



# HOW TO

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# NOTES

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## How to Design Excise Taxes on Alcoholic Beverages

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**How to Design Excise Taxes on Alcoholic Beverages**  
NOTE/2023/004

Mario Mansour, Patrick Petit, and Fayçal Sawadogo

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# How to Design Excise Taxes on Alcoholic Beverages

Mario Mansour, Patrick Petit, and Fayçal Sawadogo

December 2023

This How to Note examines the complex interplay between excise taxes on alcohol and alcoholic beverages, their revenue yield, and the public health concerns related to alcohol consumption. The note suggests guidance on how countries can approach the design of excise taxes on alcohol based on theoretical principles as well as empirical evidence drawn from international experience. Key questions addressed include: How important is alcohol consumption, and what form does it take across countries of different income levels? What has been the trend in alcohol excise tax revenue? How can countries design simple excise regimes that yield revenue while having the potential to contribute to reducing the externalities and internalities caused by alcohol consumption?

## Introduction

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**Alcohol consumption is closely linked to economic and societal factors, and it has often been associated with some aspects of culture for thousands of years.** Although low to moderate consumption may have minimal effects on health (Cnossen 2007; Rimm and others 1996), growing evidence suggests there is no safe level of consumption (Anderson and others 2023). The harms of alcohol are affected by the *volume*, *concentration*, and *speed* of consumption and can have significant consequences, including complex health issues that could lead to crime and violence, harm to children, vehicular accidents, unemployment, reduced productivity, and death. In 2016, for example, alcohol was responsible for 5.3 percent of deaths and 5.1 percent of disability-adjusted life years worldwide (Poznyak and Rekve 2018). The main causes of alcohol-related deaths are injuries (28.7 percent), digestive diseases (21.3 percent), cardiovascular diseases (19.0 percent), infectious diseases (12.9 percent), and cancers (12.6 percent). Overall, 49 percent of disability-adjusted life years attributable to alcohol consumption were due to noncommunicable diseases and mental health conditions, while 40 percent were due to injuries.

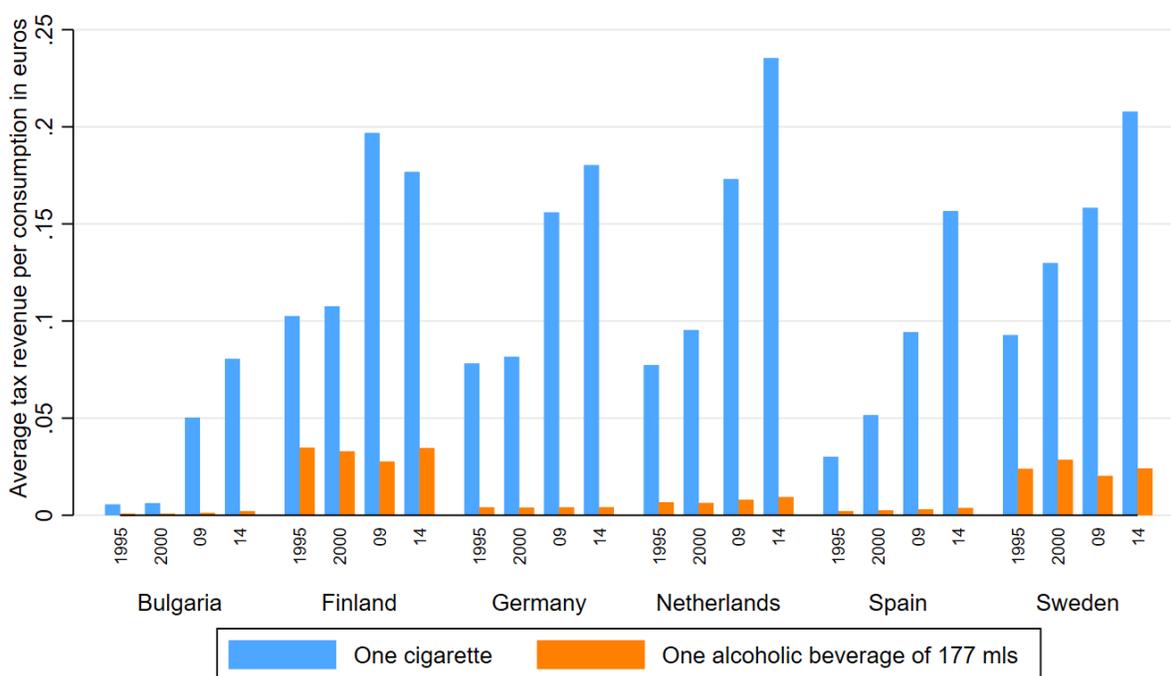
**Similar issues and consequences have resulted in significant restrictions and increases in taxes on tobacco consumption in the past few decades.** However, across countries, policies discouraging alcohol consumption have not followed the same path. For example, Figure 1 shows that from 1995 to 2014, excise taxes on tobacco products increased much more than those on alcohol products in six European countries. This increase also resulted in a significant rise in tobacco excise revenue, but alcohol excises have not followed the same trend and averaged 0.36 percent of GDP over 1990 to 2017. This finding suggests that better designed excise taxes on alcohol could represent a nonnegligible and resilient tax revenue potential—in addition to their benefit to individual and societal health.

**This note explores the rationale for and provides guidance on the design of excise taxes on alcohol and alcoholic beverages.** It discusses the evolution of alcohol consumption and related

externalities, and reviews selected theories and practices on the taxation of alcoholic beverages. The note focuses on the revenue and direct impact of taxes on behavior; it does not directly address the intricate links with other interventions for which non-tax policy instruments might be better suited—for example, smuggling and bootlegging, surrogate alcohol consumption, and access to alcoholic products.

Section 2 discusses the evolution of alcohol consumption over time and alcohol-related excise tax revenues. Section 3 presents theoretical and practical considerations about excise duties and alcohol use. Section 4 discusses policy implications and gives country examples that illustrate how theory and practice can be bridged. Section 5 offers guidance on how to design excise taxes under various country characteristics such as income level, market conditions, and institutional capacity.

**Figure 1. Evolution of Alcohol and Tobacco Excise Taxes over Time in Selected European Countries**



Sources: Taxes in Europe Database v3 (EC, n.d.); and authors' calculations.  
Note: mls = milliliters.

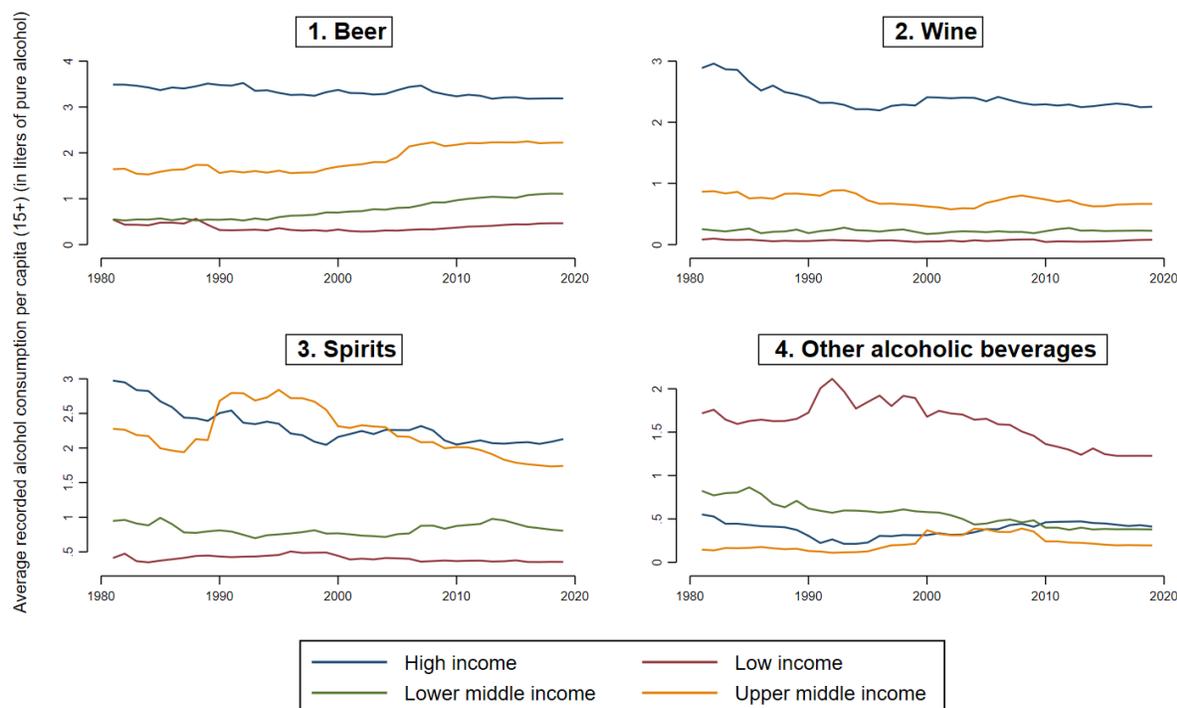
## Consumption and Tax Revenue Trends

**Alcohol consumption is closely linked to income levels and growth.** Available evidence suggests that the tax burden of alcohol has decreased over the past decade. Consumption patterns, however, remain highly idiosyncratic, with significant implications for taxation.

**Per capita consumption generally follows stable trends within an income category, especially over the past 20 years.** Beer consumption (Figure 2, panel 1) has been increasing over time in middle-income countries but remained rather stable in high-income countries and low-income countries. Wine consumption (Figure 2, panel 2) is markedly higher in high-income countries but has been remarkably constant for all income categories. Since 2000, spirits consumption (Figure 2, panel 3) has shown a

stable trend in high-income countries, lower-middle-income countries, and low-income countries, but it has declined steadily in upper-middle-income countries, edging toward its 1980s-era level—the increase from 1990 to 1995 appears to be linked to the socio-economic situation in Eastern European countries. Consumption of other alcoholic beverages (Figure 2, panel 4), such as fermented beverages made from sorghum, maize, millet, rice, cider, fruit wine, and fortified wine, overwhelmingly occurs in low-income countries where it has steadily declined since 1992, while it has slightly increased in high-income countries.<sup>1</sup>

**Figure 2. Evolution of Alcohol Consumption, by Type and Income Levels**



Source: Authors' construction using data from the Global Health Observatory (WHO, n.d.).  
 Note: Other alcoholic beverages include fermented beverages made from sorghum, maize, millet, rice, cider, fruit wine, and fortified wine. The average recorded annual alcohol consumption is calculated based on the adult population (15 years of age and older).

**Regional consumption patterns confirm the influence of income levels and cultures.** North America, Europe, and Central Asia, as well as Latin America and the Caribbean, have the highest recorded alcohol consumption per capita, with annual consumption levels exceeding two liters of pure alcohol per capita for beer and spirits (Figure 3, panel 1). These two types are widely consumed everywhere, but wine consumption is more typical in Europe, Central Asia, and North America. Religious factors largely explain low consumption in the Middle East and North Africa. Spirits and other alcoholic beverages dominate in South Asia and sub-Saharan Africa, respectively, where a large number of countries are low-income.<sup>2</sup>

<sup>1</sup> This increase could be related to the shift in consumption to new products that incorporate mixers. Mixers are nonalcoholic additions that add extra flavor to and/or dilute the strength of a drink. They are often made of simple syrups, club soda, or bitters (IWSR n.d.).

<sup>2</sup> This observation is consistent with Rehm and others (2014), who noted that distilled and fermented craft beverages play an important role in consumption patterns in Africa.

**Besides the impact of culture, income growth can play an important role in explaining consumption quantities and profile.** Indeed, both are particularly driven by the education and work status of individuals, which in turn affect their lifestyles and habits (Dufouil and others 1997; Gmel and others 2013; Ritchie and Roser 2022).<sup>3</sup> Many studies document that alcoholic beverages have become more affordable over time, with income increasing more than prices (Wall and Casswell 2013; Gil, Khaltourina, and Korotaev 2016; Blecher and others 2018).<sup>4</sup> For instance, Blecher and others (2018) showed that between 1990 and 2016, real beer prices fell in 43 percent and 49 percent of lower-middle-income countries and high-income countries, while beer affordability<sup>5</sup> increased in 95 percent and 81 percent of the same country groups, respectively. Figure 3, panel 2 shows that outside of sub-Saharan Africa, South Asia, and East Asia and the Pacific, all three types of alcohol are available at less than 7 percent of daily income—measured by GDP per capita per day. In North America, Europe, and Central Asia, these drinks remain affordable at less than 5 percent of daily income. Moreover, in some regions, the most concentrated and thus potentially dangerous alcohols are more affordable (Figure 3, panel 2; sub-Saharan Africa, Middle East and North Africa, and East Asia and the Pacific).

**Unrecorded alcohol accounts for a significant share of alcohol consumption in some countries, with consumption levels rising over time.** Rehm and others (2014) argued that illegal craft spirits and surrogate alcohol represent the most prevalent forms of unrecorded alcohol in the world. These beverages are generally prepared from mixtures with ethyl alcohol, moonshine, or polyhexamethylene guanidine—a disinfectant—that constitutes a health hazard compared with conventional beverages. Meanwhile, many countries do not tax, control, or monitor the inputs of these products (most notably ethyl alcohol) which compounds the problem. For example, of the 156 countries with information on the tax status of ethanol, 56 do not apply any tax on the ethanol<sup>6</sup> (WHO, n.d.) used in the manufacture of these beverages, which makes them much less expensive and more accessible than products that are legally produced and sold.

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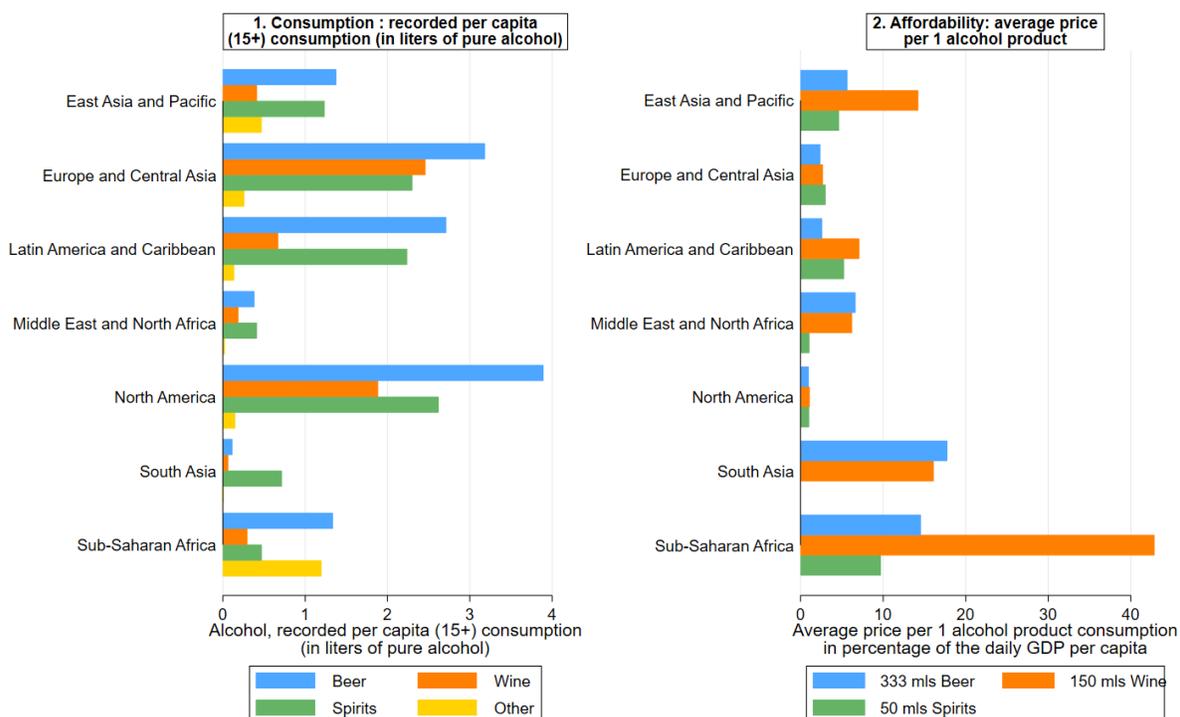
<sup>3</sup> Hu and Stowe (2013) and ONS (2018) asserted that in wealthy countries, people drink moderately at regular frequencies, whereas individuals in low-income countries drink less frequently but do so heavily.

<sup>4</sup> More evidence on this point can be found in Stoklosa and others (2016) for Poland; Rabinovich and others (2009) for the EU; and Kerr, Mulia, and Zemore (2014) for the United States.

<sup>5</sup> Affordability is measured as the percentage of per capita GDP required to buy 100 cans of the cheapest beer.

<sup>6</sup> <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/taxation-of-ethanol-production>, accessed on August 23, 2022.

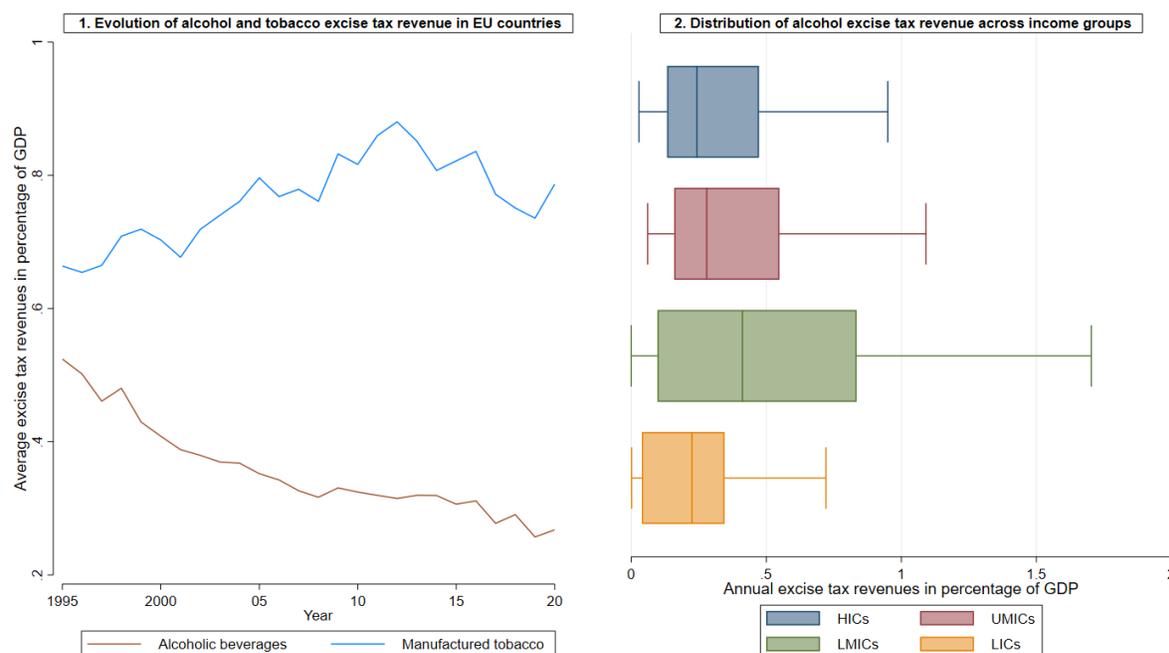
**Figure 3. Alcoholic Beverages Consumption and Affordability, by Type of Product, in 2016**



Sources: Global Health Observatory (WHO, n.d.); and authors' calculations.  
Note: mls=milliliters.

**Based on available data, it appears that tax revenues on alcoholic beverages have decreased over time.** Alcohol excise tax revenues as a percentage of GDP have been on a downward trend, with levels well below those of tobacco-related excise tax revenue, which have been increasing over time, notably in the European Union (EU; Figure 4, panel 1). Moreover, alcohol-related excise tax revenues are relatively low in most countries (Figure 4, panel 2), with lower-middle-income countries collecting more tax revenues on average (as a share of GDP). This observation implies that in addition to the observed asymmetries in consumption profiles, asymmetries in alcohol-related tax revenue mobilization exist across income levels—and hence suggests some potential for additional tax revenue, notably for high- and upper-middle-income countries. Furthermore, the distribution of tax revenue within lower-middle-income countries shows that a high proportion of these countries collect less than the group average, although in some cases this finding may be due to cultural factors. Low-income countries mobilize the least amount of alcohol excise tax revenue—at levels below the world average (0.36 percent of GDP) and those of lower-middle-income countries (0.43 percent of GDP)—which suggests that these countries have significant room for improvement given the importance of the consumption that escapes alcohol excise taxes and the fact that alcohol consumption increases with income levels.

**Figure 4. Highlight on Alcohol and Tobacco Excise Tax Revenue**



Sources: Taxes in Europe Database v3 (EC, n.d.) for panel 1; Global Health Observatory (WHO, n.d.) for panel 2; and authors' calculations. Notes: The box plot (panel 2) summarizes for each country group the distribution of alcohol excise tax revenues (in percentage of GDP) using the minimum, first quartile, median, third quartile and maximum, respectively. Bolivia, classified in LMICs, appears as an outlier with a mean value of alcohol excise tax revenues of 6.96 percent of GDP and is thus not included in the sample. LICs, LMICs, UMICs, and HICs refer to low-income, lower-middle-income, upper-middle-income, and high-income countries, respectively. In panel 1, EU = European Union.

## Excises and Alcohol Consumption: Theory and Practice

While alcohol, like any consumption product, should be subject to value-added tax (VAT) and customs duties (where these still apply), higher prices on a specific good or service are generally obtained through an excise tax—applied as an amount per quantity (specific excise), a percentage of price (ad valorem excise), or a combination of the two.<sup>7</sup> The level of this excise is usually directly related to the damage caused by the consumption or production either to third parties (externalities) or to self (internalities). In the latter case, the excise helps better align life-cycle considerations with short-term preferences (notably in the event of addiction).<sup>8</sup> The level of the excise would typically be set at the marginal cost of the externality or the internality or the sum of both (Pigou 1920; Gruber and Kőszegi 2004; O'Donoghue and Rabin 2006; Griffith and others 2017).

Externalities and internalities of alcohol consumption can be of several types—for example, traffic accidents, self-injuries, physical violence, property damage—and can extend to additional health care costs in a publicly funded health system.<sup>9</sup> However, evaluating alcohol's externalities and internalities is immensely complicated because they differ from the total burden of disease and are not directly related to the amount of alcohol consumed (Crawford, Keen, and Smith 2010). Low, irregular, and

<sup>7</sup> Appendix 2 illustrates how excise duties are applied with a VAT in selected countries.

<sup>8</sup> Imperfect information may also justify an excise, to prevent consumption in ignorance of existing dangers.

<sup>9</sup> See Petit, Mansour, and Wingender (2021) for a more detailed discussion.

slow consumption of nonconcentrated alcohol will have little or no externalities/internalities, and a small economic and health burden; however, frequent binge drinking of highly concentrated alcohol may cause injuries, death, and significant economic damages.<sup>10</sup> Quantity, consumption patterns, product concentration, speed of drinking, and social environment will have a significant impact on the size of externalities and internalities.

**Given measurement difficulties, externalities and internalities are often gauged with the total health and economic burden, and they tend to be important.** A recent global survey of the literature assesses them to be in the range of 2.0 to 3.1 percent of GDP (Manthey and others 2021). At the national level, Manning and others (1989) estimated that the net external costs of alcohol consumption for the United States are about 35 percent of the cost of producing these products, with traffic accidents accounting for a substantial proportion of these costs. Bouchery and others (2011) estimated that in 2006, the economic cost associated with alcohol consumption in the US was about \$746 per person, with alcohol abuse accounting for a large share. For the United Kingdom, Smith (2005), based on Maynard and others (1994), appraised the total cost of alcohol consumption to be about 17 percent of pretax spending on alcohol. Matzopoulos and others (2014) estimated the tangible financial costs of alcohol misuse in South Africa at about 1.6 percent of GDP in 2009. Thavorncharoensap and others (2010) assessed the total economic cost of alcohol consumption in Thailand at 1.99 percent of GDP in 2006.

**The complementarity of drinking with leisure is also evoked to justify excises on revenue-raising grounds (Crawford, Keen, and Smith 2010).** Complementarity between drinking and smoking also provides additional efficiency and revenue rationale for taxing alcohol (Dee 1999; Decker and Schwartz 2000; Room 2004; Pierani and Tiezzi 2009; Aristei and Pieroni 2010). Indeed, pharmacologically, ethanol and nicotine have partially counteracting effects, and consumers use them to assess their respective effects (Room 2004). Psychologically, personality traits such as impulsivity and sensation-seeking also lead to simultaneous heavy drinking and smoking (Little 2000).<sup>11</sup>

**Determining the optimal excise duty rate on alcoholic beverages thus remains difficult, and there is no consensus on this issue in the economic literature.** However, this literature draws one important conclusion: Existing tax rates are low and well below optimal rates. For the United States, Kenkel (1996) argued that the optimal rate should be above 100 percent of the net-of-tax price. According to Parry and Miron (2009), the appropriate rate in the literature varies between 0 and 40 percent of the pretax price. Considering the economic cost of excessive alcohol consumption in the United States, Shafer (2014) estimates that optimal excise tax rates range from \$77.7 to \$276.28 per gallon of pure alcohol across states, with an average value of \$185.95 (\$49.12 per liter of pure alcohol). Griffith, O'Connell, and Smith (2017) determined in their analysis for the UK the optimal rates to apply under a single tax on all alcohol

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<sup>10</sup> In addition, Markowitz and Ding (2020) asserted that although the average demand for alcohol is inelastic, the price elasticity varies depending on consumption patterns, with heavy drinkers facing lower price elasticities; this factor adds to the complexity of the relationship between externalities and consumption patterns. Nelson (2014, 2015) also finds that alcohol consumption is price inelastic for binge drinkers, regardless of their age group or gender. Fogarty (2004), in a meta-analysis, concludes that beer is more price inelastic than wine and spirits, which have similar elasticities. However, Araya and Paraje (2018) found that for Chile, beer is more price elastic than wine and spirits with elasticities of -0.93, -0.77, and -0.14, respectively. Jiang et al. (2016) argue that the price elasticity of demand for alcoholic beverages varies with income level, with low-income individuals and harmful drinkers being more sensitive to price changes. In this sense, excise taxes could be an effective tool to reduce poverty and have a redistributive effect.

<sup>11</sup> Pierani and Tiezzi (2009) explained that the two products are complementary and that, in absolute terms, the cross-price elasticity of tobacco with respect to alcohol is higher than that of alcohol with respect to tobacco. Decker and Schwartz (2000) concluded that higher alcohol prices reduce alcohol consumption and participation in tobacco consumption, whereas higher tobacco prices reduce smoking participation but raise alcohol consumption. This implies that the optimal taxation strategy to maximize tax revenue would be to impose higher taxes on alcohol.

and a tax by segment and by type of alcoholic beverage. In the first scenario, they estimate that the optimal single rate is 3590p<sup>12</sup> (\$55.81) per liter of ethanol. For the second scenario, optimal rates range from 2540p (\$39.49) to 4260p (\$66.23) per liter of ethanol for cider and spirits, respectively, with those on beer and wine being 2830p (\$44) and 3040p (\$47.26) per liter of ethanol, respectively.<sup>13</sup> These authors also noted that these rates vary depending on the type of alcoholic beverage. For the European Union, Cnossen (2007) stated that between one-third and one-half of alcohol consumption comes from a small proportion of alcohol consumers who are responsible for most external costs. In this respect, what makes it difficult to establish an optimal tax on alcohol is that welfare gains from reducing the social costs of excessive alcohol consumption do not necessarily balance the welfare losses from reduced moderate alcohol consumption.

**To have an impact on consumption, excises must increase consumer prices—that is, producers and retailers must not absorb them.** The literature suggests in this respect that alcohol excises are either completely shifted or even overshifted to consumer prices. Shrestha and Markowitz (2016), Kenkel (2005), Young and Bielińska-Kwapisz (2002), Carbonnier (2013) for France and Bergman and Hansen (2010) for Denmark all conclude to overshifting. Conversely, in a meta-analysis including 30 papers, 16 of which are on the United States, Nelson and Moran (2020) concluded that excise duties are perfectly shifted on prices, but not overshifted. Moreover, passthrough rates depend on product types, increase with prices (Ally and others 2014 for the UK; Shang, Ngo, and Chaloupka 2020 for countries in the Organization for Economic Co-operation and Development), and are immediate (Hindriks and Serse 2019, on Belgium). Most importantly, through their effect on prices, alcohol taxes do decrease the affordability of alcoholic beverages and, therefore, reduce consumption (for the EU, Rabinovich and others 2009; for Poland, see Stoklosa and others 2016), harm (WHO 2023), and poverty (Postolovska and others 2017).

**The form of excises also have tremendous implications, notably for revenue administration, and depends on the policy objectives pursued.** In general, specific taxes facilitate the administration, as the determination of the tax amount does not require an assessment of the price or cost of the products. In addition, these taxes can discourage alcohol consumption by directly or indirectly targeting the alcohol content, which is the source of the externality. However, specific taxes impose a higher tax burden on cheaper products, require a clear definition of the tax base, and are insensitive to inflation, which affects tax revenues over time in real terms.<sup>14</sup> Regular adjustments to prices are required to keep up with inflation, and although they seem a straightforward policy to adopt, many countries still suffer excise revenue losses due to non-indexation.

**Ad valorem taxes adjust automatically to inflation—provided it affects the price at which the excise is levied<sup>15</sup>—and have a multiplier effect on the product's price.** However, this multiplier effect may encourage the production of cheaper products, which are often more dangerous—for example, street-sold highly concentrated alcohol bags—and discourages quality improvements since producers would have to raise prices to cover investment costs (Keen 1998; Cnossen 2003). In addition, ad valorem taxes can impose valuation difficulties on tax administrations. Determining policy objectives is therefore

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<sup>12</sup> Pence sterling is referred here as “p.” There are 100 p in one pound (GBP).

<sup>13</sup> The average exchange rate on December 31, 2011, was £1 = \$1.5547 and has been used for the conversion.

<sup>14</sup> Erosion of real tax revenues can also occur because of non-inflationary increases in nominal prices, such as those due to product development and packaging enhancement.

<sup>15</sup> Some excises, including those on alcoholic beverages, apply to wholesale or ex-factory prices. If inflation affects retail prices only, then excise revenue would not automatically and entirely adjust to it.

key, and from a health perspective, which remains the core source of externalities, specific excise taxes seem to be preferred to ad valorem because they lead to a higher price effect and are easier to administer.

**Excise, and consumption taxes more generally, are considered regressive because the poorest individuals spend a larger share of their income on consumption.** However, when public health benefits are considered in the analysis, excise taxes on products such as alcohol, tobacco, or sugar-sweetened beverages are not clearly regressive and can be progressive (Gruber and Kőszegi 2004; Long and others 2015; Fuchs and Meneses 2017; Falbe 2020). Postolovska and others (2017) showed that in the case of cigarettes in Armenia, a 45 percent increase in the retail price could be beneficial from a health and financial perspective, with pro-poor effects. For instance, it will prevent 88 percent of early deaths, 22,000 cases of impoverishment, and 33,000 cases of substantial health expenditures, with half of the early deaths and 27 percent of poverty cases occurring among the poorest 40 percent. These effects come from reduced medical expenditures and years of working life lost (Fuchs and Meneses 2017; Fuchs, Mandeville, and Alonso-Soria 2020). The public health perspective is even more critical when the rich consume more alcohol. All this makes setting excise taxes extremely complex—and evaluating the trade-offs even more crucial.

**A series of additional factors highlight the complexity of taxing alcohol and suggest that tax systems should be defined in general terms to provide enough flexibility in their applications.**

First, substitution effects between different types of products would lead to shifts toward consumption of untaxed or less taxed alcohol products (Fogarty 2004). Indeed, innovation in the alcohol industry is rapid with the diversification of products and especially the proposal of various forms of mixers. Generally available at low cost, mixers are not captured by alcohol taxation systems, thus favoring a substitution in favor of these products. Second, cross-border trade also affects domestic alcohol consumption (Keen 2002; Asplund, Friberg, and Wilander 2007; Chandra, Head, and Tappata 2014; Gopinah and others 2011). Because excise duties aim to raise prices, price differentials could result—depending on the taxes and price levels in neighboring countries. This situation could motivate cross-border alcohol product transaction arbitrage, particularly in the context of regional integration, thus affecting indirect tax policy. Therefore, stricter controls on production, imports, and supply chains should accompany higher excises. Third, the consumption of unrecorded alcohol, particularly via illegal traffic or local production, is also an issue to consider for the success of tax policy choices, and an increase in the level of taxes could influence the consumption of these products, which are more affordable than recorded ones.<sup>16</sup>

**Pursuing multiple policy goals demand multiple and appropriately targeted policy instruments.**

Markowitz and Ding (2020) point out that tax policy cannot on its own modify heavy drinkers' behavior and that policies such as minimum unit pricing could be effective tools, since they can target the cost of the cheapest alcoholic beverages that the heaviest drinkers favor, without penalizing light or moderate drinkers (Holmes and others 2014; Sharma, Etilé, and Sinha 2016; Calcott 2019). Other complementary regulatory policies include adjusting the legal drinking age, limiting alcoholic beverage sales days and

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<sup>16</sup> Arguments against high taxes on alcoholic beverages often suggest that higher prices resulting from tax increases will push the poorest drinkers to consume illicit and potentially dangerous alcohol (Babor and others 2015). However, for Rehm and others (2021), high taxes are not an obstacle to the success of tax policy, as it depends on the local context. For these authors, the stigmatization or not of these products, their availability, the profile of individuals who consume them (generally the lower social classes), and the existing control measures make it difficult to reach unambiguous conclusions on the effect of taxes—beyond their generally negative effect on alcohol consumption. Along the same line, even if some data suggest that higher excise taxes can reduce youth alcohol consumption, Leung, Toumbourou, and Hemphill (2014), Brooks-Russell and others (2014), and Ali and Dwyer (2010) argued that the peer drinking effect is a more important factor. In addition, analyses have shown that the level of friendship between peers affects youth entry into the drinking population (Bot and others 2005; Guo and others 2015) but not their drinking frequency or behavior (Ajilore, Amialchuk, and Egan 2016).

hours, and liquor sales monopolies (Carpenter, Dobkin, and Warman 2016; Fletcher 2019; Markowitz and Ding 2020).

## International Experience and Policy Perspective

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**The complexity of alcohol taxation and the multiplicity of goals pursued by policymakers in various country settings have resulted in several types of tax systems.** This has had the benefit of offering an important lesson: there is no one-size-fits-all answer as to how to tax alcohol, but some guidelines can be charted.

**A key area concerns the relationship between harms caused by alcohol use and the appropriate level of taxation to reduce its consumption**—both in terms of quantity of pure alcohol consumed and the speed of ingestion, which is generally correlated with alcohol concentration. This suggests a much higher levels of taxation on spirits compared to beer, with wine somewhere in the middle. As suggested by the experience of Burkina Faso and Côte d'Ivoire (Box 1), such differences can affect consumption patterns, which raises the issue of consistency in tax policy across products to avoid substitution that could lead to health damages and revenue losses.

**Achieving these differences in taxation can be tricky, especially if one tries to align taxation with the quantity of alcohol consumed.** Many countries will have increasing ad valorem rates on beer, wine, and spirits, but production costs and sale prices of these products can be different and show large variability within each category.<sup>17</sup> Wine and especially spirits can cost much to produce, while other beverages can be produced cheaply—for example, spirits based on a mix of diluted pure industrial ethanol and artificial flavors and syrups. In this respect, a much higher ad valorem rate on spirits could support health policy but is likely to hamper the market for more expensive high-quality wines or spirits. To address this issue, some countries combine specific and ad valorem taxes. Senegal, for example, adds specific excise components for wine and spirits to a 40 percent ad valorem excise on the ex-factory price of all products (Box 2), and Thailand has explored more complex systems that consider the type of product, quantity, concentration, and value (Box 3). The frequent changes to the Thai system suggest more complexity is needed to keep the system in tandem with market evolution—and that such complexity may be too much for low-capacity countries.

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<sup>17</sup> Although excise taxes need to bear on consumption, they are often, for administrative reasons, collected as close as possible to the domestic point of production where the relevant products acquire their excisable character (that is, at the wholesale/production level) or at the point of entry for imports. In South Africa, this system—defined as duty-at-source for domestic products—is based on removals from registered production warehouses (WHO 2023). A major limitation of this system is that it leads to heterogeneities in the effective taxation of margins, which may differ between the imported and domestically manufactured products, mostly for ad valorem taxes. However, the increased digitalization of the retail sector enables more opportunities for applying excise duties at the point of retail. Thus, collecting, tracking, and reporting excise taxes could be simplified, while solving the problem of differences in distribution margins.

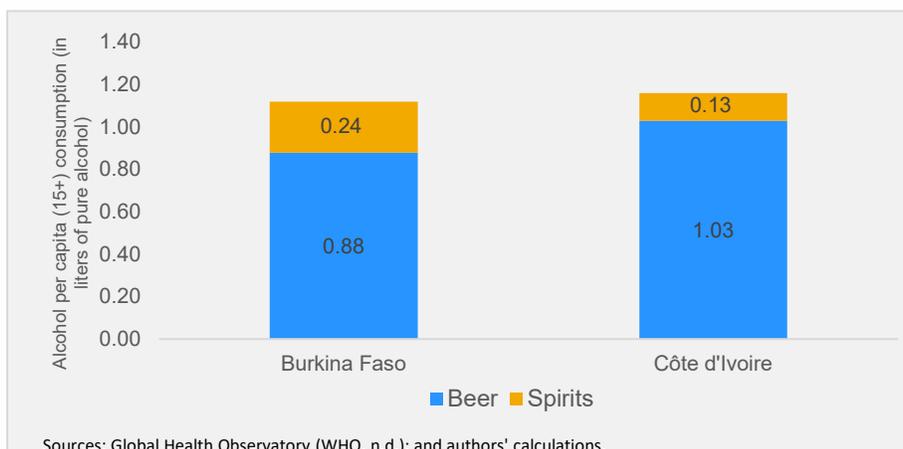
### Box 1. Excise Rate Differences: The Case of Burkina Faso and Côte d'Ivoire

Burkina Faso applied until 2016 an ad valorem excise at a rate of 30 percent of the ex-factory price on beer, wine, and spirits, regardless of alcohol content. Neighboring Côte d'Ivoire, however, applied an ad valorem excise on the same base but with differentiated rates: 17 percent for beer, 45 percent for spirits, and 35 percent or 40 percent for wine (depending on characteristics—ordinary, sparkling, and so on). Other alcoholic beverages, which are largely sold in the informal sector, with an alcohol content of less than 35 percent were in principle taxed at 40 percent and those with an alcohol content of at least 35 percent were taxed at 45 percent in Côte d'Ivoire but not taxed in Burkina Faso. Ethyl alcohol, the main input, is taxed in neither country.

Both countries had similar consumption statistics (around 8 liters of pure alcohol per capita per year), and both are struggling with unrecorded and other types of alcohol (fortified beverages), which together account for around 7 of the 8 liters, either because these products are not taxed (Burkina Faso) or because of administrative issues (Côte d'Ivoire). Regardless, the impact of the rate difference on beer and spirits (both distributed in the formal sector) remains striking: Per capita consumption of spirits was approximately two times higher in Burkina Faso, and beer consumption was 17 percent higher in Côte d'Ivoire.

Burkina Faso increased the rates on wine and spirits to 35 percent in 2016. As of January 2023, Burkina Faso adopted a new excise tax system on alcoholic beverages: wines are taxed at a rate of 70 percent, beers at 30 or 40 percent, and other alcoholic beverages at 50 or 70 percent, depending on their alcohol content (Appendix 1).

Box Figure 1. Breakdown of Alcohol Consumption for 2015 in Burkina Faso and Côte d'Ivoire



## Box 2: Combining Ad Valorem and Specific Rates: The Case of Senegal

Senegal is a member of the Union économique et monétaire Ouest Africaine (UEMOA—West Africa Economic and Monetary Union), which issues tax directives to be followed by member states. Directive N°03/2009/CM/UEMOA mandates a bracket of 15 percent to 50 percent of the ex-factory price for alcoholic beverages, and the directive’s text suggests that a single rate should be chosen for all products.

Senegal chose a rate of 40 percent for all alcoholic products (as opposed to 30 percent in Burkina Faso until 2016 and varied rates in Côte d’Ivoire, both UEMOA members) and added a specific tax on wine and spirits, notably for health and revenue reasons. For all wines (including wines enriched with alcohol, grape must, vermouths, and other fresh wines prepared with plants or aromatic substances other than vinegar) and beers with 6 percent to 18 percent alcohol, a specific excise of 800 CFA francs per liter (\$1.2) is added. For all spirits or alcohol products with 18 percent or more alcohol, the specific excise is 3000 CFA francs per liter (\$4.5). However, while this legislation clearly penalizes higher content alcohol products, it also applies the same specific rate per bottle—even when the bottles are smaller than a liter—thus encouraging the sale of larger bottles of wine and spirits.

## Box 3: Combining Ad Valorem and Specific Rates: The Complex Case of Thailand

Thailand has used an excise duty system since 1933 by combining an ad valorem tax and a specific tax. A major goal of these systems is to systematically consider the many dimensions of alcohol consumption in determining the tax burden by combining elements of alcohol concentration, volume, and price. The complexity of these systems has led to a series of adjustments, which in the end illustrate the challenge for tax design.

From 1980 to 2013, Thailand used a “two-chosen-one” system in which the higher of the ad valorem or specific excise duty was used (Sornpaisarn, Shield, and Rehm 2012). From 2013 to 2017, it used a “one-plus-the-higher one” system in which the specific tax was calculated as the greater value between the amount of the tax applied to the volume of ethanol and that applied to the volume of the beverage, in addition to the ad valorem tax. Since 2017, in view of the complexity of its previous system, Thailand switched to the “one-plus-one” system (WHO 2023) by considering only the volume of ethanol as the basis for calculating the specific excise duty, but the ad valorem duty remaining unchanged. The ad valorem part varies between 0 and 22 percent and the specific part from 0 Thai baht to 1,500 Thai baht per liter of pure alcohol (equivalent to \$46.14 per liter of pure alcohol), depending on the type of product—classified into nine categories according to the type of alcohol. The design of the tax prevents the initiation of alcohol abuse (due to the ad valorem part) as well as the consumption of high alcohol content drinks, due to the specific part (Sornpaisarn, Shield, and Rehm 2012; Sornpaisarn and others 2015, 2016).

**Another option is to use a specific rate per liter of alcohol content that would be beverage specific or proportional to concentration brackets (beer, wine, and spirits, or for example “up to 6 percent,” “6 percent to 20 percent,” and “more than 20 percent”).** This system would target the source of the externality (quantity of alcohol), and the tax would then be calculated as the multiplication of alcohol content, volume, and product specific rate.<sup>18</sup> Because it ignores values, such a system could limit revenues over time. While an ad valorem excise could be added to this system, this would again limit the

<sup>18</sup> For example, with rates per liter of pure alcohol of \$5, \$10, and \$25 for beer (5 percent alcohol), wine (13 percent alcohol), and spirits (40 percent alcohol), in bottles sized 330, 750 and 500 ml, respectively, the tax would be calculated as follows: Beer =  $5 \times 0.05 \times 0.33 = 0.085$ ; Wine =  $10 \times 0.13 \times 0.750 = 0.975$ ; Spirits =  $25 \times 0.4 \times 0.5 = 5$ . Considering pre-tax prices of USD 3.50, 12.50, and 30.00, respectively, the share of the excise tax in pre-tax prices, would 2.4, 7.8, and 16.6 percent, respectively.

impact on cheap spirits, as the specific rate would need to be moderate to accommodate the ad valorem, and inevitably bring a certain level of complexity.

**But even if one can correctly align the tax on alcohol content and concentration, the level of the tax (whether specific or ad valorem) remains difficult to assess due to the difficulty of measuring externalities that vary across several dimensions.** Although the recent evolution of revenue and comparison with tobacco suggests that tax levels should be pushed upward, regional consistency, political economy considerations (Box 4 provides the experience in selected countries), enforcement capacity, and the overall regulatory framework on access to alcohol products (see the case of Finland in Box 5) are also important considerations.

#### **Box 4: Excises and the Protection of Local Industry: The Case of Wine Producers**

Italy, France, Spain, and South Africa are among the main wine producers in the world. Although they all apply a specific excise duty system, their treatment of wine differs from that applied in other countries. First, wine is taxed at a zero rate in Italy and Spain or at a low rate relative to beer in France and South Africa. Indeed, among Organization for Economic Co-operation and Development (OECD) countries with non-zero excise duty on wine, France is the country with the lowest rate (OECD 2020), and in South Africa, wine and beer excise taxes are calculated on a tax base which depresses the effective rate on wine. Second, although beer and spirits are taxed according to alcohol content, wine is taxed only on a volume basis. WHO (2023) proposed that it is more complex to convert the rate per volume to a single rate per alcoholic strength per volume due to the diversity of alcohol strengths in wine, the diversity of producers, and the heterogeneity of wine relative to other alcoholic products—and perhaps other factors.

#### **Box 5: The Importance of Limiting Access to Alcohol and of Enforcement: The Case of Finland**

Since 2003, Finland has increased its alcoholic beverage excise tax system eight times, with an average increase from 2.5 percent to 11.5 percent, depending on product type (except for 2004, when alcohol excise taxes were reduced). These reforms have been accompanied by a decrease in consumption by 23 percent from 2007 to 2020. The first increase in 2008 and 2009 was accompanied by a decrease in the total volume of alcohol consumed but an unrecorded increase in the volume of alcohol. Subsequent reforms in 2012, 2014, and 2019 have led to a decrease in the consumption of both recorded and unrecorded alcohol, thanks to additional control and regulatory measures such as the exclusive limitation of alcohol sales rights to the state's retail units; this suggests that significant cross-border rate differences can subsist in the presence of strong and effective control measures. The 10 percent rate increase in 2018 was accompanied by a rise in total alcohol consumption, due to the relaxation of alcohol laws introduced in January 2018 (Karlsson and others 2020), which extended the right to sell alcoholic beverages to grocery stores and reduced the administrative burden of selling alcohol on site—highlighting the importance of sustained measures over time to yield permanent reductions in consumption.

## **Policy Guidance**

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**The evolution, policy perspective, and international experience of excise taxes on alcoholic beverages suggest some conclusions and policy guidance.** First, taxation should be viewed as part of a wider range of policies on alcohol. For example, specific population subgroups may require greater awareness and sustained emphasis on health education or targeted interventions, and certain domestic production, such as pharmaceutical products, may require the exemption from excises on alcohol inputs

for income affordability and other health reasons. This should also go hand in hand with tighter controls and licensing. Large informal production of surrogate products may require greater controls, as protecting the tax base of the formal sector is probably a better long-term solution than lowering rates on the formal sector in the hope of attracting the informal base.

**Second, the optimal level of taxation is country specific and cannot be driven by simple rules.**

Current levels of excises are generally too low and need to increase. But it is challenging to recommend global or regional policies to define appropriate excise tax rates on alcoholic beverages because countries differ in their consumption patterns, income levels, and the extent of local damage caused by alcohol use. Although evaluating externalities and internalities is complex, countries can fall back on estimating the external economic costs associated with alcohol use to establish a reliable base for determining the optimal level of excise taxes. These costs include public health care expenses (related to the treatment of alcohol-related diseases) and those of criminal and less severe offenses, intended or otherwise, caused by alcohol consumption.

**Third, a simple, comprehensive, and consistent approach across alcoholic products should be considered as a first best.**

This could take the form of a beverage-specific rate per liter of alcoholic content, increasing on the basis of concentration brackets of alcohol (e.g., beer, wine, spirits), and indexed to inflation. Such a system aligns taxation on alcohol content, and is easier to administer in low-income countries, where institutional capacity is generally lower.

**Fourth, in middle- and high-income countries, where the consumption of higher-value products is relatively high, an approach based strictly on alcohol content would limit the tax revenue potential.**

In that sense, an excise combining both alcohol content and beverage value could be more appropriate.

**Fifth, effective administration and collection of excise taxes on alcohol is tremendously important.**

Tight control of the import/production and distribution of excised products requires a clear legal framework with licensing as well as reporting and filing requirements. Fighting illicit production and trade requires significant means, close cooperation with neighboring countries, and strong enforcement, including appropriate fines and penalties. And coordination between customs and tax departments, irrespective of where the collection responsibility lies, is crucial.

## Appendix 1. Alcohol Excise Tax Systems in Selected Countries

Countries	Beer	Spirits	Wine	Other alcoholic beverages	Ethyl alcohol	Applicable
Algeria	77,000 DA per hectoliter of absolute alcohol	110,000 DA per hectoliter of absolute alcohol	77,000 DA per hectoliter of absolute alcohol	1,760 DA per hectoliter of absolute alcohol	50 DA per hectoliter of absolute alcohol	since 2017
Angola	15%	21%	15%	4%–8%	15%	for 2021
Argentina	8%–14%	20%–26%	n.a.	n.a.	n.a.	for 2021
Azerbaijan	0.4 AZN per liter	4–12 AZN per liter	0.2–2.6 AZN per liter	6 AZN per liter	6 AZN per liter	for 2022
Burkina Faso	<ul style="list-style-type: none"> <li>Alcohol volume ≤ 8%: 30%</li> <li>Alcohol volume &gt; 8%: 40%</li> </ul>	<ul style="list-style-type: none"> <li>Alcohol volume &lt; 35%: 50%</li> <li>Alcohol volume ≥ 35%: 70%</li> </ul>	<ul style="list-style-type: none"> <li>70%</li> </ul>	<ul style="list-style-type: none"> <li>Alcohol volume &lt; 35%: 50%</li> <li>Alcohol volume ≥ 35%: 70%</li> </ul>	n.a.	since 2023
Finland	<ul style="list-style-type: none"> <li>0.5% &lt; Alcohol volume ≤ 3.5%: 28.35 EUR per hectoliter per degree</li> <li>Alcohol volume &gt; 3.5%: 38.05 EUR per hectoliter per degree</li> </ul>	<ul style="list-style-type: none"> <li>Standard rate: 5,035 EUR per hectoliter of absolute alcohol</li> <li>Low strength spirits (that is, 1.2% &lt; Alcohol volume ≤ 2.8%): 3,090 EUR per hectoliter of absolute alcohol</li> </ul>	<ul style="list-style-type: none"> <li>1.2% &lt; Alcohol volume ≤ 2.8%: 36 EUR per hectoliter</li> <li>2.8% &lt; Alcohol volume ≤ 5.5%: 198 EUR per hectoliter</li> <li>5.5% &lt; Alcohol volume ≤ 8%: 287 EUR per hectoliter</li> <li>8% &lt; Alcohol volume ≤ 18%: 421 EUR per hectoliter</li> </ul>	<ul style="list-style-type: none"> <li>Intermediate products (15% &lt; vol ≤ 22%): 771 EUR per hectoliter</li> <li>Intermediate products (vol ≤ 15%): 501 EUR per hectoliter</li> </ul>	<ul style="list-style-type: none"> <li>5,035 EUR per hectoliter of absolute alcohol</li> <li>Low strength spirits (that is, 1.2% &lt; Alcohol volume ≤ 2.8%): 3,090 EUR per hectoliter of absolute alcohol</li> </ul>	for 2022
France	<ul style="list-style-type: none"> <li>Beer with alcohol ≤ 2.8% vol: 3.91 EUR per hectoliter per degree</li> <li>Beer with alcohol &gt; 2.8% vol: 7.82 EUR per hectoliter per degree</li> </ul>	<ul style="list-style-type: none"> <li>1,834.42 EUR per hectoliter or 1,000 EUR per hectoliter of absolute alcohol</li> <li>Low strength spirits: 917.72 EUR per hectoliter</li> </ul>	<ul style="list-style-type: none"> <li>Still: 3.98 EUR per hectoliter</li> <li>Sparkling: 9.85 EUR per hectoliter</li> </ul>	Intermediate products (1.2% < alcohol volume ≤ 22%): 198.91 EUR per hectoliter	<ul style="list-style-type: none"> <li>1,834.42 EUR per hectoliter or 1,000 EUR per hectoliter of absolute alcohol</li> <li>Low strength spirits: 917.72 EUR per hectoliter</li> </ul>	for 2022
Italy	2.99 EUR per hectoliter per ° Plato	1,035.52 EUR per hectoliter of absolute alcohol	n.a.	Intermediate products: 88.67 EUR per hectoliter	1,035.52 EUR per hectoliter of absolute alcohol	for 2022
Senegal	40% + 800 or 3000 FCFA per liter	40% + 800 or 3000 FCFA per liter	40% + 800 or 3000 FCFA per liter	40% + 800 or 3000 FCFA per liter		for 2021

	1.2% < vol ≤ 2.8%: 2.75 EUR per hectoliter					
	· vol ≤ 10.99 ° Plato: 7.48 EUR per hectoliter	· 958.94 EUR per hectoliter or 1,000 EUR per hectoliter of absolute alcohol	n.a.	· Alcohol volume ≤ 15%: 38.48 EUR per hectoliter.	· 958.94 EUR per hectoliter or 1,000 EUR per hectoliter of absolute alcohol	for 2022
Spain	· 11 ° Plato < vol ≤ 15 ° Plato: 9.96 EUR per hectoliter	· Low strength spirits: 226.36 EUR per hectoliter		· Alcohol volume > 15%: 64.13 EUR per hectoliter	· Low strength spirits: 226.36 EUR per hectoliter	
	· 15 ° Plato < vol ≤ 19 ° Plato: 13.56 EUR per hectoliter					
	· vol > 19 ° Plato: 0.91 EUR per hectoliter and per degree					
Thailand	22% + 430 THB per liter of pure alcohol	· Clear spirits: 2% + 155 THB per hectoliter of pure alcohol · Dark spirits: 20% + 255 THB per hectoliter of pure alcohol	· Wine and sparkling wine (made from grape): 0% or 10% (depending on the retail sale price) + 1,500 THB per liter of pure alcohol · Fruit wine (mixed with grape or grape wine): 0% or 10% + 150 or 900 THB per liter of pure alcohol (depending on the retail sale price and the absolute alcohol volume and/or container volume)	10% + 150 THB per hectoliter of pure alcohol	n.a.	since 2017

Source: Authors, based on various sources, including the Taxes in Europe database v3 (EC, n.d.), PWC worldwide tax guides, and governments' official websites.

Notes: This appendix presents the excise tax structure applied to each type of alcoholic beverage in each country. Ethyl alcohol is also considered in the last column. Alcoholic beverages include beer, spirits, wine, and other alcoholic beverages, i.e., those not classified in previously listed categories. "Per hl per ° Plato" refers to a method of taxation for beer based on both the volume and the exact content of the beer. n.a. refers to non-specified values. DA, EUR, FCFA, and THB refer to Algerian dinar, euro, CFA franc, and Thai baht, respectively.

## Appendix 2. Illustration of the Application of Excises with a VAT in Algeria, Finland, and France

Variables	Algeria			Finland			France			
	Details	Beer	Wine	Spirit	Beer	Wine	Spirit	Beer	Wine	Spirit
Pretax price in LCU	$P_0$	75	350	7500	3.5	12.5	30	3.5	12.5	30
Volume in liters	$V$	0.33	0.75	0.5	0.33	0.75	0.5	0.33	0.75	0.5
Alcohol content in percentage	$A$	5%	13%	40%	5%	13%	40%	5%	13%	40%
Excise tax rate in LCU per liter of absolute alcohol*	$T$	770	770	1100	0.3805	4.21	50.35	0.0782	0.0985	10.00
Excise tax revenue in LCU <sup>1</sup>	$E = V \times A \times t$	12.71	75.08	220.00	0.01	3.16	10.07	0.00	0.07	2.00
Post-excise price in LCU	$P_1 = P_0 + E$	87.71	425.08	7720.00	3.51	15.66	40.07	3.50	12.57	32.00
VAT rate	$R$	17%	17%	17%	24%	24%	24%	20%	20%	20%
VAT revenue	$VAT = P_1 \times r$	14.91	72.26	1312.40	0.84	3.76	9.62	0.70	2.51	6.40
Total tax revenue	$T = E + VAT$	27.61	147.34	1532.40	0.85	6.92	19.69	0.70	2.59	8.40
Post-tax price	$P_2 = P_0 + T$	102.61	497.34	9032.40	4.35	19.42	49.69	4.20	15.09	38.40
<b>Tax in percentage of retail (post-tax) price</b>	$T/P_2$	<b>26.9%</b>	<b>29.6%</b>	<b>17.0%</b>	<b>19.5%</b>	<b>35.6%</b>	<b>39.6%</b>	<b>16.7%</b>	<b>17.2%</b>	<b>21.9%</b>

Source: Authors calculations, based on various sources, including the Taxes in Europe database v3 (EC, n.d.), PWC worldwide tax guides, and governments' official websites.

Notes: This table illustrates the application of excises with a VAT in Algeria, Finland, and France. VAT is defined as valued-added tax. LCU refers to local currency unit and represents Algerian dinar in Algeria and euro in both Finland and France. The column details presents the abbreviation used for each variable and the used methodology to calculate related tax revenues.

<sup>1</sup> For wine in Finland and France, the excise tax rate is expressed in liters of wine.  $E$  is thus calculated as  $V \times t$ .

## References

- Ajilore, O., A. Amialchuk, and K. Egan. 2016. "Alcohol Consumption by Youth: Peers, Parents, or Prices?" *Economics & Human Biology* 23 (December): 76–83.
- Ali, M. M., and D. S. Dwyer. 2010. "Social Network Effects in Alcohol Consumption among Adolescents." *Addictive Behaviors* 35 (4): 337–42.
- Ally, A. K., Y. Meng, R. Chakraborty, P. W. Dobson, J. S. Seaton, J. Holmes, C. Angus, and others. 2014. "Alcohol Tax Pass-through across the Product and Price Range: Do Retailers Treat Cheap Alcohol Differently?" *Addiction* 109 (12): 1994–2002.
- Anderson, B. O., N. Berdzuli, A. Ilbawi, D. Kestel, H. P. Kluge, R. Krech, B. Mikkelsen, and others. 2023. "Health and Cancer Risks Associated with Low Levels of Alcohol Consumption." *The Lancet* 8 (1): E6–7.
- Araya, D., and G. Paraje. 2018. "The Impact of Prices on Alcoholic Beverage Consumption in Chile." *PloS One* 13 (10): e0205932.
- Arstei, D., and L. Pieroni. 2010. "Habits, Complementarities and Heterogeneity in Alcohol and Tobacco Demand: A Multivariate Dynamic Model." *Oxford Bulletin of Economics and Statistics* 72 (4): 428–57.
- Asplund, M., R. Friberg, and F. Wilander. 2007. "Demand and Distance: Evidence on Cross-Border Shopping." *Journal of Public Economics* 91 (1–2): 141–57.
- Babor, T. F., K. Robaina, and D. Jernigan. 2015. "The Influence of Industry Actions on the Availability of Alcoholic Beverages in the African Region." *Addiction* 110 (4): 561–71.
- Bergman, U. M., and N. L. Hansen. 2010. Bergman, U. M., and N. L. Hansen. 2019. "Are Excise Taxes on Beverages Fully Passed through to Prices? The Danish Evidence." *FinanzArchiv* 75 (4), 323–56. <https://doi.org/10.1628/fa-2019-0010>.
- Blecher, E., A. Liber, C. Van Walbeek, and L. Rossouw. 2018. "An International Analysis of the Price and Affordability of Beer." *PloS One* 13 (12): e0208831.
- Bot, S. M., R. C. Engels, R. A. Knibbe, and W. H. Meeus. 2005. "Friend's Drinking Behaviour and Adolescent Alcohol Consumption: The Moderating Role of Friendship Characteristics." *Addictive Behaviors* 30 (5): 929–47.
- Bouchery, E. E., H. J. Harwood, J. J. Sacks, C. J. Simon, and R. D. Brewer. 2011. "Economic Costs of Excessive Alcohol Consumption in the US, 2006." *American Journal of Preventive Medicine* 41 (5): 516–24.
- Brooks-Russell, A., B. Simons-Morton, D. Haynie, T. Farhat, and J. Wang. 2014. "Longitudinal Relationship between Drinking with Peers, Descriptive Norms, and Adolescent Alcohol Use." *Prevention Science* 15 (4): 497–505.
- Calcott, P. 2019. "Minimum Unit Prices for Alcohol." *Journal of Health Economics* 66 (July): 18–26.
- Carbonnier, C. 2013. "Pass-through of Per Unit and Ad Valorem Consumption Taxes: Evidence from Alcoholic Beverages in France." *The BE Journal of Economic Analysis & Policy* 13 (2): 837–63.
- Carpenter, C. S., C. Dobkin, and C. Warman. 2016. "The Mechanisms of Alcohol Control." *Journal of Human Resources* 51 (2): 328–56.
- Chandra, A., K. Head, and M. Tappata. 2014. "The Economics of Cross-Border Travel." *Review of Economics and Statistics* 96 (4): 648–61.
- Cnossen, S. 2003. "Notes and Communications: Taxing Tobacco in the European Union." *De Economist* 149: 233–49.
- Cnossen, S. 2007. "Alcohol Taxation and Regulation in the European Union." *International Tax and Public Finance* 14 (6): 699–732.
- Crawford, I., M. Keen, and S. Smith. 2010. "Value Added Tax and Excises." *Dimensions of Tax Design: The Mirrlees Review* 1: 275–362.
- Decker, S., and A. E. Schwartz. 2000. "Cigarettes and Alcohol: Substitutes or Complements?" NBER Working Paper W7535, National Bureau of Economic Research, Cambridge, MA.

- Dee, T. S. 1999. "The Complementarity of Teen Smoking and Drinking." *Journal of Health Economics* 18 (6): 769–93.
- Dufouil, C., P. Ducimetière, A. Alperovitch, and EVA Study Group. 1997. "Sex Differences in the Association between Alcohol Consumption and Cognitive Performance." *American Journal of Epidemiology* 146 (5): 405-12.
- European Commission. "Taxes in Europe database v3." Accessed August 23, 2022. [http://ec.europa.eu/taxation\\_customs/tedb/](http://ec.europa.eu/taxation_customs/tedb/) on August 30, 2022.
- Falbe, J. 2020. "The Ethics of Excise Taxes on Sugar-Sweetened Beverages." *Physiology & Behavior* (225): 113105.
- Fletcher, J. M. 2019. "Estimating Causal Effects of Alcohol Access and Use on a Broad Set of Risky Behaviors: Regression Discontinuity Evidence." *Contemporary Economic Policy* 37 (3): 427–48.
- Fogarty, J. 2004. "The Own-Price Elasticity of Alcohol: A Meta-Analysis." Economics Discussion/Working Papers 04-01, University of Western Australia, Business School, Department of Economics, Perth.
- Fuchs, A., K. Mandeville, and A. C. Alonso-Soria. 2020. *Health and Distributional Impacts of a Tax on Sugar-Sweetened Beverages in Kazakhstan*. Washington, DC: World Bank.
- Fuchs, A., & F. J. Meneses. 2017. "Regressive or Progressive? The Effect of Tobacco Taxes in Ukraine." Policy Research Working Paper 8227, World Bank, Washington, DC.
- Gil, A., D. Khaltourina, and A. Korotaev. 2016. "Alcohol Consumption in Russia: Affordability of Alcohol, Changes and Effects of Alcohol Control Policy and Future Prospects." In *Changes in Alcohol Affordability and Availability: Twenty Years of Transition in Eastern Europe*, edited by J. Moskalewicz, and E. Osterberg. Helsinki: National Institute for Health and Welfare.
- Gmel, G., F. Labhart, K. D. Shield, M. Rylett, D. W. Lachenmeier, and J. Rehm. 2013. "A Global Overview of Alcohol Consumption Patterns." In *Alcohol: Science, Policy and Public Health*, edited by Peter Boyle and others. Oxford: Oxford Academic.
- Gopinath, G., P. O. Gourinchas, C. T. Hsieh, and N. Li. 2011. "International Prices, Costs, and Markup Differences." *American Economic Review* 101 (6): 2450–86.
- Griffith, R., M. O'Connell, and K. Smith. 2017. "Design of Optimal Corrective Taxes in the Alcohol Market." IFS Working Paper W17/02, Institute for Fiscal Studies, London.
- Gruber, J., and B. Köszegi. 2004. "Tax Incidence when Individuals Are Time-Inconsistent: The Case of Cigarette Excise Taxes." *Journal of Public Economics* 88 (9–10): 1959–87.
- Guo, G., Y. Li, C. Owen, H. Wang, and G. J. Duncan. 2015. "A Natural Experiment of Peer Influences on Youth Alcohol Use." *Social Science Research* 52 (July): 193–207.
- Hindriks, J., and V. Serse. 2019. "Heterogeneity in the Tax Pass-Through to Spirit Retail Prices: Evidence from Belgium." *Journal of Public Economics* 176 (August): 142–60.
- Holmes, J., Y. Meng, P. S. Meier, A. Brennan, A., C. Angus, A. Campbell-Burton, Y. Guo, and others. 2014. "Effects of Minimum Unit Pricing for Alcohol on Different Income and Socioeconomic Groups: A Modelling Study." *The Lancet* 383 (9929): 1655–64.
- Hu, Xiaowen and C. Jill Stowe. 2013. "The Effect of Income on Health Choices: Alcohol Use," 2013 Annual Meeting, February 2-5, 2013, Orlando, Florida 143060, Southern Agricultural Economics Association.
- IWSR. "How Is the RTD Market Evolving?" <https://www.theiwsr.com/news-and-comment-radius-trend-rtd-evolution/>.
- Jiang, H., M. Livingston, R. Room, and S. Callinan. 2016. "Price elasticity of on-and off-premises demand for alcoholic drinks: A Tobit analysis." *Drug and alcohol dependence* 163: 222–228.
- Karlsson, T., P. Mäkelä, C. Tigerstedt, and I. Keskimäki. 2020. "The Road to the Alcohol Act 2018 in Finland: A Conflict between Public Health Objectives and Neoliberal Goals." *Health Policy* 124 (1): 1–6.
- Keen, M. 1998. "The Balance between Specific and Ad Valorem Taxation." *Fiscal Studies* 19 (1): 1–37.
- Keen, M. 2002. "Some International Issues in Commodity Taxation." IMF Working Paper 02/124, International Monetary Fund, Washington, DC.
- Kenkel, D. S. 1996. "New Estimates of the Optimal Tax on Alcohol." *Economic Inquiry* 34 (2): 296–319.

- Kenkel, D. S. 2005. "Are Alcohol Tax Hikes Fully Passed through to Prices? Evidence from Alaska." *American Economic Review* 95 (2): 273–77.
- Kerr, W. C., N. Mulia, and S. E. Zemore. 2014. "US Trends in Light, Moderate, and Heavy Drinking Episodes from 2000 to 2010." *Alcoholism: Clinical and Experimental Research* 38 (9): 2496–501.
- Leung, R. K., J. W. Toumbourou, and S. A. Hemphill. 2014. "The Effect of Peer Influence and Selection Processes on Adolescent Alcohol Use: A Systematic Review of Longitudinal Studies." *Health Psychology Review* 8 (4): 426–57.
- Little, H. J. 2000. "Behavioral Mechanisms Underlying the Link between Smoking and Drinking." *Alcohol Research & Health* 24 (4): 215.
- Long, M. W., S. L. Gortmaker, Z. J. Ward, S. C. Resch, M. L. Moodie, G. Sacks, B. A. Swinburn, and others. 2015. "Cost Effectiveness of a Sugar-Sweetened Beverage Excise Tax in the US." *American Journal of Preventive Medicine* 49 (1): 112–23.
- Manning, W. G., E. B. Keeler, J. P. Newhouse, E. M. Sloss, and J. Wasserman. 1989. "The Taxes of Sin: Do Smokers and Drinkers Pay Their Way?" *JAMA* 261 (11): 1604–9.
- Markowitz, S., and C. Ding. 2020. "Light, Moderate, and Heavy Drinking." In *Handbook of Labor, Human Resources and Population Economics*, edited by K. Zimmermann. Cham: Springer.
- Matzopoulos, R. G., S. Truen, B. Bowman, and J. Corrigan. 2014. "The Cost of Harmful Alcohol Use in South Africa." *South African Medical Journal* 104 (2): 127–32.
- Manthey, J., S. A. Hassan, S. Carr, C. Kilian, S. Kuitunen-Paul, and J. Rehm. 2021. "What Are the Economic Costs to Society Attributable to Alcohol Use? A Systematic Review and Modelling Study." *Pharmacoeconomics* 39 (7): 809–22.
- Maynard, A., C. Godfrey, and G. Hardman. 1994. Conceptual Issues in Estimating the Social Costs of Alcohol. Paper prepared for an International Symposium on the Economic Costs of Substance Abuse, Banff, Canada, May 11–13, 1994. [https://epe.lac-bac.gc.ca/100/200/300/ccsa-cclat/conceptual\\_issues\\_alcohol/maynard.htm](https://epe.lac-bac.gc.ca/100/200/300/ccsa-cclat/conceptual_issues_alcohol/maynard.htm).
- Nelson, J. P. 2014. "Binge Drinking, Alcohol Prices, and Alcohol Taxes: A Systematic Review of Results for Youth, Young Adults, and Adults from Economic Studies, Natural Experiments, and Field Studies." SSRN, March 10. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2407019](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2407019).
- Nelson, J. P. 2015. "Binge Drinking and Alcohol Prices: A Systematic Review of Age-Related Results from Econometric Studies, Natural Experiments and Field Studies." *Health Economics Review* 5 (1): 1–13.
- Nelson, J. P., and J. R. Moran. 2020. "Effects of Alcohol Taxation on Prices: A Systematic Review and Meta-Analysis of Pass-Through Rates." *The BE Journal of Economic Analysis & Policy* 20 (1): 1–21.
- O'Donoghue, T., and M. Rabin. 2006. "Optimal Sin Taxes." *Journal of Public Economics* 90 (10–11): 1825–49.
- Office for National Statistics (ONS). 2018. "Adult Drinking Habits in Great Britain." May 1. <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/drugusealcoholandsmoking/datasets/adultdrinkinghabits>.
- Organization for Economic Co-operation and Development (OECD). 2020. *Consumption Tax Trends 2020: VAT/GST and Excise Rates, Trends and Policy Issues*. Paris: OECD Publishing.
- Parry, I. W., and J. A. Miron. 2009. "Should Alcohol Taxes Be Raised?" *Regulation* 32 (3): 10–13.
- Petit, P., M. Mansour, and P. Wingender. 2021. "How to Apply Excise Taxes to Fight Obesity." IMF How to Note 21/08, International Monetary Fund, Washington, DC.
- Pierani, P., and S. Tiezzi, S. 2009. "Addiction and Interaction between Alcohol and Tobacco Consumption." *Empirical Economics* 37 (1): 1–23.
- Pigou, A. C. 1920. *The Economics of Welfare* (1<sup>st</sup> ed.). London: Macmillan.
- Postolovska, I., R. F. Lavado, G. Tarr, and S. Verguet. 2017. *Estimating the Distributional Impact of Increasing Taxes on Tobacco Products in Armenia: Results from an Extended Cost-Effectiveness Analysis*. Washington, DC: World Bank.
- Poznyak, V. and D. Rekve, eds. 2018. *Global Status Report on Alcohol and Health 2018*. Geneva: World Health Organization.

- Rabinovich, L., P. B. Brutscher, H. de Vries, J. Tiessen, J. Clift, and A. Reding. 2009. *The Affordability of Alcoholic Beverages in the European Union*. Cambridge: RAND Europe.
- Rehm, J., S. Kailasapillai, E. Larsen, M. X. Rehm, A. V. Samokhvalov, K. D. Shield, M. Roerecke, and others. 2014. "A Systematic Review of the Epidemiology of Unrecorded Alcohol Consumption and the Chemical Composition of Unrecorded Alcohol." *Addiction* 109 (6): 880–93.
- Rehm, J., M. Neufeld, R. Room, B. Sornpaisarn, M. Štelemėkas, M. H. Swahn, and D. W. Lachenmeier. 2021. "The Impact of Alcohol Taxation Changes on Unrecorded Alcohol Consumption: A Review and Recommendations." *International Journal of Drug Policy* 99 (January): 103420.
- Rimm, E. B., A. Klatsky, D. Grobbee, and M. J. Stampfer. 1996. "Review of Moderate Alcohol Consumption and Reduced Risk of Coronary Heart Disease: Is the Effect Due to Beer, Wine, or Spirits?" *British Medical Journal* 312 (7033): 731–36.
- Ritchie, H., and M. Roser. 2022. "Alcohol Consumption." Our World in Data, January. <https://ourworldindata.org/alcohol-consumption#citation>.
- Room, R. 2004. "Smoking and Drinking as Complementary Behaviours." *Biomedicine & Pharmacotherapy* 58 (2): 111–15.
- Shafer, H. 2014. "Optimal US State Alcohol Excise Taxes to Recover Government Cost of Excessive Consumption." *World Medical & Health Policy* 6 (3): 231–41.
- Shang, C., A. Ngo, and F. J. Chaloupka. 2020. "The Pass-Through of Alcohol Excise Taxes to Prices in OECD Countries." *European Journal of Health Economics* 21 (6): 855–67.
- Sharma, A., F. Etilé, and K. Sinha. 2016. "The Effect of Introducing a Minimum Price on the Distribution of Alcohol Purchase: A Counterfactual Analysis." *Health Economics* 25 (9): 1182–200.
- Shrestha, V., and S. Markowitz. 2016. "The Pass-Through of Beer Taxes to Prices: Evidence from State and Federal Tax Changes." *Economic Inquiry* 54 (4): 1946–62.
- Smith, S. 2005. "Economic Issues in Alcohol Taxation." In Cossen, S. (Ed). 2005. *Theory and Practice of Excise Taxation: Smoking, Drinking, Gambling, Polluting, and Driving*. Oxford University Press.
- Sornpaisarn, B., K. D. Shield, J. E. Cohen, R. Schwartz, and J. Rehm. 2015. "Can Pricing Deter Adolescents and Young Adults from Starting to Drink? An Analysis of the Effect of Alcohol Taxation on Drinking Initiation among Thai Adolescents and Young Adults." *Journal of Epidemiology and Global Health* 5 (4): S45–57.
- Sornpaisarn, B., K. D. Shield, J. E. Cohen, R. Schwartz, and J. Rehm. 2016. "The Association between Taxation Increases and Changes in Alcohol Consumption and Traffic Fatalities in Thailand." *Journal of Public Health* 38 (4): e480–88.
- Sornpaisarn, B., K. D. Shield, and J. Rehm. 2012. "Alcohol Taxation Policy in Thailand: Implications for Other Low- to Middle-Income Countries." *Addiction* 107 (8): 1372–84.
- Stokłosa, M., J. Drope, M. Zatoński, and W. Zatoński. 2016. "Towards Improved Public Health: Affecting Alcohol and Tobacco Affordability and Consumption in Poland through Taxation." *Journal of Health Inequalities* 2 (2): 101–4.
- Thavorncharoensap, M., Y. Teerawattananon, J. Yothasamut, C. Lertpitakpong, K. Thitiboonsuwan, and P. Neramitpitagkul. 2010. "The Economic Costs of Alcohol Consumption in Thailand, 2006." *BMC Public Health* 10 (1): 1–12.
- Wall, M., and S. Casswell. 2013. "Affordability of Alcohol as a Key Driver of Alcohol Demand in New Zealand: A Co-Integration Analysis." *Addiction* 108 (1): 72–79.
- World Health Organization (WHO). "Taxation of Ethanol Production." Accessed August 23, 2022. <https://www.who.int/data/gho/data/indicators/indicator-details/GHO/taxation-of-ethanol-production>.
- World Health Organization (WHO). 2023. "WHO technical manual on alcohol tax policy and administration." World Health Organization, Geneva.
- Young, D. J., and A. Bielińska-Kwapisz. 2002. "Alcohol Taxes and Beverage Prices." *National Tax Journal* 55 (1): 57–73.