

Policy brief

On the Taxation of Cigarettes and Heated Tobacco Products:

The Benefits of Following Current Law for Cigarettes and Law #466-IX for HTPs

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The team of authors consists of Estelle Dauchy¹ and Pavlo Iavorskyi². We would like to express our gratitude for an opportunity to contribute to development of economy of Ukraine and health of Ukrainians.

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List of Acronyms

BAT	British American Tobacco
EU	European Union
EUR	EURO
HTP	Heated Tobacco Products
HTU	Heated Tobacco Units
MRP	Maximum Retail Price
NPV	Net Present Value
PMI	Philip Morris International
SSSU	The State Statistics Service of Ukraine
UAH	Ukrainian Hryvnia
VAT	Value Added Tax

Summary

Increasing tobacco taxes substantially and repeatedly beyond inflation and economic growth is a proven effective mechanism to reduce tobacco use and related health costs. In addition, it can raise additional revenues for local and central government, which can be used health and social programs and can particularly raise the needed revenue during periods of slow growth, such as the economic downturn caused by the COVID 19 pandemic.

Cigarettes

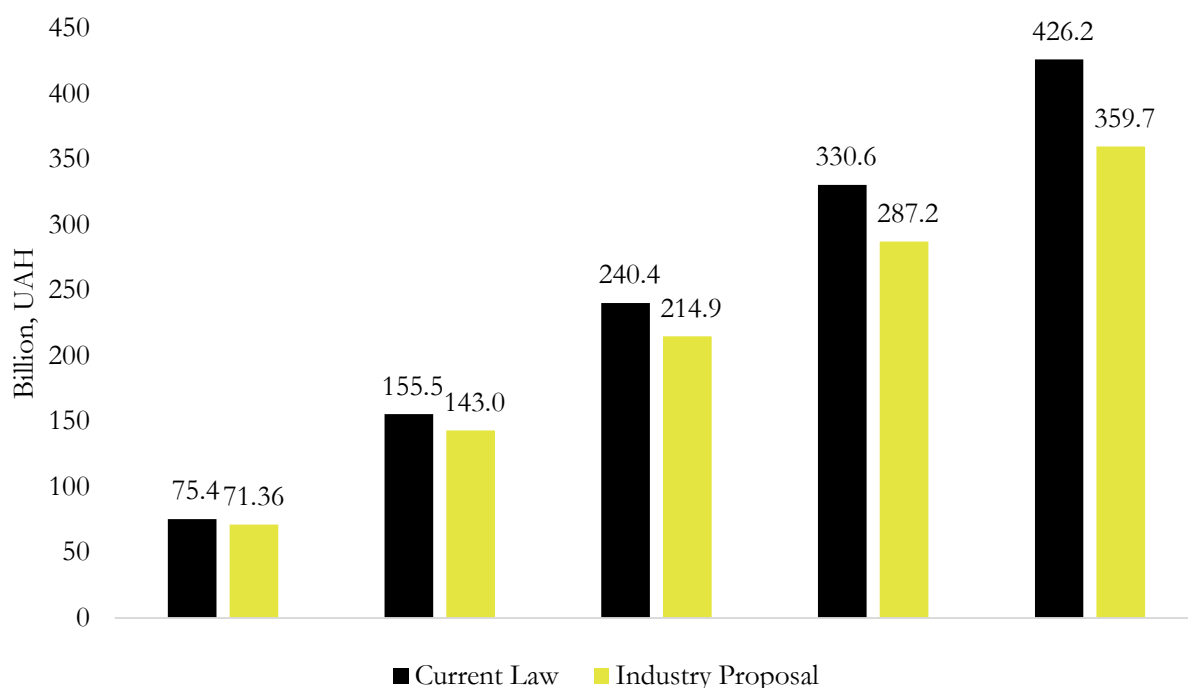
The “7-year plan”, approved by the Parliament of Ukraine and signed by former President Petro Poroshenko in Dec 2017 affected excise taxation by increasing the specific excise tax rate for cigarettes in 2018, followed by a gradual increase every year from 2019 to 2025. Current law’s tax schedule would increase the excise tax by 20% every year over the following 5 years, from Jan 1 2021 to Jan 1, 2025. As of Jan 1, 2020, cigarettes (with or without filter) are subject to a mixed excise tax system including a specific excise of UAH 907.2 per 1000 sticks and an ad-valorem tax of 12% of the retail price. The minimum total excise is UAH 1213.61 per 1000 sticks. By 2025, the specific excise would be UAH 2257.4 per 1000 sticks. The minimum total excise that year would be UAH 3,019.85 per 1000 pieces (about € 93.2).

The tobacco industry has proposed a different tax increase schedule that would automatically cancel current law’s schedule. Instead of an annual increase of 20% over the next 5 years (2021-2025), the schedule would increase the specific excise by 10% annually, over 10 years from 2021 to 2030. By 2025, the specific excise would be UAH 1,461.05 per 1000 sticks (about € 45) according to the tobacco industry research.

Under the current tax system, the net present value (NPV) of total cigarettes tax revenue (VAT, state excise tax, local retail tax) over the next five years (2021-25) would be UAH 66.5 billion larger than that of the industry’s alternative proposal. We estimate the discounted amount of tax revenue accumulated over the next 5 years as UAH 426 billion under the current tax system (including UAH 319 of state excise tax revenue), but only UAH 360 billion under the industry’s schedule for the same period (including UAH 265 of state excise tax revenue).

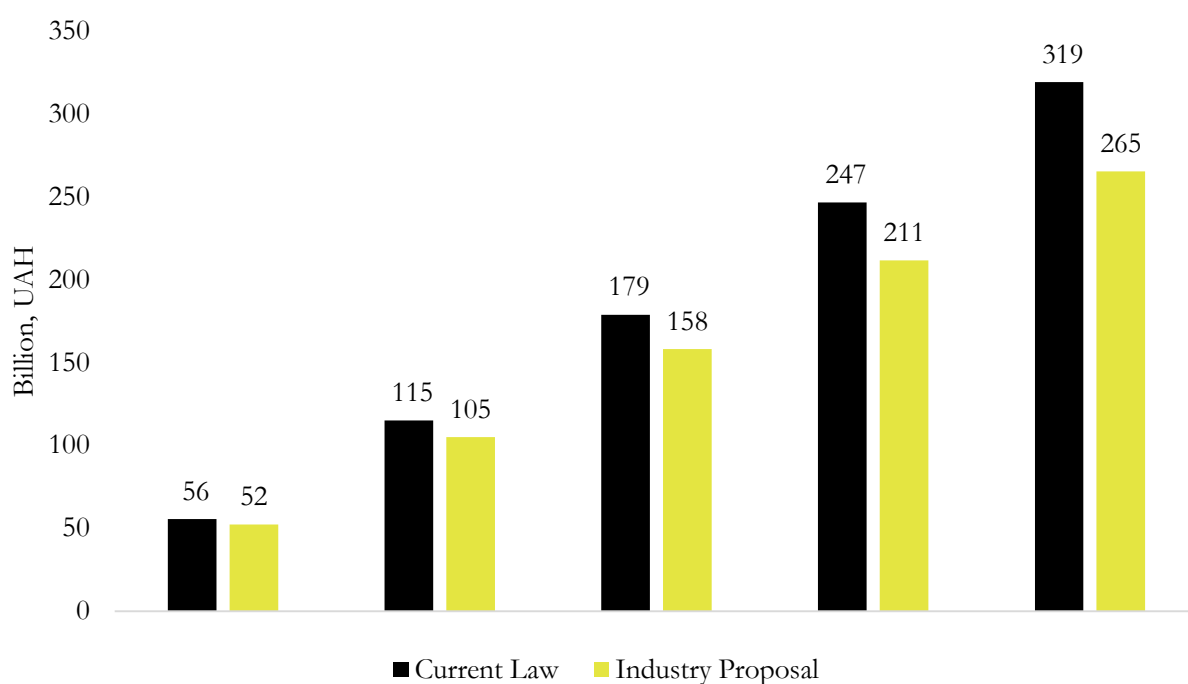
Over the next 5 years, current law would reduce cigarette consumption (including illicit trade) by an average of 5.6% annually from about 45.3 billion sticks in 2020 to almost 34 billion sticks by 2025, and increase total tobacco tax revenue by about 12.5 percent annually to UAH 128 billion in 2025. The industry’s proposal would reduce consumption by only 3% annually on average to 39 billion sticks by 2025, and increase tax revenue by only about 6.4% annually to UAH 97 billion in 2025.

Accumulated discounted total cigarette tax revenue flows under current law and industry's proposal, 2021-2025



Source: Authors' calculations. Total tax revenue includes tobacco excise tax revenue (national and local) and VAT revenue.

Accumulated discounted cigarette excise tax revenue flows under current law and industry's proposal, 2021-2025

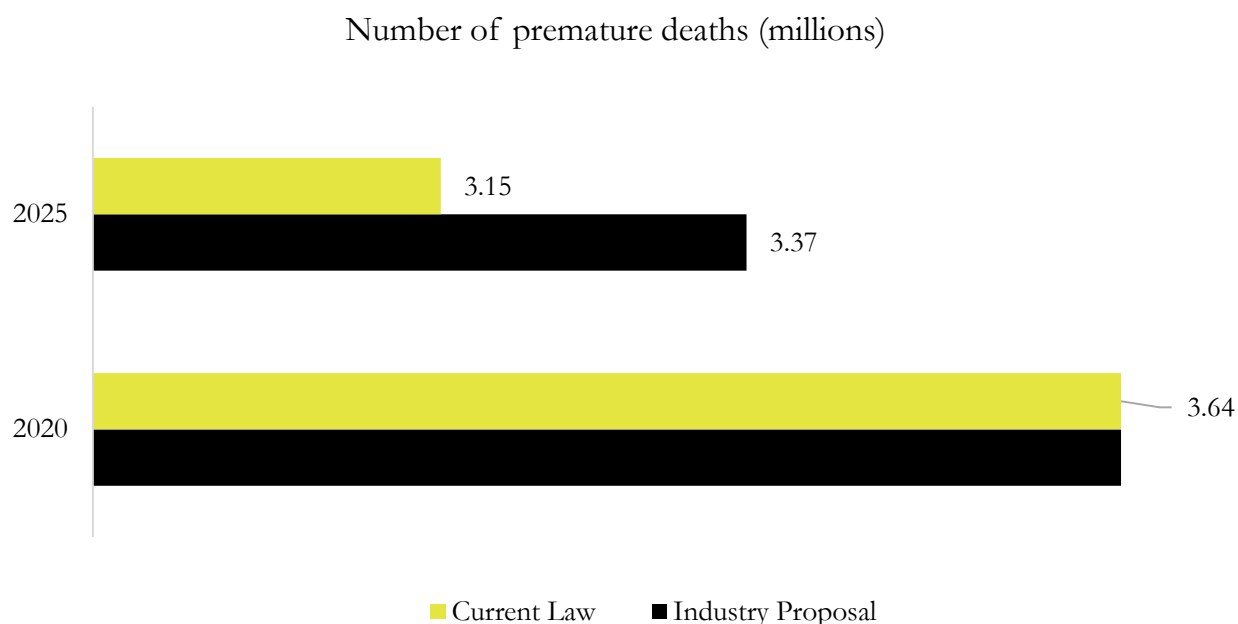


Source: Authors' calculations.

Because it would reduce cigarette use and related deaths more significantly over the next 5 years, current law would improve public health much more than the industry's proposal. Our model predicts that current law would reduce the prevalence of adult smoking from 17.4% or 6.1 million of Ukrainians adults (estimated) in 2020 to 14.7% or 5.2 million of Ukrainians adults in 2025, while with the industry's schedule at least 15.9% or 5.6 million of adults would still be smoking that year.

Following current law within the next 5 years (2021-2025) would prevent 488 thousand lives from deaths directly due to smoking over smokers' lifetimes, almost twice as many lives saved under the industry's schedule, which would save only 269 thousand by 2025.

Number of lifetime premature deaths due to cigarette smoking under current law and industry's proposal, 2020 and 2025.



Source: Authors' calculations.

Heated Tobacco Products (HTP)

Until 2020, the heated tobacco units, or sticks (e.g., PMI's HEET sticks, BAT's Neosticks), used with heated tobacco products' devices (e.g., PMI's IQOS, BAT's i-Glo) have been taxed, by default, under the category "Tobacco and tobacco substitutes". HTP devices are not subject to excise tax. Since Jan 1, 2020, this tax rate was UAH 1,139.76 (€ 39) per 1 kg or UAH 347.63 per 1000 HTP sticks. On May 21, 2020, President Volodymyr Zelenskyi signed Bill #1210, "On Amending the Tax Code of Ukraine on Improving Tax Administration, Eliminating Technical and Logical

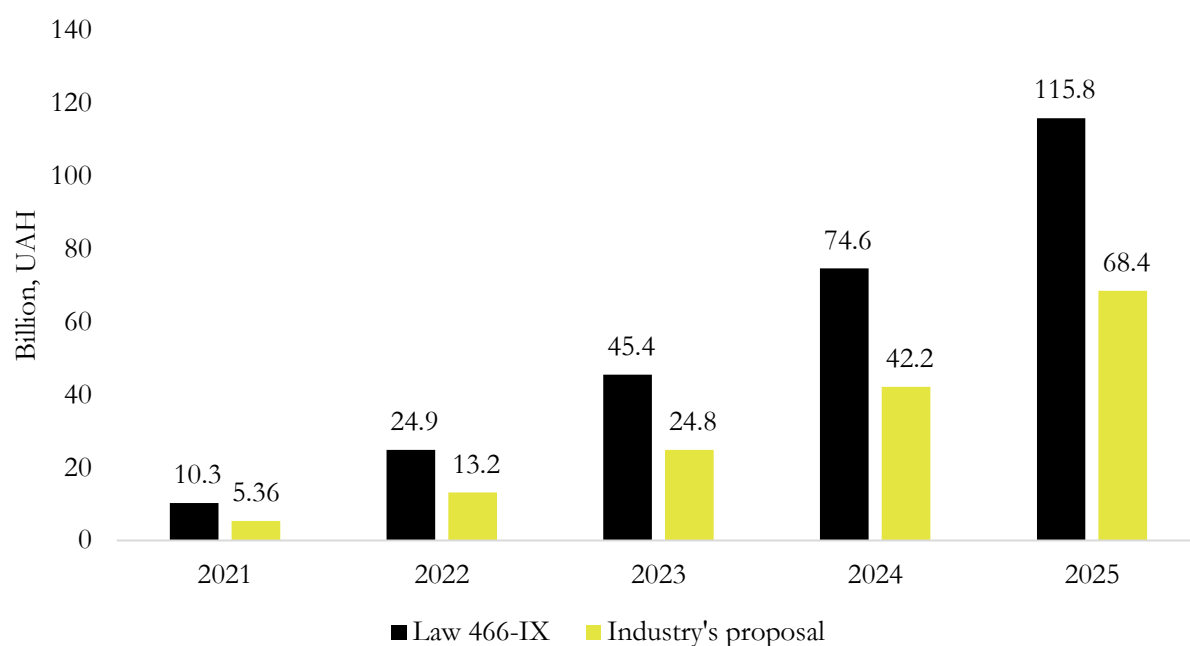
Inconsistencies in 'Tax Law,' which became Law 466-IX. The law imposed a pure specific excise tax on heated tobacco, starting from 1st January 2021 with a rate of UAH 1,456.33 per 1,000 pieces, equivalent to that of cigarettes. The rate will keep increasing every year after that, in line with the tax rate on cigarettes, to reach a total excise of UAH 3,019.85 per 1,000 pieces by 2025.

The tobacco industry has proposed a different tax increase schedule for new tobacco products that would automatically annul the provision for heated tobacco products under Law 466-IX. First, instead of introducing a specific excise for heated tobacco based on the number of sticks, the tobacco industry's proposal is to continue treating heated tobacco sticks the same way as "other smoking products", that is based on weight. Second it would increase the tax by 35% annually. This would mean that by 2025, and using the fact that a stick of heated tobacco weighs about 0.305 grams, the tax on heated tobacco would be equivalent to only UAH 1,558.77 per 1000 sticks, almost half the tax under Law 466-IX.

Under the current tax system, the NPV of total tax revenue from HTUs (VAT, state excise tax, local retail tax) over the next five years (2021-25) would be UAH 47.4 billion larger than the industry's proposal. We estimate the discounted amount of tax revenue accumulated over the next 5 years as UAH 115.8 billion under the current tax system (including UAH 83 billion of state excise tax revenue), but only UAH 68.4 billion under the industry's schedule for the same period (including UAH 38.8 billion of state excise tax revenue).

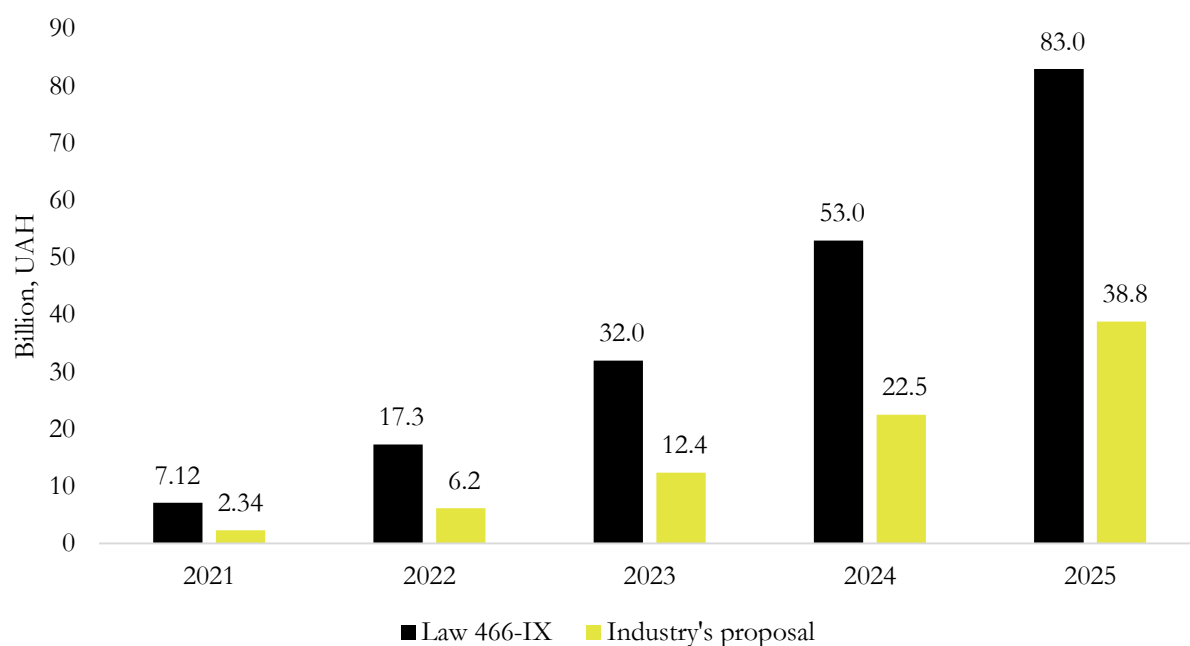
It is important to note that the market for HTP is in a natural growing phase, as users are becoming more exposed to it due to growing manufacturing and sales promotions from the tobacco companies that sell them. As of 2019, only 3.3 billion HTUs were legally sold in Ukraine, representing only 7% of the size of the legal cigarette market (45 million cigarette sticks sold in 2019). This amount was 4.4 times as large as the amount imported in 2017 (about 0.75 million sticks of heated tobacco). We estimate the total consumption of HTUs including illicit sales of HTUs to be 3.5 billion sticks in the base year. Our model accounts for the natural growth of HTP sales due to market forces and in spite of tax and price increases. Over the next 5 years, current law would reduce the natural growth rate of HTP consumption by a larger amount than that of the industry proposal,

Accumulated discounted total HTU tax revenue flows under current law (Law 466-IX) and industry's proposal, 2021-2025



Source: Authors' calculations. Total tax revenue include tobacco excise tax revenue (national and local) and VAT revenue.

Accumulated discounted HTU excise tax revenue flows under current law (Law 466-IX) and industry's proposal, 2021-2025



Source: Authors' calculations

Background

Cigarettes

The taxation of cigarettes in Ukraine under current law is guided by the “7-year plan”, first approved by the Parliament of Ukraine and signed by the former President Petro Poroshenko on Dec 2017. This plan modified several aspects of the Tax Code of Ukraine³. It particularly affected excise taxation by increasing the specific excise tax rate for cigarettes in 2018, followed by a gradual increase every year from 2019 to 2025 (Table 1). For the first year 2018, the specific excise increased by 30%, for the second year 2019 the specific excise occurred in two increments: one of 20% effective Jan 1, 2019 and another of 9% effective July 1, 2019. The excise tax increased by 20% on Jan 1, 2020.⁴ The schedule under current law would increase the excise tax by 20% every year over the following 5 years, from Jan 1 2021 to Jan 1, 2025. As of Jan 1, 2020, cigarettes (with or without filter) were subject to a mixed excise tax system including a specific excise of UAH 907.2 per 1000 sticks and an ad-valorem tax of 12% of the retail price. The minimum total excise is UAH 1213.61 per 1000 sticks. By 2025, the specific excise would be UAH 2257.4 per 1000 sticks. The minimum total excise that year would be UAH 3,019.85 per 1000 pieces (about € 93.2⁵).

The tobacco industry has proposed a different tax increase schedule that would automatically cancel current law’s tax schedule. Instead of an annual increase of 20% over the next 5 years, the schedule would increase the specific excise by 10% annually, over 10 years from 2021 to 2030. By 2025, the specific excise would be UAH 1,461.05 per 1000 sticks (about € 45)⁶.

In addition, Ukraine signed in March 2014 an Association Agreement⁷ to follow the European Commission’s Directive on the structure and rates of excise duty applied to manufactured tobacco (Directive 2011/64/EU)⁸, which requires Members States to levy a minimum rate of excise duties on cigarettes that must consist of a mixed system including an ad-valorem and a specific excise. Under the Directive, the overall excise duty must be at least € 90 per 1000 sticks, and represent at least 60% of the weighted average retail selling prices (Art. 10(2)). As explained in this policy note, current law’s tax schedule would permit to reach that target by 2025 (the overall excise would be about € 93 per

³ The Parliament of Ukraine, “On amendments to the Tax Code of Ukraine and some legislative acts of Ukraine to ensure the balance of budget revenues in 2018” (Law #2245-VIII). <https://zakon.rada.gov.ua/laws/show/2245-19#n2>

⁴ The Parliament of Ukraine, “On Amendments to the Tax Code of Ukraine to Improve Tax Administration, Eliminate Technical and Logical Inconsistencies in Tax Legislation” (Law #466-IX). <https://zakon.rada.gov.ua/laws/show/466-20/print>

⁵ National Bank of Ukraine, as of August, 2020, EURO/UAH exchange rate is UAH 32.4 per 1 EURO.

⁶ The University of the State Fiscal Service of Ukraine, May 2020, “Tax regulation of the tobacco market in terms of its transformation” <http://ndi-fp.nusta.edu.ua/newsView/345/>

⁷ Official Journal of European Union, https://trade.ec.europa.eu/doclib/docs/2016/november/tradoc_155103.pdf

⁸ European Commission, https://ec.europa.eu/taxation_customs/business/excise-duties-alcohol-tobacco-energy/excise-duties-tobacco_en

1000 sticks, at current exchange rates). By contrast, the industry's proposed schedule from the industry would reach half of the excise target by 2025 (only € 60 per 1000 sticks, and still only € 97 by 2030, assuming current exchange rate).⁹

Table 1. Cigarettes Tobacco Excise Rates: Current Law's Schedule and Industry Proposed Schedule.

Tobacco excise	Unit	Jan-Jun 2019	Jul-Dec 2019	2020	2021	2022	2023	2024	2025
Current law's schedule									
<i>Specific excise</i>									
Tobacco refuse	UAH per 1 kilo	871	950	1,140	1,368	1,641	1,970	2,363	2,836
Cigars, cheroots and cigarillos	UAH per 1 kilo	871	950	1,140	1,368	1,641	1,970	2,363	2,836
Cigarettes (with or without filter)	UAH per 1000 sticks	694	756	907	1,089	1,306	1,568	1,881	2,257
Homogenized or reconstituted tobacco; tobacco extracts and essences	UAH per 1 kilo	871	950	1,140	1,368	1,641	1,970	2,363	2,836
<i>Ad valorem excise</i>									
Cigarettes (with or without filter)	%	12	12	12	12	12	12	12	12
<i>Min excise</i>									
Cigarettes (with or without filter)	UAH per 1000 sticks	928	1,011	1,214	1,456	1,748	2,097	2,517	3,020
Industry's proposed schedule									
<i>Min excise</i>									
Cigarettes (with or without filter)	UAH per 1000 sticks			1,214	1,335	1,468	1,615	1,777	1,955

Sources: Tax Code of Ukraine, Industry proposal.

Heated Tobacco Products (HTP)

Until 2020, the heated tobacco units or HTUs (e.g., PMI's HEET sticks, BAT's Neosticks), used with heated tobacco products' devices (e.g., PMI's IQOS, BAT's i-Glo), have been taxed, by default, under the category "Tobacco and tobacco substitutes". Since Jan 1, 2020, this tax rate was UAH 1,139.76 (€ 39) per 1 kg. Accounting for the fact that each heated tobacco stick contains about 0.305 grams of

⁹ It is worth noting that the European Commission is currently revising the Directive to include new products and revise the minimum excise duty. https://ec.europa.eu/health/tobacco/products/revision_en

tobacco mixture, the specific excise tax is effectively UAH 347.63 per 1000 HTUs, much smaller than the tax on cigarettes (Table 2).

On March 21, 2020, President Volodymyr Zelenskyi signed Bill #1210, “On Amending the Tax Code of Ukraine on Improving Tax Administration, Eliminating Technical and Logical Inconsistencies in Tax Law,” which became Law 466-IX¹⁰. The law amended the excise tax system for tobacco products to include new taxation categories for heated tobacco products (HTUs only) and electronic cigarettes. It seeks to impose a pure specific excise tax on heated tobacco, starting from 1st January 2021 with a rate of UAH 1,456.33 per 1,000 pieces, equivalent to that of cigarettes. The rate will keep increasing every year after that, in line with the tax rate on cigarettes, to reach a total excise of UAH 3,019.85 per 1,000 pieces by 2025.

The tobacco industry has proposed a different tax increase schedule for new tobacco products that would automatically annul the provision for heated tobacco products under Law 466-IX. First, instead of introducing a specific excise for heated tobacco based on the number of sticks, the tobacco industry’s plan is to continue treating heated tobacco in the same way as “other smoking products”, that is based on weight. Second, it would increase the tax over the next 5 years in the same way as the category “other tobacco products” by 35% annually. This would mean that by 2025, and using the fact that a stick of heated tobacco weighs about 0.305 grams, the tax on heated tobacco **would be equivalent to only UAH 1,558.77 per 1000 sticks, almost half the tax under Law 466-IX.**

It is worth noting that heated tobacco product devices are not subject to excise taxation under current law, only heated tobacco sticks are.

Table 2. HTU Excise Rate: Law 466-IX schedule and Industry's proposed schedule.

Schedule	Unit	2020	2021	2022	2023	2024	2025
Law 466-IX	UAH per 1000 pieces	1,214	1,456	1,748	2,097	2,517	3,020
Industry's proposed schedule	UAH per 1000 pieces (estimated)	348	469	634	855	1,155	1,559

Sources: Tax Code of Ukraine, Industry proposal.

¹⁰ Ibid. Note 2.

Assessment of Initiatives

This part describes the impacts of the current tax system for cigarettes and heated tobacco products on tax revenue and health outcomes, under two alternative initiatives. To evaluate the impacts of current law's schedule under the current tobacco tax law, we build a tax simulation model tailored to the situation of Ukraine, and further presented in the methodological appendix. We also use this model to estimate the impacts of the alternative tax schedule proposed by the tobacco industry for cigarettes and HTPs, and compare it to current law's schedule for cigarettes, and Law 466-IX for HTPs.

Cigarettes: Current Law's Schedule vs Industry-Proposed Schedule

As noted earlier, both current law's tax schedule and the industry's proposed plan offer a gradual increase of specific and minimum tobacco excises for cigarettes. However, they apply different time horizons and different schedules of tax increases to achieve specific targets of tax rates.

Current law's schedule gradually increases the specific excise tax rate for cigarettes every year from 2018 to 2025. For the first year 2018, the specific excise increased by 30%, for the second year 2019 the specific excise increase occurred in two increments: one of 20% effective Jan. 1, 2019 and another of 9% effective Jul. 1, 2019. The schedule increases the excise tax by 20% every year from Jan 1 2020 to Jan 1, 2025. The tobacco industry has proposed a different schedule, over 10 years from 2021 to 2030, that would automatically cancel the current plan and instead increase the specific excise by 10% annually.

Tax Revenue

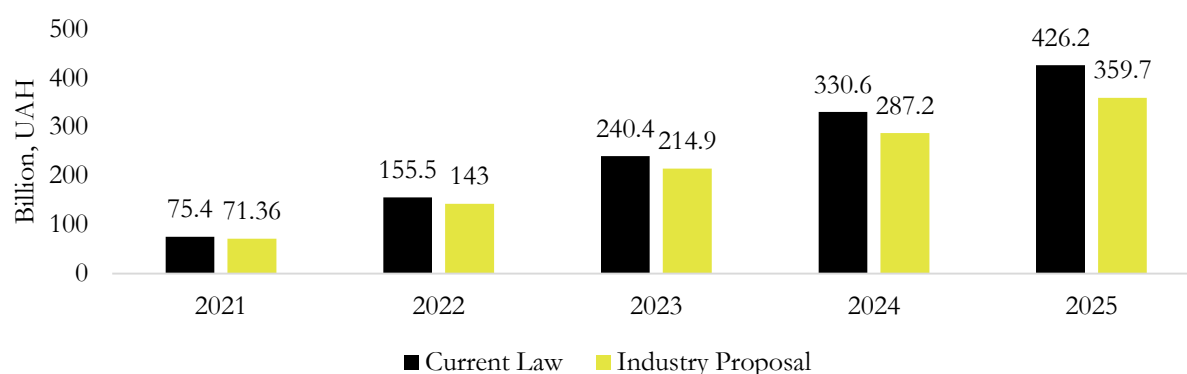
Under the current tax system, the net present value (NPV) of total cigarettes tax revenue over the next five years (2021-25) would be UAH 66.5 billion larger than that of the industry's proposal. Figure 1 shows total accumulated tax revenue from cigarettes (including state excise taxes, the value added tax (VAT) and the local retail excise tax) discounted at the risk-free rate of 6%¹¹. Figure 2 shows the distribution of total cigarette taxes across its three components. We estimate the discounted amount of tax revenue accumulated over the next 5 years as UAH 426 billion under the current tax system (including UAH 319 of excise revenue), but only UAH 360 billion under the

¹¹ Key policy rate from the National Bank of Ukraine, <https://bank.gov.ua/en/markets/interest-rates>

industry's proposed schedule for the same period (including UAH 265 of excise revenue).

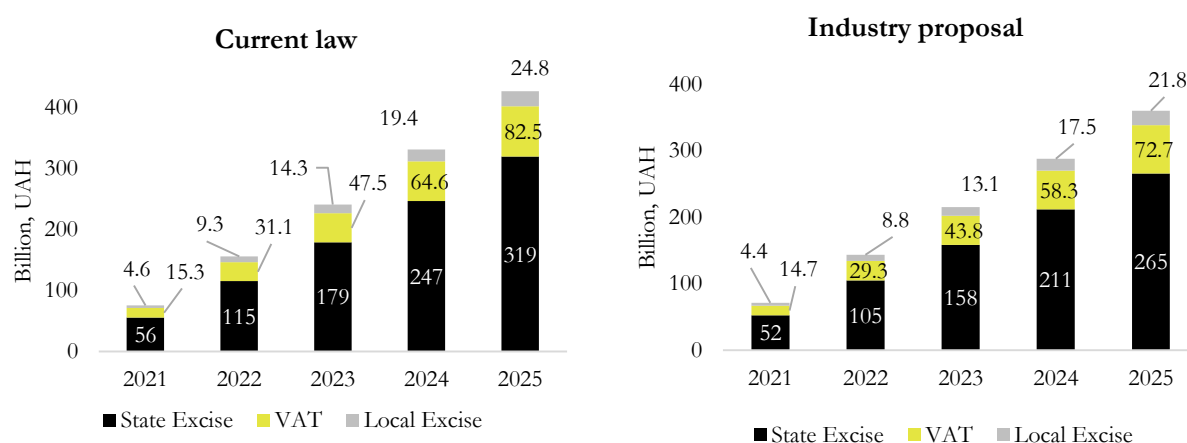
Figures 3 and 4 compare the dynamics of cigarettes consumption and tax revenue as the price of cigarettes increases under current tax law and under the industry's proposal. Over the next 5 years, current law would reduce cigarette consumption by an average of 5.6% annually from about 45.3 billion sticks in 2020 to more than 34 billion sticks by 2025, and increase total tobacco tax revenue by about 12.5 percent annually to UAH 128 in 2025 (Figure 3). The industry's proposal would reduce consumption by only 3% annually on average to 39 billion sticks by 2025, and increase tax revenue by only about 6.4% annually to UAH 97 billion in 2025 (Figure 4).

Figure 1. Accumulated discounted cigarette tax revenue flows under current law and industry's proposal , 2021-2025



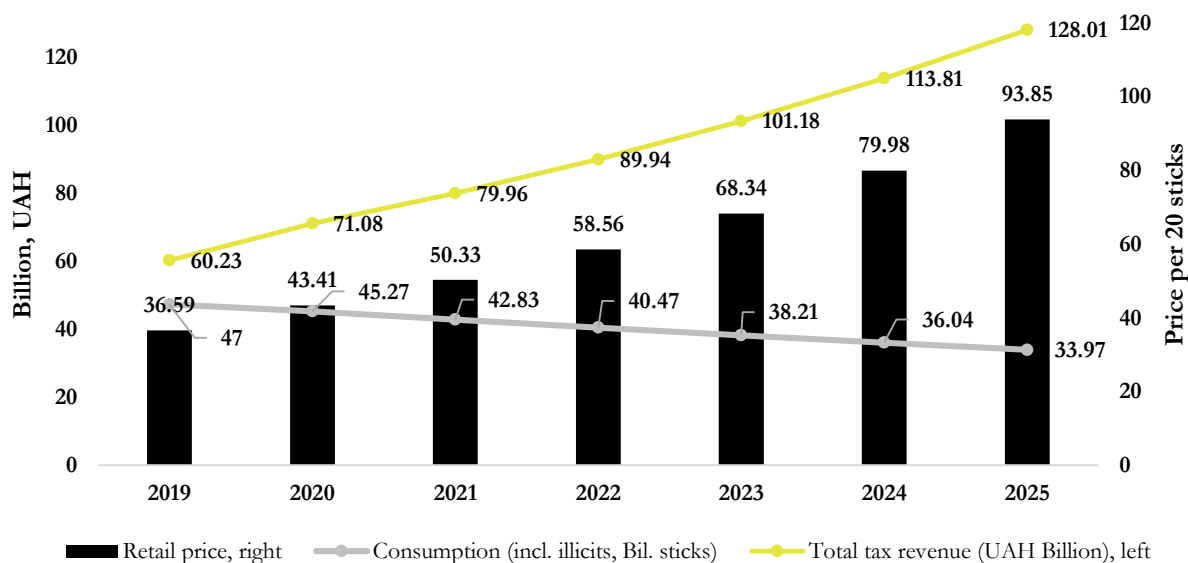
Source: Authors' calculations. Total tax revenue include the state specific excise, the VAT, and the local retail excise tax.

Figure 2. Distribution of accumulated discounted cigarette tax revenue flows across tax components under current law and industry's proposal, 2021-2025



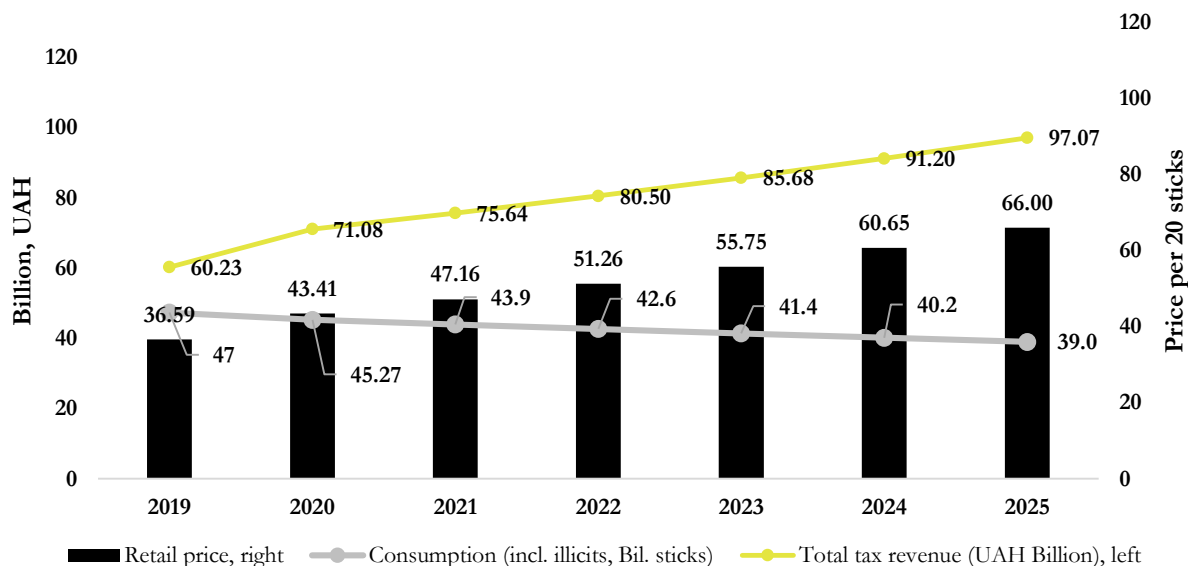
Source: Authors' calculations

Figure 3. Cigarette consumption, tax revenues and average price under current law.



Source: Authors' calculations

Figure 4. Споживання сигарет, податкові надходження та середня ціна відповідно до пропозиції тютюнової індустрії

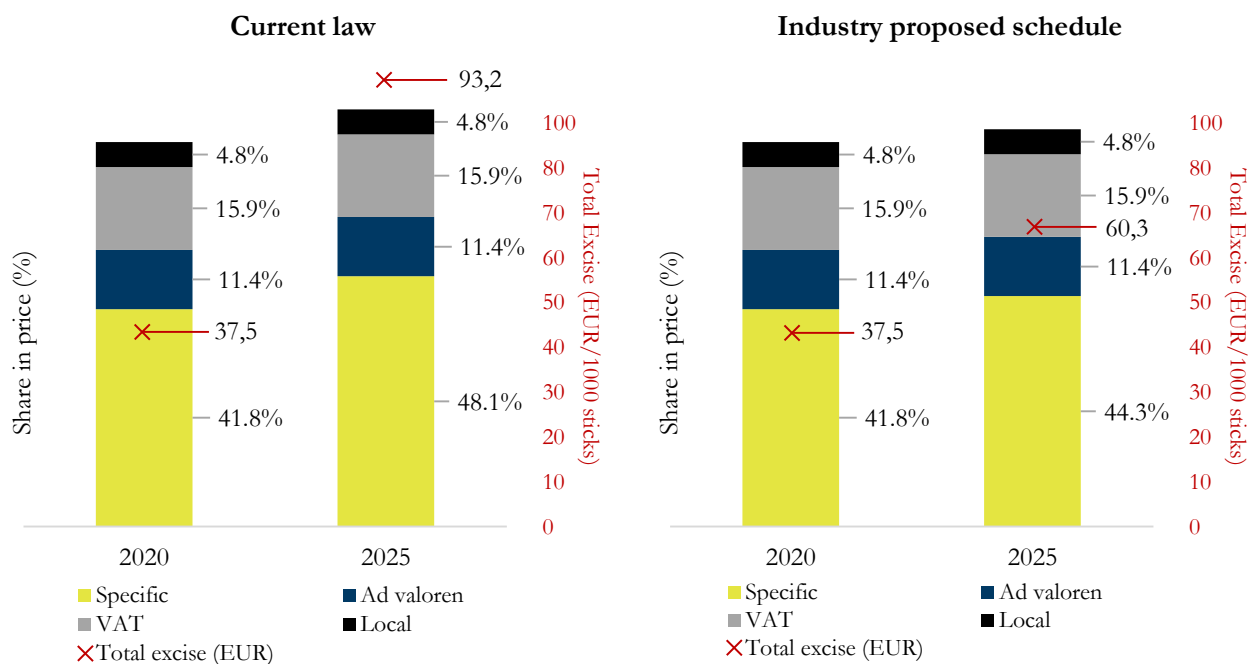


Source: Authors' calculations

Figure 5 shows the amount of excise tax (in Euros) on 1000 sticks of cigarettes in 2020 and 2025 under current law and under the industry's schedule, as well as the share of taxes in the average retail price of a pack of cigarettes (or tax burden). Today, the total excise is € 37.5 per 1000 sticks, much smaller than the € 90 required by the European

Commission's Directive on the structure and rates of excise duty applied to manufactured tobacco (Directive 2011/64/EU)¹². Also, the total excise represents about 56% of the average retail price of cigarettes, smaller than the minimum of 60% required by the Directive. However, under current law, total excise would reach € 93.2¹³ by 2025 (using current exchange rates), just above the € 90 target, and the total excise would represent 64.4% of the average retail price, higher than 60% target. By contrast, the industry's proposal would yield a total excise of only € 60.3 by 2025, 33% smaller than the EU target. Nevertheless, it is worth noting that exchange rate will likely be different by 2025, and that the EU Commission is currently revising the Directive, which means that even under the current law's schedule, the total excise on cigarettes might still not reach the € 90 target.¹⁴

Figure 10. Оподаткування сигарет (у євро) та частка податків у роздрібній ціні згідно з чинним законодавством та відповідно до пропозиції тютюнової індустрії, 2020-2025 рр.



Source: Authors' calculations

¹² Ibid. Note 5.

¹³ Ibid. Note 3.

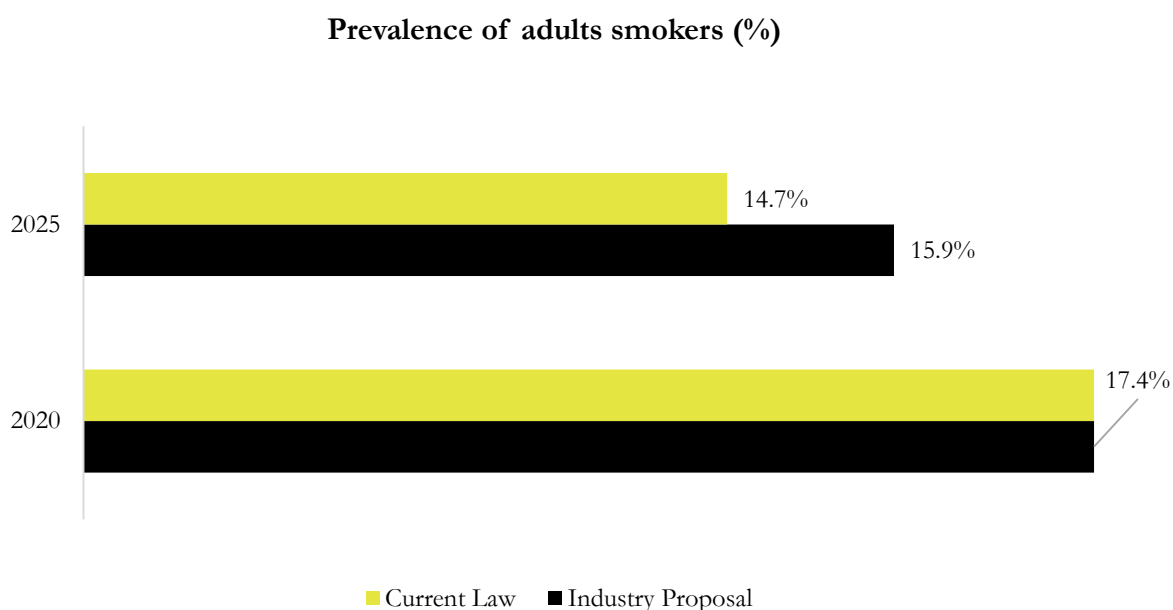
¹⁴ Ibid. Note 6.

Public Health

Because it would reduce cigarette use and related deaths more significantly over the next 5 years, current law's schedule would improve public health much more than the industry's proposal. Our model predicts that current law would reduce the prevalence of adult smoking from 17.4% or 6.1 million of Ukrainian adults in 2020 (estimated¹⁵) to 14.7% or 5.2 million of adults in 2025, while with the industry's schedule at least 15.9% or 5.6 million of adults would still be smoking that year (Figures 6 and 7).

Following current law within the next 5 years (2021-2025) would prevent premature deaths 488 thousand lives from deaths directly due to smoking over smokers' lifetimes, almost twice as many lives saved under the industry's schedule, which would save only 269 thousand by 2025 (Figure 8).

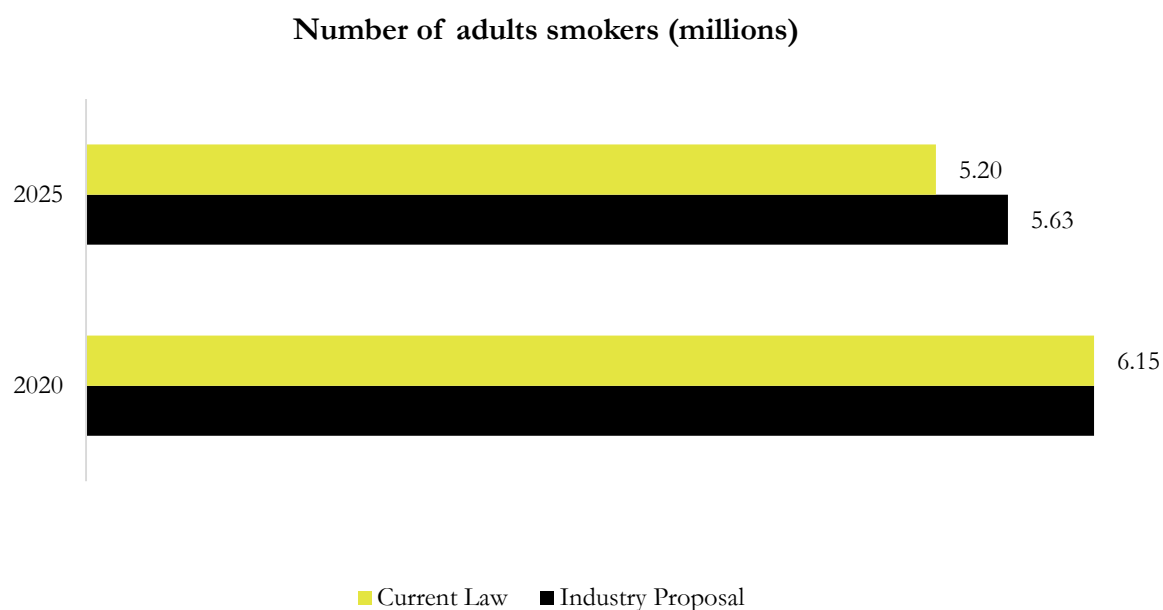
Figure 6. Prevalence of adult cigarette smoking under current law and industry's proposal, 2020 and 2025



Source: Authors' calculations

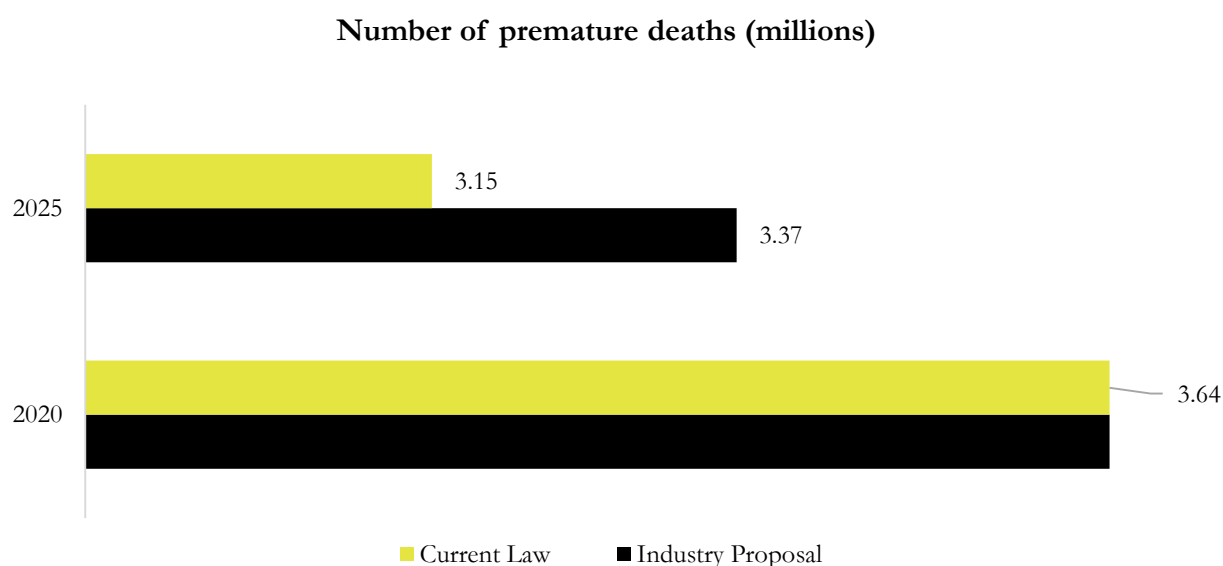
¹⁵ Details on Prevalence estimation are provided in Appendix B. Section B4.

Figure 7. Number of adult cigarette smokers under current law and industry's proposal, 2020 and 2025



Source: Authors' calculations

Figure 8. Number of lifetime premature deaths due to cigarette smoking under current law and industry's proposal, 2020 and 2025



Source: Authors' calculations

Heated Tobacco Products: Bill # 466-IX vs Industry-Proposed Schedule

Both current law's schedule and the industry's proposal offer a gradual increase of the specific tobacco excises for heated tobacco products. However, they significantly differ because while current law would start taxing heated tobacco products (heated cigarettes only) under the same tax base as that for cigarettes (number of sticks) and at the same overall excise tax rate as the rate on cigarettes, the industry proposal would keep classifying heated tobacco as "other tobacco products" for which the tax would be based on weight (kilograms). As a result, the effective tax rate on heated cigarettes would be at least twice as smaller as that on cigarettes.

As explained earlier, current law's schedule under Law 466-IX (enacted in May 2020)¹⁶ would start taxing heated cigarettes at the same rate as the minimum specific excise applied to cigarettes, starting from Jan 1, 2021, and the rate would be increase every year, in line with that of cigarettes (by 20% annually), and securing equivalency between the products over time. By contrast the industry's proposal would not change the tax base (weight of tobacco) and increase the tax rate annually by 30%. Heated tobacco devices are not subject to excise taxation under the current system, only heated tobacco is.

Tax Revenue and Consumption

Under the current tax system, the net present value (NPV) of total tax revenue from HTP sticks or heated tobacco units (HTUs) over the next five years (2021-25) would be UAH 47.4 billion larger than the industry's alternative proposal. Figures 9 shows total tax revenue from HTUs (including the specific excise, the VAT, and the local retail excise tax) discounted at the risk-free rate of 6%¹⁷. Figure 10 shows the distribution of HTP tax revenue across its three components. We estimate the discounted amount of tax revenue accumulated over the next 5 years as UAH 115.8 billion under the current tax system (including UAH 83 of excise revenue), but only UAH 68.4 billion under the industry's schedule for the same period (including UAH 38.8 of excise revenue).

Figures 11 and 12 compare the dynamics of heated tobacco consumption and tax revenue as the price of HTUs increases under the current tax law (Law 466-IX) and under the industry's proposal. It is important to note that the market for HTPs is in a natural growing phase, as users are becoming more exposed to it due to growing manufacturing and sales promotions from the tobacco companies that sell them. As of 2019, only 3.3 billion HTUs were legally sold in Ukraine¹⁸ (Figure 11), representing only 7% of the size of the legal

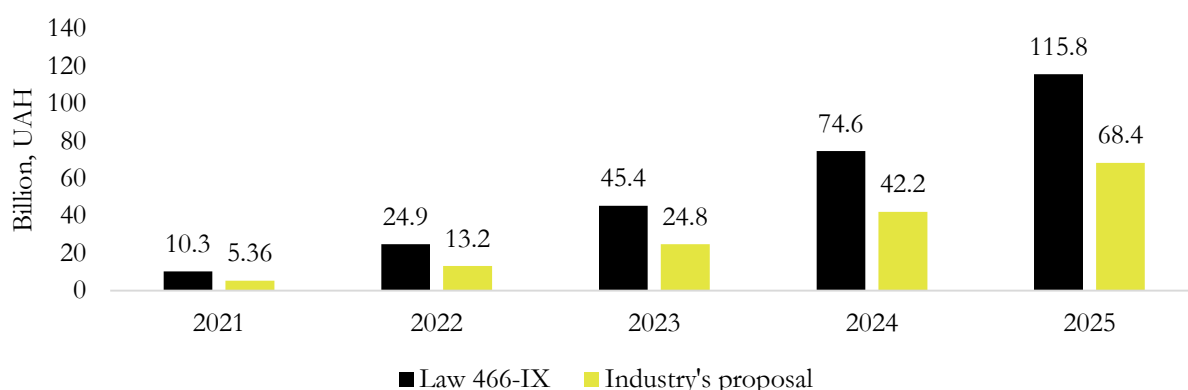
¹⁶ Ibid. Note 2.

¹⁷ Key policy rate from the National Bank of Ukraine, <https://bank.gov.ua/en/markets/interest-rates>

¹⁸ The State Tax Service of Ukraine indicates that the amounts of imports of heated tobacco was 997 tons. Using the fact that a stick of HEET (sold by PMI) weighs about 0.305 grams, this represents about 3.27 billion sticks.

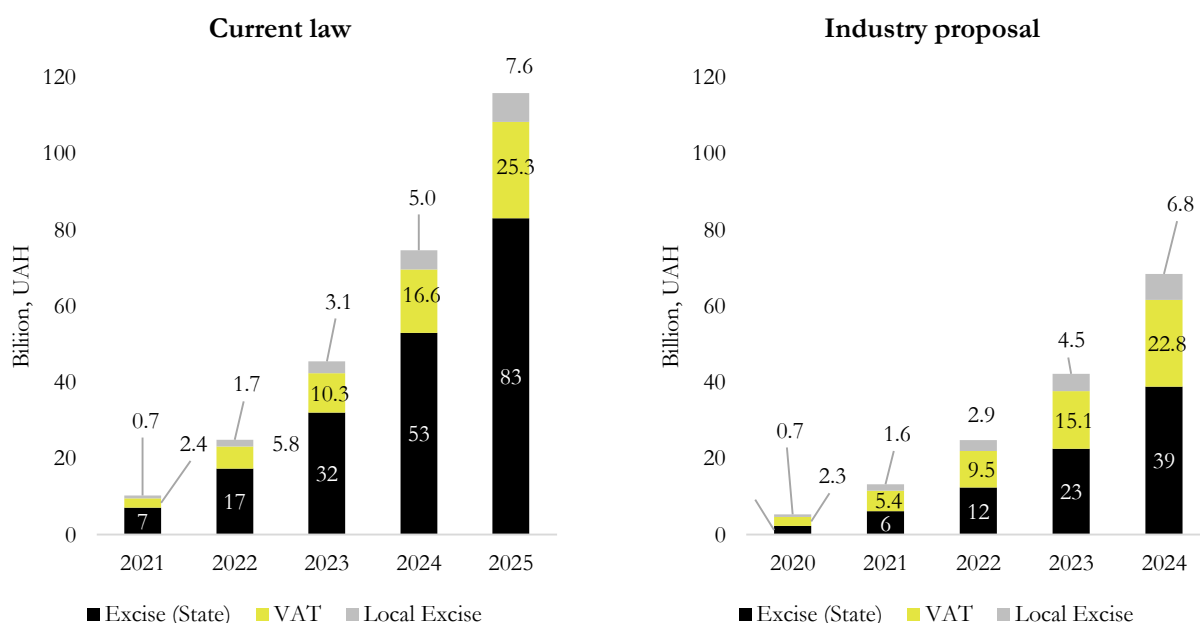
cigarette market (45 million cigarette sticks sold in 2019). This amount was 4.4 times as large as the amount imported in 2017 (about 0.75 million sticks of heated tobacco). Accounting for illicit trade of cigarettes, we evaluate the total market of HTU at 3.46 billion sticks in the base year. Our model accounts for the natural growth of HTUs sales due to market forces and in spite of tax and price increases (see Appendix C for more details on the natural growth rate of HTP products).

Figure 14. Накопичені дисконтовані загальні податкові надходження від ТВЕН при дії чинного законодавства (Закон № 466-IX) у порівнянні з пропозицією тютюнової промисловості, 2021-2025 рр.



Source: Authors' calculations. Total tax revenue include the state specific excise, the VAT, and the local retail excise tax.

Figure 10. Distribution of Accumulated discounted HTU tax revenue flows across tax components under current law (Law 466-IX) and industry's proposal, 2021-2025

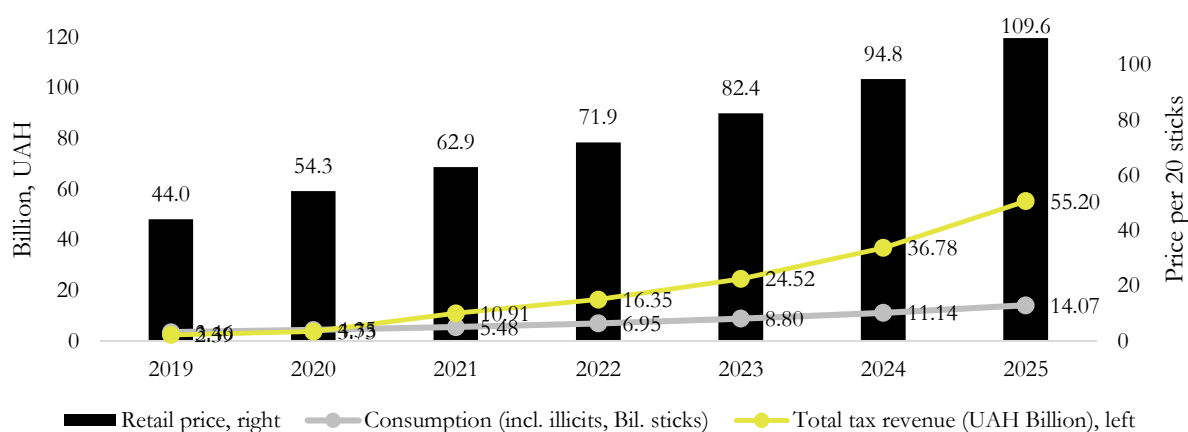


Source: Authors' calculations

In spite of this natural growth, over the next 5 years, **current law would strongly reduce the growth in HTU consumption, which would grow to 14 billion HTUs by 2025**, less than the HTP market growth that would result from the industry's proposal (15 billion sticks).

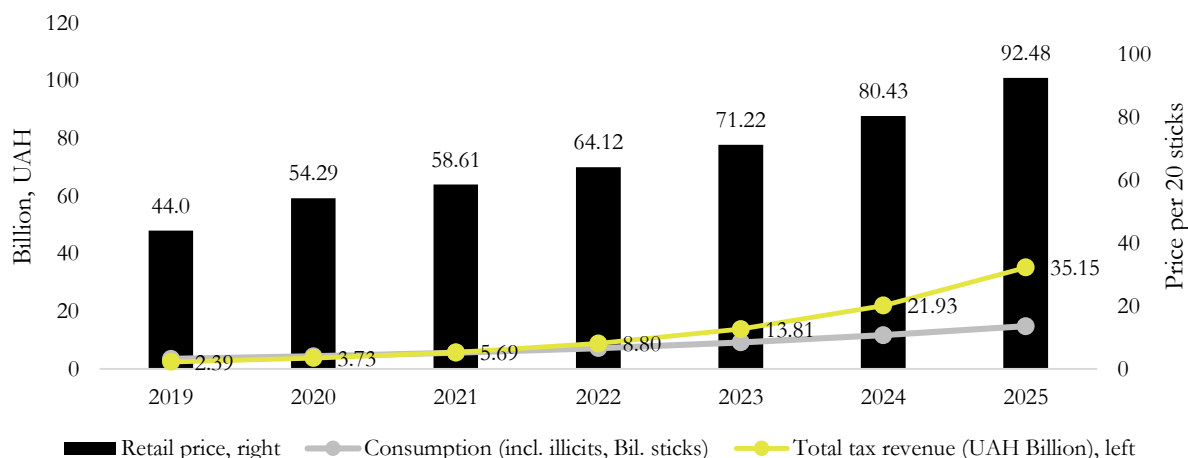
Also, **current law will almost triple total tax revenue from HTU taxation in the first year (a 196% increase in fiscal year 2021)**, and revenue will continue increase by an average of 50% annually after that. **The annual average growth of tax revenue over the next 5 years would be 78% (Figure 11)**. By contrast the industry's proposal would imply an annual increase in HTUs tax revenue by about 57% annually (Figure 12).

Figure 11. HTU consumption, tax revenues and average price under current law (Law 466-IX)



Source: Authors' calculations

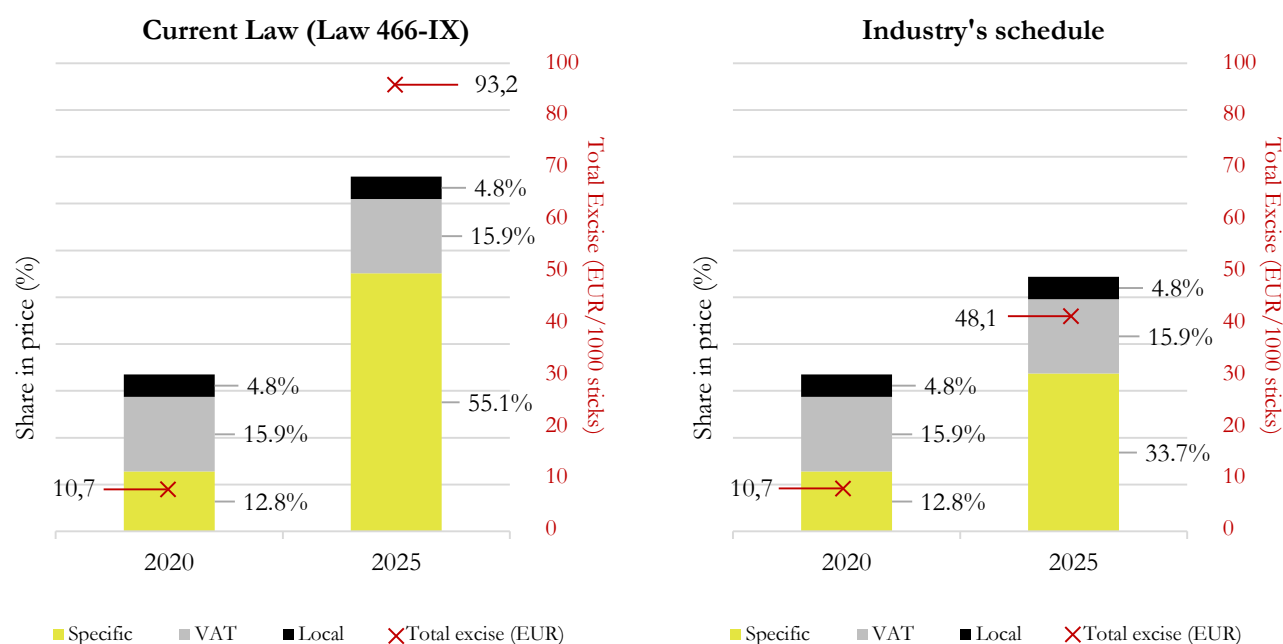
Figure 17. Споживання ТВЕН, податкові надходження та середня ціна відповідно до пропозиції тютюнової промисловості



Source: Authors' calculations

Figure 13 shows the amount of excise tax (in Euros) on 1000 HTUs or sticks 2020 and 2025 under current law (Law 466-IX) and under the industry schedule, as well as the share of taxes in the average retail price of a pack of cigarettes. Today, the excise on a pack of HTPs is € 10.7 per 1000 sticks, **3,5 times smaller than that on cigarettes** (UAH 37.5 per 1000 sticks as shown in Fig. 5). Also, the excise represents only 12.8% of the average retail price of HTU packs, much smaller than the excise tax burden on cigarettes. However, under Law 466-IX, the excise tax would be aligned to that of cigarettes starting Jan 1, 2021 and then grow at the same rate as that of cigarettes (20%), to reach € 93.3 by 2025, and the total excise would represent 55% of the average retail price. By contrast, the industry's proposal would yield a total excise of only € 48.1 by 2025, almost half of the excise on cigarettes packs.

Figure 13. HTU taxation (in EUR) and share of taxes in the retail price under current law (Law 466-IX), and industry's proposal, 2020 and 2025



Source: Authors' calculations

Appendices

Our model first simulates the impacts of tax reforms on prices of cigarettes and heated tobacco. It then simulates the impacts of price changes on consumption, prevalence, revenue and health outcomes, using a number of assumptions for the price elasticity of demand, the price elasticity of prevalence.

The baseline year is FY 2020, and is estimated for cigarettes prices using monthly data from 2019 on prices of cigarettes for different types of cigarettes (economy, mid-brands, and premium, with or without filter), and data on market shares for each cigarettes types. For the prices HTP sticks (HTUs), the FY 2020 baseline is estimated using quarterly data in 2019 on the price of Philip Morris International (PMI) HEET sticks for that year.

More details on the parameters and methodology of the model are presented below separately for cigarettes and HTUs.

Appendix A: Data Sources

- Prices and sales data are obtained from the monthly and annual reports of the National Statistic Service of Ukraine. <http://ukrstat.gov.ua/>
- Cigarette smoking prevalence is obtained from the Annual Household Survey Reports, the State Statistics Service of Ukraine (SSSU) available at http://ukrstat.gov.ua/druk/publicat/Arhiv_u/17/Arch_snsz_zb.htm
- HTP volumes data are obtained from various sources including the State Tax Service of Ukraine (import volumes) <https://center-life.org/informatsiyni-materialy/doslidzhennia/>; TobaccoIntelligenceUnit (<https://tobacointelligence.com/>); and Euromonitor International.
- Prices of HTPs are obtained from TobaccoIntelligenceUnit and PMI Investors' Reports.
- HTP prevalence is obtained from Euromonitor International and TobaccoIntelligenceUnit. <https://tobacointelligence.com/>
- Population is obtained from the State Statistics Service of Ukraine http://www.ukrstat.gov.ua/operativ/operativ2020/ds/kn/xls/kn0120_u.xls
- Discount rate: Key policy rate from the National Bank of Ukraine, <https://bank.gov.ua/en/markets/interest-rates>
- Exchange rate (UAH-EUR): Bloomberg, accessed August 20, 2020. <https://www.bloomberg.com/markets/currencies>

- Tax information on the Tax Code of Ukraine: The Parliament of Ukraine, <https://zakon.rada.gov.ua/laws>
- Tax information on the Industry 10-Year Schedule: The University of the State Fiscal Service of Ukraine, May 2020, "Tax regulation of the tobacco market in terms of its transformation" <http://ndi-fp.nusta.edu.ua/newsView/345/>
- Illicit cigarette sales is obtained from Kantar Illicit Trade Monitoring Report, Feb 2020 <https://tns-ua.com/news/monitoring-nelegalnoyi-torgivli-tyutyunovimi-virobami-v-ukrayini-2-hvilya-2020>
- *Growth of GDP per capita and inflation: [not included in this version of the model, for readability]*

Appendix B. Cigarettes: Methodology and Model Description.

B1. Impacts of Tax Changes on Prices of Cigarettes

Changes in final retail prices are measured as the ratio of current period final retail price to previous period final retail price (Equations 1).

$$\Delta Retail\ price_t = \frac{Retail\ price_{t-1}}{Retail\ price_t} - 1 \quad (\text{Equation 1})$$

The value of final retail price in the baseline year (FY2020) is the weighted average price of three type of cigarettes: basic/economy (domestic filter), medium (filter) and premium (filter, slim), using the market shares of each category of cigarettes as weights.

For 2020-2025, the final retail price is modelled as the sum of the producer/wholesaler price, the amount of total cigarette excise, a retail margin or mark-up, local retail excise tax, and the VAT (Equation 2) using the following assumptions and parameters:

$$Retail\ price_t = Producer\ price_t + Total\ cigarette\ excise_t + Wholesale/ \\ Retail\ margin_t + Local\ retail\ excise_t + VAT_t \quad (\text{Equation 2})$$

- The producer/wholesaler price in 2019 is calculated from subtracting actual weighted average prices of cigarettes its tax and mark-up components (Equation 3)

$$Producer\ price_{19} = Retail\ price_{19} - Total\ cigarette\ excise_{19} - \\ Wholesale/Retail\ margin_{19} - Local\ retail\ excise_{19} - VAT_{19} \quad (\text{Equation 3})$$

- The producer/wholesaler price is adjusted on inflation (5% inflation target of the NBU) over 2020-2025.
- The total cigarette excise is the sum of the specific and the ad-valorem cigarette excises but cannot be smaller than the minimum tobacco excise.
- The wholesale/retail margin is assumed constant at 5% of the sum of the producer price and the specific cigarette excise.
- The statutory tax rate of VAT rate is 20%, and its tax base is the maximum retail price (MRP), exclusive of VAT.

- The Maximum Retail Price (MRP) was introduced by the European Union as the base to calculate the ad-valorem tax. It is inclusive of all excises (specific and ad-valorem) and the VAT.

See how it works in the EU: https://ec.europa.eu/taxation_customs/business/excise-duties-alcohol-tobacco-energy/excise-duties-tobacco_en

- But then Ukraine introduced a unique "local ad-valorem tax". It was decided that the base for this tax will be the MRP.
- The MRP is computed as follows:
 - In 2019 (Base Year): the final retail price less the local excise tax.
 - In 2020 and after: the sum of the producer price, the wholesale/retail margin, the total cigarette excise inclusive of specific and ad-valorem.
- The local retail excise is 5% and its tax base is the MRP.
- The tax rate for the ad-valorem is 12% and its base is the MRP.

Table B1 compares the dynamics of the final retail prices of an average pack of cigarettes sold in Ukraine, estimated under “7 – year” and “10 – year” schedules, and the shares of taxes in the price.

Table B1. Structure of final retail prices of cigarettes, Current Law schedule and Industry’s proposed schedules, 2019-2025.

	2019	2020	2021	2022	2023	2024	2025
<i>Current Law</i>							
Final Retail Price (pack of 20 sticks)	36.6	43.4	50.3	58.6	68.3	80.0	93.9
Producer/wholesaler price	8.4	8.8	9.3	9.7	10.2	10.7	11.3
Wholesale / Retail Margin	1.2	1.3	1.6	1.8	2.1	2.4	2.8
Total tobacco excise	19.4	24.3	29.1	35.0	41.9	50.3	60.4
Specific	14.5	18.1	21.8	26.1	31.4	37.6	45.1
Ad Valorem	4.2	5.0	5.8	6.7	7.8	9.1	10.7
Minimum	19.4	24.3	29.1	35.0	41.9	50.3	60.4
VAT	5.8	6.9	8.0	9.3	10.8	12.7	14.9
MRP	34.9	41.3	47.9	55.8	65.1	76.2	89.4
Local Retail excise	1.7	2.1	2.4	2.8	3.3	3.8	4.5
<i>Industry proposed schedule (pack of 20 sticks)</i>							
Final Retail Price (pack of 20 sticks)	36.6	43.4	47.2	51.3	55.7	60.6	66.0
Producer/wholesaler price	8.4	8.8	9.3	9.7	10.2	10.7	11.3
Wholesale / Retail Margin	1.2	1.3	1.5	1.6	1.7	1.9	2.0
Total tobacco excise	19.4	24.3	26.7	29.4	32.3	35.5	39.1
Specific	14.5	18.1	20.0	22.0	24.1	26.6	29.2
Ad Valorem	4.2	5.0	5.4	5.9	6.4	6.9	7.5

	2019	2020	2021	2022	2023	2024	2025
Minimum	19.4	24.3	26.7	29.4	32.3	35.5	39.1
VAT	5.8	6.9	7.5	8.1	8.8	9.6	10.5
MRP	34.9	41.3	44.9	48.8	53.1	57.8	62.9
Local Retail excise	1.7	2.1	2.2	2.4	2.7	2.9	3.1

Source: Authors' calculations

B2. Impacts on Cigarette Consumption

Cigarette consumption is the sum of taxable sales (legal) and illegal sales. The share of illicit sales is obtained from Kantar Illicit Trade Monitoring Report and is assumed to be an average of 5.5%. To obtain cigarette consumption we start from total taxable sales (including domestic and imported sales of cigarettes), obtained for the base year from the National Statistic Service of Ukraine, as the sum of domestic sales and imports. Total consumption in the base year is computed as Equation 4

$$Consumption_{BY} = Taxable\ Sales_{BY} / (1 - share_illicit) \quad (\text{Equation 4})$$

Subsequent changes in consumption are estimated as a function of cigarettes price changes and the own-price elasticity of cigarette demand, denoted ϵ_{cig}^d . We further assume that the own-price elasticity of demand is convex, implying that it is not a constant over years. Instead it is an exponential function of the size of changes in prices in a given year compared to the baseline year (Equation 5).

$$Consumption_t = Consumption_{t-1} * (1 + \Delta P_t * \epsilon_{cig,t}^d) \quad (\text{Equation 5})$$

The own-price elasticity of demand in the baseline year, FY 2020, is -0.34 and estimated by authors. We use monthly data on sales (domestic and imports) by cigarettes price bands (economy, mid-price, premium), prices by cigarettes price bands, CPI index over the period covering Jan 2007 to Dec 2019. We transform sales volume and prices in log form, and estimate the linear relationship between sales and cigarettes prices (Equation 6). The regression model includes monthly (ϵ_m) and annual fixed effects (ϵ_y). The monthly data covers prices and sales of filter cigarettes from 2007 to April 2017.

$$Log\ Sales_{my} = \alpha + \beta\ Log\ Prices_{my} + \epsilon_m + \epsilon_t \quad (\text{Equation 6})$$

Subsequent changes in price elasticity are a quadratic function of the elasticity in the baseline year and the “elasticity change”, $f(\Delta P_t)$ which itself is a positive function of the size of price changes in a given year, that is its first derivative is strictly positive ($f' > 0$). In other words, the larger the price increase, the larger the reduction in the price elasticity of demand for cigarettes in a given year (Equation 7).

$$\varepsilon_{cig,t}^d = \varepsilon_{cig,FY20}^d * (1 - f(\Delta P_t))^t \quad (\text{Equation 7})$$

Table B2 presents the dynamics of the “elasticity change”, $f(\Delta P_t)$, and the own-price elasticity of demand for cigarettes used in the model to estimate the impacts of current Law’s schedule and industry’s proposed schedule. In most years, current Law’s schedule leads to 15-17% annual price increase, corresponding to own-price elasticity gradually decreasing to -0.323 in 2025. The industry’s schedule, however implies a price increase twice smaller in all years, implying a smaller decrease in the elasticity, to -0.336 by 2025.

Table B2. Model own price elasticities of demand for cigarettes

Price increase, %	up to 10%	11-15%	16-20%	21-30%	30-50%	50-75%	more than 75%
Elasticity change in % after a X % price increase	0.25%	0.50%	1.0%	1.25%	1.50%	1.75%	2%
Own-price elasticity							
2020	-0.340	-0.340	-0.340	-0.340	-0.340	-0.340	-0.340
2021	-0.339	-0.338	-0.337	-0.336	-0.335	-0.334	-0.333
2022	-0.338	-0.337	-0.333	-0.332	-0.330	-0.328	-0.327
2023	-0.337	-0.335	-0.330	-0.327	-0.325	-0.322	-0.320
2024	-0.337	-0.333	-0.327	-0.323	-0.320	-0.317	-0.314
2025	-0.336	-0.332	-0.323	-0.319	-0.315	-0.311	-0.307
2026	-0.335	-0.330	-0.320	-0.315	-0.311	-0.306	-0.301
2027	-0.334	-0.328	-0.317	-0.311	-0.306	-0.300	-0.295
2028	-0.333	-0.327	-0.314	-0.307	-0.301	-0.295	-0.289
2029	-0.332	-0.325	-0.311	-0.304	-0.297	-0.290	-0.283
2030	-0.332	-0.323	-0.307	-0.300	-0.292	-0.285	-0.278

Source: Authors’ calculations

B3. Impacts on Cigarettes Tax Revenue

The total tax revenue from cigarette taxation is computed from estimated cigarettes consumption and its associated three tax revenue flows: total cigarette excise tax, VAT, and local tobacco retail excise (Equations 8-11).

$$\text{Total cigarette tax revenue}_t = \text{Total cigarette excise revenue}_t + \text{VAT revenue}_t + \text{Local tobacco retail excise revenue}_t, \quad (\text{Equation 8})$$

where,

$$\text{Total cigarette excise revenue}_t = \text{Consumption}_t * \text{Total cigarette excise per stick}_t, \quad (\text{Equation 9})$$

$$\text{VAT revenue}_t = \text{Consumption}_t * \text{VAT revenue per stick}_t, \quad (\text{Equation 10})$$

$$\text{Local tobacco retail excise}_t = \text{Consumption}_t * \text{Local tobacco retail excise per stick}_t. \quad (\text{Equation 11})$$

B4. Impacts on Cigarette Smoking Prevalence and Deaths

To estimate the impacts of current Law's schedule and industry's proposed schedule on tobacco related deaths, we need to first estimate their impacts on adults current and future smoking prevalence. These values are estimated as functions of price changes, prevalence share elasticity¹⁹, own-price elasticity of demand and a youth elasticity factor²⁰ (Equations 12-13).

$$\Delta \text{Current adult prevalence}_t = \Delta \text{Price}_t * \text{Prevalence share elasticity} * \varepsilon_{cig,t}^d \quad (\text{Equation 12})$$

$$\Delta \text{Current future prevalence}_t = \Delta \text{Price}_t * \text{Prevalence share elasticity} * \varepsilon_{cig,t}^d * \text{Youth elasticity factor} \quad (\text{Equation 13})$$

Changes in the number of adult smokers future smokers are described in Equation 14

¹⁹ Prevalence share elasticity is assumed to be 0.59 (Nargis, Nigar et al. "The price sensitivity of cigarette consumption in Bangladesh: evidence from the International Tobacco Control (ITC) Bangladesh Wave 1 (2009) and Wave 2 (2010) Surveys." Tobacco control vol. 23 Suppl 1,0 1 (2014): i39-47. doi:10.1136/tobaccocontrol-2012-050835)

²⁰ Youth elasticity factor is assumed to be 2.

$$\Delta \text{Number of smokers}_t = \text{Number of smokers}_{t-1} * \Delta \text{Adult prevalence}_t$$

(Equation 14)

The 2019 adult smoking prevalence is based on data from SSSU and GATS 2017 (Equation 15).

$$\text{Adult prevalence}_{2019} = (\text{Total number of smokers}_{2019}^{SSSU} * \text{Share of current smokers}^{GATS} / \text{Share of daily smokers}^{GATS}) / \text{Adult population}_{2019}^{SSSU}$$

(Equation 15)

The number of lives saved, or reduction in the number of deaths due to smoking-diseases, is predicted as a function of the change in the number of smokers, the probability of surviving if quitting, and the probability of dying from tobacco related illnesses (Equation 16). The model assumes that the probability of surviving conditional on quitting smoking is smaller for current adult smokers than for future smokers (or currently young).

$$\text{Saved lives}_t = \Delta \text{Number of smokers}_t * \text{Prob}(\text{premature death if smoking}) * \text{Prob}(\text{surviving if quit smoking})$$

(Equation 16)

Appendix C. Heated Tobacco Products: Methodology and Model Description.

C1. Impacts of Tax Changes on Prices of HTP Sticks

Changes in final retail prices of HTP sticks (HTUs) are measured as the ratio of current period final retail price to previous period final retail price (Equations 17).

$$\Delta \text{Retail price}_t = \frac{\text{Retail price}_{t-1}}{\text{Retail price}_t} - 1 \quad (\text{Equation 17})$$

The value of final retail price in the baseline year (FY2020) is the average of quarterly prices of heated tobacco sticks sold (imported) by PMI in Ukraine, of IQOS' HEET sticks.

For 2020-2025, the final retail price is modelled as a sum of the producer/wholesaler price, a producer margin (or mark-up), the specific excise on heated tobacco, a retail margin (or mark-up), the local retail excise, and the VAT, using the following assumptions and parameters:

- The producer/wholesaler price in 2019 is calculated from the actual average prices of heated tobacco sticks its tax and mark-up components (Equation 18). The producer/wholesaler price is adjusted on inflation (5% inflation target of the NBU) over 2020-2025.

$$\begin{aligned} \text{Producer price}_{19} = & \text{Retail price}_{19} - \text{Producer margin}_{19} - \\ & \text{Specific excise}_{19} - \text{Retail margin}_{19} - \text{Local retail excise}_{19} - \text{VAT}_{19} \end{aligned} \quad (\text{Equation 18})$$

- The producer margin is based on the fact that the cost of producing a 20 sticks packs of HEETS is the same as that of producing a 20 sticks pack of Marlboro (as stated in PMI's annual reports). It also assumes no additional producer margin for Marlboro or other cigarettes on top of what is already included in the production cost. The producer margin is any remaining difference between the retail price of HEET sticks and Marlboro sticks, after subtracting from the retail prices: (i) all taxes (VAT, excise taxes), (ii) the retail margin, is assumed to be due to the preferential taxation of HTUs over HTPs, and captured by producers / suppliers. Given this, the model predicts the producer margin as positive in years when HTUs are subject to preferential taxation compared to cigarettes, but zero otherwise. It is:
 - Positive in up to 2020 under current law, but zero in 2021 and after (as current law would tax HTUs and cigarettes equivalently in 2021 and after).

- Positive every year under the industry's 10-year schedule (as this schedule would preserve preferential taxation for HTUs over cigarettes).
- The specific excise on heated tobacco is the tax on “other tobacco products” until 2020 (based on weight or kg), and as stated in Law 466-IX effective Jan 1, 2021.
- The retail margin is assumed constant at 5% of the sum of the producer/wholesaler price and the specific tobacco excise.
- The statutory tax rate of VAT rate is 20%, and its tax base is the maximum retail price (the sum of the producer/wholesaler price, the producer margin, the specific excise, and the retail margin).
- The local retail excise is 5% and its tax base is the same as that of the VAT.

$$\text{Retail price}_t = \text{Producer price}_t + \text{Producer margin} + \text{Specific excise}_t + \text{Retail margin}_t + \text{Local retail excise}_t + \text{VAT}_t \quad (\text{Equation 19})$$

Table C1 compares the dynamics of final retail prices of a pack of heat sticks under Law #466-IX and the industry's “10 – year” schedule, and the share of each tax in the price.

Table C1. Structure of Final Retail Price of a Pack of HTUs, Law #466-IX and Industry 10-year schedules, 2019-2025.

	2019	2020	2021	2022	2023	2024	2025
Law #466-IX							
Final Retail Price (pack of 20 sticks)	44.0	54.3	62.9	71.9	82.4	94.8	109.6
Producer/wholesaler price	16.7	17.6	18.4	19.4	20.3	21.4	22.4
Assumed Producer Margin	12.6	16.5					
Wholesale / Retail Margin	1.7	2.1	2.4	2.7	3.1	3.6	4.1
Total tobacco excise	5.6	7.0	29.1	35.0	41.9	50.3	60.4
Specific	5.6	7.0	29.1	35.0	41.9	50.3	60.4
VAT	7.0	8.6	10.0	11.4	13.1	15.1	17.4
Local Retail excise	2.1	2.6	3.0	3.4	3.9	4.5	5.2
Industry proposal							
Final Retail Price (pack of 20 sticks)	44.0	54.3	58.6	64.1	71.2	80.4	92.5
Producer/wholesaler Price	16.7	17.6	18.4	19.4	20.3	21.4	22.4
Assumed Producer Margin	12.6	16.5	16.5	16.4	16.4	16.3	16.3
Wholesale / Retail Margin	1.7	2.1	2.2	2.4	2.7	3.0	3.5
Total tobacco excise	5.6	7.0	9.4	12.7	17.1	23.1	31.2
Specific	5.6	7.0	9.4	12.7	17.1	23.1	31.2
VAT	7.0	8.6	9.3	10.2	11.3	12.8	14.7
Local Retail excise	2.1	2.6	2.8	3.1	3.4	3.8	4.4

Source: Authors' calculations

C2. Impacts on HTU Consumption

Heated tobacco units consumption is estimated as a function of price changes of a pack of HTUs, the natural growth of the HTP market, and the own-price elasticity of HTU demand, denoted $\varepsilon_{ht,t}^d$ (Equation 3).

Contrary to the market for cigarettes or other traditional tobacco products, HTP started to enter the Ukraine market in 2016, mostly as imports. Since then the market has experienced a rapid, exponential growth. Using data on the HTP market in Ukraine from 2016 to 2019 obtained from various sources (see Appendix A), we find that the prevalence of HTP use grew at a rate of 520% in 2017, 300% in 2018, and 185% in 2019. This contrast with an average decrease in cigarette prevalence of about 8% annually since 2010. Projections from Euromonitor International inform that the average annual growth rate of HTU prevalence might range between 25% and 45% annually from 2020 to 2025, compared to a continued projected decrease in cigarette prevalence between 5% and 10% annually. Based on these forecasts, in the model we assume a linear natural growth of the HTU market at 32%.

HTU taxable sales in the base year is obtained from official sources (see Appendix A). HTU consumption is the sum of taxable sales (legal) and illegal sales. The share of illicit sales is assumed the same as that for cigarettes, at an average of 5.5% in the base year. Total HTU consumption in the base year is computed as Equation 20

$$Consumption_{BY} = Taxable Sales_{BY} / (1 - share_illicit) \quad (\text{Equation 20})$$

We further assume that the own-price elasticity of demand is convex, implying that it is not a constant over years. Instead it is an exponential function of the size of changes in HTU prices in a given year compared to the baseline year (Equation 21).

$$Consumption_t = Consumption_{t-1} * (1 + HTU \text{ market growth}_t + \Delta P_t * \varepsilon_{htu,t}^d) \quad (\text{Equation 21})$$

The own-price elasticity of HTUs demand in the baseline year, FY 2020, is assumed the same as for cigarettes, at -0.45 (Fuchs and Meneses, 2017)²¹. Subsequent changes in price elasticity are a quadratic function of the elasticity in the baseline year and the “elasticity change”, $f(\Delta P_t)$ which itself is a positive function of the size of price changes in a given year, that is its first derivative is strictly positive ($f' > 0$). In other words, the larger the

²¹ Fuchs, Alan; Meneses, Francisco Jalles. 2017. Regressive or progressive? : the effect of tobacco taxes in Ukraine (English). Washington, D.C. : World Bank Group. <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/765671507036953947/regressive-or-progressive-the-effect-of-tobacco-taxes-in-ukraine>

price increase, the larger the reduction in the price elasticity of demand for HTUs in a given year (Equation 22).

$$\varepsilon_{htu,t}^d = \varepsilon_{htu,FY20}^d * (1 - f(\Delta P_t))^t \quad (\text{Equation 22})$$

Appendix Table A2 presents the dynamics of the “elasticity change”, $f(\Delta P_t)$, and the own-price elasticity of demand used for both cigarettes and HTUs used in the model to estimate the impacts of Law 466-IX and the industry’s schedule.

C3. Impacts on Heated Tobacco Units Tax Revenue

The total tax revenue from heated tobacco taxation is computed from estimated heated tobacco consumption and its associated three tax revenue flows: heated tobacco specific excise tax, VAT, and local tobacco retail excise (Equations 23-26).

$$\text{Total heated tobacco tax revenue}_t = \text{Specific excise revenue}_t + \text{VAT revenue}_t + \text{Local tobacco retail excise revenue}_t, \quad (\text{Equation 23})$$

where,

$$\text{Total heated tobacco excise revenue}_t = \text{Consumption}_t * \text{Specific excise per heated tobacco stick}_t, \quad (\text{Equation 24})$$

$$\text{VAT revenue}_t = \text{Consumption}_t * \text{VAT revenue per heated tobacco stick}_t, \quad (\text{Equation 25})$$

$$\text{Local tobacco retail excise}_t = \text{Consumption}_t * \text{Local tobacco retail excise per heated tobacco stick}_t \quad (\text{Equation 26})$$