

Table 9 displays the additional government revenues for each type of cigarette sales under different tax scenarios. It is estimated that the tax increase similar to 2020 would generate Rp 3.62 trillion in additional tax revenue from kretek cigarettes and Rp 1.06 trillion from white cigarette sales, assuming all else remains constant. In total, it would bring Rp 4.68 trillion or 2.41 percent increase in tax revenue. Meanwhile, increasing cigarette tax by 30 and 45 percent would generate total additional government revenues of Rp 5.72 trillion (2.95 percent) and Rp 7.92 trillion (4.08 percent), respectively. The additional government revenues would be allocated to spending under different allocation scenarios that increase final demand for industries. The impact of increased final demand on the economy is analyzed using the input-output approach.

4.4. IO analysis

The IO analysis is a macroeconomic analysis that models the interdependence of industries or economic sectors. In this model, the output of one industry is used as an intermediate input for other industries and consumed as a final demand by households, government, and export. Therefore, a change of output for one industry would have a ripple effect throughout the economy as it affects the output of other industries. The impact of one unit change in an industry's final demand to the total outputs in the economy is referred to as an output multiplier. The other multipliers are employment and income multipliers, which measure the impact of a change in the final demand on

total employment and income of the economy. The key terminology for the IO analysis is outlined in Table 10. Meanwhile, a technical discussion about the method is presented in Appendix 3.

The IO analysis is relatively superior to the regression analysis in examining the effects of a tax increase on output and employment due to several reasons: 1) it is able to capture sectoral impacts of some economic shocks in the economy; 2) it is simple in conducting ex-ante impact simulation of reallocations of cigarette spending to other commodities; 3) it allows for specific assumptions regarding how economic actors may replace their cigarette spending with alternative expenditures; and 4) it is possible for the IO method to simulate the impact of an elimination of a tobacco or cigarette industry in the economy (Ahsan & Wiyono, 2007).

Table 10. IO terminology

Term	Description
IO tables	Tables that summarize industries' interdependence in the economy, showing how outputs of one sector are used as inputs for other sectors
Technical coefficients	The number of inputs required to produce one unit of output
Final demand	The use of outputs for consumption, investment, government consumption, and export
Initial effect	The effect of change in final demand of an industry on the output, income, and employment of the industry itself
Direct effect	The effect of change in final demand of an industry on the output, income, and employment of the supplier industries
Indirect effect	The effect of change in final demand of an industry on the output, income, and employment of the industries that provide inputs to the suppliers
Simple multiplier (Type I)	The effect of change in final demand of an industry to the total output, income, and employment in the economy Type-I multiplier = initial effect + direct effect + indirect effect
Consumption-induced effect	The effect of change in final demand of an industry due to change in income and consumption
Total multiplier (Type II)	The effect of change in final demand of an industry to the total output, income, and employment in the economy Type-II multiplier = Type-I multiplier + consumption-induced effect

Source: Authors' compilation

4.5. Simulating the impact of cigarette tax increases

This study simulates three scenarios of tax increases for kretek and white cigarettes, while assuming the tax is fully passed through to the consumer. The first scenario is the actual increase of cigarette excise in 2020, in which the excise of kretek and white cigarettes increased by 23.78 percent and 27.15 percent compared to the 2019 level. However, instead of using the actual HJEs in 2020 which increased by more than the tax increase (i.e., tax was over-shifted), this scenario assumes a 100-percent tax pass-through. The second and third scenarios increase excise for white and kretek cigarettes by 30 and 45 percent, respectively.

Table 11 summarizes the simulations, which represent three main pathways by which the cigarette tax increase affects the economy: reduced cigarette consumption, reallocation of cigarette spending to other non-cigarette commodities, and government spending from cigarette tax revenue. Assuming the tax is fully passed on to consumers, the increase in cigarette tax leads to higher cigarette prices, thus reducing demand and spending for cigarettes. The reduced cigarette spending would impact the cigarette industry as it leads to lower cigarette sales. Simulation A estimates the impact of reduced cigarette spending on the total output, income, and employment, assuming that there is no resource reallocation at the household level.

Simulation B estimates the impact of spending reallocation, in which households allocate all the savings from averted cigarette spending to other non-cigarette commodities proportionally to the current structure of consumer spending[6]. This leads to higher demand for industries that produce these commodities. In simulations A and B, the allocation of additional government revenues is not considered. On the other hand, simulations C, D, and E estimate the impact of increased government spending due to additional revenues generated from the cigarette tax where it is assumed that the government spends all the additional tax revenues. Lastly, the aggregate or net effect of the cigarette tax rise is the combination of impact from simulations A and B and one of either C or D or E.

The government revenues from cigarette tax, which comes from excise, subnational tax, and VAT, are allocated as public spending into various economic sectors. As stipulated on the Law no. 39/2007, two percent of cigarette excise the revenue must be distributed into tobacco-producing provinces and must be used to fund quality improvement and development of related industries. On the other hand, as instructed by the Law no. 28/2009, Ministry of Health regulation no. 53/2017 and Presidential regulation no. 82/2018, the revenue from cigarette subnational tax has to be allocated into specific purpose, namely: (1) law enforcement related to cigarette regulations (50 percent), (2) non-JKN public health services (12.5 percent), and (3) JKN-related public health services (37.5 percent). Lastly, as there is no specific regulation that governs the spending from VAT revenue, it is assumed that cigarette VAT revenue would be allocated in business-as-usual sectors.[7]

[6] In such case where tax increase leads to higher cigarette spending, it is assumed that households would reallocate spending from non-cigarette commodities into cigarette.

[7] Government spending to business-as-usual sectors refers to government expenditure to various economic sectors following the current spending structure. The structure of government spending is provided in second part of Appendix 4

Table 11. Simulation scenarios

Simulation scenarios		Description
Simulation A		Simulation A estimates the impact of a cigarette tax increase on reduced cigarette demand.
Simulation B		Simulation B estimates the impact of consumer spending reallocation from cigarette to other non-cigarette commodities.
Simulations C to E		Simulations C1 to E2 estimate the impact of government expenditure of cigarette tax revenue under different spending scenarios. Note that effects estimated in these simulations do not include the effects from simulations A and B.
Simulation C	C1	Additional government revenues from cigarette tax are spent based on the following criteria: • 2% of excise revenues and 100% of subnational tax revenues are allocated to the mandated sectors.* • 98% of excise revenues and 100% of VAT revenues are allocated to the business-as-usual sectors.
	C2	Additional government revenues from cigarette tax are spent based on the following criteria: • 2% of excise revenues and 100% of subnational tax revenues are allocated to the mandated sectors.* • 20% of excise revenues are allocated to the targeted JKN sector.** • 88% of excise revenues and 100% of VAT revenues are allocated to the business-as-usual sectors.
Simulation D1 and D2		Additional government revenues from cigarette tax are spent based on the following criteria: • 2% of excise revenues and 100% of subnational tax revenues are allocated to the mandated sectors.* • 98% of excise revenues are allocated to the targeted JKN and non-JKN sectors.** The targeted allocation in simulation D2 spends more on the JKN and public health care services compared to the allocation in simulation D1. • 100% of VAT revenues are allocated to the business-as-usual sectors†.
Simulation E1 and E2		Additional government revenues from cigarette tax are spent based on the following criteria: • 2% of excise revenues and 100% of subnational tax revenues are allocated to the mandated sectors.* • 98% of excise revenues are allocated to the targeted JKN and non-JKN sectors** and sectors related to social assistance programs.*** The targeted allocation in simulation E2 spends more on the social assistance programs compared to the allocation in simulation E1. • 100% of VAT revenues are allocated to the business-as-usual sectors †.

* Mandated sectors are tobacco from excise revenues (2% of excise revenues) and public service, public health care service, and the National Health Insurance (JKN) sectors from subnational tax revenues (100% of subnational tax revenues).

** Targeted sectors are the JKN (in addition to the mandated JKN spending from the subnational tax revenues), public health care services, private health care services, pharmacy industry, medical instruments, public education services, and telecommunication services.

*** Sectors related to social assistance are food, public education services, private education services, and public health care services.

† In the case of reduced VAT revenue and no excise revenue are allocated to busines-as-usual sectors, it is assumed that spending for these sectors would be reduced.

Source: Authors' compilation

Table 11 also summarises the allocation of the government spending across Simulation C, D, and E, where it assumes that all cigarette tax revenue is spent as public expenditure. Simulation C1 depicts the current structure of government spending where two percent of the excise revenues and all subnational tax revenues are allocated to the so-called mandated sectors, while the rest of the excise and VAT revenues are spent in business-as-usual sectors. Simulation C2 is based on simulation C1 but it includes an earmarked spending to the JKN. [8]

Simulation D follows the same mandatory spending as in simulation C. However, it assumes that the remaining excise revenues (98 percent) are all allocated to the targeted sectors. Spending to the targeted sectors in are arbitrarily allocated into health-related sectors, such as public health care services, private health care services, pharmacy industry, and medical instruments. In addition, the targeted sector also includes telecommunication services as it assumes that the government would spend the extra revenue coming from cigarettes to fund anti-smoking campaigns. Similar to simulation C, it is assumed that the VAT revenue is fully allocated to the business-as-usual sectors.[9]

Simulation E differs from Simulation D in terms of allocation to the targeted sectors, where it expands the targeted sectors to include spending on social assistance programs such as conditional and unconditional cash transfer (*Bantuan Sosial* or *Program Keluarga Harapan*), food subsidy (*Beras Sejahtera*), and in-kind benefits (*Program Indonesia Pintar* and *Program Indonesia Sehat*). It is assumed that the spending for these programs affects various economic sectors, such as food and beverage industry (food sector), education services (public and private education sectors), and health services (public and private health sectors).

[8] Detailed information on allocation of government expenditure in Simulation C, D, and E is provided in Appendix 4.

[9] The simulation shows the cigarette tax increase by 30% and 45% would reduce VAT revenue (see Table 9). This means that spending to business-as-usual sectors from VAT revenue would decrease. In Simulation C, the reduced VAT spending is offset by excise revenue that are allocated to business-as-usual sectors, thus spending for these sectors are increased. However, in simulation D and E, spending to business-as-usual sectors is reduced due to decreased VAT revenue and no excise revenue is allocated to these sectors. In this case, it is assumed that spending for business-as-usual sectors would be reduced. See Appendix 4 for more detailed information.

5. Results

5.1 Intersectoral linkage between cigarette and other industries

This section discusses the interrelation between the cigarette industry and other industries in Indonesia based on the IO analysis. The first part discusses the input structure of the cigarette industry. The second part presents the output multiplier, income multiplier, and employment multiplier of the cigarette industry, as well as the most-affected sectors when the cigarette industry experiences shocks. Note that the cigarette industry in this analysis comprises three sectors, namely kretek cigarettes, white cigarettes, and other cigarettes. They have equal multipliers as their composition of inputs is relatively similar.

5.1.1 IO structure of cigarette industry

The cigarette industry produced Rp 238.1 trillion of output in 2019, of which 94 percent was kretek cigarettes. Table 12 presents the structure of inputs of the cigarette industry. To produce one unit value of output the cigarette industry requires 0.32 unit value of the intermediate inputs from other industries, 0.11 unit value from imports, and the other 0.57 unit value is generated through value added. All outputs from the cigarette industry are sold as a final demand, mostly for domestic consumption, and not being used as intermediate inputs for other sectors. For that reason, the cigarette industry has no forward linkage effect. In other words, an increase in cigarette industry output would not induce production by other industries.

Table 12. IO structure of the cigarette industry, 2019

	Value (Rp trillion)	Percent (%)
Intermediate inputs	75.86	31.86%
Import	25.66	10.78%
Value added	136.54	57.36%

Source: Authors' calculations based on the IO Table

In addition to the use of intermediate inputs, industries also employ labor in their production. Table 13 shows that the cigarette industry pays Rp 44.31 trillion annually in wages and salaries, which is about 18.61 percent of the output value. This is relatively comparable to other industries where, on average, wages account for 18 percent of the total output. On the other hand, households spend Rp 221.62 trillion annually on cigarette products, which accounts for 2.63 percent of their total consumption.

Table 13. Wage and consumption share for the cigarette industry, 2019

	Value (Rp trillion)
Wages and salaries	44.31
Total industry output	238.07
Share of wages in total output	18.61%
Household spending on cigarettes	221.62
Share of total household expenditures	2.63%

Source: Authors' calculations based on the IO Table

5.1.2 Output multiplier

An output multiplier is defined as the total value of production required from of all sectors in the economy to produce one unit of output for a certain industry. The Type-I output multiplier consists of the initial effect, direct effect, and indirect effects. The initial effect of the output multiplier is one, meaning that a decrease in an industry's final demand sales by *x* units would reduce the output of that industry by the *same amount* of units.[10] The direct effect is the summation of technical coefficients from sectors that supply intermediate inputs to the industry. Table 14 presents the direct effects of the cigarette industry and the top ten input-supplying sectors. The direct effect of the cigarette industry is 0.371, which suggests that producing an additional Rp 1.00 trillion value of output requires Rp 371 billion value of inputs from the supplying industries. Likewise, for every Rp 1.00 trillion reduction in cigarette output sales, the output of the supplier industries would be reduced by Rp 371 billion.

The direct effect only gives the total inputs that must be provided to produce one unit value of cigarette output. To supply such products, the suppliers' industries also require more inputs from their supplying industries. Therefore, the increase or decrease in cigarette outputs would not only affect the supplying industries (direct effect) but also their suppliers (indirect effect). The indirect effect of the cigarette industry is 0.26 (Table 15). Overall, the combination of the initial effect, the direct effect, and the indirect effect forms the Type-I output multiplier of 1.63. This means that for every increase (decrease) of the cigarette industry's output by Rp 1.00, the overall output in the economy would increase (decrease) by Rp 1.63.

[10] The initial impact of employment multiplier is the amount of labor used for producing one unit of output. Meanwhile, the initial impact of income multiplier is the share of income or labor compensation to produce one unit of output.

Table 14. Intermediate inputs used by the cigarette industry (industries with the highest direct effect), 2019

Industries	Value of input (Rp trillion)	Direct effect
Tobacco processing industry	24.19	0.1016
Agriculture	17.56	0.0738
Big and retail trading, not cars and motorcycles	8.39	0.0353
Air freight	5.15	0.0217
Information and communication	4.75	0.0199
Construction	3.69	0.0155
Banking and financial services	2.79	0.0117
Land transportation	2.20	0.0093
Paper industry and paper goods	1.89	0.0079
Other sectors	17.77	0.0747
Direct effect	88.40	0.3713

Source: Authors' calculations based on the IO Table

The Type-I multiplier is also known as a simple multiplier, as it only accounts for the production-induced effects. On the other hand, the Type-II or total multiplier also includes the consumption-induced effects in which demand for industries' output is also driven by consumers' income and consumption. The total multiplier for the cigarette industry is 2.31, meaning that every additional Rp 1.00 of cigarette consumption requires Rp 2.31 of outputs from all industries in the economy. In other words, the economic output would decrease by Rp 231 trillion if final demand for cigarettes is reduced by Rp 100 trillion.

The total output multiplier of the cigarette industry of 2.31 is comparable to the industries' average of 2.48 (the median is 2.31). This indicates that the cigarette sector is not among the most significant industries in terms of its impact on the overall economy.

Table 15. Output multiplier of the cigarette industry

Type of multiplier	Value
Initial effect	1.00
Direct effect	0.37
Indirect effect	0.26
Type-I multiplier	1.63
Consumption-induced effect	0.68
Type-II Multiplier	2.31

Source: Authors' calculations based on data from the IO Tables

Table 16 presents the top five most-affected industries by a change in the cigarette sector, apart from the cigarette sector itself. These sectors absorb 26 percent of the shock. The agriculture sector is among the most affected by changes in cigarette outputs, as it contributes a significant share of intermediate inputs for cigarette production. Other sectors that are relatively highly affected by changes in the cigarette industry are the food and beverages industry, tobacco processing industry, big and retail trading, and information and communication.

Table 16. Top five sectors affected by changes in the final demand of cigarette industry based on Type-II output multiplier

Sectors	Contribution to the multiplier (%)
Agriculture	6.52
Food and beverage industry	6.12
Tobacco processing industry	5.28
Big and retail trading, not cars and motorcycles	4.94
Information and communication	3.22

Source: Authors' calculations based on the IO Table

5.1.3 Income multiplier

An income multiplier is the amount of income generated or lost in the economy when the output of a certain industry is increased or decreased by one unit value. Table 17 presents the income multiplier for the cigarette industry in Indonesia. For every reduction of the cigarette industry's output by Rp 1.00 trillion the amount of income lost in the cigarette industry is Rp 190 billion (initial effect), while income lost in the supplier industries is Rp 60 billion (direct effect), and Rp 40 billion in income is lost by the industries that supply inputs to the input-supplying industries (indirect effect). Adding those multipliers with the consumption-induced effects results in the total income multiplier (Type-II) of 0.40, which means that reducing the cigarette industry's output by Rp 1.00 trillion would reduce income for the entire economy by Rp 400 billion.

The magnitude of the Type-II income multiplier in the cigarette industry at 0.40 is average compared to other sectors in the economy. The mean Type-II income multiplier for all industries is 0.48, with a median of 0.39. This highlights that the cigarette industry is not among the most significant sectors in contributing income to the economy.

Table 17. Income multiplier for the cigarette industry

Type of multiplier	Value
Initial effect	0.19
Direct effect	0.06
Indirect effect	0.04
Type-I multiplier	0.29
Consumption-induced effect	0.11
Type-II multiplier	0.40

Source: Authors' calculations based on the IO Table

Table 18 presents the most affected sectors in terms of income reduction. Agriculture is the most impacted sector, which highlights the importance of compensating farmers' forgone income as part of tobacco control policy. Other sectors among the most affected are big and retail trading, information and communication, food and beverages, and tobacco processing.

Table 18. Top five sectors affected by changes in the final demand of the cigarette industry based on Type-II income multiplier

Sectors	Contribution to the multiplier (%)
Agriculture	8.19
Big and retail trading, not cars and motorcycles	5.46
Information and communication	3.23
Food and beverage industry	3.07
Tobacco processing industry	3.02

Source: Authors' calculations based on data from the IO Tables

5.1.4 Employment multiplier

An employment multiplier depicts the amount of employment generated or lost due to a one-unit change in output in a certain industry. To estimate the employment multiplier, the employment coefficient—representing the number of workers employed for one unit value of output—is calculated. Table 19 presents the employment coefficient of the cigarette industry and other related industries. The cigarette sector employs 604,000 workers, which only accounts for 0.5 percent of employed workers in the economy. For every Rp 1.00 billion value of output, the cigarette industry employs three workers, which is lower compared to the agriculture and trade sectors (Table 19).

Table 19. Employment coefficient

Sectors	People employed	Output (Rp billion)	Employment coefficient
Agriculture	32,903,153	1,917,212	17
Wholesale and retail trade (excluding motor vehicles and motorcycles)	20,896,809	2,522,433	8
Cigarette industry	604,261	238,069	3
Tobacco processing industry	163,424	32,581	5
Paper industry and paper goods	691,875	319,095	2

Source: Authors' calculations based on the IO Table

Table 20 presents the employment multipliers of the cigarette industry. The initial effect is the employment coefficient, which depicts that a decrease in cigarette output by Rp 1 billion would reduce employment in the cigarette sector itself by three jobs. Meanwhile, two jobs would be lost in the input-supplying sectors (direct effect) and one job would be lost in the supplier of input-supplying industries (indirect effect). Combined with the consumption-induced effect, there are nine jobs that would be lost for every Rp 1.00 billion reduction in the cigarette industry's output (Type-II employment multiplier).

Table 20. Employment multipliers for the cigarette industry (to produce output of Rp 1 billion)

Type of multiplier	Value
Initial effect	3
Direct effect	2
Indirect effect	1
Type-I multiplier	6
Consumption-induced effect	3
Type-II multiplier	9

Source: Authors' calculations based on the IO Table

Table 21 presents the most-affected sectors in terms of lost employment. The agriculture and trading sectors are the most adversely affected, as they absorb around 29 percent and 11 percent of the reduced employment, respectively. This is because both sectors have high employment coefficients and are closely related to the cigarette industry. Tobacco processing, food and beverages, and other services are among the other sectors that are impacted by the employment loss.

Table 21. Top five sectors affected by changes in the final demand of the cigarette industry based on Type-II employment multipliers

Sector	Contribution to the multiplier (%)
Agriculture	28.81
Wholesale and retail trade (excluding motor vehicles and motorcycles)	10.55
Tobacco processing industry	6.82
Provision of food and beverages	3.09
Other services	2.50

Source: Authors' calculations based on the IO Table

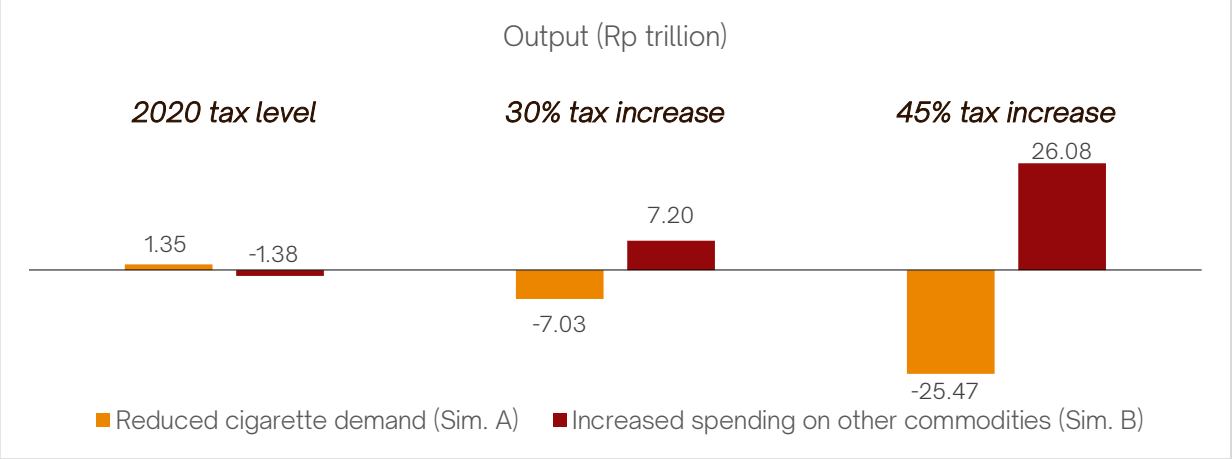
5.2. Macroeconomic impacts of cigarette tax increase

This section discusses the results of the IO analysis that estimates the impact of a cigarette tax increase on output, income, and employment in the economy. This analysis employs the total multiplier (Type-II), as it provides a more complete estimate compared to the simple multiplier. Moreover, the analysis assumes that cigarette tax is fully shifted on to the consumers. However, in practice producers might bear some portions of the tax so they could offer a competitive price to maintain sales (a tax "under-shift") or producers may over-shift the tax by raising prices more than the tax increase—in either case the impact of a tax increase would be higher or lower than in the case of full pass-through. Appendix 5 presents the results of these two scenarios where the economic impact of a cigarette tax increase under the scenarios of tax under-shift and tax over-shift is discussed.

5.2.1 The impact on economic output

Figure 3 presents the impact of decreased cigarette consumption (Simulation A) and reallocation of consumer spending on the total output (Simulation B). Simulation A shows that a higher cigarette tax would lead to a higher drop in cigarette spending, which leads to higher reductions in economic outputs. A cigarette tax increase of 30 and 45 percent would reduce total outputs by Rp 7.03 trillion and Rp 25.47 trillion, respectively. Nevertheless, these reductions are compensated for by the positive impact of consumer spending reallocation from cigarettes to other commodities (Simulation B). The spending reallocation that increases demand for non-cigarette industries generates an additional output of Rp 7.20 trillion (30-percent tax increase) and Rp 26.08 trillion (45-percent tax increase). Overall, the positive impact of consumer spending reallocation fully offsets the negative impact of reduced cigarette consumption.

Figure 3. The impact of reduced cigarette demand and consumption reallocation on output



Source: Authors' estimation

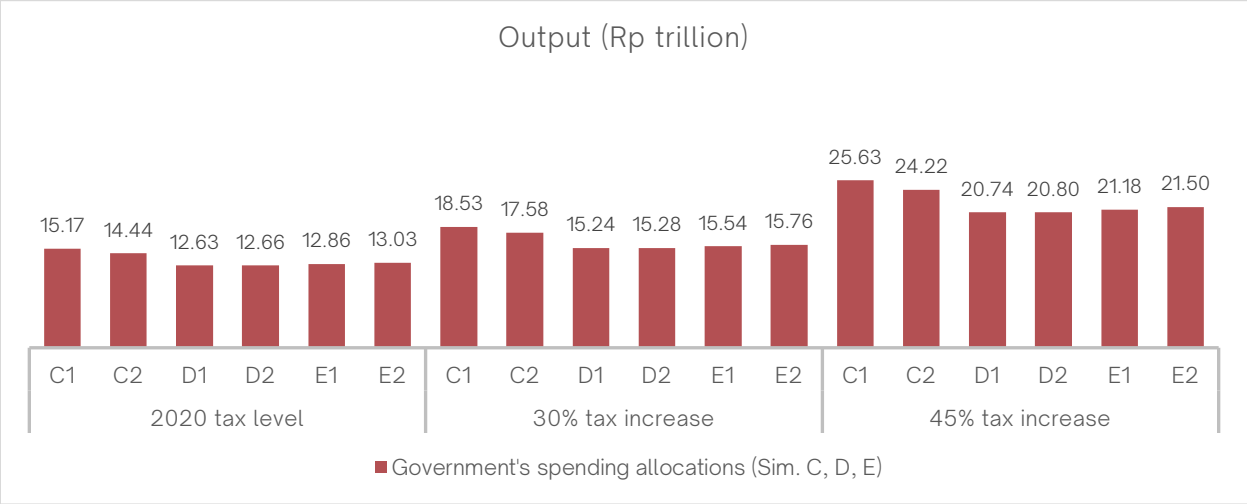
The 2020 tax increase has the opposite impact, as it would increase cigarette spending, leading to higher demand for the cigarette industry.[11] It is estimated that the increased cigarette spending would increase the total output by Rp 1.35 trillion (Simulation A). However, it is assumed that increasing cigarette spending would crowd out spending on other goods and services, which would reduce total output by Rp 1.38 trillion (Simulation B) totalling a net negative of Rp 32.42 billion between Simulations A and B.

Finally, cigarette taxes affect economic output through the spending of cigarette tax revenue by the government. Simulations C, D, and E represent different scenarios of government spending. The analysis shows that the current structure of government spending (Simulation C1)—which allocates 98 percent of cigarette tax revenue and all of VAT revenues to 'business as usual' spending—would generate the highest impact on output compared to the other simulated spending scenarios, as illustrated in Figure 4. Across the tax proposal, the current structure of government spending

[11] The increase in cigarette spending is driven by consumption of white cigarettes due to the higher price. See Table 8 in section 4.2 for discussion on cigarette demand.

(Simulation C1) consistently generates the highest impact. For instance, assuming all else constant, the 2020 cigarette tax increase, which would generate an estimated Rp 4.68 trillion in additional revenues, would have brought about an additional output of Rp 15.17 trillion from the government expenditure. Meanwhile, government spending under the 30-percent and 45-percent tax increases—which would generate Rp 5.72 trillion and Rp 7.92 trillion in additional tax revenue, respectively—would generate additional output of Rp 18.53 trillion and Rp 25.63 trillion, respectively.

Figure 4. The impact of government expenditures on output under various spending scenarios

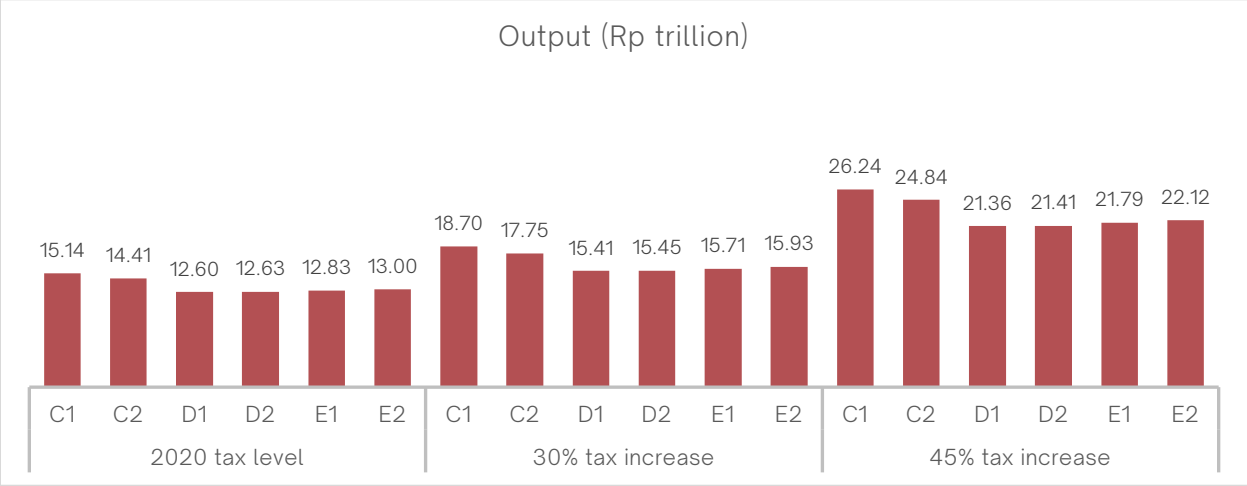


Source: Authors' estimation

Simulation C2 returns the second highest impact on total output. On top of spending to the mandated sectors (similar to Simulation C1), it allocates expenditure to the national health insurance (JKN) sector, which is earmarked for 20 percent of the excise revenue. Overall, both Simulations C1 and C2 allocate relatively small portions of the spending into mandated sectors, while a significant share of the spending is allocated to other sectors following the current structure of government spending (business-as-usual). See Appendix 4 for detailed spending allocations.

On the other hand, government expenditure under Simulations D and E allocates all the cigarette tax revenues into mandated and targeted sectors, with no allocation left for business-as-usual spending. In terms of impacts on total output, Simulations D and E would generate relatively similar outputs that are significantly lower than that of C1. This is because a significant amount under business-as-usual spending in C1 would be allocated to sectors that have high multiplier impacts. For instance, nearly 56 percent of the business-as-usual spending would be allocated to the "Government administration, defense, and mandatory social security" sector, which has a relatively high output multiplier of 3.40 (ranked fourth out of 55 sectors). Therefore, the current structure of government spending is optimal for generating the largest multiplier impact in comparison to the other proposed earmarked spending scenarios.

Figure 5. The net impact of cigarette tax on output

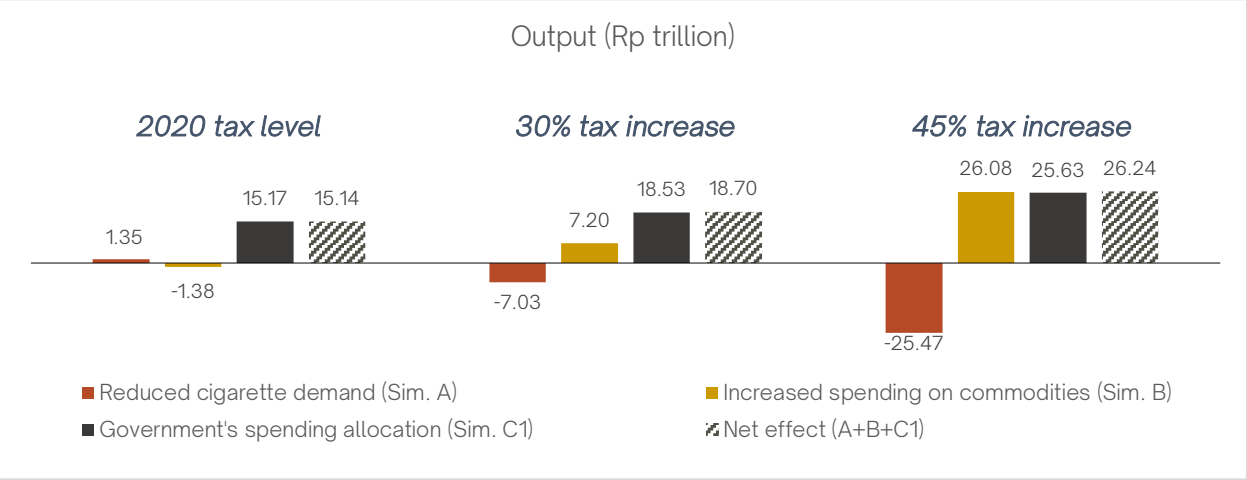


Source: Authors' estimation

Figure 5 presents the net effect of cigarette tax on total output, which combines the effects from reduced cigarette demand (Simulation A), spending reallocation from cigarettes to other commodities (Simulation B), and government spending of additional tax revenue (Simulations C, D, or E). Assuming tax is fully shifted to consumers and the government expenditure follows the existing spending allocation (Simulation C1), the 2020 cigarette tax increase would generate additional outputs by Rp 15.14 trillion which is about 0.05 percent of total outputs in 2019. Consequently, the higher tax hike, which would generate higher tax revenue, would generate a larger impact on total output by Rp 18.70 trillion (0.06 percent) for the 30-percent tax increase and Rp 26.24 trillion (0.08 percent) for the 45-percent tax increase).

The composition of the net effect on total output under the current government spending scenario (Simulation C1) is presented in Figure 6. It is shown that the higher tax rise would lead to greater reductions in cigarette demand and spending, which is illustrated by its negative impact on output (red bar). Nevertheless, this partial adverse impact is fully compensated by the stimulus generated by increased demand for non-cigarette commodities, assuming consumers fully reallocate their averted cigarette spending to consumption of other commodities. As the impacts of Simulation A and B merely compensate for each other, nearly all of the net positive impact is contributed by government expenditure from cigarette tax revenue, which highlights the significant role of fiscal policy in tobacco control measures. Overall, the 2020 cigarette tax increase would generate an additional Rp 15.14 trillion of output, while the 30-percent and 45-percent would increase economic output by Rp 18.70 trillion and 26.24 trillion, respectively.

Figure 6. Impact of cigarette tax on output for the optimal scenario



Source: Authors' estimation

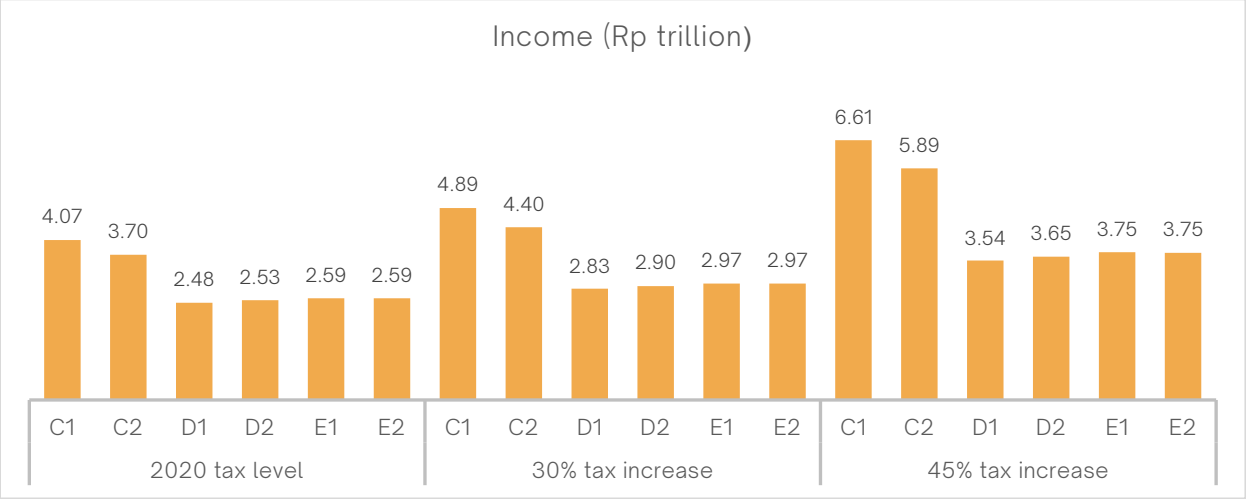
5.2.2 Impact on income

In addition to simulating the impact of cigarette tax on overall outputs, this study also simulates the impact of the tax increase on the amount of employment and total income generated in the economy. Recall that changes in industries' final demand—due to decreased cigarette spending, consumer spending on commodities, and government expenditure—will affect the number of inputs used by the industries. This in turn leads to change in employment and change in income earned by the workers. This section discusses cigarette tax impact on income, while the next section presents impact on employment.

Figure 7 presents the net impact of cigarette tax increases that combines the effect of decreased cigarette demand (Simulation A), consumer spending reallocation to other commodities (Simulation B), and government expenditure (Simulations C, D, and E).[12] It is noticeable that the current spending structure (Simulation C1) creates the highest income compared to the other proposed spending allocations as a significant portion of its business-as-usual spending is allocated to sectors that have high income multipliers, such as government administration and public education services.

[12] Results for Simulations A, B, and C of the impact of tax increase on income are available in Appendix 5.3.

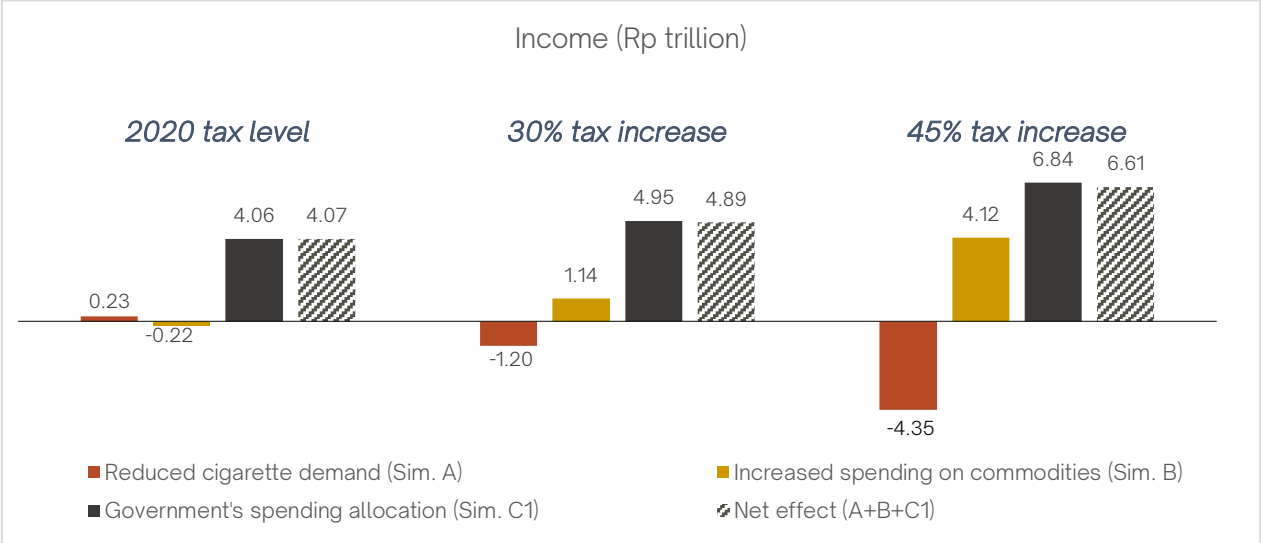
Figure 7. Net impact of cigarette tax on income



Source: Authors' estimation

Figure 8 illustrates the net impact and its components for the optimal scenarios. Overall, the net impact mainly sources from government spending and higher tax rate, which generate higher tax revenue and thus produce a bigger net impact in income. It is estimated that the 2020 cigarette tax increase would generate Rp 4.07 trillion of additional income to the economy, which is about 0.08 percent of total income in 2019. Meanwhile, the cigarette tax increases by 30 and 45 percent would add Rp 4.89 trillion (0.09 percent) and 6.61 trillion (0.12 percent) income to the economy, respectively.

Figure 8. Impact of cigarette tax on income for the optimal scenarios

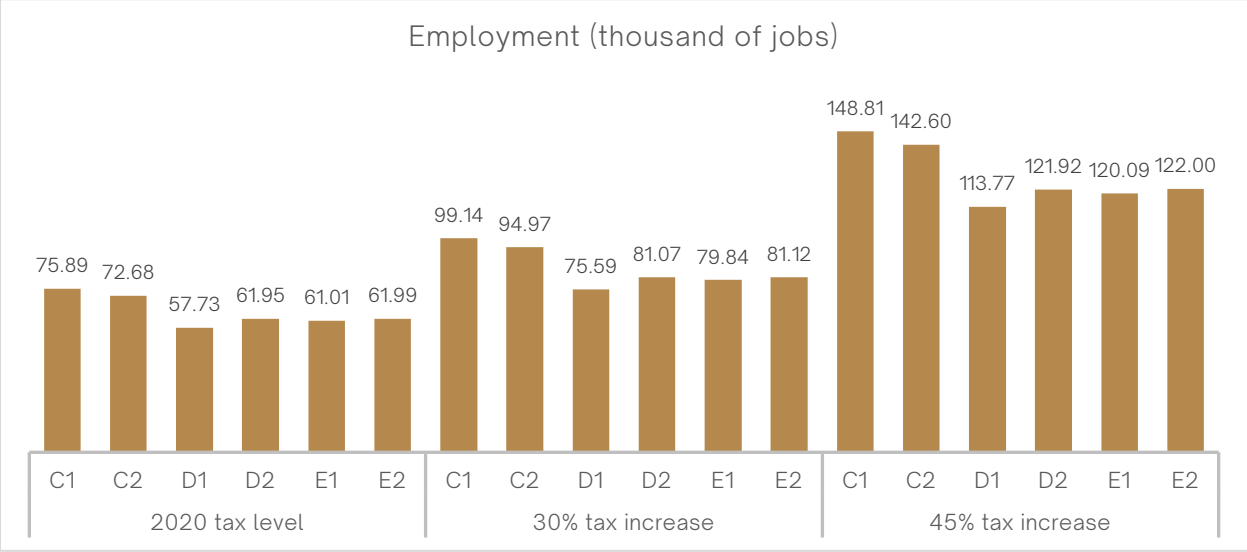


Source: Authors' estimation

5.2.3 Impact on employment

Figure 9 presents the net impact of cigarette tax on employment.[13] Consistent with the previous results, the simulation suggests that the 45-percent tax increase has the largest effect in generating employment compared to the other tax scenarios. It is estimated that a 45-percent tax increase would bring over 148 thousand additional jobs, which is about 0.12 percent of the total jobs in 2019. Meanwhile, increasing tax by 30 percent would add over 99 thousand new jobs (0.08 percent), and the 2020 tax rise is estimated to result in over 75 thousand (0.06 percent) additional jobs to the economy.

Figure 9. Net impact of cigarette tax on employment

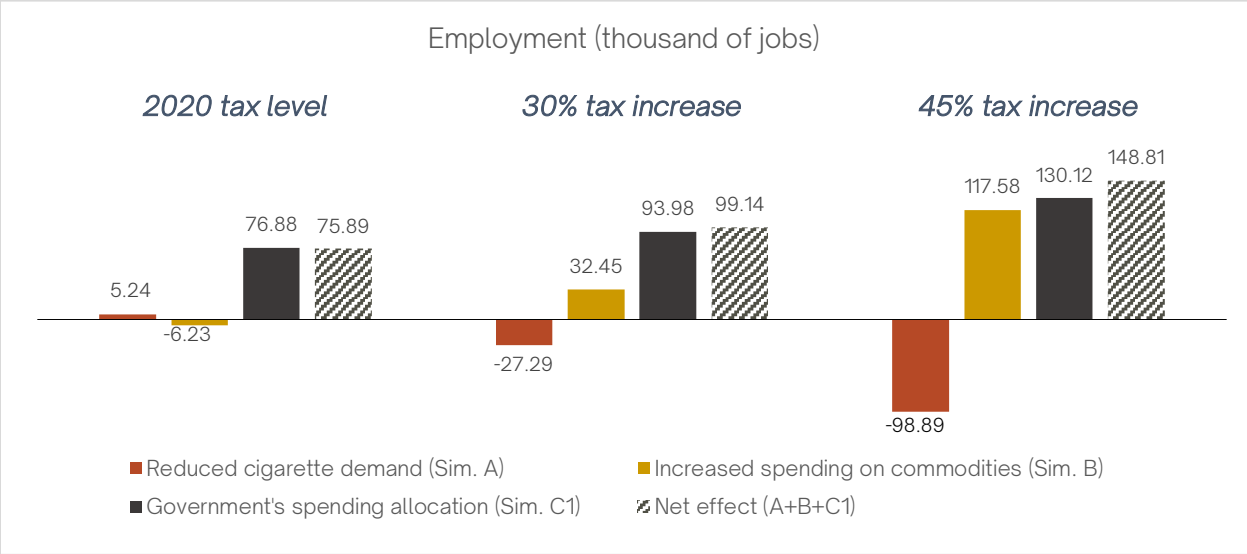


Source: Authors' estimation

Figure 10 illustrates components of the net effect on employment. For instance, a 45-percent tax increase under the optimal spending allocation would reduce over 98.9 thousand jobs due to the negative shock to the cigarette industry. However, this effect is compensated by the creation of over 117.6 thousand jobs due to increased spending in commodities as household reallocate their cigarette spending to other non-cigarette goods and services. In addition, stimulus created by increased government spending would create over 130 thousand additional jobs. In total, the 45-percent tax increase would bring over 148.8 thousand additional jobs.

[13] Results for simulations A, B, and C of the impact of the tax increases on income are available in Appendix 5.3.

Figure 10. Impact of cigarette tax on employment for the optimal scenarios



Source: Authors' estimation

6. Conclusion and Recommendations

The study reveals important insights about the macroeconomic impacts of cigarette excise tax increases in Indonesia. Utilizing an updated IO table, this study simulates the impact of various proposed cigarette excise rates on aggregate economic output, employment, and income. The increase in cigarette excise tax creates economic stimulus in three ways. First, it reduces cigarette consumption and spending on cigarettes. Second, it reduces cigarette spending which then frees up the household budget for reallocation to consumption of other commodities. Third, increasing the cigarette tax generates additional revenues for the government which will be spent back into the economy as public expenditures.

The analysis shows that a cigarette tax increase would result in a net positive impact in terms of aggregate economic output, employment, and income to the economy. Keeping in mind the limitations of the IO analysis as a static model, it is also found that the current government spending allocation has been optimal in generating the largest aggregate economic impacts compared to the other proposed spending scenarios. Moreover, the net impacts are largely contributed by the government spending as effects from reduced cigarette spending and household's spending reallocation merely offset each other.

The findings reveal that the higher tax increase, which would generate higher tax revenue, would produce a larger favourable impact on total output, income, and employment. Based on the simulations, the 45 percent tax increase would generate the highest impact on the economy compared to the 35 percent tax hike and the 2020 tax increase. The 45 percent tax increase (assuming tax is fully shifted to consumers and the government expenditure follows the optimal spending allocation) would generate Rp 26.24 trillion additional output, add 148.81 thousand jobs, and bring in Rp 6.61 trillion of additional income to the economy. Meanwhile increasing the cigarette tax by a lower rate of 35 percent would add Rp 18.70 trillion in economic output, generate 99.14 thousand additional jobs, and add income by Rp 4.89 trillion. For the 2020 tax increase, assuming all else remains constant, it is estimated it would generate an additional Rp 15.14 trillion of output, bring over 75.89 thousand additional jobs, and generate Rp 4.07 trillion income to the economy.

The results of this study reinforce a longstanding body of evidence of the effectiveness of tax measures in reducing cigarette consumption. The simulation suggests that a significant tax hike that increases cigarette prices would substantially reduce cigarette consumption. Therefore, considering that smoking prevalence in Indonesia is among the highest in the world and consumers in the country enjoy relatively affordable cigarettes, the Indonesian government should adopt and implement the longstanding consensus to "go big, go fast" in increasing cigarette taxes to reduce cigarette smoking.

Nevertheless, a major tax hike should be accompanied by simplifying tax tiers to reduce incentives for switching to cheaper tobacco products. The elasticity estimate in this study suggests downward substitution between white cigarettes and kretek cigarettes. Substitution to cheaper cigarettes would undermine the effectiveness of cigarette taxes in reducing tobacco consumption. This is particularly the case in Indonesia, which currently has ten tax tiers, where consumers can easily find

cheaper cigarette brands. Therefore, MoF should follow through with their road map to simplify the cigarette tax structure to five tiers by 2021.

Increasing cigarette taxes is not only effective in influencing smokers' behaviour but also beneficial to the economy. This study builds the case for supporting a cigarette tax hike, as it would generate a net positive impact in terms of total output, employment, and income. The study finds that negative shocks attributed to reduced cigarette demand would be fully compensated for by the positive impact of consumer's spending reallocation. Moreover, economic stimulus generated by government expenditures from cigarette tax revenue would substantially benefit the economy even further. Therefore, public spending from tobacco tax revenues should be spent in a manner that optimizes public payoff, particularly to compensate for the negative externalities of smoking and to compensate the sector(s) most adversely impacted by reduced cigarette demand.

Despite the significance of this study for the literature and policy making process, this study has several limitations. First, the analysis of IO tables does not allow a substitution between input in the production function, which may result in the failure to fully capture firms' behaviours and overestimate results. Second, the IO model is a static model that cannot capture the long-term impacts of tobacco consumption. Third, the IO analysis is unable to capture non-economic impacts of the economic shocks incorporated in the simulations. For example, a revenue reallocation to the education and health sectors in the IO analysis may not capture the positive impacts of those sectors on the economy through increased human capital. Further research in this area may consider the computable general equilibrium (CGE) model to address the limitations of the IO analysis. Fourth, the analysis does not account for the effect of the excise increase on the consumption of other cigarettes (cigarettes other than kretek and white) or illicit cigarettes due to data availability. Notwithstanding the limitations of the IO analysis in this study, this work offers valuable insights for the literature and policy makers regarding the potential effects of cigarette excise increases on the economy as well as suggested distribution of government revenue due to the excise tax increase.

References

Ahsan, A., & Wiyono, N. (2007). An analysis of the impact of higher cigarette prices on employment in Indonesia.

Ahsan, A., Wiyono, N. H., Kiting, A. S., Djutaharta, T., & Aninditya, F. (2013). Impact of increasing tobacco tax on government revenue and tobacco consumption. SEADI Discussion Paper Series. https://doi.org/10.13140/RG.2.1.3350.2563

Alpert, H. R., Vardavas, C. I., Chaloupka, F. J., Vozikis, A., Athanasakis, K., Kyriopoulos, I., Bertic, M., Behrakis, P. K., & Connolly, G. N. (2014). The recent and projected public health and economic benefits of cigarette taxation in Greece. Tobacco Control, 23(5), 452–454. https://doi.org/10.1136/TOBACCOCONTROL-2012-050857

Ashar, F., & Firmansyah. (2015). The effect of excise of cigarette price changes to the economy and household income in Central Java. Kinerja Journal of Business and Economics, 19(2), 97–111. https://doi.org/10.24002/kinerja.v19i2.537

Azagba, S., Burhoo, P., Chaloupka, F. J., & Fong, G. T. (2015). Effect of cigarette tax increase in combination with mass media campaign on smoking behaviour in Mauritius: Findings from the ITC Mauritius survey. Tobacco Control, 24, iii71–iii75. https://doi.org/10.1136/tobaccocontrol-2014-052096

Barber, S., Adioetomo, S. M., Ahsan, A., & Setyonaluri, D. (2008). Tobacco economics in Indonesia. International Union Against Tuberculosis and Lung Disease. http://www.worldlungfoundation.org/ht/a/GetDocumentAction/i/6567

Barkat, A., Uddin Chowdhury, A., Nargis, N., Rahman, M., Shahnewaz Khan, M., Kumar Pk, A., Bashir, S., & Chaloupka, F. J. (2012). The economics of tobacco and tobacco taxation in Bangladesh. International Union Against Tuberculosis and Lung Disease.

Callison, K., & Kaestner, R. (2014). Do higher tobacco taxes reduce adult smoking? New evidence of the effect of recent cigarette tax increases on adult smoking. Economic Inquiry, 52(1), 155–172. https://doi.org/10.1111/ecin.12027

Chen, C. M., Chang, K. L., Lin, L., & Lee, J. L. (2014). Brand switching or reduced consumption? A study of how cigarette taxes affect tobacco consumption. European Journal of Health Economics, 15(9), 991–998. https://doi.org/10.1007/s10198-013-0549-1

Choi, S. E. (2016). Are lower income smokers more price sensitive? The evidence from Korean cigarette tax increases. Tobacco Control, 25(2), 141–146. https://doi.org/10.1136/tobaccocontrol-2014-051680

Deaton, A. (1988). Quality, quantity, and spatial variation. The American Economic Review, 78(3), 418–430.

Deaton, B. A., & Muellbauer, J. (1980). An almost ideal demand system. The American Economic Review, 70(3), 312–326.

Drope J, Schluger N, Cahn Z, Drope J, Hamill S, Islami F, Liber A, Nargis N, Stoklosa M. 2018. The Tobacco Atlas. Atlanta: American Cancer Society and Vital Strategies

Gilmore, A. B., Branston, J. R., & Sweanor, D. (2010). The case for OFSMOKE: How tobacco price regulation is needed to promote the health of markets, government revenue and the public. Tobacco Control, 19(5), 423–430. https://doi.org/10.1136/tc.2009.034470

Goldin, J., & Homonoff, T. (2013). Smoke gets in your eyes: Cigarette tax salience and regressivity. American Economic Journal: Economic Policy, 5(1), 302–336. https://doi.org/10.1257/pol.5.1.302

Goodchild, M., Nargis, N., & D'Espaignet, E. T. (2018). Global economic cost of smoking-attributable diseases. Tobacco Control, 27(1), 58–64.

Goodchild, M., Perucic, A.-M., & Nargis, N. (2016). Modelling the impact of raising tobacco taxes on public health and finance. Bulletin of the World Health Organization, 94(4), 250–257. https://doi.org/10.2471/blt.15.164707

Hadi, P. U., & Friyatno, S. (2008). The roles of tobacco and cigarette industry sectors in Indonesian economy: Analysis of the 2000 I-O Table. Jurnal Agro Ekonomi, 26(1), 90–121. https://doi.org/10.21082/jae.v26n1.2008.90-121

Hidayat, B., & Thabrany, H. (2010). Cigarette smoking in Indonesia: Examination of a myopic model of addictive behaviour. International Journal of Environmental Research and Public Health, 7(6), 2473–2485. https://doi.org/10.3390/ijerph7062473

Hu, T. W., & Mao, Z. (2002). Effects of cigarette tax on cigarette consumption and the Chinese economy. Tobacco Control, 11, 105–108. https://doi.org/10.1177/000944556600200602

Husain, M. J., Kostova, D., Mbulo, L., Benjakul, S., Kengganpanich, M., & Andes, L. (2017). Changes in cigarette prices, affordability, and brand-tier consumption after a tobacco tax increase in Thailand: Evidence from the Global Adult Tobacco Surveys, 2009 and 2011. Preventive Medicine, 105, S4–S9. https://doi.org/10.1016/j.ypmed.2017.05.027

Jha, P. (2011). Avoidable deaths from smoking: A global perspective. Public Health Reviews, 33(2), 569–600. https://doi.org/10.1007/bf03391651

John, R., Chelwa, G., Vulovic, V., & Chaloupka, F. J. (2019). A toolkit on using household expenditure surveys for research in the economics.

Kosen, S., Thabrany, H., Kusumawardani, N., & Martini, S. (2017). Health and economic costs of tobacco in Indonesia: Review of evidence series. LPB. Jakarta.

Lee, J. M., Liao, D. S., Ye, C. Y., & Liao, W. Z. (2005). Effect of cigarette tax increase on cigarette consumption in Taiwan. Tobacco Control, 14(SUPPL. 1), 71–75. https://doi.org/10.1136/tc.2004.008177

Lee, J. M. (2008). Effect of a large increase in cigarette tax on cigarette consumption: An empirical analysis of cross-sectional survey data. Public Health, 122(10), 1061–1067. https://doi.org/10.1016/j.puhe.2007.12.013

Lian, T. Y., & Dorotheo, U. (2018). The tobacco control atlas: ASEAN region. Bangkok.

Ma, Z. Q., Kuller, L. H., Fisher, M. A., & Ostroff, S. M. (2013). Use of interrupted time-series method to evaluate the impact of cigarette excise tax increases in Pennsylvania, 2000-2009. Preventing Chronic Disease, 10(10), 1–10. https://doi.org/10.5888/pcd10.120268

Maclean, J. C., Webber, D. A., & Marti, J. (2014). An Application of Unconditional Quantile Regression to Cigarette Taxes. Journal of Policy Analysis and Management, 33(1), 188–210. https://doi.org/10.1002/PAM.21724

Meilissa, Y., Nugroho, D., Luntungan, N., & Dartanto, T. (2021). The healthcare cost of smoking in Indonesia. Jakarta: Center for Indonesia's Strategic Development Initiatives.

Ng, M., Freeman, M. K., Fleming, T. D., Robinson, M., Dwyer-Lindgren, L., Thomson, B., Wollum, A., Sanman, E., Wulf, S., Lopez, A. D., Murray, C. J. L., & Gakidou, E. (2014). Smoking Prevalence and Cigarette Consumption in 187 Countries, 1980-2012. JAMA, 311(2), 183–192. https://doi.org/10.1001/JAMA.2013.284692

Nguyen, H. T. T., Giang, L. T., & Pham, T. N. (2020). Impacts of higher tobacco tax on output and employment in Vietnam. Journal of Economics and Development, 22(1), 167–182. https://doi.org/10.1108/jed-11-2019-0058

Prasetyo, B. W., & Adrison, V. (2020). Cigarette prices in a complex cigarette tax system: empirical evidence from Indonesia. Tobacco Control, 29(6), 618 LP – 623. https://doi.org/10.1136/tobaccocontrol-2018-054872

Reitsma, M. B., Fullman, N., Ng, M., Salama, J. S., Abajobir, A., Abate, K. H., Abbafati, C., Abera, S. F., Abraham, B., Abyu, G. Y., Adebiyi, A. O., Al-Aly, Z., Aleman, A. V, Ali, R., Alkerwi, A. Al, Allebeck, P., Al-Raddadi, R. M., Amare, A. T., Amberbir, A., … Gakidou, E. (2017). Smoking prevalence and attributable disease burden in 195 countries and territories, 1990–2015: a systematic analysis from the Global Burden of Disease Study 2015. The Lancet, 389(10082), 1885–1906. https://doi.org/10.1016/S0140-6736(17)30819-X

Ross, H., Stoklosa, M., & Krasovsky, K. (2012). Economic and public health impact of 2007-2010 tobacco tax increases in Ukraine. Tobacco Control, 21(4), 429–435. https://doi.org/10.1136/tc.2010.040071

Saenz-de-Miera, B., Thrasher, J. F., Chaloupka, F. J., Waters, H. R., Hernandez-Avila, M., & Fong, G. T. (2010). Self-reported price of cigarettes, consumption and compensatory behaviours in a cohort of Mexican smokers before and after a cigarette tax increase. Tobacco Control, 19(6), 481–487. https://doi.org/10.1136/tc.2009.032177

Salti, N., Chaaban, J., Nakkash, R., & Alaouie, H. (2015). The effect of taxation on tobacco consumption and public revenues in Lebanon. Tobacco Control, 24(1), 77–81. https://doi.org/10.1136/tobaccocontrol-2012-050703

Tobacco Atlas. (2021, 3 8). Tobacco atlas. Country fact sheets: Indonesia. https://tobaccoatlas.org/wp-content/uploads/pdf/indonesia-country-facts.pdf

WHO Regional Office for South-East Asia. (2018). Indonesia tobacco factsheet 2018.

World Bank Group (WBG). (2018). The economics of tobacco taxation and employment in Indonesia. Washington D.C.: The World Bank Group. https://doi.org/10.1596/29814

World Bank Group (WBG). (2021, March 8). World Bank's microdata library. Prevalence of current tobacco use (% of adults) – Indonesia. https://data.worldbank.org/indicator/SH.PRV.SMOK?end=2018&locations=ID&start=2007&view=chart

Yeh, C.-Y., Schafferer, C., Lee, J. M., Ho, L. M., & Hsieh, C. J. (2017). The effects of a rise in cigarette price on cigarette consumption, tobacco taxation revenues, and of smoking-related deaths in 28 EU countries - Applying threshold regression modelling. BMC Public Health, 17(1), 1–9. https://doi.org/10.1186/s12889-017-4685-x

Yu, L., Cohen, J. E., Hoe, C., Yang, T., & Wu, D. (2020). Male smoking reduction behaviour in response to China's 2015 cigarette tax increase. Tobacco Control, 29(4), 405–411. https://doi.org/10.1136/tobaccocontrol-2019-055053

Zheng, R., Ahsan, A., Marquez, P. V., Wang, Y., & Hu, X. (2018). Cigarette affordability in Indonesia: 2002-2017. Washington DC: The World Bank Group.

Appendix 1. Summary of the IO tables (55 sectors)

Table A1. Summary of the IO tables

Code	Sector	Type-II multiplier			Share of output	Share of income	Share of employment	Share of household consumption	Share of government consumption
		Output	Income	Employ-ment					
1	Agriculture, livestock, hunting and agricultural services	2.09	0.39	0.02	6.03%	7.76%	26.01%	4.18%	0.00%
2	Forestry and logging	1.88	0.34	0.01	0.41%	0.48%	0.37%	0.03%	0.00%
3	Fishery	1.68	0.27	0.01	1.60%	1.61%	0.95%	3.11%	0.00%
4	Oil, gas and geothermal mining	1.95	0.22	0.00	2.03%	0.89%	0.13%	0.00%	0.00%
5	Coal mining and lignite	1.85	0.25	0.00	1.71%	1.04%	0.19%	0.00%	0.00%
6	Metal ore mining	2.52	0.38	0.01	0.48%	0.37%	0.32%	0.00%	0.00%
7	Mining and other excavations	2.15	0.47	0.01	0.99%	1.71%	0.49%	0.00%	0.00%
8	Oil and gas refinery products	2.26	0.29	0.00	2.43%	1.76%	0.20%	1.08%	0.00%
9	Food and beverage industry	2.54	0.33	0.01	10.84%	5.55%	3.34%	19.48%	2.49%
10	Kretek cigarettes	2.31	0.40	0.01	0.71%	0.79%	0.45%	2.49%	0.00%
11	White cigarettes	2.31	0.40	0.01	0.01%	0.01%	0.01%	0.04%	0.00%
12	Other cigarettes	2.31	0.40	0.01	0.03%	0.03%	0.02%	0.10%	0.00%
13	Tobacco processing industry	2.85	0.39	0.01	0.10%	0.06%	0.13%	0.02%	0.00%
14	Textile and apparel industry	2.56	0.35	0.02	1.65%	1.17%	3.12%	1.66%	0.00%
15	Leather industry, leather goods and footwear	2.52	0.45	0.02	0.30%	0.39%	0.70%	0.36%	0.00%
16	Wood industry, goods of wood and cork and woven goods of bamboo, rattan and the like	2.96	0.43	0.02	0.64%	0.42%	1.31%	0.08%	0.00%

Code	Sector	Type-II multiplier			Share of output	Share of income	Share of employment	Share of household consumption	Share of government consumption
		Output	Income	Employ-ment					
17	Paper industry and paper goods; Printing and reproduction of recording media	3.65	0.53	0.01	1.00%	0.77%	0.55%	0.08%	0.00%
18	Chemical industry, pharmaceutical and traditional medicines	2.14	0.30	0.01	1.87%	1.38%	0.37%	0.33%	0.00%
19	Pharmaceutical products industry	2.41	0.30	0.01	0.70%	0.40%	0.05%	1.03%	0.00%
20	Rubber industry, rubber goods and plastics	3.33	0.46	0.02	1.13%	0.58%	0.56%	0.55%	0.00%
21	Industrial non-metallic quarrying	2.81	0.41	0.01	0.89%	0.65%	1.07%	0.31%	0.00%
22	Basic metal industry	2.25	0.23	0.00	1.49%	0.46%	0.18%	0.00%	0.00%
23	Metal goods industry; Computers, electronic goods, optics; and electrical appliances	2.02	0.25	0.00	2.86%	1.80%	0.80%	1.44%	0.00%
24	Industrial machinery and supplies	3.25	0.43	0.01	0.61%	0.35%	0.32%	0.27%	0.00%
25	Transportation equipment industry	2.52	0.40	0.01	1.76%	1.64%	0.46%	2.93%	0.00%
26	Furniture industry, equipment (music, sports)	3.51	0.50	0.02	0.34%	0.25%	1.07%	0.48%	0.00%
27	Medical instruments	3.22	0.49	0.01	0.02%	0.02%	0.01%	0.00%	0.00%
28	Other processing industries; Repair and installation service of machinery and equipment	2.33	0.37	0.01	0.17%	0.17%	0.25%	0.04%	0.00%
29	Electricity	3.21	0.27	0.00	2.39%	0.73%	0.25%	2.30%	0.00%
30	Gas procurement and ice production	2.03	0.30	0.00	0.20%	0.19%	0.03%	0.00%	0.00%
31	Water procurement, waste management, waste, and recycling	2.80	0.37	0.04	0.04%	0.03%	0.39%	0.04%	0.01%
32	Construction	2.35	0.35	0.01	16.06%	13.22%	6.72%	0.00%	0.00%
33	Car trade, motorcycles, and reparations	2.17	0.40	0.01	2.01%	2.67%	2.30%	3.45%	0.03%

Code	Sector	Type-II multiplier			Share of output	Share of income	Share of employment	Share of household consumption	Share of government consumption
		Output	Income	Employ-ment					
34	Wholesale and retail trade (excluding motor vehicles and motorcycles)	2.26	0.38	0.01	7.93%	8.98%	16.52%	9.71%	0.23%
35	Rail transport	2.50	0.55	0.01	0.10%	0.18%	0.09%	0.23%	0.00%
36	Land transportation	2.08	0.33	0.01	2.59%	2.49%	2.46%	2.75%	0.00%
37	Sea freight	2.51	0.33	0.01	0.54%	0.30%	0.26%	1.40%	0.00%
38	Lake and river crossing shuttles	2.36	0.41	0.01	0.14%	0.17%	0.07%	0.28%	0.00%
39	Air freight	1.66	0.24	0.00	2.49%	2.00%	0.13%	5.70%	0.00%
40	Warehousing and transport support services; postal and courier	2.27	0.41	0.01	0.87%	1.07%	1.39%	1.18%	0.00%
41	Accommodation provision	2.23	0.34	0.01	0.53%	0.50%	1.16%	0.54%	0.00%
42	Provision of food and beverages	3.11	0.48	0.02	2.60%	2.48%	5.52%	7.11%	0.00%
43	Information and communication	2.25	0.38	0.01	3.28%	3.37%	0.72%	4.34%	0.03%
44	Banking and financial services	2.12	0.43	0.01	1.76%	2.63%	1.03%	1.73%	1.20%
45	Insurance (other than JKN)	1.98	0.34	0.00	0.56%	0.60%	0.11%	0.53%	0.00%
46	National Health Insurance (JKN)	2.42	0.45	0.01	0.11%	0.13%	0.20%	0.22%	0.23%
47	Other financial services	2.20	0.39	0.00	0.58%	0.63%	0.05%	0.75%	0.00%
48	Real estate	1.57	0.14	0.00	2.05%	0.55%	0.32%	6.37%	0.00%
49	Company services	2.30	0.39	0.01	1.68%	1.83%	1.52%	0.49%	0.00%
50	Government administration, defense and mandatory social security	3.40	0.93	0.02	2.93%	9.59%	3.85%	0.92%	56.04%
51	Government education services	3.18	0.97	0.02	1.48%	5.45%	3.47%	0.48%	31.48%

Code	Sector	Type-II multiplier			Share of output	Share of income	Share of employment	Share of household consumption	Share of government consumption
		Output	Income	Employ-ment					
52	Private education services	2.66	0.69	0.01	1.10%	2.72%	1.52%	3.46%	0.00%
53	Government health services	3.41	0.65	0.02	0.43%	0.76%	0.81%	0.26%	8.25%
54	Private health services	2.50	0.41	0.01	0.83%	0.88%	0.73%	2.29%	0.00%
55	Other services	2.74	0.61	0.02	1.98%	3.34%	4.97%	3.37%	0.00%

Appendix 2. Calculation of cigarette demand elasticity

In estimating the own- and cross-price elasticities, this study follows the estimation approach developed by Deaton (1988). This method adjusted the model of Almost Ideal Demand System (AIDS) introduced by Deaton & Muellbauer (1980) by allowing zero purchases of tobacco (cigarettes) into the equation, hence providing better estimation to cover the entire population for any tobacco tax increase that affects tobacco consumption.

The study uses pooled data from the National Socioeconomic Survey (Susenas) from 2017–2019 to estimate the price elasticity of cigarette consumption. Susenas is a survey conducted by Statistics Indonesia to capture individual demographic characteristics and household consumption. Following Deaton's approach, the missing value of cigarette spending for non-smoking households is replaced with zero.

Prior to using the unit value as a proxy for cigarette price, the authors test this variable for its variability across urban-rural within the district using Analysis of Variance (ANOVA). The authors found that the unit value significantly varies at the urban-rural level within the district. Next, the within-cluster regression is estimated using the following specifications (John et al., 2019):

$$\ln y_{hc} = \alpha 1 + \beta 1 lnx_{ic} + \gamma 1 Z_{hc} + \psi \ln\pi_c + u1$$

$$w_{hc} = \alpha 0 + \beta 0 lnx_{ic} + \gamma 0 Z_{hc} + \theta \ln\pi_c + f_c + u0$$

where lnv_{hc} is the log of the unit value for household *h* in cluster *c*, while w_{hc} represents the share of tobacco expenditure in total household expenditure for household *h* in cluster *c* and lnx_{ic} is the log of total household expenditure over the relevant reference period. Z_{hc} is a vector of household-specific characteristics which include household size, ratio of adult male and household demographics (such as gender, average years of education, and employment status of head of household). f_c is a cluster-fixed effect. The fixed effect benefits this study to distinguish between prices and unit values and would remove any possibility of identification of prices. $\ln\pi_c$ are the unobserved prices. Next, the unit values are averaged within the cluster by following the formulas below:

$$\widehat{y_c^1} = \frac{1}{n_c^+} \sum_{h=1}^{n_c^+} (lnv_{hc} - \hat{\beta}^1 lnx_{hc} - \hat{\gamma} Z_{hc})$$
$$\widehat{y_c^0} = \frac{1}{n_c} \sum_{h=1}^{n_c} (w_{hc} - \hat{\beta}^0 lnx_{hc} - \hat{\delta} Z_{hc})$$

where n_c is the number of households in cluster c and n^+_c is the number of households reporting tobacco product purchases, while the remaining components in the equation are the abovementioned. The price elasticity is then estimated by following

$$\widehat{\varepsilon_p} = \left(\frac{\hat{\theta}}{\bar{w}}\right) - \hat{\psi}$$

where w is the average share of household total expenditure dedicated to tobacco consumption. The Psi hat and Theta hat are the unobserved price terms and will be recovered using the following formulas.

$$\hat{\psi} = 1 - \frac{\hat{\beta}^1 (\overline{w} - \hat{0})}{\hat{\beta}^0 + \overline{w}}$$

$$\hat{\theta} = \frac{\hat{\Phi}}{1 + (\overline{w} - \hat{\Phi}) \hat{\zeta}}$$

$$\hat{\zeta} = \frac{\hat{\beta}^1}{\hat{\beta}^0 + \overline{w} (1 - \hat{\beta}^1)}$$

Additionally, Deaton also proposed distinguishing the impact of income on tobacco expenditure. The impact is examined using the following specification

$$\hat{\varepsilon}_1 = 1 + \left(\frac{\hat{\beta}^0}{\overline{w}}\right) - \hat{\beta}^1$$

where β_1 is the estimate of the coefficient on total household expenditure, and β_0 is the estimate of the coefficient on total household expenditure. Φ is the estimate of the coefficient of a regression of cluster level demand on cluster level unit value.

Table A2. Own- and cross-price elasticity

	Kretek cigarettes		White cigarettes		Residual	
Price of kretek	-1.020	***	-0.236	***	-0.188	***
	(-2204.61)		(-308.21)		(-185.89)	
Price of white	0.163	***	-0.338	***	0.196	***
	(305.57)		(-105.45)		(62.33)	
Residual	0.000	***	0.000	***	-0.256	***
	(18.22)		(-118.13)		(-84837.05)	

Note: *** (1%), ** (5%), * (10%)
T-statistics in parentheses
Source: Authors' calculation

Table A2 presents the estimation result on own- and cross-price elasticity of cigarettes in Indonesia. Using urban-rural within the district level as the cluster, the authors find that the own-price elasticity of kretek cigarettes is inelastic at -1.020 (significant at one-percent level), while the own-price elasticity of white cigarettes is -0.338 (significant at one-percent level).

Appendix 3. IO analysis

The input-output table presents flow of input and output in the economy. Table A3 illustrates the structure of the IO table. Industry's output is modelled to be allocated for intermediate inputs for other industries and sold as final demand. x_{ij} represents the output of industry i used as input for industry j. V_j is the total intermediate input used by industry j required from all industries, while X_j is the total output for industry j, and F_j is the final demand for industry j.

Table A3. Transaction IO table

Input	Sector	Intermediate Demand				Final Demand	Total Output
		1	2	...	n		
Intermediate Input	1	x_{11}	x_{12}	...	x_{1n}	F_1	X_1
	2	x_{21}	x_{22}	...	x_{2n}	F_2	X_2
	...	...	...	...	...		
	...	...	...	...	....	-	-
	n	x_{n1}	x_{n2}	...	x_{nn}	F_n	X_n
Primary Input		V_1	V_2	....	V_n		
Total Input		X_1	X_2	....	X_n		

The share of industry i's output used as input by industry j could be referred to as technical, which is illustrated by the following formula:

$$a_{ij} = \frac{x_{ij}}{X_j} \qquad (1)$$

$$x_{ij} = a_{ij} X_j \qquad (2)$$

where:

a_{ij} = intermediate input coefficient (technical coefficient) of sector i's output used by sector j

x_{ij} = the amount of sector i's output used as input in sector j

X_j = total input in sector j

Equation (2) could be applied to represent the IO table in the following system of equations:

$$\begin{array}{ccccccccccc} a_{11}X_1 & + & a_{12}X_2 & + & \ldots & + & a_{1n}X_n & + & F_1 & = & X_1 \\ a_{21}X_1 & + & a_{22}X_2 & + & \ldots & + & a_{2n}X_n & + & F_2 & = & X_2 \\ \ldots & + & \ldots & + & \ldots & + & \ldots & + & \ldots & = & \ldots \\ a_{n1}X_1 & + & a_{n2}X_2 & + & \ldots & + & a_{nn}X_n & \ldots & F_n & = & X_n \end{array} \qquad (3)$$

The equations above could be presented as:

$AX + F = X$ (4)

$X - AX = F$ (5)

$(I - A)X = F$ (6)

Therefore, the amount of output can be calculated as the effect of change in the final demand, as follows:

$X = (I - A)^{-1} F$ (7)

Where,

A = Input coefficient matrix of size n x n
X = Total output matrix of size n x 1
F = Final demand matrix of size n x 1
I = Identity matrix of size n x n

Output multiplier

The column sum of $(I - A)^{-1}$ generates the type-I output multiplier of sector *i*. The type-I output multiplier consists of the initial effect, direct effect, and indirect effect. The initial effect of the output multiplier is defined as 1, meaning that the change in final demand would affect the output of that industry by the same amount as the change in the final demand itself. The direct effect is the summation of technical coefficients in the industry indicating the share of input used to produce one unit of output. Lastly, the indirect effect is defined as a type-I multiplier – (initial effect + direct effect).

A type-I multiplier is also referred to as a simple multiplier as it only considers the production-induced effect. A type-II multiplier, however, incorporates household consumption and wages of employed labor into the model. This is done by adding a row of wages or labor compensations and adding a column of household consumption into the IO table. The extended table is referred to as matrix *B*. Therefore, the column sum of $(I - B)^{-1}$ gives the type-II output multiplier of sector *i*. The difference between the type-I and type-II multiplier is referred to as the consumption-induced effect. This study uses the type-II output multiplier as it provides a more complete estimate.

Employment multiplier

The employment multiplier refers to the change in employment in the economy due to the change in final demand of a particular sector. The employment multiplier matrix is formulated as follows:

$$E = \hat{L}(1 - B)^{-1}$$

where:

E = Employment multiplier matrix of size n x n
$(1 - B)^{-1}$ = Output type-II multiplier matrix of size n x n
$\hat{L}$ = Labor coefficient matrix which contains the ratio of labor to total inputs for each sector. The matrix is a diagonal matrix where its components are obtained by the following calculation:

$$l_j = \frac{TK_j}{X_j}$$

where:

l_j = labor coefficient of sector j
TK_j = number of workers in sector j
X_j = Total input in sector j

Changes in the number of jobs due to changes in final demand for each sector are formulated as:

$$\Delta E = \hat{L}(1 - B)^{-1}\Delta F$$

Income multiplier

The income multiplier depicts the change of total income in the economy due to the change of final demand in a certain industry. The income multiplier is formulated as:

$$M = \hat{V}(1 - B)^{-1}$$

where:

M = Income multiplier matrix of size n x n

$(1\text{-}B)^{-1}$ = Output type-II multiplier matrix of size n x n

$\hat{V}$ = Diagonal matrix of income coefficient of size n x n. The income coefficient is the ratio of labor wages to total outputs.

The impact of changes in income due to changes in final demand can be calculated as:

$$\Delta M = \hat{V}(1 - B)^{-1}\Delta F$$

Appendix 4. Allocation of government spending for simulations C, D, and E

Full tax pass-through	Simulation C						Simulation D						Simulation E					
	C1.1	C1.2	C1.3	C2.1	C2.2	C2.3	D1.1	D1.2	D1.3	D2.1	D2.2	D2.3	E1.1	E1.2	E1.3	E2.1	E2.2	E2.3
	2020 tax rate	30% tax increase	45% tax increase	2020 tax rate	30% tax increase	45% tax increase	2020 tax rate	30% tax increase	45% tax increase	2020 tax rate	30% tax increase	45% tax increase	2020 tax rate	30% tax increase	45% tax increase	2020 tax rate	30% tax increase	45% tax increase
Total additional cigarette tax revenue (Rp trillion)	**4.68**	**5.72**	**7.92**	**4.68**	**5.72**	**7.92**	**4.68**	**5.72**	**7.92**	**4.68**	**5.72**	**7.92**	**4.68**	**5.72**	**7.92**	**4.68**	**5.72**	**7.92**
Additional tax revenue from cigarette excise (Rp trillion)	4.21	5.45	8.11	4.21	5.45	8.11	4.21	5.45	8.11	4.21	5.45	8.11	4.21	5.45	8.11	4.21	5.45	8.11
Additional tax revenue from cigarette subnational tax (Rp trillion)	0.42	0.55	0.81	0.42	0.55	0.81	0.42	0.55	0.81	0.42	0.55	0.81	0.42	0.55	0.81	0.42	0.55	0.81
Additional tax revenue cigarette value added tax (Rp trillion)	0.05	-0.28	-1.00	0.05	-0.28	-1.00	0.05	-0.28	-1.00	0.05	-0.28	-1.00	0.05	-0.28	-1.00	0.05	-0.28	-1.00
Spending to mandated sectors (Rp trillion)	**0.50**	**0.65**	**0.97**	**0.50**	**0.65**	**0.97**	**0.50**	**0.65**	**0.97**	**0.50**	**0.65**	**0.97**	**0.50**	**0.65**	**0.97**	**0.50**	**0.65**	**0.97**
share of cigarette tax revenue (%)	10.8%	11.4%	12.3%	10.0%	10.0%	10.0%	10.8%	11.4%	12.3%	10.8%	11.4%	12.3%	10.8%	11.4%	12.3%	10.8%	11.4%	12.3%
Spending to targeted sectors (Rp trillion)	**0.00**	**0.00**	**0.00**	**0.84**	**1.09**	**1.62**	**4.12**	**5.34**	**7.95**	**4.12**	**5.34**	**7.95**	**4.12**	**5.34**	**7.95**	**4.12**	**5.34**	**7.95**
share of cigarette tax revenue (%)	0.0%	0.0%	0.0%	18.0%	19.1%	20.5%	88.1%	93.4%	100.4%	88.1%	93.4%	100.4%	88.1%	93.4%	100.4%	88.1%	93.4%	100.4%
Spending to other sectors / business-as-usual (Rp trillion)	**4.17**	**5.07**	**6.95**	**3.33**	**3.98**	**5.33**	**0.05**	**-0.28**	**-1.00**	**0.05**	**-0.28**	**-1.00**	**0.05**	**-0.28**	**-1.00**	**0.05**	**-0.28**	**-1.00**
share of cigarette tax revenue (%)	89.2%	88.6%	87.7%	71.2%	69.5%	67.2%	1.1%	-4.8%	-12.6%	1.1%	-4.8%	-12.6%	1.1%	-4.8%	-12.6%	1.1%	-4.8%	-12.6%
A. Spending allocation of cigarette excise revenue																		
Additional tax revenue from cigarette excise (Rp trillion)	**4.21**	**5.45**	**8.11**	**4.21**	**5.45**	**8.11**	**4.21**	**5.45**	**8.11**	**4.21**	**5.45**	**8.11**	**4.21**	**5.45**	**8.11**	**4.21**	**5.45**	**8.11**
A1. Mandated sectors	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**	**2%**
Agriculture, husbandry, and agriculture services (sector 1)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
A2. Targeted sectors	**0%**	**0%**	**0%**	**20%**	**20%**	**20%**	**98%**	**98%**	**98%**	**98%**	**98%**	**98%**	**98%**	**98%**	**98%**	**98%**	**98%**	**98%**
National health insurance (JKN) (sector 46)	0%	0%	0%	20%	20%	20%	37.5%	37.5%	37.5%	50%	50%	50%	25%	25%	25%	15%	15%	15%
Public healthcare services (sector 53)	0%	0%	0%	0%	0%	0%	12.5%	12.5%	12.5%	15%	15%	15%	10%	10%	10%	10%	10%	10%
Private healthcare services (sector 54)	0%	0%	0%	0%	0%	0%	10%	10%	10%	10%	10%	10%	10%	10%	10%	5%	5%	5%
Chemical, pharmaceutical, and traditional medicine industry (sector 18)	0%	0%	0%	0%	0%	0%	10%	10%	10%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Medical instruments (sector 27)	0%	0%	0%	0%	0%	0%	10%	10%	10%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Public education services (sector 51)	0%	0%	0%	0%	0%	0%	10%	10%	10%	10%	10%	10%	8%	8%	8%	5%	5%	5%
Information and communication (sector 43)	0%	0%	0%	0%	0%	0%	8%	8%	8%	3%	3%	3%	5%	5%	5%	3%	3%	3%
Sectors related to social assistance programs:																		
Food and beverage industry (sector 9)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	10%	10%	20%	20%	20%
Public education services (sector 51)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	5%	5%	7.5%	7.5%	7.5%
Private education services (sector 52)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	5%	5%	7.5%	7.5%	7.5%
Public healthcare services (sector 53)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	5%	5%	7.5%	7.5%	7.5%
Private healthcare services (sector 54)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	5%	5%	7.5%	7.5%	7.5%
A3. Other sectors / business-as-usual spending	**98%**	**98%**	**98%**	**78%**	**78%**	**78%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
B. Spending allocation of cigarette subnational tax revenue																		
Additional tax revenue from cigarette subnational tax (Rp trillion)	**0.42**	**0.55**	**0.81**	**0.42**	**0.55**	**0.81**	**0.42**	**0.55**	**0.81**	**0.42**	**0.55**	**0.81**	**0.42**	**0.55**	**0.81**	**0.42**	**0.55**	**0.81**
B1. Mandated sectors	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Government administration, defense, and mandatory social security (sector 50)	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Public healthcare services (sector 53)	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
National health insurance (JKN) (sector 46)	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%
B2. Targeted sectors	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
B3. Other sectors / business-as-usual spending	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
C. Spending allocation of cigarette value added tax revenue																		
Additional tax revenue from cigarette value added tax (Rp trillion)	**0.05**	**-0.28**	**-1.00**	**0.05**	**-0.28**	**-1.00**	**0.05**	**-0.28**	**-1.00**	**0.05**	**-0.28**	**-1.00**	**0.05**	**-0.28**	**-1.00**	**0.05**	**-0.28**	**-1.00**
C1. Mandated sectors	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
C2. Targeted sectors	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
C3. Other sectors / business-as-usual spending	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Expenditures to “business-as-usual spending/other sectors” as indicated in rows A3, B3, and C3 in the table above are allocated to 10 economic sectors as follows:

Sector code	Sector name	Share of spending
50	Government administration, defense and mandatory social security	56.04%
51	Public education services	31.48%
53	Public health care services	8.25%
9	Food and beverage industry	2.49%
44	Banking and financial services	1.20%
34	Big and retail trading, not cars and motorcycle	0.23%
46	National Health Insurance (JKN)	0.23%
43	Information and communication	0.03%
33	Car trade, motorcycles, and repairs	0.03%
31	Water procurement, waste management, waste, and recycling	0.01%

Appendix 5. The impact of cigarette tax on output, employment, and income

This study assumes that when cigarette taxes are increased, the tax burden is fully transferred to consumers. However, research suggests that instead of being fully paid by consumers, producers might bear some portion of the tax. Analysis of Indonesia's cigarette market conducted by Prasetyo and Adrison (2018) found for a one-percent increase of excise, the price of kretek cigarettes only increased by 0.3 percent and 0.76 percent for white cigarettes. On the other hand, there are also cases where the increase in cigarette prices is larger than the tax increase. This was particularly the case in 2020, where the price (HJE) of kretek cigarettes rose by 1.83 times more than the increase of excise, while the price of white cigarettes increased by 2.15 times higher than the increase of the excise. Tables A4 and A5 present simulations of cigarette prices under different tax pass-through scenarios. Appendix 5.1 to 5.3 present the impacts of cigarette tax increases under different types of tax pass-throughs.

Table A4. Simulation of kretek cigarette prices under different tax pass-throughs

Per stick of cigarette	2019 tax level (baseline)	Tax over-shift			Tax under-shift			Tax full-shift		
		2020 tax level	30% tax increase	45% tax increase	2020 tax level	30% tax increase	45% tax increase	2020 tax level	30% tax increase	45% tax increase
Excise (Rp)	488	604	635	708	604	635	708	604	635	708
Percentage of excise increase *(base=2019)*		23.78%	30.00%	45.00%	23.78%	30.00%	45.00%	23.78%	30.00%	45.00%
Cigarette tax (Rp) *(10% of excise)*	49	60	63	71	60	63	71	60	63	71
VAT (Rp) *(9.1% of HJE)*	95	136	139	147	101	105	113	114	118	126
NOT price (Rp) *(Price - excise – tax - VAT)*	408	692	692	692	348	348	348	476	476	476
Cigarette price (Rp)	1,040	1,492	1,529	1,618	1114	1150	1239	1255	1292	1381
Price increase (Rp) *(base=2019)*		452	489	578	74	111	199	215	252	341
Percentage of price increase *(base=2019)*		43.52%	47.05%	55.57%	7.11%	10.64%	19.17%	20.72%	24.25%	32.77%

Table A5. Simulation of white cigarette prices under different tax pass-throughs

Per stick of cigarette	2019 tax level baseline	Tax over-shift			Tax under-shift			Tax full-shift		
		2020 tax level	30% tax increase	45% tax increase	2020 tax level	30% tax increase	45% tax increase	2020 tax level	30% tax increase	45% tax increase
Excise (Rp)	569	723	739	825	723	739	825	723	739	825
Percentage of excise increase *(base=2019)*		27.15%	30.00%	45.00%	27.15%	30.00%	45.00%	27.15%	30.00%	45.00%
Cigarette tax (Rp) *(10% of excise)*	57	72	74	82	72	74	82	72	74	82
VAT (Rp) *(9.1% of HJE)*	97	154	156	166	117	119	129	120	122	131
NOT price (Rp) *(Price - excise – tax - VAT)*	348	747	747	747	378	378	378	405	405	405
Cigarette price (Rp)	1,071	1,697	1,716	1,820	1291	1310	1414	1321	1341	1444
Price increase (Rp) *(base=2019)*		626	646	749	220	240	343	251	270	374
Percentage of price increase *(base=2019)*		58.47%	60.30%	69.94%	20.56%	22.39%	32.03%	23.42%	25.24%	34.89%

Appendix 5.1 The impact of cigarette taxes assuming tax over-shift

Table A6. Cigarette price, tax, demand, and government revenue (tax over-shift)

Tax over-shift	Clove cigarettes				White cigarettes			
	2019 tax level (baseline)	2020 tax level	30% tax increase	45% tax increase	2019 tax level (baseline)	2020 tax level	30% tax increase	45% tax increase
Cigarette price								
Price per stick (Rp)	1,040	1,492	1,529	1,618	1,071	1,697	1,716	1,820
% price increase from 2019		*43.52%*	*47.05%*	*55.57%*		*58.47%*	*60.30%*	*69.94%*
Cigarette tax								
Excise per stick (Rp)	488	604	635	708	569	723	739	825
% excise increase from 2019		*23.78%*	*30.00%*	*45.00%*		*27.15%*	*30.00%*	*45.00%*
Subnational tax per stick (Rp)	49	60	63	71	57	72	74	82
Value added tax per stick (Rp)	95	136	139	147	97	154	156	166
Cigarette demand								
Change in cigarette demand (billion sticks)		-101.44	-111.06	-131.78		-4.20	-4.40	-5.14
Change in cigarette demand (% of sticks)		-34.86%	-38.16%	-45.29%		-29.99%	-31.44%	-36.71%
Change in cigarette demand (Rp billion)		-19,702.42	-27,443.53	-45,023.73		1,639.89	1,483.45	1,133.51
Cigarette sales after tax (billion sticks)		189.56	179.94	159.22		9.80	9.60	8.86
Additional tax revenue								
Revenue from excise (Rp billion)		-27,517.05	-27,867.67	-29,362.99		-874.61	-866.08	-655.01
Revenue from sub national tax (Rp billion)		-2,751.71	-2,786.77	-2,936.30		-87.46	-86.61	-65.50
Revenue from value added tax (Rp billion)		-1,792.92	-2,497.36	-4,097.16		149.23	134.99	103.15
Total additional tax revenue (Rp billion)		-32,061.68	-33,151.80	-36,396.45		-812.84	-817.70	-617.36

Table A7. Results of simulations A and B (tax over-shift)

		2020 tax level	30% tax increase	45% tax increase
Output (Rp trillion)	Simulation A	-41.81	-60.09	-101.59
	Simulation B	42.81	61.53	104.04
Income (Rp trillion)	Simulation A	-7.15	-10.27	-17.37
	Simulation B	6.77	9.73	16.45
Employment (thousands of jobs)	Simulation A	-162.33	-233.31	-394.45
	Simulation B	193.01	277.40	468.99

Table A8. Results of simulations C, D, and E (tax over-shift)

		2020 tax level	30% tax increase	45% tax increase
Output (Rp trillion)	Simulation C1	-106.61	-110.19	-120.13
	Simulation C2	-101.69	-105.21	-114.93
	Simulation D1	-89.51	-92.88	-102.05
	Simulation D2	-89.70	-93.08	-102.25
	Simulation E1	-91.03	-94.43	-103.66
	Simulation E2	-92.17	-95.58	-104.87
Income (Rp trillion)	Simulation C1	-28.54	-29.50	-32.18
	Simulation C2	-26.01	-26.95	-29.51
	Simulation D1	-17.80	-18.63	-20.83
	Simulation D2	-18.17	-19.01	-21.23
	Simulation E1	-18.54	-19.38	-21.61
	Simulation E2	-18.52	-19.37	-21.60
Employment (thousands of jobs)	Simulation C1	-540.15	-558.17	-608.24
	Simulation C2	-518.43	-536.19	-585.29
	Simulation D1	-417.55	-434.09	-478.62
	Simulation D2	-446.05	-462.93	-508.75
	Simulation E1	-439.65	-456.46	-501.99
	Simulation E2	-446.33	-463.22	-509.05

Table A9. Net effect (tax over-shift)

		2020 tax level	30% tax increase	45% tax increase
Output (Rp trillion)	Net effect: Simulation A+B+C1	-105.61	-108.75	-117.69
	Net effect: Simulation A+B+C2	-100.68	-103.77	-112.49
	Net effect: Simulation A+B+D1	-88.50	-91.44	-99.61
	Net effect: Simulation A+B+D2	-88.69	-91.63	-99.81
	Net effect: Simulation A+B+E1	-90.03	-92.98	-101.22
	Net effect: Simulation A+B+E2	-91.17	-94.14	-102.42
Income (Rp trillion)	Net effect: Simulation A+B+C1	-28.91	-30.05	-33.10
	Net effect: Simulation A+B+C2	-26.39	-27.49	-30.43
	Net effect: Simulation A+B+D1	-18.17	-19.18	-21.75
	Net effect: Simulation A+B+D2	-18.55	-19.56	-22.15
	Net effect: Simulation A+B+E1	-18.92	-19.93	-22.53
	Net effect: Simulation A+B+E2	-18.90	-19.91	-22.52
Employment (thousands of jobs)	Net effect: Simulation A+B+C1	-509.47	-514.08	-533.71
	Net effect: Simulation A+B+C2	-487.76	-492.10	-510.75
	Net effect: Simulation A+B+D1	-386.87	-390.00	-404.08
	Net effect: Simulation A+B+D2	-415.37	-418.84	-434.21
	Net effect: Simulation A+B+E1	-408.98	-412.37	-427.45
	Net effect: Simulation A+B+E2	-415.65	-419.13	-434.51

Appendix 5.2 The impact of cigarette taxes assuming tax under-shift

Table A10. Cigarette price, tax, demand, and government revenue (tax under-shift)

Tax under-shift	Kretek cigarettes				White cigarettes			
	2019 tax level (baseline)	2020 tax level	30% tax increase	45% tax increase	2019 tax level (baseline)	2020 tax level	30% tax increase	45% tax increase
Cigarette price								
Price per stick (Rp)	1,040	1,114	1,150	1,239	1,071	1,291	1,310	1,414
% price increase from 2019		*7.11%*	*10.64%*	*19.17%*		*20.56%*	*22.39%*	*32.03%*
Cigarette tax								
Excise per stick (Rp)	488	604	635	708	569	723	739	825
% excise increase from 2019		*23.78%*	*30.00%*	*45.00%*		*27.15%*	*30.00%*	*45.00%*
Sub national tax per stick (Rp)	49	60	63	71	57	72	74	82
Value added tax per stick (Rp)	95	101	105	113	97	117	119	129
Cigarette demand								
Change in cigarette demand (billion sticks)		-11.36	-20.98	-41.71		-1.21	-1.41	-2.15
Change in cigarette demand (% of sticks)		-3.90%	-7.21%	-14.33%		-8.61%	-10.06%	-15.33%
Change in cigarette demand (Rp billion)		8,862.70	8,070.27	6,319.95		1,524.46	1,509.06	1,767.31
Cigarette sales after tax (billion sticks)		279.64	270.02	249.29		9.80	9.60	8.86
Additional tax revenue								
Revenue from excise (Rp billion)		26,926.95	29,310.32	34,412.47		1,290.13	1,347.10	1,813.55
Revenue from sub national tax (Rp billion)		2,692.70	2,931.03	3,441.25		129.01	134.71	181.35
Revenue from value added tax (Rp billion)		806.51	734.39	575.12		138.73	137.32	160.83
Total additional tax revenue (Rp billion)		30,426.15	32,975.75	38,428.83		1,557.87	1,619.14	2,155.73

Table A11. Results of simulations A and B (tax under-shift)

		2020 tax level	30% tax increase	45% tax increase
Output (Rp trillion)	Simulation A	24.04	22.17	18.72
	Simulation B	-24.62	-22.71	-19.17
Income (Rp trillion)	Simulation A	4.11	3.79	3.20
	Simulation B	-3.89	-3.59	-3.03
Employment (thousands of jobs)	Simulation A	93.35	86.09	72.68
	Simulation B	-110.99	-102.36	-86.42

Table A12. Results of simulations C, D, and E (tax under-shift)

		2020 tax level	30% tax increase	45% tax increase
Output (Rp trillion)	Simulation C1	103.69	112.15	131.56
	Simulation C2	98.80	106.84	125.28
	Simulation D1	86.70	93.68	109.74
	Simulation D2	86.88	93.89	109.98
	Simulation E1	88.21	95.33	111.68
	Simulation E2	89.35	96.56	113.14
Income (Rp trillion)	Simulation C1	27.75	30.01	35.19
	Simulation C2	25.23	27.28	31.97
	Simulation D1	17.07	18.41	21.49
	Simulation D2	17.45	18.82	21.97
	Simulation E1	17.81	19.21	22.44
	Simulation E2	17.80	19.20	22.42
Employment (thousands of jobs)	Simulation C1	525.49	568.38	666.78
	Simulation C2	503.91	544.93	639.07
	Simulation D1	403.64	435.99	510.34
	Simulation D2	431.97	466.77	546.71
	Simulation E1	425.61	459.86	538.55
	Simulation E2	432.25	467.07	547.07

Table A13. Net effect (tax under-shift)

		2020 tax level	30% tax increase	45% tax increase
Output (Rp trillion)	Net effect: Simulation A+B+C1	103.12	111.62	131.11
	Net effect: Simulation A+B+C2	98.23	106.30	124.83
	Net effect: Simulation A+B+D1	86.12	93.15	109.29
	Net effect: Simulation A+B+D2	86.31	93.36	109.53
	Net effect: Simulation A+B+E1	87.63	94.80	111.23
	Net effect: Simulation A+B+E2	88.77	96.03	112.69
Income (Rp trillion)	Net effect: Simulation A+B+C1	27.96	30.21	35.36
	Net effect: Simulation A+B+C2	25.45	27.48	32.14
	Net effect: Simulation A+B+D1	17.29	18.61	21.66
	Net effect: Simulation A+B+D2	17.66	19.02	22.14
	Net effect: Simulation A+B+E1	18.03	19.41	22.61
	Net effect: Simulation A+B+E2	18.01	19.40	22.59
Employment (thousands of jobs)	Net effect: Simulation A+B+C1	507.85	552.11	653.04
	Net effect: Simulation A+B+C2	486.27	528.67	625.34
	Net effect: Simulation A+B+D1	386.00	419.73	496.61
	Net effect: Simulation A+B+D2	414.33	450.50	532.97
	Net effect: Simulation A+B+E1	407.97	443.59	524.81
	Net effect: Simulation A+B+E2	414.61	450.80	533.33

Appendix 5.3 The impact of cigarette taxes assuming full tax pass-through

Table A14. Cigarette price, tax, demand, and government revenue (full tax pass-through)

Full tax pass-through	Clove cigarettes				White cigarettes			
	2019 tax level (baseline)	2020 tax level	30% tax increase	45% tax increase	2019 tax level (baseline)	2020 tax level	30% tax increase	45% tax increase
Cigarette price								
Price per stick (Rp)	1,040	1,255	1,292	1,381	1,071	1,321	1,341	1,444
% price increase from 2019		*20.72%*	*24.25%*	*32.77%*		*23.42%*	*25.24%*	*34.89%*
Cigarette tax								
Excise per stick (Rp)	488	604	635	708	569	723	739	825
% excise increase from 2019		*23.78%*	*30.00%*	*45.00%*		*27.15%*	*30.00%*	*45.00%*
Sub national tax per stick (Rp)	49	60	63	71	57	72	74	82
Value added tax per stick (Rp)	95	114	118	126	97	120	122	131
Cigarette demand								
Change in cigarette demand (billion sticks)		-50.39	-60.01	-80.73		-1.79	-1.99	-2.73
Change in cigarette demand (% of sticks)		-17.32%	-20.62%	-27.74%		-12.79%	-14.24%	-19.50%
Change in cigarette demand (Rp billion)		-561.70	-4,148.08	-12,289.93		1,144.35	1,111.29	1,286.67
Cigarette sales after tax (billion sticks)		240.61	230.99	210.27		12.21	12.01	11.27
Tax revenue								
Revenue from excise (Rp billion)		3,338.36	4,537.20	6,780.91		867.68	915.20	1,331.81
Revenue from sub national tax (Rp billion)		333.84	453.72	678.09		86.77	91.52	133.18
Revenue from value added tax (Rp billion)		-51.11	-377.48	-1,118.38		104.14	101.13	117.09
Total tax revenue (Rp billion)		3,621.09	4,613.44	6,340.61		1,058.58	1,107.85	1,582.07

Table A15. Results of simulations A and B (full tax pass-through)

		2020 tax level	30% tax increase	45% tax increase
Output (Rp trillion)	Simulation A	1.35	-7.03	-25.47
	Simulation B	-1.38	7.20	26.08
Income (Rp trillion)	Simulation A	0.23	-1.20	-4.35
	Simulation B	-0.22	1.14	4.12
Employment (thousands of jobs)	Simulation A	5.24	-27.29	-98.89
	Simulation B	-6.23	32.45	117.58

Table A16. Results of simulations C, D, and E (full tax pass-through)

		2020 tax level	30% tax increase	45% tax increase
Output (Rp trillion)	Simulation C1	15.17	18.53	25.63
	Simulation C2	14.44	17.58	24.22
	Simulation D1	12.63	15.24	20.74
	Simulation D2	12.66	15.28	20.80
	Simulation E1	12.86	15.54	21.18
	Simulation E2	13.03	15.76	21.50
Income (Rp trillion)	Simulation C1	4.06	4.95	6.84
	Simulation C2	3.68	4.47	6.12
	Simulation D1	2.47	2.89	3.77
	Simulation D2	2.52	2.96	3.88
	Simulation E1	2.58	3.03	3.98
	Simulation E2	2.57	3.03	3.98
Employment (thousands of jobs)	Simulation C1	76.88	93.98	130.12
	Simulation C2	73.67	89.81	123.91
	Simulation D1	58.72	70.44	95.09
	Simulation D2	62.94	75.91	103.23
	Simulation E1	61.99	74.68	101.40
	Simulation E2	62.98	75.96	103.31

Table A17. Net effect (full tax pass-through)

		2020 tax level	30% tax increase	45% tax increase
Output (Rp trillion)	Net effect: Simulation A+B+C1	15.14	18.70	26.24
	Net effect: Simulation A+B+C2	14.41	17.75	24.84
	Net effect: Simulation A+B+D1	12.60	15.41	21.36
	Net effect: Simulation A+B+D2	12.63	15.45	21.41
	Net effect: Simulation A+B+E1	12.83	15.71	21.79
	Net effect: Simulation A+B+E2	13.00	15.93	22.12
Income (Rp trillion)	Net effect: Simulation A+B+C1	4.07	4.89	6.61
	Net effect: Simulation A+B+C2	3.70	4.40	5.89
	Net effect: Simulation A+B+D1	2.48	2.83	3.54
	Net effect: Simulation A+B+D2	2.53	2.90	3.65
	Net effect: Simulation A+B+E1	2.59	2.97	3.75
	Net effect: Simulation A+B+E2	2.59	2.97	3.75
Employment (thousands of jobs)	Net effect: Simulation A+B+C1	75.89	99.14	148.81
	Net effect: Simulation A+B+C2	72.68	94.97	142.60
	Net effect: Simulation A+B+D1	57.73	75.59	113.77
	Net effect: Simulation A+B+D2	61.95	81.07	121.92
	Net effect: Simulation A+B+E1	61.01	79.84	120.09
	Net effect: Simulation A+B+E2	61.99	81.12	122.00

CISDI
Jl. Probolinggo No. 40C RT.01/02, Kel. Gondangdia,
Kec. Menteng, Jakarta Pusat, DKI Jakarta 10350
Email secretariat@cisdi.org
Phone: (+62) 213917590
Fax: (+62) 213913471