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Global Excise Tax Application and Trends

Adam Hoffer Director of Excise Tax Policy

Key Findings

- The tax base is shrinking for traditional excise taxes, including tobacco, alcohol, and motor fuels. These sources of revenue are unstable and work poorly as a source to fund growing expenditure programs.
- Newer excise taxes—including those on carbon, cannabis, alternative tobacco products, ride-sharing, and plastics—have the potential to significantly affect global trade and increase the percent of tax revenue generated by excise taxes.
- For most excise taxes, the best choice of tax base is the externality-causing agent, as that provides the best target for external costs.
- Excise taxes should ideally be levied early in the value chain. Limiting the number of taxpayers lowers the cost of enforcement and improves compliance, making tax implementation less costly and more efficient.
- Revenues from excise taxes should be spent on those social expenses (e.g., infrastructure costs associated with driving, and enforcement costs related to alcohol). Excise taxes should not be levied to raise general fund revenue because the tax bases are typically narrow and unstable.
- Excise taxes should take harm reduction into account to minimize the costs of excise tax policy and maximize well-being.

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Tax Foundation
1325 G Street, NW, Suite 950
Washington, DC 20005

202.464.6200

taxfoundation.org

Introduction

Excise taxes are a well-established component of global tax policy. Excise taxes are used to generate government revenue while providing incentives for market participants to consume and produce less harmful products. With proper design and implementation, excise taxes can improve overall well-being and fund public programs to improve market outcomes. Poor implementation of excise tax policy, however, can create an environment in which people are worse off than if no policy had been implemented in the first place.

Excise taxes are selective consumption taxes levied on targeted products or activities. The excise tax is added on top of other broad-based taxes like value-added taxes (VATs) or sales taxes. The selective nature of the excise taxes provides a narrow tax base. That narrow base must be justified by unique costs or considerations related to the taxed activity.

Excise taxes are sometimes referred to as “sin taxes” because they are often levied on products whose consumption is considered socially undesirable. Today, targets for selective excise taxes include products that are unhealthy for the user, create negative outcomes for third-party bystanders (negative externalities), generate burdens on public expenditures (which I will call “governalities”), or act as a user fee for accessing publicly funded goods or services. Many products slated for excise taxes trigger more than one of the motivations for selective taxation.

A variety of tax structures are used as excise taxes. Excise taxes can be applied per unit—selectively or *ad quantum*—or as a percentage of the price or value—*ad valorem*. The taxes can be levied at different points in the production process, including at the point of sale to the consumer, during wholesale transactions between businesses, or at the manufacturer when production is complete. Specific taxes can target different parts of the product, including raw materials, product ingredients, the weight of a product, the quantity of a product, or combinations of the above. In this paper, we explore existing tax structures and evaluate the best practices for using excise taxes on a range of products.

Traditional targets of excise taxes, including alcohol, tobacco, and fuel, have well-established tax rates and policies. Recent years have seen a pronounced shrinking of the tax base for these products.

Meanwhile, new excise taxes, such as those on carbon, cannabis, alternative tobacco products, ride-sharing, and plastics have the potential to significantly affect global trade and increase global excise tax revenues. Within each country, the revenues from a carbon tax alone could exceed the revenues from all other excise taxes.¹

This paper details a principled approach to selective excise taxation and explores recent trends and applications of global excise taxation. The first section describes excise taxes and how they are used. The second section describes what goes into designing effective and efficient excise taxes. The third section describes taxes on traditional excise products, while the fourth section details emerging and growing excise tax categories. Finally, the paper concludes with a summary and outline of best practices for excise taxes.

¹ Kyle Pomerleau and Elke Ansen, “Carbon Tax and Revenue Recycling: Revenue, Economic, and Distributional Implications,” Tax Foundation, Nov. 6, 2019, <https://taxfoundation.org/carbon-tax/>.

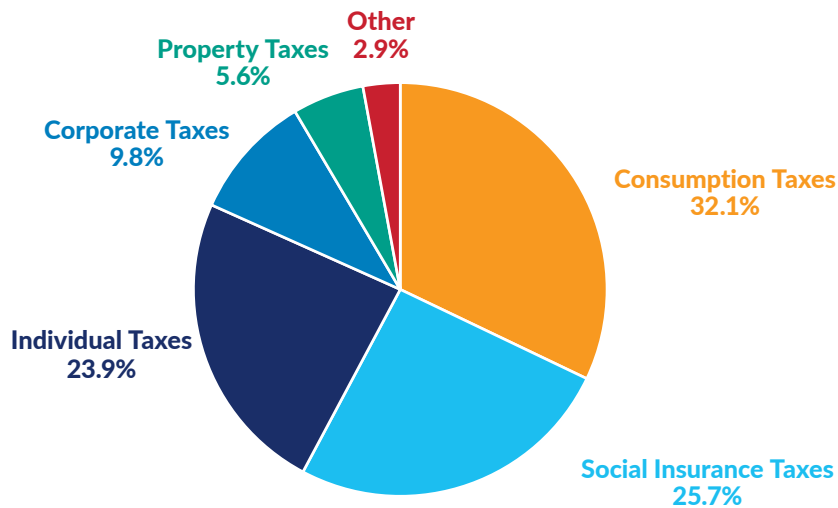
Excise Taxes Are Ubiquitous

Excise taxes are a type of consumption tax used around the globe. Across the Organization for Economic Co-operation and Development (OECD), consumption taxes are the largest source of government revenue.

FIGURE 1

Consumption Taxes Are the Most Important Tax Revenue Source for OECD Countries

OECD Average Sources of Tax Revenue, 2021

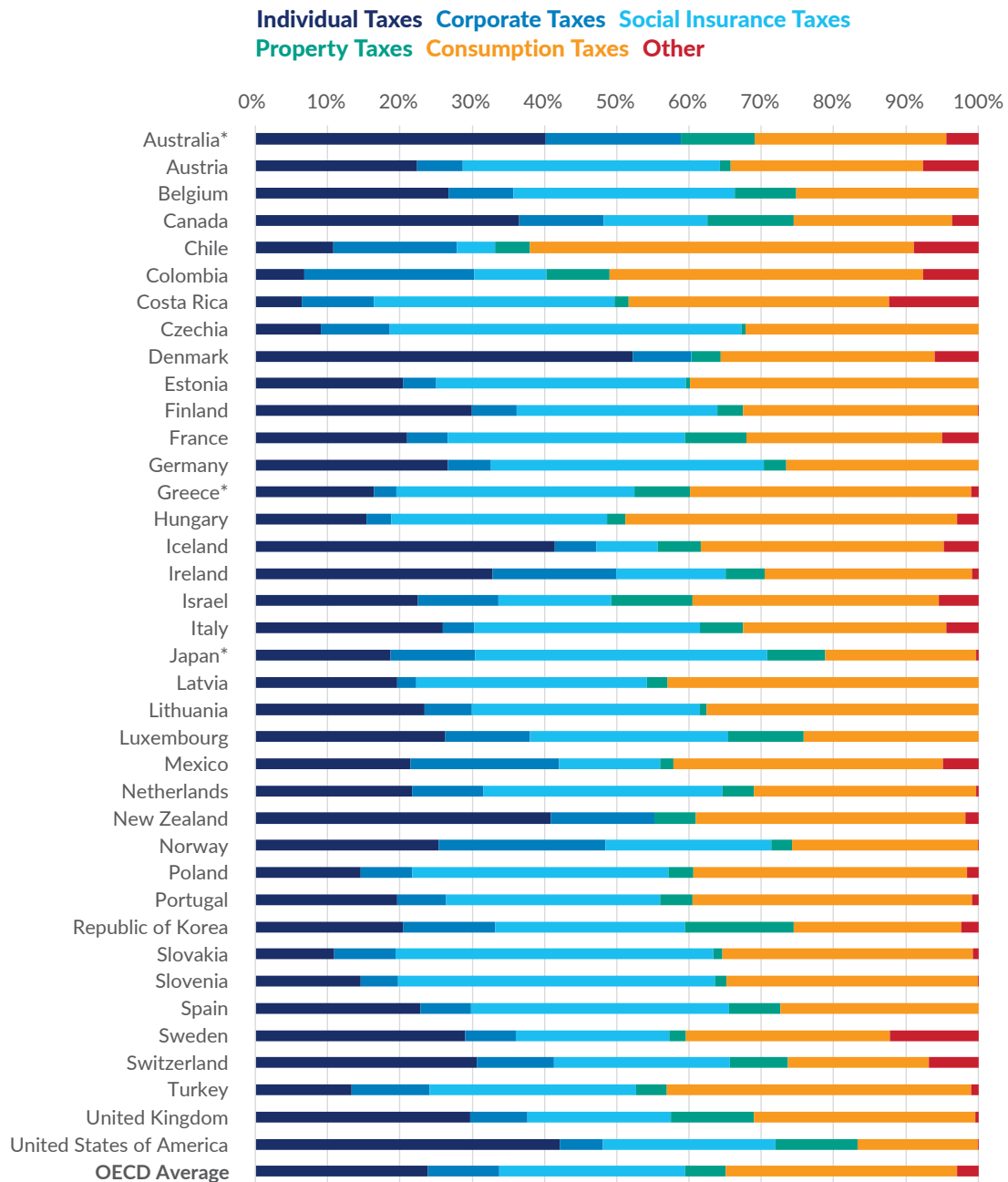


Source: OECD, "Revenue Statistics - OECD Countries Comparative Tables."

Each country in the OECD uses consumption taxes, but reliance on consumption taxes varies. Consumption taxes account for more than half of government revenue in Chile, at 53.1 percent. They account for less than 20 percent of revenues in Switzerland—19.6 percent—and the United States—16.6 percent.

Most consumption tax revenue is generated by broad-based taxes such as VATs. Excise taxes are a major component of consumption taxes in many countries, however. At least 170 countries across the globe levy some sort of excise tax. Modern excise taxes come in a variety of forms, but excise taxes are one of the oldest kinds of taxes on record.

History's first documented tax is from ancient Egypt around 3000 B.C. The focal point of Egyptian tax collection was an excise tax on the quantity of grain produced, but taxes were also levied on heads of cattle and liquid measures of oil and beer. Excise taxes first appeared in western Europe in the early 17th century and the first national excise tax in the United States was levied in 1791 on whiskey.

FIGURE 2**Tax Structures Vary Significantly Across OECD Countries***Sources of Tax Revenue, OECD Countries, 2021*

Note: *Data for Australia, Japan, and Greece is from 2020 because 2021 data was not available yet.
Source: OECD, "Revenue Statistics - OECD Countries Comparative Tables."

Historically, the primary motivation for excise taxes was the raising of government revenue. Governments needed tangible items that could be taxed. Non-necessities made relatively attractive targets. In the book that launched the modern field of economics in 1776, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Adam Smith wrote, "Sugar, rum, and tobacco are commodities which are nowhere necessities of life, which [have] become objects of almost universal consumption, and which are therefore extremely proper subjects of taxation."²

2 Adam Smith, *An Inquiry into the Nature and Causes of The Wealth of Nations* (Cambridge, MA: Harvard University Press, Mar. 9, 1776), 399, https://www.google.com/books/edition/An_Inquiry_Into_the_Nature_and_Causes_of/rpMuAAAAYAAJ?hl=en&gbpv=0.

Smith emphasizes that these products are ideal for taxation partly because they *are of almost universal consumption*. Of course, at the time the book was written, the British Empire relied on land taxes, stamp duties, customs duties, and excise taxes—not income taxes, general sales taxes, or many of the other broad-based taxes we are familiar with today.

Today, these goods are not universally consumed, and we have far broader bases and easier collection methods for tax revenue. Modern excise taxes thus rely on Smith's point that these products are *nowhere necessities of life*. Many of the products may even be harmful to users and bystanders. Thus, modern excise taxes are often implemented to try to deter the consumption of certain goods.

Basic economics dictates that as (tax-induced) prices go up, (legal) consumption falls. What follows this fundamental law of demand are questions and considerations that form the foundation for tax design: By how much will consumption fall? How much revenue will the tax generate? Who is consuming less? Who is bearing the burden of the tax? To what will people switch if they stop consuming? Will a tax create illicit markets? Are the net effects of the tax better than if no tax were put in place at all?

Excise Tax Design and Considerations

Excise tax design faces trade-offs like all tax and public policy. An underlying goal of tax policy is revenue generation. Unlike broad consumption and incomes taxes, where the disincentivized taxed activity results in societal loss—income taxes, for example, penalize working and the decrease in work caused by income taxes results in less production and an overall decline in well-being—the targets of many excise taxes have negative external effects, meaning that a reduction in market output could improve overall well-being. Poorly designed excise taxes, by contrast, may penalize certain classes of consumption arbitrarily, or even discourage consumers from shifting to products with fewer harms or externalities.

The design of excise tax systems is important. Well-designed taxes generate revenue with far less societal impact than poorly designed taxes.

The outcome of excise taxation should be to improve the lives of taxpayers and non-taxpayers alike. The best design for excise taxes is often simple in theory, but in a world with imperfect information and challenging implementation, several rules can guide tax policy to a point where, even if not perfect, tax policy still delivers reliable tax revenue and reduces harm.

Textbook Taxation to Practical Policy

The on-paper public policy solution for products that create an externality can be found in almost every introductory economics textbook. Pigouvian taxes and subsidies are named after economist Arthur Pigou, who penned the policy prescription in 1920. Pigou concluded that if a product produced some external harm/benefit, the market could move to an optimal output by the addition of a tax or subsidy in the amount of the harm/benefit. If a gallon of gasoline creates \$1 of external harm,

adding a \$1 tax to each gallon would decrease the market quantity to an optimal, lesser amount. A subsidy would likewise increase the production and consumption of products with positive external benefits.

The general framework based on Pigouvian principles is still the premise for government's use of excise taxes today, apart from governalities, as many the government programs responsible for governalities didn't exist in 1920. Examples of products taxed for Pigouvian purposes include alcohol taxes due to the external harms of alcohol consumption (e.g., drunk driving, domestic violence, and property damage), carbon taxes due to climate change, and plastic taxes due to environmental harms.

The textbook solution to negative externalities via Pigouvian taxes assumes information not necessarily available to policymakers and unfortunately ignores certain key features of practical tax policy. First, Pigouvian taxes assume the knowledge of the exact amount of social costs. Even for products where there is a general consensus that a social cost exists, estimates of the precise magnitude of those costs often vary widely. We present a wide range of estimates for the social costs per ton of carbon emissions later in this paper, for example.

In other cases, such as the development of new products or a product with a wide array of social effects, there may be few or no estimates of social costs available. The academic literature on cannabis is very young, without a consensus on the external harms of cannabis consumption. The resulting tax landscape is chaotic, absent an academically-supported universal foundation for tax policy.

Pigouvian solutions are also static in a world of constant change. Innovations and consumer preference shifts can completely alter the markets and change the social costs of the product. This would suggest that ideal Pigouvian taxes would change instantly in response to market fluctuations.

Similarly, Pigouvian taxes make no reference to the political economy involved in fiscal policy. Constantly changing tax rates would be infeasible. Political factors including the distributional effects of the tax burden and the ways in which the revenue from these taxes is spent further create a disconnect from the policy on paper to the real world.

Imperfect information and political barriers create enormous barriers to the practical implementation of Pigouvian taxes. As such, we can build off the foundation laid from Pigouvian insights, but we must extend those insights to provide both a robust set of guiding principles for tax policy and then specially cater tax design based on the characteristics of each product.

Simplicity, Transparency, Neutrality, and Stability

All tax policy should be guided by the principles of simplicity, transparency, neutrality, and stability. Tax policies that are simple, transparent, neutral, and stable are easier to understand for taxpayers and governments. They are not wildly distortive, and they provide consistent, predictable, and equitable sources of revenue to fund public expenditures over time.

For simplicity, excise taxes should ideally be levied early in the value chain because this generally results in a smaller number of taxpayers. Limiting the number of taxpayers reduces the cost of enforcement and lowers the barriers to tax compliance, making the tax relatively efficient. This is easiest for excise taxes that are levied at a specific rate (e.g., \$1.00 per pack of 20 cigarettes). The tax bill can be applied based on quantity and remitted by the limited number of manufacturers, as opposed to needing to be remitted by every consumer or every point-of-sale vendor.

Ad valorem rates (a percentage of value or sales price) should also be levied early in the production process to limit the number of taxpayers. The challenge to applying *ad valorem* taxes early in the production chain is that true market values may not be established until the final point of sale retailer. Market power at the wholesale or retail level, or vertical integration in a supply chain, can distort transaction prices prior to market sales. Market value is best reflected in the final sales price to customers, but levying a retail excise tax multiplies the number of taxpayers significantly. This will increase the cost of tax enforcement and is one reason that many federal governments do not levy excise taxes at the retail level.

For internationally traded products, simplicity means taxing at the port of arrival, levied at the same time as any tariffs. Taxes should be based on the destination jurisdiction's rate and should match the rates of that country's domestically manufactured goods.

For tax transparency, specific taxes tend to be more transparent than *ad valorem*, as the taxpayer more easily can identify the tax burden. The posted retail sales price will also be better-reflective of the final purchase price and incorporate the tax burden if taxes are levied early in the supply chain, allowing consumers to price in the tax as part of their purchasing decision and face fewer tax-induced surprises at checkout.

To increase the transparency of taxes levied prior to the point of sale, vendors can report out aggregate tax levied on the transaction on a receipt for consumers to review after purchase. Like simple taxes, transparent taxes are easier to comply with for taxpayers and tax administrators.

While excise taxes can be simple and transparent, they are not neutral. Neutral taxes, often with broad bases and low rates, minimize market distortions and facilitate decisions based on economic merits and not tax reasons. Excise taxes are targeted and designed specifically to impact decisions made by consumers.

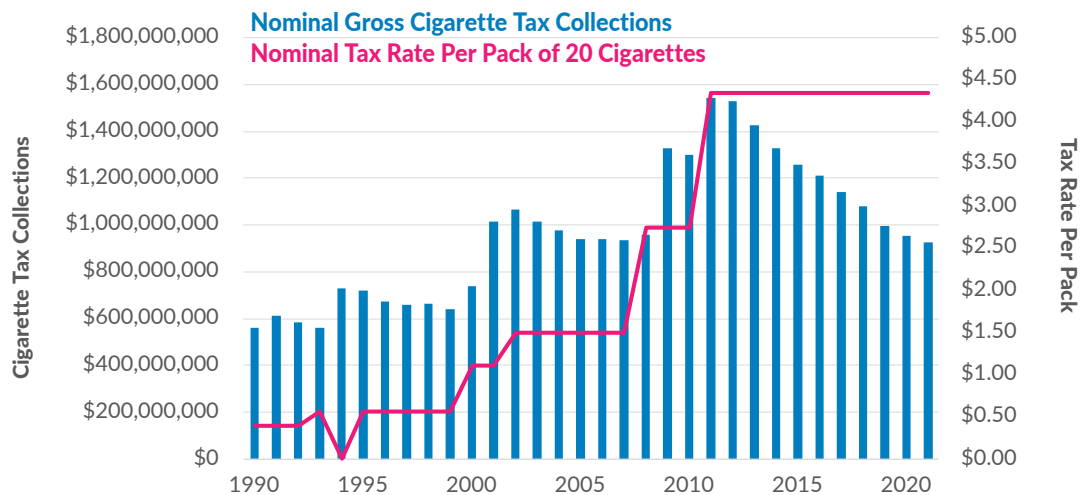
Nevertheless, excise tax design should strive to be as neutral as possible within the taxed category. This is achieved by levying the tax on the best available proxy for the externality or cost. Doing this ensures that, for instance, two beers with the same alcohol content will have the same tax burden and two different brands of combustible cigarettes will have the same tax burden. By designing the tax to capture the externality, lawmakers guarantee that separate, non-problematic product design qualities will not affect tax levels.

The final design principle is stability. Given their narrow and often shrinking tax base, revenue from excise taxes lack long-term stability. Consider tobacco taxes. Tobacco consumption has been declining for decades, leading to a gradual decrease in revenues. Most countries and subnational governments have continued to ratchet up rates, which increase revenue immediately, but then revenues continue their downward trend. The result is a volatile source of revenue.³

FIGURE 3

Despite New York Having the Nation's Highest Cigarette Tax Rate, Revenue Continues to Decline

Nominal Gross Cigarette Tax Collections and Tax Rate Per Pack of 20 Cigarettes, 1990-2021



Source: Orzechowski and Walker (2022)

Because excise taxes are non-neutral and provide an unstable source of revenue, they should be limited to cases where they can capture some externality or create a “user pays” system—not relied upon for general revenue.

Tax Base

The first question to ask in tax design is *what* will be taxed. The total amount of income, property, assets, consumption, transactions, or other economic activity subject to taxation is called the tax base.

In cases where an excise tax is levied as a user fee, the tax base should be the best available proxy for use. For instance, consumption of motor fuel acts as a proxy for drivers’ use of public roads.⁴ In the future, some other proxy may prove superior; a vehicle miles traveled (VMT) tax has certain advantages as a proxy, for instance, though it raises legitimate privacy concerns. Nevertheless, motor fuel is a far better proxy for contributions to road use than simply taxing vehicle registration.

3 Ulrik Boesen and Tom VanAntwerp, “How Stable is Cigarette Tax Revenue?” Tax Foundation, Jul. 9, 2020, <https://www.taxfoundation.org/cigarette-tax-revenue-tool/>.

4 This tax base may become obsolete in the near future. For a discussion on modernizing transportation taxes, see Ulrik Boesen, “Who Will Pay for the Roads?,” Tax Foundation, August 2020, https://files.taxfoundation.org/20200824160626/TaxFoundation_FF7251.pdf.

For excise taxes that target harm-generating products, the tax base should target the harm or external cost-causing element. Targeting the harm-causing element best allows market participants to “internalize the externality” or incorporate any external effects into their decision-making. For example, a tax placed on carbon emissions can price in external damages from pollution and climate change into energy consumption and production decisions.

Quantity-based specific taxes also help better align the tax base to the tax’s purpose than do *ad valorem* taxes for both user fees and externalities. The number of gallons of gasoline used better approximates road usage and emissions produced than the price paid per gallon. Similarly, the number of cigarettes smoked or the amount of alcohol consumed has a much clearer connection to any harm caused by this consumption than the retail sales price of the products.

Specific taxation is often simpler because the tax can be calculated based on weight, volume, or amount instead of an estimated value. This is especially true as products often flow between different layers of a vertically integrated company (for instance a beer brewer that also operates as a wholesaler) and as such does not have a clear market value to tax. If a tax is levied on value, the taxpayer or taxing entity must compute an artificial value to tax if the tax is not levied at the retail level (which few federal excise taxes are due to the number of taxpayers this would involve). Although rules exist for making this computation, it can create problems or perverse incentives—some of which are known as transfer pricing.⁵

Ad valorem taxes are more appropriate in certain circumstances, however. In sports betting, for example, the potential harm of betting is best expressed by the size of the bet. In other cases, the harm-causing agent can be difficult to quantify. Based on current technology, the amount of tetrahydrocannabinol (THC) in raw cannabis products is difficult and expensive to measure and can vary from plant to plant. Thus, a THC-based tax is difficult to apply and administer. In these cases, either a weight-based *ad quantum* tax or an *ad valorem* tax may be more effective (despite inherent limitations), or a hybrid model can be used until harm measurement can be more easily quantified.

Naturally, consumption alternatives that do not create negative externalities should not be included in the tax base. Coal-generated electricity emits carbon dioxide, making it an appropriate target for a carbon tax, whereas wind-generated electricity produces no carbon emissions and should be excluded from a carbon tax. There is a clear distinction between a tax on *carbon* and a tax on *electricity*. Identifying the proper tax base is essential if excise taxes are to be efficient and improve upon non-tax market outcomes.

Including substitute goods in the tax base can discourage desirable substitutions from more harmful goods to less harmful ones. Two examples, discussed in more detail later, are taxes on vapor products and on other cigarette alternatives. Despite their significantly lower harm profile, these products are too often taxed as tobacco products. To encourage harm-reducing behavior, tax burdens should reflect differences in harm.

5 Daniel Bunn, “The Impacts of Tightening up on Transfer Pricing,” Tax Foundation, Jul. 11, 2019, <https://www.taxfoundation.org/impacts-of-tightening-up-on-transfer-pricing/>.

Directly targeting the externality also helps promote tax neutrality. France used to apply one excise tax rate on grain-based alcohol products like gin and whiskey and another lower rate on grape-based alcohol products like cognac. This practice, which favored domestically produced products over imports, was stopped by the European Court of Justice. The simpler, neutral approach would have been to levy a tax on alcohol content by volume, making the rates similar on cognac and gin.⁶

For practical implementation of excise taxes, a clear, well-defined tax base is essential. Poorly written tax base definitions can lead to the disproportionate treatment of similar products. In a recent example from the United States, in the state of Wisconsin, a “vapor product” was defined as a “noncombustible product that produces vapor or aerosol for inhalation from the application of a heating element to a liquid or other substance that is depleted as the product is used, regardless of whether the liquid or other substance contains nicotine.” Lawmakers in the state applied a tax where the tax rate was determined by *milliliter of liquid*, but the definition of a vapor product clearly referred to vaping *equipment*. As a result, a tax is only levied on products where vapor liquid and equipment were bundled together.⁷

Tax Rate

When a suitable tax base has been established, the next element of tax design is selecting the tax rate. The excise tax rate should be determined by several factors, first and foremost being the negative externalities or costs the tax is serving to internalize or recoup. Precise individual-specific estimates of social costs are difficult, so we often resort to using estimates of average social costs.

These calculations are relatively straightforward for some excise categories (e.g., the average cost of a mile driven by an average car on an average road). And because most roads are built with public funds, the costs incurred for road construction and maintenance are well-documented. (Even here, of course, the selected measure—motor fuel—cannot account for relevant factors like curb weight and number of axles.)

Other products taxed by excises are more difficult to quantify and assign costs. For instance, society is very unlikely to incur costs from a person drinking a glass of wine a week. Not until that person becomes a heavy user does she impose costs on society, and yet the excise rate is the same for the first glass as it is for the 10th. While using average costs to help set rates does overcharge responsible drinkers, heavy drinkers will still face a greater tax burden and disincentive to drinking.

Ad valorem rates have built-in inflation adjustments. As prices increase, so do tax collections. Specific taxes don't have this mechanism. Consequently, specific taxes should be indexed for inflation, but only if the costs associated with the product's consumption increase over time. Road maintenance costs tend to increase with inflation, so specific fuel taxes should logically be indexed to inflation. The incredible decline in alcohol-related driving fatalities in certain countries—due in large part to the availability of ride-share technology—may have decreased the overall social costs of alcohol consumption, suggesting rates could actually decrease.

6 Sijbren Cnossen, “Alcohol Taxation and Regulation in the European Union,” *International Tax and Public Finance* 14 (2007): 699-732, <https://link.springer.com/article/10.1007/s10797-007-9035-y>.

7 Ulrik Boesen and Katherine Loughhead, “Future of Wisconsin Vapor Tax Uncertain after Decision by State Supreme Court,” Tax Foundation, Jul. 13, 2020, <https://www.taxfoundation.org/wisconsin-vapor-tax-wisconsin-supreme-court/>.

Other considerations that should go into establishing excise tax rates are market conditions, available economic substitutes, and the general tax burden. Market conditions play a particularly important role for products that compete with the illicit market. For example, recreational marijuana retailers not only compete with each other, but also with illegal operators. The same is true for both sports betting services and tobacco retailers.

Considering economic substitutes is important because a tax that is too narrow will not be neutral and simple consumer substitution may negate intended benefits from a tax. Consider excise taxes applied only to soda with the intention of decreasing total caloric consumption and reducing public health expenditures related to obesity. Academic studies find that after a soda tax people drink less soda, but they substitute elsewhere and do not decrease their overall caloric consumption. Bans can have similar effects: in one specific instance, soda was banned from a public school and children switched to drinking more chocolate milk.⁸

Finally, as lawmakers decide on tax rates, they should consider the overall tax burden for their citizens. Excise taxes are typically imposed in addition to general sales taxes, individual and corporate income taxes, property taxes, and other kinds of taxes. Because of the narrow base, excise taxes make poor tools for funding broad government expenditures. Even where an excise tax is economically rationalized, excessive taxes on businesses can impair economic growth, job creation, and wages.

Revenue Allocation

Revenue from excise taxes should be allocated to cover societal costs related to the consumption of the taxed products. Some examples include funding health costs related to smoking, infrastructure costs associated with driving, anti-addiction programs, and enforcing bans on alcohol-impaired driving. Allocating revenue to cover the cost associated with the consumption of excised goods increases the taxpayers' understanding of the tax and may be able to decrease social costs over time.

The fraction of revenue dedicated or “earmarked” to an expenditure category varies widely by tax type and jurisdiction. In Europe, many environmental taxes are earmarked for environmental expenditures. The Dutch water pollution tax, for example, is used to finance the sanitization and purification of water.⁹

Globally, the World Bank reports that at least 80 countries earmark some portion of their revenue to health spending. The most common earmarks are income or payroll taxes to fund health care or pensions. The next most popular sources of earmarks are revenues from tobacco, alcohol, and unhealthy foods.¹⁰

In the United States, only about half of all tobacco tax revenue is earmarked for an expenditure purpose. The expenditures to which the revenues are earmarked range from the obvious—health

8 Jason Fletcher, David E. Frisvold, and Nathan Tefft, “Non-Linear Effects of Soda Taxes on Consumption and Weight Outcomes,” *Health Economics* 24:5 (May 2015), <https://www.dx.doi.org/10.1002%2Fhec.3045>.

9 Eurostat, *Environmental Taxes – A statistical guide*, 2013, <https://ec.europa.eu/eurostat/documents/3859598/5936129/KS-GQ-13-005-EN.PDF>

10 Cheryl Cashin, Susan Sparkes, and Danielle Bloom, *Earmarking for health: from theory to practice*, World Health Organization (2017), <https://apps.who.int/iris/handle/10665/255004>.

care (60.8 percent of all earmarked tobacco revenue) and social services (18.4 percent)—to the less theoretically connected—capital projects (4.4 percent) and debt payments (1.5 percent). Tobacco control receives less than 1 percent of earmarked tobacco revenues.¹¹ Lawmakers in 25 U.S. states divert a significant amount of revenue raised from motor fuel taxes to unrelated spending programs like education (Kansas and Texas), tourism (Utah), or wildlife conservation (Florida).¹²

Improper alignment of expenditure programs that grow over time with excise tax revenue sources creates a problem. Well-designed excise taxes discourage use (e.g., less smoking, fewer carbon emissions, etc.), resulting in a shrinking tax base over time.

In the UK, for example, as fewer consumers smoke and drink, tobacco and alcohol collections have declined. The several-decade trend of shrinking tax bases means that tobacco now makes up just 1 percent of total public sector receipts, down from 1.9 percent two decades ago, and alcohol revenues make up 1.3 percent of receipts, down from 1.7 percent.¹³

If the revenues are dedicated directly to expenditure programs to help alleviate the social costs of consumption, there should be no problem with a shrinking tax base. Less consumption would mean fewer social costs and less need for tax-funded expenditures.

Often, however, governments use these revenues for general expenses or special projects unrelated to the tax. In the United States, the state of Colorado earmarks funds from an excise tax on online sports gaming to be spent on its Water Plan. When volatile gaming revenue missed projections in 2022, the state had difficulty funding water infrastructure projects. The state then followed up with a redesign of its gaming tax, with a higher effective tax rate.

A common response is for political calls to increase the tax rate to offset revenue loss from a shrinking or volatile excise tax base. Unless the social costs of the activity increased, such calls are economically unfounded. Shrinking tax bases only present a major problem for expenditure programs that are poorly connected to an excise revenue source.

In Europe, serious fiscal questions loom as the EU pursues a 55 percent reduction in carbon emissions by 2030. Energy taxes are the primary tool currently proposed for pursuing reduced carbon emissions. However, the more successful the transition away from carbon fuels becomes, the more the carbon fuel tax base will shrink, generating lower revenues to pursue technologies and alternative energy investments. To the extent that this is a mark of success, that may not be a problem—but if lawmakers come to count on the resources for broader expenditures, success at decarbonization can generate revenue shortfalls.

11 John Dunham & Associates, "The Earmarks of State Tobacco Excise Revenues – Fiscal Year 2021 – A fifty-state plus Washington D.C. Report" Commissioned by NATO, May 2022, <http://natocentral.org/uploads/economic-reports/The%20Earmarks%20of%20State%20Tobacco%20Excise%20Revenues%20Final%20Report%205.23.22.pdf>.

12 Baruch Feigenbaum and Joe Hillman, "How Much Gas Tax Money States Divert Away From Roads," Reason Foundation, Jun. 30, 2020, <https://www.reason.org/policy-brief/how-much-gas-tax-money-states-divert-away-from-roads/#new-york-diversions>.

13 Tom Rees, "Gen Z's Clean Living Means £14 Billion in Lost 'Sin Tax' for UK," Bloomberg Tax, Mar. 23, 2013, <https://www.bloomberglaw.com/product/tax/bloombergtaxnews/daily-tax-report-international/BN%2000000187-1800-d7a3-a9e7-da36a01a0003?isAlert=false>.

Regressivity

Excise taxes are regressive because the tax comprises a larger percentage of lower-income households' budgets than higher-income households' budgets. Regressive taxes disproportionately impact the poor.

Simply because a tax is regressive, however, doesn't mean it shouldn't be used. Most consumption taxes are regressive, but they still have a role in a broader system of tax and transfers that is almost invariably highly progressive.

Consumption doesn't keep pace with income growth because savings increases as incomes grow. Progressive taxes—those that increase in burden as incomes grow—enjoy substantial popularity. Relying only on progressive taxes, however, would be problematic, as would carving up consumption tax bases exclusively in service to progressivity, in part because of the narrow number of taxable items would create a narrow, volatile tax base whose non-neutrality could introduce sizable economic distortions and disincentivize important economic activities like earning income, saving, and investing in property. Best practices for tax policy, therefore, usually include a mix of both progressive and regressive taxes that provide a stable source of revenue but minimize market distortions and the tax burden on the poor.

While excise taxes are regressive, they vary in extent. Table 1 illustrates the tax burden in the U.S. from select federal excise taxes and income by quintile. One way to measure the degree to which a tax is regressive is by subtracting the tax burden for a product in the lowest quintile from the share of income earned by that same quintile. The lowest quintile of Americans shoulders 15.9 percent of the tax burden on tobacco, while earning only 3.1 percent of the income.

TABLE 1.

Tax Burden Paid by Income Group and Income Distribution in the United States on Selected Federal Excise Taxes and Income 2019

	Motor Fuel	Air Travel	Alcohol	Tobacco	Income Distribution
Lowest quintile	4.20%	4.50%	3.50%	15.90%	3.10%
Second quintile	10.50%	7.00%	8.60%	18.30%	8.30%
Middle quintile	17.10%	14.10%	17.20%	18.10%	14.10%
Fourth quintile	23.40%	21.60%	23.90%	20.10%	22.70%
Top quintile	44.40%	52.40%	46.70%	27.30%	51.90%
Total	100%	100%	100%	100%	100%

Note: aggregates may not equal 100% due to rounding.

Sources: Urban Brookings Tax Policy Center, "Who bears the burden of federal excise taxes?" <https://www.taxpolicycenter.org/briefing-book/who-bears-burden-federal-excise-taxes>; and U.S. Census Bureau, "Income and Poverty in the United States: 2019," <https://www.census.gov/library/publications/2020/demo/p60-270.html>.

The excise tax burdens on motor fuels, air travel,¹⁴ and alcohol generally mirror the income distribution by income group. This is truer for taxes on air travel but less so for highway and alcohol taxes. Tobacco taxes have a far greater burden on the poorest income earners than taxes on motor fuels, air travel, or alcohol.

For comparison, an income tax is highly progressive. Using data from U.S. federal income taxes, one study finds that the bottom 50 percent of earners paid only 3.1 percent of all federal income taxes in 2019.¹⁵ That is a far smaller tax burden on income than the tax burden on tobacco, alcohol, or fuel for the bottom half of income earners.

Another way to explore the regressive effect of excise taxes is to calculate how a tax increase would affect after-tax income. Table 2 presents the results of a 50 percent increase in the U.S. federal tobacco excise tax, as estimated by the Tax Foundation's General Equilibrium Model. A 50 percent increase in the U.S. tax rate on tobacco products would negatively impact the lowest quintile's after-tax income by 0.2 percent whereas the top quintile would only see a 0.02 percent decline—one-tenth of the impact.

TABLE 2.

Impact of 50 Percent Increase of Federal Tobacco Excise Taxes

	Income Distribution	Impact on After Tax Income	Additional Tax Burden
Lowest quintile	3.10%	-0.20%	\$5.3 billion
Top quintile	51.90%	-0.02%	\$9.2 billion

Sources: Tax Foundation Tax and Growth Model, October 2019; U.S. Census Bureau

The model also estimates that the 50 percent tax increase on tobacco would raise an additional \$33.6 billion in federal revenue over 10 years.¹⁶ If that additional burden is distributed like the existing burden, the lowest quintile would pay \$5.3 billion more in taxes on tobacco and the top quintile would pay \$9.2 billion more in taxes on tobacco. While the top quintile pays more actual tax, they also earn 51.9 percent of total income, whereas Americans in the lowest quintile earn 3.1 percent of total income.

It is worth noting that most tax burdens are represented as average effects for the entire quintile. Not everyone in those groups consumes tobacco products; most do not. Therefore, the tax increase will be substantially greater for the tobacco consumers in each group.

By itself, having a regressive effect should not dissuade policymakers from levying a tax. User-pay systems and internalizing externalities are positive motivations for excise tax policy. However, the disproportionate effect of regressive taxes on the poor is reason to limit the application of excise taxes to those uses. Excise taxes should not be a tool for revenue maximization or used as a method to fund general government expenses.

14 Excise taxes on air travel is not discussed in further detail in this report, but for a short introduction to the federal taxes on air travel, see Ulrik Boesen, "Understanding the Price of Your Plane Ticket," Tax Foundation, Oct. 28, 2019, <https://www.taxfoundation.org/understanding-the-price-of-your-plane-ticket/>.

15 Erica York, "Summary of the latest federal income tax data, 2022 Update", Tax Foundation, Jan. 20, 2022, <https://taxfoundation.org/summary-latest-federal-income-tax-data-2022-update/>.

16 Estimate assumes elasticity of -0.3, a negative consumption trend for cigarettes, and tax increases passed on to consumers.

Harm Reduction and Well-Being

The overall goal of excise taxation should be to improve well-being. Individual well-being is notoriously difficult to measure and often impossible to quantify. When studying well-being, economists can use revealed preference as a baseline against which to judge relative ranking and preferences. These are informative, but not very helpful in comparing across individuals or aggregating across a population. Even in the absence of robust quantifiable data, though, accounting for personal preferences and individual well-being is essential to any discussion about how taxes impact people.

Taxes, almost exclusively, decrease well-being. In an ideal setting, government expenditures enabled by tax revenues should broadly offset that decrease. But in this framework, taxes are costs that should be minimized. The exception to this is when a product or activity has a social cost. In this case, well-being increases for bystanders when consumption falls, but market participants are made worse off by the tax.

Consider a tax increase on beer. If a person wants to have a drink at home in the evening, they must pay more (tax) for that drink and are thus worse off. The brewer also faces costs in the form of lower sales and smaller margins. They lose. The person who used to buy a beer to drink at home in the evening but now switches to a different drink because beer is more expensive post-tax is worse off: no matter what they drink instead, revealed preference tells us that they would rather have had a beer. So even those that get priced out of the market are made worse off. Obviously, if there are societal gains because a higher beer tax means fewer people become inebriated and then drive a vehicle, there are also winners. Similarly, some people may never form an alcohol addiction if taxes are higher (though for others, alcohol dependency will yield inelastic demand even as taxes rise). But it is essential to highlight that most market participants are made worse off by a tax.

A thorough discussion of the reasons why individuals choose to consume products that inebriate or yield short-term satisfaction at the cost of long-run health is beyond the scope of this paper. But recognizing that individuals make these choices in pursuit of their own happiness is paramount to crafting policy that promotes well-being.

These issues are at the forefront of the discussion about harm reduction products. For example, smoking is addictive and causes long-run health problems. Because smokers primarily smoke to consume the stimulant nicotine, producers have responded by creating a wide array of products that allow people to consume nicotine without smoking. These alternative tobacco products—including vapes, heat-not-burn tobacco, and several others—are markedly less harmful to users.

Policies that encourage consumers to move from smoking to an alternative form of nicotine consumption yield many of the benefits of smoking cessation without the heavy-handedness of, say, a prohibition on nicotine products. They would also avoid withdrawal symptoms and driving people to illicit markets. Alternative tobacco products alleviate most of the external harms of tobacco use (e.g., secondhand smoke), the internal harms (e.g., long-run health problems), and still allow individuals to consume nicotine. These products are socially beneficial in the real world where addictions cannot simply be willed away and consumers' preferences may not align with policymakers'. Taxing harm

reduction products as intensely as more harmful ones may discourage—and certainly does nothing to encourage—switching.

Harm reduction is a key approach to excise tax policy to maximize well-being. The well-being of individuals participating in markets targeted by excise taxes is often overlooked when researchers don't have quantifiable data on post-tax happiness or well-being.

Traditional Excise Categories

Alcohol

Alcohol taxes are among the oldest taxes on record. Beer was included as a taxable item in ancient Egyptian tax records. British excise taxes on table beer and brewing hops date back to 1643, where the tax on beer was particularly striking because these policies were a direct reversal of statutory price controls in the earlier medieval and early modern periods.¹⁷ The United States can trace its beer taxes back to colonial days when New Amsterdam (now New York) governors began to collect taxes on beer. In 1644, the tax amounted to two guilders (80 cents) on each half barrel of beer tapped; half was paid by the brewer and half by the retailer.¹⁸

Today, all OECD countries tax alcohol. Alcohol by volume (abv) is the standard measure of alcohol content contained in an alcoholic beverage.¹⁹ To compare across products and across countries, we convert the tax rates into common currency and standard container sizes.

Alcohol can be produced from a wide range of products and processes. The Customs Combined Nomenclature Code (CN) separates alcoholic beverages into six categories:²⁰ (1) beer made from malt (code 22.03); (2) wine made from grapes (code 22.04); (3) vermouth and other wine of fresh grapes flavored with plants or aromatic substances (code 22.05); (4) cider, mead and other fermented beverages (code 22.06); (5) undenatured ethyl alcohol of an alcoholic strength of 80 percent pure abv or higher (code 22.07 and code 22.08); (6) and undenatured ethyl alcohol of an alcoholic strength of less than 80 percent abv (code 22.08). We focus our discussion on the most popular consumer products in the alcohol space: beer, wine, and spirits (ethyl alcohol products).

17 Henry Yeomans, "Taxation, State Formation, and Governmentality: The Historical Development of Alcohol Excise Duties in England and Wales," *Social Science History* 42:2 (2018): 269–93, <https://www.jstor.org/stable/90020349>.

18 "The Oxford Companion to Beer definition of Manhattan, New York," Craft Beer&Brewing, <https://beerandbrewing.com/dictionary/aSv1o5A40M/>.

19 ABV is defined as the number of liters of pure ethanol present in 100 liters of solution at 20 °C, expressed as a percentage of the total volume.

20 OECD, *Consumption Tax Trends 2020: VAT/GST and Excise Rates, Trends and Policy Issues* (December 2020), <https://www.oecd-ilibrary.org/sites/fc2d6da5-en/index.html?itemId=/content/component/fc2d6da5-en#section-d1e32814>.

Beer

Beer tax rates vary considerably across countries. The Czech Republic, Germany, Luxembourg, the Slovak Republic, and Turkey levy a rate less than \$5 per hectoliter per abv, while Finland (\$44.76) and Israel (\$74.30) apply rates that are as much as 3,200 percent higher than the rates applied in lower tax countries.

Table 3 presents the beer tax rates for all OECD countries. Many countries apply intricate tax rates that can vary by alcohol content of the beer sold or size of the producer, while others apply an *ad valorem* excise tax. The rates presented in Table 3 are summaries for presentation and comparison. More details on the countries' tax rates can be found in the Notes Tables.

Many countries have multinational agreements on tax policy. EU law, for example, requires every EU country to levy an excise duty on beer of at least €1.87 per 100 liters (26.4 gal) and degree of alcohol content.²¹

Converting that rate to a typical 330ml (11.2 oz) beer bottle with 5 percent alcohol content, the rate amounts to a minimum tax of €0.03 (\$0.04). As Figure 4 illustrates, only a few EU countries stick close to the minimum rate; most levy much higher excise duties.

Subnational governments can levy taxes on alcohol as well. In the United States, the federal excise tax ranges from \$0.11 to \$0.58 per gallon based on production, location, and quantity. All 50 U.S. states and the District of Columbia also levy additional taxes on fermented malt beverages, illustrated in Figure 5. Rates vary from \$0.02 per gallon in Wyoming to \$1.29 per gallon in Tennessee.

Wine

Wine is a unique product in the alcohol category in that many countries levy no excise tax on it. Thirteen OECD countries apply no excise tax to wine (Austria, Czech Republic, Germany, Greece, Hungary, Israel, Italy, Luxembourg, Portugal, Slovak Republic, Slovenia, Spain, and Switzerland). Luxembourg goes so far as to offer a lower VAT rate (14 percent instead of the standard 17 percent) for wine with alcohol content less than or equal to 13 percent.

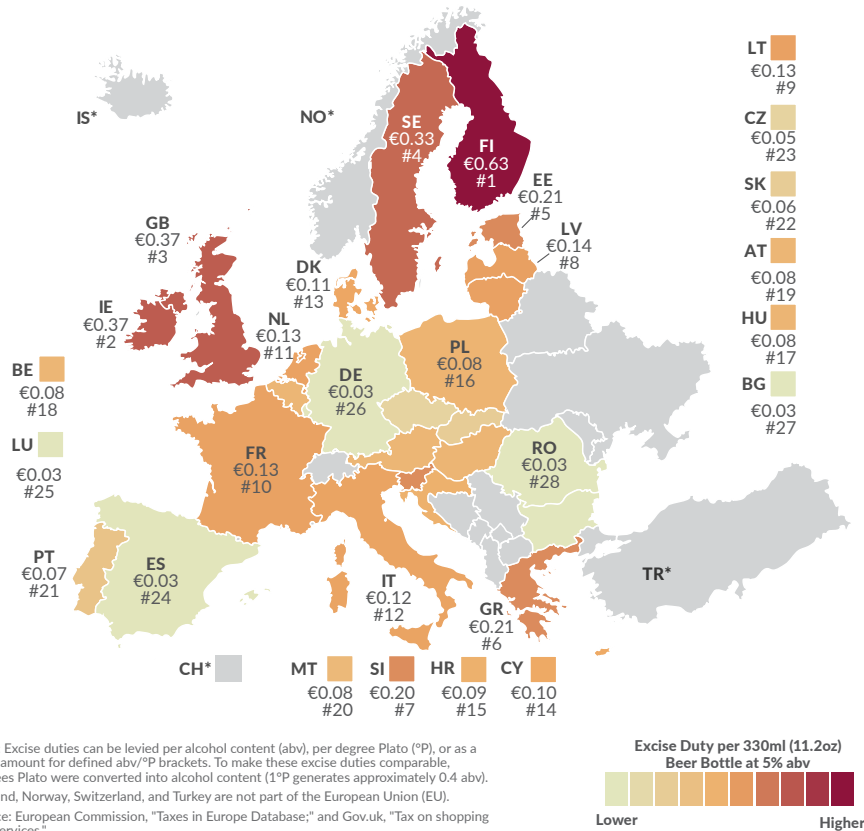
On the other end of the spectrum, Norway has the highest wine tax among OECD countries at \$6.73 per liter, followed by Ireland and Finland at nearly \$5 per liter. Table 4 displays the wine tax rates for all OECD countries.

Australia, Chile, Korea, and Mexico apply *ad valorem* taxes in lieu of *ad quantum* or specific excise taxes. The United States has many subnational state taxes in addition to the federal excise tax. The two maps below show the wine tax rates, adjusted for currency and measuring unit, across the European Union and the United States.

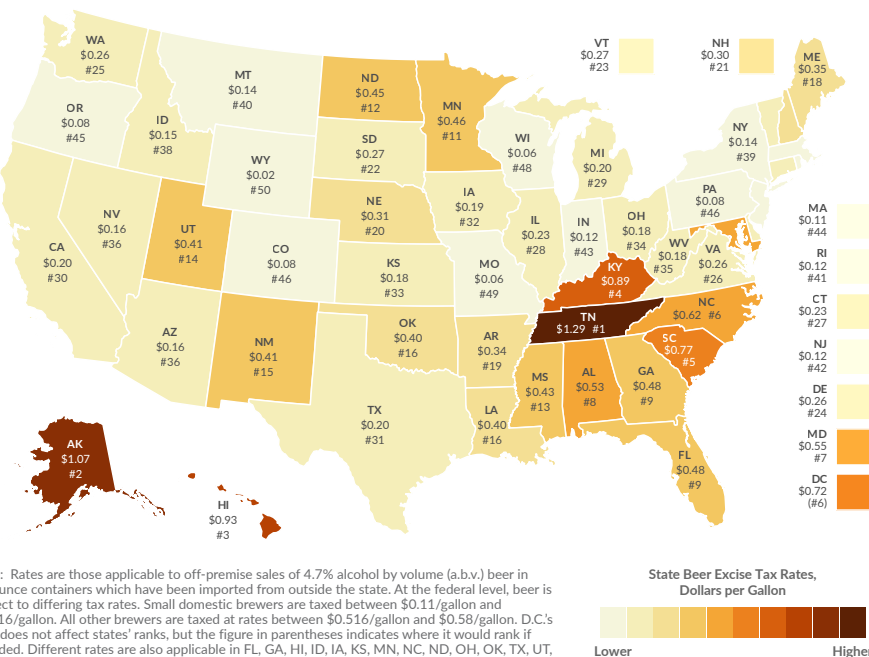
21 European Commission Taxation and Customs Union, "Excise Duty on Alcohol," https://ec.europa.eu/taxation_customs/business/excise-duties-alcohol-tobacco-energy/excise-duties-alcohol_en.

FIGURE 4.**Beer Taxes in Europe**

Excise Duty per 330ml (11.2oz) Beer Bottle at 5% abv in European Union (EU) Member States and the United Kingdom, as of July 2022

**FIGURE 5.****How High are Beer Taxes in Your State?**

State Beer Excise Taxes (Dollars per Gallon), 2022



Sources: Distilled Spirits Council of the United States; Alcohol and Tobacco Tax and Trade Bureau; state revenue departments.

FIGURE 6.

Wine Taxes in Europe

Excise Duty per Standard Size Wine Bottle (0.75 Liters or 0.20 Gallons)
in EU Member States and the United Kingdom, as of July 2021

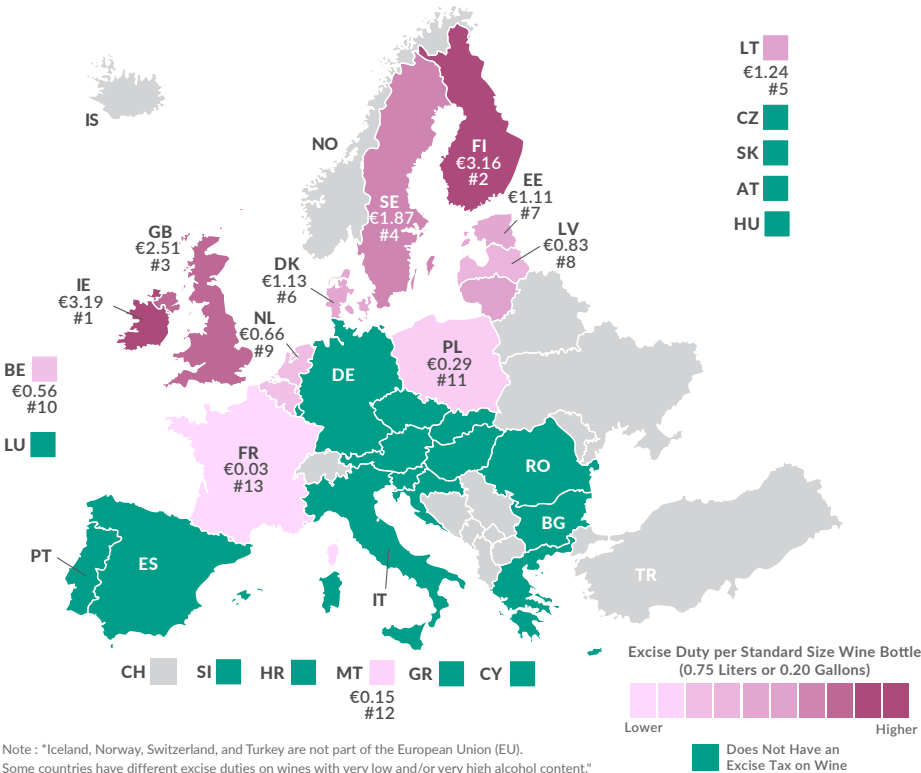
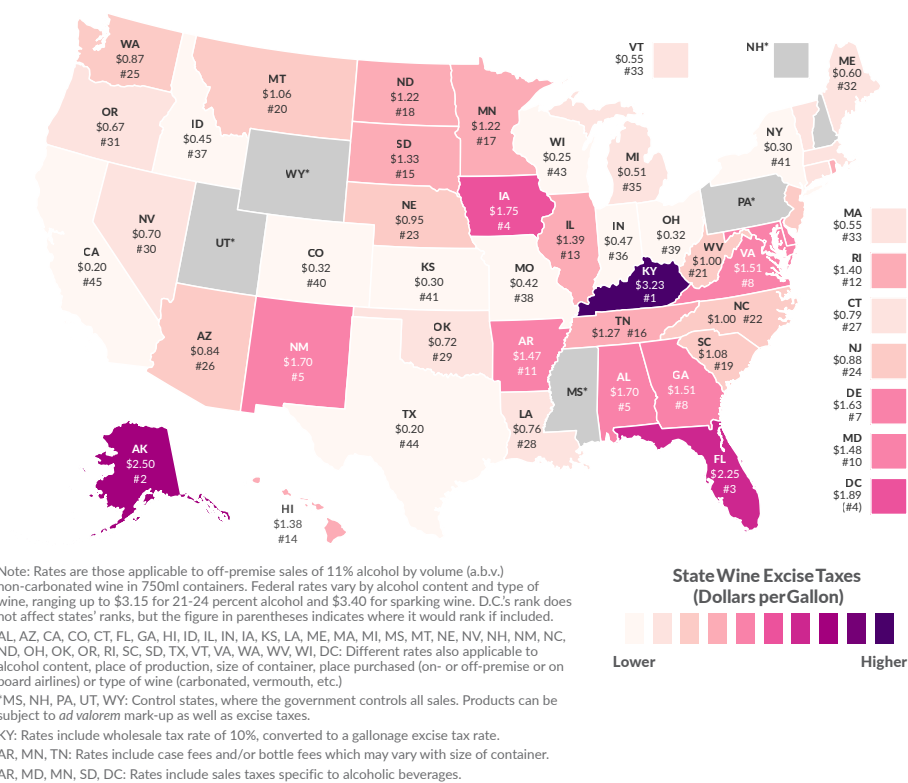


FIGURE 7.

How High are Wine Taxes in Your State?

State Wine Excise Taxes (Dollars per Gallon), as of January 2021



Spirits

Consumption of distilled spirits has increased significantly in recent years. Due in part to new product developments and innovations like ready-to-drink (RTD) cocktails, consumers can purchase spirits that are easier to consume and with less bulk. Long considered a secondary beverage of choice in many countries, spirits sales overtook beer sales in the United States in 2022.²²

Spirits consumption and tax revenues have experienced significant fluctuations based on currency rate swings and changing international tastes over the past few years as well. All types of alcohol have various geographic production clusters, based largely on agricultural yields (grapes, grain, potatoes, rice, etc.). Recent changes have been particularly fruitful for certain products. The market for Mexican tequila has seen sizable growth and exports of Japanese liquor—mostly sake and whiskey—have grown sixfold over the past decade.²³

Spirits are generally taxed per proof per volume. The higher the alcohol content, the greater the tax. Like other kinds of alcohol taxes, spirits excise taxes vary widely. Table 5 shows that the tax on a hectoliter of absolute alcohol ranges from less than \$1,000 in the United States to more than \$12,000 in Iceland.

Even adjusting for higher alcohol content, distilled spirits generally carry a greater tax per alcohol content than either beer or wine. Nowhere is that more evident than in countries that apply taxes to spirits and no tax to wine. A glass of wine with 13 percent alcohol content could go tax-free, while a 13 percent alcohol content rum and coke will carry the full weight of a country's spirits taxes.

Across the EU, spirits are the most heavily taxed alcohol. Taxes range from \$6.41 per liter in Bulgaria to more than \$57 per liter in Finland.

In the United States, the state of Washington taxes distilled spirits more than any other state, at \$35.31 per gallon, followed by Oregon (\$21.95) and Virginia (\$19.89). Distilled spirits are taxed the least in Wyoming and New Hampshire. However, in these states (and others), the state maintains a monopoly on the sale of spirits. This allows the state government to manipulate prices to (dis)incentivize the purchase of distilled spirits through non-tax measures including price adjustments and retail availability, and to generate revenue through “markup” rather than taxes.

22 Jessica DiNapoli, “Cheers! Spirits like gin, vodka, overtake beer’s U.S. market share” Reuters, February 9, 2023, <https://www.reuters.com/markets/cheers-spirits-like-gin-vodka-overtake-beers-us-market-share-2023-02-09/>.

23 Yohei Matsuo, “Japanese liquor makes little splash in global market” Nikkei Asia, January 2023, <https://asia.nikkei.com/Spotlight/Datawatch/Japanese-liquor-makes-little-splash-in-global-market#:~:text=Exports%20of%20Japanese%20alcoholic%20beverages%20have%20risen%20sixfold%20over%20the,while%20export%20volumes%20surged%2040%25>.

FIGURE 8.

Distilled Spirits Taxes in Europe

Excise Duties per 700ml (23.7oz) Liquor Bottle at 40% abv in EU Member States and the United Kingdom, as of July 2021

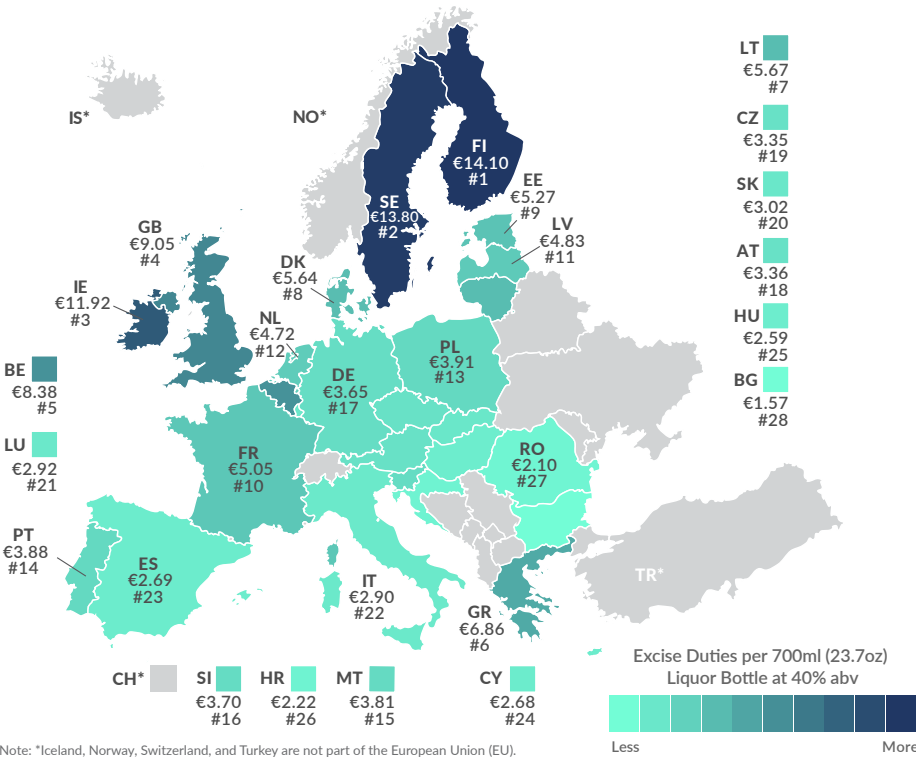
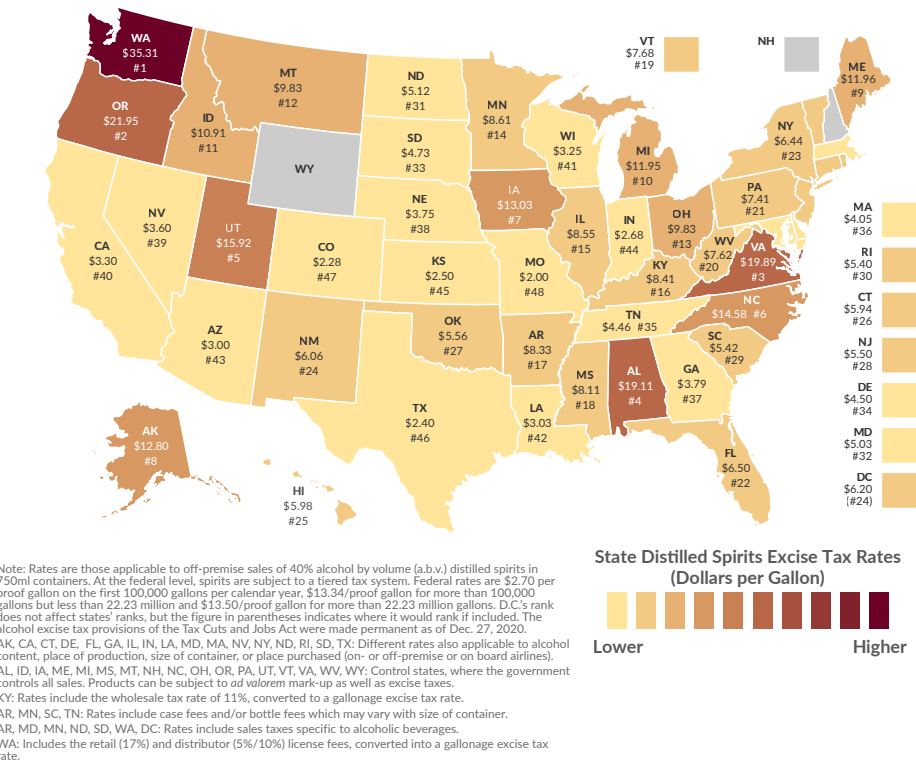


FIGURE 9.

How High are Distilled Spirits Taxes in Your State?

State Distilled Spirits Excise Tax Rates (Dollars per Gallon), as of January 2021



Tobacco

All OECD countries tax tobacco. As with alcohol, combustible tobacco products are subdivided into multiple categories for tax purposes, including cigarettes, cigars, cigarette rolling tobacco, and pipe tobacco. Unlike excises on alcoholic beverages, which are almost exclusively *ad quantum*, most countries levy a combination of *ad quantum* and *ad valorem* taxes on tobacco products.

Table 6 shows the excise tax rates for OECD countries on cigarettes and Table 7 shows the tax rates for cigars and rolling tobacco. Once again, a wide range of taxes are levied on tobacco products. Specific taxes range from \$0.84 per cigarette in Australia to \$0.02 per cigarette in Luxembourg. Several countries don't levy an *ad valorem* tax, but for countries that do, rates range from 1 percent of the retail sales price (RSP) in Sweden and Denmark to more than 60 percent in Turkey (63 percent) and South Korea (64.76 percent).

Across the EU, the Tobacco Tax Directive requires Member States to levy a minimum excise tax rate on cigarettes and other tobacco products. EU cigarette taxes include both a specific cigarette tax (a fixed euro amount per pack of cigarettes) and an *ad valorem* tax (an added percentage of the RSP).²⁴

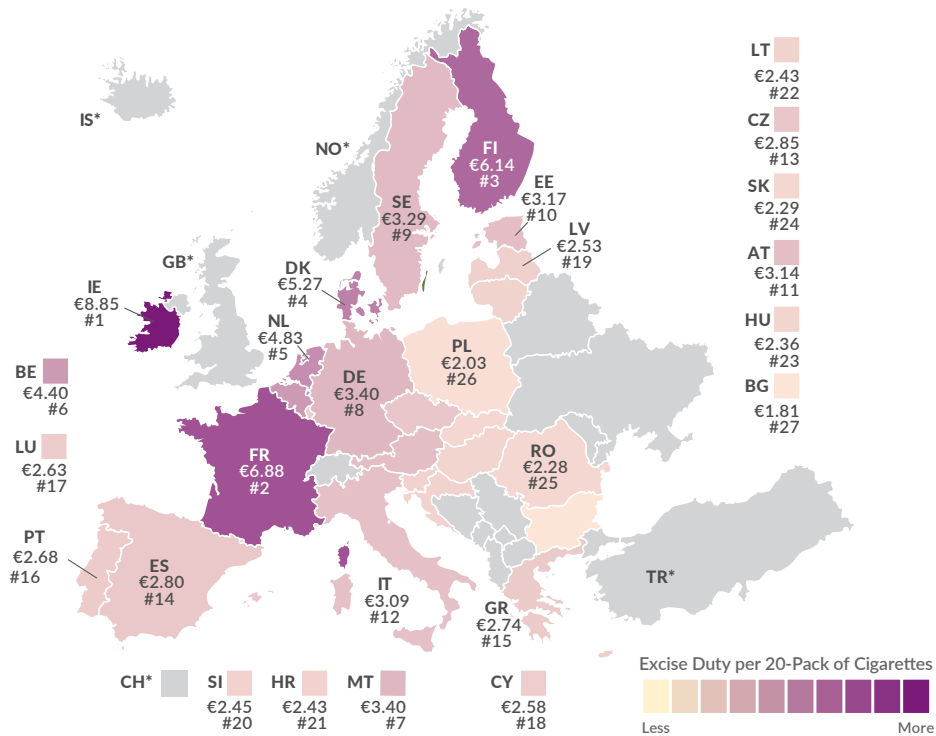
In total, the current minimum cigarette excise taxes in the EU are €1.80 (\$1.89) per 20-cigarette pack and the total excise duty must be at least 60 percent of an EU country's weighted average RSP (certain exceptions apply). These tobacco excise taxes come in addition to the broad consumption value-added taxes (VATs). EU legislation only establishes minimum rates. Several countries levy higher rates, illustrated in Figure 10.

Tax rates can vary significantly at the subnational level as well. In the United States, for instance, local excise rates on cigarettes (on top of the federal tax) range from \$0.17 per pack of 20 cigarettes in Missouri to \$4.50 in Washington, D.C., and \$4.35 in New York and Connecticut. Several counties and cities also add their own taxes to tobacco. These rates are applied in addition to the \$1.01 tax applied per pack of 20 cigarettes at the national level.

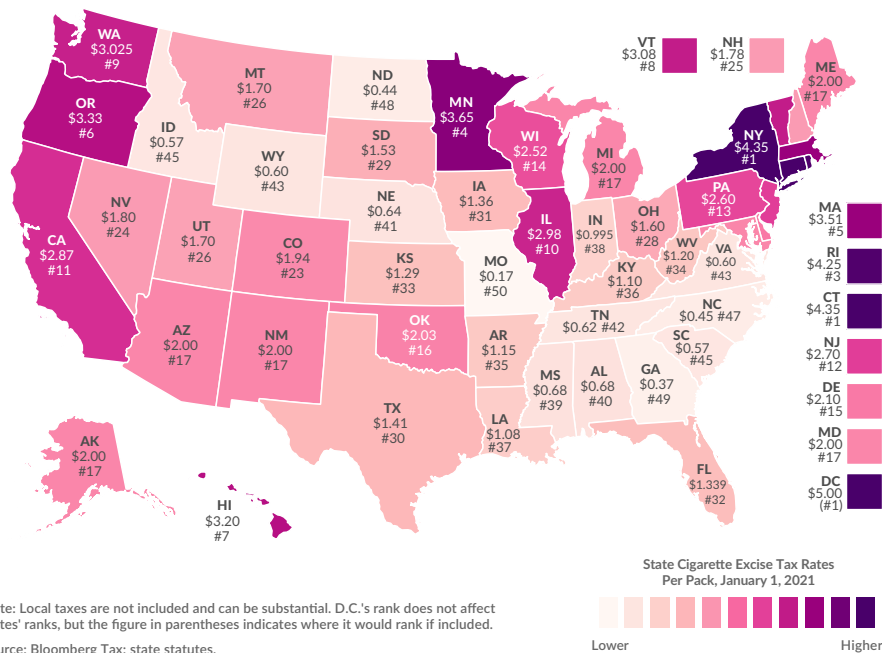
24 Adam Hoffer, "The Future of Tobacco Taxation in Europe," Tax Foundation, Dec. 5, 2022, <https://taxfoundation.org/eu-tobacco-tax-directive/>.

FIGURE 10.**Cigarette Taxes in Europe**

Excise Duty per 20-Pack of Cigarettes in Euros, as of July 2022

**FIGURE 11.****State Cigarette Excise Tax Rates**

State Cigarette Excise Tax Rates Per Pack, January 1, 2021



Tax Burden on Tobacco

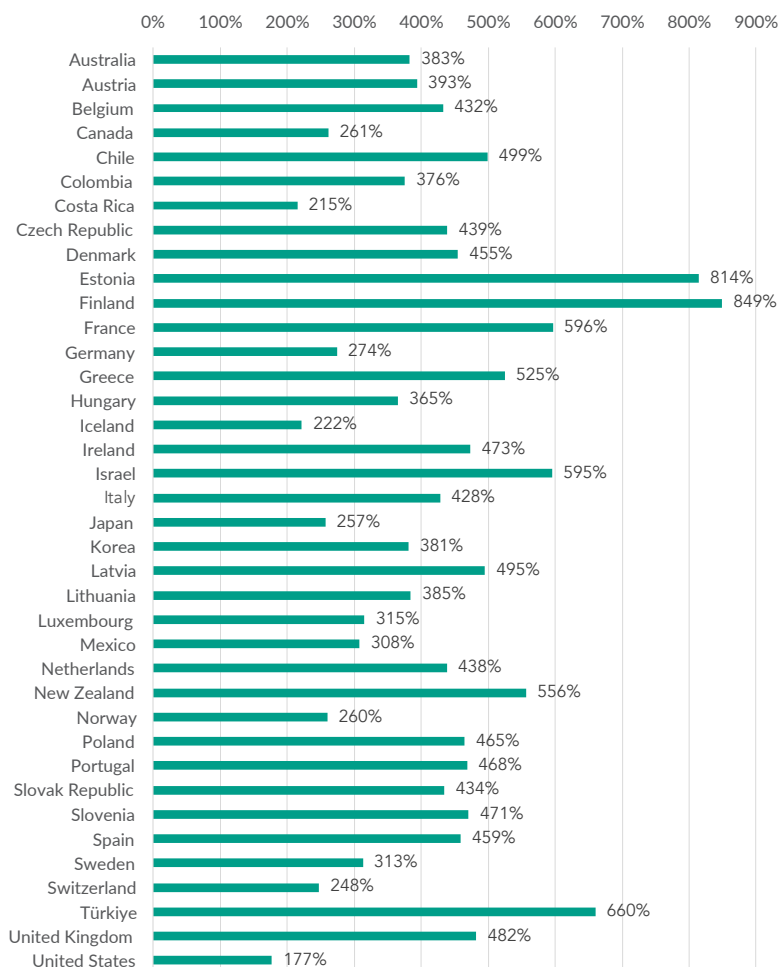
To assess the total tax burden on tobacco products, we need to combine all the multiple kinds of taxes (*ad valorem* excise, *ad quantum* excise, VAT, sales taxes, import duties, etc.) from each level of government, along with any minimum tax, markup, or pricing controls. To estimate the total tax burden, we calculate the difference between the pre-tax price for cigarettes and the aggregate amount of taxes paid for that product using average RSP as reported by OECD member representatives.

Table 8 shows the average RSP and tax burden as a share of the total price of cigarettes for OECD countries. Both the RSP and the pre-tax prices vary widely based on economic conditions, geographic production capabilities, and the structure of the market.

Figure 12 illustrates the tax-induced markup for cigarettes. The lowest levels of tobacco tax burden are in the United States and Costa Rica, where the RSP is 177 percent and 215 percent of the pre-tax price for a package of 20 cigarettes, respectively. In Estonia and Finland, the RSP is more than 800 percent of the pre-tax price for cigarettes.

FIGURE 12.

Tax-Induced Price Increase as a Share of Non-Tax Price for Cigarettes in 2020



Notes: Conversion in USD; market exchange rates for 2020 – OECD Statistics.
Source: Author Calculations, World Health Organisation

Cigarette Smuggling

Sizable price markups for legal cigarettes create incentives for tax avoidance. Tax avoidance can take two different forms, each with different policy implications. Customers can shop across borders to purchase cigarettes legally in lower-tax jurisdictions, or illicit actors can establish a marketplace in which cigarettes are sold with little or no tax paid whatsoever.

Cross-border shopping or tax arbitrage is mostly a zero-sum activity from a cost perspective, and smugglers may even facilitate an increase in total economic activity by decreasing the market tax burden, albeit at high costs (not to mention the innate criminal nature of the activity). A smuggler who legally purchases cigarettes in a lower-tax region like Portugal and then sells the cigarettes in a high-tax area, like Ireland, still pays tax and buys European products—even if the tax loss for Ireland exceeds the tax gain for Portugal and tax-based attempts of discouraging consumption are partially thwarted.

Some criminals, however, avoid legal markets altogether. Rather than pay market prices and lower taxes on cigarettes, criminal organizations produce counterfeit cigarettes with the look and feel of legitimate brands and sell them with counterfeit tax stamps, paying no tax at all. In 2020, three men were arrested in the United States for transporting internationally produced illicit cigarettes. They admitted intentions to smuggle over 400 million cigarettes.²⁵

The counterfeit cigarette capital of the world is China. Estimates put the Chinese counterfeit production as high as 400 billion cigarettes per year.²⁶ Because of the enormous volume of product that ships into global ports from China, it may be easier and cheaper to smuggle Chinese cigarettes through ports than transport products across continental territories.

“Cheap whites” or “illicit whites” are a staple of the international counterfeit market. These generic-looking white cigarettes are produced legally in low-tax jurisdictions but are often intended for smuggling.²⁷ Reports indicate that the Chinese tobacco monopoly is playing a significant role in the “illicit whites” tobacco markets across North, Central, and South America.²⁸

There are real social costs associated with the tax arbitrage in legally purchased manufactured cigarettes, but they pale in comparison to the dangers posed by this counterfeit market. Internationally smuggled and counterfeit cigarettes are dangerous products as they do not live up to the quality control standards imposed on legitimate brand cigarettes. Researchers have found that counterfeit cigarettes can have as much as seven times the lead of authentic brands and close to three times as much thallium, a toxic heavy metal.²⁹ Other sources report finding insect eggs, dead flies, mold, and human feces in counterfeit cigarettes.³⁰

25 St. John Barned-Smith and Gabrielle Banks, “Inside the lucrative smuggling operation that sees millions of Chinese cigarettes pass through Texas,” *Houston Chronicle*, Jul. 1, 2021, <https://www.houstonchronicle.com/news/houston-texas/crime/article/china-cigarettes-tobacco-trafficking-tx-16281704.php>.

26 Te-Ping Chen, “China’s Marlboro Country,” Center for Public Integrity, Jun. 29, 2009, https://reportingproject.net/underground/index.php?option=com_content&view=article&id=9:chinas-marlboro-country&catid=3:stories&Itemid=22.

27 Roger Bate, Cody Kallen, and Aparna Mathur, “The perverse effect of sin taxes: the rise of illicit white cigarettes,” *Applied Economics* 52:8 (Aug. 5, 2019), <https://www.tandfonline.com/doi/abs/10.1080/00036846.2019.1646403?journalCode=raec20>.

28 Ulrik Boesen, “Cigarette Taxes and Cigarette Smuggling by State, 2019” Tax Foundation, December 2021, <https://taxfoundation.org/state-tobacco-tax-cigarette-smuggling/>.

29 R.S. Pappas et al., “Cadmium, Lead, and Thallium in Smoke Particulate from Counterfeit Cigarettes Compared to Authentic US Brands,” *Food and Chemical Toxicology* 45:2 (Aug. 30, 2006): 202-209.

30 International Chamber of Commerce, Commercial Crime Services, “Counterfeit Cigarettes Contain Disturbing Toxic Substances,” <https://icc-ccs.org/index.php/360-counterfeit-cigarettes-contain-disturbing-toxic-substances>.

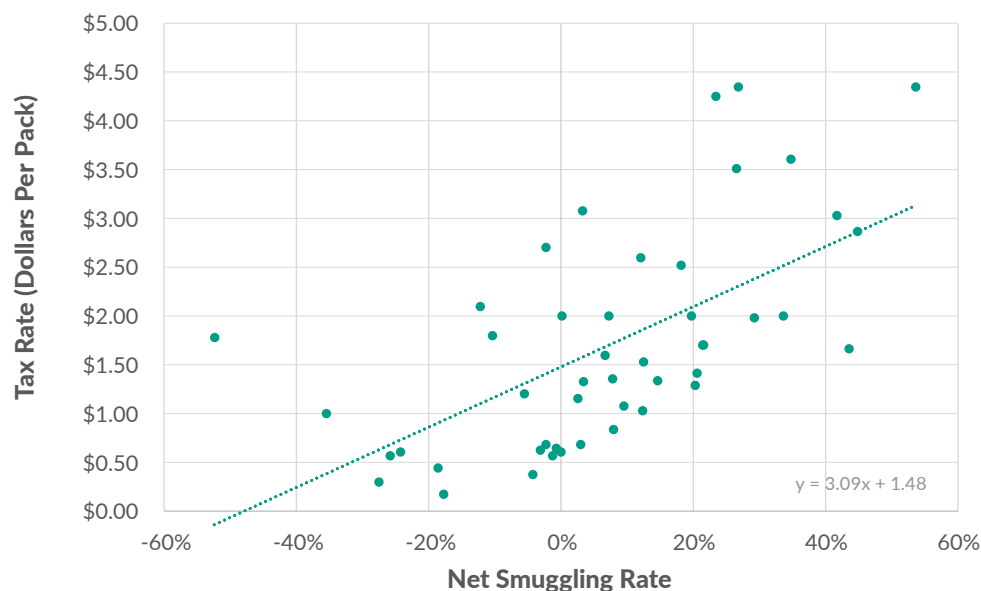
In June 2019, Canadian authorities arrested nine people who reportedly smuggled over one million pounds of tobacco (valued at CAD 110 million). According to police, the group was involved in both theft and arms trafficking.³¹ That same year, European authorities arrested 22 people across five countries representing an organized crime ring suspected of large-scale cigarette trafficking, drug trafficking, assassinations, and money laundering which had netted an estimated \$750 million over two years.³² In Spain in 2020, authorities busted an underground illegal cigarette factory. The organized crime network behind the operation is suspected of large-scale cigarette trafficking with profits estimated at \$647,000 per week.³³

Empirical studies consistently show a positive relationship between cigarette tax rates and smuggling. Figure 13 shows a strong positive relationship between cigarette tax rates and smuggling rates in U.S. States.

FIGURE 13.

Cigarette Smuggling Increases as Excise Tax Rates Increase

Cigarette Smuggling vs. Cigarette Excise Tax Rates, 2020



Source: Mackinac Center for Public Policy, Tax Foundation, and author calculations.

Academic studies of European smuggling reach the same conclusion. A 2018 study concluded that a €1 increase in tax per pack of cigarettes would increase illicit market share by 5 to 12 percentage points and increase illicit cigarette sales by 29 percent to 95 percent.³⁴

Global illicit trade in tobacco is a growing problem. Cigarette smuggling is low-risk and high-reward; billions of dollars are made each year through smuggling. To make matters worse, smuggling

31 CTV News, "Nine arrested in major contraband tobacco bust," Jun. 26, 2019, <https://montreal.ctvnews.ca/nine-arrested-in-major-contraband-tobacco-bust-1.4483651>

32 The Guardian, "More than 20 arrested across Europe in swoop on drug gang," May 22, 2019, <https://www.theguardian.com/uk-news/2019/may/22/22-arrested-across-europe-in-swoop-on-alleged-dangerous-drug-gang>.

33 Graham Keeley, "British gang abandons workers in underground cigarette factory," *Al Jazeera*, Feb. 20, 2020, <https://www.aljazeera.com/news/2020/2/20/british-gang-abandons-workers-in-underground-cigarette-factory>.

34 James Prieger and Jonathan Kulick, "Cigarette taxes and illicit trade in Europe," *Economic Inquiry* 56:3 (February 2018): 1706-1723, <https://doi.org/10.1111/ecin.12564>

operations involve corruption, money laundering, and terrorism.³⁵ According to the Financial Action Task Force (FATF), “Large-scale organized smuggling likely accounts for the vast majority of cigarettes smuggled globally.”³⁶ These operations hurt consumers, because the products often fail to adhere to health standards; governments, because of lost revenue; legal businesses, because they cannot compete with illicit products; and bystanders, because they endure the effects of a more financially solvent black market.

Fuel

Fuels are subdivided into categories based on the material specifications and product uses. The main categories for excise purposes are unleaded gasoline, diesel oil, and light fuel for home heating. Many OECD countries also tax other energy products such as natural gas and electricity. Others directly levy carbon taxes or implement caps on carbon emissions as part of a tradable permit system. In this section, we discuss excise taxes on motor fuels and heating fuels. We discuss carbon taxes in the Trends section.

Motor Fuel

Transportation fuel taxes have existed since the early 20th century. Initially designed as a targeted revenue-raising tool, modern fuel taxes serve several purposes. Fuel taxes act as a user fee for road usage, fund road construction and maintenance, discourage traffic congestion, incentivize the use of public transportation, and incorporate environmental concerns.

The motor fuel tax is relatively well designed to capture many of the negative externalities caused by driving petroleum-powered vehicles. From the Pigouvian perspective, the motor fuel tax is one of the best policy options to internalize the externalities associated with automotive transportation.³⁷

Across all OECD countries, the tax burden for premium unleaded gasoline is nearly half of the retail sales price. Table 9 shows that the United States is an outlier, with a tax burden of 14.2 percent, less than half of the next lowest OECD country, Turkey, at 29 percent. The tax burden in Ireland and Israel exceeds 60 percent of the price at the pump.

The EU Energy Taxation Directive (2003/96/EC) sets common rules for the taxation of energy products in Member States, including fuel. The minimum rates on road fuels are €0.359/l for unleaded gasoline; €0.330/l for diesel fuel and €0.125/kg for liquified petroleum gas. The map below highlights that only Bulgaria, Hungary, and Poland stick to the minimum fuel tax rate, while all other EU countries opt to levy higher excise duties on gas.

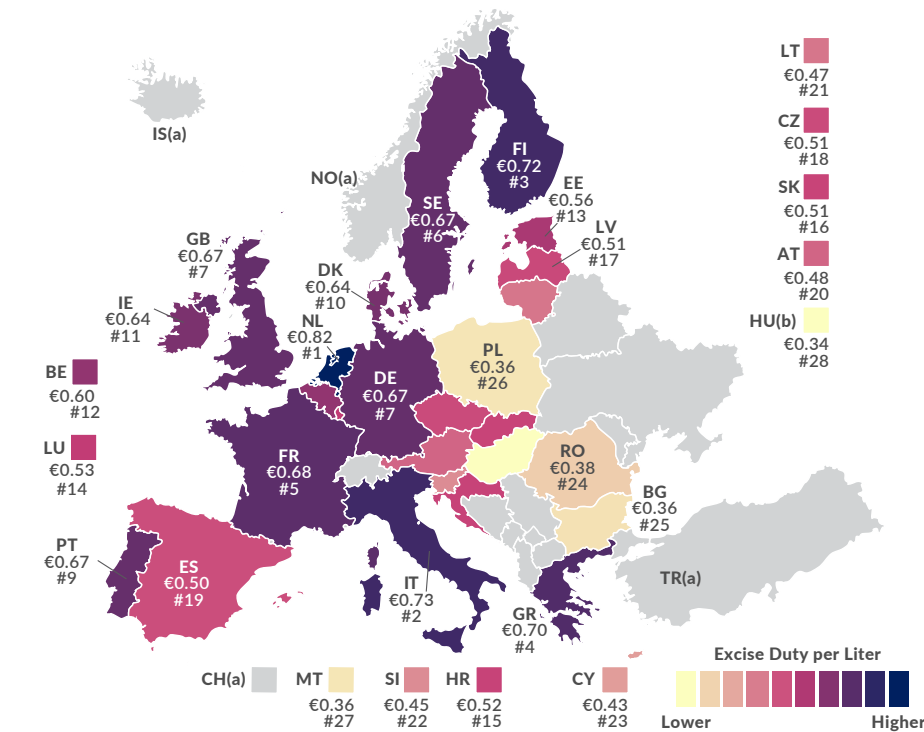
35 Al Qaeda has made millions of dollars selling counterfeit cigarettes. See Francesca Astorri, “EXCLUSIVE: How extremists smuggled \$1 billion in cigarettes to finance terror,” AlArabiya News, May 20, 2020, <https://english.alarabiya.net/features/2017/10/14/Smuggling-cigarettes-new-source-of-terror-financing-worth-1bn-in-North-Africa>; and Department of State, Department of Justice, Treasury Department, Department of Homeland Security, Department of Health and Human Services, “The Global Illicit Trade in Tobacco: A Threat To National Security,” December 2015, <https://2009-2017.state.gov/documents/organization/250513.pdf>

36 The Financial Action Task Force (FATF), “FATF Report: Illicit Tobacco Trade,” June 2012, <https://www.fic.na/uploads/TrendsandTypologies/OtherTrendsandTypologyReports/FATF%20Guidance%20on%20Illicit%20Tobacco%20Trade%20FATF%20June%202012.pdf>.

37 Amir El-Sibaie, “Electric Vehicles Will Have a Long-Term Impact on the Gas Tax,” Tax Foundation, Feb. 12, 2018, <https://www.taxfoundation.org/electric-vehicles-gas-tax/>.

FIGURE 14.**Gas Taxes in Europe**

Excise Duty per Liter (0.26 Gallons) of Unleaded Petroleum in European Union (EU) Member States and the United Kingdom, as of July 2022

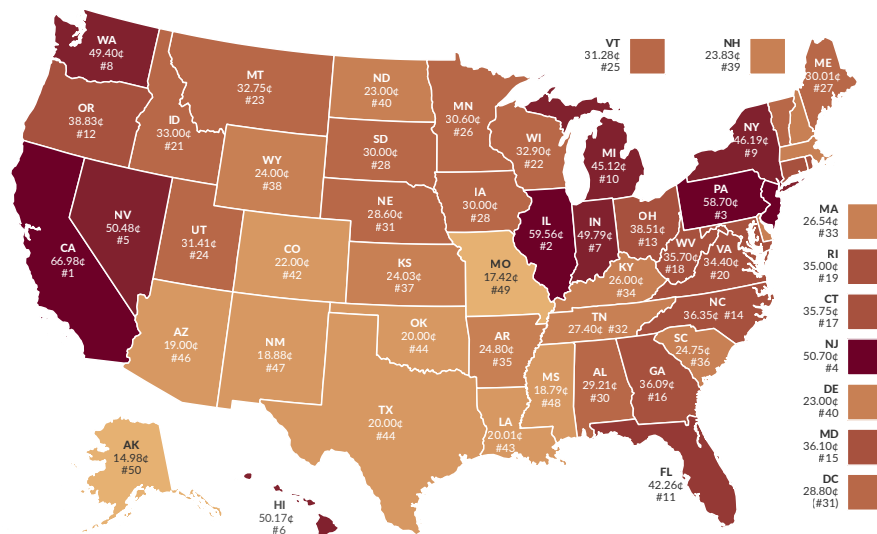


Note: The excise duties apply to petroleum with a sulphur content of < 10 mg/kg, RON 95, bioethanol content, and, if applicable, include carbon taxes and surcharges.

(a) These countries are not part of the European Union (EU).

FIGURE 15.**How High are Gas Taxes in Your State?**

Total State Taxes and Fees on Gasoline, July 2021 (cents per gallon)



Note: These rates do not include the 18.4 cent/gallon federal excise tax rate on gas. The American Petroleum Institute has developed a methodology for determining the average tax rate on a gallon of fuel. Rates may include any of the following: excise taxes, environmental fees, storage tank taxes, other fees or taxes, and general sales taxes. In states where gasoline is subject to the general sales tax, or where the fuel tax is based on average sale price, the average rate determined by API is sensitive to changes in the price of gasoline. D.C.'s rank does not affect states' ranks, but the figure in parentheses indicates where it would rank if included. Data as of July 2021.

The Netherlands has the highest gas tax in the European Union, at €0.82 per liter (\$3.69 per gallon). Italy applies the second highest rate at €0.73 per liter (\$3.26 per gallon), followed by Finland at €0.72 per liter (\$3.24 per gallon).

Roughly 30 percent of new passenger vehicles in the European Union are diesel vehicles.³⁸ Therefore, many European consumers face excise duties on diesel instead of gasoline. The EU sets a slightly lower minimum excise duty of €0.33 per liter (\$1.48 per gallon) on diesel.³⁹

Excise tax rates for diesel fuel are lower than the rates for gasoline in all OECD countries except Australia, Belgium, and the United Kingdom where the rates are the same, and in Switzerland and the United States where the tax rate for diesel exceeds the rate for gasoline. This is peculiar from an environmental tax perspective, as diesel consumption has a greater environmental impact than unleaded gasoline, largely due to the significant differences in nitrogen oxides (NO_x) and particulate emissions.⁴⁰ In Finland, Norway, Slovenia, and Sweden, the environmental concerns of fuel consumption are sufficient that the excise rate explicitly includes a CO₂ component for both unleaded gasoline and diesel fuel.

Gas taxes also differ across the United States. State tax rates range from \$0.6698 per gallon in California and \$0.5956 in Illinois to \$0.1498 in Alaska and \$0.1742 in Missouri.

The aggregate tax burden on transportation is larger than the excise tax on fuel. Vehicles are subject to registration (and recurrent circulation) fees and taxes, purchase fees and taxes, distance-and-weight-based taxes, parking fees, and road usage tolls.

While motor fuel taxes have served as a highly effective tool for more than a century, significant changes are likely underway to transportation taxes. Growing environmental concerns about carbon dioxide emissions have created upward pressure on fuel rates. At the same time, electric vehicles that consume no motor fuel, but still use the roadways, have a growing market share; and new individual-level tracking technology can more precisely identify the amount of road usage per vehicle. The motor fuels tax may soon become obsolete, as governments are able to levy a combination of vehicle registration fees and precise user fees via vehicle miles traveled taxes (VMTs).

Heating Fuel

Heating oil is taxed at lower rates than motor fuels in most OECD countries, illustrated in Table 10. In the European Union (EU), the Energy Tax Directive's (ETD) minimum tax for heating fuel (€0.021/l) is much lower than the minimum tax rate for motor fuel (€0.3/l of diesel). Only a few EU Member States (Czech Republic, Hungary, and the Netherlands) apply a similar tax rate for heating and diesel oil. No countries apply reduced VAT rates for diesel or gasoline, but Ireland, Luxembourg, and the UK apply a reduced VAT rate for heating oil.

38 European Automobile Manufacturers' Association (ACEA), "Fuel types of new passenger cars in the EU," July 2022, <https://www.acea.auto/figure/fuel-types-of-new-passenger-cars-in-eu/>.

39 European Commission, Taxation and Customs Union, "Excise Duty on Energy," https://ec.europa.eu/taxation_customs/business/excise-duties-alcohol-tobacco-energy/excise-duties-energy_en

40 OECD, *Consumption Tax Trends 2020: VAT/GST and Excise Rates, Trends and Policy Issues* (December 2020), <https://www.oecd-ilibrary.org/sites/fc2d6da5-en/index.html?itemId=/content/component/fc2d6da5-en#chapter-d1e32595>.

For countries that tax heating fuels, the taxes range from \$0.05 in the United States to \$1.22 in Israel. Taxes make up more than 40 percent of the total price of heating fuels in Denmark, Greece, Israel, Italy, the Netherlands, and Portugal. Taxes comprise less than 5 percent of the price of home heating oil in the United States.

New Excise Taxes and Trends

New excise tax categories arise constantly. Most of these taxes have limited geographic applicability and generate relatively small amounts of revenue. Relatively niche excise taxes are levied on decks of playing cards, fur clothing, blueberries, admission to entertainment shows, parking spots, candy, ice cream, and sales of products at establishments related to the sex industry.⁴¹ In 2022, the United States even added a 1 percent tax to publicly traded company stock buybacks.⁴²

Other trends in excise taxes could completely change the landscape of excise taxation. Growth in excise taxes on cannabis, alternative tobacco products, sugar-sweetened beverages, ride-sharing, and plastics have the potential for a global tax base and major implications for global consumption. Carbon taxes would also have global implementation, ideally, and the revenue from carbon taxes has the potential to exceed annual tax collections from all other forms of excise taxes combined.

Carbon

Climate change has become an increasingly pressing global issue. Policy solutions to address climate change are increasingly muddled, from an all-encompassing agenda that expands government control over the whole economy to a status quo of patchwork of subsidies and regulatory regimes.

The patchwork policy approach has produced, not surprisingly, mixed results. Many policies, including tax credits for alternative fossil fuels, green energy subsidies, and energy efficiency standards for appliances and automobiles, help reduce carbon emissions, but often at a high cost for a small environmental gain.

One policy that could internalize the social costs in a neutral manner would be to impose a price on carbon. In 2019, more than 3,500 U.S. economists signed the Economists' Statement on Carbon Dividends.⁴³ The statement offered five policy recommendations:

1. Implement a carbon tax because it is the most cost-effective method of reducing carbon emissions at the necessary scale and speed.
2. A carbon tax should increase every year until emissions reduction goals are met and be revenue neutral to avoid debates over the size of government.

41 Adam J. Hoffer, William F. Shughart, and Michael D. Thomas, "Sin taxes and industry: Revenue, paternalism, and political interest," *The Independent Review* 19:1 (2014): 47-64.

42 Alex Durante, "Stock Buyback Tax Would Hurt Investment and Innovation," Tax Foundation, Aug. 12, 2022, <https://taxfoundation.org/inflation-reduction-act-stock-buybacks/>.

43 George Akerlof, Alan Greenspan, et al., "Economists' statement on Carbon Dividends organized by the Climate Leadership Council," January 2019, <https://www.econstatement.org/>.

3. A sufficiently robust and gradually rising carbon tax will replace the need for various carbon regulations that are less efficient.
4. A border carbon adjustment system can prevent carbon leakage and enhance the competitiveness of firms that are more energy efficient.
5. To maximize the fairness and political viability of a rising carbon tax, all the revenue should be returned directly to citizens through equal lump-sum rebates. Most families, including the most vulnerable, will benefit financially by receiving more in “carbon dividends” than they pay in increased energy prices.

The foundation of a carbon tax is simple. Executing and implementing a global carbon tax is more challenging.

First, to apply an appropriate tax on carbon, we need to have an approximate measure of the social costs of carbon emissions. What are the social costs of carbon emissions? There are a range of answers. Within just the United States, the Trump administration estimated the social cost of carbon to be \$8 per ton,⁴⁴ while the Biden administration currently uses a social cost of carbon of \$51 per ton. High-end estimates of the social cost of carbon can reach well above \$100 per ton—as an example, the state of New York arrived at the social cost of carbon of \$125 per ton.⁴⁵ The number of assumptions required for an estimate of the social cost of carbon leads to a wide variety of dollar figures, but \$50 per ton is an estimate near the median.⁴⁶

When applying a carbon tax, the earlier in the production process the better. According to a 2009 study, it would be possible to collect a carbon tax on 80 percent of U.S. carbon emissions while only directly taxing 3,000 businesses, illustrating the relative simplicity of an upstream point of collection.⁴⁷

Across the globe, existing carbon taxes have a range of coverage. British Columbia’s carbon tax covers 78 percent of the province’s emissions, but Poland’s carbon tax covers less than 5 percent of the country’s emissions.⁴⁸ Spain’s carbon tax only applies to fluorinated gases, taxing only 3 percent of the country’s total greenhouse gas emissions. Norway, by contrast, recently abolished most exemptions and now covers more than 60 percent of its greenhouse gas emissions. Ideally, a carbon tax base should be broad enough to cover most carbon emissions.

Finland was the first country to introduce a carbon tax in 1990. Eighteen European countries have followed suit, implementing carbon taxes that range from less than €1 per metric ton of carbon to more than €100.

44 Lorraine Woellert and Zack Colman, “Biden Hikes Cost of Carbon, Easing Path for New Climate Rules,” Politico, Feb. 26, 2021, <https://www.politico.com/news/2021/02/26/biden-carbon-price-climate-change-471787>.

45 Kevin Rennert, Brian C. Prest, William A. Pizer, Richard G. Newell, David Anthoff, Cora Kingdon, Lisa Rennels, Roger Cooke, Adrian E. Raftery, Hana Ševčíková, and Frank Errickson, “The Social Cost of Carbon: Advances in Long-Term Probabilistic Projections of Population, GDP, Emissions, and Discount Rates,” Resources for the Future Working Paper 21-28 (October 2021), https://media.rff.org/documents/WP_21-28_V2.pdf; see also New York State Department of Environmental Conservation, “DEC Announces Finalization of ‘Value of Carbon’ Guidance to Help Measure Impacts of Greenhouse Gas Emissions,” Dec. 30, 2020, <https://www.dec.ny.gov/press/122070.html>.

46 Alex Muresianu and Huaqun Li, *Carbon Taxes and the Future of Green Tax Reform*, Tax Foundation, June 21, 2022, <https://taxfoundation.org/carbon-taxes-green-tax-reforms/#dividend>.

47 David A. Weisbach and Gilbert E. Metcalf, “The Design of a Carbon Tax,” *Harvard Environmental Law Review* 33 (2009), https://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=3033&context=journal_articles.

48 World Bank, “Carbon Pricing Dashboard,” updated Apr. 1, 2022, https://carbonpricingdashboard.worldbank.org/map_data.

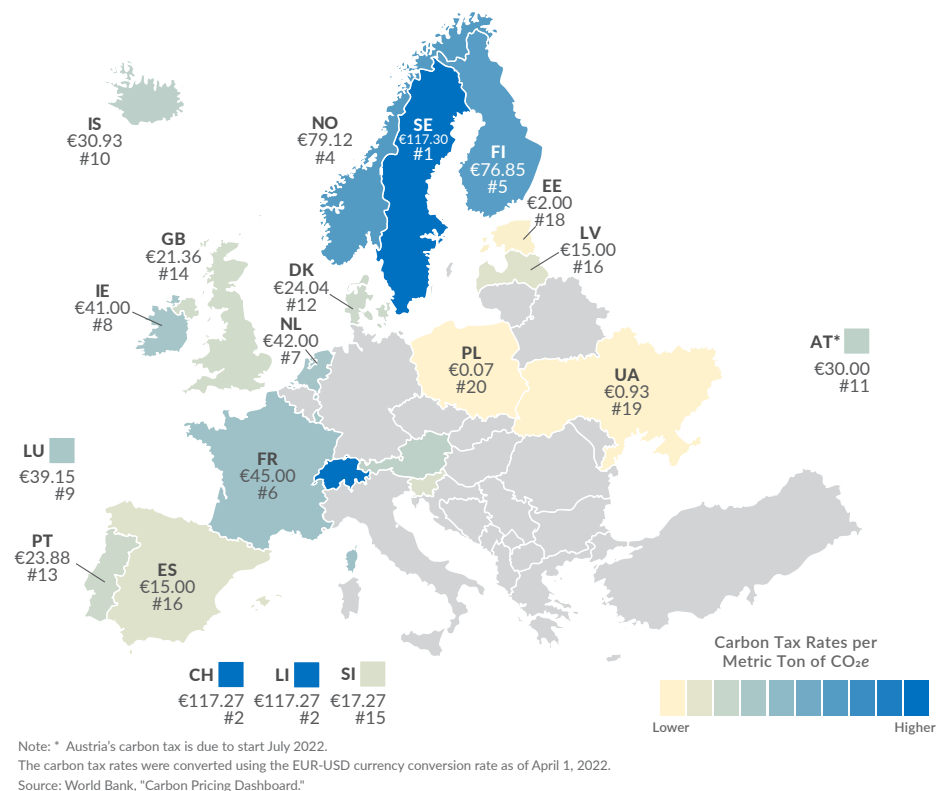
FIGURE 16.**Carbon Taxes in Europe***Carbon Tax Rates per Metric Ton of CO₂e, as of April 1, 2022*

Figure 16 shows that in Europe, Sweden levies the highest carbon tax rate at €117.30 (\$129.89) per ton of carbon emissions, followed by Switzerland, Liechtenstein, and Finland. The lowest carbon tax rates in Europe are in Poland (€0.07, \$0.08), Ukraine (€0.93, \$1.03), and Estonia (€2, \$2.21).

All Member States of the EU, plus Iceland, Liechtenstein, and Norway, are part of the EU Emissions Trading System (EU ETS). The EU ETS is a market created to trade a capped number of greenhouse gas emission allowances. European Economic Area countries also levy a carbon tax that is also part of the EU ETS. Separate European emissions trading systems include Switzerland's system, which is tied to the EU ETS, and the UK's ETS post-Brexit system established in 2021. A separate ETS for buildings and transport (ETS II) is expected to launch in 2027.

Lastly, in December 2022, the European Union entered the final stage of negotiations on the world's first carbon border adjustment mechanism (CBAM). The transitional phase of CBAM will begin in October 2023, with the permanent system in place in January 2026.⁴⁹

While the EU finalizes its laws and policies on CBAM, it may have succeeded in another, potentially equally important objective abroad. Its approach to CBAM emphasized "encouraging partner countries to establish carbon pricing policies to fight climate change." The CBAM is a tariff that will be imposed on all imported products within CBAM's product scope. Producers can offset this tariff if they can demonstrate that the producer already paid a carbon tax on the product in their

49 European Commission, "Carbon Border Adjustment Mechanism," 2023, https://taxation-customs.ec.europa.eu/green-taxation-0/carbon-border-adjustment-mechanism_en#latest-developments.

home country. Thus, by implementing CBAM as a tariff, the EU encouraged foreign policymakers—particularly in the United States—to engage in climate negotiations more seriously.

As policymakers across the globe debate the way forward on carbon taxes and CBAM, the fundamentals of good tax policy are paramount to keep in mind. A broad-based carbon tax could allow governments to raise stable revenue, incentivize greenhouse gas emission reductions, and potentially avoid a harmful trade war over climate tax measures.

Cannabis

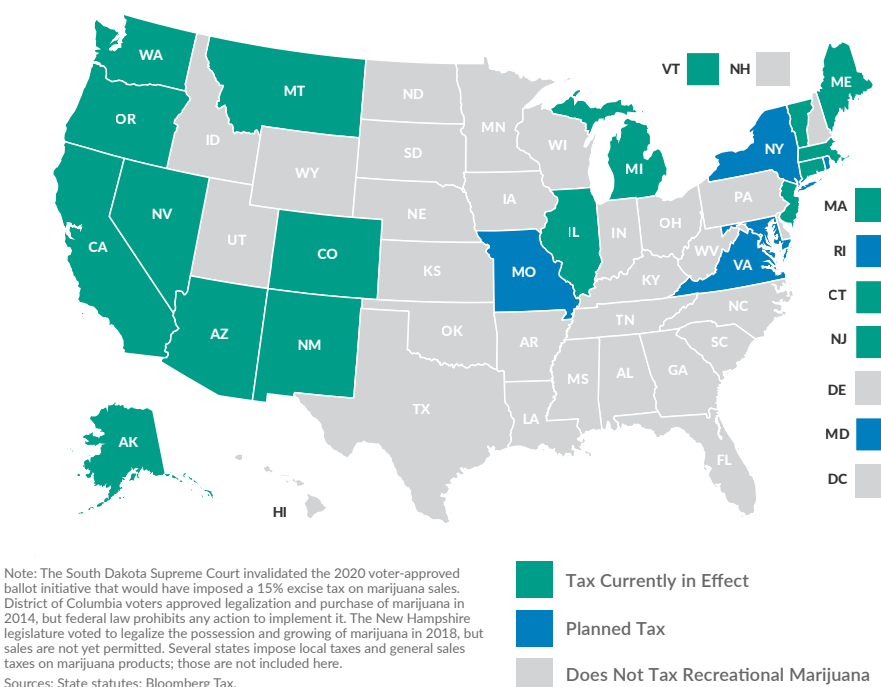
Globally, cannabis is the most widely used illicit drug, and its usage has increased over the past two decades.⁵⁰ The UN Office on Drugs and Crime's (UNODC) World Drug Report estimates that in 2020, more than 4 percent of the global population aged 15–64 (209 million people) had used cannabis in the past year.⁵¹ Marijuana use, cultivation, and global traffic are all on upward trajectories.

Uruguay was the first country to legalize recreational use of cannabis in 2014. A handful of countries have followed suit, with much of the growth in the global cannabis market generated from the legalization of medical and recreational use in North America. Canada legalized recreational marijuana use in 2018; legal reforms started in Mexico but have stalled; and while no policy has been adopted at the national level in the United States, 21 states, illustrated below, have implemented legislation to legalize and tax recreational marijuana sales.

FIGURE 17.

Does Your State Tax Recreational Marijuana?

State Recreational Marijuana Taxes as of November 9, 2022



50 Louisa Degenhardt, Alize J. Ferrari, Bianca Calabria et al., "The global epidemiology and contribution of cannabis use and dependence to the global burden of disease: Results from the GBD 2010 study," *PLoS ONE* (2013), <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0076635>.

51 United Nations Office on Drugs and Crime, "Drug Market Trends – Cannabis Opioids," 2022, https://www.unodc.org/res/wdr2022/MS/WDR22_Booklet_3.pdf.

The unusual situation surrounding the legality of cannabis, along with the novelty of legalization, has resulted in a wide variety of tax designs.⁵² Table 11 highlights the variety of tax policies implemented across the U.S. states. Certain states apply specific taxes, others apply *ad valorem* taxes, and some states apply a hybrid approach that uses both. The *ad valorem* rates are applied at the wholesale and retail levels and range from 10 percent in Michigan and Rhode Island (as a standalone tax, though rates go as low as 3 percent in Connecticut, which applies a hybrid tax) to 37 percent in Washington. Specific taxes are levied separately on cannabis seeds, flower (mature and immature), leaves, trim, clones, whole plants, concentrates, and edibles, and can vary by THC content in the product.

TABLE 11.
U.S. State Recreational Marijuana Taxes, 2022

State	Tax Rate
Alaska	\$50/oz. mature flowers; \$25/oz. immature flowers; \$15/oz. trim, \$1 per clone
Arizona	16% excise tax (retail price)
California	15% excise tax (levied on wholesale at average market rate); \$10.08/oz. flowers & \$3/oz. leaves cultivation tax; \$1.41/oz fresh cannabis plant
Colorado	15% excise tax (levied on wholesale at average market rate); 15% excise tax (retail price)
Connecticut	3% excise tax (retail price) \$0.00625 per milligram of THC in flower; \$0.00275 per milligram of THC in edibles; \$0.009 per milligram of THC in other cannabis products
Illinois	7% excise tax of value at wholesale level; 10% tax on cannabis flower or products with less than 35% THC; 20% tax on products infused with cannabis, such as edible products; 25% tax on any product with a THC concentration higher than 35%
Maine	10% excise tax (retail price), \$335/lb. flower; \$94/lb. trim; \$1.5 per immature plant or seedling; \$0.3 per seed
Massachusetts	10.75% excise tax (retail price)
Michigan	10% excise tax (retail price)
Missouri	6% excise tax (retail price)
Montana	20% excise tax (retail price)
Nevada	15% excise tax (fair market value at wholesale); 10% excise tax (retail price)
New Jersey	Up to \$10 per ounce, if the average retail price of an ounce of usable cannabis was \$350 or more; up to \$30 per ounce, if the average retail price of an ounce of usable cannabis was less than \$350 but at least \$250; up to \$40 per ounce, if the average retail price of an ounce of usable cannabis was less than \$250 but at least \$200; up to \$60 per ounce, if the average retail price of an ounce of usable cannabis was less than \$200
New Mexico (a)	12% excise tax (retail price)
New York (a)	\$0.005 per milligram of THC in flower; \$0.008 per milligram of THC in concentrates; \$0.03 per milligram of THC in edibles; 9% of retail
Oregon	17% excise tax (retail price)
Rhode Island	10% excise tax (retail price)
Vermont	14% excise tax (retail price)
Virginia (a)	21% excise tax (retail price)
Washington	37% excise tax (retail price)

(a) As of January 2023, retail sale of recreational marijuana had not yet started.

Note: Maryland voters approved Question 4 in November to legalize recreational marijuana beginning in July of 2023, but lawmakers have not outlined tax rates as of the date of this publication. District of Columbia voters approved legalization and purchase of marijuana in 2014 but federal law prohibits any action to implement it. In 2018, the New Hampshire legislature voted to legalize the possession and growing of marijuana, but sales are not permitted. Alabama, Georgia, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Nebraska, North Carolina, South Carolina, Oklahoma, Rhode Island, and Tennessee impose a controlled substance tax on the purchase of illegal products. Several states impose local taxes as well as general sales taxes on marijuana products. Those are not included here.

Sources: State statutes; Bloomberg Tax.

52 This short video summarizes some of the basic issues around cannabis taxation in the United States: <https://taxfoundation.org/cannabis/>.

TABLE 12.**State Marijuana Tax Potential**

State	Marijuana Excise Tax Revenue Potential
Alabama	\$92,217,856
Alaska	\$28,258,632
Arizona	\$183,169,705
Arkansas	\$59,314,764
California	\$1,086,253,401
Colorado	\$230,239,177
Connecticut	\$97,696,550
Delaware	\$24,566,974
District of Columbia	\$26,605,996
Florida	\$448,740,070
Georgia	\$198,400,771
Hawaii	\$28,453,985
Idaho	\$33,295,445
Illinois	\$277,576,356
Indiana	\$157,009,061
Iowa	\$50,183,462
Kansas	\$42,058,743
Kentucky	\$83,008,154
Louisiana	\$81,616,779
Maine	\$50,685,850
Maryland	\$135,837,117
Massachusetts	\$214,347,227
Michigan	\$288,183,493
Minnesota	\$122,072,389
Mississippi	\$47,304,242
Missouri	\$119,222,374
Montana	\$35,142,502
Nebraska	\$35,975,930
Nevada	\$106,255,348
New Hampshire	\$44,163,575
New Jersey	\$158,974,353
New Mexico	\$61,692,434
New York	\$431,141,823
North Carolina	\$182,947,622
North Dakota	\$13,231,599
Ohio	\$220,827,478
Oklahoma	\$67,680,000
Oregon	\$182,845,089
Pennsylvania	\$244,553,615
Rhode Island	\$35,455,500
South Carolina	\$96,680,914
South Dakota	\$14,270,281
Tennessee	\$132,509,552
Texas	\$397,424,206
Utah	\$44,428,908
Vermont	\$27,313,974
Virginia	\$139,977,848
Washington	\$285,674,135
West Virginia	\$38,327,540
Wisconsin	\$117,791,078
Wyoming	\$10,054,045

Note: Calculation is based on average recreational marijuana excise tax paid per marijuana-using resident in Alaska, Colorado, California, Nevada, Oregon, and Washington (\$220 in FY 2020) and number of marijuana-using residents in every state. The \$220 is likely an underestimation of the amount paid per legal user, as the total number of users include 18-21-year-olds who do not have access to the legal market in any state. Numbers may be slightly skewed the other way as an amount of excise revenue paid in legal states is paid by visitors. Numbers do not include general sales taxes, fees, or other business taxes.

Sources: Colorado Department of Revenue; SAMHSA; U.S. Census Bureau; author's calculations.

Several important lessons emerged from the rollout of marijuana laws and the adoption of legal markets. First, the revenue potential from legal marijuana markets is significant. These revenues may take years to materialize after legalization, however, and revenues will be volatile, particularly if taxes are levied *ad valorem* instead of *ad quantum*. Table 12 projects the excise tax potential for all 50 U.S. states and the District of Columbia using average revenue from early adopting states, \$220 per marijuana-using resident.⁵³

When designing the tax, rates should be low enough to allow legal markets to undercut, or at least gain price parity with, the illicit market. Revenue targets should aim to raise enough revenue to fund marijuana-related spending priorities and cover societal costs related to consumption.

Identifying the social costs of marijuana consumption is difficult because the academic literature on the topic is very young and some costs would be reduced by legalization. In 2018, the Canadian Substance Use Costs and Harm Scientific Working Group estimated the annual external costs of several drugs, including cannabis. Their estimates of the national social costs of cannabis were \$2.8 billion. That included \$0.2 billion in health-care costs, \$0.4 billion in lost productivity, \$1.8 billion in criminal justice costs, and \$0.5 billion in other costs.

A 2019 academic study merged these costs with legal and illegal cannabis price data to calculate separate externalities based on legal and illegal sales.⁵⁴ They arrive at estimates of illicit market externalities of CAD 4.36 per gram (CAD 123.60 per ounce) and legal market externalities of CAD 1.62 per gram (CAD 46.41 per ounce).

The researchers conclude that current taxation and pricing policies in Canada overprice legally sold cannabis. Recent data show that Canadians buying cannabis from legal sources pay about CAD 10 per gram, while those utilizing the grey market pay CAD 6.37 per gram.⁵⁵ This overpricing causes users who would otherwise prefer legal cannabis to continue to purchase illicit market cannabis. Because every gram of illicit cannabis purchased as a substitute for a gram of legal cannabis imposes an additional cost to society of CAD 2.74 policymakers should carefully design pricing strategies to encourage customers to move from illicit markets to legal markets.

Part of the complexity involved with taxing marijuana is that an array of marijuana consumption products exists. Alcohol is consumed by drinking a liquid, making a tax on alcohol content simple and effective. Marijuana can be smoked, with different strands having different potency levels of THC,⁵⁶ or liquid cannabis extracts and concentrates can be used in the creation of edible or drinkable products, with varying levels of THC.

The solution to marijuana taxation is to tax by potency where possible, and weight where THC content is impractical to measure. The weight-based approach would capture harm derived from the use of smokable products. Eventually, when product testing for THC content in plant materials

53 Ulrik Boesen, "Excise Tax Application and Trends," Tax Foundation, Mar. 16, 2021, <https://taxfoundation.org/excise-taxes-excise-tax-trends/>.

54 Jason Childs and Jason Stevens, "The state must compete: Optimal pricing of legal cannabis," *Canadian Public Administration* 62:4 (2019): 656-673.

55 Anees Bahji and Callum Stephenson, "International Perspectives on the Implications of Cannabis Legalization: A Systematic Review & Thematic Analysis," *International Journal of Environmental Research and Public Health* (Aug. 26, 2019): 3095, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6747067/#B1-ijerph-16-03095>

56 Tetrahydrocannabinol (THC) is the main psychoactive compound and is generally used to define the potency of the marijuana product, even though there are other compounds in the plant that may influence the effects on the user.

becomes less costly, products taxed by weight can transition into a tax by potency. In the immediate term, a weight-based approach captures the externality and is simple enough to allow new products to enter the market without prohibitively high barriers to product testing simply for tax purposes.

Taxes by potency grow as THC content increases in the product, making more concentrated products more expensive and yield more revenue, reflecting higher societal costs associated with more potent products. A specific, separate category should be created for edibles and concentrates as they are easier to test. Neither weight nor potency are perfect, but both are substantially better proxies than price for internalizing the externalities.

Legal markets for cannabis products are still in their infancy, as are the tax policies applied to those markets. A simple, low-rate and low-cost tax system has the potential to raise significant amounts of revenue, while simultaneously decreasing social harms from cannabis by bringing illicit market transactions into a legal market framework.

Alternative Tobacco Products

Innovations in nicotine delivery are among the most interesting developments in the entire excise tax landscape. Consuming nicotine via burning tobacco and combustible cigarettes is dangerous. Millions of deaths each year are attributable to smoking tobacco, according to the World Health Organization.⁵⁷

New products have emerged with significantly less harmful means of consuming nicotine. These include heat-not-burn tobacco products, vaping, and nicotine pouches, patches, and gums. Many of these products are direct substitutes for smoking, representing incredible opportunities for harm reduction. However, tax and regulatory restrictions on these products are all over the map.

This may be best illustrated in the treatment of vaping or e-cigarette products, which constitute the largest alternative tobacco product market. The Royal College of Physicians in the United Kingdom found, after a thorough review of the empirical evidence, that e-cigarettes were significantly less harmful than cigarettes and that smokers use e-cigarettes as an aid to quit smoking. They conclude, “[I]n the interests of public health it is important to promote the use of e-cigarettes, NRT and other non-tobacco nicotine products as widely as possible as a substitute for smoking.”⁵⁸ UK policy, therefore, promotes vaping as an alternative to smoking. Vape shops have even been allowed to open in two National Health System hospitals.⁵⁹

On the other hand, 32 countries prohibit the sale of electronic nicotine delivery systems (ENDS).⁶⁰ At least 50 countries tax e-cigarettes, but there is no consistency in tax policy. The tax base may include ENDS devices and/or e-liquids for both open and closed systems. The tax rates vary widely and the point in the production process at which the tax is applied also varies.

57 World Health Organization, “Tobacco,” 2023, https://www.who.int/health-topics/tobacco#tab=tab_1.

58 Royal College of Physicians, “Nicotine without smoke: Tobacco harm reduction,” April 2016, <https://www.rcplondon.ac.uk/projects/outputs/nicotine-without-smoke-tobacco-harm-reduction>

59 The Guardian, “Vape shops open in two UK hospitals to help smokers kick the habit,” July 2019, <https://www.theguardian.com/society/2019/jul/10/vape-shops-hospital-smokers-kick-habit-west-midlands>.

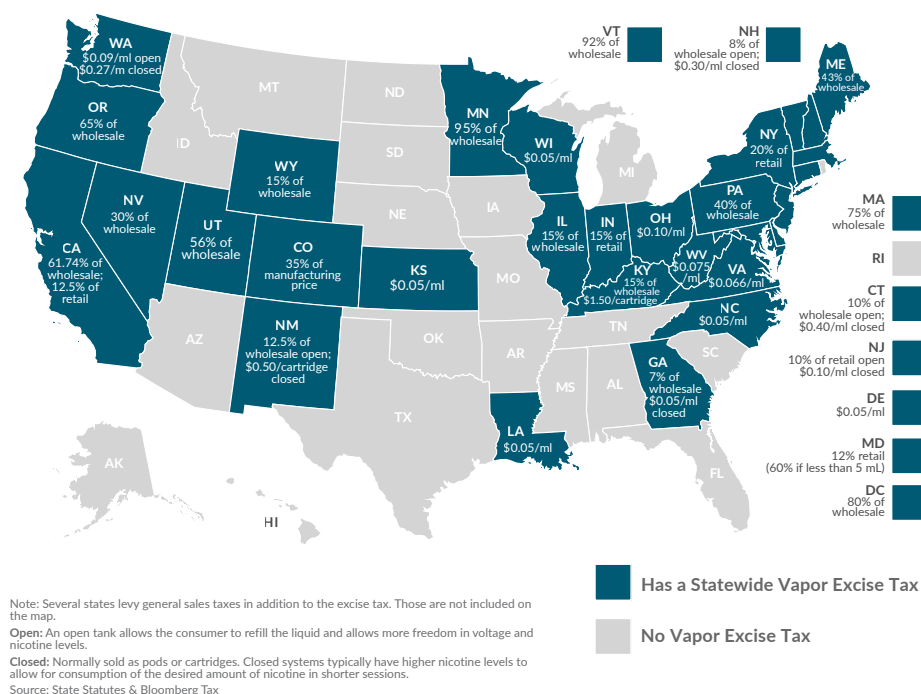
60 World Health Organization, “Report on the Global Tobacco Epidemic – Addressing new and emerging products,” 2021, <https://apps.who.int/iris/bitstream/handle/10665/343287/9789240032095-eng.pdf?sequence=1&isAllowed=y>

Consider the United States. The U.S. has no federal tax on e-cigarettes or vaping, but 30 states plus the District of Columbia tax vaping as of July 2022. Those taxes include *ad valorem* taxes applied on the wholesale price (ranging from 7 percent to 95 percent), manufacturer's price, and retail sales price to consumers; and *ad quantum* taxes applied to vaping cartridges, per mL of liquid in an open container, and per mL of liquid in a closed system.

FIGURE 18.

How High are Vapor Taxes in Your State?

State Vapor Products Excise Tax Rates, July 1, 2022



The core of the problem with ENDS taxation is that there isn't a negative externality to target with the tax policy. Excise tax best practices revolve around the concept of targeting the problem-causing component, like carbon emissions or alcohol content.

ENDS products don't create the kinds of problems we observe with other products. They may even generate positive externalities by moving consumers away from cigarettes, even if these products still impose some negative health internalities for consumers compared to not using any nicotine product, since they provide an alternative to much more harmful products. The economic rationale for ENDS products would suggest a subsidy. The closest policy to an ENDS subsidy is a reduced VAT, from 20 percent to 5 percent, for e-cigarettes designated as medicinal products in the UK.⁶¹ Many countries do subsidize other nicotine replacement therapy (NRT) products, such as nicotine patches, gum, inhalers, spray, and lozenges.

Nicotine is addictive, however. Addictive products may warrant excise taxes to fund anti-addiction programs. Sports betting is a long-running market with some similarities; the problem is addictive behavior, and the harms are largely constrained to the individual participating in the behavior.

61 Brooke Campus, Patrick Fafard, Jessica St. Pierre, and Steven J. Hoffman, "Comparing the regulation and incentivization of e-cigarettes across 97 countries," *Social Science & Medicine* 291 (2021), <https://www.sciencedirect.com/science/article/pii/S0277953621005190>.

Because the problems with addiction may arise from both over-consumption (a quantity-based problem) and over-spending (a value-based problem), an *ad quantum* or an *ad valorem* tax could be an appropriate tool.

For vaping and e-cigarette products, the simplest tax may be the best tool. A low-rate tax on the volume of vaping liquid would be broad enough to capture all ENDS products. This may also help simplify the tax structure on other tobacco products.

The EU Tobacco Tax Directive sets minimum tax rates on non-cigarette products. Those include fine-cut smoking tobacco, cigars and cigarillos, and other smoking tobacco products. Early reports indicate that the next EU Tobacco Tax Directive will not only increase rates on most existing product categories, but also expand the number of categories and products that are taxed.⁶²

Simple, direct taxes work best as the tax base for other tobacco products. Similar to a weight-based tax for vaping liquid, a weight-based tax for pouches and loose tobacco-snus products would be most effective. Heated tobacco products (HTP) could be designed like cigarette taxes, with a specific amount per stick, but until a market-wide product standard is adopted, HTP taxes should be applied by weight. These structures capture the harmful behavior and keep the tax neutral.

TABLE 13.

Proposed Tax Structure for Nicotine Products

Product	Tax Type
Vapor Products	Specific per milliliter
Snus	Specific per ounce
Nicotine Pouches	Specific per ounce
Heated tobacco	Specific per ounce

Source: Author's analysis.

For the tax rate, alternative tobacco products should be taxed at a level that maintains price differentials compared to combustible cigarettes. A switch from consuming combustible cigarettes to an alternative form of nicotine consumption reduces harm. A simple way to envision tax policy in such an environment is that the tax should be proportionate to the level of harm. If e-cigarettes are 95 percent less harmful than combustible cigarettes, they should have a 95 percent lower tax rate.

Absent precise measures of relative harm levels across products, tax policy can use a broader categorical approach.⁶³ Nicotine products that are less harmful than combustible cigarettes receive a reduced rate. Two or three categories of reduced rates would likely be appropriate as harm reduction levels vary. A transdermal nicotine patch is likely less harmful than a snus oral tobacco pouch, so the less harmful patch can have a tax differential from the oral tobacco pouch, but both products should have significant tax advantages over combustible cigarettes.

62 Oliver Barnes and Mary McDougall, "Brussels to propose rise in cigarette taxes and first EU-wide vaping levy," *Financial Times*, November 2022, <https://www.ft.com/content/6f1c4211-5e54-4aa8-a391-0ec9bc5244de>.

63 The United States has a modified risk tobacco product application, for example, which can result in a tax reduction for approved products. The U.S. program is administered by the Food and Drug Administration and has been riddled with problems. See, for instance, the Reagan-Udall report: <https://reaganudall.org/operational-evaluation-fdas-tobacco-program>.

Sugar-Sweetened Beverages

Obesity has become a major driver of preventable disease and health-care costs around the globe. Obesity prevention is a worthy goal. Excise taxes on sugar-sweetened beverages (SSB) have been proposed as a means of curbing obesity, but academic studies on early SSB taxes cast doubt on their effectiveness at reducing obesity.

SSB taxes are generally implemented to decrease soda consumption—and overall caloric consumption—and as a tool to raise revenue for prioritized spending programs. As both a revenue-raising tool and a health-improvement measure, SSB taxes have flaws.

First, the tax base is exceedingly narrow. A narrow tax base is likely to result in a volatile revenue source. It is also non-neutral and easily allows for substitution to other products, which have the combined effect of decreasing the original well-being of the customer, avoiding taxation, and skirting attempts to decrease overall caloric consumption.

The tax is also highly regressive. Low-income consumers pay a disproportionate share of their disposable income on soda and thus pay a disproportional amount of excise taxes on SSBs.

More than 40 countries apply some form of sugary drink tax. The tax design includes both specific excise taxes and *ad valorem*. Many are national-level taxes, though in Spain the tax is applied in Catalonia, and in the United States the tax is applied in a few cities.⁶⁴

While SSB taxes may decrease soda consumption, academic research suggests the taxes are not effective in decreasing caloric intake. National Health and Nutrition Examination Survey data suggests that when individuals reduce soda consumption due to soda tax increases, they fully offset the calories they would have consumed from soda with calories consumed elsewhere, rendering soda taxes ineffective in terms of caloric reduction.⁶⁵ Another academic study found that, when faced with a new soda tax, many households buy less soda and more beer, substituting one “vice” for another.⁶⁶

Finally, one study concluded that the impact of soft drink taxes on body mass index (BMI) is minimal and not statistically significant.⁶⁷ All in all, it remains highly uncertain whether an excise tax on SSBs has any positive effect on public health whatsoever.

The experiment with SSB taxes has not substantiated claims that such a tax could have a positive benefit on public health. In addition, the inherent design flaws in such a narrow tax also make it unsuitable to raise revenue in a stable and equitable manner. A much broader tax on all added sugar in manufactured products would likely have a far greater effect on health and revenue, but the regressive nature of food taxes is particularly problematic, and a tax of that magnitude, on such a wide range of foodstuffs, would be difficult to implement.

64 Global Food Research Program, “Sugary Drink Taxes Around the World,” University of North Carolina, 2020, https://globalfoodresearchprogram.org/wp-content/uploads/2020/08/SugaryDrink_tax_maps_2020_August_REV.pdf.

65 Jason Fletcher, “Soda Taxes and Substitution Effects: Will Obesity Be Affected?,” *Choices* 26:3 (2011), http://www.ageconsearch.umn.edu/bitstream/117066/2/cmsarticle_188.pdf.

66 Andrew Hanks, Brian Wansink, and David Just, “From Coke to Coors: A Field Study of a Fat Tax and its Unintended Consequences,” *Journal of Nutrition Education and Behavior* 45:4 (July 1, 2013), <https://www.doi.org/10.1016/j.jneb.2013.04.108>.

67 Jason Fletcher, David E. Frisvold, and Nathan Tefft, “Non-Linear Effects of Soda Taxes on Consumption and Weight Outcomes,” *Health Economics* 24:5 (May 2015), <https://www.doi.org/10.1002/2Fhec.3045>.

Ride- and Car-Sharing

Governments have long used car rental excise taxes to raise revenue. These taxes are implemented, not on the premise of internalizing some negative externality, but with the goal of exporting the tax base onto non-residents. Local residents, with the power to vote in local elections, make up a small percentage of the market for car rentals at a local airport. The same goes for hotel rooms and corresponding hotel taxes.

The biggest constraint in car rental and hotel taxes is their deterrence in aggregate tourism. Evidence shows that travelers reduce their demand for car rentals when taxes rise and they cross state lines in search of a better deal.

Recent developments have transformed the ride- and car-sharing industry. The sharing economy has given people the opportunity to rent out their own cars through peer-to-peer car-sharing arrangements. Peer-to-peer car-sharing is projected to grow upwards of 20 percent per year in some countries. The change has prompted questions about how to incorporate this new industry into the existing tax structure on rental cars. Instead of extending poor tax policy to new businesses, policymakers should reevaluate the tax regime imposed on car rental services.⁶⁸

While car-sharing is a nascent industry, the sharing economy's expansion into ride-hailing is much better established. Given that ride-hailing services are substitutes for traditional taxi services, some localities have extended taxes on taxi fares to online ride-hailing services.

A vehicle being used in ride-sharing (or for taxi services) does not increase the social costs already captured by motor fuel taxes. In fact, ride-sharing can decrease congestion compared to people using their own vehicles and also decreases the need for parking in dense urban areas.⁶⁹

Ride-sharing also decreases crime, fatal traffic accidents, and drunk driving. Researchers studied the rollout of Uber into American cities and found that ride-sharing decreased fatal traffic accidents, arrests for assault, and disorderly conduct.⁷⁰ Much of the effects are concentrated around alcohol-induced behaviors. With easier access to ride-sharing, intoxicated individuals are more easily able to return to their residences before problems escalate or crimes are committed. Also, drivers with less skill or who are uncomfortable driving have easier mobility in cities with less convenient public transportation systems.

The overall economic effects of ride-sharing are large and significant. The same researchers estimated that once Uber had operated in a country for four or more years, fatal crashes declined by as much as 40 percent. Governments may not want to subsidize ride-sharing, but given the magnitude of these effects, the case for a subsidy is actually more defensible than the case for targeted taxation.

68 For a detailed discussion and analysis of rental car taxes, see Garrett Watson, "Reforming Rental Car Excise Taxes," Tax Foundation, Mar. 26, 2019, <https://www.taxfoundation.org/reforming-rental-car-excise-taxes/>.

69 Winnie Hu, "When Calling an Uber Can Pay Off for Cities and States," *The New York Times*, Feb. 18, 2018, <https://www.nytimes.com/2018/02/18/nyregion/uber-lyft-public-transit-congestion-tax.html>.

70 Angela K. Dills and Sean E. Mulholland, "Ride-sharing, fatal crashes, and crime," *Southern Economic Journal* 84:4 (2018): 965-991, <https://www.jstor.org/stable/26747680>.

Plastic and Extended Producer Responsibility

Plastic taxes come in two forms. First, a relatively narrow tax or ban on single-use plastics (bags). Second, a broad-based plastic, production, and recycling policy that encompasses a growing movement of extended producer responsibility (EPR).

Single-Use Plastics

As many as 77 countries have implemented some sort of full or partial ban on plastic bags.⁷¹ Plastic bag bans are relatively more popular in developing countries, particularly in Africa where many countries lack the infrastructure to recycle plastics.

Most European countries opt for a tax on plastic use. Among the most notable plastic bag taxes was Ireland's 9 pence (\$0.15) tax on the use of plastic grocery bags in March 2002, which cut plastic bag usage by 90 percent in the first five months.⁷²

The European Union implemented the bloc-wide Single-Use Plastics Directive in 2019, with the goal of significantly limiting the use of plastics in consumer goods. The Directive includes a plastics tax levied through Member States' contributions and based on the weight of single-use plastics placed on each Member State's market. The rate is €0.80 per kilogram (US \$2.14 per pound).⁷³

The United States doesn't have a national ban or tax on single-use plastic, but several states and municipalities have adopted subnational policies. In eight states—California, Connecticut, Delaware, Hawaii, Maine, New York, Oregon, and Vermont—single-use plastic bags are banned.⁷⁴ Ten states have plastic (and glass) bottle deposit fees that are charged per bottle and refunded if the bottle is returned.⁷⁵ The bottle deposit system guarantees that only single-use bottles are charged (not refunded).

Single-use plastic taxes come with trade-offs. The environmental gains from single-use plastic taxes may be small and, in some cases, the gains be more than offset by environmental costs of producing and using alternative products. Isolated plastic taxes on bags and straws are unlikely to create net environmental gains because they represent a small percentage of overall trash and some countries have very little plastic polluting waterways⁷⁶.

71 United Nations Environment Program, "Legal limits on Single-use Plastics and Microplastics: A global review of National Laws and Regulations," https://wedocs.unep.org/bitstream/handle/20.500.11822/27113/plastics_limits.pdf?sequence=1&isAllowed=y

72 Andrew Chamberlain, "Bootleggers, Baptists, and the Irish Plastic Bag Tax," Tax Foundation, August 2005, <https://taxfoundation.org/bootleggers-baptists-and-irish-plastic-bag-tax/>.

73 EUR-Lex, "Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment (Text with EEA relevance)," <https://www.eur-lex.europa.eu/eli/dir/2019/904/oj>.

74 National Conference of State Legislatures, "State Plastic Bag Legislation," updated Feb. 8, 2021, <https://www.ncsl.org/research/environment-and-natural-resources/plastic-bag-legislation.aspx>.

75 National Conference of State Legislatures, "State Beverage Container Deposit Laws," Mar. 13, 2020, <https://www.ncsl.org/research/environment-and-natural-resources/state-beverage-container-laws.aspx>

76 E. Frank Stephenson, "Persecuting Plastic Bags," in *For Your Own Good: Taxes, Paternalism, and Fiscal Discrimination in the 21st Century*, edited by Adam Hoffer and Todd Nesbit (Mercatus Center 2018), <https://www.mercatus.org/media/65571/download?attachment>.

Plastic bag production is also highly energy efficient.⁷⁷ One study estimates that compared to paper grocery bags, plastic grocery bags consume 40 percent less energy, generate 80 percent less solid waste, produce 70 percent fewer atmospheric emissions, and release up to 94 percent fewer waterborne wastes.⁷⁸ Reusable bags may need to be used 130 times to be carbon equivalent with single-use plastic bags.⁷⁹

Cloth bags also require washing to keep them clean and sanitary, further increasing their environmental footprint. If owners fail to wash their bags, food leaks or spills can contaminate the bags with harmful bacteria, such as *E. coli*. One academic study found that half of the studied reusable bags in the United Kingdom contained traces of *E. coli* and many contained evidence of salmonella, while 97 percent of reusable bag users reported that they never washed their bags.⁸⁰ Another study looked at the health effects of banning single-use bags and found that San Francisco's emergency room admissions for *E. coli* illnesses increased by about one-fourth relative to other counties following its bag ban in October 2007. They study also documented increases in *E. coli*-related emergency department visits following bag bans in the cities of Palo Alto, Malibu, and Fairfax in the United States, along with a 46 percent increase in deaths attributable to foodborne illnesses.⁸¹

Excise taxes that target all or some types of single-use plastics have become more common over the past decade. While this kind of tax may be justified as an attempt to internalize the externalities associated with single-use plastics the tax base is exceptionally small and does not apply to the most of the plastic products responsible for pollution.

Extended Producer Responsibility

More recent attempts to target the broader base of solid material pollution are captured in the policy strategy of extended producer responsibility (EPR). EPR is an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle.⁸² EPR has two primary features: (1) the shifting of responsibility, physically and/or economically (fully or partially), upstream toward the producer and away from municipalities for the treatment or disposal of post-consumer products; and (2) providing incentives to producers to incorporate environmental considerations in the design of their products. The goal is to progress toward a "circular economy" where aggregate waste and environmental contamination are minimized.

The umbrella of EPR covers all production and selective forms of EPR have been deployed in several countries for decades. Australia has a National Television and Computer Recycling Scheme; Columbia uses EPR to manage batteries, used tires, bulbs, and computers; and Japan has separate EPR systems for packaging, home appliances, and batteries.⁸³

77 Andrew Chamberlain, "Bootleggers, Baptists, and the Irish Plastic Bag Tax," Tax Foundation, August 2005, <https://taxfoundation.org/bootleggers-baptists-and-irish-plastic-bag-tax/>.

78 John Roach, "Are Plastic Grocery Bags Sacking the Environment?," *National Geographic News*, Sep. 2, 2003, http://news.nationalgeographic.com/news/2003/09/0902_030902_plasticbags.html.

79 Katherine Mangu-Ward, "Plastic Bags Are Good for You," *Reason Magazine*, Sep. 1, 2015, <https://reason.com/archives/2015/09/01/plastic-bags-are-good-for-you>.

80 Harry Wallop, "Bags for Life Could Have E.coli," *Telegraph*, Jun. 10, 2010, <https://www.telegraph.co.uk/finance/newsbysector/retailandconsumer/7863807/Bags-for-life-could-have-E.coli.html>

81 Jonathan Klick and Joshua D. Wright, "Grocery Bag Bans and Foodborne Illness," University of Pennsylvania Institute for Law and Economics Research Paper 13-2 (2012), <http://ssrn.com/abstract=2196481> or <http://dx.doi.org/10.2139/ssrn.2196481>.

82 OECD, *Extended Producer Responsibility: A Guidance Manual for Government* (2001), https://www.oecd-ilibrary.org/environment/extended-producer-responsibility_9789264189867-en

83 OECD, "Extended Producer Responsibility," <https://www.oecd.org/environment/extended-producer-responsibility.htm>.

The modern focus of EPR is on plastic. Plastic has a very long biodegradable timeline—anywhere from 10 years up to thousands of years. EPR policies, therefore, try to incentivize producers to use fewer plastics during the production and distribution process and to recycle materials whenever possible.

To successfully create a circular product lifecycle, many actors need to work in synchronization. At the beginning of the lifecycle, manufacturers decide which raw materials to use. From a circular economy perspective, these materials vary on a spectrum of sustainability and ability to reuse. After production, those products are transported and moved to a retail outlet and then to the user and consumer of the product. In an ideal scenario, the private user then recycles what can be reused. Recycled products from around a metropolitan area are collected and brought to a recycling facility where they can be sorted and prepared for reuse.

The infrastructure, systems, and incentives need to be aligned in order to facilitate the full circular system. Early in the life cycle, manufacturers need incentives to both use less plastic and to use recycled materials. This is the best stage in which to use plastic tax policy to incentivize less virgin plastic in countries with private business ownership to simplify enforcement, minimize the number of tax remitters, and maintain the neutrality of the plastic tax base.

Later in the lifecycle, private users need incentives to both consume less plastic—passing market signals to producers to produce less plastic—and then to recycle. Simple financial incentives can be used to encourage recycling, such as bottle rebates or weight-based recycling credits, but perhaps the biggest action a government can take to encourage recycling is to lower the barriers to recycling for municipal residents. The standard in many developed countries is to provide no-charge (tax-financed) curbside municipal recycling services.

Municipal recycling services need to be reliable and then take on the task of sorting recyclable materials and efficiently preparing the recycled products for reuse. Recycling processes are almost exclusively unprofitable ventures.⁸⁴ When private companies are forced to run recycling operations, they're often considered "loss leaders," the most unprofitable part of the business. When municipal governments run recycling programs, they are unprofitable and must compete for operational funding with other popular local services for local tax revenues.

A tax on virgin plastic early could be used to subsidize recycling operations. However, there is still no guarantee that individual users will recycle. Further, recycling facilities often struggle to find manufacturers that wish to buy the recycled products, in large part because the process of recycling plastic and returning it to a state where it can be used is expensive. Here, subsidies for the use of recycled products, funded from the virgin plastics taxes, could further incentivize manufacturer use of recycled materials, though subsidies of any sort create their own policy trade-offs. For now, it is clear that plastic taxes have gained popularity as a policy to promote EPR and to support measures to promote the circular economy.

84 Michael Corkery, "As Costs Skyrocket, More U.S. Cities Stop Recycling," *The New York Times*, Mar. 16, 2019, <https://www.nytimes.com/2019/03/16/business/local-recycling-costs.html>.

In 2021, the EU implemented a non-recycled plastic packaging waste tax, applying an €0.80 tax per kilogram of plastic packaging waste that is not recycled. The tax burden is placed on Member States and transferred to the EU. Estimates of the tax burden reach as high as €1.3 billion per year for France and Germany.⁸⁵

Each Member State is responsible for financing the plastic levy. Some countries, including Germany, Luxembourg, and Austria, have financed the plastics levy from their general budget. Other countries have opted to pass the expense onto the private sector. Italy, for example, levied a tax on plastic manufacturers beginning January 1, 2023. Portugal applied a tax of €0.30 per single-use plastic packaging as of July 1, 2022, as well as a tax on aluminum packaging beginning in 2023.⁸⁶

A recent report from the OECD evaluated several EPR systems, with an emphasis on the fee and tax structure.⁸⁷ The report identified several policy insights and good practices:

- EPR systems need clear objectives, periodic reviews, and evaluations. Long-term objectives ensure predictability and reduce uncertainty. Periodic reviews and evaluations improve effectiveness.
- Stakeholder networks in EPR systems can be instrumental in collecting insights on the feasibility and likely effectiveness of the criteria that could be used. They can also help coordinate between producers and recyclers.
- To ensure clear, simple incentives for producers, taxes should be easily understandable, enforceable, and harmonized within regional and federal EPR systems.
- Tax complexity requires cost-effective data collection and management capacity. This may be more easily available in mature EPR systems. It is therefore advisable to begin with a simple tax structure to minimize the complexity of initial implementation.

Many EPR policies have been around for decades, but plastic-centric EPR policies are still in their infancy. We will learn more from the existing policies in place each year. As new countries and subnational jurisdictions look to implement their own policies, simple, low-cost systems that are applied as far upstream in the production process as possible are perhaps the best place to start. Moreover, as U.S. states and other subnational jurisdictions begin implementing such taxes, uniformity will be crucial to avoid double taxation or conflicting standards and obligations.

85 KPMG, "Plastic Tax," <https://kpmg.com/xx/en/home/insights/2021/09/plastic-tax.html>.

86 Ebner Stolz, "Plastic tax: New challenge for companies?," Jan. 3, 2023, <https://www.ebnerstolz.de/en/plastic-tax-new-challenge-for-companies-398882.html>.

87 Frithjof Laubinger, Andrew Brown, Maarten Dubois, and Peter Börkey, "Modulated fees for extended producer responsibility schemes (EPR)," OECD, Oct. 28, 2021. [https://one.oecd.org/document/ENV/WKP\(2021\)16/En/pdf](https://one.oecd.org/document/ENV/WKP(2021)16/En/pdf).

Summary and Principles for Excise Tax Design

Excise taxes are an integral part of global tax policy. When designed well, excise taxes discourage the consumption of products that create external harm and generate revenue for funding services that ameliorate social costs. When poorly designed, they create unnecessary negative effects and produce a volatile source of revenue for growing expenditure programs.

Excise taxes on tobacco, alcohol, and fuel are seasoned taxes, but their bases have eroded over time. Smoking rates have plummeted in developed countries and motor fuel usage has decreased as the share of electronic vehicles on the road has increased.

As the tax base shrinks on traditional excise taxes, more and more products will be targeted for excise taxes. In the near future, carbon taxes will have a massive tax base and may produce more revenue than all other excise taxes combined. Alternative tobacco products currently on the market have the potential to end the smoking epidemic if tax policy is wisely implemented. Cannabis markets are young but have the potential for a large tax base if widely decriminalized. Sugar-sweetened-beverage taxes have been rolled out in many areas across the globe; though having little to no effect on obesity, SSB taxes may be a gateway tax to a broader policy on added sugars. Ride-sharing taxes have impeded the rollout of ride-sharing adoption, which may prove costly due to the external benefits of ride-sharing. Plastic taxes are transitioning from a narrow tax on single-use plastics to a component of extended producer responsibility and a broad tax policy in pursuit of a circular economy.

The effectiveness of excise tax policy depends on the appropriate selection of the tax base and tax rate, as well as the efficient use of revenues. The overall excise tax design and considerations above can be summarized in general rules of thumb for excise tax design:

- An excise tax should target the negative externality or social cost of a product. This means the tax base should be targeted directly to the harmful product component or the best available proxy for that externality or cost. Less harmful or less costly substitutes should be excluded from the tax base.
- Specific taxes are superior to *ad valorem* taxes in most cases because quantity is associated more with negative externalities than a product's price.
- Excise taxes are regressive and should be used in a targeted manner.
- Revenues from excise taxes should be aligned as user fees or paired with programs designed to minimize social costs associated with the taxed product.
- Improper alignment of social costs and tax revenues creates a problem. Well-designed excise taxes encourage less use, resulting in a shrinking tax base and declining revenues. These should not be paired with expenditure programs that need more revenue over time.
- Excise taxes should take harm reduction into account to maximize well-being.

- And finally, while excise taxes do generate revenue, general fund revenues should come from broad-based taxes like a general sales tax.

These are neither exhaustive nor always appropriate. They are, however, a good starting point for developing principled excise taxes.