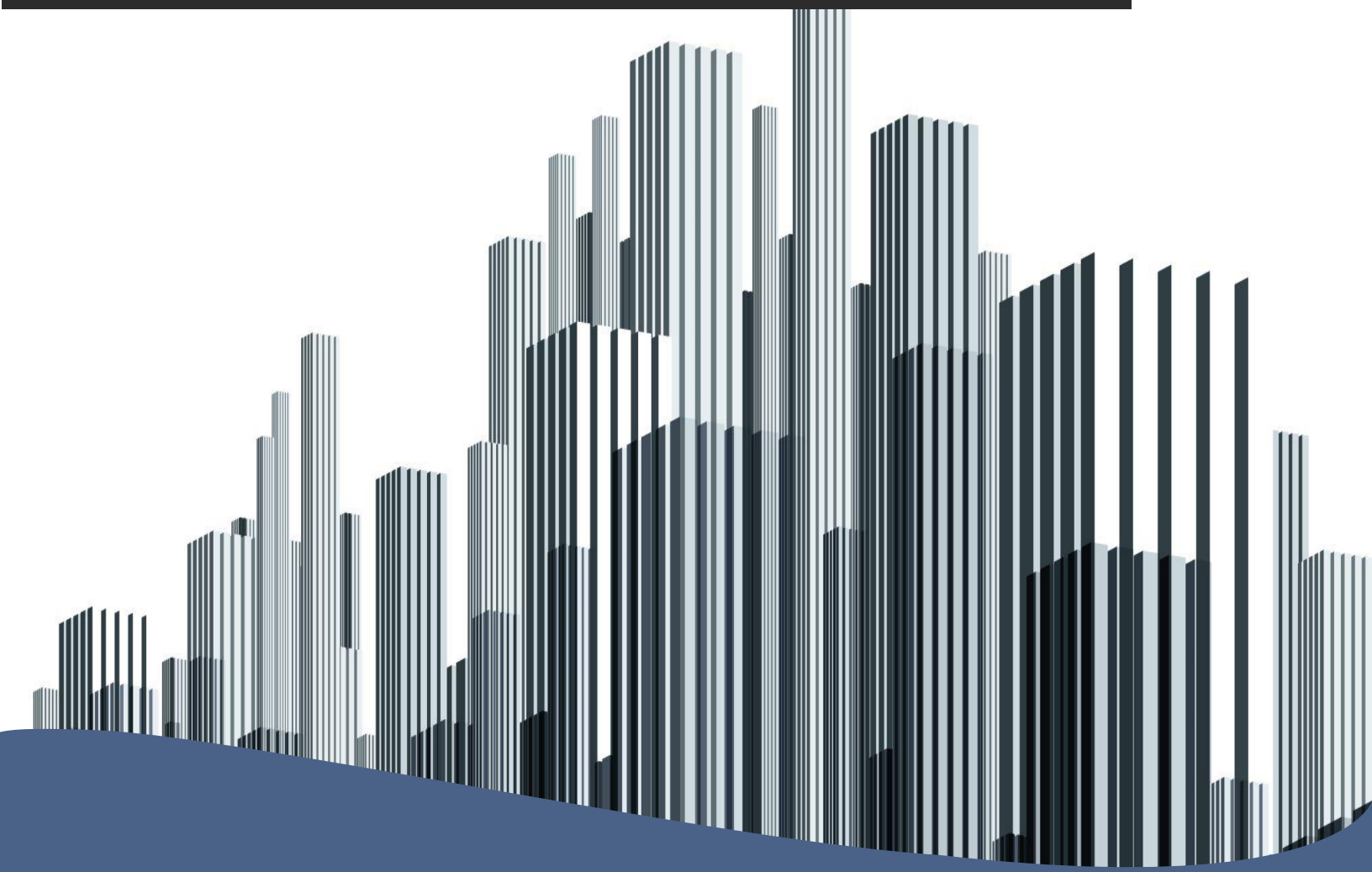
White Paper Report

Economic Impact of Proposed FDA Nicotine Limit on Cigarettes



Prepared for

National Association of Tobacco Outlets

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CHMURA

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Executive Summary

The United States Food and Drug Administration (FDA), which regulates the manufacture, marketing, sale, and distribution of tobacco products, intends to pursue a rule for a tobacco product standard that would establish a maximum nicotine level in cigarettes and certain other finished tobacco products. The FDA has previously specifically referenced academic research that recommends a maximum nicotine content of 0.3-0.5 milligrams per gram of tobacco, an approximately 95% reduction in the average nicotine content of cigarettes today. The FDA anticipates that lowering nicotine levels in cigarettes would result in lower cigarette usage. However, the FDA must weigh this potential benefit against the costs of such a rule, including the rule's significant negative economic and fiscal impacts.

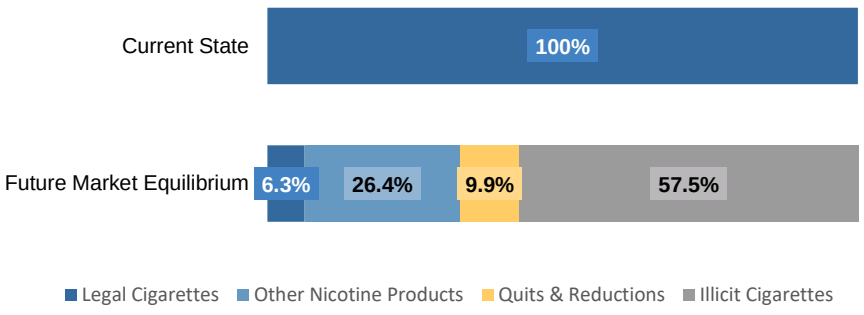
A 0.5 mg per rod nicotine maximum for cigarettes represents a 95% nicotine level reduction for the typical cigarette.

The National Association of Tobacco Outlets (NATO) commissioned a report with Chmura to provide analysis on the economic and fiscal impact of the Very Low Nicotine Cigarette (VLNC) regulation, from the perspectives of national tobacco retailers. This analysis utilizes assumptions that are documented and believed to be reasonable. Chmura does not evaluate the potential public health consequences of this regulation.

Chmura estimates that demand for Very Low Nicotine Cigarettes **may only reach ~6% of current legal cigarette sales** (in volume) given demand reduction from substitution, reduction in use, illicit market participation, and quitting *(Section 2).*

Today, cigarette and other tobacco product (OTP) sales (not including cigars) amount to over $90 billion, with much of this revenue flowing to governments, including federal, state, and local taxing authorities. To model the economic impact of the potential VLNC regulation, Chmura conducted a thorough literature review to obtain reasonable assumptions regarding the decrease in cigarette market demand. Additionally, there are several effects on smoking prevalence to consider depending on the level of enforcement of a VLNC restriction. Specifically, some consumers may choose to use VLNCs, switch to other tobacco products, move to the illicit cigarette market, or quit smoking completely. Chmura derived the overall reduction in demand for taxed and regulated cigarettes by considering evidence from the current literature. Then, from the population that continues to use VLNCs, a further reduction in average cigarettes smoked per day was applied.

Figure E.1: Chmura's Model Assumes only 6.3% of Current Cigarette Volume Transfers to VLNCs



A Note on The Illicit Market

Chmura believes the best way to model the illicit market is for it to be "parallel" to other categories of demand reduction. This means one individual may participate, for example, in both the legal substitute market and the illicit cigarette market.

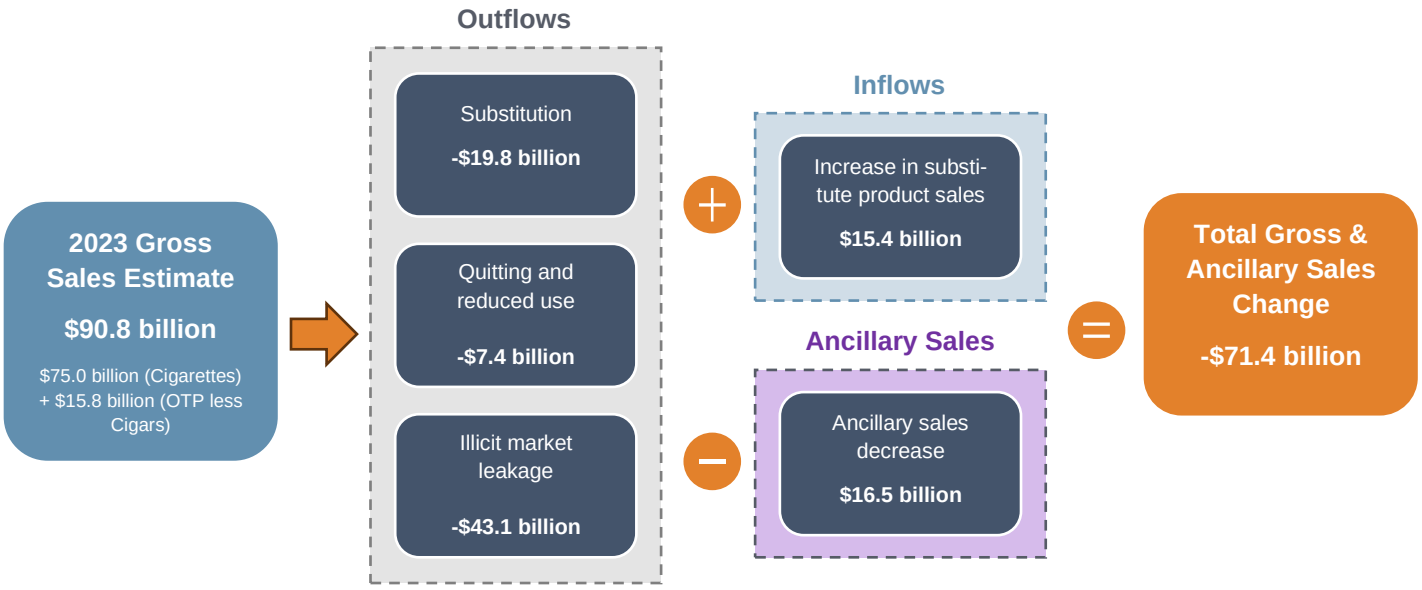
Forecasting the illicit market size is inherently difficult. Chmura uses the midpoint (57.5%) of the illicit market size estimates for six (6) comparison scenarios.

The midpoint estimate is not necessarily the most likely scenario. That will depend on enforcement effectiveness—which, if enforced at the same low level as contemporary vapor product restrictions, may increase the illicit market size. This estimate, on the other hand, could be lower if enforcement is more punitive.

Figure E.1. summarizes the assumptions behind the reduction in demand for regulated and taxed cigarettes in the economic impact model. These numbers represent the percentage of current legal cigarette volume that would move to each category and are based on the midpoint of previous studies' estimates. While using a midpoint estimate is deemed to be a reasonable approach, a range was provided to account for variability in the impacts of the policy (see Section 2.1 for more details). Only the midpoint estimates are used to compute the gross sales, economic impact, and fiscal impact described below.

Total **gross sales are estimated to decline by $71.4 billion nationwide,** with retailers' revenue reduced to $13.9 billion in year one *(Section 3.2).* The economic impact will continue in future years.

Figure E.2: Gross Sales Affected by Outflows, Inflows, and Ancillary Sales Effects – Total Gross Sales Loss is $71.4 Billion



Source: Chmura Economics & Analytics

Gross sales (cigarettes plus other tobacco products) are estimated by multiplying the volume of sales by the tobacco product price (excluding sales tax). The price used in the gross receipts calculation includes many pass-through items, such as the cost of products paid to manufacturers and wholesalers, and excise taxes paid to federal, state, and local governments. Sales tax is not included in this definition, which can be significant. Retailers' revenue excludes any pass-through payments made to manufacturers or wholesalers. It also excludes taxes paid to federal, state, and local governments.

Total tax contributions (federal, state, and local) are estimated to decrease by $24.0 billion in the United States following the implementation of a VLNC regulation *(Section 3.3).*

- Federal tobacco exercise tax is estimated to be reduced by $8.0 billion annually, from $8.7 billion to $696.8 million.
- Annual state and local excise tax on tobacco products is estimated to be reduced by $11.8 billion (from $16.6 billion to $4.8 billion). This translates to a ~71.0% decrease in total state and local excise tax receipts from cigarettes.[1]
    - This represents a $13.4 billion loss (from $14.3 billion to $902.9 million) from cigarette excise taxes plus $1.6 billion in taxes added back from increases in substitute product sales (from 2.2 billion to $3.8 billion).
- State sales taxes are expected to experience a net decrease of $3.2 billion annually (from $5.4 billion to $2.2 billion).
- Local sales taxes are expected to experience a decrease of $1.1 billion annually (from $1.8 billion to $714.8 million).

[1] Total cigarette excise tax estimate as reported by "The Tax Burden on Tobacco" publication (Volume 57). Given the latest data for taxes is for Fiscal Year 2022 and this study estimates impacts for 2023, this percentage may be slightly different in reality.

Total MSA payment to states (plus payments for the four states with separate agreements) is expected to drop by $5.6 billion (Section 4).

Master Settlement Agreement Impacts (Section 4)

The 1998 MSA requires that the original participating manufacturers (OPMs) pay settlements to the participating states, the District of Columbia, and territories in perpetuity, to help mitigate the costs associated with tobacco consumption.

- Total MSA payments (plus payments to the four states with separate agreements) is expected to **drop by 83.5%.**

Total **economic impact (direct, indirect, and induced) is estimated at -$30.6 billion nationwide** corresponding to a potential employment loss of 154,478 jobs *(Section 3.4).*

The loss of sales for tobacco retailers will also have ripple effects throughout the national economy. In this study, the direct impact is measured by revenue to tobacco retailers. The indirect impact is defined as the secondary economic activity that is generated by the direct impact. For example, due to loss of cigarette and ancillary retail sales, retailers will cut back their purchases from national suppliers to maintain their operations (indirect impact). The induced impact is defined as the secondary economic activity generated by household income resulting from direct and indirect impact. For example, due to lost sales, retailers such as convenience stores may need to cut hours for store clerks or even lay off some workers. This will affect other businesses serving retail industry employees because of the induced impact.

- Annual economic output (sales based on 2023 data) is expected to decrease by $30.6 billion.[2] This represents -$13.9 billion from direct sales, -$7.1 billion in indirect impact, and -$9.6 billion in induced impact.
- Labor income is expected to experience a net decrease of $9.8 billion each year from the 2023 baseline.
- 154,478 fewer jobs will be supported by retail sales of tobacco products, down from 256,648 before the change.

States are affected at different magnitudes for economic and tax impacts. Some of the **least affluent states have disproportionately large negative impacts** *(Section 5)*.

States experience differential impacts based on their industry mix and smoker population. States with higher populations see the largest nominal impacts. The top ten states with the highest negative total and per capita impacts are detailed below.

Table E.1: The Ten (10) Most Negatively Impacted States by Total or Per Capita Amount for Economic and Tax (Fiscal) Impacts

Total Economic Impact (Million)		Economic Impact (Per Capita)		Total Fiscal Impact (Million)		Fiscal Impact (Per Capita)	
Texas	-$2,343.7	New Hampshire	-$227.04	California	-$1,310.4	Rhode Island	-$112.6
California	-$2,118.9	West Virginia	-$188.10	Texas	-$1,213.1	New Hampshire	-$101.7
Florida	-$1,754.2	Kentucky	-$177.96	Illinois	-$926.7	West Virginia	-$97.8
North Carolina	-$1,517.0	Missouri	-$172.07	New York	-$902.0	Alaska	-$86.3
Ohio	-$1,506.1	Delaware	-$140.74	Florida	-$870.9	Delaware	-$80.5
Pennsylvania	-$1,345.5	North Carolina	-$140.01	Ohio	-$830.0	Wisconsin	-$78.1
Georgia	-$1,268.3	Indiana	-$138.51	Pennsylvania	-$786.0	Kentucky	-$76.6
Michigan	-$1,205.9	North Dakota	-$136.53	Michigan	-$708.0	Illinois	-$73.8
Illinois	-$1,164.6	Alabama	-$136.09	New Jersey	-$489.2	Oklahoma	-$72.4
Virginia	-$1,099.3	Tennessee	-$131.76	Wisconsin	-$461.8	Michigan	-$70.5

Source: Chmura

[2] Please note that this figure is smaller than $71.4 billion because the economic output for retailers excludes passing through items such as costs of goods, which is part of the gross sales. Section 3.2 has a detailed explanation.

1. Background

The United States Food and Drug Administration (FDA), which regulates the manufacture, marketing, sale, and distribution of tobacco products, intends to pursue a rule for a tobacco product standard, titled, "Tobacco Product Standard for Nicotine Level of Certain Tobacco Products." This would establish a maximum nicotine level in cigarettes and certain other finished tobacco products ("the policy", "VLNC regulation"). The FDA, under Section 907 of the Federal Food, Drug, and Cosmetic Act (FD&C Act), among other things, issues "tobacco product standards if the Secretary finds that a tobacco product standard is appropriate for the protection of public health, and includes authority related to provisions for nicotine yields in tobacco product standards."

While the scope of this rule is not yet entirely clear, previous FDA publications provide key information regarding the likely regulatory scope. FDA issued an Advanced Notice of Proposed Rulemaking (ANPRM) in March 2018.[3] This ANPRM was aimed to source information and comments for consideration in "developing a tobacco product standard to set the maximum nicotine level for cigarettes." In this document, the FDA references academic research recommending a maximum nicotine content of 0.3-0.5 milligrams per gram in tobacco to minimize addictiveness, an approximately 95% reduction in nicotine from an average cigarette.[4] The ANPRM issued by the FDA notes cigarettes as a primary target for this regulation. It is also likely that the FDA will extend this regulation to cover all combustible tobacco products in addition to cigarettes.

The FDA anticipates that lowering nicotine levels in cigarettes would result in lower cigarette usage, thus reducing mortality and morbidity among adult consumers and deterring youth from becoming regular smokers. The FDA also claims secondary benefits, including increased productivity for smokers and a decrease in smoking-related fires and littering. On the other hand, the FDA notes this rule would be expected to generate compliance costs for manufacturers as they alter their internal processes. There may also be temporary withdrawal costs for consumers and larger enforcement costs for the United States government.[5] This initial notice does not mention the potential negative economic impacts such a rule would likely yield, especially on tobacco retailers. These include decreases in cigarette sales resulting in lower employment and tax receipts at the national, state, and local levels. Importantly, lower cigarette sales could also mean lower Master Settlement Agreement (MSA) payments to states, which are dedicated to fund important priorities including tobacco control, healthcare and health related research, education, Medicaid, state general funds, and other services and programs that are unique to each state.[6]

In Chmura's analysis of the economic impact of the FDA rule on nicotine content of tobacco products, it is assumed that this rule applies to all combusted tobacco products (excluding some specific products like premium cigars)—not just cigarettes. However, Chmura's analysis specifically deals with the **impacts regarding the decrease in cigarette sales**. Other combusted products like cigars are not evaluated for sales losses but are excluded as a possible legal substitute option because they are likely to be covered by the FDA rule. If non-combusted tobacco products were also restricted by the policy, this could further reduce legal substitutes, therefore amplifying the magnitude of the negative economic impact. Furthermore, Chmura presents this economic impact analysis as the difference from the current state to the future state when the market reaches equilibrium (Chmura does not model year-by-year change with different impact levels). These economic and fiscal impacts are all presented in 2023 dollars, demonstrating the effect of such a rule applying to the latest level of industry sales.

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[3] United States Federal Register, "Tobacco Product Standard for Nicotine Level of Combusted Cigarettes," March 16, 2018, https://www.federalregister.gov/documents/2018/03/16/2018-05345/tobacco-product-standard-for-nicotine-level-of-combusted-cigarettes.

[4] Ibid.

[5] Office of Information and Regulatory Affairs, "Tobacco Product Standard for Nicotine Level of Certain Tobacco Products," 2023, https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202310&RIN=0910-AI76.

[6] Public Health Law Center, "The Master Settlement Agreement: An Overview," January 2019, https://publichealthlawcenter.org/sites/default/files/resources/MSA-Overview-2019.pdf and National Association of Tobacco Outlets, The Distribution of Tobacco Settlement Revenues https://www.natocentral.org/fda/state-msa-reports

Chmura conducted this demand analysis partly based on the studies cited by the FDA and is not endorsing the conclusions by those studies. Instead, Chmura used those studies to form a set of assumptions in the economic impact analysis. Chmura does not evaluate the potential public health consequences of this regulation.

The following sections of this report detail the research and methods along with the overall economic and estimated tax impacts:

- Section 2 provides a literature review that forms the basis for key assumptions in this study.
- Section 3 discusses the economic and fiscal impact of the FDA rule in the United States, including its impact of Master Settlement Agreement Payments.
- Section 4 summarizes the economic and fiscal impact in each state.
- Appendices provide Chmura methodology and summary impact in each state and congressional district.

2. Literature Review

2.1. Total Demand Reduction Summary

To model the economic impact of the potential VLNC regulation, Chmura conducted a thorough literature review to obtain reasonable assumptions regarding the decrease in cigarette consumer demand. There is much uncertainty, and several possible scenarios related to demand change, especially regarding transitions to the illicit market and adult consumers who may smoke more to compensate for lower nicotine levels.

There are several effects on smoking prevalence to consider if the policy limiting nicotine levels in cigarettes were to be enforced. Specifically, the alternatives are to quit smoking entirely, transition to VLNCs, switch to another tobacco product, or explore the illicit cigarette market. The overall demand reduction estimate for this study was derived by first predicting the portion of users that would leave the legal market to source cigarettes in the illicit market, switch to other tobacco products (substitution), or quit. Then, from the population that transitions to VLNCs, a further reduction in average cigarettes smoked per day is applied. This subsection provides a high-level summary of the process. For detailed information including sources, please refer to Sections 2.2 to 2.4.

Several different studies inform the assumption of quitting and substitution under the VLNC regulation. For example, a 2018 New England Journal of Medicine study by Apelberg et al. interviewed eight experts to gather average estimates for potential figures regarding reductions in demand for cigarettes.[7] On average, the experts predicted that 15.0% to 21.0% of males and 13.5% to 19.0% of females would quit smoking under a condition where VLNCs were enforced. Additionally, these experts estimated that between 35.0% and 40.0% of all smokers would completely switch to non-combusted tobacco products.[8] However, this study did not consider illicit market effects as a direct demand influencer. The study did note, however, that "current cigarette smokers could maintain their nicotine dependence by obtaining illicit cigarettes with current nicotine levels."[9] Another study by Hatsukami et al. found that only 10.1% of smokers that wished to quit and used VLNCs were continuously abstinent for 36 months.[10] Multiplying this 10.1% by the percentage of smokers who say they are interested in quitting (68%[11]) equals a 6.8% quit rate normalized to the smoker population average. The average quit rate from these two studies equals 12.0%. Each of these studies has significant limitations that must be considered before implementing this rule.

Before directly applying the Apelberg et al. and Hatsukami et al. estimates, however, Chmura considered the possibility of an illicit market. Using comparison scenarios from other similar restrictions/bans, Chmura estimated the range of demand reduction from illicit market access to be 30% to 85% of current cigarette volume (see Section 2.4 for further details). Using the midpoint of 57.5%, Chmura then adjusted the cited study estimates for quits and substitution rates slightly downward to account for the addition of the illicit market component.[12]

Using these cessation, switching, and illicit market estimates, Chmura computed the percentage of current smokers who would likely not smoke very low nicotine cigarettes under this policy. Then, from the population which continues to smoke VLNCs, Chmura applied a 25% average reduction in cigarettes smoked per day—sourced from a meta-analysis of VLNC studies (see Section 2.2). Table 2.1 reports a summary of this analysis.

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[7] Apelberg et al., "Potential Public Health Effects of Reducing Nicotine Levels in Cigarettes in the United States," *New England Journal of Medicine*, May 3, 2018, https://www.nejm.org/doi/full/10.1056/NEJMsr1714617?query=featured_home.

[8] Ibid.

[9] Ibid.

[10] Hatsukami et al., "Reduced Nicotine Content Cigarettes and Nicotine Patch," *Cancer Epidemiology, Biomarkers & Prevention*, June 1, 2013, https://aacrjournals.org/cebp/article/22/6/1015/69880/Reduced-Nicotine-Content-Cigarettes-and-Nicotine.

[11] Centers for Disease Control and Prevention, "Cigarette Smoking in the U.S.", May 4, 2023, https://www.cdc.gov/tobacco/data_statistics/fact_sheets/fast_facts/cigarette-smoking-in-the-us.html#:~:text=In%202015%2C%20nearly%207%20in,who%20tried%20to%20quit%20succeeded.

[12] This adjustment was made to restrict reduction estimates to a maximum of 100% of total current cigarette demand. If an adjustment was not applied, reductions would equal over 100% which is not feasible. Logically, if illicit cigarettes are easier to obtain, quits and substitution rates would decrease.

Table 2.1: Total Legal Cigarette Demand Estimated to Reduce by 93.7%, Specific Reduction Levers Range in Estimated Magnitude

Equilibrium Policy Effects	Midpoint Reduction (Percentage Point)	Reduction Range (Percentage Point)
Reduction from quitting	-8.3 pp	-2.9 to -13.6 pp
Reduction from substituting	-26.4 pp	-9.3 to -43.5 pp
Reduction from illicit market use	-57.5 pp	-30.0 to -85.0 pp
Reduction in cigarettes smoked per day	-1.6 pp	-0.6 to -2.6 pp
Total reduction in demand	**-93.7 pp**	**-89.7 to -97.8 pp**

Source: Donny et al. (2015), Hatsukami et al. (2013), Benowitz et al. (2012), Apelberg et al. (2018), and Chmura

Taking all relevant studies into account and using a midpoint illicit market estimate, Chmura estimates demand for legal VLNCs at -93.7% of the current legal cigarette market size, if the VLNC rule were to become effective. **In other words, market demand for VLNCs corresponds to 6.3% of the current cigarette market volume**.

These estimates of the overall reduction in cigarette demand are reasonable and generally consistent with other "sense-check" metrics. For example, 22nd Century, a manufacturer of VLNCs, reported that their FDA-authorized low-nicotine cigarette (the only VLNC authorized so far by the FDA) successfully captured a 1% market share in their pilot markets.[13] While this is lower than Chmura's estimate, the pilot occurred with non-VLNC cigarettes still available. The market potential would likely be larger if standard cigarettes were unavailable through legal channels. While Chmura recognizes that the estimation of an illicit cigarette market size is subject to a considerable margin of error, using a midpoint value of similar markets provides a reasonable estimate of the potential illicit market generated by the VLNC policy, if it were to become effective.

Notably, this reduction in demand does not directly correspond one-to-one to a reduction in revenue for tobacco retailers, as legal substitute products must also be considered in the net revenue impact. However, this estimate forms the basis for the subsequent economic and fiscal impact analyses in this report.

As noted above, some of this decrease is due to the growth in illicit cigarette markets. Chmura believes the best way to model this effect is to consider the illicit market as not mutually exclusive to other categories of demand reduction. This means one individual may participate, for example, in both the legal substitute market and the illicit cigarette market. To account for this uncertainty, Chmura allows for the possibility that the illicit cigarette market could be larger or smaller than assumed by midpoint value (see Table 2.1). Hence, ranges are displayed for these demand reduction categories. This relationship is further expanded upon in Section 2.4.

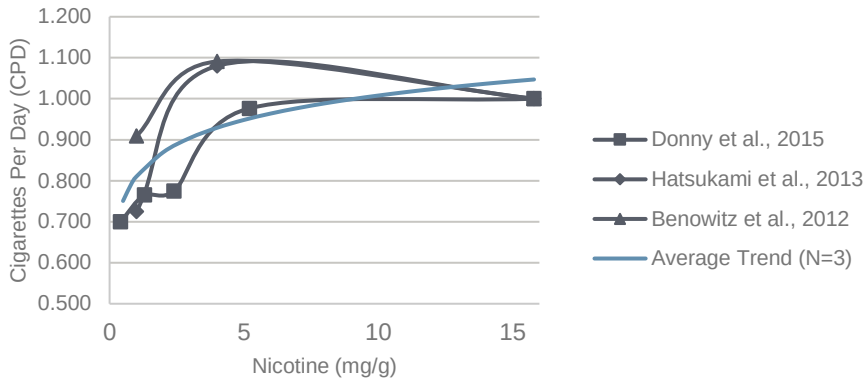
2.2. Link Between Nicotine Level and Cigarette Demand

Peer-reviewed academic studies have shown, with relative consistency, that limiting nicotine to 0.5 mg per cigarette or below (each cigarette weighs approximately 1 gram) decreases the number of cigarettes smoked per day (CPD) after a sufficient time period of six or more weeks. Decreasing the average number of cigarettes smoked per day would, in turn, decrease overall demand and sales for VLNCs.

[13] Tobacco Reporter, "22nd Century Reports Quarterly Results," March 9, 2023, https://tobaccoreporter.com/2023/03/09/22nd-century-reports-quarterly-results/.

To determine the specific impact that a 0.5 mg nicotine limit would have on cigarette demand, Chmura conducted a meta-analysis of the most recent and appropriate academic studies in peer-reviewed journals.[14] For inclusion in this meta-analysis, Chmura prioritized studies that included proper treatment and control groups as well as those utilizing a U.S. sample. Studies were excluded that only used a specific population subsection, such as those with psychiatric conditions. Given these criteria, a total of three (3) studies were analyzed.[15,16,17]

Figure 2.1: CPD vs Nicotine Levels (Index = 15.8 mg/g)



Source: Donny et al., Hatsukami et al., Benowitz et al., and Chmura

Each study utilized different minimum nicotine levels for their VLNCs ranging from 0.1 mg/g to 1 mg/g. Overall, Chmura assessed that the relationship between nicotine levels and consumption was best captured using a logarithmic best-fit line (as shown in Figure 2.1). The R^2 value is above 0.6, indicating a relatively strong goodness of fit. Using this line of best fit, CPD at the 0.5 mg/g nicotine level is 75% of the level of CPD for normal 15.8 mg/g cigarettes. In other words, this equates to a 25% reduction in cigarette demand for those who continue smoking VLNCs. Chmura notes that several researchers have raised concerns with these studies—namely with the high levels of non-compliance (participants that smoke "non-study" cigarettes with higher nicotine levels).[18] Chmura acknowledges these concerns; but given that this reduction affects VLNC-only smokers (and the projected number of these smokers is low), the decrease in frequency of use results in a minor total impact on the overall cigarette market.

2.3. Cigarette Substitutes

Given a restriction on nicotine level in cigarettes, it is likely that many cigarette smokers will either completely substitute cigarettes for other products containing nicotine, or supplement use with these products. These may include other combustible tobacco products like cigars or pipe tobacco or non-combustible tobacco alternatives like e-cigarettes, snuff, or nicotine pouches. In this study, Chmura assumes the FDA rule will apply to other combustible products, such as "little cigars," or "large machine-made cigars."[19] rendering them not suitable as a substitute for cigarettes.

The first element to consider when estimating how many cigarette smokers would turn to nicotine substitutes is to examine the current tendencies of cigarette smokers. Per a 2021 study published by the United States Centers for Disease Control and Prevention (CDC), 18.1% of tobacco users reported using two or more tobacco products in 2021. The most common combinations containing cigarettes included e-cigarettes (31.4% of multiple-product users), cigars/cigarillos (21.0%), smokeless tobacco (7.9%), and pipes (3.7%).[20]

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[14] Meta-analyses are often used as a best-practice method for summarizing the academic consensus on a topic between multiple studies.
[15] Donny et al., "Randomized Trial of Reduced-Nicotine Standards for Cigarettes," *New England Journal of Medicine*, October 2015, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4642683/.
[16] Hatsukami et al., "Reduced Nicotine Content Cigarettes and Nicotine Patch," *Cancer Epidemiology, Biomarkers & Prevention*, June 22, 2013, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3681886/.
[17] Benowitz et al., "Smoking Behavior and Exposure to Tobacco Toxicants During 6 months of Smoking Progressively Reduced Nicotine Content Cigarettes," *Cancer Epidemiology, Biomarkers & Prevention*, May 21, 2012, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3348427/.
[18] See, for example, the Goldstein comment on the Donny et al. study, "Randomized Trial of Reduced-Nicotine Standards for Cigarettes," *New England Journal of Medicine*, 2016.
[19] This rule may exclude premium cigars. Chmura, however, does not consider premium cigars in the substitution analysis as they represent a very small portion of the cigar market.
[20] Cornelius et al., "Tobacco Product Use Among Adults – United States, 2021," Centers for Disease Control and Prevention, May 5, 2023, https://www.cdc.gov/mmwr/volumes/72/wr/mm7218a1.htm.

Crucially, multiple studies show that a large portion of cigarette smokers are not interested in substitutes of any kind. For example, 75.6% of smokers in a recent study expressed no interest in moving to a smokeless tobacco substitute.[21] Accordingly, another study published in 2013 showed that of smokers who had previously tried an alternative product to cigarettes, only 11.0% to 14.0% were interested in trying smokeless tobacco products again.[22] It does appear, however, that e-cigarettes and cigars are two of the more popular cigarette substitutes (newer smokeless tobacco products like nicotine pouches have also recently grown in popularity). For example, of the cigarette smokers who previously tried e-cigarettes, 53.0% indicated interest in trying e-cigarettes again.

There are additional factors to consider, however, than just past and current use history or willingness to use. In particular, some consumers may treat separate tobacco products as complements (rather than substitutes), meaning they increase their use of an alternative product when they smoke cigarettes. Additionally, these data points do not evaluate smoker choices if standard cigarettes were unavailable. One recent study by Hatsukami et al. (2017) does, however, analyze this relationship directly. They found that when cigarette smokers were told to only use VLNCs or non-combusted tobacco products, the most common substitute was e-cigarettes.[23]

Table 2.2: E-cigarettes are the Most Popular Substitutes

Alternative Product	Usage (%)
E-cigarettes	40%
Nicotine Replacement Therapy (NRT)	12%
Other smokeless	3%

Note: Categories represent rough percentages of study participants that used a substitute product during the study. Categories are not mutually exclusive and not meant to sum to 100%.

Note: "NRT", for the purposes of this study, is also assumed to include nicotine pouches and snus. "Other smokeless" is assumed to be moist snuff.

Source: Hatsukami et al. (2017), Chmura

Results of this relationship are found in Table 2.2. Notably, the "Usage (%)" column is not mutually exclusive—for example, an e-cigarette user may also use nicotine pouches. To account for this, Chmura uses the overall substitution rate from Table 2.1 as the top-line reduction in cigarette use from substitution. This guards against double counting in the model from some individuals using multiple products. The percentages presented in Table 2.2 are therefore ultimately used as a percentage of the overall 26.4% decrease from Table 2.1.

The next step is to determine what effect this substitution has on increased demand for each product, specifically. Table 2.3 details these assumptions. Using the most applicable nicotine content data from medical journals and other market sources, we assume that the average smoker who substitutes with one of these products would use the product to satisfy a similar daily nicotine intake. This comes out to 2 mL of e-vapor liquid, one nicotine pouch can, 0.3 moist snuff cans, or 0.4 snus cans for every cigarette pack. Using the midpoint projection that around 26.4% of cigarette smokers would substitute given a VLNC regulation, Chmura estimates the increase in demand for each of these products given the estimated overall decrease in cigarette usage due to substitution.

[21] David Timberlake, "Are smokers receptive to using smokeless tobacco as a substitute?", *Preventive Medicine*, July 23, 2009, https://pubmed.ncbi.nlm.nih.gov/19631684/.
[22] Lucy Popova and Pamela Ling, "Alternative Tobacco Product Use and Smoking Cessation: A National Study," *American Journal of Public Health*, May 2013, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3661190/.
[23] Hatsukami et al., "Reduced Nicotine Content Cigarettes and Use of Alternative Nicotine Products: Exploratory Trial," *Addiction*, January 2017, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5249662/.

Table 2.3: Increase in Substitute Products Assumed to be Proportional to Estimated Cigarette Reduction

Alternative Product	Units	Comparable Use per Cigarette Pack	Cigarette Decrease from Substitution (Annual, Packs)	Requisite Substitute Product Increase (Annual, Units)
E-cigarettes	mL	2.0	-1,638,782,905	3,277,565,810
Moist Snuff (MST)	cans	0.3	-122,908,718	40,504,009
Nicotine Pouches	cans	1.0	-225,873,135	218,344,031
Snus	cans	0.4	-21,577,523	7,672,149

Source: Digard et al., Seidenberg et al., Southeastern National Tuberculosis Center, Podsalt, and Chmura

Assumption: The average smoker consumes 16.4 cigarettes per day.[24]

*Note: NRT split into nicotine pouches and snus. Smokeless tobacco is defined as MST. Requisite product increase = avg. annual use * (cigarette decrease from substitution / 16.4 cigarettes/day).*

Other non-nicotine alternatives (e.g., cannabis and alcohol) were also considered as possible cigarette substitutes. However, there is limited evidence suggesting consumers treat these products as substitutes. When compared to cigarettes, many studies show that alcohol and cannabis are complements, and therefore reductions in tobacco use may also reduce alcohol and cannabis use.[25,26]

2.4. Illicit Cigarette Market

Not all current smokers would simply stick with VLNCs or substitute with an alternative tobacco product, however. The illicit cigarette market would likely see significant growth if a nicotine level maximum were enacted. In fact, the existing market for illicit cigarettes is already estimated to be between 8.5% and 21% of the legal market size, meaning that in 2024, the illicit market for cigarettes in the United States can be estimated at approximately $11.0 billion (average estimate).[27,28] The illicit tobacco market is not only harmful to underage users who purchase illicit cigarettes, but also to government agencies which lose up to $6.92 billion in local and state tax revenue.[29] In addition, several testimonies point to the illicit tobacco market being a key source of potential revenue for terrorist organizations like Hezbollah and Hamas as well as drug cartels like the Jalisco New Generation Cartel.[30,31] Furthermore, illicit tobacco revenue can facilitate other crimes such as money laundering, human trafficking, and other illicit goods trafficking.[32]

Overall, Chmura analyzed six different comparisons scenarios in an attempt to ascertain a reasonable range for the illicit cigarette market if the VLNC regulation entered into effect. These scenarios include: VLNC academic studies' non-compliance rates; United States Alcohol Prohibition; South Africa's 2020 tobacco ban; menthol cigarette bans across the United States, Canada, and Europe; e-vapor restrictions in the United States; and a smoker survey.

[24] Cornelius et al., "Tobacco Product Use Among Adults — United States, 2020," *Morbidity Mortality Weekly Report*, March 2022. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8942309/.
[25] Lisa Cameron and Jenny Williams, "Substitutes or Complements? Alcohol, Cannabis and Tobacco," School of Economics and Public Policy Working Papers, University of Adelaide, School of Economics and Public Policy, February 1999, https://ideas.repec.org/p/adl/wpaper/1999-02.html.
[26] Tauchmann et al., "Tobacco and alcohol: complements or substitutes?" *Empirical Economics*, 2013, https://www.econstor.eu/handle/10419/141886.
[27] Industry data provided by National Association of Tobacco Outlets.
[28] Peter Reuter and Malay Majmundar, "Understanding the U.S. Illicit Tobacco Market: Characteristics, Policy Context, and Lessons from International Experiences," National Academies of Sciences, Engineering, and Medicine, 2015, Washington, DC: The National Academies Press. https://doi.org/10.17226/19016.
[29] Ibid.
[30] Florencia Montaruli, "Hezbollah's South American Tobacco Racket: What do we Know?", IranWire, August 4, 2021, https://iranwire.com/.
[31] Bill Cassidy, "Cassidy, Colleagues Raise Concerns About the National Security Threat of Illicit Tobacco Trafficking," May 2023, https://www.cassidy.senate.gov/.
[32] "The Global Illicit Trade in Tobacco: A Threat to National Security," United States Department of State, December 2015, https://2009-2017.state.gov/documents/organization/250513.pdf.

Table 2.4: High- and Low-Bound Comparisons Signal that VLNC Regulation would Motivate 30%–85% of Current Smokers to Pursue Illicit Markets

	Comparison	Illicit market participation (%)
High-bound	South Africa Tobacco Ban	85%
	E-Vapor Restrictions	60% – 98%
	United States Alcohol Prohibition	60% – 70%
	VLNC Studies Non-Compliance	60%
Average	**VLNC Regulation Illicit Market Range**	**30% – 85%**
	Smoker Survey	36%
Low-bound	Menthol Bans	28%

Source: Previously cited studies (N = 11), Chmura

Table 2.4. (above) summarizes the six evaluated illicit market scenario comparisons. Overall, the illicit market participation averages for these comparison scenarios range between 28% and 98%. When considering scenarios and specific regulations, no comparison presents a direct one-to-one example with the proposed VLNC regulation. However, high- and low-bound estimates are used to ascertain a reasonable range for illicit market participation. While effective enforcement and other factors may limit the illicit market potential, Chmura assesses it would be unlikely that this market would reduce to negligible size**.** Overall, when the menthol ban illicit market estimate is rounded up to 30%; and using only the lower-bound estimate of the e-vapor illicit market, **the illicit cigarette market for this VLNC scenario could capture between 30% to 85% of current cigarette volume.** The high-end estimate assumes that the illicit market trade is relatively accessible, similar to the 1920s Prohibition era and in VLNC studies. The low-end estimate assumes the illicit cigarette market follows a pattern closer to the illicit menthol markets and what was reported in the smoker survey. **Chmura uses the midpoint illicit market size of 57.5% to calculate the economic impact for this study**. However, it is important to note that the illicit market size could be larger or smaller based on the level of enforcement. Chmura's midpoint estimate is simply a midpoint; it infers no particular assumption on future state enforcement effectiveness.

VLNC Studies Non-Compliance: One reason illicit market growth is likely is because in many VLNC studies, including those mentioned in Sections 2.2 and 2.3, non-compliance rates can be quite high. For example, the Hatsukami study (Section 2.3) reported that about 30% of participants reported using non-study cigarettes.[33] In five other independent studies with VLNC programs, non-compliance rates ranged from 36% to 81%.[34,35,36,37,38] These six studies (including the Hatsukami study) point to an average non-compliance rate of 60%, meaning that 60% of participants were smoking non-study cigarettes (or other tobacco products) even when explicitly directed not to. Reasonably, there is a tangible difference between being directed by a researcher not to consume a certain product versus being directed by a legal authority. Nonetheless, this 60% non-compliance average could serve as a **high average** for cigarette smokers who will use illicit cigarettes.

[33] Hatsukami et al., "Reduced Nicotine Content Cigarettes and Use of Alternative Nicotine Products: Exploratory Trial," *Addiction*, January 2017, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5249662/.
[34] Jeffery Goldstein and Lila Goldstein, Comment on "Randomized Trial of Reduced-Nicotine Standards for Cigarettes," *New England Journal of Medicine*, January 28, 2016.
[35] Benowitz et al., "Biochemical estimation of noncompliance with smoking of very low nicotine content cigarettes," *Cancer Epidemiology, Biomarkers & Prevention*, February 2015, https://pubmed.ncbi.nlm.nih.gov/25416718/.
[36] Foulds et al., "Estimation of compliance with exclusive smoking of very low nicotine content cigarettes using plasma cotinine," *Preventive Medicine*, April 2018, https://pubmed.ncbi.nlm.nih.gov/.
[37] Nardone et al., "Estimations and Predictors of Non-Compliance in Switchers to Reduced Nicotine Content Cigarettes," *Addiction*, Society for the Study of Addiction, June 2016.
[38] Zhang et al., "Method for Estimating Non-study Cigarette Use among Switchers to Low Nicotine Content Cigarettes in Ambulatory Clinical Studies," *International Journal of Clinical Research and Trials*, January 2020.

United States Alcohol Prohibition: While the enforcement mechanisms regarding this regulation against illicit cigarettes are yet to be seen, a similar example of this potential regulation is the period of alcohol prohibition in the United States in the 1920s. While this was a long time ago, Prohibition is similar to a potential nicotine limit—in that a once-legal product was suddenly outlawed. One estimate found that while alcohol consumption immediately reduced to 30% of its pre-Prohibition total, it climbed back to 60-70% of the pre-Prohibition total by the time Prohibition was repealed.[39] This relationship makes sense, as it would take some time for illicit manufacturers and distributors to organize "black market" operations. However, there are also significant differences between an alcohol ban and a high-nicotine cigarette ban. Specifically, Prohibition banned all alcohol, not just certain types. The proposed FDA rule seeks only to limit nicotine levels in one type of tobacco product; hence the illicit market size would likely not be as large. Therefore, these top-line figures can only be considered a **high average** of the potential illicit cigarette market.

South Africa Tobacco Ban: Other nations have enacted some specific tobacco restrictions/bans over the past decade. For example, South Africa briefly banned the sale of all tobacco and vaping products as part of the COVID-19 lockdown. However, 85% of smokers continued to purchase these products illicitly and prices initially increased by 250%.[40] This scenario not only includes a cigarette ban, but it also bans the availability of many substitutes—driving more individuals to the illicit market. In the proposed VLNC regulation, more substitutes would be available thus lowering dependance on illicit markets. Chmura considers this scenario to be an **upper bound** of illicit market size.

Menthol Bans: Menthol-flavored cigarettes have recently come under scrutiny, with several different countries and a few states banning the sale of these products. In a meta-analysis of 16 different studies reporting illicit market use post-menthol ban, 24% (range: 3% - 70%) of menthol smokers continued purchasing menthol tobacco products through illegal networks.[41] Furthermore, a study conducted by the WSPM group found that the market for menthol products in California decreased by just 14% after the state's ban.[42] The weighted average illicit market participation for these 17 studies is 28%. However, differences still exist between this scenario and the potential VLNC regulation. For instance, menthol flavoring itself is not addictive as nicotine is, and therefore, substituting would be a more likely alternative for menthol cigarette smokers. As for the VLNC regulation, while some smokers would definitely substitute for other nicotine products, cigarette substitutes are not popular with a large proportion of smokers (see Section 2.3). Hence, Chmura reasons cigarette smokers would have a larger incentive to explore illicit market options than menthol cigarette smokers. Therefore, Chmura considers this scenario to be a **lower-bound** estimate.

E-Vapor Restrictions: In 2020, the FDA began restricting flavored e-vapor products. Specifically, manufacturers of flavored and cartridge-based e-cigarette products were required to obtain "premarket authorization" before being able to legally sell their products in the United States.[43] While the FDA notes this is not meant to be an outright "flavor ban," as of July 2024, only tobacco-flavored e-cigarette products (and just one brand of menthol e-cigarette products) had been authorized for sale.[44] Nonetheless, a wide variety of flavored vapor products are still widely available at retail establishments in the United States.[45] Industry participants have estimated that illegal disposable vapor products now control 60% of the entire United

[39] Jeffrey Miron and Jeffrey Zwiebel, "Alcohol Consumption During Prohibition," *National Bureau of Economic Research*, April 1991, https://www.nber.org/system/files/working_papers/w3675/w3675.pdf.
[40] Filby et al., "The temporary ban on tobacco sales in South Africa: lessons for endgame strategies," *Tobacco Control*, January 20, 2021, https://tobaccocontrol.bmj.com/content/31/6/694.
[41] Mills et al., "The Impact of Menthol Cigarette Bans: A Systematic Review and Meta-Analysis," *Nicotine & Tobacco Research*, February 21, 2024, https://academic.oup.com/ntr/advance-article/doi/10.1093/ntr/ntae011/7611609.
[42] WSPM Group, "Empty Packs Survey USA-CA, Q2 2023," August 2023.
[43] U.S. Food & Drug Administration, "FDA finalizes enforcement policy on unauthorized flavored cartridge-based e-cigarettes that appeal to children, including fruit and mint," January 2, 2020, https://www.fda.gov/news-events/press-announcements/fda-finalizes-enforcement-policy-unauthorized-flavored-cartridge-based-e-cigarettes-appeal-children.
[44] FDA, Searchable Tobacco Products Database (*Category: E-Cigarette; Submission Type – Marketing Authority: Submission Type – Marketing Authority*), https://www.accessdata.fda.gov/scripts/searchtobacco/.
[45] Yuki Noguchi, "Flavored vapes are supposed to be illegal, but they're still widely available," NPR, July 12, 2023. https://www.npr.org/2023/07/12/1187354558/flavored-vapes-are-supposed-to-be-illegal-but-theyre-still-widely-available.

States e-vapor market.[46] An additional study conducted by the WSPM group found that 97.9% of e-vapor products in circulation were flavored in California, even though flavored tobacco of any kind is also banned under state law.[47,48] Therefore, this 97.9% figure can also be considered a high-end measure of illicit market participation. Chmura considers this to be an **upper-bound** estimate for the VLNC scenario as differences still exist—namely FDA enforcement is still unreliable, and there is significant political pressure for improved enforcement.[49] Also, state-level bans cannot be fully representative of a nationwide ban.

Smoker Survey: Importantly, none of the aforementioned scenarios are one-to-one comparisons. One study, however, tests this scenario directly via survey. The study tested whether learning about a potential VLNC standard increases smokers' interest in illicit cigarette purchases. Overall, 36% of smokers who learned about the VLNC standard indicated interest in purchasing illegal cigarettes.[50] Several challenges remain when determining the illicit market's growth. For example, just because an individual would be interested in obtaining illicit cigarettes does not mean he/she would be able to. Additionally, this is a survey reporting stated preferences;[51] therefore, upward and/or downward bias on this number may exist. For example, some interviewees might not want to admit that they are interested in illicit market purchases, thus biasing the survey results downward. Therefore, Chmura considers this as a **low-average** estimate of illicit market use compared to the proposed VLNC restriction.

Other Considerations: Several limiting factors to the illicit cigarette market also exist. Specifically, the nature of the illicit cigarette market in the United States would need to change from one of tax evasion (buying cigarettes in lower-taxed states to sell in higher-taxed states) to one of illegal import and manufacturing. Some commentators on this subject have expressed that, because of these limitations, there would likely be no significant risk to illicit markets from a VLNC regulation. Specifically, Eric Lindblom claims in an article that, "new illicit trade that might emerge would inevitably be too small to interfere seriously with the nicotine rule's public health gains."[52] While the full-nicotine illicit cigarette market may indeed be more difficult to operate while evading law enforcement, this does not mean that the resulting illicit market would have negligible market strength. However, evidence on today's current market demonstrates that international illicit actors have enjoyed significant success penetrating domestic tobacco markets. One can look to the current illicit market in the e-vapor market, (see above) which is currently dominated by illicit import products. In addition, the illicit drug trade is a similar market that law enforcement has been unable to significantly reduce. In fact, it is estimated that Americans spent over $150 billion on illicit cocaine, heroin, marijuana, and methamphetamine in 2016.[53] Additionally, Mexican cartels are already reported to be involved in the illicit cigarette manufacturing market.[54] The eventual size of the illicit market ultimately depends on the enforcement effectiveness, production capacity, and substitute popularity. However, because similar restricted products have not seen law enforcement be 100% effective in combating illicit market activity, Chmura does not believe it is reasonable to model an outcome where the illicit cigarette market is of negligible size.

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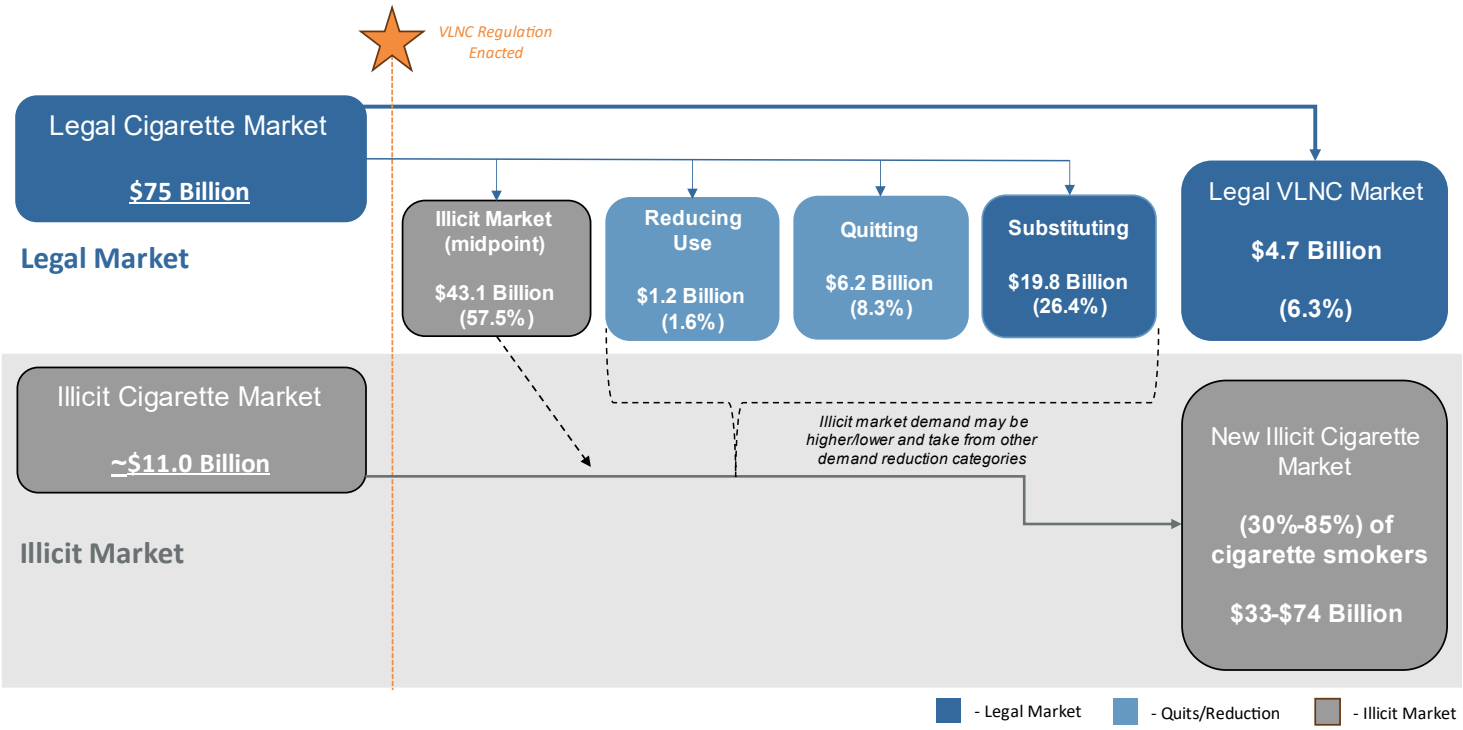
[46] Tobacco Insider, "Illicit Trade – RRPs: The US," April 26, 2024, https://tobaccoinsider.com/illicit-trade-rrps-the-us/.
[47] WSPM Group, "Empty Packs Survey USA-CA, Q2 2023," August 2023.
[48] California Department of Public Health, "California Prohibits Retailers from Selling Flavored Tobacco Products," February 12, 2024, https://www.cdph.ca.gov/Programs/CCDPHP/DCDIC/CTCB/Pages/CAFlavorTobaccoLaw.aspx.
[49] Christina Jewett, "Illicit E-Cigarettes Flood Stores as F.D.A. Struggles to Combat Imports," The New York Times, October 10, 2023, https://www.nytimes.com/2023/10/10/health/illegal-vapes-ecigarettes-fda.html.
[50] Hall et al., "Interest in Illicit Purchase of Cigarettes Under a Very Low Nicotine Content Product Standard," *Nicotine Tobacco Research*, December 2019, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6939751/.
[51] "Stated preference" studies test individuals' stated behavior in a hypothetical setting. These tests, while useful, can be prone to bias as they may not accurately reflect actual actions in a real-life setting.
[52] Eric Lindblom, "Illicit Trade Poses No Threat to an FDA Rule to Minimize Nicotine in Smoked Tobacco Products," *American Journal of Public Health*, July 2019, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6603443/.
[53] Midgette et al., "What America's Users Spend on Illegal Drugs, 2006–2016," RAND, August 20, 2019, https://www.rand.org/pubs/research_reports/RR3140.html.
[54] Peter Appleby, "Jalisco Cartel Cashing in on Mexico's Illegal Cigarette Market," InSight Crime, June 8, 2022, https://insightcrime.org/news/jalisco-cartel-cashing-in-on-mexicos-illegal-cigarette-market/.

As discussed previously, the current illicit cigarette market would need to change from one of mainly tax evasion to one of illegal manufacturing. While there would be less demand for VLNCs via tax evasion, the demand represented by the illicit market is still tangible in terms of volume. Some of the current illicit market may not continue in this theoretical future state scenario, but for the sake of simplicity, Chmura estimates that the $11.0 billion currently in the illicit market remains in the future state. Together the $11.0 billion tax evasion market plus the 30% to 85% illicit cigarette market created by the VLNC restriction brings the **total illicit cigarette market size to $33 to $74 billion**.[55]

Figure 2.2: The Illicit Cigarette Market Would Likely Act as a "Parallel" Market (Midpoint Assumptions)



Source: Chmura Economics & Analytics

Figure 2.2 illustrates how this theoretical future market would operate under a VLNC regulation, with the illicit market running parallel to the legal market.[56] While the model segments demand reduction by column, specific consumers may still participate in one or both markets. For example, a smoker unenthused by VLNCs may supplement some of their past use with e-cigarettes and also turn to the black market for illicit cigarettes. Therefore, Chmura assumes that additional lost legal cigarette demand could leak into the illicit market (Figure 2.2 represents midpoint estimates). However, pinpointing exact leakage from each major cigarette demand reduction category would be difficult and likely inaccurate at this time.

[55] The total market size estimate was computed by applying the 30% and 85% range estimates to the current United States cigarette market size and adding that to an illicit cigarette market size estimate. This assumes no change to average cigarette price.
[56] The $75 billion cigarette market represents 2023 estimated gross receipts, not retailer revenue.

3. Economic Impact in the United States

3.1. FDA Rule and Key Assumptions

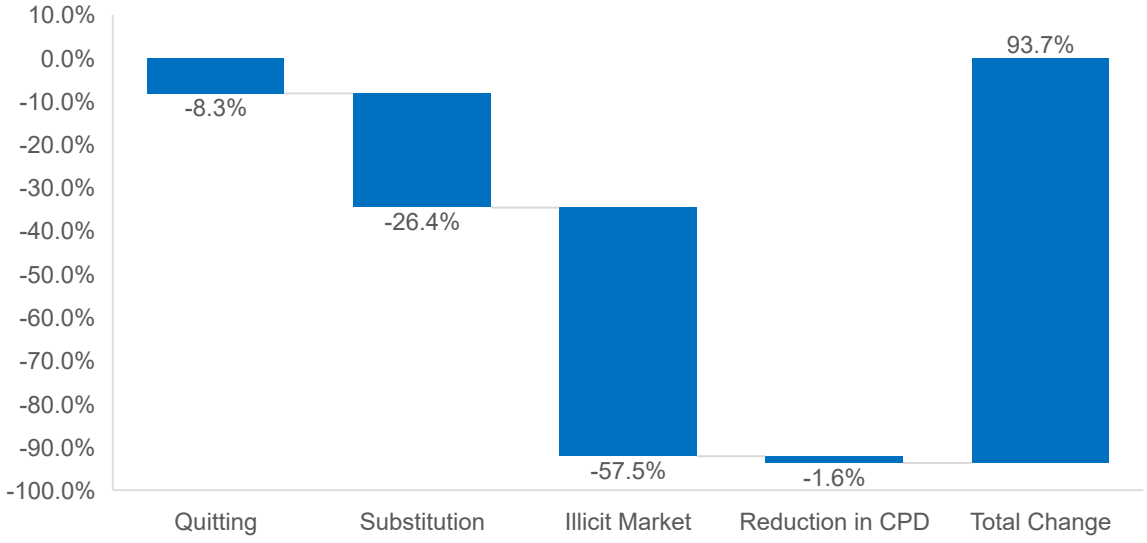
Section 2.1 of the literature review has provided strong justification for the key assumptions that will drive the economic impact of the proposed FDA rule. Those key assumptions are summarized below:

1. It is assumed that the FDA rule will apply to cigarettes and cigar products. As a result, consumers will not be able to utilize cigars as a substitute.

2. Based on a literature review and studies related to the VLNC's current market share, it is assumed that if the FDA rule is imposed, it will cause dramatic changes in consumer behavior. It is assumed that the remaining legal VLNC market will be only 6.3% of the existing cigarette market size.

3. It is assumed that quitting will reduce total cigarette demand by 8.3%, and substitution with other legal tobacco products will reduce cigarette sales by 26.4% (Figure 3.1). Further, leakage to the illicit market will result in a 57.5% demand reduction and another 1.6% drop due to reduced consumption. There is overlap among those last groups, as consumers seeking legal substitutes may also purchase cigarettes from illicit markets.

Figure 3.1: Legal Market will Decline by 93.7%



Source: Chmura Economics & Analytics

4. Regarding substitution with other legal tobacco products, based on the previous literature, it is assumed that e-vapor products are the most popular options, followed by nicotine pouches and other oral products including NRT products (Nicotine Replacement Therapy),[57] moist snuff, and snus. In determining the effect on sales for those substitutes, Chmura equates those substitutes to average daily cigarette use based on nicotine intake.

Chmura's impact analysis of the proposed FDA rule uses 2023 as a benchmark. This study intends to determine what the impact would be if the FDA rules on nicotine content were imposed on the sales data of 2023. Even though, in reality, it may take years for such a rule to be implemented and reach its maximum effect. Chmura chose 2023 as a benchmark since there is uncertainty related to the timing of the proposed regulation. Rather than projecting tobacco product sales for future

[57] Sales data for NRT are not available, and this product is excluded from the analysis.

years and performing an impact analysis with respect to the projections, this analysis uses the latest actual data as the benchmark. More importantly, the relative changes in retail sales and tax revenue are compared with the benchmark year's data.

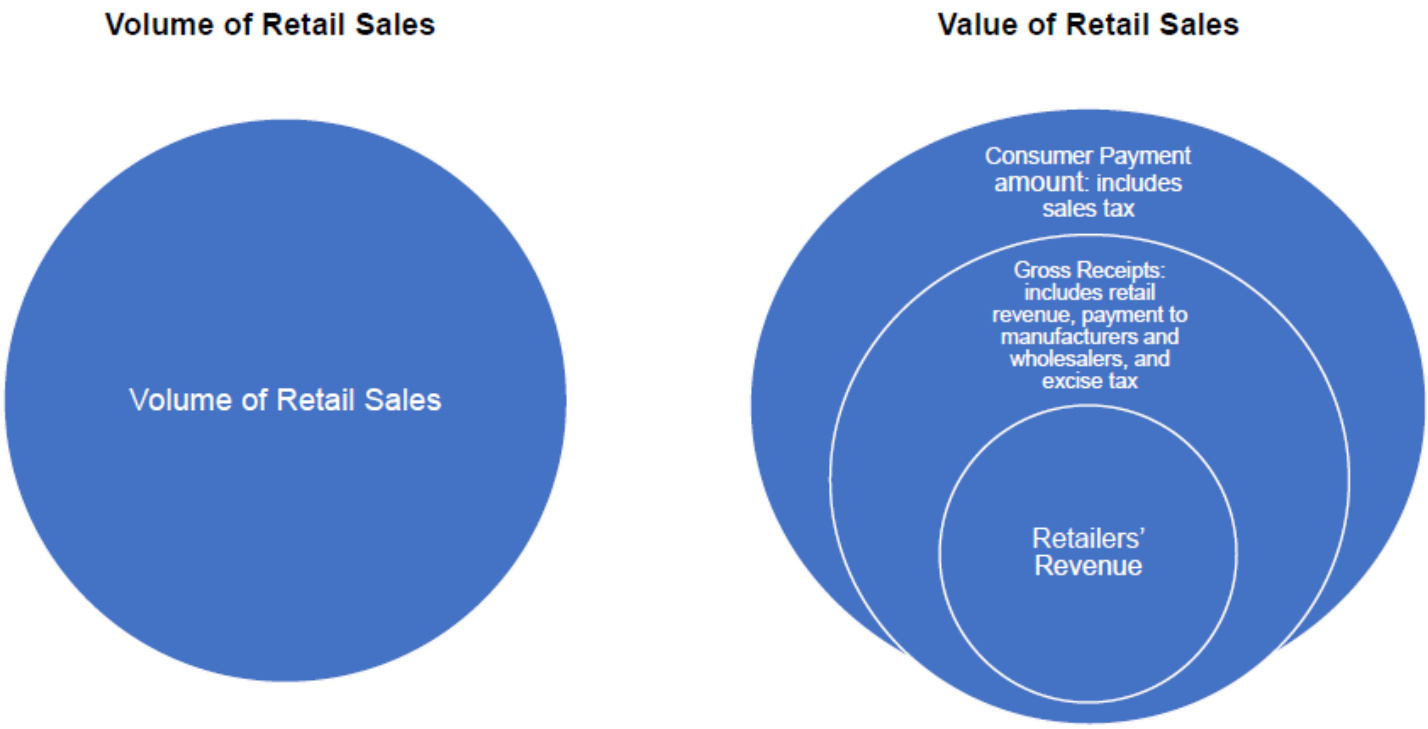
In addition, Chmura does not assume any price change of tobacco products in this analysis. Granted, changes in demand and supply of various tobacco products will affect their prices as well. However, introducing price changes will render this analysis overly complicated.

3.2. Effect on Tobacco Product Sales and Ancillary Retail Sales

If the FDA imposes its rule on a maximum nicotine level for cigarettes, it will affect sales for various tobacco products and ancillary retail sales. As consumers quit, switch to substitutes, or seek products from the illicit market, it is expected that legal sales of cigarettes (VLNC) will decline. Since some consumers will seek substitutes such as e-vapor, moist snuff, nicotine pouches, and other oral products, sales from those substitute products will increase. Imposing any new restrictive regulation, such as a federal nicotine level limit, will trigger a series of events. Economic theory on consumer demand indicates that ancillary retail sales will increase as consumers change their purchase behavior of tobacco products. That is because tobacco products are usually the main motivation for consumers to visit convenience stores and other retail outlets. Tobacco consumers will also purchase other retail products during their visits.

There are multiple ways to measure retail sales. In general, retail sales are sales of merchandise or services at retail establishments. In this report, retail sales can be defined as either the volume of sales or the value of sales (see Figure 3.2).

Figure 3.2: Definition of Retail Sales



Source: Chmura Economics & Analytics

When measuring the economic impact of the proposed FDA rule change, it is important to distinguish between different measurements of the value of retail sales. Specifically, the value of sales can be measured as the consumer payment amount, gross receipts, and retailers' revenue. The cost to consumers is the broadest measure of the value of retail sales, defined as the final price paid by consumers multiplied by the sales volume. The final price includes the cost of products paid to manufacturers and wholesalers as well as federal, state, and local excise taxes.

Gross receipts are estimated by multiplying the volume of sales by the tobacco product price (excluding sales tax). The price used in the gross receipts' calculation includes many pass-through items, such as the cost of products paid to manufacturers and wholesalers, and excise taxes paid to federal, state, and local governments. Sales tax is not included in this definition.

Finally, retailers' revenue excludes any payments made to manufacturers or wholesalers. It also excludes taxes paid to federal, state, and local governments. Retailers' revenue is most closely related to the money received by retail merchants. In essence, it is the margin for retailers. This money, in turn, is used to hire and pay workers, pay rent and utilities, and acquire services to maintain operations. Industry data indicate that the retail margin is about 16.9% for cigarettes and 29.0% for other tobacco products.[58]

Table 3.1 presents the estimated effects of the proposed FDA rule on national retail sales. Using cigarettes as an example, it is estimated that the proposed FDA rule will lead to a 93.7% decline in cigarette volume sales. In terms of changes in retail sales value, national retailers will experience a decrease of $70.3 billion in gross receipts, and a decrease of $10.1 billion in retailers' revenue for cigarettes. Since Chmura does not assume any price changes, the retail revenue for cigarettes is expected to decline by 93.7% as well.

Table 3.1: National Retail Sales Impact is -$71.4 Billion in Gross Receipts

		Cigarettes	Moist Snuff Tobacco	E-Vapor	Nicotine Pouch/ Oral	Snus	Ancillary Retail	Total
Before FDA Rule Change	2023 Gross Receipts (Million)	$75,012.7	$7,495.4	$5,668.0	$2,405.1	$226.3		**$90,807.6**
	2023 Retail Revenue (Million)	$10,796.4	$1,077.6	$830.2	$354.1	$33.4		**$13,091.7**
	2023 Volume (Million)	8,532.8	1,295.0	1,316.6	504.6	48.2		
After FDA Rule Change	Estimated Volume Change	-7,995.2	40.5	3,277.6	218.3	7.7		
	Estimated Volume Change (%)	-93.7%	3.1%	248.9%	43.3%	15.9%		
	Estimated Gross Receipts (Million)	$4,725.8	$7,729.9	$19,778.1	$3,445.8	$262.3		**$35,941.8**
	Estimated Retail Revenue (Million)	$680.2	$1,111.3	$2,897.0	$507.3	$38.7		**$5,234.5**
	Estimated Change Gross Receipts (Million)	-$70,286.9	$234.4	$14,110.1	$1,040.6	$36.0	-$16,527.8	**-$71,393.6**
	Estimated Change in Retail Revenue (Million)	-$10,116.2	$33.7	$2,066.8	$153.2	$5.3	-$6,028.7	**-$13,885.9**

Note: Volume units for cigarettes – one million packs, MST – one million cans, and e-vapor – one million mLs.
Source: NATO and Chmura

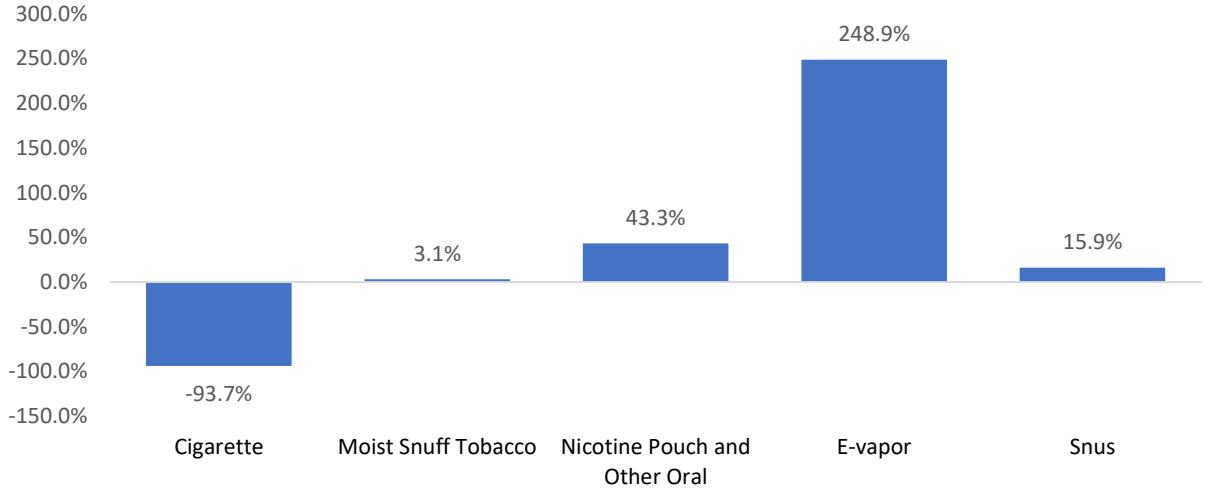
For other tobacco products that can serve as substitutes for cigarettes, their sales are expected to increase as cigarette users switch to those products. E-vapor products are expected to experience the largest increase.[59] Compared with their 2023 values, volume and retail revenues are expected to increase 248.9%, or $2.1 billion in retail revenue. Sales volume and revenue for moist snuff tobacco are expected to increase 3.1%, or $33.7 million. For nicotine pouches and other oral products, sales volume and revenue are expected to increase 43.3% or $153.2 million. Finally, for snus, its sales volume and revenue are expected to increase 15.9% or $5.3 million.

[58] This data was provided by NATO.
[59] For this estimate, Chmura used literature that was conducted before the FDA e-vapor flavor restrictions. If flavor restrictions become more strongly enforced nationwide, the popularity of e-vapor as a substitute may drop.

Ancillary retail will suffer as a result of the volume decline of cigarette sales. For adults who purchase tobacco products, these transactions often include prominent add-on purchases such as gas, packaged beverages, candy, snacks, and other products. A 2018 study showed that these ancillary retail sales are 30% of total purchases consumers make at tobacco retailers. As the new FDA rule results in a drastic decline in legal cigarette sales, cigarette consumers will make fewer trips to retailers. Increased purchases of substitute tobacco products will boost ancillary retail sales, but this increase will not be able to offset the decline due to cigarette purchase reduction. The net loss in retailers' revenue from ancillary merchandise is estimated at $6.1 billion.

If the new FDA rule were to be imposed on 2023 sales, the total estimated annual loss of retailers' revenue in the United States would have been $13.9 billion.

Figure 3.3: Changes in Sales Volume of Tobacco Products



Source: Chmura Economics & Analytics

3.3. Effect on Federal, State and Local Tax Revenue

Changes in sales of different tobacco products and ancillary retail items will lead to an overall reduction in tax revenue for state and local governments. The main revenue sources affected are state and local excise taxes on tobacco products and state and local sales taxes on tobacco products and ancillary merchandise.

Table 3.2 summarizes the impact of such change on federal, and all state and local governments' tax revenue for the nation. In total, if the FDA rule were to be imposed on 2023 sales, federal, state and local governments would see a combined tax revenue reduction of $24.0 billion, down from $32.5 billion without the rule change. State excise taxes on tobacco products account for the largest share of the decline ($11.4 billion), followed by a $8.0 billion reduction in federal exercise tax, and a $3.1 billion reduction of the state sales tax. Reductions in local tax account for the remaining tax revenue losses.

Table 4.3: Federal, State, and Local Taxes Impact (Million)

		Cigarettes	Moist Snuff Tobacco	E-Vapor	Nicotine Pouch/Oral	Snus	Ancillary Retail	Total
Federal Excise Tax	Current (2023)	$8,589.1	$146.7	$0.0	$0.0	$3.9	$0.0	**$8,739.6**
	After Rule Change	$541.1	$151.2	$0.0	$0.0	$4.5	$0.0	**$696.8**
	Change	**-$8,048.0**	**$4.6**	**$0.0**	**$0.0**	**$0.6**	**$0.0**	**-$8,042.8**
State Excise Tax	Current (2023)	$13,871.7	$1,389.2	$593.4	$159.6	$56.5	$0.0	**$16,070.5**
	After Rule Change	$873.9	$1,432.6	$2,070.7	$228.7	$65.5	$0.0	**$4,671.5**
	Change	**-$12,997.8**	**$43.4**	**$1,477.3**	**$69.1**	**$9.0**	**$0.0**	**-$11,399.0**
Local Excise Tax	Current (2023)	$459.5	$23.5	$16.4	$2.2	$0.8	$0.0	**$502.3**
	After Rule Change	$28.9	$24.2	$57.1	$3.1	$0.9	$0.0	**$114.3**
	Change	**-$430.6**	**$0.7**	**$40.8**	**$0.9**	**$0.1**	**$0.0**	**-$388.0**

Table 4.3: Federal, State, and Local Taxes Impact (Million)

		Cigarettes	Moist Snuff Tobacco	E-Vapor	Nicotine Pouch/Oral	Snus	Ancillary Retail	Total
State Sales Tax	Current (2023)	$3,203.0	$332.3	$272.3	$114.1	$9.2	$1,481.9	**$5,412.9**
	After Rule Change	$201.8	$342.7	$950.3	$163.5	$10.7	$579.8	**$2,248.8**
	Change	**-$3,001.2**	**$10.4**	**$678.0**	**$49.4**	**$1.5**	**-$902.1**	**-$3,164.1**
Local Sales Tax	Current (2023)	$1,057.1	$105.1	$83.3	$38.9	$2.9	$487.8	**$1,775.2**
	After Rule Change	$66.6	$108.4	$290.7	$55.7	$3.4	$190.0	**$714.8**
	Change	**-$990.5**	**$3.3**	**$207.4**	**$16.8**	**$0.5**	**-$297.9**	**-$1,060.3**
Total Federal, State, & Local Tax	Current (2023)	$27,180.4	$1,996.7	$965.5	$314.8	$73.4	$1,969.8	**$32,500.5**
	After Rule Change	$1,712.4	$2,059.2	$3,368.9	$451.0	$85.0	$769.8	**$8,446.3**
	Change	**-$25,468.0**	**$62.4**	**$2,403.4**	**$136.2**	**$11.7**	**-$1,200.0**	**-$24,054.3**

Source: NATO and Chmura

Chmura utilized the retail sales volume decline estimated in Section 2.1 to arrive at those estimates. For federal excise taxes on tobacco products, since they are levied based on volume of sales, Chmura is able to estimate the change in federal tax for different products. Primarily, the current federal excise tax is $1.01 per pack on cigarettes, a reduction in sales volume of 93.7% will result in an $8.0 billion reduction in this tax, from $8.6 billion without FDA rule change to only $541.1 million after. The Federal government will benefit from increased tax receipts from moist snuff tobacco and snus due to substitution. Currently, the federal government has no tax on e-vapor and nicotine pouch products.

For state and local exercise tax on cigarettes, since almost all state and local excise taxes are on a per-pack basis, the reduction in sales volume results in a loss of $13.0 billion in state excise tax and a loss of $430.6 million in local excise tax.[60] For other tobacco products, since their sales are expected to increase under the FDA rule, the state and local excise taxes are estimated to increase. For example, for e-vapor products, state excise tax is expected to increase by $1.5 billion, while local excise tax is estimated to increase by $40.8 million.

State and local sales tax estimates are more complicated. Many states allow sales tax to be assessed on top of excise tax (or on gross receipts). However, some states exclude tobacco products from sales tax as they are subject to excise tax. Overall, reductions in cigarette sales also result in lower sales tax for state and local governments, estimated at losses of $3.0 billion and $990.5 million, respectively. In addition, the loss of ancillary retail sales will cause a decline of $902.1 million in state sales tax revenue and a loss of $297.9 million in local sales tax revenue. Increased sales of tobacco products that are substitutes for cigarettes will result in more sales tax for state or local governments, but not enough to compensate for the drastic decline resulting from reduced cigarette and ancillary retail sales. In total, state and local sales taxes are estimated to decline by $3.2 billion and $1.1 billion, respectively.

3.4. Effect on Master Settlement Agreement Payments

The Tobacco Master Settlement Agreement (MSA) was an agreement made in 1998 between 46 states, five United States territories, the District of Columbia, and the four largest tobacco manufacturers at the time. The MSA requires that the original participating manufacturers (OPMs) pay settlements to the participating states, the District of Columbia, and territories in perpetuity, to help mitigate the costs associated with tobacco consumption. The MSA also imposed restrictions on how tobacco companies could advertise their products, which was intended to prevent the companies from advertising to youth.[61] Outside of the MSA, the states of Florida, Minnesota, Mississippi, and Texas have their own settlement agreements with major tobacco manufacturers.

[60] Please note that due to tax rate changes, and different estimation methods, this estimate may not be wholly consistent with other estimates such as that contained in The Tax Burden on Tobacco, 2022.

[61] National Association of Attorneys General, The Master Settlement Agreement, accessed June 5, 2024, https://www.naag.org/our-work/naag-center-for-tobacco-and-public-health/the-master-settlement-agreement/.

The total settlement amount under the MSA is calculated each year. That amount is then distributed to participating states, territories, and the District of Columbia, and is based on a fixed ratio. Under the MSA, the current total settlement amount starts at $9.0 billion each year. This amount is then adjusted for inflation and cigarette sales volume. Each year, the settlement amount increases by 3.0% or by the consumer price index (CPI) of the previous year if the CPI exceeds 3.0%. Volume adjustment compares cigarette sales volume each year with the volume of 1998, as well as with the ratio used to adjust the settlement amount. Additional adjustments, such as settlement credits, are allowed under the MSA. While the inflation adjustment increases the total settlement amount, the volume adjustment tends to reduce the total settlement amount, as cigarette smoking in the nation is on a downward trend. The settlement amounts for the four non-participating states are computed in a similar fashion.

Data from the National Association of Attorneys General (NAAG) show that the 2023 total payment (calculated based on 2022 volume) was $6.34 billion. Based on cigarette volume from 2023, the 2024 payment is $5.80 billion under the MSA. Excluding payment to U.S. territories and adding back payment to the four non-participating states,[62] the total settlement payment to the 50 states and the District of Columbia is estimated at $6.66 billion, also based on 2023 volume.

If the FDA rule is implemented, cigarette sales volume would dramatically decrease. Using the computed volume reduction for 2023, **it is estimated that total 2024 MSA payments to the 50 states and the District of Columbia will be reduced by $5.56 million, to only $1.10 billion per year. This is equivalent to an 83.5% reduction in total payments to all states.** Table 5.1 in the next section presents the estimated reduced settlement amount for each state.

3.5. Broader Economic Impact

The loss of sales for tobacco retailers will also have ripple effects throughout the national economy. For example, due to lost sales of cigarette and ancillary retail, retailers will cut back their purchases from national suppliers to maintain their operations (indirect impact). In addition, due to lost sales, retailers such as convenience stores may need to cut hours for store clerks or even lay off some workers. That will affect other businesses serving the retail industry employees because of the induced impact.

Chmura used its proprietary JobsEQ® economic impact model to estimate the additional economic impact due to lost sales of tobacco products and ancillary merchandise. The estimated broad economic impact is presented in Table 3.3. Chmura's estimate shows that national retail merchants will experience a reduction in retailers' revenue of $13.9 billion (as evaluated in Section 3.2), which is the direct impact for national retail businesses. This represents a loss of 95,511 jobs nationally, with an associated lost labor income of $4.2 billion. The indirect impact is estimated to be $7.1 million in lost economic output in industries providing goods and services to retail businesses, such as transportation, utilities, and professional services. This represents a loss of 22,882 jobs, with an associated lost labor income of $2.1 billion. Finally, the induced impact is estimated to be a loss of $9.6 billion in economic output. Since the source of the induced impact is lost labor income, the impacted industries are concentrated in consumer service businesses such as retail, restaurants, and health care services. This represents a loss of 36,084 jobs, with lost labor income of $3.2 billion. In total, if the proposed FDA rule is enacted, the national economy could lose $30.6 billion in economic output, 154,478 jobs, and $9.5 billion in labor income. The estimated loss of economic impact is permanent, as compared with the 2023 level.

Table 3.3: Broad Economic Impact in the United States

	Direct	Indirect	Induced	Total
Sales/Output (Million)	-$13,885.9	-$7,121.1	-$9,581.6	**-$30,588.7**
Labor Income (Million)	-$4,212.2	-$2,112.1	-$3,152.9	**-$9,477.2**
Employment	-95,511	-22,882	-36,084	**-154,478**

Source: Chmura

[62] The settlement amounts for the four non-participating states were calculated separately.

4. State Impact Summary

Chmura uses the same approach to analyze the impact of the proposed FDA rule change in each state and for the District of Columbia. Table 5.1 summarizes the key impacts, including total retailers' revenue, total state and local tax revenue, and total economic impact.[63]

Table 4.1: State Impact Summary

State	(1) Direct Output Impact on Retail Revenue (Million)	(2) Total Output Impact (Direct+ Indirect+ Induced, Million)	(4) Total Employment Impact	(3) Total Labor Income Impact (Million)	(5) State and Local Taxes Impact (Million)	(6) MSA Change (Million)	(7) State and Local Revenue Impact (Million)	(8) Aggregate Economic and Fiscal Impact (Million)
Alabama	-$320.7	-$695.2	-3,949	-$209.4	-$294.0	-$77.7	-$371.6	-$1,066.9
Alaska	-$45.8	-$86.4	-455	-$27.3	-$63.3	-$16.4	-$79.7	-$166.1
Arizona	-$235.6	-$527.8	-2,359	-$154.8	-$346.7	-$70.8	-$417.5	-$945.3
Arkansas	-$149.6	-$311.3	-1,909	-$99.0	-$181.2	-$39.8	-$220.9	-$532.2
California	-$902.8	-$2,118.9	-8,319	-$662.1	-$1,310.4	-$613.3	-$1,923.7	-$4,042.5
Colorado	-$135.4	-$308.5	-1,369	-$96.6	-$133.2	-$65.9	-$199.1	-$507.6
Connecticut	-$120.5	-$268.7	-1,178	-$79.9	-$247.6	-$89.2	-$336.8	-$605.6
Delaware	-$68.3	-$145.2	-711	-$38.0	-$83.1	-$19.0	-$102.1	-$247.3
District of Columbia	-$2.8	-$5.8	-22	-$1.6	-$4.3	-$29.2	-$33.5	-$39.2
Florida	-$775.3	-$1,754.2	-8,226	-$520.6	-$870.9	-$263.7	-$1,134.6	-$2,888.8
Georgia	-$537.0	-$1,268.3	-6,554	-$395.4	-$323.6	-$117.9	-$441.6	-$1,709.8
Hawaii	-$60.8	-$123.5	-556	-$34.9	-$87.4	-$28.9	-$116.3	-$239.8
Idaho	-$57.4	-$116.8	-657	-$36.8	-$43.5	-$17.5	-$60.9	-$177.8
Illinois	-$508.3	-$1,164.6	-5,544	-$380.8	-$926.7	-$223.6	-$1,150.3	-$2,314.9
Indiana	-$452.1	-$950.5	-5,441	-$301.7	-$373.6	-$98.0	-$471.6	-$1,422.1
Iowa	-$135.5	-$272.9	-1,650	-$82.3	-$171.9	-$41.8	-$213.7	-$486.7
Kansas	-$86.0	-$189.4	-1,111	-$59.9	-$116.2	-$40.1	-$156.2	-$345.6
Kentucky	-$397.5	-$805.5	-4,782	-$256.2	-$346.6	-$84.6	-$431.2	-$1,236.7
Louisiana	-$259.9	-$531.1	-3,104	-$162.6	-$282.3	-$108.4	-$390.7	-$921.7
Maine	-$65.1	-$123.5	-680	-$37.9	-$58.8	-$37.0	-$95.8	-$219.3
Maryland	-$196.7	-$442.8	-2,075	-$135.9	-$210.2	-$108.6	-$318.8	-$761.6
Massachusetts	-$213.0	-$451.2	-1,923	-$133.9	-$313.6	-$194.1	-$507.7	-$958.9
Michigan	-$550.7	-$1,205.9	-6,301	-$370.4	-$708.0	-$209.1	-$917.2	-$2,123.1
Minnesota	-$237.7	-$540.3	-2,681	-$175.5	-$311.6	-$122.3	-$433.9	-$974.2
Mississippi	-$162.5	-$314.0	-2,053	-$99.3	-$129.5	-$81.5	-$211.0	-$525.0
Missouri	-$499.7	-$1,066.2	-5,888	-$340.0	-$280.2	-$109.3	-$389.5	-$1,455.7
Montana	-$41.0	-$79.7	-449	-$23.2	-$48.8	-$20.4	-$69.2	-$149.0
Nebraska	-$85.1	-$177.1	-990	-$58.5	-$63.1	-$28.6	-$91.7	-$268.7
Nevada	-$159.3	-$337.8	-1,613	-$95.0	-$182.8	-$29.3	-$212.1	-$549.9
New Hampshire	-$154.1	-$318.3	-1,466	-$95.3	-$142.6	-$32.0	-$174.6	-$492.9
New Jersey	-$323.0	-$727.0	-3,146	-$225.1	-$489.2	-$185.8	-$675.0	-$1,402.0
New Mexico	-$78.3	-$150.0	-864	-$45.0	-$98.1	-$28.7	-$126.8	-$276.8
New York	-$423.6	-$945.5	-3,920	-$293.0	-$902.0	-$613.2	-$1,515.2	-$2,460.7
North Carolina	-$663.7	-$1,517.0	-8,117	-$468.1	-$407.6	-$112.1	-$519.6	-$2,036.7
North Dakota	-$54.1	-$107.0	-560	-$34.7	-$33.3	-$17.6	-$50.9	-$157.9
Ohio	-$672.6	-$1,506.1	-8,070	-$464.0	-$830.0	-$242.1	-$1,072.1	-$2,578.2
Oklahoma	-$236.5	-$479.4	-2,869	-$150.9	-$293.5	-$49.8	-$343.3	-$822.7
Oregon	-$147.9	-$306.2	-1,527	-$97.2	-$170.0	-$55.1	-$225.2	-$531.4
Pennsylvania	-$627.2	-$1,345.5	-6,861	-$426.7	-$786.0	-$276.1	-$1,062.1	-$2,407.6

[63] The Appendix includes impact summaries for each state and each congressional district in the country.

Table 4.1: State Impact Summary

State	(1) Direct Output Impact on Retail Revenue (Million)	(2) Total Output Impact (Direct+ Indirect+ Induced, Million)	(4) Total Employment Impact	(3) Total Labor Income Impact (Million)	(5) State and Local Taxes Impact (Million)	(6) MSA Change (Million)	(7) State and Local Revenue Impact (Million)	(8) Aggregate Economic and Fiscal Impact (Million)
Rhode Island	-$57.3	-$122.0	-589	-$37.8	-$123.4	-$34.5	-$158.0	-$280.0
South Carolina	-$266.7	-$589.6	-3,341	-$181.5	-$200.3	-$56.5	-$256.8	-$846.5
South Dakota	-$43.0	-$82.8	-496	-$25.2	-$48.3	-$16.8	-$65.1	-$147.9
Tennessee	-$423.5	-$939.0	-4,911	-$280.9	-$359.1	-$117.3	-$476.4	-$1,415.4
Texas	-$997.7	-$2,343.7	-11,077	-$727.0	-$1,213.1	-$347.6	-$1,560.7	-$3,904.4
Utah	-$57.1	-$124.4	-611	-$38.5	-$40.9	-$21.4	-$62.3	-$186.7
Vermont	-$7.7	-$14.8	-75	-$4.6	$9.9	-$19.8	-$9.8	-$24.6
Virginia	-$488.2	-$1,099.3	-5,706	-$354.3	-$363.3	-$98.3	-$461.6	-$1,560.9
Washington	-$198.2	-$436.8	-1,699	-$126.7	-$358.6	-$98.7	-$457.3	-$894.1
West Virginia	-$173.9	-$333.0	-2,092	-$103.9	-$173.2	-$42.6	-$215.8	-$548.7
Wisconsin	-$302.2	-$665.5	-3,638	-$211.0	-$461.8	-$99.6	-$561.4	-$1,226.8
Wyoming	-$27.2	-$52.8	-294	-$16.3	-$14.0	-$11.9	-$26.0	-$78.7
United States	**-$13,885.9**	**-$30,588.7**	**-154,478**	**-$9,477.2**	**-$16,011.5**	**-$5,563.4**	**-$21,574.8**	**-$52,163.5**

Source: Chmura

Chmura's estimates show that the proposed FDA regulation has negative impacts on each state and the District of Columbia. Using Alabama as an example, retail merchants in the state will experience a loss of $320.7 million in retailers' revenue from reduced sales of cigarettes and ancillary retail. State and local governments in Alabama will see a reduction of $294.0 million in tax revenue from the tobacco product excise tax and retail sales tax. In total, the state economy will lose $695.2 million in economic output, resulting in losses of 3,949 jobs and $209.4 million in labor income. The state will also lose $77.7 million in MSA settlement payments. The effects of the proposed legislation on other states and the District of Columbia can be interpreted similarly.

5. Conclusion

Chmura estimates that the proposed new FDA rule limiting the nicotine content of cigarettes will negatively affect the national tobacco retail industry and the broader economy. Using 2023 data, it is projected that tobacco retailers in the United States will lose $13.9 billion of revenue per year, as well as 95,511 jobs in those retail establishments. Other industries related to retail will also be affected. Adding indirect and induced impacts, the national economy could lose $30.6 billion in economic output per year, with an estimated 154,478 jobs being lost. Federal, state and local governments will also be negatively impacted. Chmura estimates that federal exercise tax on tobacco products will decline by $8.0 billion. In addition, tax revenue for state and local governments will decline by $16.0 billion per year. Moreover, payments to states via the Tobacco Master Settlement Agreement (MSA) and payments to the other four states pursuant to separate settlements will decline by $5.6 billion, with a total revenue loss for state and local governments reaching $21.6 billion per year.

Appendix 1: Analysis Methodology

Chmura analyzes the effect of the FDA's "Tobacco Product Standard for Nicotine Level of Combusted Cigarettes" at the national, state, and congressional district level on the following important economic indicators:

- Retail sales at the state and congressional district levels
- Federal, state and local tobacco excise tax revenue
- State and local retail sales tax revenue
- State revenue under the Master Settlement Agreement (MSA)
- Economic output, labor income, and employment impact (jobs) at the national, state, and congressional district levels

The steps Chmura followed to determine the impact on the economic indicators is as follows:

1. Obtain demand reduction estimates for cigarettes and demand increase estimates for substitute nicotine products as a result of the proposed maximum nicotine limit (see *Section 2: Literature Review* for more details).
2. Apply the percentage change in sales volume (Step 1) to FY2023 product sales to calculate the change in sales volume by product type.
3. Use the change in sales volume by product type to estimate:
    a. Change in gross receipts and retailers' revenue from tobacco products
    b. Change in gross receipts and retailers' revenue from ancillary retail
4. Calculate the change in state and local excise tax revenue using the change in retail volume for tobacco products (Step 2).
5. Calculate the change in state and local retail sales tax revenue using the change in gross receipts for tobacco products (Step 3a) and ancillary retail (Step 3b).
6. Calculate the change in MSA payments to states using the change in tobacco retail volume (Step 3a).
7. Calculate the broad economic impact using the change in retailers' revenue for tobacco products (Step 3a) and ancillary products (Step 3b).

For more details on the methodology, please see below.

A1.1. Approach to Retail Sales of Tobacco Retailers

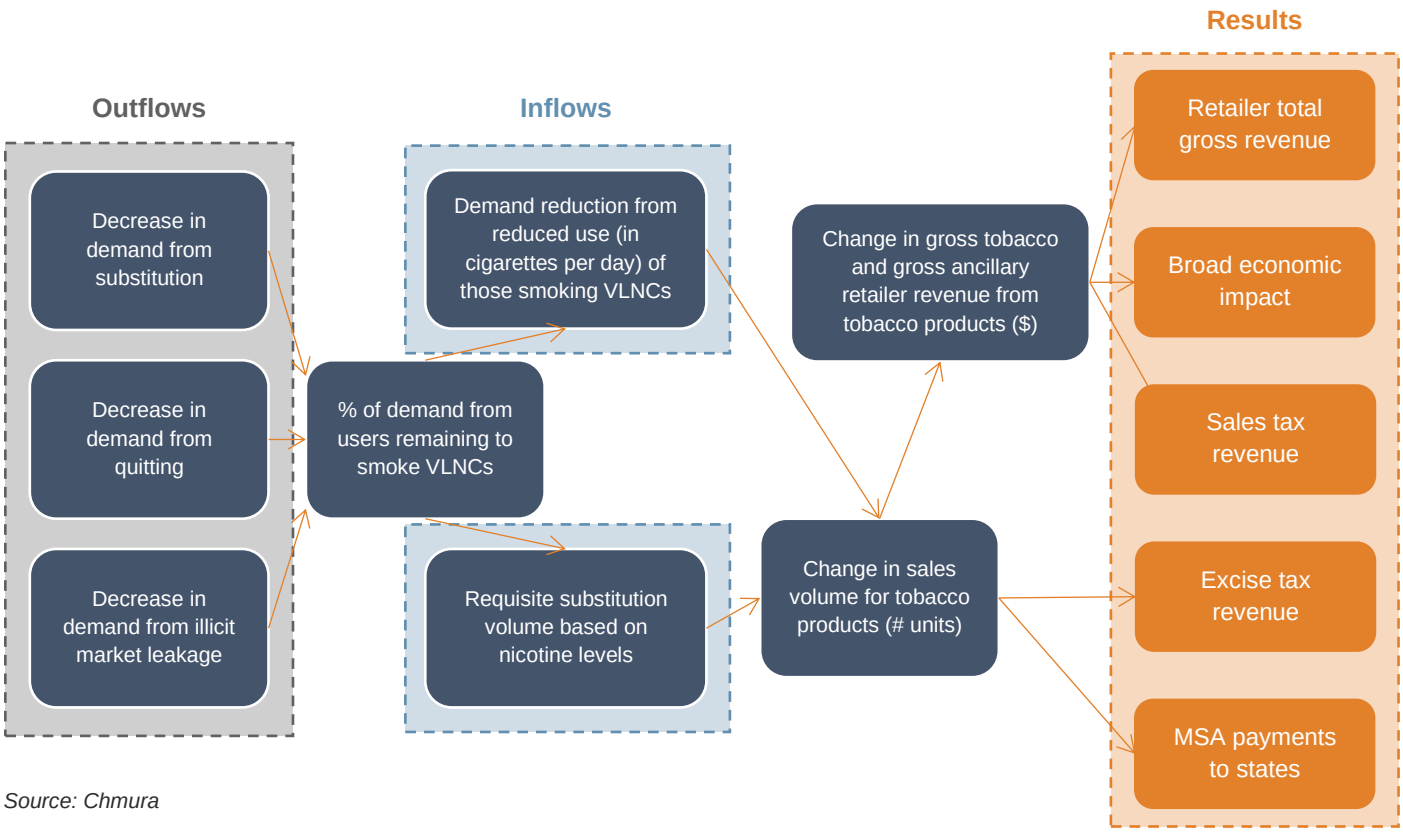
Figure A.1 illustrates the research process. To examine the change in the proposed federal nicotine limit on various economic indicators, the first task is to understand how such a regulation will affect retail sales (in volume or value) of tobacco and nicotine products. For consumers, reduced nicotine cigarettes have not seen high levels of popularity. New VLNCs have been able to achieve a 1% market share in a few select pilot markets but not on a wide scale.[64] In the past, VLNCs (e.g., QUEST cigarettes) were discontinued due to lack of popularity and profitability.[65] Even in medical trial studies, non-compliance rates are high meaning participants commonly use their normal cigarettes in direct rejection of researcher instructions.[66] Whether this is directly due to the reduced nicotine level or the taste, feel, or brand of cigarette itself is different for each individual consumer. Economic theory indicates that with a restriction of product availability, users will look to the

[64] Tobacco Reporter, "22nd Century Reports Quarterly Results," March 9, 2023, https://tobaccoreporter.com/2023/03/09/22nd-century-reports-quarterly-results/.
[65] Jennifer Greyber, "Very Low Nicotine Content Cigarettes: A Revolution or Just Another Tobacco Product?", Tobacco Training Specialist Treatment Program, July 27, 2022. https://www.dukeunctts.com/post/very-low-nicotine-content-cigarettes-a-revolution-or-just-another-tobacco-product.
[66] Zhang et al., "Method for Estimating Non-study Cigarette Use among Switchers to Low Nicotine Content Cigarettes in Ambulatory Clinical Studies," *International Journal of Clinical Research and Trials*, January 2020.

next-best option which maximizes their personal "utility." This may come in the form of using substitute nicotine products, attempting to quit smoking, obtaining illicit "normal nicotine" cigarettes, or trying the VLNCs.

The impact on retail sales of tobacco products will come in two waves: (1) outflow and (2) inflow. The outflow in this scenario is the lost cigarette sales volume that occurs due to substitution, quitting, reducing use, and illicit market leakage. Remaining VLNC demand is considered equivalent to current legal cigarette demand and therefore is not considered "outflow." Inflows come from the legal substitute products that increase in demand as a result of this regulation. Cigarette volume and substitute product volume are equated on nicotine level. Therefore, the sales value outflow from substitution (in dollars) is not the same as the substitute product demand value inflow. For the combination of the remaining VLNC market and the increase in substitute products, the change in total volume and value of sales for tobacco and nicotine products can be calculated.

Figure A.1: Research Methodology



Source: Chmura

The imposition of the proposed policy will not only affect tobacco sales, but ancillary retail sales as well. Some research has shown that when consumers purchase tobacco products, they tend to purchase additional goods from tobacco retailers such as drinks, snacks, gasoline, and other items. When consumers reduce tobacco product purchases, this leads to fewer trips to retail stores. As a result, retailers will lose ancillary sales. Chmura used tobacco consumer profile studies to estimate the changes in ancillary retail sales associated with tobacco product purchases. The ancillary or "bundle" sales are assumed to be approximately 30% of the gross retailer revenue from tobacco and nicotine product sales (including sales tax).

A1.2. Approach to Broad Economic Impact

A change in tobacco product sales and ancillary retail sales will have a broad economic impact at the national, state, and congressional district levels. The broad impacts were estimated for economic output, labor income, and employment (jobs).

The changes in tobacco and ancillary retail sales will affect the revenue of retail businesses. Declining sales may lead to a reduction in staff hours or workers being laid off. These circumstances are direct economic impacts of the proposed FDA

regulation. The total economic impact also includes ripple effects (indirect and induced) from the direct impact. Using a convenience store as an example, indirect impacts are benefits to industries that supply goods and services to the convenience store, such as local transportation and other service businesses. Induced effects occur when convenience store workers and suppliers' workers spend their income within the community. After the direct impacts were determined, broad economic impacts were estimated by Chmura with the JobsEQ economic impact model.

A1.3. Approach to Tobacco Excise Tax, Retail Sales Tax, and MSA Revenue

Changes in tobacco product sales will affect the amount of revenue that state and local governments receive from tobacco products. First, Chmura collected data on state and local excise tax rates of various tobacco products. Then, estimated changes in tobacco product sales were used to determine the effect on state and local revenue. Changes in tobacco excise tax revenue were estimated for each state. For local effects, Chmura used the average excise tax rates of tobacco products to estimate local excise tax changes in each state and congressional district.

Changes in tobacco product sales will likely lead to changes in ancillary retail sales, which will then affect state and local sales tax revenue. Chmura collected data on state and local sales tax rates and applied those to estimated changes to retail sales.

The change in cigarette sales volume will also affect revenue received by states under the Tobacco Master Settlement Agreement. Similarly, revenue for four states (Florida, Minnesota, Mississippi, and Texas) that are not part of the MSA will also be affected, as they have their own settlement agreements with tobacco manufacturers. The total payment for states under settlement agreements is based on the total cigarette sales volume for each year (adjusted for inflation). Chmura conducted research on the MSA and other settlement agreements to understand how annual payments are calculated. Based on the estimated changes in cigarette sales volume, Chmura assessed the changes in MSA revenue payable to each state.

Appendix 2: Glossary

JobsEQ® Economic Impact Model—an economic impact assessment modeling system. It allows the user to build economic models to estimate the impacts of economic changes in states, counties, or communities.

Input-Output Analysis—an examination of business-business and business-consumer economic relationships capturing all monetary transactions in a given period, allowing one to calculate the effects of a change in an economic activity on the entire economy (impact analysis).

Direct Impact—economic activity generated by a project or operation. For construction, this represents the activity of the contractor; for operations, this represents activity by tenants of the property.

Indirect Impact—secondary economic activity that is generated by a project or operation. An example might be a new office building generating demand for parking garages.

Induced (Household) Impact—economic activity generated by household income resulting from direct and indirect impacts.

Ripple Effect—the sum of induced and indirect impacts. In some projects, it is more appropriate to report ripple effects than indirect and induced impacts separately.

Multiplier—the cumulative impacts of a unit change in economic activity on the entire economy.

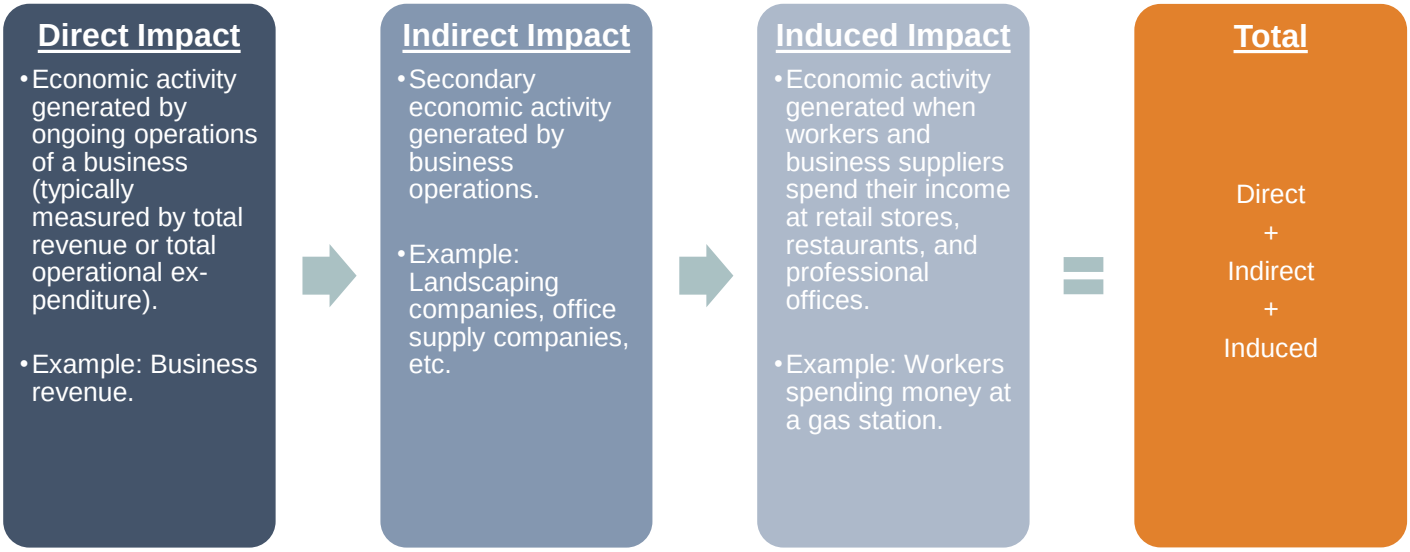
Retail Sales: the sales of merchandise or services at retail establishments. When used in this report, retail sales are defined as either the volume of sales or the value of sales in dollar terms. Furthermore, the value of sales can be classified more broadly as gross receipts or more narrowly as retailers' revenue.

Gross Receipts: the amount of retail sales based on sales volume times the price of the tobacco product without sales tax. That price includes many pass-through items, such as the cost of products paid to manufacturers and wholesalers, and excise taxes to federal, state, and local governments.

Retailers' Revenue: the retail sales amount that excludes payments to manufacturers or wholesalers, and also excludes taxes paid to federal, state and local governments. In essence, this is the margin for retail merchants. It is used by retailers to pay for items such as rent, utilities, and payroll.

Economic Output: defined as the total revenue or sales for businesses. It includes values of intermediary products, labor income, other costs, and profits.

Labor Income: defined as the total compensation paid to workers. It includes wages and salaries, plus benefits such as health insurance paid by employers.



Appendix 3: Impact in Each State and Congressional District