



Resource tool on alcohol taxation and pricing policies

Editors

Bundit Sornpaisarn, Kevin D. Shield,
Esa Österberg, Jürgen Rehm

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Developed by

The Center for Alcohol Studies (CAS), Thailand
and
The Centre for Addiction and Mental Health (CAMH), Canada

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the World Health Organization and the ThaiHealth Promotion Foundation
to support the
implementation of the WHO Global strategy to reduce the harmful use of alcohol

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Contents

Foreword	V
Acknowledgements	VI
Abbreviations	VII
Executive summary	IX
Introduction	1
Section 1: The need for alcohol taxation and pricing policies	5
Section 2: Economic concepts for public health personnel	19
Section 3: Designing taxation and pricing policies	31
Chapter 3.1. Basic economic concepts related to taxation and pricing policy design	32
Chapter 3.2. Taxation and pricing policies among countries worldwide: results from the 2012 Global Survey on Alcohol and Health	45
Section 4: Implementation issues concerning taxation and pricing policies	53
Chapter 4.1. General implementation issues of alcohol taxation and pricing policies	54
Chapter 4.2. The effect of unrecorded consumption on taxation	64
Chapter 4.3. Special issues concerning the implementation of alcohol taxation and pricing policies	67
Chapter 4.4. Earmarked tax	82
References	85

List of tables

Table 1.1. The price elasticity of demand by beverage type in high-income countries and in LMICs	p.8
Table 1.2. The price elasticity of various health outcomes in high-income countries	p.9
Table 2.1. The relationship between three taxes on alcohol and the four types of goods	p.26
Table 2.2. Equations illustrating the definitions of ethanol price (EP), beverage price (BP) and beverage price per unit of ethanol (BPPE)	p.28
Table 3.1. A comparison of the attributes of three taxation methods (specific, ad valorem and unitary) in oligopoly or monopoly markets	p.35
Table 3.2. A comparison of the various pricing and taxation model attributes in oligopoly and monopoly markets	p.43
Table 4.1. Summary of probable transition costs from the perspective of each sector within a given country	p.76
Table 4.2. Total population-level costs, effects and cost-effectiveness of interventions to reduce hazardous alcohol use	p.80

IV

List of figures

Fig. 1.1. Diagram of the short- and long-term preventions of alcohol-attributable harm addressed by alcohol control policies	p.13
Fig. 1.2. Efficient consumption or production when taking into account the externality caused by a particular product	p.16
Fig. 2.1. Demand-supply equilibrium	p.21
Fig. 2.2. The relationship between taxation, price, and the equilibrium	p.22
Fig. 2.3. The relationship between minimum pricing and the utility equilibrium	p.23
Fig. 2.4. A hypothetical model of an alcoholic beverage	p.27
Fig. 3.1. A comparison of the tax rate per unit of ethanol for four types of taxation: specific (Sp), MSA favouring Sp, MSA favouring ad valorem (AV), and AV	p.37
Fig. 3.2. A comparison of the tax rate per unit of ethanol for three types of taxation (ad valorem with specific floor, specific and ad valorem)	p.39
Fig. 3.3. Reported value added tax rates by country for 2010	p.47
Fig. 3.4. The application of excise taxation on beer, wine, and spirits by country for 2010	p.48
Fig. 3.5. Alcohol excise taxation methods reported by the 2010 Global Survey on Alcohol and Health	p.49
Fig. 4.1. Unrecorded alcohol types and examples	p.64

List of box

Box 4.1. The establishment of the ThaiHealth Promotion Foundation using a surcharged tax from alcohol and tobacco excise taxes	p.83
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Foreword

Harmful use of alcohol represents one of the most important risk factors for the global burden of disease and injuries. Alcohol consumption is a causal factor in over 200 health conditions, including mental and behavioural disorders and major noncommunicable diseases (NCDs), as well as road traffic crashes, violence and suicides. The harmful use of alcohol also has a significant impact on development and treatment outcomes of some major infectious diseases such as tuberculosis and HIV/AIDS. We are also beginning to obtain a better understanding of the impact that harmful use of alcohol can have on people other than the drinker, and sometimes this impact is devastating.

To reduce this burden, governments need to develop and implement evidence-based and ethically sound strategies and interventions. WHO is committed to assisting countries in this task. In 2010, the World Health Assembly approved a resolution endorsing WHO's "Global strategy to reduce the harmful use of alcohol". The resolution urges countries to strengthen national responses to public health problems caused by the harmful use of alcohol. WHO's "Global action plan for the prevention and control of NCDs 2013-2020" includes harmful use of alcohol as one of the four key risk factors for NCDs and calls for at least 10% relative reduction in the harmful use of alcohol.

The inclusion of a target to strengthen the prevention and treatment of substance abuse, including harmful use of alcohol, under the health goal in the United Nations' 2030 Agenda for Sustainable Development further illustrates and acknowledges the importance of reducing the harmful use of alcohol for development of our societies.

In the global strategy to reduce the harmful use of alcohol, pricing policies represent one of the key areas recommended for governments to use. WHO's NCD action plan contains a menu of policy options and cost-effective interventions to assist Member States to implement actions for prevention and control of major NCDs. An updated list of the most effective and complementary policy options recommends increasing excise taxes on alcoholic beverages as one of the most cost-effective interventions governments can use.

This resource tool is developed under a Memorandum of Understanding between ThaiHealth and WHO as a part of a broader effort by WHO to develop technical tools and resource materials in support of implementation of the global strategy to reduce the harmful use of alcohol. We are grateful for the longstanding collaboration and dedication of ThaiHealth. I hope that this resource tool will contribute to enhancing knowledge and competence relating to taxation and pricing policies among public health professionals and alcohol-control policy advocates. This will enable them to more effectively ensure for the inclusion of key public health perspectives in the design and implementation of alcohol taxation and pricing policies.

Shekhar Saxena
Director, Department of Mental Health and Substance Abuse
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Abbreviations

ABV	Alcohol by volume
Afr	WHO African Region
Amr	WHO Region of the Americas
ARIMA	Autoregressive integrated moving average model
ASF	Ad valorem with specific floor
AV	Ad valorem taxation
BP	Beverage price
BPPE	Beverage price per unit of ethanol
CAMH	Centre for Addiction and Mental Health
CAS	Center for Alcohol Studies
CER	Cost-effectiveness ratio
CI	Confidence interval
CPEoD	Cross-price elasticity of demand
DALYs	Disability-adjusted life years
EAC	East African Community
EP	Ethanol price
EU	European Union
Eur	WHO European Region
FTEs	Full-time equivalent employees
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GDP-PPP	Gross domestic product – purchasing power parity
GSAH	Global Survey on Alcohol and Health
GST	General sales tax
HICs	High-income countries
HoReCa	Hotels, Restaurants, and Catering Sectors
ICD	International Classification of Diseases
LICs	Low-income countries
LMICs	Low- and middle-income countries
MC	Marginal cost
ME	Marginal externality
MICs	Middle-income countries
MSA	Mixed specific and ad valorem
PE	Price elasticity
RTD	Ready-to-drink
SD	Standard drink
Sear	WHO South East Asia Region

Abbreviations

Sp	Specific taxation
ThaiHealth	ThaiHealth Promotion Foundation
TMP	Tax Modernization Programme
TPP	Tax due as a percentage of retail price
TPU	Tax due per unit of ethanol
UNIDO	United Nations Industrial Development Organization
VAT	Value added tax
WHO	World Health Organization
Wpr	WHO Western Pacific Region
WTO	World Trade Organization

Executive summary

Executive summary

Literature has collectively illustrated the effectiveness of taxation and pricing policies in controlling public health problems caused by alcohol. Indeed, this knowledge led the World Health Organization (WHO) to include taxation and pricing control measures among the recommended policies in its Global Strategy to Reduce the Harmful Use of Alcohol. Such awareness also has led public health personnel and non-economist alcohol control policy advocates increasingly to support alcohol taxation and pricing policies. However, designing and implementing alcohol taxation and pricing policies are normally in the hands of finance personnel, who are usually concerned with public finance rather than public health perspectives. Thus, this resource tool is designed to inform public health personnel and non-economist alcohol control policy advocates how to facilitate effective discussions and negotiations with financial officers. The goal is to integrate public health perspectives into taxation and pricing policy design and implementation. Thus, this resource tool explains relevant economic concepts and provides evidence of effective public health policies to augment the understanding of taxation and pricing policies by public health personnel and non-economist alcohol policy advocates.

Alcohol taxation and pricing policies have several public health, economic and social benefits as they have the capacity to: 1) generate tax revenue, 2) reduce alcohol consumption and associated harms (covering both externalities and internalities) among various groups, including young people and heavy drinkers, and 3) prevent the initiation of drinking, which is an important preventive strategy in low-and middle-income countries that have a high prevalence of lifetime abstainers. Even though controversy still surrounds whether taxation should be imposed on social drinking or only on the harmful use of alcohol, there are several reasons to support government action to apply taxation to general alcoholic beverages to control the problems which result from harmful alcohol use.

This resource tool explains a number of important basic economic concepts, including: demand-supply equilibrium, price mechanisms of taxation and minimum price, price and tax elasticity, price and demand under different market structures, short-run and long-run reactions of the alcohol market associated with changes in taxation and pricing policies, alcohol excise tax, custom tax and general tax, basic notions related to the structure of an alcoholic beverage, and a limitation of the economic model. Alcohol consumption and control by taxation and pricing policies operate via a demand-supply equilibrium mechanism, with elements related to price increases, consumption decreases, price decreases, and consumption increases. However, the effects of taxation and pricing policies vary depending on different market structures and the lag time to measure the effects after implementation. In order to target alcoholic beverages specifically to generate tax revenue or control consumption, excise tax is the best tool the government can use, as compared to custom tax and general tax.

Several types of alcohol excise taxation methods are employed around the world. These include uniform tax methods – such as specific taxation (where the tax is calculated based on the amount of ethanol a beverage contains), ad valorem taxation (where the tax is based on the price of the alcoholic beverage) and unitary taxation (where the tax is based on the volume of the alcoholic beverage) – and combination tax methods (a combination of two or more of the basic taxation methods) – such as mixed specific and ad valorem taxation and ad valorem with specific floor taxation. These methods have different attributes that may be appropriate to different contexts and different alcohol control objectives.

Governments should take three goals into account when considering an alcohol excise taxation model: 1) tax revenue generation, 2) control of alcohol consumption and public health problems caused by alcohol consumption, and 3) prevention of drinking initiation (for countries with a high prevalence of lifetime abstention). Assessments based on these three goals show that specific taxation may be appropriate for high-income countries that have a high prevalence of drinkers since it promotes consumption of beverages with low alcohol content instead of beverages with high alcohol content, resulting in a reduction in total alcohol consumption. Ad valorem with specific floor taxation and mixed specific and ad valorem taxation may be appropriate for low- and middle-income countries since they promote consumption of medium alcohol content beverages, which are expected to reduce total alcohol consumption among heavy drinkers and prevent drinking initiation among young people. The government may apply a minimum price measure to control problems caused by inexpensive alcoholic beverages.

XI

Two indicators are used to assess the extent of a tax rate – i.e. the tax due as a percentage of the retail price and the tax due per unit of ethanol. The former indicator is better at measuring tax incidence (which measures the tax burden on the distribution of income), while the latter is better at measuring how much tax burden is imposed on each unit of ethanol. Both indicators should be applied in comparisons of alcohol excise tax rates between countries.

Alcohol taxation methods vary at global and country-based levels, as individual provinces, regions and states take different approaches to alcohol taxation. The 2012 Global Survey on Alcohol and Health found that 11 countries did not tax beer, 28 countries did not tax wine, and 15 countries did not tax spirits; many of these countries do not tax alcohol for historical reasons. Additionally, the excise taxation methods vary considerably by country and, in several cases, within countries. Thus, there is a need to determine which types of taxation methods work best, taking into account a variety of differing circumstances between countries and within individual countries.

To advocate for alcohol taxation and pricing policies, public health personnel and non-economist alcohol control policy advocates should understand general implementation issues relating to taxation and pricing policies. Alcohol excise duties are typically collected by Customs and Excise officers from importers and producers at the point at which

products enter the wholesale or retail market. Collection requires some form of registration or licensing of all alcohol producers or places of alcohol manufacture.

Tax administration should be effective and efficient. The effectiveness of tax administration depends on ensuring high rates of compliance by taxpayers, while the efficiency of tax administration requires lowering administrative costs relative to revenue collected. Effective and efficient tax administration requires a strong technical capacity by the administrative agency and a well-designed tax system. A well-designed excise tax policy exhibits transparency and easy definability, thus increasing efficiency by reducing administrative costs.

Effective administration of excise taxation requires a well-established cooperation between taxpayers and the tax administration agency. In countries with well-established tax collection systems, excise taxes are administered by relying on the taxpayer's registration, filing and payment of tax returns. Tax authorities, in return, execute enforcement actions aimed at ensuring compliance by verification. In countries with poor administration systems, "enforced compliance" is generally executed by imposing physical control over the production and manufacturing process and by applying various kinds of tax stamps.

The government should be aware that substitution consumption among various alcoholic beverage categories may occur as a result of taxation and pricing policies. The government should also increase tax rates regularly, taking account of inflation and population income, in order to make taxation and pricing policies more effective than affordable.

The government should make efforts to prevent tax avoidance and tax evasion in order to implement taxation and pricing policies effectively. Tax avoidance is legal; it is a change in economic or other activity aimed at reducing tax payment. Tax evasion, on the other hand, involves illegal activities aimed at avoiding tax payment.

The government may tend to modify taxation and pricing policies to protect sales of domestic alcohol products. Public health personnel and policy advocates should be aware of this situation because, as the tax gap increases, consumers switch to a lower-tax product resulting in a less effective taxation policy and difficulty in controlling the problems caused by alcohol. Furthermore, when manufacturers, wholesalers or retailers anticipate a tax increase, they may stock more alcoholic beverages taxed at the current or lower tax level, so that an alcohol taxation increase reduces the effectiveness of taxation policies. As a result, the government should consider keeping news of alcohol taxation increases quiet.

To be significantly effective in designing and implementing taxation and pricing policies, the government needs several types of information – including market shares of alcoholic beverage categories, of on-premise and off-premise alcohol sales, and of recorded and unrecorded alcohol consumption, as well as substitution within and between

these alcoholic beverage categories and own-price and cross-price elasticity of various types of alcohol. This information is not usually available although, with this information, the government can better employ taxation and pricing policies.

Unrecorded consumption is all alcohol consumption that is not recorded in the country where it is consumed. This includes home production, cross-border shopping, surrogate alcohol, illegal homemade and artisanal production, and illegal production and smuggling on a commercial (industrial) scale. While the effect of cross-border shopping on alcohol consumption and alcohol-attributable harm certainly exists, its overall impact on global public health is not as large as depicted. As unrecorded consumption constitutes a sizeable portion of overall alcohol use, it should be reduced or better controlled as part of a national alcohol policy by integrating different measures, including taxation. More control of unrecorded alcohol may result in increasingly effective taxation measures. The following measures can be used to reduce unrecorded consumption: the prohibition of toxic compounds used to denature alcohol (e.g. methanol) can improve health outcomes associated with surrogate alcohol consumption; actions limiting illegal trade and counterfeiting can include the introduction of tax stamps and electronic surveillance of the alcohol trade; an overall increase in enforcement; and the offer of financial incentives to home and small-scale producers for registration and quality control.

XIII

While there is no doubt that trade agreements have an impact on the freedom to implement alcohol policies, this should not lead policy-makers to deny the consideration of policies that are entirely legitimate under the current trading system. Policy-makers, in general, are free to adopt policies on alcohol provided they are not more trade restrictive than necessary to protect health and are non-discriminatory. While alcohol pricing policies may lead to some adjustment costs in the short term, in the long term most economists would expect the effect on employment to be effectively zero. In general, trade policies are likely to increase alcohol-related harms through their effect on policies that are fully or partly protectionist. However, countries may regulate purely on health grounds. Uncertainty over trade treaties – and the exaggerated claims made by companies – could hamper domestic policy-making initiatives, and may cause leading policy-makers to avoid considering policies that are entirely legitimate under the current trading system. To avoid this, it is necessary to send a clear message to policy-makers that, in general, they are free to adopt nearly any health policy on alcohol so long as it is non-discriminatory and not more trade restrictive than necessary.

If people spend less money on alcohol, they will spend more money on other goods, which will create jobs elsewhere in the economy. The costs that therefore should be considered are the adjustment costs in the medium and short term (i.e. over a few years). Alcohol causes economic costs in society, including in health care, policing (plus courts and prisons), crime prevention, property damage, traffic accident damage, workplace productivity, unemployment and premature mortality. It may also be related to part of the considerable cost of HIV/AIDS in some countries. Alcohol policies are likely to decrease costs in these areas. These reductions in cost are estimated to far outweigh any potential economic disadvantages of alcohol pricing policies.



Determining a proportion of excise tax from alcohol products (and other products such as tobacco) is a good strategy to secure a reliable and sustainable source of funding to support health promotion activities and to control problems caused by harmful alcohol consumption. Determining the special budget can result from non-legislation budgeting by the government (called “dedicated tax”) or from a legislative process of the parliament (called “earmarked tax”). Sources of this budget can also be an existing excise tax (earmarked) or may be an additional source on top of the existing excise tax (“surcharged tax”). An increasing number of countries have adopted this effective financial mechanism following its establishment in Australia in 1983, and scholarly literature shows the effectiveness of implementing financial mechanisms of this kind. Governments may consider this financial strategy if they need a sustainable funding mechanism to control problems caused by alcohol consumption.

The goal of this resource tool is to help public health personnel and non-economist alcohol control policy advocates to effectively discuss, argue and negotiate with finance personnel to ensure the inclusion of public health perspectives in taxation and pricing policy, design and implementation.

XIV

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The goal of this resource tool is to help public health personnel and non-economist alcohol control policy advocates to effectively discuss, argue and negotiate with finance personnel to ensure the inclusion of public health perspectives in taxation and pricing policy, design and implementation.

Introduction

Introduction

The World Health Organization's (WHO) "Global strategy to reduce the harmful use of alcohol", endorsed by the Sixty-third World Health Assembly in May 2010, lists alcohol taxation and pricing policies as among the most effective interventions to reduce the harmful use of alcohol (WHO, 2010a). To support Member States in their implementation of alcohol taxation and pricing policies, the WHO and the ThaiHealth Promotion Foundation (Thailand) agreed to develop the WHO Resource Tool on Alcohol Taxation and Pricing Policies. This tool provides evidence of the effectiveness of interventions and offers guidelines for intervention implementation. The resource tool was created by a memorandum of understanding between the WHO and the ThaiHealth Promotion Foundation, and is based on the framework of WHO international research initiatives on alcohol, health and development. This project was developed by the Center for Alcohol Studies (CAS), Thailand, and the Centre for Addiction and Mental Health (CAMH), Canada.

Literature has collectively illustrated the effectiveness of taxation and pricing policies in controlling the public health problems caused by alcohol (Babor et al., 2010; Elder et al., 2010; Gallet, 2007; Anderson et al., 2009; Wagenaar et al., 2009b; Wagenaar et al., 2010). This knowledge has led public health personnel and non-economist alcohol control policy representatives to advocate increasingly for alcohol taxation and pricing policies. However, designing and implementing alcohol taxation and pricing policies typically falls under the purview of financial officers concerned with public finance rather than with public health (Cnossen, 2005; New Zealand Law Commission, 2010). Financial officers typically cite five concerns with respect to taxation and pricing policy issues, namely that: 1) it is unclear why the government should control problems caused by alcohol consumption using taxation and pricing policies, 2) that tax revenue generation should not decrease because of alcohol taxation and pricing policies, 3) policies other than taxation and pricing would be preferable, 4) taxes should be levied on harmful alcohol users rather than on social drinkers (Cnossen, 2005; New Zealand Law Commission, 2010), and 5) there are difficulties in handling issues such as taxation and pricing policy design and implementation, and the problem of unrecorded alcohol consumption.

The aim of this resource tool is not to convince financial officers to apply taxation and pricing policies to control alcohol consumption and its related harms. Rather, the aim is to inform public health personnel and non-economist alcohol control policy advocates how to facilitate effective discussions and negotiations with financial officers. The goal is to integrate public health perspectives into taxation and pricing policy design and implementation. Thus, this resource tool explains relevant economic concepts and provides evidence of the effectiveness of policies to augment public health personnel and non-economist alcohol policy advocates' understanding of taxation and pricing policies.

This resource tool is composed of four sections, as follows:

1. The need for alcohol taxation and pricing policies. Section 1 provides justification for alcohol taxation and pricing policies from public health, economic and other perspectives. This section provides evidence of the harms and externalities caused by alcohol consumption, the effectiveness and cost-effectiveness of taxation and pricing policies, an answer to the dilemma of tax revenue generation versus alcohol consumption control, and a discussion concerning government taxation of the harmful use of alcohol and social drinking. This section concludes by describing the limitations of taxation and pricing policies.
2. Basic knowledge of economic concepts for public health personnel. Section 2 explains several basic economic concepts – including demand-supply equilibrium, price mechanisms of taxation and minimum price, price and tax elasticity, price and demand under different market structures, short-run and long-run reactions of the alcohol market to changes in taxation and pricing policies, alcohol tax/custom tax/general tax, basic notions related to the structure of an alcoholic beverage, and limitations of the economic model.
3. Problems with the design of taxation and pricing policies. Section 3 contains two chapters. The first explains the basic concepts of taxation methods, tax base, minimum price, indicators assessing the quality of taxation methods, and indicators assessing the extent of tax rates. The second chapter provides epidemiological information on tax methods employed in countries worldwide based on data from the WHO's Global Survey on Alcohol and Health 2010.
4. Taxation and pricing policy implementation. Section 4 is comprised of four short chapters. The first addresses the general implementation of taxation and pricing policies, such as tax administration, substitution effect, affordability and tax rate determination, symmetry of price elasticity, tax avoidance and tax evasion, protection of domestic brands, alcohol taxation and the poor, and taxation and stockpiling. The second chapter focuses on the effect of unrecorded alcohol consumption on taxation. The third chapter discusses specific alcohol taxation and pricing policy issues that include trade agreement practices, the economy and other alcohol control policies. The fourth chapter in this section discusses earmarked taxes.

Section 1

The need for alcohol taxation and pricing policies



Section 1:

The need for alcohol taxation and pricing policies

*Bundit Sornpaisarn, Kevin D. Shield, John E. Ataguba,
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A broader understanding of the need for alcohol taxation and pricing policies by governments, public health personnel, and alcohol control policy advocates can lead to improvements in such policies. The design and implementation of appropriate alcohol taxation and pricing policies can maximize the potential for reductions in the health and social burdens caused by alcohol consumption. This section outlines the justification for alcohol taxation and pricing policies from three perspectives: 1) the public health perspective, 2) the economic perspective, and 3) other perspectives.

The importance of alcohol taxation and pricing policies from a public health perspective

Governments require alcohol taxation and pricing policies that have been formulated after accounting for public health concerns for the following reasons:

- The burden of alcohol-related problems is substantial and increasing.
- The price of alcohol is the main factor influencing alcohol consumption and its related harms.
- Alcohol taxation and pricing policies are among the most effective and cost-effective alcohol control measures.
- Alcohol taxation and pricing policies can prevent the initiation of drinking.

Alcohol-related problems are significant and increasing

Alcohol consumption is linked to more than 200 illnesses defined by the International Classification of Diseases (ICD-10) as three-digit disease codes (Rehm et al., 2010a).

In 2013, alcohol was the seventh leading risk factor – after dietary risks, high blood pressure, child and maternal malnutrition, tobacco smoking, air pollution and high body-mass index – for the global burden of disease, as measured by disability adjusted life years (DALYs) lost, a measure of both years lost due to premature mortality and years lost to disability (Forouzanfar et al., 2015). In 2013, alcohol consumption was responsible for 2.8 million deaths (0.8 million female deaths and 2.0 million male deaths) among a total of 54.9 million deaths worldwide, and was responsible for 99.3 million DALYs lost (20.9 million female DALYs lost and 78.4 million male DALYs lost) among a total of 2449.8 million DALYs lost worldwide (Forouzanfar et al., 2015). In the same year, alcohol accounted for 5.1% (95% confidence interval [CI]: 3.9-6.0%) of all deaths globally, and accounted for 4.1% (95% CI: 3.3-4.6%) of the total global DALYs lost (Forouzanfar et al., 2015). The burden of alcohol consumption increased from 1990 to 2013. Alcohol was responsible for 4.2% of all deaths in 1990 and was responsible for 3.0% of all DALYs lost in 1990

(Forouzanfar et al., 2015). The ranking of alcohol use compared to other risk factors for the global burden of disease has remained the same, as alcohol consumption was also ranked the seventh leading cause of DALYs lost in 1990 (Forouzanfar et al., 2015). An increase in the global burden of disease attributable to alcohol was also observed by Rehm and colleagues (Rehm et al., 2009).

The burden of disease is a growing problem for low- and middle-income countries (LMICs). As gross domestic product adjusted for purchase power parity (GDP-PPP) increases, so does alcohol consumption (Shield et al., 2011). Additionally, LMIC populations experience a greater amount of harm compared to high-income countries for the same amount of alcohol consumed (WHO, 2011).

Alcohol consumption also creates a substantial economic burden (Rehm et al., 2009). Rehm and colleagues demonstrated that the weighted average economic cost of alcohol consumption was 2.5% of GDP-PPP among selected high-income countries (Canada, France, Scotland and United States), and also showed that the average social cost of alcohol consumption was 2.1% of GDP-PPP for selected middle-income countries (MICs) (Republic of Korea and Thailand) (Rehm et al., 2009). Although there is a slightly greater economic burden in high-income countries compared to LMICs, the economic burden of alcohol consumption will increase for LMICs because *per capita* alcohol consumption in these countries increases as GDP-PPP increases (Shield et al., 2011).

The problems caused by alcohol consumption are significant and are increasing worldwide; however, a substantial portion of the alcohol-attributable burden of disease is avoidable. Thus, effective policies to reduce alcohol consumption, its related ills, and alcohol-attributable costs must urgently be implemented by governments. Moreover, LMICs in particular may need to implement unique alcohol control policies to prevent the growth of problems caused by increases in alcohol consumption.

Price is an important factor that determines alcohol consumption and its related problems

In most countries, alcohol is a commodity with some restrictions, such as availability and a minimum purchasing age. However, it can be bought and consumed freely within these restrictions. As is the case with most commodities, price is an important determinant of sales and, ultimately, consumption (Hirshleifer, Glazer & Hirshleifer, 2005). Section 2 provides an in-depth discussion of the relationship between price and alcohol consumption. The significance of price as a determinant of alcohol consumption follows economic theory and has been empirically demonstrated in numerous studies (Babor et al., 2010), including experimentally controlled studies (Babor et al., 1980; Babor et al., 1978).

Alcohol taxation and pricing policies are among the most effective and cost-effective alcohol control measures

Taxation in part determines the price of alcoholic beverages (Babor et al., 2010). Two indicators that are used to describe the effectiveness of taxation and pricing policies are price elasticity and tax elasticity. Price elasticity is determined by the percentage

change in an outcome of interest that results from a 1% increase in price. For example, a price elasticity in the demand for beer of -0.4 means an increase of 10% in the price of beer is associated with a 4% reduction in beer consumption; a price elasticity in traffic fatalities of -0.2 means a 10% increase in the alcohol price is associated with a 2% reduction in traffic fatalities. Similarly, tax elasticity is determined by the percentage change in an outcome resulting from a 1% increase in taxation. For example, a tax elasticity of demand for beer of -0.2 means an increase of 10% in beer tax is associated with a 2% reduction in beer consumption; a tax elasticity of traffic fatalities of -0.1 means a reduction in traffic fatalities of 1% results from a 10% increase in alcohol taxation. These two indicators are different in terms of their magnitude because tax elasticity typically has less value than price elasticity; however, these indicators are combined when analysed in some of the literature (Wagenaar et al., 2009b; Wagenaar et al., 2010).

The impact of alcohol taxation and pricing policies on alcohol consumption

Wagenaar and colleagues (Wagenaar et al., 2009b) and Elder and colleagues (Elder et al., 2010) performed systematic reviews of price elasticity and tax elasticity that included studies primarily from high-income countries. In their review of 112 studies, Wagenaar and colleagues mixed price and tax elasticities in their analyses and indicated that the mean of price and tax elasticity of demand is -0.46 for beer, -0.69 for wine, -0.80 for spirits, and -0.51 for total alcohol consumption (Wagenaar et al., 2009b). In a systematic review of 72 studies, Elder and colleagues observed that the median value of price elasticity is -0.50 for beer, -0.64 for wine, -0.79 for spirits, and -0.77 for ethanol (Elder et al., 2010). Sornpaisarn and colleagues (Sornpaisarn et al., 2013) performed a systematic review that summarized the results of 10 studies conducted in LMICs assessing the effect of taxation and pricing policies. The authors estimated that the average price elasticities of demand for these countries were -0.5 for beer, -0.79 for other alcohol (including wine and spirits), and -0.64 for total alcohol consumption (Sornpaisarn et al., 2013). See Table 1.1 for a summary of price elasticities of demand.

Table 1.1. The price elasticity of demand by beverage type in high-income countries and in LMICs

Beverage type	The price elasticity of demand		
	High-income countries		LMICs
	(Wagenaar et al., 2009b) ^a	(Elder et al., 2010)	(Sornpaisarn et al., 2013)
Beer	-0.46	-0.50	-0.50
Wine	-0.69	-0.64	-0.79
Spirits	-0.80	-0.79	
Total	-0.51	-0.77	-0.64

^a Results are pooled estimates of both price and tax elasticity.

A meta-analysis of alcohol price and income elasticities with corrections for publication bias (by excluding the “outlier studies” with extreme estimates of price elasticity, which were included in the previous systematic reviews) by Nelson (2013) estimated average price elasticities. However, the results of this analysis should be interpreted cautiously because there was only one coder. Based on his systematic review, Nelson found smaller but still significant effect sizes of average price elasticities of -0.30 for beer, -0.45 for wine and -0.55 for spirits (Nelson, 2013).

The impact of alcohol taxation and price on alcohol-related harms

Wagenaar and colleagues summarized the results of 50 studies that quantified the effects of alcohol taxation or price on alcohol-related harms. From these studies, Wagenaar and colleagues observed that the price and tax elasticities of harms are -0.347 for alcohol-related disease and injury outcomes, -0.112 for traffic crash outcomes, -0.055 for sexually transmitted diseases, -0.048 for suicide, -0.022 for violence, -0.022 for other drug use, and -0.014 for crime and other misbehaviours (Wagenaar et al., 2010). Elder and colleagues observed that the tax elasticities of traffic fatalities range from -0.1 to -0.27, and the tax elasticity of violence and crimes range from -0.09 to -0.13 (Elder et al., 2010). See Table 1.2 for the summary of tax elasticities of alcohol-related harms.

9

Table 1.2. The price elasticity of various health outcomes in high-income countries

Outcome	Price elasticity	
	Wagenaar et al., 2009 ^a	Elder et al., 2010
Alcohol-related disease and injury outcomes	-0.347	
Alcohol-impaired driving		-0.50 to -0.81
Motor vehicle crashes		-1.20
Motor vehicle injuries	-0.112	-0.1 to -0.27 ^b
Death from cirrhosis		Inverse relationship between price and cirrhosis death, but there are substantial differences in the estimated strength of this relationship
Alcohol dependence		-1.49
Sexually transmitted diseases	-0.055	
Suicide	-0.048	
Violence	-0.022	-0.13 for rape ^b , -0.09 for robbery ^b -0.12 for any violence towards children ^b
Crime and related behaviours	-0.014	-0.09 for robbery ^b -0.12 for any violence towards children ^b

^a Results are pooled estimates of both price and tax elasticity.

^b These figures are based on tax elasticity, which is a percentage change in an outcome of interest resulting from a 1% increase in alcohol taxation. Typically, in the situation of a taxation increase resulting in a price increase and, eventually, in a reduction of the outcome of interest, price elasticity has a higher value than tax elasticity.

The effects of alcohol taxation and price for risky subpopulations

Increases in alcohol taxation and pricing reduce alcohol consumption in general, and excessive alcohol consumption among young persons and among people in the general population (Wagenaar et al., 2009b; Babor et al., 2010; Elder et al., 2010). Using the results from 10 studies, Wagenaar and colleagues observed that the mean elasticity of demand for heavy drinkers is -0.28 (Wagenaar et al., 2009b). In their systematic review, Elder and colleagues found that the price elasticity of demand is -0.29 for high school students, -0.53 for heavy drinkers among people aged 16-21 years, and -0.95 and -3.54 for binge-drinking 18-21 year-old males and females respectively (Elder et al., 2010). Elder and colleagues also observed that the price elasticity of demand is -0.29 to -1.29 for adult binge drinkers (Elder et al., 2010). A recent qualitative systematic review on the effects of alcohol prices on binge drinking claimed that increased alcohol taxes or prices were unlikely to be effective in reducing binge drinking, regardless of gender or age group (Nelson, 2015). However, the results of this study should be interpreted cautiously because of its methodology for vote counting. Vote counting is a simple but limited method for synthesizing evidence from multiple evaluative studies, and involves simply comparing the number of significant positive studies with the number of significant negative studies and the number of non-significant studies. Vote counting does not take account of the quality of the studies, the size of the samples, or the size of the effect.

Cost-effectiveness of alcohol taxation and pricing policies

Alcohol taxation and pricing policies are effective alcohol control measures and are highly cost-effective compared to other alcohol control interventions (Chisholm et al., 2006; Anderson et al., 2009). Anderson and colleagues reviewed published systematic reviews and meta-analyses that assessed the effectiveness of policies and programmes aimed at reducing the avoidable harm caused by alcohol (Anderson et al., 2009). In terms of the cost in international dollars of one DALY saved, Anderson and colleagues observed that, in the WHO regions of the Americas and Europe, one DALY costs 241-380 international dollars when increasing taxation, 515-567 international dollars for measures that regulate the availability of alcohol, 781-924 international dollars for drink-driving policies and countermeasures, and 931-961 international dollars for measures regulating the marketing of alcoholic beverages (Anderson et al., 2009). For comparison purposes, the WHO defines a cost-effective intervention as one that averts each additional DALY at a cost less than the GDP per capita (WHO, 2002). However, for countries with high levels of unrecorded alcohol consumption, the cost-effectiveness of pricing and alcohol control policies was lower (e.g. 1150-1358 international dollars for the WHO Western Pacific region) (Anderson et al., 2009). In countries where unrecorded alcohol constitutes a large proportion of the total alcohol consumed, increasing the proportion of alcohol that is taxed may be more effective than increasing the tax on already taxed beverages (Anderson et al., 2009).

Differences in the effects of alcohol taxation and pricing policies depending on the drinking culture

The effects of alcohol taxation and pricing policies may differ depending on the drinking culture. Fogarty and colleagues' study found no differences in the effects of alcohol taxation and pricing policies between countries; however, Fogarty found that alcohol elasticity is negatively associated with market share, and that alcoholic beverages with a large market share tend to have more inelastic demand compared to alcoholic beverages with a small market share (Fogarty, 2006). This implies that the dominant alcoholic beverage in a market is considered a basic dietary commodity and is thus less responsive to changes in price when compared to other beverages. Additionally, a country's beverage preferences can change over time – e.g. in Sweden, spirits were popular (inelastic) during the first half of the 20th century, but then spirits and beer became popular from 1968 to 1986 and, finally, wine gained popularity during the period from 1984 to 2004 (Babor et al., 2010). The results of previous studies suggest that price elasticity decreases over time in some countries (Babor et al., 2010). A study of trends in alcohol and tobacco consumption in the United Kingdom from 1963 to 2003 found that alcohol price elasticity moved towards zero: short-run price elasticity changed from -0.76 (in 1986) to -0.42 (in 2003), and the long-run price elasticity changed from -0.52 to 0.10 (the value 0.10 is not statistically significantly different from zero) (Mazzocchi, 2006). Mazzocchi (2006) also found that an increase in alcohol consumption in the United Kingdom from 1963 to 2003 was explained by a strong alcohol preference (compared to tobacco preference), addictive behaviour and a change in price elasticity. By studying price elasticity in Finland from 1955 to 1980, Ahtola and colleagues found that price elasticity changed from -0.93 in 1955-1956 to -0.70 during the period 1979-1980 (Ahtola et al., 1986). It has also been observed that alcohol is more inelastic in countries with a higher adult per capita consumption of alcohol (Holder & Edwards, 1995; Fogarty, 2006). Results from these studies imply that the drinking culture or norm of a country, in terms of preferred beverage (and the market share of this beverage) and the amount of alcohol consumed, influences the effects of alcohol taxation and pricing.

Addiction attributes of alcohol and price elasticity

Traditionally, the elasticities computed by economists are short-run elasticities. They are considered myopic in the sense that they assume that alcohol consumption in previous years does not affect current consumption. However, alcohol consumption can be addictive (Chaloupka et al., 2002). The seminal work by Becker & Murphy (1988), however, assumed that human beings are not myopic, even in the case of substance abuse. This implies that alcohol consumers do not ignore the future consequences of their consumption decisions. Increased current alcohol consumption, as an addictive substance, follows from increased past consumption. Becker & Murphy (1988) assumed that a consumer's current consumption decision depends on the changes in expected future costs of alcohol consumption. Because the future costs could increase because of tax or price policies, for instance, it is likely that future consumption will decrease. The authors

predict that such anticipated impact (decrease) on future consumption will cause a parallel reduction in current consumption.

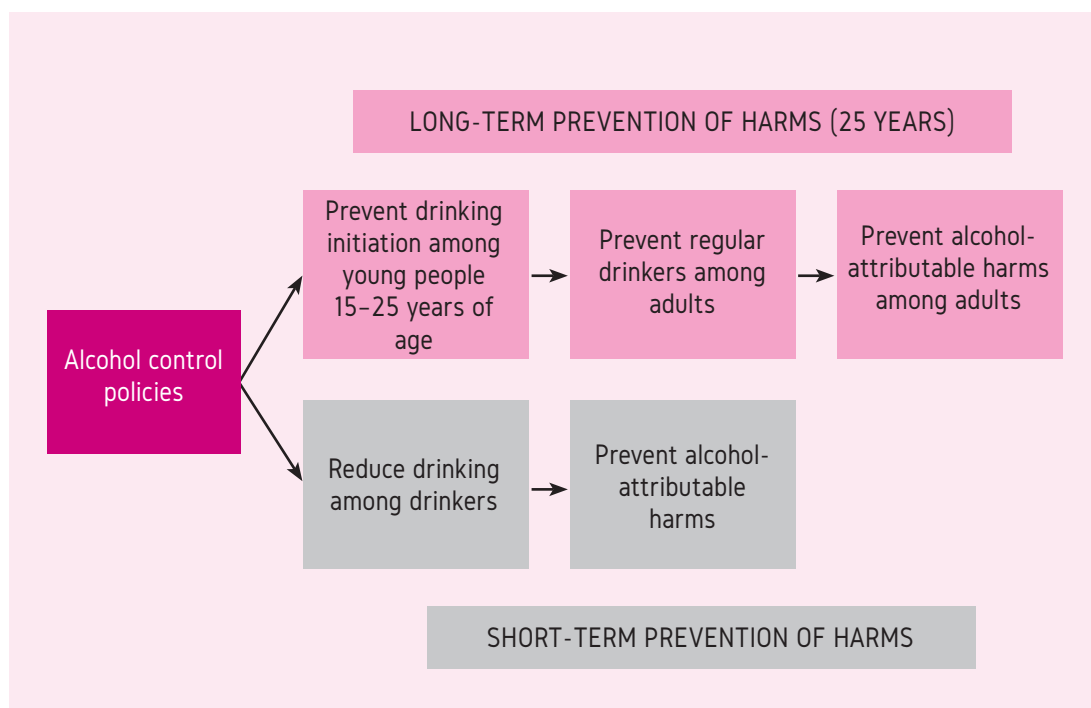
Becker & Murphy (1988) further predicted that short-run elasticity, based on the myopic view, will be smaller in absolute terms than long-run elasticity that allows for variations in past consumption. This prediction has been confirmed in several studies, mainly from developed countries (e.g. Johnson et al., 1992; Becker et al., 1994; Grossman et al., 1998; Bentzen et al., 1999; Baltagi & Griffin, 2002). The dearth of data in developing countries has limited the application of this model. Grossman et al. (1998), for instance, using data from the United States, showed that alcohol consumption is addictive. They reported that the long-run price elasticity is approximately 60% larger than the short-run elasticity.

These results, applying the rational addiction model of Becker & Murphy (1988), show that long-run elasticities are higher than their short-run counterparts. This is confirmed in Gallet's (2007) review, where the average long-run elasticity of alcohol reported is -0.82 compared to the short-run value which is estimated at -0.52. This finding, according to Grossman et al. (1998), indicates the significance of considering long-run elasticity when addressing pricing policies, including tax, as a means of curbing harmful drinking and alcohol-related harm. This is because higher alcohol taxes in the current year will lead to a reduction in alcohol consumption in current and future years. This effect will reduce future revenue from alcohol tax.

Alcohol taxation and pricing policies can prevent drinking initiation

Alcohol taxation and pricing measures can be applied to achieve long-term prevention of alcohol-related harm (Sornpaisarn et al., 2012a; Sornpaisarn et al., 2015b). Fig. 1.1 illustrates the short- and long-term prevention of alcohol-related harms from alcohol control policies. Policies that reduce consumption are short-term prevention policies, whereas policies that prevent drinking initiation are long-term prevention policies (Sornpaisarn et al., 2012a). The first study that examined the ability of alcohol taxation to prevent drinking initiation was performed by Sornpaisarn and colleagues (2015b). This study found that a 10% increase in the inflation-adjusted tax rate of the total alcohol market from 2001 to 2011 was associated with a 4.3% reduction in the prevalence of lifetime drinking (as a surrogate of drinking initiation prevention) among Thai people between 15 and 24 years of age.

Fig. 1.1. Diagram of the short- and long-term preventions of alcohol-attributable harm addressed by alcohol control policies



Source: reproduced from Sornpaisarn et al., 2012a.

Preventing drinking initiation is particularly important in LMICs where there are high rates of lifetime abstainers (WHO, 2014). Furthermore, adolescent drinking is prone to be problematic in LMICs (Sornpaisarn et al., 2012a). In 2010, for countries in the WHO regions of the Eastern Mediterranean, South-East Asia, and Africa, the prevalence of lifetime abstainers (among people 15 years of age and older) was 90%, 77%, and 57%, respectively, whereas the prevalence of lifetime abstainers in 2010 in high-income countries was 21%, 19% and 37% for the European, American and Western Pacific WHO regions, respectively (WHO, 2014). As observed by Shield et al. (2011) and Sornpaisarn et al. (2012a), as the GDP-PPP per capita increases in LMICs, so does alcohol consumption (Shield et al., 2011) and the prevalence of current drinkers (Sornpaisarn et al., 2012a). This factor may lead to increases in the magnitude of alcohol-related harms (Rehm et al., 2004) and a higher risk of mortality and morbidity from alcohol-related causes (such as injuries) (Smith & Barss, 1991). Thus, alcohol control policies, particularly in LMICs, should aim simultaneously to reduce consumption by existing drinkers and prevent the initiation of drinking.

The importance of alcohol taxation and pricing policy from an economic perspective

Alcohol taxation and pricing policies are also important from an economic perspective. Cnossen (2010) outlined that the objectives of excise taxation include: 1) raising revenues, 2) externality correction, and 3) information failure and internality correction.

Revenue-raising efficiency aspects

Governments employ alcohol excise taxation (as with excise tax on other goods such as tobacco, petroleum and motor vehicles) for revenue-generation purposes (Cnossen, 2010). Excise tax is typically easier to administer than other forms of taxation. Alcoholic beverages are easily identifiable products with a high sales volume, few producers and few substitutes. Consequently, the consumption of alcohol is consistently high despite excise-induced price increases (Cnossen, 2010). While alcoholic beverages may be taxed to account for externalities, tax may also be imposed on alcoholic beverages because there is a level of complementarity between the demand for leisure and the consumption of alcohol¹ (Corlett & Hague, 1953; Grossman et al., 1993; Kaplow, 2010). This is more so the case for heavy drinkers than for light or moderate drinkers where alcohol consumption may be complementary to work (Crawford et al., 2010). Such taxes are justified on the basis of the disincentive effects created by income taxation on labour supply (Corlett & Hague, 1953; Grossman et al., 1993; Cook & Moore, 1994) by effectively reducing income taxation and increasing the demand for leisure (Cook & Moore, 1994). Because leisure cannot be taxed directly, commodities such as alcoholic beverages that are consumed as a component of leisure, can be taxed at a relatively high rate to discourage reductions in labour supply (Corlett & Hague, 1953) that result from alcohol consumption.

The Ramsey rule (a rule proposed by economist Frank P. Ramsey) suggests that, for the purposes of taxation revenue, governments can impose higher-than-average tax rates on goods and services that are price inelastic (Cnossen, 2010). Price inelastic alcoholic beverages have generated excise tax revenue for governments for more than a century (Babor et al., 2010).

Tax revenue generation from alcoholic beverages is an important source of state revenue for some countries (Babor et al., 2010). In the United States between 1911 and 1917, over one third of total tax revenues were generated from alcoholic beverages, and similar figures have been observed for Denmark, Finland, Iceland, Ireland, Netherlands, Norway, Sweden and the United Kingdom (Babor et al., 2010). The significance of excise taxes generated from alcoholic beverages as a source of government revenue declined in most high-income countries during the 20th century, particularly after revenue increased from company taxes, from the introduction of personal income taxes and from indirect taxes such as “value added taxes or general sales taxes” (Babor et al., 2010). Ireland has experienced a decrease in alcohol tax revenues relative to total state revenues since 1970 (alcohol taxation in Ireland accounted for 14.4% of all tax revenues in 1969-1971 (Cnossen, 2010) and 5% of all tax revenues in 1996 (Babor et al., 2010). In 1991, for the 12 European Union countries, alcohol taxation accounted for 2.4% of tax revenues (Mäkelä & Österberg, 2009). In developing countries, the proportion of government revenues generated from alcohol excise taxes was 2% in Nigeria, 2.3% in South Africa, 4% in Sri Lanka and 10% in Kenya (Babor et al., 2010).

¹ Such complementarity implies that, for a given level of total spending, individuals who supply more labour will drink less (Crawford et al., 2010).

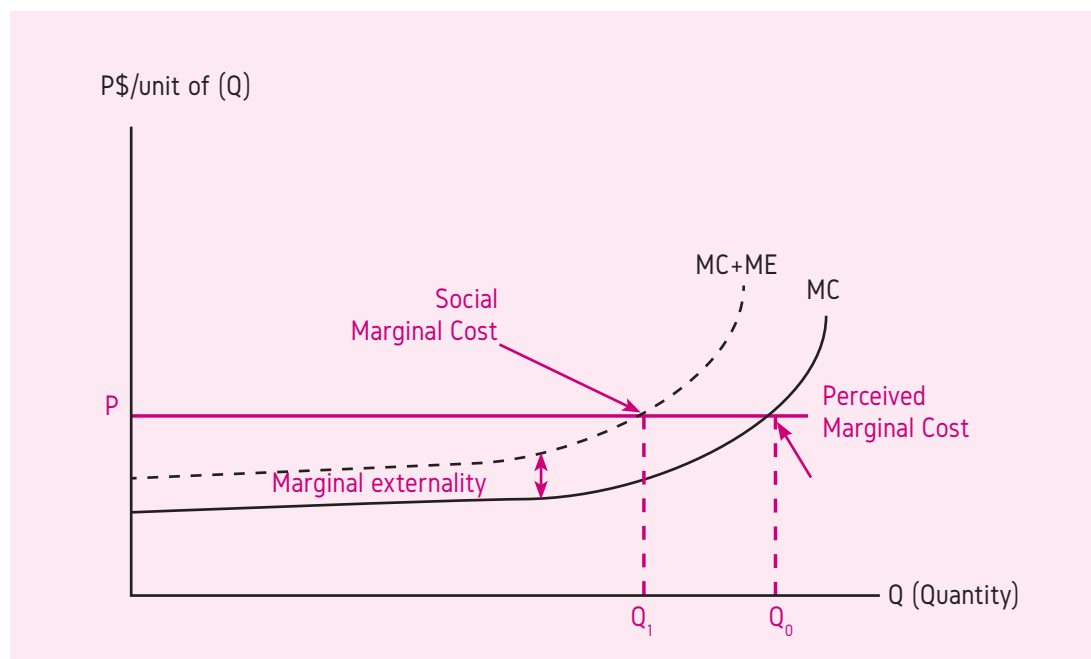
Externality-correcting issues

Excise taxation is typically rationalized as an intervention that governments employ to correct for externalities (external costs of a particular good that consumers or producers impose on other people). The charging of consumers and/or producers for external costs, which should reduce the consumption of a particular good to socially acceptable levels, is known as the Pigouvian prescription (Cnossen, 2010). For the Pigouvian prescription to be effective, Cnossen states that the imposed excise taxation for alcohol should be organized so that the reduction in the external cost of heavy and moderate drinkers is greater than any welfare (well-being) loss experienced by light drinkers who never binge (Cnossen, 2010). However, as alcohol consumption at the population level follows a particular distribution (Rehm et al., 2010b; Kehoe et al., 2012) and all countries experience a net negative effect from alcohol consumption (Lim et al., 2012), all countries may benefit from increases in alcohol taxation.

Other factors support government taxation of all alcohol consumed. First, there is no effective information on how to tax the harmful use of alcohol only (New Zealand Law Commission, 2010; Ataguba, 2012). It is difficult to identify and measure the marginal costs of the harmful use of alcohol (Smith, 2005). Second, the preventive paradox implies that taxation measures should be employed either to prevent chronic problems caused by heavy drinkers or to prevent acute problems caused by binge drinkers (New Zealand Law Commission, 2010). Eaton argues that governments should be concerned not only with heavy drinkers, who represent the minority of the drinking population. Binge drinkers should also be of concern and are among the social drinkers that represent the majority of the drinking population (New Zealand Law Commission, 2010). Third, the taxing of all alcohol consumed prevents current heavy drinking and prevents future heavy drinkers by reducing consumption among young people (New Zealand Law Commission, 2010). Finally, taxing all alcohol consumed in the market is equitable: heavy drinkers still pay a greater amount of excise tax than do social drinkers (New Zealand Law Commission, 2010). For example, based on excise taxes in New Zealand for 2007-2008, light and moderate drinkers (50% of New Zealand drinkers) paid only NZ\$ 38 per person in excise taxes per year, whereas the top 10% of heavy drinkers paid over NZ\$ 1300 per person per year (New Zealand Law Commission, 2010).

Fig. 1.2 shows that consumption of an externality-producing good is lower if the perceived marginal cost (MC) (the cost of producing one more unit of a particular good) and the marginal externality (ME) are taken into account. Every unit of an externality-producing good consumed or produced causes ME. When only the perceived MC is considered by consumers, competitive producers will produce an output of Q_0 units; however, a producer's output will be Q_1 when the true social MC (including the ME) is taken into account (Hirshleifer, Glazer & Hirshleifer, 2005).

Fig. 1.2. Efficient consumption or production when taking into account the externality caused by a particular product



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Information failure and internality-correcting arguments

With respect to alcohol, consumers do not take negative externalities into account and do not possess full information and/or recognize the negative long-term consequences (Cnossen, 2010; Kahneman, 2003; Gruber & Koszegi, 2001). Kahneman proposed that humans have bounded rationality and decide to perform a particular behaviour based on the immediate situation rather than on a perfect rationale (Kahneman, 2003).

If the younger generation does not fully recognize the negative health consequences of alcohol consumption (information failure) that will occur in the future (internalities), governments could apply excise taxation to raise alcohol prices to reduce consumption (Cnossen, 2010). Gruber & Koszegi (2001), in an analysis of the benefits of taxation of tobacco, argued that governments should consider the “externalities” when formulating taxation policies, but should also consider the “internalities” (Gruber & Koszegi, 2001).

The significance of alcohol taxation and pricing policies from other perspectives

In addition to alcohol-related health and economic burdens, alcohol consumption is associated with a social burden (Klingemann, 2001). Alcohol has been considered a major cause of deviant behaviours ranging from disorderly and socially disruptive conduct to serious threats to public order and safety (Klingemann, 2001). Two recent literature reviews have found sufficient evidence to demonstrate a causal relationship between alcohol consumption and violence (Room & Rossow, 2001) and found a strong association between the amount of alcohol consumed and the prevalence of violence against an

intimate partner (Foran & OLeary, 2008). Although information is limited concerning the extent of child abuse, divorce and marital problems, and work-related problems other than work accidents caused by and associated with alcohol consumption, the magnitude of these harms is estimated to be substantial (Babor et al., 2010). National surveys estimated that 70% of Australians and 71% of New Zealanders were affected by the drinking habits of strangers (they experienced nuisance, fear or abuse). Additionally, 30% of Australians and 25% of New Zealanders reported that the drinking habits of someone close to them negatively affected them (Casswell et al., 2011; Laslett et al., 2011). In New Zealand, 84% of people knew at least one heavy drinker and experienced harm from this person's drinking (Casswell et al., 2011). Because these social harms are associated with alcohol consumption, a decrease in consumption that results from an increase in taxation and/or price should reduce traffic fatalities and injuries, crime and violence. Thus, alcohol taxation and pricing policies can be justified as a means of maintaining social order.

Many religions (such as Buddhism and Islam) prohibit alcohol consumption or consider it sinful, whereas other religions use alcohol ceremonially. Previous research has found a strong association between people's religious tendencies and the amount of alcohol they consume. The more religious person, on average, consumes less alcohol (Fearer, 2004). Thus, for religious countries and territories (particularly in the case of predominantly Buddhist or Muslim countries), alcohol control policies, including taxation and pricing measures, can be advocated from a religious perspective (Sornpaisarn & Kaewmunkun, 2012c).

Limitations of alcohol taxation and pricing policies

Major arguments regarding limitations of alcohol taxation and pricing policies relate to whether these policies could reduce consumers' consumption or just make consumers shift their drinking from expensive alcoholic beverages to cheaper ones, and whether such policies could selectively affect problem drinkers rather than social drinkers (IARD, 2016). The first limitation is a problem of substitution which could reduce the impact of the policies. Substitution means that consumers may choose to shift their drinking from the more expensive alcoholic beverages to the cheaper ones instead of stopping or reducing their drinking. Substitution can occur in any of the following ways: shifting within a beverage type (from an expensive brand to a cheap one), from one beverage type to another which is cheaper, from taxed to untaxed (or unrecorded) alcoholic beverages, from expensive on-premise beverages to cheap off-premise beverages, or purchasing alcoholic beverages in bulk at discount rates to offset increases in price (IARD, 2016). Governments should consider the possible substitution effect when implementing taxation and pricing policies, particularly in cases where the differential tax rate policy is employed.

Unrecorded alcohol consumption has been shown to reduce the effectiveness of alcohol taxation and pricing strategies (Anderson et al., 2009; IARD, 2016). Unrecorded alcoholic beverages include privately imported alcohol, privately produced alcohol, alcohol

intended for industrial, technical, or medical use, alcohol sold duty-free to foreign embassies, consumption of alcohol abroad, consumption of beverages that contain alcohol but which are not defined as alcoholic beverages in official statistics, and an over- or under-estimation of statistics on recorded consumption. The consumption of alcohol by individuals abroad, the consumption of beverages that contain alcohol but are not defined as alcoholic beverages in official statistics, and the over- and under-estimation of recorded consumption statistics create their own economic dynamics in the domestic alcohol system and, consequently, are generally not included in discussions concerning unrecorded alcohol control policies (Nordlund & Österberg, 2000). As alcohol taxation increases, the amount of unrecorded alcohol consumption tends to increase, thereby reducing the effectiveness of alcohol taxation and pricing strategies (Anderson et al., 2009). Thus, when implementing strategies, governments should also consider policies that aim to reduce the unrecorded consumption of alcohol.

Effective alcohol policies other than taxation and pricing should also be implemented to reduce alcohol consumption and its resulting harms (Babor et al., 2010; WHO, 2010a). Babor and colleagues' (2010) systematic review assessed and compared various alcohol control policies and measures with respect to their effectiveness, breadth of research support and cross-national testing. Based on Babor and colleagues' assessment of 42 policy options, 19 options – including reducing affordability, restrictions on marketing, availability, and accessibility, and drink-driving deterrence measures – were deemed effective (Babor et al., 2010). Of these strategies, taxation, availability controls and advertising controls were identified as the three “best buys” (the most cost-effective alcohol control policies) by the first Global Ministerial Conference on Healthy Lifestyles and Non-communicable Disease Control and the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases in New York in September 2011 (WHO, 2012).

Summary of Section 1

Alcohol taxation and pricing policies have public health, economic and social benefits. Such policies: 1) generate tax revenue, 2) reduce alcohol consumption and its related harms (which cover both externalities and internalities) among various groups, including young people and heavy drinkers, and 3) prevent drinking initiation, which is a significant preventive strategy among LMICs that report a high prevalence of lifetime abstainers. Although controversy surrounds whether taxation should be imposed on social drinking or on harmful use only, several factors support government taxation on general alcoholic beverages in order to mitigate harmful alcohol use. However, to design or promote appropriate alcohol excise taxation methods, government personnel and/or alcohol taxation and pricing policy advocates must understand the basic economic concepts that influence these policies.

Section 2

Economic concepts for
public health personnel



Section 2:

Economic concepts for public health personnel

Bundit Sornpaisarn, Esa Österberg, Kevin D. Shield, Jürgen Rehm

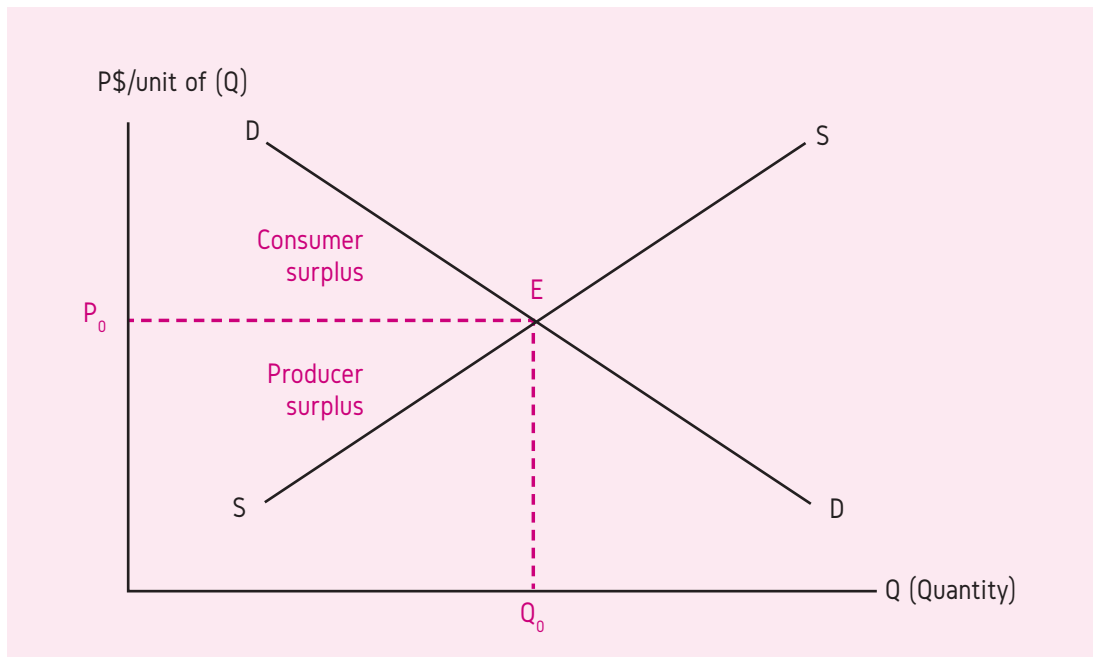
To advocate pricing and taxation policies effectively from a financial perspective, public health professionals and non-economist alcohol policy advocates require knowledge of several economic concepts. These concepts include:

- demand-supply equilibrium;
- price mechanisms of taxation and minimum price;
- price and tax elasticity;
- price and demand under different market structures;
- short-run and long-run reactions of the alcohol market to changes in taxation and pricing policies;
- alcohol excise tax, custom tax and general tax;
- basic notions related to the structure of an alcoholic beverage; and
- limitations of the economic model.

Demand-supply equilibrium

Demand-supply equilibrium is a fundamental economic concept that explains alcohol excise taxation (Hirshleifer, Glazer & Hirshleifer, 2005). Fig. 2.1 illustrates the equilibrium of demand and supply in a competitive market. Demand refers to the amount of a product that consumers will buy at a specified price and during a specified period. Supply refers to how much of a product producers will sell at a specified price and during a specified period. A competitive market contains a number of buyers and sellers; no party buys or sells a substantial quantity of product. Consequently, the market price of a product in a competitive market cannot be manipulated (Malcolm, 2011). The demand curve (D-D) and the supply curve (S-S) in Fig. 2.1 demonstrate the collective economic behaviours of consumers and producers, respectively. The demand curve shows that consumers are collectively willing to buy a greater quantity of a particular good if the price per unit of that good decreases. The supply curve shows that producers are collectively willing to sell a greater quantity of a particular good if the price per unit of that good increases. At the equilibrium point E in the competitive market, the quantity that consumers want to buy equals the quantity that producers want to sell.

Fig. 2.1. Demand-supply equilibrium.



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21

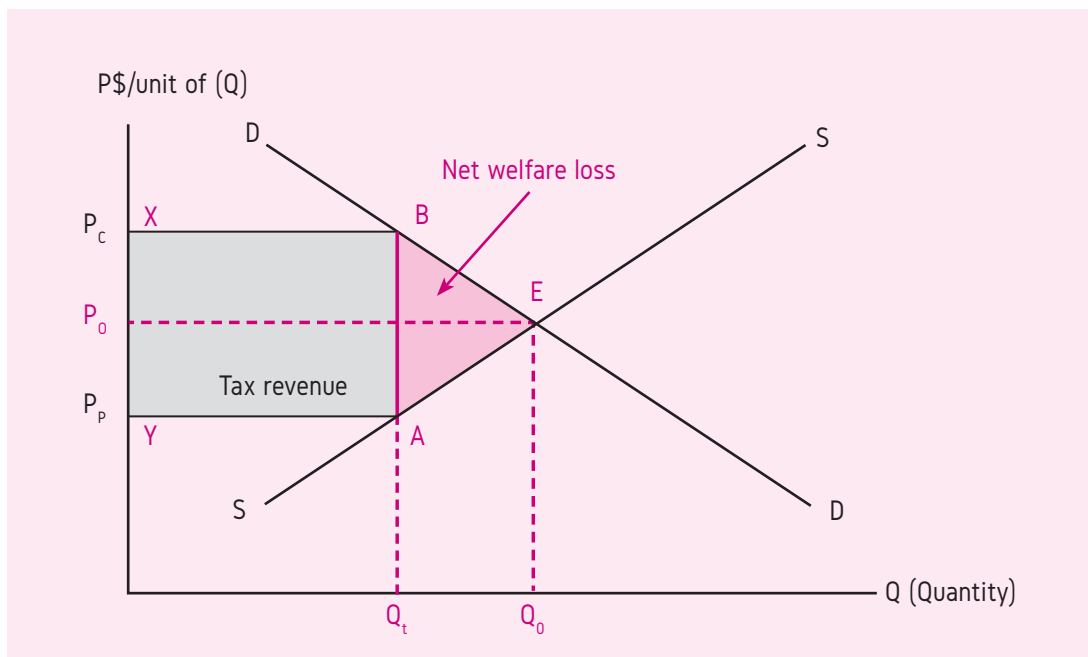
If the price of a good is less than its price under equilibrium (P_0), consumers demand more of the good, but producers want to sell less than they would at equilibrium (Q_0). Conversely, if the price of a good is greater than P_0 , producers want to sell more, but consumers demand less than Q_0 . Thus, the quantity Q_0 at equilibrium point E is optimal for the market as a whole, and is equal to consumer surplus plus producer surplus. Consumer surplus is represented by the area under the demand curve and above the line EP_0 , whereas producer surplus is represented by the area above the supply curve and under the line EP_0 . Consumer surplus is welfare gained by consumers because they can buy the good at price P_0 , which is less than the price they are willing to pay at lower quantities of sales. Producer surplus is welfare gained by the producers because they can sell the good at quantity Q_0 , which is greater than the quantity they are willing to sell at a lower price.

Price mechanisms of taxation and minimum price

Tax refers to required monetary payments by households and businesses to governments (Hirshleifer, Glazer & Hirshleifer, 2005). Fig. 2.2 illustrates the mechanism by which taxation decreases consumption and creates a welfare loss by influencing price (Hirshleifer, Glazer & Hirshleifer, 2005). If a government imposes taxation equal to the line $A-B$, the quantity (Q) will shift from the equilibrium Q_0 to the new equilibrium Q_t . At Q_t , the price that producers receive is represented by P_p (producer price), whereas the price that consumers pay is represented by P_c (consumer price). The rectangle $A-B-X-Y$ is tax revenue that the government collects (equal to the tax rate multiplied by the equilibrium quantity). The triangle $A-B-E$ is a net welfare loss: the total loss of consumer surplus and producer surplus ($A-E-B-X-Y$) minus tax revenue ($A-B-X-Y$).



Fig. 2.2. The relationship between taxation, price and the equilibrium.

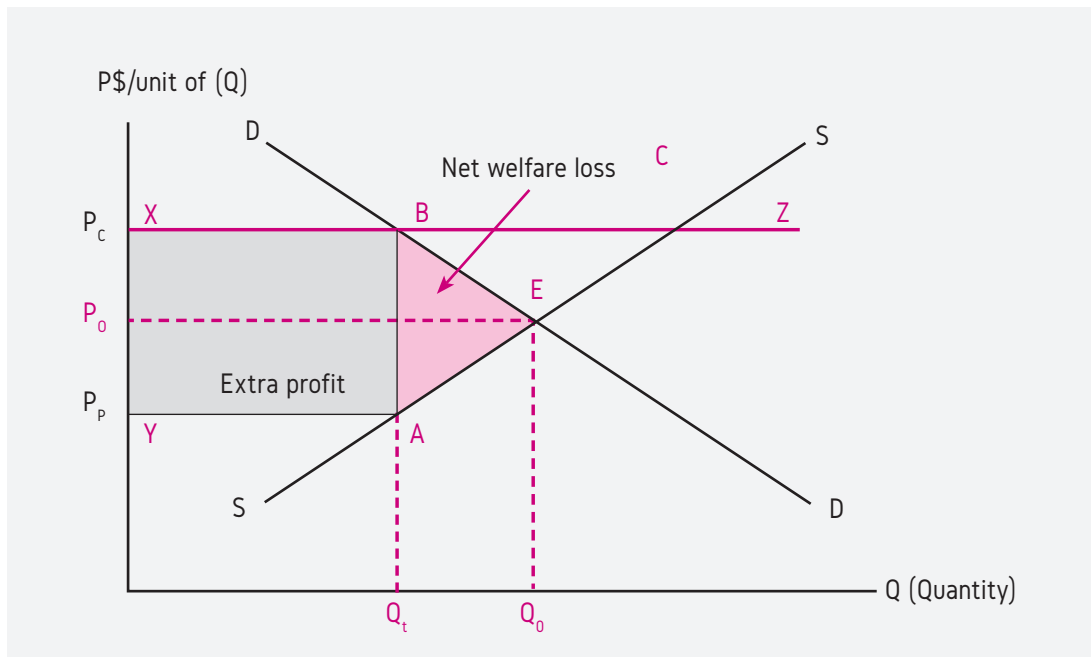


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In the situation above the government receives the full amount of the excise taxes. Consumers pay a higher price for the product (which results in a reduction in consumption), and producers receive a lower net-of-tax price for their product. In this case (and in all instances where the supply curve is upward-sloping), the excise tax is borne by both consumers and producers. However, alcohol producers may be able to adjust their product quality and quantity to reduce the tax burden in the long run under certain market structures, which is explained in more detail below under “Price and demand under different market structures” and “Short- and long-term reactions of the alcohol market to changes in taxation and pricing policies.”

Minimum price is an alcohol control measure imposed by the government to prohibit the sale of a particular product below a designated price (Hirshleifer, Glazer & Hirshleifer, 2005). Fig. 2.3 illustrates a decrease in consumption from an imposed minimum price and the subsequent welfare loss. If the government imposes a minimum price equal to P_{mp} (the line X-Z), the quantity utilized shifts from the equilibrium Q_0 to the new equilibrium Q_{mp} . At price P_{mp} , consumers want to buy only Q_{mp} . Although producers want to sell more, the quantity B-C becomes excess to demand. The rectangle A-B-X-Y represents profit to the producers (equal to the extra price [A-B] multiplied by quantity). If a government has a monopoly on the sale of a good, all or part of this extra profit is claimed by the government; however, in an open market, this extra profit is claimed by the private alcohol producers. The triangle A-B-E represents the net welfare loss: the total loss of consumer surplus and producer surplus (A-E-B-X-Y) minus extra profits (A-B-X-Y).

Fig. 2.3. The relationship between minimum pricing and the utility equilibrium.



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23

Minimum price is a measure that directly manipulates the retail prices of alcoholic beverages, whereas taxation indirectly manipulates price. However, both minimum price and taxation can reduce alcohol consumption. Minimum price is not a fiscal measure but a regulation measure; hence, intensive policy enforcement is required.

Price and tax elasticity

Price and tax elasticities are used as indicators of the effects of pricing and taxation on alcohol consumption or harms (Babor et al., 2010). Below we outline some of the elasticities applied in alcohol research. The price elasticity of demand (PE) is defined as the percentage change in demand of a good that results from a 1% increase in price. For example, if the price elasticity of demand for alcohol is estimated to be -0.4, a 10% increase in alcohol price results in an overall alcohol consumption decrease of 4%. Tax elasticity of demand is defined as the percentage change in consumption because of a 1% increase in taxation.



Additionally, the price elasticity and tax elasticity of alcohol-related harms, such as traffic fatalities, are defined as the percentage change in harms that results from a 1% increase in the price or tax of alcohol respectively.

Cross-price elasticity of demand (CPEoD) refers to the percentage change in demand for one good (Good A) resulting from a 1% increase in the price of another good (Good B) (Moffatt, 2013). For example, a cross-price elasticity of wine with respect to beer ($CPE_{\text{wine,beer}}$) of 0.5 implies that wine consumption increases by 5% because of a 10% increase in beer price. If two goods are substitutes, we should see consumers purchase more of one good when the price of its substitute increases. Similarly, if the two goods are complements, we should expect to see that a price rise in one good causes the demand for both goods to fall (Moffatt, 2013). If $CPEoD > 0$, the two goods are substitutes; if $CPEoD = 0$, the two goods are independent; if $CPEoD < 0$, the two goods are complements (Moffatt, 2013).

Price and demand under different market structures

There are three market structures: monopolies, oligopolies and competitive markets (Hirshleifer, Glazer & Hirshleifer, 2005; Malcolm, 2011; Shubik & Richard, 1980). A monopoly market has only one producer or retailer supplying the market. An oligopoly has a small number of significant producers or retailers that supply the market. A competitive market has a substantial number of small producers, retailers and consumers so that no single one can manipulate the equilibrium of market price and quantity. The explanations of demand-supply behaviours presented thus far assume that a competitive market exists for the production, sale and consumption of alcohol. However, alcohol markets in many countries are not competitive (Hirshleifer, Glazer & Hirshleifer, 2005; Babor et al., 2010; Barzel, 1976; Keen, 1998; Myles, 1996). Most markets consist of a few large alcohol companies that share the alcohol market (oligopoly market), or they are monopolies where the government controls the production or sale of alcohol through government-owned factories or retail outlets.

Producers in competitive markets are called “price-takers” or “price-taking firms” because they do not influence market price (Hirshleifer, Glazer & Hirshleifer, 2005; Malcolm, 2011; Shubik & Richard, 1980). The producer behaviour representing the supply curve SS in Fig 2.1 (the quantity produced changes when price changes) represents collective behaviour (all individual producers in a competitive market react in a similar way); however, producers at the individual level accept the market price and determine the quantity of production accordingly. If the production cost is higher than the market price, a producer will stop production. If the cost of production is lower than the market price of alcohol, a producer will produce alcohol at maximum capacity.

In contrast, the producer(s) in a monopoly or oligopoly market are called “price-makers” or “price-making firms” because they determine the market price by manipulating production quantity (since a monopoly’s products supply the entire market)

(Shubik & Richard, 1980; Hirshleifer, Glazer & Hirshleifer, 2005; Malcolm, 2011). The reactions of price makers are different under short-run and long-run conditions (Hirshleifer & Hirshleifer, 2005; Moffatt, 2012), and are explained below.

Short- and long-run reactions of the alcohol market to changes in taxation and pricing policies

The difference between short-run and long-run markets with respect to alcohol is the extent of decision-maker flexibility (Moffatt, 2012). Short-run and long-run are not separated by the actual time frame (Hirshleifer, Glazer & Hirshleifer, 2005; Moffatt, 2012). Short-run reaction of the market represents market reaction to an imposition or increase in taxation that is under the condition of at least one fixed variable (e.g. consumers may have the same amount of money to buy alcohol, and therefore alcohol producers cannot increase the quality of product produced without any effect on the quantity of alcohol sold) (Moffatt, 2012). Long-run reaction of the market occurs when an imposition or increase in taxation is under the condition that all variables may change (e.g. producers are able to produce the same products at a lower cost, or even produce new, more attractive products, and consumers have higher income or greater affordability) (Moffatt, 2012).

Because the market conditions for short-run reaction are fixed by definition, an alcohol price increase results in a reduction of alcohol consumption (Hirshleifer, Glazer & Hirshleifer, 2005). A tax increase causes consumers to consider that alcoholic beverages are more expensive (represented by an upward shift of the supply curve) and product consumption decreases correspondingly (because in a short-run market the demand curve is fixed) (Hirshleifer, Glazer & Hirshleifer, 2005). In the long-run market, alcohol producers in an oligopoly or a monopoly can improve production technology and lower the alcohol price (represented by a downward shift in the supply curve). The consumption of alcohol will increase compared to the short-run reaction (Barzel, 1976; Keen, 1998; Myles, 1996; Shubik & Richard, 1980). If producers can increase the demand for a product by improving the product and/or increasing advertising (represented by an upward shift in the demand curve), alcohol consumption will increase compared to the short-run reaction (even if the alcohol price has previously increased because of taxation) (Barzel, 1976; Keen, 1998; Myles, 1996; Shubik & Richard, 1980).

Consequently, for oligopoly and monopoly alcohol markets, price-making producers can adjust their products' quantities, quality and prices to reduce the impact of alcohol pricing and taxation changes in the long term (Barzel, 1976; Hirshleifer, Glazer & Hirshleifer, 2005; Keen, 1998; Myles, 1996; Shubik & Richard, 1980). (These product adjustments are explained in detail in Chapter 3.1. Thus, to examine the effectiveness of pricing and taxation policies, both short-term (short-run) and long-term (long-run) outcomes from demand and supply behaviours should be considered.



Alcohol excise tax, customs tax and general tax

The three main taxes related to alcoholic beverages are: 1) general tax, 2) customs tax, and 3) excise tax (Cnossen, 2005). General tax is imposed on all or almost all goods and services (such as general sales tax [GST] and value added tax [VAT]) (Cnossen, 2005). Customs tax is imposed on goods imported into a particular country and creates a barrier to protect similar domestically produced goods (Cnossen, 2005). Excise tax is imposed on some specific goods – such as luxury goods and goods considered to generate negative externalities (such as alcoholic beverages, tobacco products, gambling instruments, oil and cars) (Cnossen, 2005). Table 2.1 outlines the relationships between general taxation, customs taxation, and excise taxation and their targeted goods. Excise taxation is considered the optimal tool to manipulate alcohol consumption without affecting other goods. Increasing customs taxation would affect imported alcohol; however, it would not affect domestic alcohol consumption and would affect other imported goods. Increasing general taxation would affect alcohol consumption, but would also affect the price of all other goods. Thus, excise taxation is the main instrument that governments use to control alcohol consumption and its related harms.

Table 2.1. The relationship between three taxes on alcohol and the four types of goods

Types of goods	Source of Product		
	Domestic	Imported	
Alcohol	1. Domestic alcoholic beverages	2. Imported alcoholic beverages	Alcohol excise taxation (affects 1 and 2)
General goods	3. Other domestic goods	4. Other imported goods	

Customs taxation (affects 2 and 4)
 General taxation (affects 1 to 4)

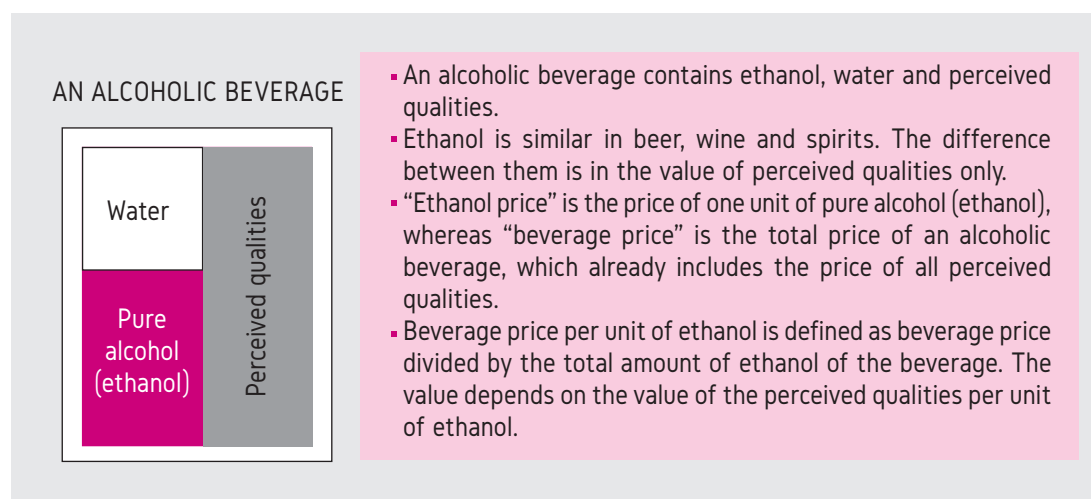
Basic notions related to the structure of an alcoholic beverage

There are common notions related to the structure of an alcoholic beverage. These notions relate to alcohol concentration, perceived quality, ethanol price, beverage price, and beverage price per unit of alcohol.

Fig. 2.4 shows a hypothetical diagram of an alcoholic beverage containing pure alcohol (or ethanol), water and perceived qualities. “Alcohol concentration” – the percentage of alcohol by volume (% ABV) – refers to the percentage of ethanol volume in the total volume of an alcoholic beverage. For example, a 5% beer can contain an absolute ethanol volume of beer of 25 cc in a 500 cc can of beer. “Perceived quality” refers to all other components and attributes, such as years of brewing, colour, taste, container, image (determined by advertising), and transportation and distribution costs. The only difference in any alcoholic beverage is the perceived quality component (which is assumed to cost

more than either the ethanol or the water components). Thus, people who purchase alcohol consume, apart from water, ethanol and perceived qualities from any alcoholic beverage. If we assume that the value of pure ethanol is the same in all alcoholic beverages (within and across alcoholic beverage types: beer, wine, and spirits), beverage preferences are assumed to be a function of the value of the perceived qualities per unit of ethanol and affordability (Barzel, 1976).

Fig. 2.4. A hypothetical model of an alcoholic beverage



Ethanol price (EP) is the price of one unit of pure alcohol (ethanol) (represented in a unit of \$/ethanol), whereas beverage price (BP) is the total price of an alcoholic beverage, which already includes the total price of ethanol and the price of all perceived qualities (represented in a unit of \$/beverage). Beverage price per unit of ethanol (BPPE) is the BP per unit of ethanol contained in an alcoholic beverage (represented in a unit of \$/ethanol).

BPPE depends on the total value of perceived qualities per unit of ethanol, but it is independent of the number of units of ethanol in a beverage (see Table 2.2). BPPE is a good indicator for comparing the cost of various alcoholic beverages regardless of their alcohol concentration; hence, all explanations that follow are explained in terms of BPPE. The expensive alcoholic beverage (high BPPE) is a beverage that has a high value of perceived qualities per unit of ethanol, whereas the inexpensive alcoholic beverage (low BPPE) has a low value of perceived qualities per unit of ethanol.

Table 2.2. Equations illustrating the definitions of ethanol price (EP), beverage price (BP) and beverage price per unit of ethanol (BPPE)

Notion	Definition
Ethanol price (EP) (\$/ethanol)	= Value of one unit of ethanol
Beverage price (BP) (\$/beverage)	= Total price of an alcoholic beverage = Total price of all ethanol + the total value of perceived qualities = (#of ethanol) x (EP) + total value of perceived qualities
Beverage price per unit of ethanol (BPPE) (\$/ethanol)	= Beverage price of an alcoholic beverage (BP) Total amount of ethanol in such beverage (#of ethanol) $= \frac{(\text{\#of ethanol}) \times (\text{EP}) + \text{total value of perceived qualities}}{(\text{\#of ethanol})}$ $= \frac{(\text{\#of ethanol}) \times (\text{EP})}{(\text{\#of ethanol})} + \frac{\text{total value of perceived qualities}}{(\text{\#of ethanol})}$ $= \text{EP} + \frac{\text{total value of perceived qualities}}{(\text{\#of ethanol})}$

Note: Water is assumed to have no value in this equation.
= number.

Another significant notion with respect to tax calculations is a country's definition of an alcoholic beverage. Typically, the government determines excise tax rates for various alcoholic beverages; hence, there is no alcohol excise tax imposed on non-alcoholic beverages. Consequently, the definition of an alcoholic beverage is important. For instance, the government may define an alcoholic beverage as a beverage that contains at least 2% of alcohol by volume, in which case a beverage with 1.5% of alcohol by volume would not be subject to alcohol excise taxation. In this case, alcohol producers may choose to sell 1.5% beer rather than 2% beer.

Limitations of the economic model

The economic concepts described above assume that consumers make rational decisions: a price increase leads to a consumption decrease and a price decrease leads to a consumption increase (Hirshleifer, Glazer & Hirshleifer, 2005). Moreover, based on the rational addiction theory, in their decision to consume alcohol, consumers are already affected by the addictive factor, future cost and the harmful consequences of alcohol consumption (Becker & Murphy, 1988). Therefore, the consumption behaviours of demand and supply are predictable using rational economics theories: alcohol consumption is reduced by tax and price increases. However, consumers' decisions to consume alcohol also depend to a substantial extent on emotion and immediate situations (such as alcohol

accessibility, friends and social occasions) rather than on rational acknowledgement of potential long-term consequences (Kahneman, 2003; Bickel & Marsch, 2001).

Summary of Section 2

This section illustrates a number of basic economic concepts, including demand-supply equilibrium; price mechanisms of taxation and minimum price; price and tax elasticity; price and demand under different market structures; short- and long-run reactions of the alcohol market to changes in taxation and pricing policies; alcohol excise tax, customs tax and general tax; basic notions related to the structure of an alcoholic beverage; and limitations of the economic model. Alcohol consumption and its control using taxation and pricing policies operate via a mechanism of demand-supply equilibrium. However, the effects of taxation and pricing policies vary under different market structures, and time is required to measure the effects of policy implementation. To generate tax revenue or to control alcohol consumption, excise tax is the optimal tool that a government can use to target alcoholic beverages compared to customs tax and general tax. These concepts clarify the effect of taxation and pricing policies and allow the public health professional to advocate for the most effective strategy.

Section 3

Designing taxation and pricing policies



Section 3:

Designing taxation and pricing policies

To discuss and negotiate with financial officers effectively, public health personnel and non-economist alcohol control advocates require an understanding of taxation and pricing policy design. This section contains two chapters. The first chapter explains basic economic concepts concerning taxation and pricing policy design. The second chapter provides epidemiological information collected from the 2010 WHO Global Survey on Alcohol and Health on the taxation methods employed by countries worldwide.

Chapter 3.1

Basic economic concepts related to taxation and pricing policy design

Bundit Sornpaisarn, Kevin D. Shield, Esa Österberg, Jürgen Rehm

This chapter demonstrates several economic concepts related to taxation and pricing policy design. These include basic economic concepts of taxation methods and minimum pricing measures, tax base, basic economic concepts of minimum price, assessment of price/taxation models against the ultimate goals of price/taxation policies, indicators that assess the extent of a tax rate, and the limitations of an economic model.

Tax methods and tax base

Several types of excise taxation methods are employed by countries worldwide (Barzel, 1976; Keen, 1998; Myles, 1996; Shubik & Richard, 1980; WHO, 2010b; Rerchuphan, 2005). Excise taxation methods can be divided into two main groups: uniform taxation and combination taxation. Uniform taxation may be specific taxation, ad valorem taxation or unitary taxation. Combination taxation can be any combination of the three uniform taxations.

In a competitive market, any type of taxation can reduce alcohol consumption because alcohol consumption has a negative demand slope and producers cannot influence market prices; taxation, the cost of production and consumer affordability influence the price of alcoholic beverages (Smith, 2005; Barzel, 1976; Keen, 1998; Malcolm, 2011). However, in oligopoly and monopoly markets, different excise taxation methods yield different market reactions (Smith, 2005; Barzel, 1976; Keen, 1998; Malcolm, 2011).

Uniform taxation

The following text describes the differences between specific, ad valorem and unitary taxation. Table 3.1 provides a comparison of their attributes.

Specific taxation

Specific taxation is a type of excise taxation. The tax due is calculated based on the amount of ethanol a beverage contains. If specific taxation rates increase, and the amount of ethanol and value of the perceived qualities remain the same, the after-tax price of the alcoholic beverage per unit of ethanol (after-tax BPPE) will increase and consumption will decrease in a short-run situation. This is because consumers do not observe a change in the value of the product, but do observe an increase in price. In reaction to specific taxation increases in the long-run in oligopoly or monopoly markets, however, alcohol producers have an incentive to improve the quality and image of their products to increase sales (Barzel, 1976; Smith, 2005; Keen, 1998; Myles, 1996).

Under specific taxation, a government imposes a tax on ethanol while imposing no tax on perceived qualities or water. Under specific taxation, the tax due depends on the ethanol content; therefore, specific taxation discourages the production of high ethanol content beverages and encourages the production of low ethanol content beverages that are relatively high in perceived quality and have a good image. This is called the “upgrading effect.” Because BPPE depends on the value of the perceived qualities per unit of ethanol (see Table 2.2), increasing the value of the perceived qualities increases the beverage price. As a result, specific taxation encourages high BPPE, leading to a decrease in total alcohol consumption in oligopoly or monopoly markets (Barzel, 1976; Smith, 2005; Keen, 1998; Myles, 1996). Tax revenue generation should increase under specific taxation because the proportion of total alcohol consumption reduction is less than the proportion of alcohol price acceleration (when the average price elasticity of market demand is less than one).

Ad valorem taxation

Ad valorem taxation calculates the tax due based on the price of the alcoholic beverage. If ad valorem taxation rates increase, and the amount of ethanol and value of the perceived qualities remain the same, the after-tax price of the alcoholic beverage per unit of ethanol (after-tax BPPE) will also increase and consumption will decrease because consumers observe no change in the value of the product but do observe an increase in price. In the long-run, however, in reaction to ad valorem taxation increases in oligopoly or monopoly markets, alcohol producers have an incentive to adjust their products to reduce the tax burden per unit of ethanol (Barzel, 1976; Smith, 2005; Keen, 1998; Myles, 1996).

Ad valorem taxation taxes both ethanol and perceived qualities. By adding more ethanol, or increasing the value of perceived qualities, consumers pay for the additional cost of the extra ethanol or the increase in the value of the perceived qualities and pay for the corresponding increase in taxes (this is called the “multiplier effect”). Thus, ad valorem taxation encourages alcohol producers to produce perceived low-quality alcoholic beverages by reducing the value of the unnecessary perceived qualities (such as reducing the brewing period or the quality of packaging) in order to reduce the price and tax burden



per unit of ethanol (Barzel, 1976; Smith, 2005; Keen, 1998; Myles, 1996). Consequently, under ad valorem taxation, long-run alcohol prices will decrease compared to full-tax BPPE because of a reduction in the value of the perceived qualities per unit of ethanol (this is called the “downgrading effect”) (Barzel, 1976; Smith, 2005; Myles, 1996; Keen, 1998). Ad valorem taxation also encourages producers to produce high ethanol content beverages to decrease the value of the perceived qualities per unit of ethanol (Barzel, 1976; Smith, 2005; Keen, 1998; Myles, 1996). Thus, ad valorem taxation encourages the production and sale of high ethanol content beverages and perceived low-quality beverages, thus resulting in a lower beverage price (Smith, 2005; Barzel, 1976; Keen, 1998; Myles, 1996). The lower BPPE increases total alcohol consumption when compared to the immediate post-taxed alcohol consumption situation under ad valorem taxation in oligopoly or monopoly markets. Tax revenue generation should increase under ad valorem taxation because total alcohol consumption increases.

Unitary taxation

Unitary taxation is a type of excise taxation that bases the tax due for an alcoholic beverage on beverage volume. Some countries categorize unitary taxation as specific taxation that uses the volume of beverage as a tax base instead of the volume of ethanol. This resource tool separates unitary taxation from specific taxation because each method elicits a different reaction from producers. Unitary taxation is preferred for alcoholic beverages for which it is difficult to determine the exact ethanol concentration, such as wine (Rerchuphan, 2005; New Zealand Law Commission, 2010). If unitary taxation rates increase, and the amount of ethanol and the value of the perceived qualities remain the same, the after-tax price of the beverage per unit of ethanol (after-tax BPPE) will increase and consumption will decrease because consumers perceive the same product with a higher price. In the long run, and in reaction to an increase in unitary taxation in oligopoly or monopoly markets, we expect that alcohol producers will adjust their products by increasing the ethanol content to reduce the tax burden per unit of ethanol (Sornpaisarn et al., 2015a).

Unitary taxation renders beverage volume a tax cost, but not alcohol content or perceived quality (Rerchuphan, 2005). Thus, unitary taxation encourages alcohol producers to produce alcoholic beverages that have a high ethanol content (Sornpaisarn et al., 2015a). Theoretically, under unitary taxation, alcohol producers produce, first, beverages with high ethanol content to reduce the tax burden per unit of ethanol, followed by a wide range of perceived quality alcoholic beverages (to favour consumer choice) because there is no tax barrier for the corresponding decision. Long-run BPPE may decrease relative to fully taxed BPPE because there are no tax implications associated with adding ethanol to an alcoholic beverage. As a result, total alcohol consumption may increase compared to the immediate post-taxed alcohol consumption situation under unitary taxation because this form of taxation does not tax alcoholic beverages based on ethanol content and favours consumer choice. Tax revenue generation may increase under unitary taxation because total alcohol consumption may increase.

Table 3.1. A comparison of the attributes of three taxation methods (specific, ad valorem and unitary) in oligopoly or monopoly markets

Attributes	Type of taxation		
	Specific taxation	Ad valorem taxation	Unitary taxation
Tax base	Volume of ethanol	Beverage price	Volume of beverage
Tax function	Ethanol has a tax cost; perceived qualities have no tax cost	Everything has a tax cost	Container size has a tax cost; both alcohol and perceived qualities have no tax cost
Effect of taxation on producers' adjustment in the long run	Encourages production of low ethanol content beverages and high perceived quality alcoholic beverages	Encourages production of high ethanol content beverages and low perceived quality alcoholic beverages	Encourages production of high ethanol content beverages with a wide variety of perceived qualities
Effect on BPPE ^a Effect on alcohol consumption	BPPE increase Total consumption decreases	BPPE decrease Total consumption increases when compared to the immediate post-taxed alcohol consumption situation	BPPE may decrease Total consumption may increase as compared to the immediate post-taxed alcohol consumption situation
Effect on tax revenue generation	Alcohol tax revenue increases	Alcohol tax revenue increases (to a greater extent than under specific taxation)	Alcohol tax revenue may increase

^a BPPE: beverage price per unit of ethanol.

Tax base

Tax base is an assessed value used for tax calculation. The specific taxation calculation is based on the amount of ethanol in an alcoholic beverage. The ad valorem taxation calculation is based on the price of an alcoholic beverage. Unitary taxation calculation is based on the total volume of an alcoholic beverage.

The tax base of ad valorem taxation is complex. First, the ad valorem tax rate can be determined as a percentage of the retail price or of the producer price (or ex-factory price). The relationship between producer price and retail price is the following: producer price incorporates the production (and/or advertising and transportation) costs plus a producer profit charged for an alcoholic beverage. Retail price incorporates producer price, the retail sale cost, the retailer profit and various types of taxes. However, in the interests of economic theory simplification, all costs and profits of producers and sellers are combined as a cost. Therefore, the main components in any price and taxation policy economic theory are cost, tax and price inclusive of tax.

Second, the ad valorem tax rate can be determined in terms of inclusive and exclusive tax rates. The tax base of the inclusive tax rate is the price that already includes tax, whereas the tax base of the exclusive tax rate is the price that excludes tax. For example, if the cost of an alcoholic beverage is US\$ 1 and the excise tax is US\$ 0.50, the retail price (inclusive of tax) is US\$ 1.50. The ad valorem inclusive tax rate is 33% (US\$ 0.50/US\$ 1.50), whereas the ad valorem exclusive tax rate is 50% (US\$ 0.50/US\$ 1). Therefore, the tax base of the ad valorem tax rate must be clearly articulated.

Combination taxation

Combination taxation is defined as a combination of two or more of the basic taxation methods. Combination taxation typically occurs by 1) calculating the tax due on an alcoholic beverage by combining specific taxation and ad valorem taxation, or 2) calculating the tax of each alcoholic beverage using both the specific and ad valorem taxation methods with the beverage tax determined as the higher of the two calculations. The WHO technical manual on tobacco tax administration refers to the above-described first combination of taxation as “mixed specific and ad valorem taxation” (MSA) and the second combination of taxation as “ad valorem with specific floor taxation” (ASF) (WHO, 2010b). The MSA taxation model is widely used in European countries (Cnossen, 2001), whereas the ASF taxation model is employed in Thailand (Sornpaisarn et al., 2012a; Sornpaisarn et al., 2012b) and in Turkey (OECD iLibrary, 2012).

The properties of MSA taxation and ASF taxation are outlined below based on simulated data (Sornpaisarn et al., 2015a). For both examples, 100 alcoholic beverages were simulated that fell equally under 10 beverage categories and that differed in ethanol content (from one to 10 units of ethanol per beverage). Within each category, the beverages differed in value of the perceived qualities per beverage (from one to 10 units of perceived quality value per beverage). The price per unit of ethanol and per perceived quality, and the value of tax rates for both specific and ad valorem taxation, were assigned. For the 100 simulated alcoholic beverages, the beverage price (\$/bottle) and the beverage price per unit of ethanol (BPPE, \$/unit of ethanol) were estimated. For the MSA example, based on the beverage price and the BPPE, the tax due and the average tax rate per unit of ethanol were calculated using the four following taxation models: 1) ad valorem taxation, 2) MSA taxation favouring ad valorem taxation, 3) MSA taxation favouring specific taxation, and 4) specific taxation. (See the next paragraph for the meaning of MSA favouring specific taxation and MSA favouring ad valorem taxation.) For the ASF example, both specific and ad valorem taxation were calculated for each of the 100 simulated alcoholic beverages described; however, the tax due on each of the beverages was the higher of the two calculations.

Mixed specific and ad valorem taxation (MSA)

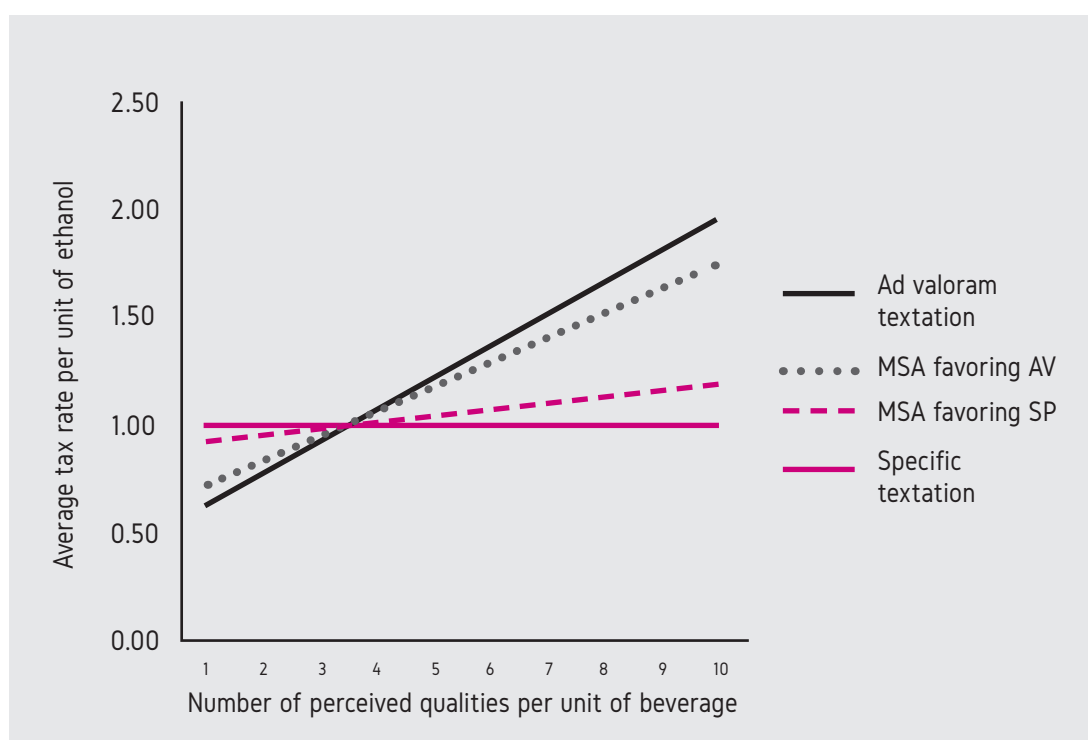
Among the European Union (EU) countries that use MSA taxation, the northern EU countries favour specific taxation (that is, the specific tax rate is greater than the ad valorem tax rate), whereas the southern EU countries favour ad valorem taxation (that

is, the specific tax rate is less than the ad valorem tax rate) (Cnossen, 2001). MSA taxation has attributes of both specific taxation and ad valorem taxation; however, the attributes of MSA taxation depend on the relative magnitude of the specific and ad valorem tax rates.

Taking the 100 simulated alcoholic beverages described above, Fig. 3.1 illustrates the average tax rate per unit of ethanol change based on the value of the perceived qualities per unit of ethanol for an alcoholic beverage under the four taxation systems. Specific taxation imposes an equal tax rate per unit of ethanol regardless of the value of the perceived qualities per unit of ethanol (the purple horizontal line). Ad valorem taxation imposes a tax based on the value of the perceived qualities per unit of ethanol (the blue highest slope line). MSA taxation favouring specific taxation has an attribute close to specific taxation (the green line that is less steep), whereas MSA taxation favouring ad valorem taxation has an attribute closer to ad valorem taxation (the red line with the steeper slope). Thus, by incentivizing producers to upgrade or increase the value of the perceived qualities per unit of ethanol, specific taxation causes the price of alcohol (BPPE) to increase and total alcohol consumption to decrease. Ad valorem taxation imposes a tax based on the value of the perceived qualities per unit of ethanol, leading producers to downgrade or decrease the perceived qualities in their products and resulting in a lower alcohol price and an increase in alcohol consumption. MSA taxation favouring specific taxation resembles specific taxation in its effect, whereas MSA taxation favouring ad valorem taxation resembles ad valorem taxation in its effect.

37

Fig. 3.1. A comparison of the tax rate per unit of ethanol for four types of taxation: specific (SP), MSA favouring specific, MSA favouring ad valorem, and ad valorem (AV)



Note: MSA, mixed specific and ad valorem taxation; Sp, specific taxation; AV, ad valorem taxation.

Specific taxation promotes the production of low alcohol content beverages (upgrading effect), and ad valorem taxation promotes the production of high alcohol content beverages (downgrading effect). MSA taxation promotes the production of medium alcoholic content beverages because MSA combines the attributes of both taxation methods.

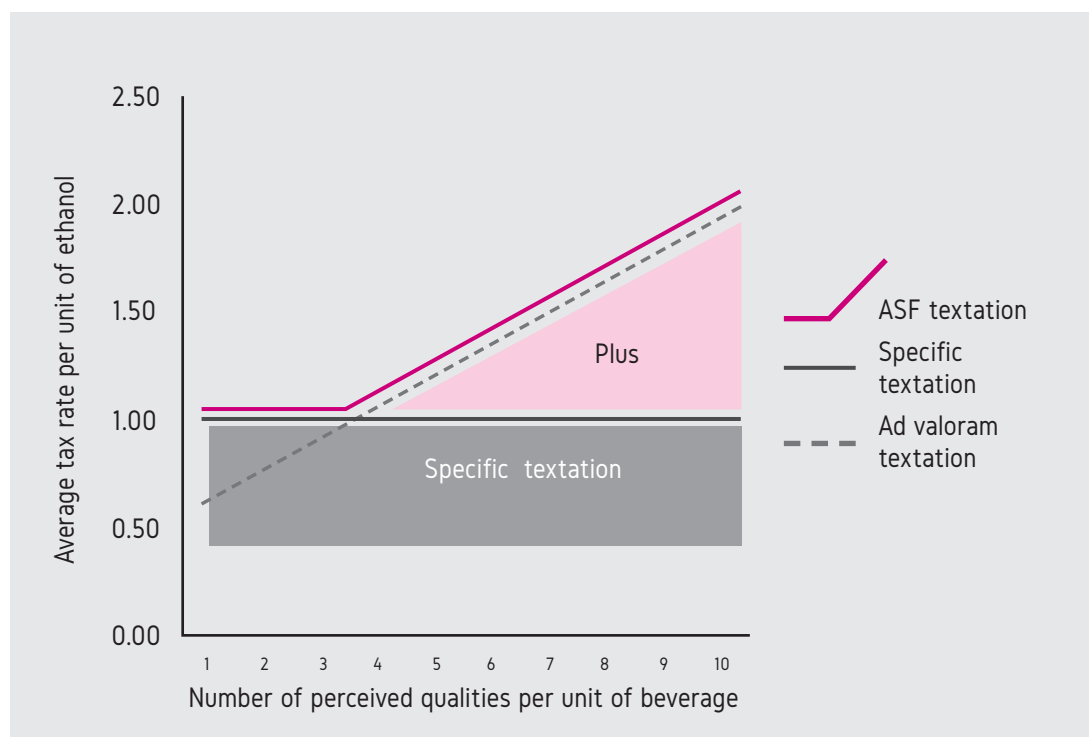
Ad valorem with specific floor taxation (ASF)

Fig. 3.2 illustrates the average tax rate per unit of ethanol change based on the value of the perceived qualities per unit of ethanol for an alcoholic beverage under ASF taxation, specific taxation and ad valorem taxation. We observe that the specific tax rates for lower perceived quality alcoholic beverages (beverage numbers 1-3 in Fig. 3.2) are higher than their ad valorem tax rates. Thus, for the lower perceived quality alcoholic beverages, the ASF tax rate is equal to the specific tax rate. For alcoholic beverages of higher perceived quality (beverages 4-10), which are generally more expensive, the ad valorem tax rate is higher than the specific tax rate. Conversely, for higher perceived quality alcoholic beverages, the ASF tax rate is equal to the ad valorem tax rate. This change in the effective tax rate for ASF taxation creates a taxation structure that is termed “ad valorem with specific floor taxation.”

ASF can also be considered “specific-plus taxation.” This is because ASF taxation is equal to specific taxation plus the area between specific taxation and ad valorem taxation in Fig. 3.2. Thus, for ASF taxation for all alcoholic beverages, the tax due is equal to the specific tax rates and the difference between the ad valorem tax rate and the specific tax rates (if the ad valorem tax rate is greater than the specific tax rate).

The advantages of ASF compared to specific taxation include: 1) ASF taxation has a higher average tax rate, greater tax revenue generation, and will result in lower total alcohol consumption (Sornpaisarn et al., 2012a; Sornpaisarn et al., 2016), and 2) ASF taxation can prevent drinking initiation (particularly in countries with a high prevalence of lifetime abstainers) because the tax due on low ethanol content beverages (which young people tend to consume when initiating drinking) is higher than under specific taxation (Sornpaisarn et al., 2012a; Sornpaisarn et al., 2015b). The disadvantage of ASF compared to specific taxation is that producers under ASF have no incentive to produce high-quality alcoholic beverages in the expensive alcohol category. This reduces the variety of high-price beverages.

Fig. 3.2. A comparison of the tax rate per unit of ethanol for three types of taxation (ad valorem with specific floor, specific and ad valorem)



Note: ASF, ad valorem with specific floor.

Homogeneity of tax method system design and tax rate determination

The complexity of the excise taxation system in a specific country can be the result of a combination of two factors: the homogeneity of tax methods applied and the homogeneity of tax rates employed. The possible taxation policy approaches that the government can utilize to address this combination are as follows:

1. Homogeneity of tax methods employed and tax rates applied to all types of alcoholic beverages: the government employs only one type of taxation method (specific, ad valorem, unitary, MSA, ASF or others) for all types of alcoholic beverages and applies a uniform tax rate to all alcoholic beverages.
2. Homogeneity of tax methods employed for all types of alcoholic beverages, but heterogeneity of tax rates employed for different categories of alcoholic beverages (beer, wine, spirits): the government employs only one type of taxation method for all types of alcoholic beverages, but employs differential tax rates for different categories of alcoholic beverages. Thailand is an example of a country that employs this tax policy approach because the government employs ASF for all types of alcoholic beverages but applies differential tax rates to different categories of alcoholic beverages (Sornpaisarn et al., 2012a).
3. Heterogeneity of tax methods employed and tax rates applied to different categories of alcoholic beverages (beer, wine, spirits): the government employs more than one type of taxation method to alcoholic beverage categories; however, this approach consequently cannot apply a uniform tax rate approach. Alcohol excise tax in Australia,

for instance, is based on beverage type and ethanol content, with beer and spirits taxed under a specific taxation structure and wine taxed under an ad valorem taxation structure (Australian Government, Department of Health and Ageing, 2013). Accordingly, the specific tax rate for beer and spirits is distinct from the ad valorem tax rate for wine.

Differential tax methods and tax rates yield differential actual tax rates between alcoholic beverage categories, resulting in some categories being favoured over others. The reasons supporting government application of the differential tax method and tax rate policy approach are the following. First, the differential tax method and tax rate policy approach can be considered if it results in different alcoholic beverage consumption and the government wishes to discourage the consumption of certain beverages (New Zealand Law Commission, 2010). For instance, in some countries, such as China, the government may wish to discourage the troublesome tradition of the consumption of heavy spirits. Second, spirits should be taxed at higher rates because the production cost is less than the production cost for beer and wine. A higher tax rate on spirits will bring the price of spirits per unit of ethanol in line with other alcoholic beverages (New Zealand Law Commission, 2010). Third, taxing spirits at a higher rate is based on a justification of progressivity because spirits are considered luxury products favoured by the rich in some countries, such as New Zealand (New Zealand Law Commission, 2010) and the EU countries (New Zealand Law Commission, 2010; Smith, 2005).

The reasons for the government to apply a uniform tax method and tax rate policy approach are the following. First, alcohol produces similar consequences regardless of the beverage type; the consequences of different alcoholic beverages in the market are already the result of differential tax rates among various types of alcoholic beverages (New Zealand Law Commission, 2010; Smith, 2005). For instance, spirits might not currently cause major externalities in EU countries if a high price confines consumption to richer consumers who are interested in attributes unrelated to alcohol. However, this does not inform us of the level of externalities that would be related to spirits consumption if spirits were taxed at the same rate per unit of alcohol as beer and wine (Smith, 2005). Second, higher tax rates produce greater welfare losses to non-abusive consumers in proportion to the square term of the tax rate; hence, the greater the difference in tax rates across beverage type, the higher the cost of welfare loss for non-abusive consumers (Smith, 2005). Third, there is a substitution effect between differently taxed alcoholic beverages because consumers shift their beverage choices toward alcoholic beverages with less tax (New Zealand Law Commission, 2010). For instance, the ready-to-drink (RTD) taxation increase in 2008 in New Zealand reduced RTD consumption by 35%, increased the consumption of spirits by 18%, and the consumption of beer by 5%, and the total excisable alcoholic beverages consumption declined by 0.5% (New Zealand Law Commission, 2010). Fourth, the government can determine other alcohol control policies to regulate beverage-specific consumption that produces higher externality.

A number of countries employ the differential tax method policy approach (see Chapter 3.2) and almost all countries worldwide, if not all, apply differential tax rates for

different types of alcoholic beverages, such as the EU countries (Smith, 2005), African countries (Bird, 2010) and countries of South-East Asia (Rerchuphan, 2005).

The basic economic concept of minimum price

Minimum pricing per unit of ethanol is a measure imposed by governments that prohibits the sale of alcoholic beverages to consumers below a designated price. The price of a lower-priced alcoholic beverage will increase after the introduction of a minimum price, and consumption will decrease because consumers will observe the same product with a higher price. Accordingly, minimum pricing affects the sale of low-priced beverages and reduces alcohol consumption and its related harms among heavy drinkers and the poor. These are the groups of people who experience the greatest harm from alcohol consumption because heavy drinkers and low-income groups typically consume low-priced alcoholic beverages (Meier et al., 2009). Indeed, there is evidence that minimum pricing in Canada reduced alcohol consumption (Stockwell et al., 2012) and alcohol-attributable hospital admissions (Stockwell et al., 2013).

Assessing price/taxation models against the ultimate goals of price/taxation policies

41

A government alcohol excise taxation model should consider three goals: 1) tax revenue generation, 2) control of alcohol consumed by drinkers and the public health problems caused by alcohol consumption, and 3) prevention of drinking initiation (for countries with a high prevalence of lifetime abstention). Here we compare various models of price/taxation measures that consider these goals under oligopoly and monopoly markets (see Table 3.2).

Specific taxation reduces alcohol consumption and its related harms and increases tax revenue generation. However, specific taxation may encourage drinking initiation among young people in countries with a high prevalence of lifetime abstention because young people typically consume low ethanol content beverages (that are not taxed heavily under specific taxation) when initiating drinking.

Ad valorem taxation increases tax revenue generation, but also increases total alcohol consumption and drinking initiation (because ad valorem taxation promotes low-cost alcoholic beverages).

Unitary taxation promotes inexpensive high ethanol content beverages and a wide variety of product qualities. Thus, unitary taxation is neither likely to decrease alcohol consumption and its related harms nor prevent drinking initiation. However, unitary taxation increases the generation of tax revenue.

MSA taxation has attributes of both specific and ad valorem taxation, with the effects of MSA taxation depending on the proportion between the specific and ad valorem

tax rates. Thus, MSA is less effective than uniform specific taxation in controlling alcohol consumption because, relatively, it promotes lower-cost alcoholic beverages. However, MSA may prevent drinking initiation because it promotes medium alcohol content beverages. A low alcohol content beverage under MSA has a higher tax cost compared to uniform specific taxation because MSA includes a higher tax rate based on its component of ad valorem tax.

ASF taxation or “specific-plus taxation” reduces alcohol consumption and its related harms, prevents drinking initiation, and increases tax revenue generation when compared to specific taxation. ASF taxation is effective in reducing alcohol-related harms because the tax due on any alcoholic beverage is never less than the calculated specific taxation rate. ASF taxation prevents drinking initiation because it heavily taxes low ethanol content beverages (preferred by young people when initiating drinking). ASF taxation also increases tax revenue generation; however, compared to specific taxation, ASF taxation may generate lower tax revenues from expensive beverages (if these beverages are elastic compared to inexpensive alcoholic beverages).

Minimum pricing per unit of ethanol has attributes similar to specific taxation because both are based on ethanol content. However, minimum pricing reduces consumption of, and the related harms caused by, the lowest-priced alcoholic beverages. When minimum pricing is applied in conjunction with taxation, tax revenues are generated and the difference between minimum price and the price of the taxed alcoholic beverage represents profit for alcohol companies. The ability of minimum pricing to prevent drinking initiation is unknown because low ethanol content beverages are normally expensive and thus are not affected by the minimum price policy. Governments should consider implementing minimum pricing policies in circumstances where significant harm is caused by lower-priced alcoholic beverages.

The literature has theoretically and empirically assessed the attributes of specific and ad valorem taxation (Smith, 2005; Barzel, 1976; Keen, 1998; Myles, 1996). Additional empirical studies are required to evaluate the theoretical assessment of the attributes of unitary, MSA and ASF taxation.

Table 3.2. A comparison of the various pricing and taxation model attributes in oligopoly and monopoly markets

Tax Method	Attributes		
	Tax revenue generation	Consumption and harm reduction	Drinking initiation prevention
Specific taxation (Sp)	Yes	Yes	May exacerbate drinking initiation in LMICs
Ad valorem taxation (AV)	Yes, more than specific taxation	No, when compared to Sp	No
Unitary taxation	Yes	No, when compared to Sp	No
Mixed Sp and AV favouring specific (MSA-Sp)	Close to Sp	Close to Sp	Somewhat, yes
Mixed Sp and AV favouring ad valorem (MSA-AV)	Close to AV	Close to AV	Somewhat, yes
Ad valorem with specific floor (ASF) (or specific-plus taxation)	Yes, when compared to Sp	Yes, when compared to Sp	Yes, when compared to Sp
Minimum price with taxation	Yes (The amount of tax revenue depends on which type of taxation is applied). The difference between minimum price and price inclusive of tax represents profit for alcohol companies	Yes (Among the lowest-priced beverages)	Uncertainty (Because low ethanol content beverages are not the least-expensive alcoholic beverages in terms of price per unit of ethanol)

Indicators that assess the extent of a tax rate

Two indicators assess the extent of a tax rate: the tax due as a percentage of retail price (TPP) and the tax due per unit of ethanol (TPU). TPP is the proportion of tax of an alcoholic beverage compared to the total retail price of the beverage by percentage. TPU is calculated using the tax amount of an alcoholic beverage divided by the amount of ethanol in that beverage. For example, suppose that an alcoholic beverage has 10 units of ethanol, a tax of \$ 10 and a retail price of \$ 20. The TPP is 50% (\$ 10/\$ 20), whereas its TPU is \$ 1 per unit of ethanol (\$ 10/10 units). (The BPPE of this beverage is \$ 2 per unit of ethanol (\$20 / 10 units).) TPP represents the tax burden per unit of purchasing money regardless of ethanol; this indicator is superior for measuring tax incidence, which measures the tax burden on the distribution of income. TPU represents the tax burden per unit of ethanol regardless of beverage price; this indicator is superior in measuring the burden of tax imposed on each unit of ethanol. Hence, both indicators should be applied in a comparison of the extent of alcohol excise tax rates between countries.

Summary of chapter 3.1

Several types of alcohol excise taxation methods are employed worldwide. These include uniform tax methods – such as specific taxation, ad valorem taxation and unitary taxation – and combination tax methods – such as mixed specific and ad valorem taxation and ad valorem with specific floor taxation. All of these methods have different attributes and may be appropriate for different contexts and the different alcohol control objectives of countries.

Governments should consider three goals when considering an alcohol excise taxation model: 1) tax revenue generation, 2) control of alcohol consumed by drinkers and public health problems caused by alcohol consumption, and 3) prevention of drinking initiation (for countries with a high prevalence of lifetime abstention). Assuming these three goals, specific taxation may be appropriate for high-income countries that have a high prevalence of drinkers because it promotes the consumption of low alcohol content beverages, which results in a reduction in total alcohol consumption. Mixed specific and ad valorem taxation (MSA) and ad valorem with specific floor taxation (ASF) may be appropriate for LMICs because it promotes the consumption of medium alcohol content beverages, which is expected to reduce total alcohol consumption among heavy drinkers and prevent drinking initiation among young people. The government may apply a minimum price measure as a method of controlling problems caused by the cheapest alcoholic beverages.

Two indicators are used to assess the extent of a tax rate – the tax due as a percentage of retail price (TPP) and the tax due per unit of ethanol (TPU). The former indicator is superior in measuring tax incidence, which measures the tax burden on the distribution of income, whereas the latter is superior in measuring the burden of tax imposed on each unit of ethanol. Both indicators should be applied in a comparison between countries of the extent of alcohol excise tax rates.

Chapter 3.2

Taxation and pricing policies among countries worldwide: results from the 2012 Global Survey on Alcohol and Health

Jürgen Rehm, Kevin D. Shield

The 2012 Global Survey on Alcohol and Health

The WHO has collected alcohol consumption and control policy data from Member States since 1996 using the Global Survey on Alcohol and Health (GSAH). In addition to collecting comparable information at the global level, the GSAH is instrumental in developing regional and global information systems on alcohol and health, as required by the World Health Assembly Resolution on “Public Health Problems Caused by Harmful Use of Alcohol.” The information provided by the Member States is published in the Global Status Report on Alcohol and Health (2014), as well as in WHO regional publications.

Previous publications that have reported GSAH data have not reported on the taxation systems of the Member States but have reported on subjects such as the legal drinking age, drink-driving laws and whether excise taxation is applied to alcohol. The 2012 GSAH collected information on the types of excise taxes applied to various alcoholic beverages and the amount of tax collected for these alcoholic beverages, thereby providing a unique opportunity to study global alcohol taxation and pricing policies.

This chapter presents the results of the 2012 GSAH respecting taxation by country, and provides an overview of the taxation methods employed.

Methodology of the 2012 Global Survey on Alcohol and Health and the sources of other data

The 2012 GSAH was conducted in collaboration with all six WHO regional offices (Africa, the Americas, Eastern Mediterranean, Europe, South-East Asia and Western Pacific). The 2012 GSAH was sent to WHO Member States for completion by national representatives who were officially nominated by the Member States’ ministries of health. Additionally, data were collected in conjunction with the European Commission in countries belonging to the EU. During questionnaire development, comments were solicited from WHO regional offices, the European Commission and a group of experts. The questionnaire, which was initially prepared in English and then translated into French, Portuguese, Russian and Spanish, was divided into three sections: Section A addressed alcohol policy, Section B addressed alcohol consumption, and Section C addressed alcohol and health indicators.

We supplemented the data collected from the 2012 GSAH with additional data from another source; data on recorded, unrecorded and tourist alcohol consumption were also obtained from a paper by Shield and colleagues (Shield et al., 2013a).



Religious bans on alcohol production and/or consumption

Some countries ban the production and/or consumption of alcohol, usually for religious reasons. The 2012 GSAH found that Afghanistan, the Islamic Republic of Iran, the Maldives, Mauritania, Saudi Arabia, Sudan and Yemen – representing 3.9% of the countries surveyed – had laws that prohibited the production and/or consumption of alcohol. In these countries, Islam is the predominant religion and is practised by the majority of the population. Although the production and/or consumption of alcohol is illegal in these countries, recorded per capita alcohol consumption for 2005 in these countries was, on average, 0.39 litres of pure alcohol (ranging from zero litres in Afghanistan, Iran, Mauritania and Yemen to 1.5 litres in Sudan). Unrecorded per capita alcohol consumption was, on average, 0.43 litres of pure alcohol (ranging from zero litres in Afghanistan to one litre in Iran and Sudan) and total per capita alcohol consumption, on average, was 0.67 litres of pure alcohol (ranging from zero litres in Afghanistan to 2.5 litres in Sudan). However, as measured by the 2010 GSAH, per capita alcohol consumption in these countries was, on average, 0.8 litres of pure alcohol (ranging from 0.02 litres in Afghanistan to 2.56 litres in Sudan), with 0.49 litres of the total per capita consumption derived from consumption of unrecorded alcohol (ranging from 0.02 litres in Afghanistan to one litre in the Islamic Republic of Iran and Sudan).

Value added tax on alcoholic beverages by country

Of the 175 countries that provided data on sales tax, 151 applied a form of value added tax to alcohol (the other 24 countries did not have a value added tax, or the production or consumption of alcohol was illegal). The average sales tax rate on alcohol varied from 3% in the Federated States of Micronesia to 30% in Sierra Leone and Tajikistan, with an average sales tax rate of 16.6% (standard deviation of 4.9%). Fig. 3.3 outlines the sales tax rates in 2012 by country.

Excise tax on alcoholic beverages by country

For historical reasons, in some countries alcoholic beverages are currently not taxed. Of the countries surveyed in the 2012 GSAH where alcohol consumption was not banned, 11 countries did not apply excise tax on beer, 28 countries did not apply excise tax on wine, and 15 countries did not apply excise tax on spirits (10 countries did not tax any alcoholic beverages). Fig. 3.4 lists the countries that do and do not apply excise tax on beer, wine and spirits, and those countries where the consumption of alcohol is illegal.

The method of calculating the excise tax payable on alcohol varies globally, with countries using ad valorem taxation, specific taxation, unitary taxation and a combination of taxation methods. Fig. 3.5 outlines the different excise taxation methods reported by the 2012 GSAH.

Fig. 3.3. Reported value added tax rates by country for 2012

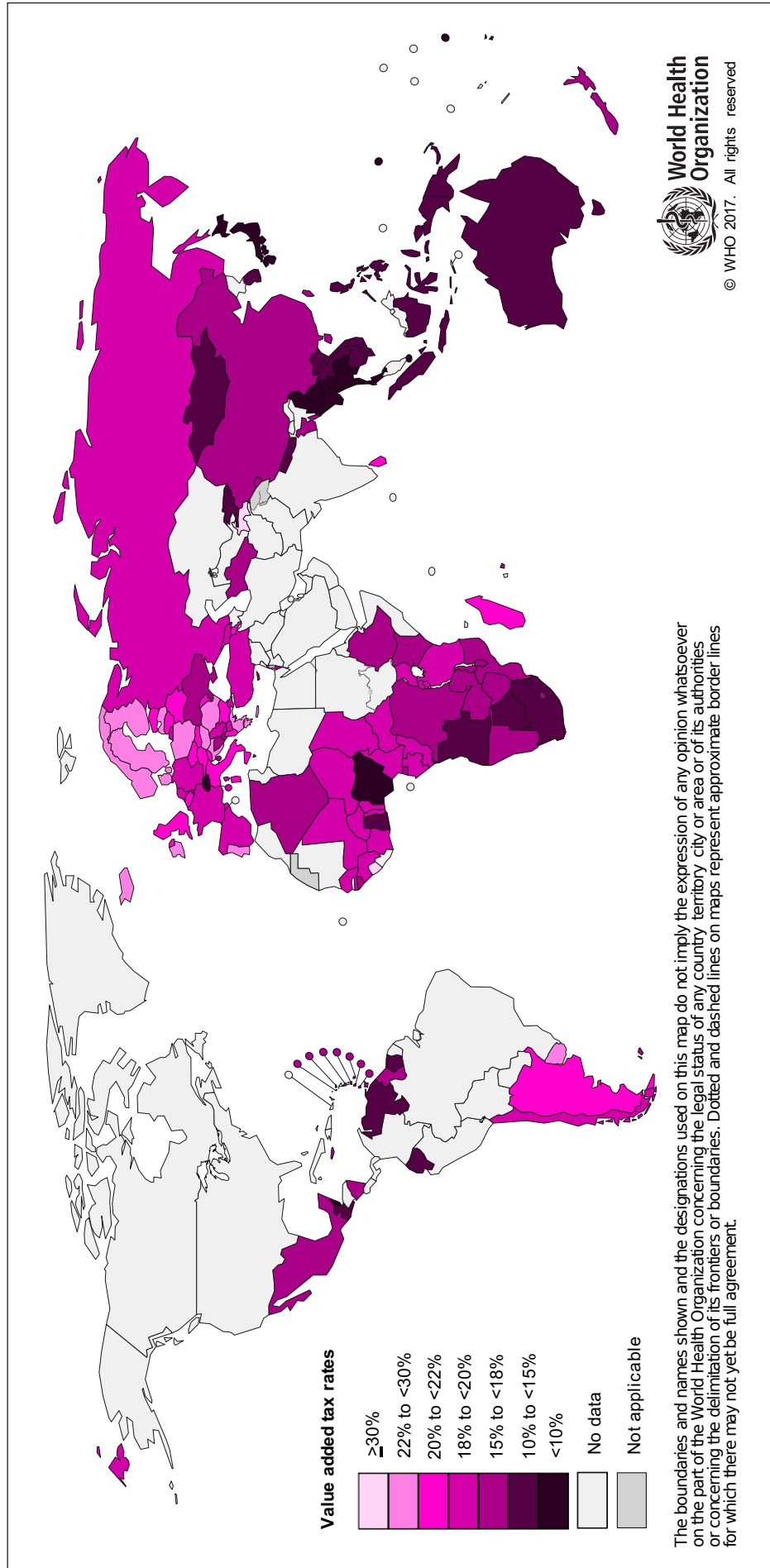


Fig. 3.4. Reported value added tax rates by country for 2012

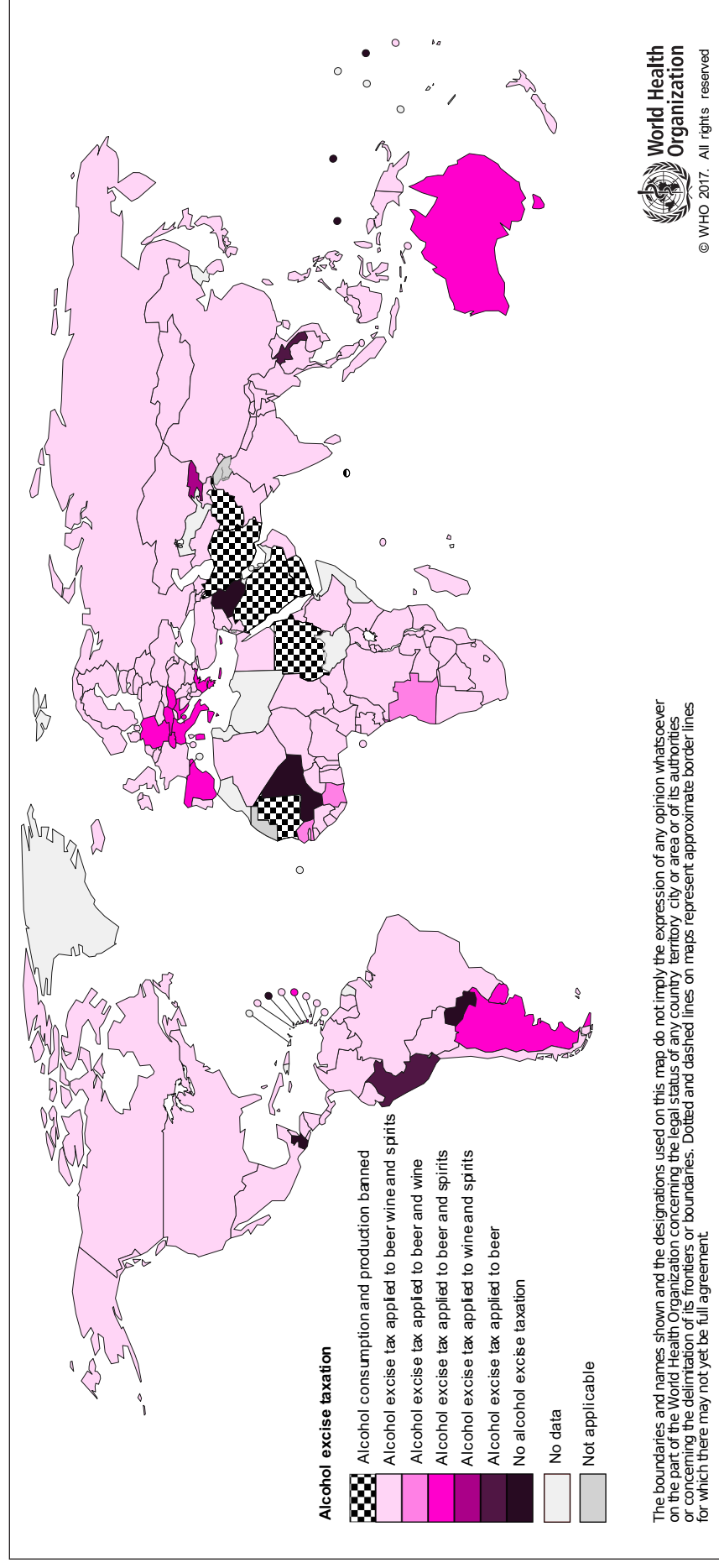
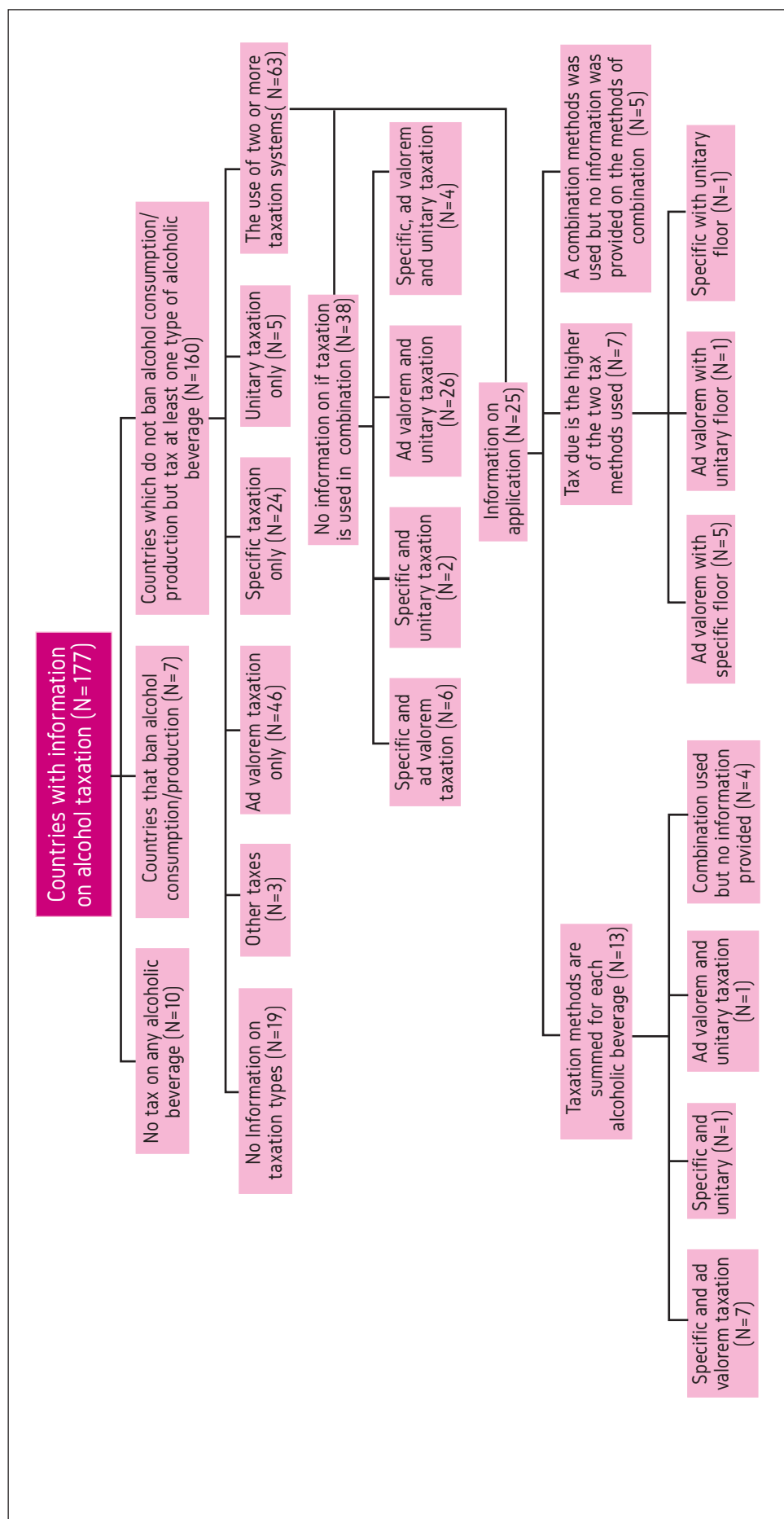


Fig. 3.5. Alcohol excise taxation methods reported by the 2012 Global Survey on Alcohol and Health



Of the countries that did not ban alcohol consumption and taxed alcohol using an excise tax, 19 did not provide any information on the type of alcohol taxation applied. Of the countries that provided information on excise taxation, three countries applied unique excise tax to alcoholic beverages (the Bahamas implemented a royalty tax that was collected on alcoholic beverages produced locally, Guinea-Bissau applied a special tax on alcohol sales, and Oman taxed all alcohol imports [for non-Muslims] by 100%). Additionally, 46 countries used an ad valorem alcohol taxation system only, 24 used a specific taxation system only, five used a unitary taxation system only, and 63 used two or more taxation systems. Of these 63 countries, 38 did not provide information on the alcohol taxation methods used, whereas 25 indicated that alcohol taxation systems were used in combination. For the countries that used two or more alcohol taxation systems but did not indicate if they were used in combination, six used both specific and ad valorem taxation, two used both specific and unitary taxation, 26 used both ad valorem and unitary taxation, and four used specific, ad valorem and unitary taxation. It is important to note that the categories of ad valorem taxation, specific taxation and unitary taxation may not fit in countries that have complex taxation systems, such as in Mexico, which applies ad valorem taxation but where the tax rate differs for different alcoholic beverages and where alcoholic beverage categories are based on alcohol content. For the countries that used two or more alcohol taxation systems and did not indicate if they were used in combination, 13 countries calculated the tax due on an alcoholic beverage as the sum of two or more alcohol taxation systems (seven countries summed specific and ad valorem taxation, one country summed specific and unitary taxation, one country summed ad valorem and unitary taxation, and four countries summed taxation methods but did not provide data on which taxation methods they summed). Seven countries calculated the tax due on an alcoholic beverage as the higher of two or more alcohol taxation systems (five countries used an ad valorem taxation system with a specific floor, one country used an ad valorem taxation system with a unitary floor, and one country used a specific taxation system with a unitary floor).

Overall, 74 countries used ad valorem taxation (13 based ad valorem taxation on retail price alone, 43 countries based ad valorem taxation on producer price, five countries based ad valorem taxation on both producer and retail price, and 13 countries implemented ad valorem taxation but did not indicate the price on which the tax was based), 75 used specific taxation, and 42 used unitary taxation.

Problems related to unrecorded alcohol consumption and alcohol taxation

Unrecorded consumption presents two problems with respect to taxation. First, unrecorded consumption lessens the effects of taxation increases on alcohol consumption. The increases in the price of recorded alcohol can lead, theoretically, to the substitution of recorded alcohol by unrecorded alcohol, and increases in the price of recorded alcohol do not directly affect the price of unrecorded alcohol. Second, excise tax is not applied to purchases of unrecorded alcohol, resulting in the loss of potential taxation revenues.

Summary of chapter 3.2

Alcohol taxation methods vary globally. Many countries – and within these countries the provinces, regions and states – adopt different approaches to the taxation of alcoholic beverages. The 2012 GSAH found that 11 countries did not tax beer, 28 countries did not tax wine, and 15 countries did not tax spirits; many of these countries do not tax alcohol for historical reasons. Additionally, the excise taxation methods vary considerably by country and, in a number of cases, within countries. Thus, there is a need to determine which taxation methods are the most effective considering the variety of circumstances that exist among and within individual countries.

Section 4

Implementation issues concerning taxation and pricing policies



Section 4:

Implementation issues concerning taxation and pricing policies

The fourth section addresses the implementation of taxation and pricing policies, and provides strategies to facilitate effective and efficient tax administration.

This section has four chapters. Chapter 4.1 addresses general implementation issues, which include tax administration, the substitution effect, affordability, tax rate determination, symmetry of price elasticity, tax avoidance and tax evasion, protection of domestic brands, alcohol taxation and the poor, and taxation and stockpiling. Chapter 4.2 focuses on the effect of unrecorded alcohol on taxation. Chapter 4.3 discusses specific issues that relate to alcohol taxation and pricing policies, which include trade agreement practices, the general economy, and other alcohol control policies. Chapter 4.4 discusses earmarked taxation.

Chapter 4.1

General implementation issues of alcohol taxation and pricing policies

Bundit Sornpaisarn, Esa Österberg

This chapter addresses the general implementation of taxation and pricing policies – including tax administration, the substitution effect, affordability and tax rate determination, symmetry of price elasticity, tax avoidance and tax evasion, protection of domestic brands, alcohol taxation and the poor, and taxation and stockpiling. Because there is limited literature on alcohol tax administration, this chapter mainly comprises lessons learned from the taxation of tobacco which are documented in the WHO technical manual on tobacco tax administration (WHO, 2010b).

Tax administration

The implementation of taxation and pricing policies presupposes an administrative structure for setting and collecting taxes, and at least some knowledge of the alcohol market in the jurisdiction where the policies are to be implemented. Taxes on alcoholic beverages can be collected when alcoholic beverages are imported to the country, when they are released for distribution and consumption from domestic production centres or tax-free storage, or when they are sold to consumers from on-premise or off-premise retail establishments. Alcohol excise duties are typically collected by customs and excise officers from importers and producers at the point at which products enter the wholesale or retail market. Tax collection requires some form of registration or licensing of all alcohol importers and producers or places of alcohol manufacture. In the WHO's "Global strategy to reduce the harmful use of alcohol" (2010), the recommendation for regulatory mechanisms with respect to production, importation and wholesaling of alcohol is to facilitate taxation procedures, although regulation at this level can also have health and safety purposes. Uncontrolled or unsafe distillation methods, for instance, can accidentally produce highly poisonous methanol rather than ethanol.

The cost-effectiveness of alcohol taxes as a public health strategy in countries is partly based on customs and excise systems that existed before the introduction of specific customs duties or excise taxes on alcoholic beverages. The existing administrative systems for tax collection should, therefore, be already in place. Regulation, reporting and collecting of tax from importers and local producers involve fewer points of collection and enforcement than, for instance, sales tax. Consequently, knowledge is required of the quantity of alcoholic beverages consumed and of how this consumption is spread across different alcoholic beverage categories such as beer, cider, wine, fortified wine, alcopops or RTD-products, distilled beverages, or other locally important beverages. For the estimation of new alcohol tax decisions, knowledge of total alcohol consumption based on recorded on- and off-premise alcohol sales and on unrecorded alcohol consumption is also valuable. To ensure exact planning of alcohol taxation, studies on price elasticities and drinking habits can be conducted.

Tax administration should be effective and efficient (WHO, 2010b). Effective tax administration requires a high level of compliance by taxpayers, whereas efficient tax administration requires low administrative costs in relation to revenue collected. Effective and efficient tax administration requires technical capacity by the administrative agency and a well-designed tax system. A well-designed excise tax policy exhibits transparency and is easily defined; increased efficiency can be achieved by reducing administrative costs.

A precursor for a well-designed tax system is a simple and unified excise taxation system within which all alcohol products are taxed at the same level. The system should possess the ability to generate tax revenue, decrease alcohol consumption and its related harms, and prevent initiation of alcohol drinking. As analysed in Section 3, specific taxation may be appropriate for high-income countries with a high prevalence of current drinkers; combination methods, including mixed specific and ad valorem taxation and ad valorem with specific floor taxation, may be appropriate for LMICs with a high prevalence of lifetime abstainers, whereas a minimum pricing policy may be employed if the government requires a solution to problems caused by the consumption of cheap alcoholic beverages.

To choose the best taxation design, the government can do the following. First, taxation and pricing policy goals should be set that represent a combination of tax revenue generation, reduction of alcohol consumption and its related harms, and prevention of alcohol drinking initiation. Second, the taxation method that will achieve the desired goals should be selected. Third, the uniform tax rate system, or the smallest number of differential alcoholic beverage categories should be determined in case the government decides to employ a differential tax rate system. The smaller the number of categories, the less complexity in determining the differential tax rate.

The strength of tax administration comes from the administrators' ability to monitor and enhance tax compliance and ensure greater revenues by reducing opportunities for



tax avoidance and tax evasion. Effective tax administration should have strategies and structures to ensure that noncompliance with tax law is minimized. Tax authorities may implement the following compliance-enhancing procedures:

- Request producers, importers and exporters to register for tax purposes and obtain a licence for production, distribution and retail sales.
- Monitor domestic production and trade activities by conducting physical controls and requiring tax stamps on alcohol products.
- Require taxpayers, including manufacturers and importers, to file tax returns and pay tax liability within a specific period of time after the alcohol products move from the factories or enter the country.

Effective administration of excise taxation requires cooperation between taxpayers and the tax administration agency. In countries with well-established tax collection systems, excise taxes are administered by relying on the taxpayer's registration, filing and payment of tax returns. Tax authorities, in return, execute enforcement actions that aim to ensure compliance by verification. The most common enforcement actions are auditing taxpayers' accounts periodically and taking costly measures to combat illicit activities and ensure higher revenues. These measures include conducting physical controls and using various tax stamps.

The implementation of physical controls in countries with poor administration systems, "enforced compliance", is typically executed by imposing physical controls over the production and manufacturing process. The costs of physical control increase when the potential for fraud by excise officers is considered. However, fraud is reduced considerably when excise officers are rotated frequently among different locations and when supervisors conduct supervision visits.

Based on lessons learned from the WHO technical manual on tobacco tax administration (WHO, 2010b), tax stamps include traditional tax stamps, enhanced tax stamps (banderoles), and digital tax stamps. Traditional tax stamps are required by many countries and ensure taxpayer compliance by monitoring production and distinguishing licit products from illicit ones. Products that do not hold tax stamps are considered to have been produced illegally or smuggled. Enhanced tax stamps (banderoles) represent a new tax stamp technology that is used to reduce the risk of counterfeit tax stamps, monitor domestic producers more efficiently, and increase the flow of information. The system requires manufacturers' compliance because monitoring scanners are placed at production facilities. Monitoring scanners read the tax stamps and electronically transfer the information to the finance ministry. Consequently, the tax administration agency receives live information concerning the number of products produced by the manufacturer, the brands, when the products were produced and by which factories, and other useful information for tracking, tracing and enforcement. The system enables the tax administrators to verify manufacturer compliance. Digital tax stamps provide an effective tracking and tracing system to reduce tax evasion. They carry information concerning the brand and manufacturers' name, the facility where the products were produced, and the time the stamp was produced and purchased. The product can thus be traced back to its

source. Banderoles and digital tax stamps differ in that the finance ministry obtains the necessary information live from the banderole system, whereas the digital system requires distributors to place an order via a secure connection to a designated government authority. After the authority verifies and approves the order, the distributor fulfils the order by delivering encrypted codes and authorizes digital stamps. However, it is not clear how the authority verifies the order. For instance, the cigarette distributor prints the digital stamps, and the cigarettes are then shipped to retail outlets.

Substitution effects

Three recent meta-analyses showed that beer possessed a lower own-price elasticity value than wine or distilled spirits. An explanation for the low absolute value of own-price elasticity of beer could be that beer is a common beverage consumed daily during leisure activities or with meals in the countries from which these meta-analyses originate. In these countries, beer is considered almost a necessary commodity among beer-drinkers. In other countries, beer is a luxury item with higher price elasticity (Edwards et al., 1994; Sornpaisarn et al., 2012a). This point is better highlighted by wine which, in the three meta-analyses, had a higher absolute value for own-price elasticity than beer. However, a study of price elasticities in countries where wine is an ordinary beverage consumed with meals shows wine to be price-inelastic (Edwards et al., 1994). A low absolute value of price elasticity for wine indicates that the studied wine drinkers identify the beverage as a necessity, similar to an ordinary foodstuff. Only a few decades ago, in the Nordic countries, wine was considered a rare luxury commodity consumed mostly during festive occasions. In Sweden at that time, wine had an own-price elasticity of -1.6 (Sundström & Ekström 1962). Even in later years, the value of own-price elasticity for wine was -1.5 in Norway and -1.3 in Finland (Horverak 1979; Salo 1990). In the latest Finnish study on price elasticities, the own-price elasticity value for wine was -1.4, indicating that, in Finland, wine is not a common beverage consumed with meals, but a beverage consumed in other social situations (Vihmo, 2006).

As Wagenaar and his colleagues emphasize, price elasticity values are not inherent properties of alcoholic beverages (Wagenaar et al., 2009, see also Bruun et al., 1975). As different uses of alcoholic beverages are reflected in price elasticity values, the substitution between different alcoholic beverages and other commodities depends on the uses of alcoholic beverages (Bruun et al., 1975). For instance, in a country where wine is used as a beverage with meals, an increase in wine prices could increase the consumption of bottled water, but it would be unlikely to increase the use of home distilled spirits or illicit drugs. In countries where wine is mostly used as an intoxicant, increases in wine prices are more likely to lead to an increase in the consumption of distilled spirits or moonshine, or even illicit drugs, rather than bottled water or milk.

Based on the above explanation and on other details of the limitations of taxation and pricing policies set out in Section 1, the government should consider a possible substitution effect when implementing taxation and pricing policies, particularly in cases where the differential tax rate policy is employed.



Affordability and tax rate determination

The term “alcohol affordability” is now prevalent. It refers to people’s ability to buy and consume alcohol and is a function of alcohol price and consumers’ income (Rabinovich et al., 2009). According to Rabinovich and colleagues, the affordability of alcohol increased between 1996 and 2004 in almost all EU Member States. The authors’ analysis also indicated that, across the EU, 84% of the increase in alcohol affordability in the period of 1996-2004 was driven by increases in income, and only 16% was driven by changes in alcohol prices (Rabinovich et al., 2009). Although incomes have increased considerably across EU countries, the relative prices of alcoholic beverages have remained stable or decreased (Rabinovich et al., 2009). A meta-analysis that included 132 studies with 1014 income elasticity estimates found a positive relationship between income and alcohol consumption, with an estimated median short-run elasticity of 0.676 and an estimated median long-run elasticity of 0.860 (Gallet, 2007). The increase in affordability is associated with an increase in alcohol consumption in the EU, with an estimated short-run and long-run income elasticity of demand of 0.22 and 0.32, respectively (Rabinovich et al., 2009).

Alcohol prices have been decreasing in many countries in recent decades because of changing industry cost structures and also because many governments have allowed alcohol excise duty and its effect on prices to be eroded by inflation in the cost of living. It is significant, therefore, that countries have alcohol tax legislation that permits ready adjustment of tax rates for various alcohol products on an annual basis and that allows rates to be adjusted for inflation – particularly in cases of specific taxation and unitary taxation. The effective price of alcohol to the consumer can also be affected by changes in income levels within a country. In times of increasing incomes, excise tax levels may also require regular adjustment to ensure that alcohol does not become more affordable (Rabinovich et al., 2009). A review of alcohol affordability is a reminder that increases in alcohol prices alone are not sufficient to reduce alcohol consumption if other factors affecting alcohol demand have a conflicting effect.

The effect of affordability on alcohol consumption may be greater for developing countries than for developed ones. A study that compared income elasticity of alcohol consumption in 19 developing countries with the income elasticity of alcohol consumption in 24 developed countries found that the average income elasticity of alcohol consumption was 1.1 for developing countries compared to an average income elasticity of alcohol consumption of 0.8 for developed countries (Selvanathan & Selvanathan, 2005).

A strong association between affordability (measured by alcohol price and income), alcohol consumption (Gallet 2007; Rabinovich et al., 2009), and alcohol-related harms (Babor et al., 2010) implies that effective alcohol taxation and pricing policies should consider the affordability of alcohol and how the affordability of alcohol may change, particularly in LMICs.

The symmetry of price elasticities

It has been argued that the addictive nature of alcohol implies that the price elasticity of alcoholic beverages may not be symmetrical (Bruun et al., 1975). A decrease in alcohol prices may have a greater increasing impact on alcohol consumption than the same magnitude of a price increase realized after a decrease in alcohol consumption. Another reason for asymmetrical price elasticities could be that alcoholic beverages are now so accessible in many industrialized countries that a further increase in alcohol availability will not increase alcohol consumption because the market is already saturated (Room et al., 2009).

Saturation can be used as one explanation for the results of the Nordic alcohol tax study. This study included Denmark, Finland and Sweden which were all obliged to abolish the quantitative quotas for travellers' duty-free alcohol imports for private use at the beginning of 2004. To combat increases in travellers' alcohol imports, the alcohol excise duty rates for distilled spirits were decreased in Denmark in October 2003. In Finland, the excise duty rates were decreased for all alcoholic beverages in May 2004 (Mäkelä & Österberg, 2009). In Denmark, neither the alcohol sales statistics nor the survey data found an increase in total alcohol consumption, and there were no clear increases in mortality or morbidity. The survey data were similar in southern Sweden where an increase in travellers' alcohol imports from Denmark was expected. Only Finland experienced an increase in alcohol consumption, with evidence of both increases in alcohol consumption and in related harms being found.

Tax avoidance and tax evasion

One challenge for tax administrators is maintaining a tax revenue base and flow, particularly after a tax increase. Tax avoidance and tax evasion can reduce tax revenue and undermine or decrease the health impact of increasing alcohol taxation. Tax avoidance is legal as it is a change in economic or other activity for the purpose of reducing tax payment, whereas tax evasion involves illegal activities for the purpose of avoiding tax payment.

Tax avoidance is performed by both consumers and producers (WHO, 2010b). Tax avoidance by consumers involves legal activities, such as the purchase of goods for personal consumption from duty-free shops or lower tax jurisdictions and transporting them across borders under an allowance quota. Tax avoidance by producers is more complex, and is largely unexplored in the literature, even with respect to tobacco. Tax avoidance involves legal activities, such as manipulating the characteristics of the product (such as the alcohol concentration of the beverages, the mixture of the beverages, or the packaging) and a pricing policy that reduces the tax burden on the products. For example, Thailand's largest alcohol company increased its production of the least-taxed alcoholic beverage type and decreased its production of the most-taxed alcoholic beverage type during 2005-2009 (Sornpaisarn & Kaewmungkun, 2010). There is also evidence of a production shift toward

the least-taxed alcoholic beverage in each tax tier in New Zealand (New Zealand Law Commission, 2010). Opportunities for tax avoidance tend to increase if the tax structure is too complex; simplifying the structure of alcohol excise taxation will help reduce these opportunities and will facilitate monitoring of the costs per unit of tax revenue raised.

Tax evasion usually involves taxpayers intentionally misrepresenting or concealing their true economic activities from the tax authorities to reduce their tax responsibility (WHO, 2010b). For instance, alcohol importers may evade customs duties and domestic manufacturers may evade domestic production excise taxes by misdeclaration of the quantity or description of the products or by under-invoicing. Under-invoicing will reduce the tax base when the duty is ad valorem taxation, whereas misdeclaration of quantity is more relevant when the duty is specific taxation.

Tax evasion, or illicit trade, includes both smuggling and illicit production (WHO, 2010b). It may involve legitimate or imitation products. Smuggling is the trade of products through unauthorized routes. It implies total or substantial evasion of customs duties, excise and income taxes. It may be either long-distance, large-scale organized smuggling, or cross-border smuggling. Large-scale smuggling happens when large quantities of alcohol products are illegally transported, distributed and sold without any tax being paid at all, even in the country of origin. During transport, export goods have in-transit status; the goods can leave the country of export without being assessed for any taxes or duties. In-transit goods are often temporarily stored in countries other than their final destinations to await transfer. Large-scale smugglers often divert cargos at this point. Smugglers and legal traders may not always be separate groups. Smugglers may be distributors disguising their smuggling with legal imports and reducing the costs of their legal imports with contraband.

Illicit production may involve the production of legitimate brands by legal manufacturers who declare to the tax authorities only a fraction of their production, or illicit production may involve imitation products by illegal domestic manufacturers (WHO, 2010b).

High tax increases may provide financial incentives for under-invoicing, misdeclaration of the quantity or description of the product, smuggling, and illicit production, particularly when tax laws and enforcement are weak, penalties are small, and if the prosecution of smugglers takes time. Both tax revenues and consumption are impacted by the presence of an illicit market, and the impact is greater if this market is substantial (WHO, 2010b).

Protection of domestic brands

Taxation measures have been used to protect domestic brands of alcohol products (Babor et al., 2010). One of the main reasons for the involvement of the government has been to provide affordable products to the mass population (WHO, 2010b). Governments

impose a differential excise system including the differential excise tax method, or a differential excise tax rate levies greater taxes on premium or high-price brands, which are often produced by foreign manufacturers, than tax rates on lower-grade, lower-priced brands that are often produced domestically. For instance, Australia applies the specific tax method for all alcoholic beverages other than wine, whereas the country applies the ad valorem tax method to wine to protect the low-price wine industry in the country (Doran et al., 2013); the Republic of Korea employs lower tax rates for Soju, the popular domestic beverages, than for other beverages (Chung, 2004); and Thailand increases tax rates greater and faster for expensive brands, which are usually imported, than for cheap brands which are usually produced domestically (Sornpaisarn & Kaewmungkun, 2014). Consequently, as the tax gap increases, consumers switch to lower-tax products, resulting in a less effective taxation policy for the control of alcohol-related problems.

Alcohol taxation and the poor

Progressivity is an economic term used to describe the distribution of tax burdens (or tax incidences) across the population (Kesselman & Cheung, 2004). Excise taxation on (luxury) goods and services, with an income elasticity of demand greater than one, has been justified as an instrument for improving the progressivity of the tax system (Cnossen, 2010). A progressive tax is a tax that attempts to reduce the tax incidence of poor people as it shifts the incidence to wealthier individuals, whereas a regressive tax works in the reverse manner (Kesselman & Cheung, 2004). Specific taxation is considered a regressive tax because the wealthy and the poor pay the same amount of excise tax under specific taxation if they consume a cheap or expensive alcoholic beverage with similar alcohol content (Smith, 2005). This implies that the poor pay tax at a greater proportion of income than do the rich. Conversely, ad valorem taxation is considered a progressive tax because the wealthy pay more excise tax if they consume more expensive alcoholic beverages compared to the preferences of the poor (Smith, 2005). Combination taxes have both regressive and progressive attributes (Sornpaisarn & Kaewmungkun, 2014). Combination tax methods are considered regressive because their specific taxation component is more effective on inexpensive beverages, resulting in a higher tax burden on the poor. Combination tax methods are still considered progressive because their ad valorem component is more effective on expensive beverages that impose a greater tax burden on the rich. There is no literature that explains clearly the progressivity attribute of unitary taxation. With respect to progressivity, the government must consider the effect of a taxation method on tax incidence distribution across the population of alcohol consumers.

Taxation and stockpiling

When manufacturers, wholesalers or retailers anticipate a tax increase, they may stockpile alcoholic beverages of the current, lower tax level (WHO, 2010b). Thailand is an example of a country exhibiting potential stockpiling before taxation increases (Sornpaisarn



& Kaewmungkun, 2014). Seven alcohol excise tax increases occurred between 1997 and 2009. Alcohol producers typically produce their products according to their sale capacity in order to manage stock warehouses effectively. With respect to the seven alcohol tax increases, however, there were three incidences of potentially overstocked production one year prior to the taxation increases during the same period. One large alcohol company had potentially stocked all tax-affected products before the taxes increased, resulting in the ability to obtain the prior lower tax rates. Revealing intended alcohol taxation increases thus reduces the effectiveness of taxation policy; hence, governments should not disclose their intention to increase alcohol taxation.

Summary of chapter 4.1

To advocate for alcohol taxation and pricing policies, public health personnel and non-economist alcohol control policy advocates must understand the factors relating to the implementation of taxation and pricing policies. Alcohol excise duties are typically collected by customs and excise officers from importers and producers at the point at which products are about to enter the wholesale or retail markets. Collection requires some form of registration or licensing of all alcohol importers, producers, or places of alcohol manufacture and wholesalers.

Tax administration should be effective and efficient. The effectiveness of tax administration depends on high levels of compliance from taxpayers, whereas the efficiency of tax administration depends on low administrative costs in relation to revenue collected. Effective and efficient tax administration requires a well-designed tax system and significant technical capacity in the administrative agency. A well-designed excise tax policy is transparent and easily defined, increasing efficiency by reducing administrative costs.

Effective administration of excise taxation requires cooperation between taxpayers and the tax administration agency. In countries with well-established tax collection systems, excise taxes are administered by relying on the taxpayer's registration, filing, and payment of tax returns. Tax authorities, in return, execute enforcement actions to ensure compliance by verification. In general, in countries with poor administration systems, "enforced compliance" imposes physical control over the production and manufacturing processes and applies various types of available tax stamps.

The government should consider substitution consumption among various alcoholic beverage categories which may result from taxation and pricing policies. The government should increase tax rates regularly by taking account of inflation and the income of the population to ensure effective taxation and pricing policies that keep pace with developments in affordability.

The government must prevent or combat tax avoidance and tax evasion to implement taxation and pricing policies effectively. Tax avoidance is legal; it is a change

in economic or other activity to reduce tax payment, whereas tax evasion involves illegal activities to avoid tax payment.

The government sometimes modifies taxation and pricing policies to protect sales of domestic alcohol products. Public health personnel and policy advocates should be aware of this situation because, as the tax gap increases, consumers switch to lower-tax products, resulting in a taxation policy that is less effective in controlling alcohol-related problems. Moreover, when manufacturers, wholesalers or retailers expect a tax increase, they may stockpile alcoholic beverages of the current, lower tax level. Consequently, the government must not reveal its intention to increase alcohol taxation.

Lastly, the effective designing and implementation of taxation and pricing policies requires government knowledge of market shares between alcoholic beverage categories, on- and off-premise alcohol sales, recorded and unrecorded alcohol consumption, substitution within and between alcoholic beverage categories, and own-price and cross-price elasticity of various alcoholic beverages. This information is usually not available; however, the government can employ taxation and pricing policies with the information that is available.

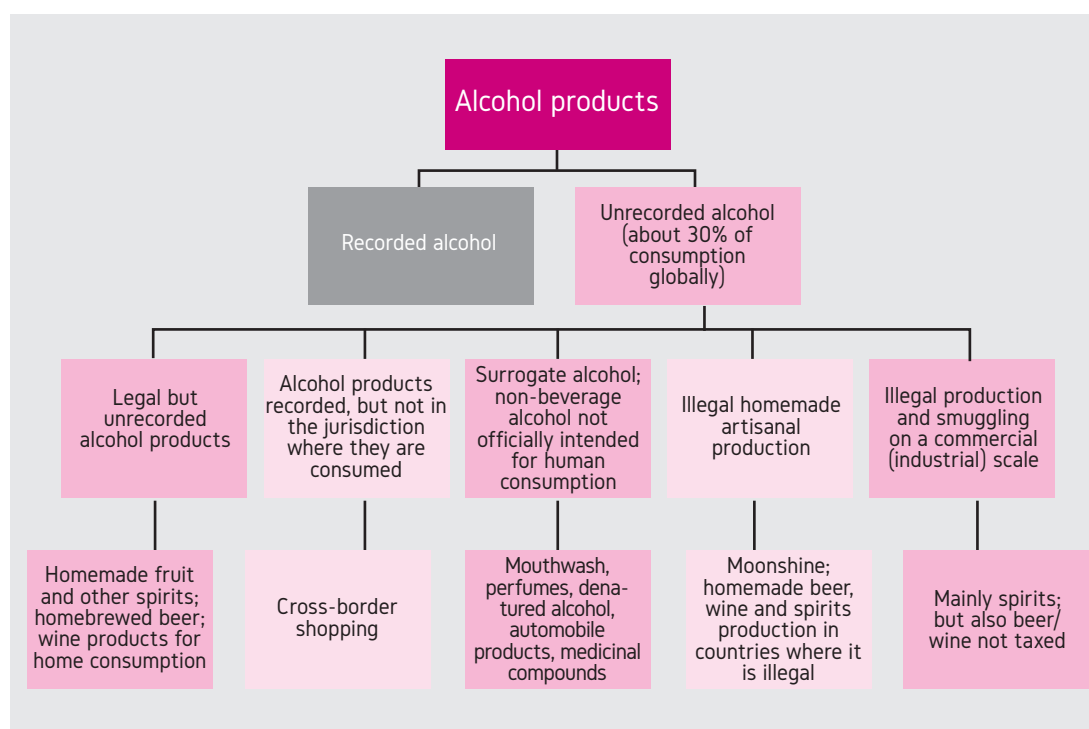
Chapter 4.2

The effect of unrecorded consumption on taxation

Jürgen Rehm

Unrecorded consumption is a summary term for all alcohol that is not recorded in the country where it is consumed (Rehm et al., 2014). The WHO's 2011 Global Status Report on Alcohol and Health (WHO, 2011) found that for 2004, globally, 28.7% of all alcohol was unrecorded, with a clear gradient from low-income countries (47.9%) to lower-middle-income ones (38.9%), and from upper-middle-income countries (30.5%) to high-income ones (11.2%). Fig. 4.1 provides an overview of the various categories of unrecorded alcohol consumption (Lachenmeier et al., 2013), which is also helpful in devising alcohol policy measures to reduce unrecorded consumption, as recommended by the "Global strategy to reduce the harmful use of alcohol" (WHO, 2010). This chapter will consider the different forms of unrecorded consumption and the impact on taxation.

Fig. 4.1. Unrecorded alcohol types and examples, based on Lachenmeier et al., 2013



Source: Reproduced by permission by the publisher from Rehm et al., 2014.

Cross-border shopping as a form of unrecorded consumption is a challenge for taxation, mainly for smaller countries or countries with longer borders which have established a taxation structure resulting in overall higher prices compared to neighbouring countries. The Nordic countries are an example of the potential effect of cross-border shopping subsequent to their joining the EU, at which point the existing restrictions on travel allowances were not considered compatible with EU rules (Nordlund & Österberg, 2000). Consequently, Denmark, Finland, and Sweden lowered their taxes to

avoid losing revenue to increased importation of alcohol from neighbouring countries. In Finland, the lowering of taxation was associated with an increase in alcohol-attributable mortality, and the one time average decrease in taxation of 33% was subsequently reversed by four subsequent increases of approximately 10%, which led to a decrease in alcohol-attributable mortality (National Institute for Health and Welfare, 2012). Cross-border shopping can affect national taxation objectives for alcohol in countries that border those with a lower alcohol pricing structure. The effect decreases with distance to the border (e.g. Bygvrå, 2009; Grittner & Bloomfield, 2009), and cross-border shopping is the only unrecorded consumption that mainly affects middle-income and high-income earners (Svensson, 2009).

Cross-border drinking is source of unrecorded alcohol consumption. For example, there may be price differences for alcohol between the United States and Mexico and between the United States and Canada, as well as different legal systems which allow young adults to drink in Mexico and/or Canada although they are not old enough to meet the minimum legal age requirements for drinking in the United States (Clapp et al., 2001; Room & West, 1998). Indeed, this situation led to extensive cross-border drinking among students of two southwestern United States universities in Mexican bars and pubs close to the border (Clapp et al., 2001). However, given the size of the United States, the overall impact of this phenomenon on average per capita consumption or alcohol-attributable harm is small (for an overview of alcohol-attributable harm, see Shield et al., 2013b).

Although the effect of cross-border shopping on alcohol consumption and alcohol-attributable harm exists, its overall impact on global public health is not as large as has been suggested. Even in smaller countries, or countries that have long borders with neighbouring countries with cheaper alcohol, the impact is limited – i.e. not exceeding 30% of all alcohol consumed. The lowering of taxation as a reaction to price differences between countries is problematic from a public health perspective because it may increase overall alcohol consumption and decrease revenues. However, limiting cross-border shopping by limiting travel allowances supports alcohol policies, including taxation, and could be justified by the negative impact of alcohol on public health (Lim et al., 2012; Rehm et al., 2009).

With respect to other forms of unrecorded consumption, the development of the unrecorded market as a function of taxation changes should be addressed. Many pleas for taxation increases, particularly in LMICs, have been challenged because of evidence pointing to resulting increases in unrecorded consumption. However, actual evidence of taxation increases leading to substantial increases in unrecorded consumption is scarce (see Room et al., 2002 for the example of Zambia), whereas a recent review of taxation increases found parallel decreases of consumption in LMICs (Sornpaisarn et al., 2013), even though unrecorded consumption was not always subject to controls. The only study to date of the effects of taxation increases on harm indicators in LMICs found a strong association between taxation increases and a reduction in motor vehicle accidents (Sornpaisarn et al., 2016). Unrecorded alcohol consumption constitutes a sizable portion



of overall alcohol consumption and should, therefore, be reduced or controlled as part of a national alcohol policy that integrates different measures, including taxation (WHO, 2010). The greater the control of unrecorded alcohol, the more effective taxation measures will be. The following measures can be used to reduce unrecorded consumption (Lachenmeier et al., 2011; see also Lachenmeier, 2009):

- The prohibition of toxic compounds used to denature alcohol (e.g. methanol) can improve health outcomes associated with surrogate alcohol consumption (Lachenmeier et al., 2007).
- The implementation of actions limiting illegal trade and counterfeiting include the introduction of tax stamps, electronic surveillance systems of the alcohol trade, and increased enforcement (Lachenmeier et al., 2011).
- The most problematic category appears to be home and small-scale artisanal production, for which the most promising option may be to offer financial incentives to the producers for registration and quality control. For instance, the government could establish a monopoly to buy unrecorded liquor at market prices and initiate quality control, as the German government did following World War I, to limit unrecorded consumption (Lachenmeier & Rehm, 2010). Such a measure may be too expensive for LMICs today, but for some Eastern European countries it may be a cost-effective measure. Alternatively, a market process that increases recorded product share by offering cheaper recorded products with a more traditional content (e.g. maize beer in Africa) might prove effective (see Willis, 2003 for the example of Kenya). Recent globalization and economic growth have seen a decrease in traditional beverages and an increase in beer and other globalized beverages when the GDP-PPP increases (see the changes concerning pulque versus industrial beer in Mexico (Medina-Mora et al., 2000)). It remains to be seen whether these measures will lead to reduced consumption globally of unrecorded products.

Chapter 4.3

Special issues concerning the implementation of alcohol taxation and pricing policies

Peter Anderson, Ben Baumberg

This chapter discusses the potential impact of trade agreements on alcohol pricing policies, and the potential impact of pricing policies on employment in the alcohol production and retail sectors. There is no doubt that trade agreements have an impact on the freedom to implement alcohol policies; however, this should not cause policy-makers to avoid considering policies that are entirely legitimate under the current trading system. Policy-makers, in general, are free to adopt policies on alcohol provided they are not more trade restrictive than necessary to protect health and are non-discriminatory. Although alcohol pricing policies may lead to some adjustment costs in the short term, most economists would expect the effect on employment to be effectively zero in the long term.

Alcohol pricing policies and trade agreements²

International trade law is a generic term for the legal provisions that cover varying geographical and subject areas. The most high-profile global agreement for many years was the General Agreement on Tariffs and Trade (GATT 1947) on goods, which was agreed by 23 countries and was progressively revised and expanded to incorporate over 100 countries by the 1970s. In 1995, the World Trade Organization (WTO) was created, and the WTO Agreement incorporated a number of agreements. These include the General Agreement on Trade in Services (GATS), which is relevant to some alcohol policies affecting retail or distribution services and the Agreement on Technical Barriers to Trade, which is relevant to some labelling regulations. These are the agreements that are most relevant to alcohol policies (Baumberg & Anderson, 2008a; Ziegler, 2009), and policies at the regional level such as the policies of the EU (Baumberg & Anderson, 2008b). However, the obligations in the WTO framework may be added to by free trade agreements or customs unions – i.e. additional trade agreements between two countries – as has been suggested in the case of tobacco (Fooks & Gilmore, 2013).

There are two parts to the WTO system. First, there is the law itself: a set of agreements that all Members agree to adhere to, although there are some areas where Members can either opt in or opt out of commitments. Second, the enforcement of the law follows a process whereby: 1) a Member makes a request for consultations with the Member implementing the measure in question 2) failing resolution through negotiations, the complainant requests establishment of a WTO panel to judge the case, if necessary with the help of scientific/technical experts; and 3) if the panel report is appealed, the appeal is adjudicated by the Appellate Body (AB). Finally, the Dispute Settlement Body adopts the Panel or AB report.

² This part mainly summarizes the longer discussion in Baumberg & Anderson, 2008a. The more recent United States Clove Cigarettes case supports the analysis in that paper; for details on this case, see Jarman, 2012 and von Tigerstrom, 2013.

The WTO agreements prohibit alcohol and other policies that inadvertently discriminate in favour of domestic goods or services over foreign goods or services. Yet both GATT (Article XX) and GATS (Article XIV) explicitly state that nothing in either agreement “shall be construed to prevent the adoption or enforcement by any contracting party of measures . . . necessary to protect . . . human health.” This applies as long as such measures are not applied in a manner which would constitute a “disguised restriction on trade” or “arbitrary or unjustifiable discrimination.” Although this health exception allows WTO Members to implement alcohol policies that would otherwise violate international trade commitments, the crucial word here is “necessary.” The necessity test requires, among other things, that “the measure be the least trade-restrictive measure reasonably available in the circumstances to meet the objective of protecting health” (Fidler et al., 2005).

Protectionist policies

As a general rule, policies that protect domestic alcohol industries from foreign competition are unlikely to be permissible under WTO law (Shaffer et al., 2005). This is reflected in the laws struck down in a series of pre-WTO disputes between Canada and the United States (Ferris et al., 1993; Vingils et al., 1998; Room & West, 1998) and later disputes giving locally-produced drinks favourable tax treatment in Chile, Japan, and Korea (Ziegler, 2006). However, tariffs charged on the import of foreign drinks are permissible up to bound levels agreed by each Member under the GATT 1947, but are also likely to be scrapped where Members have made commitments, such as under free trade agreements or customs unions. The removal of such policies is likely to increase alcohol consumption by a combination of reduced price (through comparative advantage and productivity improvements) and increased marketing (Gould & Schacter, 2002).

Health policies

In contrast, effective health policies are likely to be consistent with WTO law. This is with the caveat that policies will still be subject to a necessity test, which certain highly trade-restrictive policies are unlikely to pass. For example, banning imports (but permitting domestic production) is also unlikely to be lawful, as was illustrated by the 1990 Thai cigarettes case, where a GATT (1947) Panel ruled that there were equally effective but less trade-restrictive measures available, such as tax increases and an advertising ban (Baumberg & Anderson, 2008a). However, Members are entirely free to set their own level of health protection (Bloche & Jungman, 2003), and a purely health-motivated policy would be upheld in the WTO courts. Members can also follow minority reasonable scientific opinion (Saspin et al., 2003) when assessing risks (Bloche & Jungman, 2003).

Trade policies are likely to increase alcohol-related harm by their effect on fully or partly protectionist policies. However, Members may regulate purely on health grounds (Grieshaber-Otto et al., 2000; Ziegler, 2006). Yet there are signs that the belief among the public health community is that a greater number of health-motivated policies may not be permissible under WTO law (Baumberg & Anderson, 2008a). Uncertainty over trade

treaties - and the exaggerated claims made about them by companies - could “chill” domestic policy-making initiatives and lead policy-makers to avoid considering policies that are entirely legitimate under the current trading system. To avoid this, it is necessary to send a clear message to policy-makers that, in general, they are free to adopt nearly any health policy on alcohol as long as it is non-discriminatory and not more trade restrictive than necessary.

For existing policies that are compromises between health and protectionist interests, policy-makers can wait to see if they are challenged at the WTO and, if they are, the policies can be redesigned on health grounds rather than abolishing them completely. Any perceptions to the contrary may be needlessly damaging to public health. Whatever the views on these options, governments can act within the current system to minimize possible trade effects on alcohol-related harm. First, they can avoid making any further commitments related to alcohol in the future, thus allowing themselves to pursue health-focused policies. This also allows them to avoid the negative effects of liberalization per se, and to pursue the purely health-focused policies mentioned above. Second, to the extent that this is politically feasible and desirable, policy-makers can introduce stringent alcohol policies to counteract the effect of liberalization that is taking place. Finally, they can ensure – and be shown to ensure – that their alcohol policies attempt to achieve their health and social welfare goals with the minimum possible impact on trade to render the likelihood of breaching WTO law as remote as possible (Baumberg & Anderson, 2008a).

Alcohol pricing policies and the economy

Alcohol sector and GDP

Few global statistics are available for levels of employment or the contribution to GDP associated with alcoholic drinks production, although scattered figures are available for individual countries. United Nations Industrial Development Organization (UNIDO) figures from the late 1990s showed that the alcohol industry generated 3% of total manufacturing value added in Argentina and the Netherlands, yet only 0.07% in the Islamic Republic of Iran; the figures also suggested that the growth rate was much higher in low-income countries (5.3%) compared to high-income ones (1.3%) (Room & Jernigan, 2000). The Brewers of Europe estimated that beer production generated €12 billion of value added in the EU, which is approximately 0.1% of GDP (Ernst & Young, 2006). The RAND Corporation's economic impact assessment for the European Commission has further extended this to wine and, more speculatively, spirits (Horlings & Scoggins, 2006), finding that the combination of the two produce a similar contribution to EU GDP as beer (€9 billion for wine, €4 billion for spirits) and providing over 0.2% of GDP in total.

The alcohol sector and jobs

Another way of expressing this economic contribution is to count the number of jobs in alcohol production. Using the same EU example and sources as before, 164,000 people were estimated to work in brewing, 50,000 in distilleries, and 385,000 in the

labour-intensive process of wine production (including agriculture; see below), which is roughly 13% of employment in the food industry and 0.3% of total EU employment. If productivity is assumed to be constant within and outside the EU – a highly debatable assumption, (see below) – this would suggest that around 600,000 people work in beer production and wine production worldwide, and a further 300,000 work in spirits production, amounting to a total of 1.5 million people.³

However, there are various reasons to be cautious about this total, particularly because it represents the total number of employees rather than full-time equivalent employees (FTEs), which is particularly important for seasonal employment in wine production. Previous research for the World Bank suggested that numbers reported to be employed by the tobacco industry were three times the actual number of FTEs (Jacobs et al., 2000). The level of FTE employment in alcoholic drinks production is unknown. The gap between FTEs and the number at least partly employed in drinks production becomes significant when we consider small-scale production in low-income countries (LICs). For example, an estimate from the 1980s suggests that at least 20-30% of rural households in Botswana regularly brew traditional beers, and 90% of these are produced for sale (Kortteinen, 1989, cited in Room & Jernigan, 2000). Certain estimates from Botswana, Burkina Faso, Kenya, Uganda and Zambia in the early 1980s have suggested that, in areas where traditional beers are produced, 7-20% of the labour force is involved in its production or retail (Haggblade, 1987). However, other estimates have been lower at 4-7% (Dar es Salaam, Tanzania) and 1-2% (distilled palm wine in a village in Benin) (both taken from Maula, 1997, cited in Room et al., 2002). This does not mean that all these households are fully employed in drinks production; many are likely to use drinks production as a supplementary source of income.

The discussion so far has focused on value added and employment within particular countries; however, alcoholic drinks production is an internationalized industry with complex patterns of ownership and licensing. Recent decades have seen the growth of multinational drinks producers (da Silva Lopes, 2003) which have partly exploited the associated economies of scale in the brewing industry (Karrenbrock, 1990; Muchlinski, 1996). This has been true more recently for wine because of technological changes that have made global brands and distribution viable (da Silva Lopes, 2003). One estimate suggests that 10 million cases is the minimum required to support a worldwide network of distributors (Jones, 2003).

Productivity changes in the sector

Before considering the effect of alcohol pricing policies on employment and value added, it should be remembered that the economic success or otherwise of alcoholic drinks production – as with all product production – depends on many other factors. Most significantly, the productivity of each worker is a key determinant of industry employment,

³ This shows the EU employment estimates by the share of alcohol production that is estimated to occur within the EU, using FAOSTAT data. Note that this omits the production of beverages not included in the FAOSTAT figures, with anecdotal evidence suggesting that employment in palm wine production in countries such as Gambia could be considerable (Kortteinen, 1989, cited in Room & Jernigan, 2000.)

in conjunction with the total output level. Limited aggregate data are available, and the extent to which developed country productivity figures are replicated elsewhere is difficult to estimate. Capital investment is likely to be greater in developed countries and associated with higher levels of productivity, particularly for beer and spirits that are now capital-intensive in developed countries. One example of the potential productivity gap can be seen from the privatization of the ABC Brewery in Ghana, where the number of jobs was halved following privatization (Room, 2002).

Significantly, without any policy shifts there will be an increase in the productivity of drinks-producing workers in all countries. Productivity changes over time are particularly relevant for most developing countries, where the insufficiency of previous capital investment provides significant opportunity for productivity to be improved (Curry, 1993). For instance, a detailed study of the Gwembe district in Zambia (Colson & Scudder, 1988) shows the replacement of small-scale, women-owned beer production with larger-scale more efficient production in urban areas followed by replacement with imported beer. Such effects on female employment in beer production may well be common (Room, 2002). Similarly, the democratic transition in Chile coincided with a significant growth in investment with “what has amounted to a technological revolution in a large number of wineries” (Gwynne, 2006). The replacement of indigenous beer brewing with industrialized production will lead to job losses in developing countries that will have an impact on the lower-income and female small-scale brewers (Haggblade, 1987) but will benefit those with the capital to invest in larger-scale production.

Alcohol pricing policies and jobs in the alcohol sector

From a health policy perspective, the most important factor is the effect of alcohol price increases on economic indicators. We can assume that any policy that reduces consumption will reduce revenue and, therefore, both value added and employment in that sector. If we crudely assume that employment is linearly related to output at the margins, then a 10% reduction in global alcohol consumption would lead to a 10% reduction in global employment and value added. Using the previously mentioned employment estimate of 1.5 million jobs worldwide, this translates to approximately 150 000 jobs lost in alcohol production globally. This does not mean that the unemployment rate will increase by 150 000 jobs; the money saved on alcohol will be spent on other goods and services, and the same crude assumptions suggest that 150 000 jobs will be created elsewhere in the global economy.

What this illustrates is the probable scale of adjustments that would need to be made following a 10% reduction in alcohol consumption. In practice, the possibility of adjustment depends on the scale of adjustment and on the speed of the consumption change and several industry-specific factors. Workers with transferable skills and low-skilled workers will find adjustment easier than workers with specialist skills that cannot be used in alternative employment. For instance, the decline in brewing workers in the United Kingdom - primarily due to productivity increases - occurred among specialized

brewing operatives to a greater extent than among the transferable administrative and clerical staff (Godfrey & Hartley, 1990).

Rapid changes in demand will have a certain degree of lag in their effects on employment, which will be considerably greater for countries where the legal framework protects labour. One model from the United Kingdom has suggested that a 1% reduction in beer output leads to a 1% decrease in brewing employment in the long term, but only a 0.4% decrease in employment in the first quarter following the drop in output (Godfrey & Hartley, 1990).

Countries that export most of their drinks production and rely substantially on alcoholic drink exports to generate foreign capital will suffer most from a global decline in consumption, particularly if there is no available alternative use for the land and labour. Only Moldova and Saint Lucia depend on alcohol exports to a similar extent as Malawi and Zimbabwe's dependence on tobacco (Jacobs et al., 2000; Warner, 2000), but in all these cases any decline in demand will cause significant problems. Policies that reduce domestic consumption will, however, have a lesser effect on the domestic industry given partial dependence on foreign markets. For example, because only 7% of cigarette production in Virginia is sold within the state, the simulated effect of a 19% reduction in tobacco spending is only 42 jobs, much less than if global demand had dropped by the same amount (Gottlob, 2004).

Large exporters will be relatively less affected by declines in domestic demand; however, this may lead to knock-on effects concerning their competitiveness in foreign markets (Booth & Weir, 1990). In particular, a significant reduction in the home market may reduce economies of scale and thereby increase unit costs, which could in turn reduce competitiveness in comparison to foreign producers. For example, one estimate has suggested that a tripling of beer output in the United Kingdom could reduce unit costs by 15% excluding taxes (Booth et al., 1990). An alternative assumption is that reduced domestic demand will increase the amount of drinks production for export, with this increased supply likely to depress rather than increase prices and lead to increased demand for exports (Wittwer & Anderson, 2002).

Countries that import most of their drinks production are likely to see an improved balance of trade from both a global and a domestic decline in alcoholic drinks consumption. Because the majority of the drinks produced in the country are consumed domestically, however, the local alcoholic drinks industry will be sensitive to changes in domestic demand.

Countries that are high-consuming and self-sufficient with respect to alcoholic drinks production are likely to be the hardest hit by a decline in domestic consumption, although a decline in export markets will have no effect. Most countries trade large quantities of alcohol compared to other goods. This situation is increasingly common as the level of intra-industry trade that occurs for alcohol increases. This means that even countries that drink as much as they produce will trade considerable amounts of alcoholic drinks. A global decline in consumption would be detrimental to the export market but

have no effect on the balance of trade, whereas a certain share of any decline in domestic consumption would be “exported” because of the partial reliance on drinks imports.

Other parts of the supply chain

The production of alcoholic drinks is only one part of the chain from raw materials to the final alcohol product sold to the consumer, and the other links are also associated with the generation of value and jobs. The RAND report (Horlings & Scoggins, 2006) mentions several sectors that are linked to alcoholic drinks at some stage, including inputs (such as malt, barley, hops and grapes), semi-manufacturers (bottles), services (transport and, particularly, advertising) and trade (retail, wholesale and catering). Globally, it is estimated that, while 30% of the cost of a bottle of wine goes to the winery, 37% goes to transporters, wholesalers and retailers (Anderson et al., 2003). The remainder goes to the government in the form of tax revenue. The extent of the links will vary depending on the context, such as the simple chains of traditional beer production in an African village compared to the more complex chains of developed countries (Jernigan, 2000).

Alcohol pricing policies that reduce consumption will lead to reduced demand for agricultural inputs, with the option for farmers to adjust depending on the alternate uses for the crop, land, labour and capital investment. For inputs such as malting barley, the adjustment may be easier because existing barley output could be redirected to a variety of other uses. The situation is different for vines and hops, however, or for farmers who do not want to (or cannot) survive on a lower income by redirecting existing outputs. Farmers have the choice of either using the land to grow a less profitable alternative, or to leave farming altogether and pursue a different career (or to retire).

For individual countries, the effect of any alcohol policies will depend on the extent to which agricultural inputs to drinks production are imported rather than locally sourced. Raw materials are typically produced locally, particularly for traditional consumption in developing countries. However, for some drinks, such as lager in African countries, there is a need to import many ingredients, including barley (Kortteinen, 1989, cited in Room & Jernigan, 2000; Room, 2002).

Jobs in the retail sector with respect to alcohol

Of all the sectors linked to alcohol, the retail and hospitality sectors are the most important to consider from a public health perspective, simply because the estimates of the economic significance of alcoholic drinks depend to a startling degree on these sectors. Using the Brewers of Europe estimates, the combined significance of beer production, agriculture, advertising and other beer supplier sectors in the EU was estimated at approximately 500 000 jobs. This is dwarfed by the estimated number of jobs in the retail and hospitality sectors at over 2 million – hence the importance of considering this sector in some detail.



Internationally, the hotels, restaurants and catering sector (including bars) – widely known as the “HoReCa” sector – accounts for approximately 3% of GDP. This varies between countries depending on a range of factors, such as HoReCa’s link to the level of tourism within a country. Using the United Nations Committee for Development Policy (UNCDP) data, the importance of HoReCa and retail/wholesale sectors does not appear to be linked to levels of development. In the EU, the highest levels of employment in HoReCa are 6-9 % of all jobs in Cyprus, Greece, Malta and Spain, whereas the lowest levels of employment are around 2% in Denmark and Poland (Bovagnet, 2005). The actual share of working time is likely to be lower than this, however, because part-time work is at relatively high levels in this sector (according to Eurostat, over 25% of all workers in this sector are part-time). The level may be even higher for pubs and bars, with 1990 data from the United Kingdom suggesting that 75% of pub employees were part-time (Godfrey & Hartley, 1990).

Most of the economic contribution of these sectors is not linked to alcohol. The transition costs of the alcohol policy effect on the HoReCa and retail sectors will vary depending on the type of establishment. Those businesses that depend little on alcohol sales will be able to adjust easily to changes in alcohol sales, which will fall within the typically experienced sales fluctuations. Alcohol expenditures will be replaced by alternative spending; therefore, affected businesses will also see new areas of spending within their own stores (depending on the direction of this alternative spending), further reducing the transition costs. This explains the (relatively crude) research conducted in two states in the United States that found small, insignificant and negative relationships between cigarette sales and retail employment, where tobacco sales as a share of total retail sales value was similar to the share for alcohol in the United States (Gottlob, 2003; 2004).

In contrast, the businesses that depend primarily on alcohol sales – in practice, specialist alcohol retailers and bars – will be more affected by changes in alcohol sales, less likely to receive replacement spending and less able to adjust. Even for workers in these establishments, however, the work is low-skilled and poorly paid, and the transition to other low-skilled work incurs much lower transition costs than movement among higher-skilled, more specialized occupations.

Using data from the United States, a 10% reduction in alcohol expenditure would be equivalent to a 9% reduction in specialist alcohol stores’ turnover, an 8% reduction in bars’ turnover, a 1.7% reduction in restaurants’ turnover, a 1.2% reduction in convenience stores’ turnover, and less than a 0.5% reduction in the turnover of supermarkets, hotels and limited-service restaurants (United States Census Bureau, 2005). If employment is linearly related to turnover at the margins, this is equivalent to an adjustment of around 25,000 jobs in the retail sector (0.2% of total retail employment) and 90,000 jobs in the HoReCa sector (0.9% of total HoReCa employment). Many of these jobs will be part-time and, as the discussion suggests, the 35 000 jobs in specialist alcohol shops and bars will face much greater transition costs than the other 80,000 jobs.

However, the money formerly spent on alcohol will be spent elsewhere, including the retail sector. Simulations for tobacco typically find an increase in employment in the retail sector after a reduction in tobacco spending, a finding that is likely also to apply to alcohol. For example, a 25% cut in spending on tobacco in New South Wales was estimated to produce a 0.1% drop in retail employment before expenditure reallocation but, after spending reallocation, the change was either negligible or positive depending on the scenario (Junor et al., 2004).

The discussion has thus far assumed that any policy change would have an effect of an overall decrease in alcohol spending. In practice, many policies have effects on either the retail or HoReCa sectors, most obviously with licensing requirements. Even a policy such as taxation would be expected to have a differential impact on these sectors – HM Treasury analyses suggest that consumption in the United Kingdom off-trade is twice as price-sensitive in proportional terms as consumption in the on-trade, which makes it significantly more sensitive in absolute terms (Huang, 2003). This also implies that any given tax rise will increase the competitiveness of on-trade compared to the off-trade, although there are difficulties in accurately estimating cross-price elasticities. The sector relationships with alcohol are constantly changing, which lead to economic consequences of their own. In the United Kingdom, for example, the increasing use of below-cost alcohol sales in supermarkets as “loss-leaders” has taken its toll on the price-sensitive sales of specialist alcohol retailers.

Other sectors

Several sectors linked to the production and sale of alcoholic drinks have not been considered in this paper. These include utilities, packaging, equipment, transport and other services (e.g. payroll services), which together have been estimated by the Brewers of Europe to include 100 000 jobs linked to beer in the EU. Of these sectors, the majority are not specialized and, therefore, are subject to the same considerations as retail and advertising (e.g. transport). Some sectors – such as equipment manufacturers – may be more specialized and subject to greater transition costs. For instance, approximately 25% of domestic demand in the Scottish packaging and glass industries was estimated to be a response to the Scotch whisky industry (Booth & Weir, 1990), whereas 15% of can companies’ total volume and total glass demand in the United States is estimated to come from Anheuser-Busch. One problem in obtaining statistics on these sectors is that some functions may be done “in-house”; for example, over half of the employment in the Scotch whisky industry in 1978 was in blending and bottling plants, complicating analyses of external linkages.

Finally, many industry studies such as that commissioned by the Brewers of Europe include induced employment associated with alcohol production. This can be thought of as the economic impacts already mentioned. For example, the farm production that feeds into alcoholic drinks production may require capital equipment, which generates expenditure elsewhere in the economy. The Ernst & Young (2006) study accounts for this by multiplying the indirect impact by 50%, which they present as the average second-round effects in

the EU economy and find this adds 120 000 to their estimate of beer-attributable employment in the EU. In the tobacco sector, the industry-commissioned estimates use generous multipliers (Godfrey & Hartley, 1990; Jacobs et al., 2000), although no alternative estimates have been done with respect to alcohol that would enable comparisons.

While calculating the induced employment is a technically sound procedure – see Zhang (2002) for a description – the amount of the transition costs for induced employment will be negligible because the same induced employment will be generated by the replacement spending (Jacobs et al., 2000).⁴ As Arthur Anderson Economic Consulting notes for tobacco, these are jobs that “are not in the tobacco industry, do not supply or serve the tobacco industry, and do not relate to tobacco in any other way” (Arthur Andersen Economic Consulting, 1993).

Table 4.1 provides a summary of probable transition costs in different sectors, assuming a fall in alcohol consumption.

Table 4.1. Summary of probable transition costs from the perspective of each sector within a given country

	Details	Domestic decline	Global decline
Production	Crudely estimated at 1.5 million people; many relatively specialized; threatened by productivity improvements	Potentially difficult to adjust; less difficult if more production is exported	Potentially difficult to adjust; more difficult if more production is exported
Agriculture	Unknown size; almost entirely dependent on potential alternate uses for land; likely to be harder for vine growers than barley farmers	Dependent on production changes	Dependent on production changes
Advertising	Small but high value added; sector as a whole not dependent on alcohol revenue	Potentially affected; adjustment unknown but unlikely to be significant	No effect
Retail and HoReCa	Largest number of jobs dependent on alcohol revenues (mainly in HoReCa); mainly low-skilled	Specialist retailers hardest hit; adjustment costs likely to be low-to-moderate	No effect
Rest of the economy	Consumers' spending on other goods will increase employment, with the economy overall likely to see a negligible net effect in the long term		No effect

⁴ The tobacco simulations above show that this is an approximation; some sectors benefit and others lose in the long-run expenditure reallocations. However, given that these adjustments will be distributed over the whole economy – unlike the concentration of alcohol sales in particular retailers, for instance – it is reasonable to treat these induced estimates as correct but not important for policy.

Conclusion

If people spend less money on alcohol but more money on other goods, this will create jobs elsewhere in the economy. In the long run, most economists would expect the effect on employment to be effectively zero. The costs that should be considered, therefore, are the adjustment costs in the medium and short term – i.e. over a few years.

A considerable number of people are employed in the production of alcoholic drinks worldwide – perhaps as many as 1.5 million people. This employment will continue to decrease as drinks companies invest in productivity improvements, particularly in developing countries. Adjustment costs in this sector will depend on the situation within a given country, and will be lower for slow declines in consumption than for rapid declines. A greater number of jobs are linked with alcohol in other sectors such as the retail, hotels, restaurants and catering sectors. Adjustment costs will be much lower in these sectors than for drinks production. Whether these adjustment costs are borne within the country experiencing a consumption decline depends on the extent to which their output is exported, and the extent to which imported drinks are consumed.

Alcohol causes economic societal costs - including those associated with health care, police (including courts and prisons), crime prevention, property damage, traffic accident damage, workplace productivity, unemployment and premature mortality. Alcohol may also be related to the considerable cost of HIV/AIDS in some countries. Alcohol policies are likely to decrease costs in these areas and these cost reductions are likely to outweigh any potential economic disadvantages of alcohol pricing policies (Anderson, 2012).



Pricing policies and other alcohol control policies

A final form of economic analysis is to compare the cost-effectiveness of different alcohol policies. The cost-effectiveness studies below do not include the various economic impacts above – they consider only the costs of implementing the policy itself, set against the (health) benefits that they are likely to provide. The possibilities of more encompassing forms of cost - benefit analysis are discussed elsewhere (see Baumberg, 2010).

An analysis of the intervention costs (1 international dollar per 1 million population per year), intervention effects, (DALYs lost per 1 million population per year), and the average cost-effectiveness ratio (CER) (1 international dollar per DALY lost) have been calculated for different WHO regions of the world (Chisholm et al., 2004). Table 4.2 shows the results for 12 subregions of the WHO regions of Africa, the Americas, Europe, South-East Asia and the Western Pacific. Combining costs and effects data (Table 4.2) reveals that, relative to the situation of doing nothing, taxation is the most cost-effective strategy in six of the subregions with a high prevalence of heavy drinkers (each DALY averted by current taxation costs 100-600 international dollars, and 90-500 international dollars if taxation rates are increased by 50%). Of the remaining population strategies, advertising bans “dominated” restricted access to sales outlets with greater effect, but cost less to implement, whereas random breath-testing had the highest cost per DALY averted (in the range of 650-4500 international dollars). Extensive treatment coverage (50%) of heavy drinkers with brief physician advice had an average CER of 400-2500 international dollars.

In the other six subregions, taxation was the most cost-effective in the Western Pacific subregion WprA (but at a less favourable ratio of costs to effects; 1368 international dollars), but not elsewhere. Random breath-testing was the most cost-effective strategy where rates of hazardous alcohol use are very low (South-East Asia; average CER 420-550 international dollars), brief advice was most cost-effective in the African subregion AfrD and American subregion AmrD (CER 600-700 international dollars), while advertising bans or restricted access to sales outlets had the lowest expected costs per healthy life year gained in the Western Pacific subregion WprB (200-250 international dollars per DALY averted).

Specific intervention strategies are not implemented in isolation, but should be combined to maximize possible health gains up to the point at which it remains affordable to do so (Anderson et al., 2009). The best possible mix of interventions at different spending limits will depend on the relative cost and cost-effectiveness of the individual components and on the interactions that exist between them. The final set of values in Table 4.2 show incremental CERs in relation to the current tax situation. The incremental CERs for increased taxation rates are modelled to equal zero because estimated costs of implementation (relative to the situation of no taxation) are the same as those for current taxation (i.e. additional health gains are achieved at negligible extra cost). In subregions with a higher prevalence of hazardous alcohol use, moving away from, or adding to, taxation policies alone (e.g. by also implementing an advertising ban and/or brief advice in

primary care) carries an incrementally greater cost per DALY averted as less cost-effective interventions are implemented. In the European subregion EurA, for instance, the incremental CER for adding an advertising ban to alcohol taxation would be close to 300 international dollars (not much more than the 258 international dollars for taxation alone), but 1700 international dollars if brief advice was also made widely available. In subregions with low rates of hazardous drinking, interventions other than taxation are either dominant (i.e. they have lower costs but greater effects than current taxation) or have a more favourable CER (e.g. the incremental CER for moving from current taxation to roadside breath-testing in South-East Asia is 50-150 international dollars, well below the CER of the 200-4000 international dollars for the current taxation).



Table 4.2. Summary of probable transition costs from the perspective of each sector within a given country⁵

Example countries	Africa		The Americas				Europe			South East Asia			Western Pacific		
	Afr D	Afr E	Amr A	Amr B	Amr D		Eur A	Eur B	Eur C	Sear B	Sear D		Wpr A	Wpr B	
	Nigeria	Botswana	Canada	Brazil	Ecuador		France	Armenia	Estonia	Indonesia	India		Australia	China	
	Senegal	Kenya	USA	Mexico	Peru		Norway	Poland	Russia	Thailand	Nepal		Japan	Vietnam	
	Low	Low	High	Mid	Mid		High	Mid	Mid	Mid	Low		High	Low	
Income category															
Total population (million)	294.1	345.5	325.2	430.9	71.2		411.9	218.5	243.2	293.8	1241.8		154.4	1532.9	
Hazardous alcohol users (million)	4.5	17.2	26.8	24.3	1.1		51.7	13.3	33.9	2.0	6.7		5.2	43.2	
Hazardous alcohol users per 1,000 population	15.3	49.9	82.5	56.3	14.9		125.4	60.7	139.3	7.0	5.4		33.8	28.2	
Notes															
Intervention cost (\$m per 1m popn p.a.) a															
Taxation (current)	0.17	0.15	0.44	0.24	0.21		0.45	0.28	0.21	0.12	0.07		0.47	0.13	
Taxation (current + 25%)	0.17	0.15	0.44	0.24	0.21		0.45	0.28	0.21	0.12	0.07		0.47	0.13	
Taxation (current + 50%)	0.17	0.15	0.44	0.24	0.21		0.45	0.28	0.21	0.12	0.07		0.47	0.13	
Random Breath Testing (RBT)	0.29	0.20	0.48	0.59	0.34		0.61	0.74	0.51	0.16	0.08		0.83	0.23	
Restricted access (sales)	0.13	0.09	0.16	0.15	0.17		0.27	0.22	0.14	0.06	0.04		0.25	0.06	
Advertising ban	0.12	0.09	0.14	0.14	0.15		0.27	0.15	0.14	0.05	0.04		0.24	0.06	
Brief physician advice (50% coverage)	0.19	0.39	3.55	0.63	0.21		4.44	0.63	1.25	0.11	0.08		1.89	0.27	
Highest tax + Ad Ban	0.27	0.22	0.56	0.36	0.34		0.69	0.41	0.33	0.16	0.10		0.67	0.18	
Highest tax + Ad Ban + Brief advice	0.46	0.60	3.97	0.97	0.55		4.96	1.01	1.53	0.27	0.18		2.48	0.43	
Intervention effect (DALYs per 1m popn p.a.) b															
Taxation (current)	99	1,506	1,224	806	196		1,365	442	1,137	64	17		258	104	
Taxation (current + 25%)	74	1,589	1,366	899	226		1,576	503	1,243	71	13		301	121	
Taxation (current + 50%)	64	1,688	1,489	987	254		1,764	564	1,349	77	10		340	138	
Random Breath Testing (RBT)	145	308	261	378	185		247	161	460	392	146		150	168	
Restricted access (sales)	112	779	250	383	117		251	320	689	45	40		68	260	
Advertising ban	104	837	470	331	106		459	300	616	33	25		127	296	
Brief physician advice (50% coverage)	320	987	1,353	997	300		1,889	1,024	2,111	135	105		546	494	
Highest tax + Ad Ban	164	2,475	1,919	1,291	353		2,178	847	1,925	108	35		458	425	
Highest tax + Ad Ban + Brief advice	473	3,407	3,212	2,245	641		3,988	1,832	3,954	238	136		983	901	

Table 4.2. (cont.)

Example countries	Africa		The Americas				Europe		South East Asia		Western Pacific		
	Afr D Nigeria Senegal	Afr E Botswana Kenya	Amr A Canada USA	Amr B Brazil Mexico	Amr D Ecuador Peru	Eur A France Norway	Eur B Armenia Poland	Eur C Estonia Russia	Sear B Indonesia Thailand	Sear D India Nepal	Wpr A Australia Japan	Wpr B China Vietnam	
Notes	Random Breath Testing (RBT)	2,022	656	1,845	1,554	1,847	2,467	4,566	1,108	421	547	5,527	1,345
	Restricted access (sales)	1,188	119	636	392	1,447	1,087	703	200	1,413	1,097	3,672	240
	Advertising ban	1,135	106	306	434	1,435	594	511	224	1,590	1,409	1,855	197
	Brief physician advice (50% coverage)	601	398	2,624	629	691	2,351	612	592	812	742	3,455	536
	Highest tax + Ad Ban	1,663	90	290	280	975	317	481	172	1,501	2,977	1,455	419
	Highest tax + Ad Ban + Brief advice	974	177	1,236	431	854	1,244	554	388	1,130	1,315	2,528	482
d	Incremental CER (\$ per DALY)												
	Random Breath Testing (RBT)	2,671	Dominated	Dominated	Dominated	Dominated	Dominated	Dominated	Dominated	141	53	Dominated	1,522
	Restricted access (sales)	Dominant	74	290	206	508	164	416	161	2,942	Dominant	1,134	Dominant
	Advertising ban	Dominant	87	395	198	637	201	864	138	2,131	Dominant	1,752	Dominant
	Brief physician advice (50% coverage)	104	Dominated	24,073	2,039	Dominant	7,607	604	1,068	Dominant	61	4,936	348
	Highest tax + Ad Ban	1,579	79	165	257	858	291	326	153	987	1,745	1,004	152
Highest tax + Ad Ban + Brief advice	778	240	1,775	507	759	1,718	531	470	864	894	2,786	383	

Note a Costs expressed in discounted international dollars, and include programme costs as well as patient-level costs (where applicable)

b Age-weighted and discounted (3%) DALYs averted per year, relative to null scenario of no intervention

Total cost per year / total DALYs averted per year

c Incremental CER, relative to current taxation; ICERs for increased tax are zero since additional health gain is achieved at negligible extra cost.

d Dominated: intervention has higher costs and lower effects than tax; Dominant: intervention has lower costs and larger effects than tax

⁵ WHO advises that these WHO-CHOICE CEA estimates are due to be re-calculated in 2017

Chapter 4.4

Earmarked tax

Esa Österberg, Bundit Sornpaisarn

Revenue from taxes on alcohol is typically applied to the general government accounts. There is no requirement that this revenue will be spent on reducing or meeting the costs of alcohol-related harms, although it can contribute to police and justice budgets, offsetting costs arising from alcohol-related traffic crashes or alcohol-related crime and public disorder. As general revenue, it also offsets public health and health-care costs arising from alcohol-related disease and injury. The implementation and enforcement of effective alcohol policies, including collection of excise duties, incur their own costs and may be perceived as expensive if they are competing for budgets against the full range of government services, rather than viewed separately in an alcohol cost-benefit analysis. Government revenue, however, is not linked to government spending, and spending will relate to alcohol only if it is a policy priority.

Consideration can be given to dedicating a proportion of alcohol excise duties, or a separate levy on alcohol, to alcohol control, health promotion and harm prevention activities. Three keywords should be addressed: dedicated tax, earmarked tax, and surcharged tax. The WHO technical manual on tobacco tax administration defines dedicated tax as a budget committed by the government but no similar legislation is required, whereas earmarked tax is committed by law. With this definition, the earmarked tax is more difficult to collect but is more reliable and more sustainable when the law is passed compared to a dedicated tax. Vathesatogkit (2013), author of Health promotion fund: sustainable financing and governance, defines surcharged tax and earmarked tax separately. In his definition, earmarked tax refers to a government determination of a proportion of the existing excise tax revenue to become a budget supporting health promotion activities, whereas surcharged tax refers to government collection of extra excise tax revenue by determining an additive proportion of the existing excise tax revenue. The author argues that finance ministries tend to accept surcharged tax more than earmarked tax because the government budget is not affected by this type of tax.

In a number of countries, governments earmark taxes on alcoholic beverages for health promotion purposes (i.e. as a dedicated tax) (Carol, 2004). The earliest version of a dedicated tax was a tobacco tax implemented in Western Australia in 1983, which was followed by the implementation of a dedicated tobacco tax in the Australian state of Victoria in 1987 (Carol, 2004). Since 1983, other countries have implemented dedicated tobacco taxes, and some countries have implemented dedicated alcohol taxes. In 2000, Estonia implemented a dedicated alcohol tax of 3.5%, and in 2001 Thailand implemented a surcharged alcohol and tobacco tax of 2% (devoted to health promotion funding, see box 4.1) (Carol, 2004). The Taiwan Health Promotion Foundation was set up in 2001 and receives budgets from fixed rates per pack of tobacco excise tax, which were US\$ 0.17 in 2002, US\$ 0.33 in 2006 and US\$ 0.67 in 2009 (Vathesatogkit et al., 2013). The Mongolian Health Promotion Foundation, established in 2007, has budgets composed of 2% from

tobacco excise tax, 1% from alcohol excise tax, and 2% from drug registration. The Lao People's Democratic Republic's Tobacco Control Fund, established in 2013, obtains its budgets from 2% of profit tax from tobacco business operators and 200 Lao Kip per cigarette package from all locally manufactured and imported tobacco products. The Viet Nam Tobacco Control Fund, established in 2013, obtains budgets from 1% of the factory price of all cigarette packs consumed in Viet Nam (Vathesatogkit et al., 2013).

Box 4.1. The establishment of the ThaiHealth Promotion Foundation using a surcharged tax from alcohol and tobacco excise taxes

ThaiHealth Promotion Foundation (ThaiHealth) is a semi-governmental organization in Thailand (Vathesatogkit et al., 2013). It was established when Thailand's parliament enacted the Thai Health Promotion Foundation Act (B.E.2544) in 2001. ThaiHealth is not part of the Ministry of Public Health, but is under the supervision of the Prime Minister directly. The foundation's budget comes from a 2% surcharge levied on excise tax from alcohol and tobacco producers. This type of funding mechanism is the most effective means of securing sustainable and long-term funding support for health promotion activities in the country.

ThaiHealth, using its budget, is a catalyst for the coordination and empowerment of all partner organizations collectively to promote the health of Thai people (Adulyanon, 2012). ThaiHealth and its alliances employ healthy policy advocacy strategies, mass media campaigns and community mobilization to advocate for the promotion of health for all Thai people. The success of the alcohol control policy advocacy is illustrated by the number of national alcohol policies in Thailand, which increased from one policy per eight years between 1950 and 2001 to two policies per year during the period of 2003-2008. The "collective impact" of the works of ThaiHealth and its alliances includes a reduction in the prevalence of excessive alcohol drinkers from 9.1% in 2004 to 7.3% in 2009, a decline in adult smoking from 25.5% in 2001 to 20.7% in 2009, and a reduction in the traffic fatality rate from 22.9 per 100,000 population in 2003 to 16.8 per 100,000 in 2010.

The examples of dedicated taxes that fund, in part, VicHealth and Healthway in Australia, the Korean Health Promotion Fund in Korea, and ThaiHealth in Thailand demonstrate that earmarking of taxes to be used by health promotion foundations can substantially enhance the health promotion activities in a country (Slama, 2006). Accordingly, because of this increased funding, dedicated alcohol taxes may be more effective than non-dedicated alcohol taxes (Slama, 2006).



References

References

- Adulyanon S (2012). Funding health promotion and disease prevention programmes: an innovative financing experience from Thailand. *WHO South-East Asia Journal of Public Health*. 1(2):201-7.
- Ahtola J, Ekholm A, Somervuori A (1986). Bayes estimates for the price and income elasticities of alcoholic beverages in Finland from 1955 to 1980. *Journal of Business and Economic Statistics*. 4:199-208.
- Anderson K, Norman D, Wittwer G (2003). Globalisation of the world's wine markets. *The World Economy*. 2-6(5):659-87.
- Anderson P, Chisholm D, Fuhr D (2009). Effectiveness and cost-effectiveness of policies and programmes to reduce the harm caused by alcohol. *Lancet*. 373:2234-46. PMID: 19560605.
- Anderson P (2012). Cost benefit analysis of alcohol policy. *Alcoholism I Narkomania*. 25:23-35.
- Anderson P, Møller L, Galea G, editors (2012). *Alcohol in the European Union. Consumption, harm and policy approaches*. Copenhagen: World Health Organization Regional Office for Europe.
- Arthur Andersen Economic Consulting (1993). *Tobacco industry employment: a review of the Price Waterhouse Economic Impact Report and Tobacco Institute estimates of "Economic Losses from Increasing the Federal Excise Tax"*. Los Angeles (CA): Arthur Andersen Economic Consulting.
- Ataguba JE (2012). Alcohol policy and taxation in South Africa: an examination of the economic burden of alcohol tax. *Applied Health Economics and Health Policy*. 10:65-76.
- Australian Government Department of Health and Ageing (2013). *Standard drinks guide*. (<http://www.health.gov.au/internet/alcohol/publishing.nsf/Content/drinksguide-cnt>, accessed 24 January 2013).
- Babor T, Mendelson JH, Greenberg I, Kuehnle J (1978). Experimental analysis of the "happy hour": effects of purchase price on alcohol consumption. *Psychopharmacology*. 58:3541.
- Babor T, Mendelson J, Uhly B (1980). Drinking patterns in experimental and barroom settings. *Journal of Studies on Alcohol*. 41:63561.
- Babor T, Caetano R, Casswell S, Edwards G, Giesbrecht N, Graham K, et al. (2010). *Alcohol: no ordinary commodity. Research and public policy*, second edition. Oxford and London: Oxford University Press.
- Baltagi BH, Griffin JM (2002). Rational addiction to alcohol: panel data analysis of liquor consumption. *Health Economics*. 11:48591.
- Barzel Y (1976). An alternative approach to the analysis of taxation. *The Journal of Political Economy*. 84:117797.
- Baumberg B, Anderson P (2008a). Trade and health: how world trade law affects alcohol and public health. *Addiction*. 103:19528.
- Baumberg B, Anderson P (2008b). Health, alcohol and EU law: understanding the impact of European Single Market law on alcohol policies. *European Journal of Public Health*. 2008. 18:3928.
- Baumberg B (2010). Best practice in estimating the costs of alcohol – recommendations for the future. Beard TR, Gant PA, Saba RP (1997). Border-crossing sales, tax avoidance, and state tax policies: an application to alcohol. *Southern Economic Journal*. 64:293-306.
- Becker GS, Murphy KM (1988). A theory of rational addiction. *The Journal of Political Economy*. 96(4):675-700.
- Becker GS, Grossman M, Murphy KM (1994). An empirical analysis of cigarette addiction. *The American Economic Review*. 84:396-418.
- Bentzen J, Eriksson T, Smith V (1999). Rational addiction and alcohol consumption: evidence from the Nordic countries. *Journal of Consumer Policy*. 22:257-79.
- Bickel WK, Marsch LA (2001). Toward a behavioral economic understanding of drug dependence: delay discounting process. *Addiction*. 96:73-86.
- Bird RM, Wallace S (2010). *Taxing alcohol in Africa: reflections and updates*. International Studies Program Working Paper 10-31. Atlanta (GA): Andrew Young School of Policy Studies, Georgia State University.
- Bloche M, Jungman E (2003). International trade and health: health policy and the WTO. *Journal of Law, Medicine & Ethics*. 31:529-38.
- Booth M, Weir R (1990). Prevention policy and the Scotch whisky industry. In: Maynard A, Tether P, editors. *Preventing alcohol and tobacco problems*, volume 1. Aldershot: Avebury.
- Booth M, Hartley K, Powell M (1990). Industry: structure, performance and policy. In: Maynard A, Tether P, editors. *Preventing alcohol and tobacco problems*, volume 1. Aldershot: Avebury.
- Bovagnet F-C (2005). *Statistics in focus: employment in hotels and restaurants in the enlarged EU still growing*. Brussels: Eurostat.
- Bruun K, Edwards G, Lumio M, Mäkelä K, Pan L, Popham RE et al. (1975). *Alcohol control policies in public health perspective*. Helsinki: Finnish Foundation for Alcohol Studies.
- Bygvrå S (2009). Distance and cross-border shopping for alcohol. *Nordic Studies on Alcohol and Drugs*. 26:141-63.
- Carol A (2004). *The establishment and use of dedicated taxes for health*. Manila: World Health Organization Regional Office for the Western Pacific.
- Casswell S, Harding JF, You R, Huckle T (2011). Alcohol's harm to others: self-reports from a representative sample of New Zealanders. *Journal of the New Zealand Medical Association*. 124:1336.
- Chaloupka FJ, Grossman M, Saffer H (2002). The effects of price on alcohol consumption and alcohol-related problems. *Alcohol Research and Health*. 26:22-34.
- Chisholm D, Rehm J, Ommeren MV, Monteiro M (2004). Reducing the global burden of hazardous alcohol use: a comparative cost-effectiveness analysis. *Journal of Studies on Alcohol*. 65(5): 782-93.
- Chisholm D, Doran C, Shibuya K, Rehm J (2006). Comparative cost-effectiveness of policy instruments for reducing the global burden of alcohol, tobacco and illicit drug use. *Drug and Alcohol Review*. 25:553-65.
- Chung W (2004). Type of alcoholic beverage and high-risk drinking: beer drinking in Korea? *Alcohol & Alcoholism*. 39(1):39-42.
- Clapp JD, Voas RB, Lange JE (2001). Cross-border college drinking. *Journal of Safety Research*. 32:299-307.
- Cnossen S (2002). *Tax policy in the European Union*. CESifo Working Paper Series No. 758 (<http://ssrn.com/abstract=340905>, accessed 12 November 2012).

- Cnossen S (2005). Economics and politics of excise taxation. In: Cnossen S, editor. Theory and practice of excise taxation: smoking, drinking, gambling, polluting, and driving. New York: Oxford University Press.
- Cnossen S (2010). The economics of excise taxation. Working Paper 10-18. Atlanta (GA): Andrew Young School of Policy Studies, Georgia State University.
- Colson E, Scudder T (1988). For prayer and profit: the ritual, economic and social importance of beer in Gwembe district, Zambia, 1950-1982. Stanford (CA): Stanford University Press.
- Cook PJ, Moore MJ (1994). This tax's for you: the case for higher beer taxes. *National Tax Journal*. 47:559-73.
- Corlett WJ, Hague DC (1953). Complementarity and the excess burden of taxation. *The Review of Economic Studies*. 21:21-30.
- Crawford I, Keen M, Smith S (2010). Value added tax and excises. In: Besley T, Blundell R, Gammie M, Poterba JM, editors. Dimensions of tax design: the Mirrlees Review. Oxford: Oxford University Press.
- Curry RL (1993). Beverage alcohol as a constraint to development in the Third World. *International Journal of the Addictions*. 28:227-42.
- da Silva Lopes T (2003). The growth and survival of multinationals in the global alcoholic beverages industry. *Enterprise and Society*. 4(4):592-98.
- Daley JL, Stahre MA, Chaloupka FJ, Naimi TS (2012). The impact of a 25-cent-per-drink alcohol tax increase. *American Journal of Preventive Medicine*. 42:382-9.
- Doran CM, Byenes JM, Coblac L, Vandenberg B, Vos T (2013). Estimated impacts of alternative Australian alcohol taxation structures on consumption, public health and government revenues. *Med J Aust*. 199:619-22.
- Edwards G, Anderson P, Babor TF, Caswell S, Ferrenc R, Giesbrecht N et al. (1994). Alcohol policy and the public good. Oxford: Oxford University Press.
- Elder RW, Lawrence B, Ferguson A, Naimi TS, Brewer RD, Chattopadhyay SK, et al. (2010). The effectiveness of tax policy interventions for reducing excessive alcohol consumption and related harms. *American Journal of Preventive Medicine*. 38:217-29.
- Ernst & Young (2006). The contribution made by beer to the European economy: employment, value added and tax (full report, European and country chapters). Amsterdam: Ernst & Young for the Brewers of Europe.
- Fearer SA (2004). Examining the role of social cognitive constructs in religion's effect on alcohol use (doctoral dissertation). Blacksburg (VA): Virginia Tech.
- Ferris J, Room R, Giesbrecht N (1993). Public health interests in trade agreements in alcoholic beverages in North America. *Alcohol Health and Research World*. 17:235-41.
- Fidler DP, Drager N (2003). Trade in health related Services and GATS: legal review of the General Agreement on Trade in Services (GATS) from a health policy perspective. Geneva: World Health Organization.
- Fidler DP, Correa C, Aginam O (2005). Draft legal review of the General Agreement on Trade in Services (GATS) from a health policy perspective. Globalization, Trade and Health Working Papers Series (Prepared by the GATS legal review team for the World Health Organization).
- Fogarty J (2006). The nature of the demand for alcohol: understanding elasticity. *British Food Journal*. 108:316-32.
- Fooks G, Gilmore AB (2013). International trade law, plain packaging and tobacco industry political activity: the Trans-Pacific Partnership. *Tobacco Control*. 00:1-9. doi:10.1136/tobaccocontrol-2012-050869.
- Foran HM, O'Leary KD (2008). Alcohol and intimate partner violence: a meta-analytic review. *Clinical Psychology Review*. 28:1222-34.
- Forouzanfar MH, Alexander L, Anderson HR, Bachman VF, Biryukov S, Brauer M, et al. (2015). Global, regional, and national comparative risk assessment of 79 behavioral, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet*. 386(10010):2287323. doi: 10.1016/S0140-6736(15)61455-6.
- Gallet CA (2007). The demand for alcohol: a meta-analysis of elasticities. *Australian Journal of Agricultural and Resource Economics*. 51:121-35.
- Godfrey C, Hartley K (1990). Employment. In: Maynard A, Tether P, editors. Preventing alcohol and tobacco problems, volume 1. Aldershot: Avebury.
- Gottlob B (2003). The fiscal and economic impacts of increasing the tobacco tax in New Hampshire. Dover (NH): PolEcon Research for the New Hampshire Healthy Families Campaign.
- Gottlob BJ (2004). The fiscal and economic impacts of increasing the cigarette tax in New Hampshire. Dover (NH): PolEcon Research for the Campaign for Tobacco-Free Kids.
- Gottlob BJ (2004). The fiscal and economic impacts of increasing the cigarette tax in Virginia. Dover (NH): PolEcon Research for the Campaign for Tobacco-Free Kids.
- Gould E, Schacter N (2002). Trade liberalization and its impact on alcohol policy. *SAIS Review*. 22:119-39.
- Grieshaber-Otto J, Sinclair S, Schacter N (2000). Impacts of international trade, services, and investment treaties on alcohol regulation. *Addiction*. 95:491-504.
- Grittner U, Bloomfield K (2009). Changes in private alcohol importation after alcohol tax reductions and import allowance increases in Denmark. *Nordisk Alkohol- og Narkotikatidskrift*. 26:177-91.
- Grossman M, Sindelar JL, Mullahy J, Anderson R (1993). Policy watch: alcohol and cigarette taxes. *The Journal of Economic Perspectives*. 7:211-22.
- Grossman M, Chaloupka FJ, Sirtalan I (1998). An empirical analysis of alcohol addiction: results from the monitoring the future panels. *Economic Inquiry*. 36:39-48.
- Gruber J, Koszegi B (2001). Is addiction "rational"? Theory and evidence. *The Quarterly Journal of Economics*. 116:1261-303.
- Gwynne RN (2006). Export-orientation and enterprise development: a comparison of New Zealand and Chilean wine production. *Tijdschrift voor Economische en Sociale Geografie (Journal of the Royal Dutch Geographical Society)*. 97(2):138-56.
- Hagglblade S (1987). Vertical considerations in choice-of-technique studies: evidence from Africa's indigenous beer industry. *Economic Development and Cultural Change*. 35(4):723-42.
- Hirshleifer J, Glazer A, Hirshleifer D (2005). Price Theory and Applications. New York: Cambridge University Press.
- Holder H, Edwards G, editors (1995). Alcohol and public policy: evidence and issues. Oxford: Oxford University Press.

- Horlings E, Scoggins A (2006). An ex ante assessment of the economic impacts of EU alcohol policies. RAND Technical Report TR-412-EC. Leiden: RAND Europe for the European Commission.
- Horverak O (1979). Norsk alkoholpolitikk 1960–1975. En analyse av alkoholpolitiske virkemidler og deres virkninger (Alcohol policy in Norway. An analysis of alcohol control measures and their effects). Oslo: Statens institutt for alkohol-og narkotikaforskning (SIFA).
- Huang CD (2003). Econometric models of alcohol demand in the United Kingdom. London: HM Customs and Excise.
- International Alliance for Responsible Drinking (IARD) (2016). Taxation of beverage alcohol. Washington (DC): IARD Policy Review.
- Jacobs R, Gale HF, Capehart TC, Zhang P, Jha P (2000). The supply-side effects of tobacco-control policies. In: Tobacco control in developing countries. Oxford: Oxford University Press for the World Bank and World Health Organization: 311.
- Jansen M, Keck A (2004). National environmental policies and multilateral trade rules. Staff Working Paper ERSD-2004-01. Geneva: World Trade Organization Economic Research and Statistics Division.
- Jarman H (2012). When trade law meets public health evidence: the World Trade Organization and clove cigarettes. *Tob Control*. 21(6):596–8.
- Jernigan D (2000). Applying commodity chain analysis to changing modes of alcohol supply in a developing country. *Addiction*. 95(Suppl 4):S465–75.
- Johnson JA, Oksanen EH, Vedd MR, Fretz D (1992). Short-run and long-run elasticities for Canadian consumption of alcoholic beverages: an error-correction mechanism/cointegration approach. *The Review of Economics and Statistics*. 74:64–74.
- Jones SRH (2003). Brand building and structural change in the Scotch Whisky Industry since 1975. *Business History*. 45(3):72–89.
- Junor W, Collins D, Lapsley H (2004). The macroeconomic and distributional effects of reduced smoking prevalence in New South Wales. Sydney: The Cancer Council New South Wales.
- Kahneman D (2003). Maps of bounded rationality: psychology for behavioral economics. *American Economic Review*. 93:1449–75.
- Kaplow L (2010). Taxing leisure complements. *Economic Inquiry*. 48:1065–71.
- Karrenbrock JD (1990). The internationalization of the beer brewing industry. *Federal Reserve Bank of St. Louis Review*. 72(6):3–19.
- Kehoe T, Gmel G Jr, Shield K, Gmel G, Rehm J (2012). Determining the best population-level alcohol consumption model and its impact on estimates of alcohol-attributable harms. *Population Health Metrics*. 10:6. PMID: 22490226.
- Keen M (1998). The balance between specific and ad valorem taxation. *Fiscal studies*. 19:1–37.
- Kesselman JR, Cheung RC (2004). Tax incidence, progressivity, and inequality in Canada. *Canadian Tax Journal/Revue fiscale canadienne*. 52(3):709–89.
- Klingemann H (2001). Alcohol and its social consequences – the forgotten dimension. Copenhagen: World Health Organization Regional Office for Europe.
- Koricheva J, Gurevitch, J (2013). Place of meta-analysis among other methods of research synthesis. *Handbook of meta-analysis in ecology and evolution*: 3–13.
- Lachenmeier DW, Rehm J, Gmel G (2007). Surrogate alcohol: what do we know and where do we go? *Alcoholism: Clinical and Experimental Research*. 31:1613–24.
- Lachenmeier DW (2009). Reducing harm from alcohol: what about unrecorded products? *Lancet*. 374:977.
- Lachenmeier DW, Rehm J (2010). Von Schwarzbrennern und Vieldrinkern. Die Auswirkungen des deutschen Branntweinmonopols auf den gesundheitlichen Verbraucherschutz. (Bootleggers and heavy drinkers. The impact of the German alcohol monopoly on public health and consumer safety). *Sucht*. 56:91–3.
- Lachenmeier DW, Taylor BJ, Rehm J (2011). Alcohol under the radar: do we have policy options regarding unrecorded alcohol? *International Journal of Drug Policy*. 22:153–60.
- Lachenmeier DW, Gmel G, Rehm J (2013). Unrecorded alcohol consumption. In: Boyle P, Boffetta P, Lowenfels AB, Burns H, Brawley O, Zatonski W, Rehm J, editors. *Alcohol: science, policy, and public health*. Oxford: Oxford University Press.
- Laslett AM, Room R, Ferris J, Wilkinson C, Livingston M, Mugavin J (2011). Surveying the range and magnitude of alcohol's harm to others in Australia. *Addiction*. 106:1603–11.
- Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. (2012). A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 380:2224–60. PMID: 23245609.
- Mäkelä P, Österberg E (2009). Weakening of one more alcohol control pillar: a review of the effects of the alcohol tax cuts in Finland in 2004. *Addiction*. 104:554–63.
- Malcolm M (2011). Perfect competition (http://jasandford.com/401_f12/perfectcompetition.pdf, accessed 5 November 2012).
- Mamudu HM, Hammind R, Glantz SA (2011). International trade versus public health during the FCTC negotiations, 1999–2003. *Tobacco Control*. 20:e3 doi:10.1136/tc.2009.035352.
- Mazzocchi M (2006). Time patterns in UK demand for alcohol and tobacco: an application of the EM algorithm. *Computational Statistics & Data Analysis*. 50:2191–205.
- Medina-Mora ME, Villatoro J, Caraveo J, Colmenares E (2000). Mexico. In: Demers A, Room R, Bourgault C, editors. *Surveys of drinking patterns and problems in seven developing countries*. Geneva: World Health Organization.
- Meier PS, Purshouse R, Brennan A (2009). Policy options for alcohol price regulation: the importance of modeling population heterogeneity. *Addiction*. 105:383–93.
- Moffatt M (2012). Short run vs. long run: how long is the short run anyway? ThoughtCo (website) (http://economics.about.com/cs/studentresources/a/short_long_run.htm, accessed 12 November 2012).
- Moffatt M (2013). Cross-price elasticity of demand. ThoughtCo (website) (http://economics.about.com/cs/microhelp/a/cross_price_d.htm, accessed 5 April 2017).
- Muchlinski P (1996). A case of Czech beer: competition and competitiveness in the transitional economies. *Modern Law Review*. 59(5):658–74.

- Myles GD (1996). Imperfect competition and the optimal combination of ad valorem and specific taxation. *International Tax and Public Finance*. 1:29–44.
- National Institute for Health and Welfare (2012). Päihdetilastollinen vuosikirja 2012 – Alkoholit ja huumeet (Statistical Yearbook of Alcohol and Drug Statistics 2012). Tampere: National Institute for Health and Welfare.
- Nelson JP (2013). Meta-analysis of alcohol price and income elasticities – with corrections for publication bias. *Health Economics Review*. 3(1):1–10.
- Nelson JP (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.
- New Zealand Law Commission (2010). Alcohol in our lives: curbing the harm. Wellington: New Zealand Law Commission.
- Nordlund S, Osterberg E. (2000). Unrecorded alcohol consumption: its economics and its effects on alcohol control in the Nordic countries. *Addiction*. 95:S551–64.
- OECD iLibrary. Consumption tax trends 2012. Paris: Organisation for Economic Cooperation and Development (http://www.oecd-ilibrary.org/taxation/consumption-tax-trends-2012_ctt-2012-en, accessed 13 November 2012).
- Rabinovich L, Brutsher PB, Vries HD, Tiessen J, Clift J, Reding A (2009). The affordability of alcoholic beverages in the European Union: understanding the link between alcohol affordability, consumption and harms. RAND Technical Report prepared for the European Commission. Cambridge: RAND Corporation.
- Ranson K, Beaglehole R, Correa C, Mirza Z, Buse K, Drager N (2002). The public health implications of multilateral trade agreements. In: Lee K, Buse K, Fustukian S, editors. *Health policy in a globalising world*. Cambridge: Cambridge University Press:41–62.
- Rehm J, Room R, Monteiro M, Gmel G, Graham K, Rehn N, et al. (2004). Alcohol use. In: Ezzati M, Lopez AD, Rodgers A, Murray CJL, editors. *Comparative quantification of health risks: global and regional burden of disease attributable to selected major risk factors*. Geneva: World Health Organization.
- Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J (2009). Global burden of disease and injury and economic cost attributable to alcohol use and alcohol use disorders. *Lancet*. 373:2223–33. PMID: 19560604.
- Rehm J, Baliunas D, Borges GLG, Graham K, Irving HM, Kehoe T, et al. (2010a). The relation between different dimensions of alcohol consumption and burden of disease – an overview. *Addiction*. 105:817–43. PMID: 20331573.
- Rehm J, Kehoe T, Gmel G, Stinson F, Grant B, Gmel G (2010b). Statistical modeling of volume of alcohol exposure for epidemiological studies of population health: the example of the US. *Population Health Metrics*. 8:3. PMID: 20202213.
- Rehm J, Kailasapillai S, Larsen E, Rehm MX, Samokhvalov AV, Shield KD, et al. (2014). A systematic review of the epidemiology of unrecorded alcohol consumption and the chemical composition of unrecorded alcohol. *Addiction*. 109(6):880–93. doi: 10.1111/add.12498.
- Rerchuphan S (2005). Alcohol products taxation: international experiences and selected practices in Asia. Asia Excise Taxation Conference, Singapore, 24 March 2005. Prepared for the International Tax and Investment Center (ITIC), Singapore.
- Room R, West P (1998). Alcohol and the U.S.-Canada border: trade disputes and border traffic problems. *Journal of Public Health Policy*. 19:68–87.
- Room R, Jernigan D, Carlini-Marlatt B, Gureje O, Mäkelä K, Marshall M, et al. (2002). Alcohol in developing societies: a public health approach. Helsinki: Finnish Foundation for Alcohol Studies.
- Room R, Jernigan D (2000). The ambiguous role of alcohol in economic and social development. *Addiction*. 95(Suppl 4):S523–35.
- Room R, Rossow I (2001). The share of violence attributable to drinking. *Journal of Substance Use*. 6:218–28. doi: 10.1080/146598901753325048.
- Salo M (1990). Alkoholijuomien vähittäiskulutuksen analyysi vuosilta 1969–1988 (An analysis of off-premise sales of alcoholic beverages). Alkon taloudellinen tutkimus- ja suunnitteluyksikön tutkimuslaskelma nro 15 (Report no. 15 of Alko's Department for Economic Research and Planning. Helsinki: Alko.
- Saspin J, Thompsom T, Stone L, DeLand K (2003). International trade, law, and public health advocacy. *Journal of Law, Medicine & Ethics*. 31:546–56.
- Selvanathan S, Selvanathan EA (2005). *The demand for alcohol, tobacco and marijuana: international evidence*. Burlington (VT): Ashgate Publishing.
- Shaffer ER, Waitzkin H, Brenner JE, Jasso-Aguilar R (2005). Global trade and public health. *American Journal of Public Health*. 95:23–34.
- Shield K, Rehm M, Patra J, Sornpaisarn B, Rehm J (2011). Global and country specific adult per capita consumption of alcohol, 2008. *Sucht*. 57:99–117.
- Shield K, Rylett M, Gmel G, Gmel G Jr, Kehoe-Chan TK, Rehm J (2013a). Global alcohol exposure estimates by country, territory and region for 2005 – a contribution to the comparative risk assessment for the 2010 Global Burden of Disease Study. *Addiction*. 118(5):912–22.
- Shield K, Gmel G, Kehoe T, Dawson DA, Grant BF, Rehm J (2013b). Mortality and potential years of life lost attributable to alcohol consumption by race and sex in the United States in 2005. *PLoS One*. 8:e51923. PMID: 23300957.
- Shubik M, Richard L (1980). *Market structure and behavior*. Cambridge (MA): Harvard University Press.
- Slama K (2006). Background information for adopting a policy encouraging earmarked tobacco and alcohol taxes for the creation of health promotion foundations. *Promotion and Education*. 13:30–5.
- Smith GS, Barss P (1991). Unintentional injuries in developing countries: the epidemiology of a neglected problem. *Epidemiologic Reviews*. 13:228–66.
- Smith S (2005). Economic issues in alcohol taxation. In: Cnossen S, editor. *Theory and practice of excise taxation: smoking, drinking, gambling, polluting, and driving*. Oxford: Oxford University Press.
- Sornpaisarn B, Kaewmungskun C (2010). Thailand annual report on alcohol 2010. Bangkok: Center for Alcohol Studies.
- Sornpaisarn B, Shield K, Rehm J (2012a). Alcohol taxation policy in Thailand: implications for other low-to-middle income countries. *Addiction*. 107:1372–84. PMID: 22324742.
- Sornpaisarn B, Shield K, Rehm J (2012b). Two-chosen-one taxation: examining its potential effectiveness to reduce drinking initiation and heavy alcohol consumption in low- to middle-income countries. *Addiction*. 107:1389–90.

- Sornpaisarn B, Kaewmunkun C (2012c). Addiction in a traditional Buddhist mid income country. *Alcoholism: Clinical and Experimental Research*.
- Sornpaisarn B, Shield K, Cohen J, Schwartz R, Rehm J (2013). Elasticity of alcohol consumption, alcohol-related harms, and drinking initiation in low- and middle-income countries: a systematic review and meta-analysis. *International Journal of Drug and Alcohol Research*. 2:1-14.
- Sornpaisarn B, Kaewmunkun C (2014). The politics of the alcohol taxation system in Thailand: the behaviors of three major alcohol companies from 1992 to 2012. *International Journal of Drug and Alcohol Research*. 3(3):210-18.
- Sornpaisarn B, Kaewmunkun C, Rehm J (2015a). Assessing patterns of alcohol taxes produced by various types of excise tax methods: a simulation study. *Alcohol and Alcoholism*. 50(6):639-46.
- Sornpaisarn B, Shield KD, Cohen J, Schwartz R, Rehm J (2015b). 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 Suppl1):S45-57. doi:10.1016/j.jegh.2015.05.004.
- Sornpaisarn B, Shield KD, Cohen J, Schwartz R, Rehm J (2016). The association between taxation increases and changes in alcohol consumption and traffic fatalities in Thailand. *Journal of Public Health*. 38(4):e4808. doi: <https://doi.org/10.1093/pubmed/fdv163>.
- Stockwell T, Auld MC, Zhao J, Martin G (2012). Does minimum pricing reduce alcohol consumption? The experience of a Canadian province. *Addiction*. 107:912-20.
- Stockwell T, Zhao J, Martin G, Vallance K, Treno A, Ponicki W, et al. (2013). Minimum alcohol prices and outlet densities in British Columbia, Canada: estimated impacts on alcohol-attributable hospital admissions. *American Journal of Public Health*. 103(11):2014-20. doi: 10.2105/AJPH.2013.301289. Epub: 18 April 2013.
- Sundström A, Ekström E (1962). *The beverage consumption in Sweden*. Stockholm: Industrial Institute for Economic and Social Research.
- Svensson J (2009). Travellers' alcohol imports to Sweden at the beginning of the 21st century: do those who privately import alcohol drink more than or have different patterns of drinking to those who do not? *Nordic Studies on Alcohol and Drugs*. 26:193-205.
- United States Census Bureau (2005). *2002 Economic Census, Subject Series*. Washington (DC): United States Census Bureau.
- Vathesatogkit P, Lian TY, Ritthiphakdee B (2013). *Health promotion fund: sustainable financing and governance*. Bangkok: Thai Health Promotion Foundation.
- Vihmo J (2006). Alkoholijuomien hintajoustot Suomessa vuosina 1995-2004 (Price elasticities of alcoholic beverages in Finland 1995-2004). *Yhteiskuntapolitiikka*. 71:23-32.
- Vingilis E, Lote R, Seeley J (1998). Are trade agreements and economic cooperatives compatible with alcohol control policies and injury prevention? *Contemporary Drug Problems*. 25:579-620.
- Wagenaar AC, Salois MJ, Komro KA (2009b). Effects of beverage alcohol price and tax levels on drinking: a meta-analysis of 1003 estimates from 112 studies. *Addiction*. 104:179-90. doi: 10.1111/j.1360-0443.2008.02438.x.
- Wagenaar AC, Tobler AL, Komro KA (2010). Effects of alcohol tax price policies on morbidity and mortality: a systematic review. *American Journal of Public Health*. 100:2270-78.
- Warner KE (2000). The economics of tobacco: myths and realities. *Tobacco Control*. 9:78-89.
- Willis J (2003). New generation drinking: the uncertain boundaries of criminal enterprise in modern Kenya. *African Affairs*. 102:241-60.
- Wittwer G, Anderson K (2002). Impact of the GST and wine tax reform on Australia's wine industry: a CGE analysis. *Australian Economic Papers*. 41(1):69-81.
- World Health Organization (2002). *The world health report 2002. Reducing risks, promoting healthy life*. Geneva: World Health Organization.
- World Health Organization (2010a). *Global strategy to reduce the harmful use of alcohol*. Geneva: World Health Organization.
- World Health Organization (2010b). *WHO technical manual on tobacco tax administration*. Geneva: World Health Organization.
- World Health Organization (2011). *Global status report on alcohol and health*. Geneva: World Health Organization.
- World Health Organization (2012). *Outcomes of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases and the First Global Ministerial Conference on Healthy Lifestyles and Non-communicable Disease Control: Report by the Secretariat*. Geneva: World Health Organization.
- World Health Organization (2014). *Global Status Report on Alcohol and Health 2014*. Geneva: World Health Organization.
- Zhang P, Yurekli A, de Beyer J (2002). *Understand and evaluate the impact of tobacco control policies on employment*. World Bank Economics of Tobacco Toolkit, Tool 5. Washington (DC): The World Bank.
- Ziegler D (2006). International trade agreements challenge tobacco and alcohol control policies. *Drug and Alcohol Review*. 25, 567-79.
- Ziegler D (2009). The alcohol industry and trade agreements: a preliminary assessment. *Addiction*. 104:13-6.

Consumers, including heavy drinkers and young people, are sensitive to changes in the price of drinks. Pricing policies can be used to reduce underage drinking, to halt progression towards drinking large volumes of alcohol and/or episodes of heavy drinking, and to influence consumers' preferences. Increasing the price of alcoholic beverages is one of the most effective interventions to reduce harmful use of alcohol. A key factor for the success of price-related policies in reducing harmful use of alcohol is an effective and efficient system for taxation matched by adequate tax collection and enforcement (WHO Global strategy to reduce the harmful use of alcohol).

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