

POLICY NOTE

IS TOBACCO TAXATION REGRESSIVE?

**EVIDENCE ON PUBLIC HEALTH,
DOMESTIC RESOURCE MOBILIZATION,
AND EQUITY IMPROVEMENTS**

Alan Fuchs, Patricio V. Márquez,
Sheila Dutta, Fernanda González Icaza



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POLICY TOOL TO
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AND IMPROVE
HEALTH OUTCOMES.
HOWEVER, POLICY
MAKERS OFTEN

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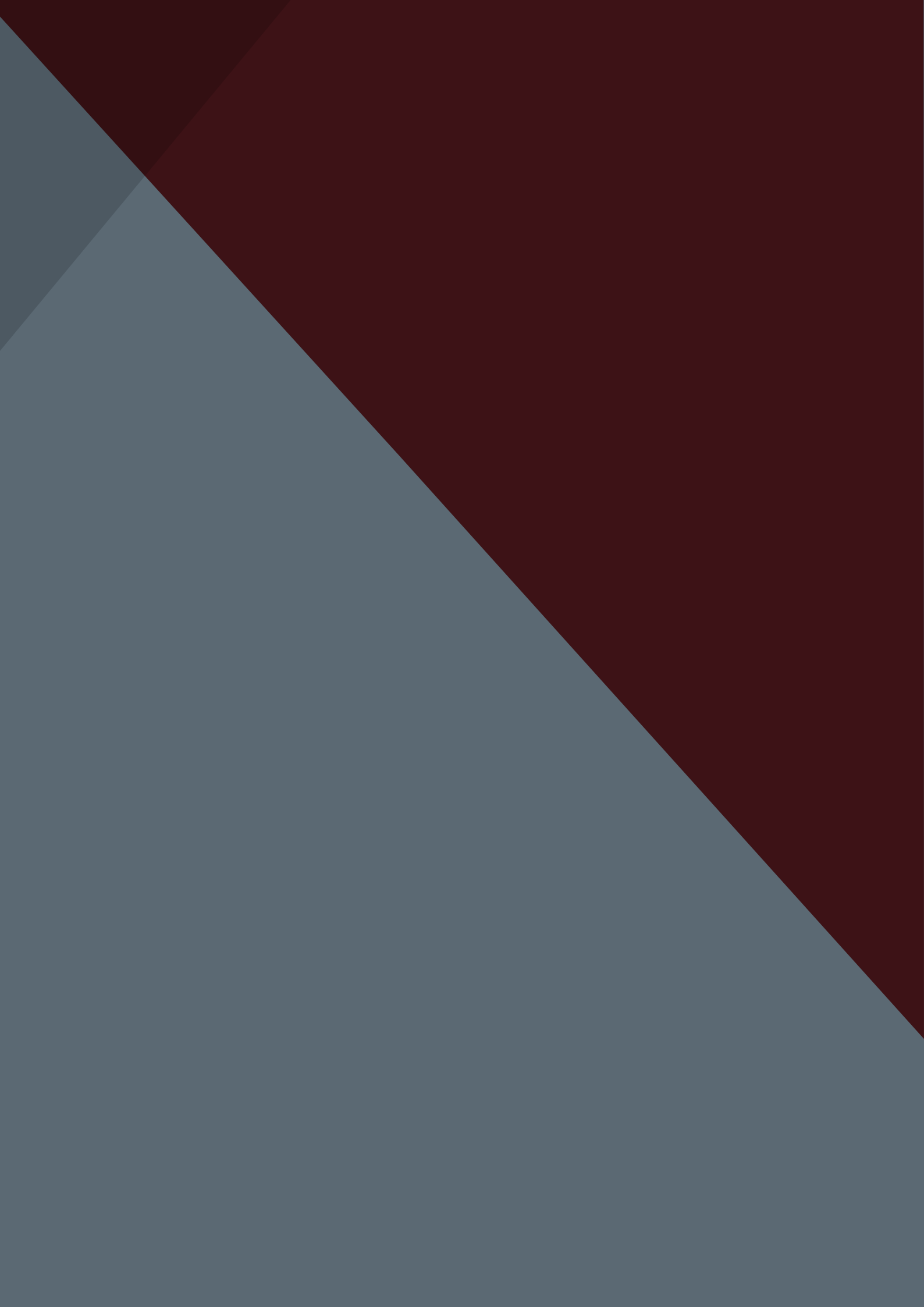
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**Alan Fuchs, Patricio V. Márquez, Sheila Dutta,
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ABSTRACT

Tobacco taxes are recognized as an effective policy tool to reduce tobacco consumption and improve health outcomes; however, policy makers often hesitate to use them because of their possible regressive effects. This report assesses the ability of taxes on tobacco to improve future health and welfare outcomes, with a focus on their distributional impact and effects on the poor. In addition to adverse consequences on health and quality of life of smokers and their family members, tobacco-related illnesses cost billions of dollars in medical expenditures and losses in human capital and productivity, imposing heavy economic tolls on households and governments. Developing countries bear a high and increasing share of the economic burden of tobacco. However, traditional analyses often overlook the many economic benefits of reducing tobacco consumption. This report presents empirical findings using an extended cost benefit analysis (ECBA) methodology, to incorporate a more comprehensive view of the costs and benefits of increasing prices of tobacco on household welfare, and to assess their distributional impact by accounting for different consumer behaviors across income groups. Evidence for several countries shows that large price shocks on cigarettes can generate progressive and welfare-improving medium and long-term net impacts, that particularly improve welfare of lower-income households. Large shares of societies—and

particularly the poor—can benefit from positive income gains by reducing tobacco-related medical expenses and avoiding premature deaths. Moreover, there will be additional fiscal revenues generated that can be used to further enhance measures to control tobacco use and promote equity. Additionally, the generally positive benefits and impact of raising taxes on tobacco can be enhanced by a set of complementary policies to leverage consumers' responses toward quitting tobacco, and to target comprehensive interventions to help the most vulnerable groups.



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‘Sugar, rum, and tobacco, are commodities which are nowhere necessities of life, [but] which are ... objects of almost universal consumption, and which are therefore extremely proper subjects of taxation.’

Adam Smith, “An Inquiry into the Nature and Causes of the Wealth of Nations” (1776)

“Cigarettes are among the most addictive substances of abuse and by far the most deadly.”

Thomas C. Shelling, 2005 Nobel Prize Laureate in Economics

“In significant ways, sellers play to our weaknesses. They are “phishing for phools.” “Humans think in terms of stories, and decisions are consequently determined by the stories we tell ourselves. Advertisers use this to their advantage by “graph[ing] their story” onto ours, and thereby influencing the decisions we make”—in this case, to get us addicted to tobacco use, particularly teenagers and low-income people.

*George A. Akerlof and Robert J. Shiller,
Nobel Price Laureates, 2001 and 2013, respectively
“Phishing for Phools: The Economics of Manipulation and Deception” (2015)*



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1

INTRODUCTION

With the entering into force of the Framework Convention for Tobacco Control (FCTC) in 2005, the first negotiated global public health treaty, significant progress has been observed in controlling tobacco use. Worldwide, the age-standardized prevalence of daily smoking was estimated at 25.0 percent among men and 5.4 percent among women in 2015, representing 28.4 percent and 34.4 percent reductions, respectively, since 1990 (GBD 2015 Tobacco Collaborators 2017). Nonetheless, nearly 1 billion people still smoke daily around the world. As shown in Table 1, the countries with the most male daily smokers in 2015 were China, India, and Indonesia, while the countries with the most female daily smokers were the United States, China and India. In 2015, 11.5 percent of global deaths were attributable to smoking, of which 52.2 percent took place in four countries (China, India, the United States, and Russia).

In addition, daily smoking contributes to a significant amount of the world's overall health burden, measured using the disability-adjusted life years (DALYs) metric, which combines years of healthy life lost due to illness with those lost due to premature death. Smoking was ranked among the five leading risk factors by disability adjusted life years in 109 countries and territories in 2015, rising from 88 locations in 1990, and 11.5 percent of global deaths were attributable to smoking worldwide

(GBD 2015 Tobacco Collaborators 2017). Most DALYs attributable to daily smoking were due to cardiovascular diseases (41 percent), cancers (28 percent), and chronic respiratory diseases (21 percent). As observed in the GBD 2015 study, unless daily smoking is significantly reduced from current levels, the total number of smokers will continue to rise and place tremendous burden on health systems.

Among tobacco control interventions, substantial tax and price increases are the most cost-effective policy measures (Marquez and Moreno-Dodson 2017; NCI and WHO 2016; World Bank 1999). By increasing prices and reducing the affordability of tobacco products, taxes encourage current smokers to quit and discourage potential consumers, particularly the youth, to initiate smoking, while simultaneously reducing the health risk of secondhand smoking. They also contribute to raising government revenues. Nonetheless, policy makers often hesitate to increase taxes on tobacco because of claims of the potentially regressive impact of taxes—it is often argued that since low-income smokers spend a greater share of their income on tobacco, increases in cigarette taxes will have a disproportionately larger impact on poor consumers' income than of rich consumers.

Reducing tobacco consumption is associated with several economic benefits that are often overlooked, in addition to better

Table 1. Countries With the Highest Number of Deaths from Smoking, and the Highest Prevalence of Daily Smokers, 2015

COUNTRIES WITH THE HIGHEST NUMBER OF DEATHS FROM SMOKING (ROUNDED):
China (1.8 million)
India (743,000)
US (472,000)
Russia (283,000)
Indonesia (180,000)
Japan (166,000)
Bangladesh (153,000)
Brazil (149,000)
Germany (130,000)
Pakistan (124,000)
COUNTRIES WITH THE HIGHEST PREVALENCE OF MALE DAILY SMOKERS:
Kiribati (48%)
Indonesia (47%)
Laos (47%)
Northern Mariana Islands (46%)
Armenia (43%)
Greenland (43%)
Belarus (42%)
Ukraine (41%)
Azerbaijan (40%)
Timor-Leste (40%)
COUNTRIES WITH THE HIGHEST PREVALENCE OF FEMALE DAILY SMOKERS:
Greenland (44%)
Bulgaria (28%)
Greece (27%)
Montenegro (26%)
Croatia (26%)
Northern Mariana Islands (25%)
Kiribati (25%)
Macedonia (23%)
Hungary (23%)
Austria (23%)

Source: GBD 2015 Tobacco Collaborators.

health and longer lives for smokers and their family members (Lancet Editorial 2017 , NCI and WHO 2016). Among other economic benefits, households and governments face lower medical bills associated with the treatment of tobacco-attributable diseases and workers increase their productive life due to an expanded healthy life expectancy, reflected in higher earnings. Accurately assessing the burden of tobacco and the benefits of taxing tobacco products requires accounting for the distribution of these benefits across the population.

This report summarizes the rapidly growing evidence of the ability of taxes on tobacco to improve future health and welfare outcomes, with a focus on understanding the distributional impact and equity implications of these taxes.

Empirical studies in a variety of low- and middle-income countries show that increasing tobacco prices is unlikely to result in regressive outcomes. In contrast, accounting for different behavioral responses to the price shock can show progressive distributional effects because poorer households are more likely to cut back on the consumption of tobacco as prices rise. Moreover, other medium- and long-term benefits of reducing tobacco consumption are often overlooked. Accounting for these benefits—such as reduced medical bills associated with the treatment of tobacco-attributable diseases and additional years of productive life—can increase household welfare and offset the short-term negative price shock of raising taxes on household

budgets. Overall, empirical applications of this more comprehensive view of costs and benefits consistently find that the effects of raising taxes on tobacco are progressive and welfare-increasing.

The report proceeds as follows. Section 2 reviews the literature on the well-established negative health effects of tobacco, their economic burden, and the most common policy instruments to control tobacco consumption. Section 3 summarizes the theoretical mechanisms that allow taxes on tobacco to reduce consumption and potentially to induce progressive and welfare-enhancing outcomes. Section 4 presents results on the distributional effects of increasing taxes on tobacco in a set of countries at different income levels, using an extended cost-benefit analysis (ECBA) methodology, as well as emerging new comparative evidence. Section 5 concludes with a discussion on the main policy implications of the theoretical and empirical knowledge on taxes on tobacco.



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HEALTH AND ECONOMIC IMPACT OF TOBACCO USE

The Health Impacts of Tobacco Use

The scientific evidence accumulated over the past five decades is clear: tobacco kills. Smokers who begin early in adult life and do not stop smoking face a three-fold higher risk of death compared to otherwise similar non-smokers, resulting in a loss, on average, of at least one decade of life (Jha and Peto 2014). The landmark Surgeon General's Report on Smoking and Health, issued in 1964 by the U.S. Surgeon General Dr. Luther Terry, first drew wide public attention to the evidence linking smoking and ill health, including lung cancer and heart disease. Since then, a vast, rigorous body of evidence has accumulated, showing that tobacco use imposes an unparalleled health and economic burden across countries, hindering human capital development and economic gains worldwide (Marquez and Moreno-Dodson 2017; NCI and WHO 2016; U.S. Department of Health, Education and Welfare 1964). The uptake of cigarette consumption has been influenced by advertising and promotional expenses of tobacco companies (in 2016, for example, tobacco companies spent US\$9.5 billion in marketing cigarettes and smokeless tobacco in the United States alone) (Federal Trade Commission 2016).

Smoking is the second-leading cause of death globally (GBD 2015 Collaborators).

Both active smoking and exposure to secondhand smoke cause disease and kill prematurely (Marquez and Moreno-Dodson 2017). More than 7 million people die from tobacco use every year, a figure that is predicted to grow to more than 8 million a year by 2030, in the absence of intensified global action (WHO 2017). Annually, the number of deaths from tobacco-attributable diseases exceeds the deaths from HIV/AIDS, tuberculosis, and malaria combined (WHO 2008). Most of these deaths are due to direct tobacco use, while close to 10 percent of deaths are the result of non-smokers' exposure to secondhand smoke. Smoking also leaves chemical residue on surfaces where smoking has occurred, which can persist long after the smoke itself has cleared from the environment. This phenomenon, known as "thirdhand smoke," is increasingly recognized as a potential danger, especially to children, who not only inhale fumes released by these residues but also ingest residues that get on their hands after crawling on floors or touching walls and furniture (Martins-Green, Adhami, Frankos et al. 2014).

Tobacco consumption is causally linked to diseases of nearly all organs of the body (U.S. Department of Health and Human Services 2014). The evidence is enough

to conclude that the risk of developing lung cancer from cigarette smoking has increased since the 1950s, due to changes in the design and composition of cigarettes. There is also evidence for a causal relationship between smoking and other types of cancer, including liver, colorectal, and prostate cancers. Smoking or chewing tobacco can immediately raise blood pressure, albeit temporarily, as the chemicals in tobacco can damage the lining of artery walls, causing arteries to narrow, and increasing blood pressure (Marquez 2018). Secondhand smoke can increase blood pressure, as well. Smoking is the dominant cause of chronic obstructive pulmonary disease (COPD), including emphysema and chronic bronchitis. Smoking also increases the risk of tuberculosis. Research continues to identify diseases caused or exacerbated by smoking, including common diseases as diabetes. Scientists now know that the risk of developing diabetes is 30–40 percent higher for active smokers than nonsmokers. It is estimated that for every person who dies as a result of smoking, at least 30 people live with a serious smoking-related illness (U.S. Department of Health and Human Services 2014).

Chemicals in tobacco have harmful health impacts. Accumulated evidence shows that nicotine (a chemical in tobacco): (1) is a highly addictive stimulant that at high levels produces acute toxicity; (2) activates multiple biological pathways through which smoking increases risk for disease; (3) adversely affects maternal and fetal health during pregnancy, contributing to adverse outcomes such as preterm delivery and stillbirth, as well as

congenital malformations (e.g., cleft lips or palates); and (4) during fetal development and adolescence has lasting adverse consequences for brain development. Most smokers use tobacco regularly because they are addicted to nicotine (addiction is characterized by compulsive drug-seeking and use, even in the face of negative health consequences) (Balfour 2015; Picciotto and Mineur 2014). Research has shown that the majority of smokers would like to stop smoking, and each year about half try to quit permanently, but, only about 6 percent of smokers are able to quit in a given year (Centers for Disease Control and Prevention (CDC) 2011). Although nicotine itself does not cause cancer, at least 69 chemicals in tobacco smoke are carcinogenic (U.S. Department of Health and Human Services 2014). Evidence also shows that tar, the resinous, partially combusted particulate matter produced by the burning of tobacco, is toxic and damages the smoker's lungs over time. Carbon monoxide, a colorless, odorless gas produced from the incomplete burning of tobacco, accumulates indoors and reduces the oxygen-carrying capacity of the blood.

E-cigarettes pose similar threats to public health. In recent years, the issue of whether e-cigarettes and other smoke-free nicotine delivery systems should be classified as tobacco products—and hence be regulated in the same way as cigarettes—has acquired great importance (Marquez 2017). The production and marketing of these products is at the core of new diversified business plans of tobacco companies alongside the production and marketing of

cigarettes. E-cigarettes, a battery-powder device that heats a liquid containing nicotine into a vapor that is inhaled like a cigarette, is being touted as a harm-reducing technological innovation to protect smokers from the ill-effects of cigarettes. However, a comprehensive review of available evidence done by U.S. Surgeon General (2016) concluded that tobacco use among youth and young adults in any form, including e-cigarettes, is not safe. This report further indicated that in recent years, e-cigarette use by youth and young adults has increased at an alarming rate, becoming the most commonly used tobacco product among youth in the United States. The report also warned that since e-cigarettes are tobacco products that deliver nicotine, they may pose the risk that many of today's youth who are using e-cigarettes could become tomorrow's cigarette smokers to continue to feed their nicotine addiction; using nicotine in adolescence also can increase risk of future addiction to other drugs. The regulatory response to e-cigarettes in the United States and the European Union (EU) is clear in signaling the potential health risks of e-cigarettes.²

Developing countries and vulnerable groups face health risks associated with tobacco use, and with e-cigarettes.

² E-cigarettes, like other cigarette products, now fall under the regulatory jurisdiction of the U.S. Food and Drug Administration (FDA). This is in accordance with the U.S. Surgeon General Report recommendations that comprehensive tobacco control and prevention strategies for youth and young adults should address all tobacco products, including e-cigarettes. In May 2017, the EU's Court of Justice cleared new legislation that also places e-cigarettes under similar regulatory pressures as traditional cigarettes, including a broad ban on advertising and other promotional activity.

Low- and middle-income countries (LMICs) face an increasing burden of noncommunicable diseases (NCDs), which are now the leading cause of death in the world, killing 40 million people each year and representing 70 percent of all annual deaths (WHO 2018). Eighty percent of deaths due to tobacco-related NCDs—cancer, cardiovascular disease, chronic lung disease, and diabetes— occur in LMICs, straining health care systems, contributing to poverty, and posing a major barrier to development. An estimated 40 percent of the global economic costs of tobacco use are already borne by these countries, and there is a risk that the costs will escalate if effective and sustained tobacco control action is not supported over the short and medium term.

Global trends in smoking-prevalence reduction also mask important differences within countries, such as rising smoking rates among youth and women in some urban areas of Latin America and Eastern Europe, or the marked change in South Asia from consuming local bidis (small, hand-rolled, generally untaxed cigarettes) to consuming cigarettes (Mishra et al. 2016). This poses a major challenge for developing countries with sizable younger populations vulnerable to tobacco advertisement and marketing, and where smoking is on the rise, or that lack the resource base, health systems, or social safety nets to protect populations from the negative health, social, and economic consequences of tobacco-related chronic

diseases (Marquez and Farrington 2013).³ In high-income countries, smoking rates are also substantially higher among some of the most vulnerable people in society. In the United States, for example, the 25 percent of the population with mental disorders, including substance use disorders, account for 40 percent of the cigarettes smoked (Substance Abuse and Mental Health Services Administration 2013), while over 40 percent of people with low educational attainment (i.e., with only a General Education Development certificate [GED]) smoke, the highest prevalence of any socioeconomic group (Jamal, Homa, O'Connor et al. 2015). Additionally, people who live in rural areas use all forms of tobacco at higher rates than people who live in urban areas (Roberts, Doogan, Kurti et al. 2016).

While the hazards of smoking accumulate slowly, cessation is effective, helping to reduce tobacco-related mortality and inequality of mortality. People who quit by age 40 get back nearly the full decade of life they would have lost from continued smoking (Jha and Peto 2014). Cessation is now common among adults in high-income countries. For example, in Canada, there are now over one million more ex-smokers than only a decade ago. However, largely because of the advertising, marketing and pricing strategies of the tobacco industry, including the use of social media to promote e-cigarettes among the youth, cessation remains a major public health challenge in most LMICs,

where more than 80 percent of smokers live (Jha, Marquez, and Dutta 2017).

The Economic Burden of Tobacco

Smoking-related illness costs billions of dollars each year, imposing a heavy economic toll on households and governments, both in terms of direct medical care costs and productivity losses (NCI and WHO 2016). Calculations by Lightwood et al. (2000) indicate that the health cost of tobacco use in high-income countries is between 0.1 percent and 1.0 percent of gross domestic product (GDP). In the United States, for example, smoking-related illness costs more than US\$300 billion each year, including nearly US\$170 billion for direct medical care for adults, as well as more than US\$156 billion in lost productivity, which includes US\$5.6 billion in lost productivity due to secondhand smoke exposure (U.S. Department of Health and Human Services 2014; Xu et al. 2015). In high-income countries, smoking-related care already places a significant burden on health care systems. As shown by the experience in the United States, it accounts for an estimated 8.7 percent of annual health care spending (more than 60 percent of this spending is covered by public programs such as Medicare and Medicaid) (Xu et al. 2015). Worldwide, recent estimates suggest that the global burden of tobacco-related diseases accounts for US\$422 billion in health care expenditures annually, representing almost 6 percent of total global spending on health. The total economic cost of smoking—including health care expenditures and productivity losses—is estimated at

³ For a discussion on the economics of deception and manipulation, see the work of Nobel Laureates in Economics George Akerlof and Robert Schiller (2015).

more than US\$1.4 trillion per year, equivalent to 1.8 percent of the world's annual GDP (Goodchild, Nargis, and Tursan d'Espaignet 2018).

Developing countries bear a high and increasing share of the economic burden of smoking. The highest share of the estimated total economic costs of smoking occurs in high-income countries (US\$1.12 trillion in PPP dollars), where the tobacco epidemic is most advanced. However, nearly 40 percent of the health and productivity costs related to tobacco use are already concentrated in developing countries (Goodchild, Nargis, and Tursan d'Espaignet 2018). Those shares are expected to increase along with the demographic and epidemiological transition occurring in these countries.

Policy Instruments for Tobacco Control

Since 2005, 181 countries have become parties to the FCTC. The FCTC now covers nearly 90 percent of the world's population. Over the past decade, progress has been made in expanding the coverage of the FCTC's supply- and demand-reduction tobacco control measures (WHO 2015). More than half the world's countries, accounting for 40 percent of the total global population, have implemented at least one tobacco control policy measure supported under the MPOWER technical assistance package of the World Health Organization (WHO). MPOWER includes the six most important and effective tobacco control policies: raising taxes and prices; banning advertising,

promotion, and sponsorship; protecting people from secondhand smoke; warning everyone about the dangers of tobacco; offering help to people who want to quit; and carefully monitoring the epidemic and prevention policies (WHO 2008). Recent studies, as noted before, show that the accelerated implementation of all key FCTC demand-reduction measures since 2005 has been significantly associated with a decrease in smoking prevalence worldwide (GBD 2015 Tobacco Collaborators 2017; Gravely et al. 2017).

However, despite the progress observed in many countries, much more needs to be done to reduce the human, social and economic toll of tobacco use. A scaled up and stronger tobacco control effort is needed to achieve the WHO-recommended target of at least a 30 percent reduction in smoking prevalence by 2025, which would avoid at least 200 million deaths among current and future smokers by the end of the 21st century (WHO 2013). A reduction in smoking prevalence of this magnitude is also critical to reaching the health and social targets of the United Nations Sustainable Development Goals (SDGs) by 2030 (United Nations 2015).



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TAXING TOBACCO: A POLICY MEASURE TO IMPROVE HEALTH, DOMESTIC RESOURCE MOBILIZATION, AND EQUITY

"As the success in rich countries shows, there is no mystery about how to get people to stop smoking: a combination of taxes and public-health education does the job. This makes the abysmal record in poor countries a grave failure of public policy. The good news is that, following recent research, it is one that has just become easier to put right."

The Economist (2017).

The Effectiveness of Taxes on Tobacco

Tobacco taxes are recognized as an effective policy tool to reduce tobacco use. As such, the prime objective of tobacco taxes is to improve health outcomes (World Bank 1999; Petit and Nagy 2016; Marquez and Moreno-Dodson 2017). To achieve this aim, aggressive increases in tobacco taxes are required to influence cigarette smokers to stop or sharply cut back their tobacco consumption and to persuade young people not to initiate this addictive habit. This is

needed also to reduce the number of former smokers who return to cigarettes. However, as discussed below, the ultimate changes in tobacco use depend on both the price shock and the behavioral responses of consumers facing higher retail prices for tobacco.

Taxes work by increasing prices and reducing the affordability of tobacco products

(Gruber 2008; Sunley 2009). Higher tobacco taxes help boost cigarette prices, which are highly effective in reducing demand. Currently, in high-and middle-income countries, taxes average about two-thirds or more of the average retail price of a pack of cigarettes, while in low-income countries, they amount to not more than half the average retail price of a pack of cigarettes (WHO 2015, 2017). Evidence of cigarette taxes translating to increased consumer prices is available globally (WHO 2015, 2017). However, tobacco taxes only reduce tobacco consumption if they reduce cigarette affordability. In most LMICs, wages are rising. Thus, cigarettes will become de facto more affordable for consumers, increasing consumption, unless tobacco taxes rise even faster. Effective strat-

egies will generally involve combining big initial tax increases with recurrent hikes over time, to keep cigarette prices climbing more steeply than per capita real income growth (including inflation). In some countries, such as the United Kingdom, governments have adopted a “tobacco tax escalator” that automatically increases tobacco taxes by a certain percentage above the inflation rate (HM Revenue and Customs 2018). Going too slowly or timidly on tax increases or allowing affordability to increase should be recognized as condemning large numbers of people to tobacco addiction and the risk of ill health and premature death (Marquez and Moreno-Dodson 2017).

Beginning with its landmark report “Curbing the Epidemic” (1999), the World Bank Group has advised policy makers who seek to reduce smoking to use as a yardstick tax levels that amount to two-thirds and four-fifths of the retail price of a pack of 20-cigarettes, as adopted as part of the comprehensive tobacco control policies of countries where cigarette consumption has fallen. Similarly, the WHO recommends countries to adopt at least 70 percent excise tax share in final consumer price of a pack of 20-cigarettes, and a 75 percent total tax burden (including excise taxes, VAT, and other duties) on the retail price of a pack of 20-cigarettes (WHO 2015, 2017).

Higher Tobacco Taxes Boost Government Revenues

The positive impacts of higher tobacco taxes and prices go beyond direct

health gains and indirect benefits such as reduced health care expenditures and higher productivity (Furman 2016).

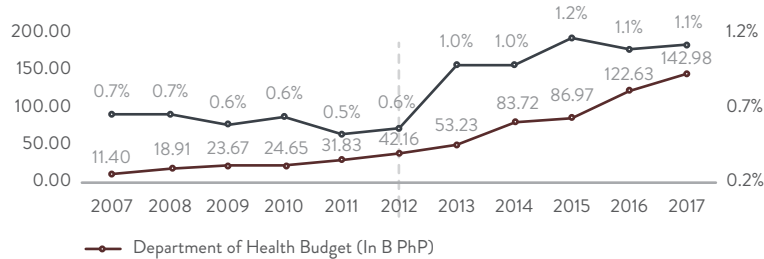
Increasing tobacco taxes can also enlarge a country’s tax base to augment domestic resource mobilization (Marquez 2016a, 2016b, 2016c). This can expand the fiscal space for priority investments and programs, including the expansion of universal health coverage, education for all, and other activities to help countries achieve the SDGs.

The United Nations has recognized that tax and price measures on tobacco are an effective means to reduce tobacco use, as well as related illnesses and premature death and escalating health care costs.

These measures can also represent a revenue stream to finance development in many countries. This double impact of tobacco taxes was acknowledged in the Financing for Development Action Agenda, approved by country leaders at the Third International Conference on Financing for Development in Addis Ababa (UN 2015), and subsequently endorsed by the United Nations General Assembly as part of the strategies to achieve the SDGs, in September 2015. Today, policy practitioners concur that domestic resource mobilization in LMICs’ will be the primary financing engine for the next wave of development, and they point to tobacco taxation as a potentially important contributor (Junquera-Varela et al. 2017).

Since 2013, multisectoral teams supported under the World Bank’s Global Tobacco Control Program have assisted national governments in adopting tobacco tax

Figure 1. Philippine Sin Tax Reform: Higher Tobacco Tax Revenue (As % of GDP) and Budgetary Allocation for Public Health



Source: Paul, J. 2018.

reforms, often as part of fiscal consolidation programs, and working with other international partners. This has occurred in countries across the income spectrum, such as Armenia, Azerbaijan, Belarus, Botswana, Colombia, El Salvador, Gabon, Georgia, Ghana, Indonesia, Kazakhstan, Lesotho, Moldova, Mongolia, Montenegro, Nigeria, Peru, the Philippines, Senegal, Sierra Leone, Tonga, Tuvalu, Ukraine, Vietnam, and Uzbekistan, covering approximately 934 million people.

Recent Country Experiences: Fiscal and Health Impact

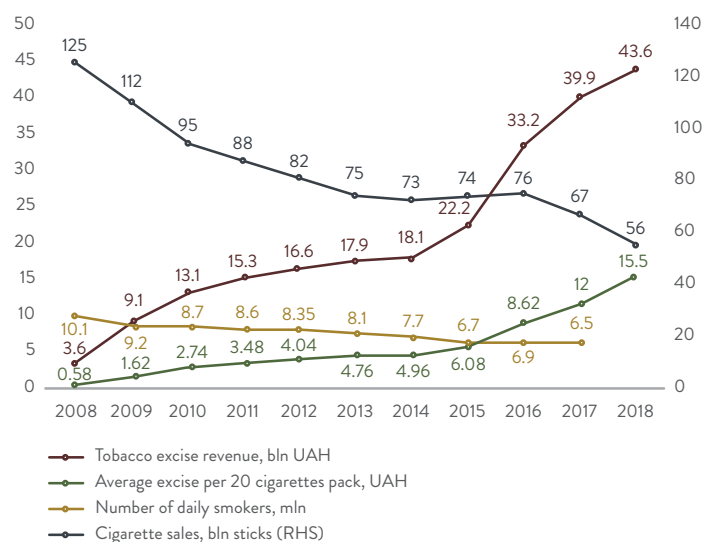
The experience of the Philippines since the adoption of the Sin Tax Law of 2012 is one of the most compelling examples of ambitious national tobacco tax reform (Kaiser, Bredenkamp, and Iglesias 2016). The Philippines' bold effort—supported by the World Bank, the WHO, and other international partners—involved a fundamental restructuring of the country's tobacco excise tax structure, including reduction in the number of tax tiers, indexation of tax rates to inflation, and substantial tax increases to multiply public health impact. Such a bold

reconfiguration of the tobacco tax structure can be good for both fiscal revenues and public health. As shown in Figure 1, excise tax revenue on tobacco and alcohol products has more than doubled since 2012, reaching US\$5.2 billion in additional revenues during the first 4 years of the Sin Tax Law implementation (about 1 percent of GDP). Tobacco accounts for about 80 percent of these additional tax revenues. The expanded fiscal space created by the Sin Tax reform increased the Department of Health budget threefold. The number of households whose health insurance premiums were paid by the national government rose from 5.2 million primary members in 2012 to 15.2 million in 2017.

Smoking prevalence among current daily tobacco smokers also decreased significantly over the 2009-2015 period, from 22.5 percent to 18.7 percent (GATS 2009 and 2015). The Philippines' success confirms that tobacco taxation may be a low-hanging fruit for governments that want to increase domestic resources to attain the SDGs.

The experiences of Ukraine and Moldova are also noteworthy. Continuing the

Figure 2. Results of Tobacco Excise Policy Reform in Ukraine, 2008-2018



Source: World Bank Group staff based on national data collected by Konstantin Krasovsky and Tatiana Andreeva, 2019.

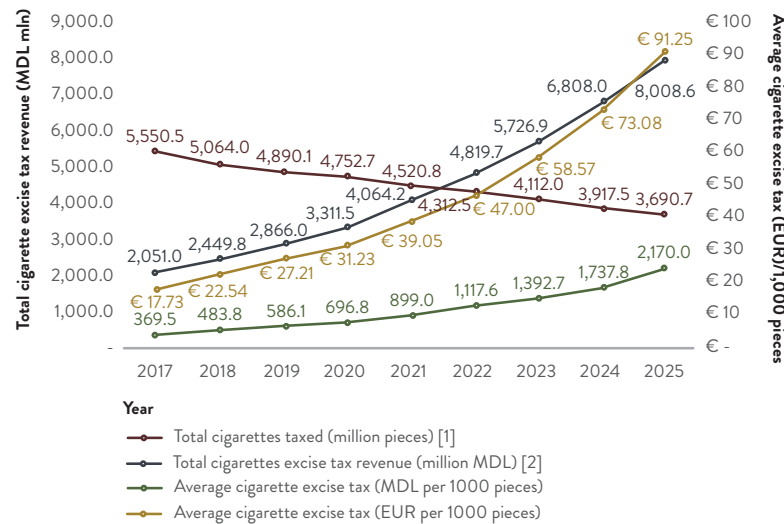
tobacco tax increase pathway adopted since 2016 with support of the World Bank Group Global Tobacco Control Program, the Ukrainian Parliament approved a new increase as part of the 2019 budget: from January 1, 2019, all specific excise rates were increased by 20 percent, and an additional 9 percent excise increase will be effective July 1, 2019.⁴ Building upon tobacco tax increases in previous years, the average excise tax burden (excise tax as a percentage of retail price) after the 2019 increase will rise from 45 percent in 2015 to 60 percent in 2019. The total tax burden (including excise taxes, value-added tax [VAT], and other duties on

tobacco as a percentage of retail price) will increase from 62 percent in 2015 to 77 percent in 2019. Figure 2 shows how national tobacco excise revenue in Ukraine increased from 22 billion UAH in 2015 (1.12% of GDP) to 40 billion UAH (1.34% of GDP).

Tax increases are helping to reduce tobacco consumption, generating public health benefits in Ukraine. Results from the Ukraine Global Adult Tobacco Survey (GATS) show that daily smoking prevalence has dropped by nearly 20 percent during the last seven years, from 25% in 2010 to 20% in 2017 (GATS Ukraine 2017). This is largely due to a reduction in smoking among men, with no significant reductions observed in the share of women who smoke (GATS Ukraine, 2017). Additional World Bank Group-supported microsimulation modeling in Ukraine estimated the public-health

⁴ The increases adopted in 2016 included a 40 percent specific excise tax increase on tobacco products over the 2015 level and the increase of effective ad valorem excise rate from 10 to 12 percent. In 2017 and 2018, the specific excise rates were further increased by 40 percent and 29.8 percent, respectively. In 2015, Ukraine introduced an additional 5 percent ad valorem excise tax paid to local budgets.

Figure 3. Results/Projections of Tobacco Excise Policy Reform in Moldova, 2007-2025



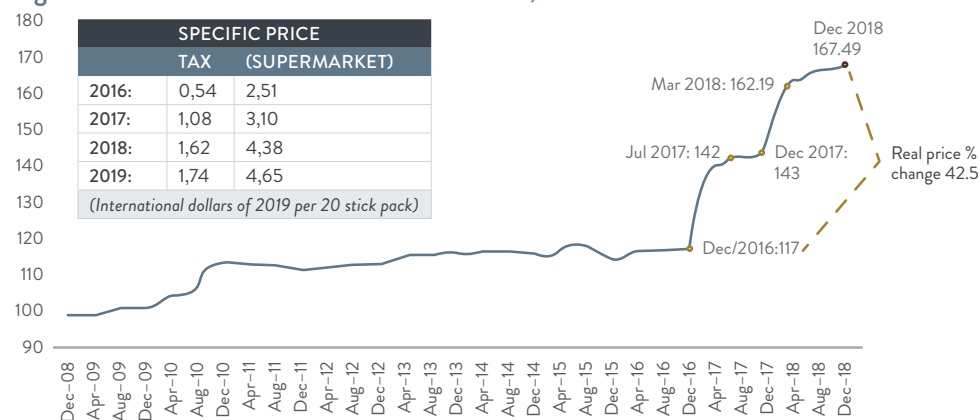
Source: World Bank Group staff estimates; excise tax revenue and total cigarettes taxed data from MoF & Customs, 2018.

impacts of tobacco taxation measures, along with other tobacco control policies. The health impacts were modeled for 2025 and 2035, including coronary heart disease (CHD), stroke, chronic obstructive pulmonary disease (COPD), and lung cancer. Relative to a status quo scenario with no change in tobacco taxes, the model estimated that, by 2035, Ukraine’s tobacco tax hike will avoid: 126,730 new cases of smoking-related disease; 29,172 premature deaths; and 267,098 potential years of life lost. Reductions in disease and death will save UAH 1.5 billion (about US\$ 57 million) in healthcare costs and UAH 16.5 billion (about US\$ 631 million) in premature mortality costs (Webber et al. 2017).

Moldova’s positive experience with taxing tobacco in recent years provides some lessons, and possible encouragement, for other countries considering this mea-

sure (Marquez and Guban 2018; Marquez et al 2018). The government has increased tobacco taxes every year since 2016, with the goal of achieving the European Union (EU) tobacco tax directive minimum rate of 90 EUR/1,000 cigarettes by early next decade, per its Associate Agreement with the EU. This has translated into public health gains for the country, with a reduction in the volume of cigarettes sales taxed (used as a proxy for consumption) by about 10 percent, to 5.55 billion pieces in 2017 compared to 6.19 billion pieces in 2016. While reducing tobacco use, and the related risk of developing tobacco-attributable diseases, Moldova has been able to collect additional tax revenue, partly because of still high levels of tobacco use and the low cost of cigarette production relative to the average retail price. As shown in Figure 3, cigarette excise tax revenue in the country increased from

Figure 4. Tax and Price Increases in Colombia, 2017-2018



Source: Llorente, B. and Maldonado, N. 2019

MDL 1.73 billion (US\$ 87 million) in 2016 to MDL 2.05 billion (US\$ 110.6 million) in 2017, or about 1.16 percent of Moldova’s GDP. The tobacco tax increases adopted by Moldova’s Parliament for 2018-2020 are projected to further increase excise tax revenue, hitting 3.31 billion MDL (US\$194 million) or 1.45 percent of GDP in 2020.

The recent experience of Colombia is another good international example.

As part of a broad fiscal reform package approved by Colombia’s Congress on December 23, 2016, the specific excise tax on a pack of 20 cigarettes was increased from COP 700 (US\$ 0.25) in 2016 to COP 1,400 (US\$ 0.50) in 2017, and COP 2,100 (US\$ 0.75) in 2018, with annual adjustments of Consumer Price Index (CPI) + 4 points in subsequent years. The ad valorem excise tax component was maintained at 10 percent of the total sale price of a 20-cigarette pack, and the general VAT rate was raised from 16 percent to 19 percent. As a result, the total tax burden (as

percentage of retail price of a pack of 20 cigarettes) increased from 50 percent in 2016 to 68 percent in 2018. The average real price of a pack of 20 cigarettes increased by 42.5 percent over 2017-2018, as shown in Figure 4. The expected fiscal and health impacts of this measure are noteworthy. It is estimated that COP 1 trillion (about US\$ 347 million) in additional revenue will be generated through 2022, along with a reduction of approximately 20 percent in the mortality associated with tobacco consumption. In addition, the fiscal reform law mandates the earmarking of tobacco tax revenues to finance health insurance coverage at the departmental level (World Bank Group 2016).⁵

The recent experience of Australia, United States, United Kingdom (UK), and Russia also clearly illustrates the public

⁵ The fiscal reform program adopted by the Colombian government, including tobacco and alcohol tax increases, is supported under the World Bank Group’s US\$ 600 million fiscal Development Policy Operation, approved on March 9, 2017. The tax reforms are accompanied by stronger anti-contraband measures to prevent illicit tobacco trade.

health and fiscal gains that result from the imposition of high tobacco taxes.

In Australia, population use of tobacco has been falling steadily since the 1980s.

This has resulted from the combined impact of increased costliness, awareness about health risks, declining social acceptability of smoking, campaigns encouraging quitting, improved treatments for tobacco dependence, and greatly reduced opportunities for smoking (Scollo and Bayly 2016). Indeed, the annual increases in tobacco excise taxes in the past decade have led Australia to have one of the highest prices of cigarettes in the world—a 20-pack of Marlboro costs approximately a high US\$19, while the same pack costs only US\$12 in the UK, US\$7 in the United States and US\$3.88 in South Africa. The high tobacco tax level has also contributed massive yearly tax revenue to the Government.

In the United States, the federal cigarette tax for cigarettes was increased significantly in 2009 from US\$0.39 per pack to approximately US\$1.01 per pack to fund the expansion of children’s health insurance coverage. Besides revenue mobilization, estimates suggest that this tax increase could have reduced the number of smokers in a cohort of 18 year-olds by between 45,000 and 220,000 people, roughly 3 to 15 percent (CBO 2012), and contribute to the reduction of the number of premature deaths due to smoking by between 15,000 and 70,000 for two young population cohorts (12-17 and 18-25) (Furman 2016).

The UK Government uses excise duty (& VAT) as part of a unified approach to reducing smoking, in addition to generating revenue. In the UK, tax accounts for 77 percent of the price of a pack of cigarettes and has increased significantly more than the rate of inflation. As a result, of high taxes and prices, smoking rates has continued to decline over the past decade. Statistical information indicates that the number of adult cigarette smokers dropped nearly 20 per cent from an estimated 10.2 million in 2007 to 7.4 million or 15.1 percent of the population in 2017 (Cancer Research UK’s site 2019; Kay 2019). Tobacco taxes also contributed the UK government an estimated £10 billion in tax revenue over 2016/17 (HM Revenue and Custom).

Assessments done by the World Bank Group in Russia show that that life expectancy in the country for men increased to 65.4 years in 2016, up from 58 years in 2003, and among women, to 76.2 years in 2016, up from 72 years in 2003.

A big factor for this change has been the effective measures adopted to control the consumption of tobacco and alcohol over this period, including the enactment of a law on tobacco control in 2013 and regular increases in tobacco excise taxes since 2010. Because of tax and price increases, along with other tobacco control interventions, tobacco sales fell by almost 30 percent over this decade. Not surprisingly, the number of smokers also decreased, by 21 percent between 2009 and 2016, while higher tobacco taxes increased tax revenue for the country. (Marquez and Salakhutdinova 2018, Marquez et al 2005).

Table 2. Trends in Prices and Taxes on Tobacco Products, Selected Countries in Europe and Central Asia

COUNTRY	AVERAGE PRICE OF 20 CIGARETTE PACK, LCU	EXCISE PER PACK, LCU	TAX BURDEN (EXCISE + VAT), % OF AVERAGE PRICE	TOBACCO EXCISE REVENUE, BILLION LCU	EXCHANGE RATE TO USD	TOBACCO EXCISE REVENUE, MILLION USD	GDP, BILLION LCU	GDP, MILLION USD	TOBACCO EXCISE REVENUE, % OF GDP
ARMENIA									
2015	350	100.0	45.3	23.5	470	50.0	5,044	10,732	0.47
2016	362	110.0	47.1	30.4	480	63.3	5,067	10,556	0.60
2017	386	126.4	49.4	44.3	480	92.3	5,569	11,602	0.80
2018	417	145.5	51.6		480		6,003	12,506	
AZERBAIJAN									
2015	1.55	0.1	20.4		1.03		54	52,997	
2016	2.20	0.1	18.9		1.60		60	37,863	
2017	1.56	0.1	20.4	0.0	1.72	28.8	70	40,868	0.07
2018		0.2			1.70		80	46,940	
BELARUS**									
2015	0.93	0.3	47.5		1.59		90	56,541	
2016	1.09	0.3	44.6	0.8	1.99	395.5	95	47,688	0.83
2017	1.29	0.3	42.0	0.9	1.93	467.9	106	54,767	0.85
2018	1.39	0.4	43.8	1.2	2.04	603.9			
GEORGIA									
2015	2.40	1.0	52.4	0.4	1.77	213.0	32	17,944	1.19
2016	2.95	1.4	56.4	0.5	2.27	241.9	34	14,991	1.61
2017	4.03	2.0	60.3	0.7	2.37	283.5	38	15,970	1.78
2018	4.36	2.1	58.9		2.51		41	16,367	
KAZAKHSTAN									
2015	296	78.0	37.1	96.1	222	433.4	40,884	184,387	0.24
2016	324	100.0	41.6	121.4	342	354.8	46,971	137,278	0.26
2017	358	124.0	45.4	137.8	326	422.7	53,101	162,887	0.26
2018	397	150.0	48.5	165*	345	445.9	58,786	170,537	0.28
MOLDOVA									
2015	16	6.0	54.2	1.4	19	71.9	146	7,674	0.94
2016	22	8.0	53.0	1.7	20	86.7	161	8,040	1.08
2017	24	9.2	55.0	1.8	18	101.5	179	9,939	1.02
2018	26	10.8	58.2		17		190	11,176	
UKRAINE									
2015	16	6.1	59.6	22.2	21.85	1,016.0	1,989	91,007	1.12
2016	17	8.5	71.7	33.2	25.55	1,299.4	2,385	93,362	1.39
2017	23	11.9	73.4	39.9	26.6	1,500.0	2,984	112,177	1.34
2018	29	15.5	74.9	43.6	27.2	1,602.9	3,559	130,846	1.23

Source: World Bank Group team based on national and international data collected by Konstantin Krasovsky and Tatiana Andreeva, 2019. Notes: LCU = Local currency units. * Preliminary. ** Revenue includes excise and other taxes.

In the European Union (EU) member states, the consumption of cigarettes has been declining over the years, as reflected in the number of cigarettes released for consumption between 2002 and 2015, from almost 800 billion pieces in 2002 to just below 500 billion pieces in 2015 (Bouw 2017). Also, in the EU, the total revenue of excise duties on cigarettes has been stable between 2008 and 2015, despite declining consumption. The latter is explained by the increase in tax rates—since 1992, the EU tobacco excise duty directive requires member states to levy a minimum overall excise duty on cigarettes consisting of at least €90 per 1000 cigarettes and least 60 percent of the weighted average retail selling price.

And in the Republic of Korea, the 2015 tobacco tax reform introduced a series of extensive tax increases for all tobacco products, including cigarettes, e-cigarettes, pipe tobacco, cigars, waterpipes, roll-your own tobacco, chewing tobacco, snus, and snuff (Eun Choi, S. 2018). There are several taxes and charges imposed on tobacco products to reduce consumption but also to mobilize revenue (Local Education Tax, National Health Promotion Charge, Waste Charge, Public Fund, Tobacco Production Stabilization Charge, Special Consumption Tax, and General VAT). As a result of the 2015 reform, the price of a pack of cigarettes rose by 80 percent (from 2,500 won per pack to 4,500 won). Tax as a percentage of cigarette retail prices increased from 62 percent to 74 percent. The 2015 tobacco tax reform prompted male smoking prevalence to fall by 3.8 per-

cent that year, and by 2.5 percent in 2016. Smoking prevalence among youth in Korea also declined from 9.2 percent in 2014 to 7.8 percent in 2015, and to 6.3 percent in 2016. At the same time, total tax revenue significantly increased by 20 percent (0.9 trillion won) – a figure that continued to rise in 2016. In addition, as shown by a recent study, reduced tobacco use and related health risks are estimated to lower national health expenditure by 1.02 billion won and by 14.08 billion won over 10 years (KIPF 2015).

Table 2 above summarizes trends in tobacco prices and tax systems in Eastern Europe and Central Asia. Data for countries like Armenia, Azerbaijan, Belarus, and Uzbekistan, show the potential of tobacco tax and price hikes to increase government revenues, as a secondary effect to reducing health risks associated with tobacco use. Since 2018, other countries across the world—including China, Gabon, Indonesia, Lesotho, and Nigeria—have undertaken reforms on tobacco tax structures and increased tax rates, and Kazakhstan will start taxing e-cigarettes beginning in 2020.

Overall, as clearly observed on a International Monetary Fund (IMF) how-to note (Petit and Nagy 2016), *“in many countries, raising tobacco taxes can offer a “win-win”: higher revenue and positive health outcomes. Countries’ circumstances and governments’ weighting of revenue, health, and other objectives vary, and hence so too will the desirable level of tobacco tax rates. In many cases, however, current tax rates are evidently far below what is feasible in terms of revenue potential. Thus, tax*

increases could serve revenue purposes as well as health and other objectives. Of course, countries putting more weight on health objectives could raise taxes even further.”

Empirical Findings Contradict Traditional Arguments of Illicit Trade, Employment and Regressive Effects

Illicit trade undermines global tobacco prevention and control interventions. However, a recent global report by the World Bank (2019) also shows that, contrary to tobacco industry arguments, tobacco taxes and prices have only a limited impact on the illicit market share at country level. From a public health perspective, illicit trade weakens the effect of tobacco excise taxes on tobacco consumption—and consequently on preventable morbidity and mortality—by increasing the affordability, attractiveness, and/or availability of tobacco products. Furthermore, tobacco illicit trade often depends on and can contribute to weakened governance. However, evidence presented in the report from over 30 countries across the income and development spectrum, shows that raising tobacco taxes is not the primary cause of illicit trade. The evidence indicates that the illicit cigarette market is relatively larger in countries with low taxes and prices, while relatively smaller in countries with higher cigarette taxes and prices. Non-price factors such as governance status, weak regulatory framework, and the availability of informal distribution networks appear to be far more important factors.

Countries reporting significant progress in the control of illicit tobacco trade adopted some key policy and institutional measures which contributed to their success. A good example is Ireland, where a high rate of tobacco excise, and the consequent high price of tobacco products, makes the country attractive to those involved in the illicit tobacco trade. However, Ireland’s comprehensive and effective system of customs and tax enforcement, alongside strong regulatory control of the tobacco market, has contained the illicit flow of tobacco products onto the Irish market. Box 1 summarizes these measures, which are fully consistent with the provisions of the WHO FCTC Protocol to Eliminate Illicit Trade in Tobacco Products, which entered into force in September 2018, and needs to be ratified and adhered to by all FCTC Parties.

Policymakers considering tobacco tax hikes are often concerned about impacts on employment. However, increase in tobacco taxes does not negatively affect employment, as evidence from Indonesia shows. Recent assessments done by the World Bank Group (Araujo et al 2018), with the participation of the American Cancer Society, indicate that share to industry-wide employment is about 5 percent, or .60 percent of total employment in Indonesia. This share is smaller in comparison to employment in the food (27 percent), garment (11 percent), and textile (8 percent) sectors in Indonesia. The core-sector employment includes about 2.5 million manufacturing workers: 693 thousand farmers, 1.04 million

Box 1. Policies and Institutional Measures to Confront Illicit Tobacco Trade

Findings from the country case studies and assessments included in the World Bank Group report “Confronting Illicit Tobacco Trade: A Global Review of Country Experiences” (2019), suggest the following specific actions:

- **Require licensing for the full tobacco supply chain.** At present there is licensing at least for all manufacturers, importers, exporters, and distributors in almost all country cases. What is needed is for each country to assess its capacity to require licensing the rest of the supply chain, particularly retail. As noted in the Canada case study, the best example of using licensing to control the supply chain is in the province of Quebec, where the entire supply chain is licensed including tobacco growers, transporters, manufacturers, those who store raw tobacco and/or final products, importers, wholesalers, retailers, as well as those in possession of manufacturing equipment. Tobacco importers are licensed in Malaysia and the Philippines requires suppliers of raw materials to the production process, including those providing tobacco papers and filter components, to be licensed.
- **Require use of secure excise tax stamps and other product markings to facilitate enforcement and tax collection.** These markings should possess multiple layers of security (as implemented in Kenya, Georgia, and the Philippines, for example); they should not be removable; and they should be destroyed when the pack is opened (also to prevent reuse). The absence of secure excise marking in Southern African Customs Union countries, Chile, and Mexico weakens the ability of the tax authorities to collect taxes, as noted in the case studies.
- **Establish effective track-and-trace systems to follow tobacco products through the supply chain from production or import to sale to consumers.** Secure excise stamps are crucial but not sufficient to prevent tax evasion if there is no downstream verification that cigarettes have tax stamps and that they are authentic. A track-and-trace system would help address, for example, the challenge posed by under-declared domestic cigarette production or production declared for export but then sold on the domestic market. The Mexico, Chile, and Southern African Customs Union case studies identify the absence of a track-and-trace system as the major obstacle to controlling illicit trade in tobacco products. Notably, as detailed in the case studies, Ecuador’s tax track-and-trace system for domestically produced cigarettes, alcoholic beverages, and beer was implemented by its Internal Revenue Service in 2017 and is the first track-and-trace to comply with the Protocol to Eliminate Illicit Trade in Tobacco Products.
- **Establish effective enforcement teams equipped with automated reporting devices, to reduce human discretion**

in tobacco tax administration. This feature played a major role in improving the level of enforcement in Kenya and Georgia. However, the Kenya case also underlines the importance of enforcement agents with the power to carry out inspections at any time and at any point in the supply chain, to seize illicit products on the spot, and to bring immediate charges against offenders.

- **Obtain detection equipment and use it effectively at customs posts.** Most countries already have access to detection equipment, although not necessarily in adequate quantity. Potential governance challenges, with respect to the use of this equipment, can be further reduced by separating the roles of generating and interpreting scans (as noted in the Kenya case study).
- **Develop a risk profile to target inspections.** The Chile case highlights the use of a risk analysis tool for targeting suspicious cargos and to generate customs alerts.
- **Set relatively low duty-free allowances** for tobacco product purchases, both in terms of amounts (e.g. only two packs, as in Australia) and frequency (e.g. only once every 30 days as in Georgia). Chile shows how the lack of restrictions on frequency led to substantial but legal small-scale tax avoidance.
- **Regulate or ban trade in tobacco products in free trade and other special economic zones.** The Chile case study illustrates how the relative freedom from regulation in these zones can make them gateways for domestic sale of untaxed

tobacco products. In contrast, Colombia and Malaysia both established a strict regulatory framework for free trade zones to prevent this challenge.

- **Set and enforce significant financial penalties and penal provisions for illicit trade in tobacco products.** Seizures, financial penalties, and other punishment severe enough to be a deterrent (unlike some of those reported in the Kenya case study) are important. Criminal prosecutions are particularly important as deterrents, as indicated in both the UK and the Colombia case studies.
- **Provide for secure and environmentally friendly destruction of seized cigarettes, carried out by the regulatory authorities and not by the tobacco industry.** In Mexico, customs officials destroy seized cigarettes, while in the Philippines approval and presence of a Bureau of Internal Revenue representative is required. In contrast to this guidance, in South Africa an industry-representative body is responsible for the destruction of illicit goods.
- **Educate the public on the impact of tobacco illicit trade.** Getting the public involved supports enforcement and reduces the demand for illegal products. As noted in the case studies, the Philippines and Kenya introduced apps for the public to verify the authenticity of cigarette packs, while the UK ran a public awareness campaign explaining how purchasing illegal cigarettes harms the country and local communities.

Source: World Bank 2019

clove farmers, and 750 thousand tobacco farmers. Most tobacco sector workers are females and unskilled (66 percent manufacturing workers and 92 percent production workers). About 43 percent of households with tobacco workers are poor; they contribute, on average, to 60 percent of household income. There is also a male-female wage gap: female production workers earn 25 percent less than males. The assessments also estimated that raising cigarette taxes by an average of 47 percent and simplifying the cigarette tax structure to 6 tiers in Indonesia would reduce cigarette demand by 2 percent, increase government revenue by 6.4 percent, and reduce gross employment in tobacco manufacturing sector by only 0.43 percent.

Another often-cited concern among policy makers is that tobacco taxes are regressive, as they disproportionately burden poorer smokers, who spend a larger portion of their incomes on tobacco products, relative to wealthier consumers. To assess this argument, empirical analyses by the World Bank in several countries over 2016–19 provide an in-depth picture of the sociodemographic distribution of tobacco use. They use the ECBA framework, described below, to incorporate a wider view of longer-term health and economic costs and benefits by income group. This approach allows the adjustment behaviors to be compared if tobacco taxes rise for poorer and wealthier smokers. It also allows health benefits and productivity gains because of taxes to be incorporated that are neglected in traditional fiscal incidence analyses. This more

inclusive analytic model reverses the initial appearance of tobacco tax regressivity. Far from unfairly burdening the poor, tobacco taxes deliver the greatest share of their potent long-term benefits to people with low incomes. It is smoking that is regressive and tobacco tax increases that are progressive (Marquez and Moreno-Dodson 2017). The next sections discuss the main theoretical elements of this approach, as well as the main findings of the country studies.

The Price Elasticity of Tobacco Consumption

The distributional impact of raising taxes on tobacco—whether the poor are more heavily burdened or see the greatest benefits—depends on the responsiveness of low- and high-income consumers to the price changes in tobacco (WHO 2011a). The responsiveness of consumers to price changes can be expressed by the price elasticity of demand.⁶ Because of their highly addictive nature, tobacco products may be expected to be more price-inelastic—have lower price elasticities in absolute value, or less responsiveness among consumers to price changes—than other non-addictive products. This intuition may be used to advocate against raising tobacco taxes. However, the magnitude and distribution of elasticities remain an empirical question to be determined in each country context and population group. Understanding the price elasticities of tobacco across the population

⁶ This parameter—often used in economics—captures the change in the quantity of cigarettes demanded by consumers in reaction to a 1 percent rise in the price of cigarettes.

Figure 5. Effect of Increasing Tobacco Prices, Extended Cost-Benefit Analysis

Net Income Effect	=	Change in tobacco expenditure (A)	+	Change in medical expenses (B)	+	Change in years of productive life list (C)
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Source: World Bank Group elaboration.

is therefore crucial in calibrating the correct policy actions and estimating the welfare and distributional effects of tobacco tax systems.

An extensive body of evidence attempts to estimate the relationship between tobacco prices and consumption. Meta-analyses of the relationship between tobacco prices and use suggest that the overall elasticity of demand among adults lies between -0.3 and -0.8, signifying that a 10 percent increase in cigarette prices will lead to a 0.3 percent to 0.8 percent decline in consumption (CBO 2012; Chaloupka and Warner 2000; Gallet and List 2003; IARC 2011).

Such relationships, however, are not homogeneous across countries and income groups. In high-income countries, raising the price of cigarettes by 10 percent leads to an estimated reduction of 4 percent in the demand for cigarettes (World Bank 1999). An equivalent price change in low- and middle-income countries would likely result in a 6 percent average fall in demand (IARC 2011).

Lower-income households tend to show higher price elasticity of demand relative to medium- and higher-income groups (World Bank 1999). Empirical research in a variety of countries, including Bangladesh, Canada,

China, Indonesia, the United Kingdom, and the United States, suggests that the sensitivity of smoking prevalence to changes in cigarette pricing is greater among lower socio-economic strata. However, the evidence is still mixed in other cases, including Egypt, Bulgaria, and Turkey (IARC 2011).

Tobacco elasticities can be expected to increase in the future as more-responsive young generations become the largest consumer group (Fuchs and Del Carmen 2018). It is often argued that younger individuals and low-income groups are more responsive to price changes relative to their peers. Lower dependence on nicotine, larger peer effects, and limited disposable income may cause younger people to be more responsive to tobacco price shocks (Jha and Peto 2014). Chaloupka and Grossman (1996) and Lewit and Coate (1982) find that, in the United States, individuals ages under 18 exhibit much larger tobacco price elasticities (between -1.44 and -1.31) than adults (between -0.27 and -0.42).

The Extended Cost Benefit Analysis Methodology

ECBA can be used as a theoretical framework to understand the mechanisms

through which taxes on tobacco affect household welfare and equity outcomes.

While the ECBA methodology can vary, two main features allow the distributional impact of increasing taxes on tobacco to be assessed. First, incorporating decile-specific price elasticities of tobacco products allows the stylized fact that different income groups can have different behavioral responses to price changes to be taken into account. Second, accounting for both the costs and the benefits of increasing prices provides a more comprehensive understanding of the net effects, as well as likely short-, medium-, and long-term policy outcomes.

Figure 5 summarizes the mechanisms that have thus far been incorporated in empirical applications of the ECBA by the World Bank. And the next two sections describe the main cost and benefit components. (For further methodological details, see Fuchs and Meneses, various years; Pichón-Riviere et al. 2014; Verguet et al. 2015.)

Costs of Tobacco Taxes: Short-Term Direct Price Effect (A)

All else being equal, increasing prices of tobacco necessarily translate to a welfare loss among consumers, who must spend higher shares of their budgets to continue to purchase the same quantities of tobacco. Such a mechanism is generally behind the claims of regressive effects. A naïve complete pass-through scenario whereby households continue to purchase the same quantity of tobacco at higher prices disproportionately affects lower-income households,

which tend to allocate a larger proportion of their budgets to tobacco.

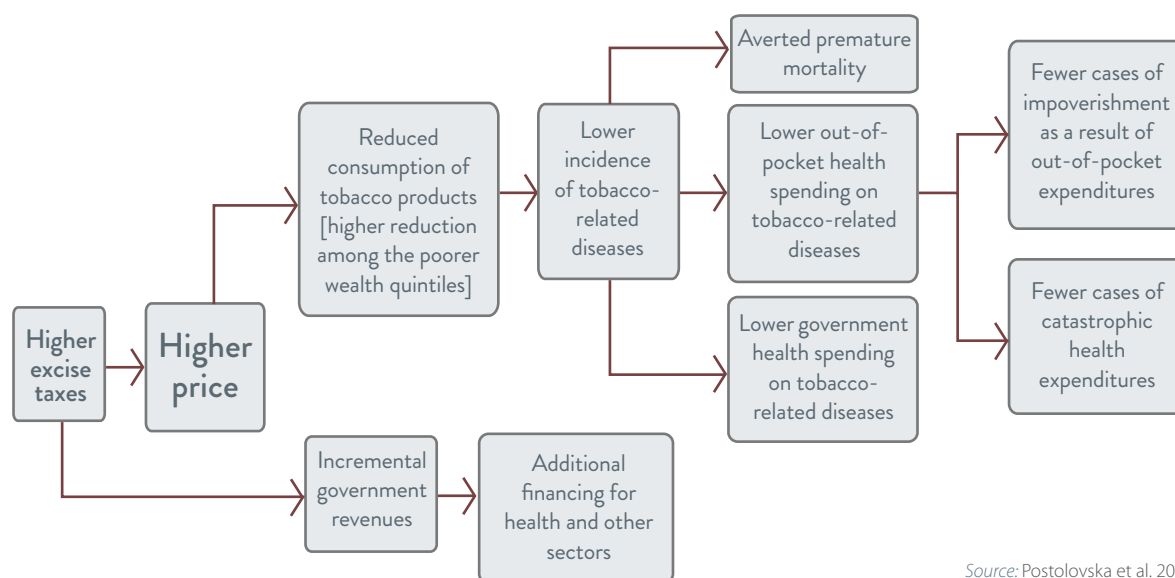
However, consumers respond to price increases by adjusting their consumption behavior. This response depends on the sensitivity of consumers to price changes, captured by price elasticities of demand. While the effect may still inflict a short-run welfare loss on some households, its magnitude and distribution depend on the initial distribution of consumption across households, household elasticities of demand, and the magnitude of the price shock.

Benefits of Tobacco Taxes: Reduced Medical Costs (B) and Additional Years of Working Life (C)

By discouraging consumption, taxes on tobacco products reduce the adverse health effects of tobacco, as well as the large associated medical and human capital costs to households and societies.

Medical treatment of the numerous chronic diseases caused or exacerbated by tobacco swells annual health care costs in public health care systems and households (World Bank 2017). Smoking reduces household earning potential and labor productivity, negatively affecting human capital accumulation and development (WHO 2015). Hence, reducing tobacco use translates to lower smoking-related medical expenses, increases in life expectancy at birth, and reductions in disability.

Figure 6. Benefits of Increasing Tobacco Taxes: Channels of Transmission



Source: Postolovska et al. 2017.

Public and private health care accounts for the major share of the costs of tobacco use, beyond the price of household consumption. Tobacco-related health care costs can be either direct or indirect. Direct costs include the monetary value of the consumption of goods and services that is motivated or compelled because of tobacco use. These include health care costs (hospitalization, pharmaceuticals and supplies, medical equipment, and so on) and non-health care costs (insurance, job replacements for sick smokers, cleaning up cigarette residues and packaging, and so on). For example, in the United States, tobacco-related diseases are associated with direct health care costs of 1.1 percent of GDP or 8.7 percent of annual health care spending (Xu et al. 2015).

The indirect costs of smoking on household welfare may include losses in labor incomes because of lower productivity or working days forgone because of illness, as well as the value of lives prematurely lost because of tobacco (WHO 2011b).

Hence, raising the prices of tobacco may expand the years of productive life. Verguet et al. (2015) analyze the health effects of a price increase in China and conclude that a 50 percent rise in prices would result in 231 million life years gained over 50 years and would have a significant impact among the poor. In contrast, Pichón-Riviere et al. (2014) estimate that tobacco use in Chile would reduce life expectancy by nearly 4.0 years among women and 4.3 years among men. Ahsan et al. (2013) estimate that, if taxes were raised to 57 percent of the retail price of tobacco products, 1.96 million tobacco-re-

lated deaths would be averted in Indonesia. Similarly, if taxes were raised even more, to 70 percent, more than 5 million deaths would be averted.

Other indirect and second-round effects may also be significant. Raising taxes on cigarettes may reduce exposure to second-hand smoke, with significant health and economic benefits. Households may likewise benefit from increased public expenditure because governments have typically earmarked tax revenues from tobacco sales for health care and social programs.

Figure 6 summarizes the channels of transmission from taxes to health and economic benefits. It is assumed that the excise tax is directly passed on to the consumer in the form of higher prices. This results in reduced consumption of tobacco products, leading to a decline in the incidence of tobacco-related diseases, such as stroke, lung cancer, cardiovascular disease, and chronic obstructive pulmonary disease. In turn, this reduces premature deaths associated with tobacco use. In addition, it leads to lower out-of-pocket spending for the treatment of tobacco-related diseases, resulting in fewer cases of impoverishment and catastrophic health spending. Given that a large share of health services is financed by governments, this would also result in government savings on tobacco-related health expenses. Combined with the revenues from tobacco taxes, the additional resources could be used to finance health care and other sectors.



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EMPIRICAL RESULTS: LESSONS FROM COUNTRY CASE STUDIES

A growing body of evidence has successfully applied the ECBA methodology to different countries and consistently found evidence of medium- to long-term progressive distributional effects. This section summarizes the lessons learned through eight country studies carried out by the World Bank. Most studies highlight that lower-income households are more likely to reduce consumption of tobacco when facing higher prices. They also find that the medium- and long-term benefits of reduced consumption can often outweigh the short-term costs, resulting in net income gains, particularly among lower-income groups. In addition to the eight cases presented below, the World Bank Group also produced assessments following a similar methodology in **Armenia (Postolovska et al 2017)**, **Colombia (James et al 2017)**, and **Kyrgyz Republic (Postolovska et al 2018)**. (For full methodological details, results, and further information, the reader should refer to the individual country studies that can be accessed at the World Bank Group Global Tobacco Control Program site).

Chile

Findings from Chile illustrate the relevance of the price responsiveness across

income groups; accounting for benefits facilitates a more comprehensive long-term picture of the effects of tobacco tax policy. Fuchs and Meneses (2017b) simulate the effect of increasing taxes on cigarettes in Chile. As expected, a naive assumption that smokers do not adjust their consumption to the price changes would appear to confirm the concerns about regressive policy effects. To keep on purchasing the same quantity of tobacco, the poorest 20 percent of the population would have to reduce their consumption of other goods more than three times the equivalent reduction among the wealthiest decile (as a percentage of income). However, accounting for behavioral changes by incorporating price elasticities reduces the negative shock across all deciles because smokers react by switching consumption away from tobacco products and toward other goods. This price effect remains negative before taking into account of health and earnings benefits, but simulations suggest that, in the long term (under an upper-bound elasticity scenario), the price effect on household budgets would approach zero, as tobacco consumption is further abandoned.

The net effect of increasing taxes on tobacco is calculated by incorporating the

benefits of reducing the medical costs and years of life lost to the direct price effect.

Medical costs because of tobacco-related diseases are estimated at US\$496 million in Chile by Pichón-Riviere et al. (2014). Almost 30,000 people are estimated to die prematurely from tobacco-related diseases annually. Simulations under a lower-bound elasticity scenario, show that the net effect of increasing the price of cigarettes by 25 percent is negative and regressive, affecting the lower-income groups of the population more severely. However, as elasticities increase, the effects become more progressive. Assuming a long-term (or high-elasticity) scenario, the price increase has a progressive distributional effect, has a positive effect on all income groups, and shows a progressive pattern, that is, greater benefits among lower-income groups.

Indonesia

The ECBA in Indonesia highlights the need to account for different tobacco products that raise further complexities in understanding the effects of tobacco tax increases. Using data from the 2015–16 Indonesia National Socioeconomic Surveys, Fuchs and Del Carmen (2018) estimate that the net distributional effect of increasing prices on white and clove cigarettes in Indonesia will likely be progressive. Smoking prevalence in Indonesia is among the highest in the world, with two households in every three reporting positive expenditure on tobacco products. The amount spent on tobacco among these households is large, reaching almost 10 percent of the household

budget in some middle-income groups (deciles 3–6). The ECBA allows the relevant benefits of reducing tobacco consumption in Indonesia to be incorporated that would be underestimated under a traditional naive estimation. Approximately 153,108 people (mostly men) died prematurely from tobacco-related diseases in Indonesia in 2016, which translated to more than 4 million years of life lost. Additionally, in 2015, annual direct health care costs attributable to tobacco use amounted to US\$2.2 billion (equivalent to 2.5 percent of GDP).

The case of Indonesia raises a variety of complexities in applying ECBA, and it sheds light on many questions that may be applicable to countries with local substitutes for cigarettes.

White and clove cigarettes are widely consumed in Indonesia. Hence, price elasticities and cost benefits were estimated separately. Clove cigarettes are cheaper and, on average, have lower price elasticities than white cigarettes (–0.52 vs. –0.63). However, in both cases, the distribution of elasticities is consistent with the literature; lower-income households are more responsive to price changes. Assuming a 25 percent price shock, the benefits of reducing tobacco-related medical bills and years of life lost contributed to offsetting the direct price shock of increasing taxes. In the case of white cigarettes, the net effect is always positive, but regressive; irrespective of the elasticity assumption, poorer deciles benefit less than richer ones. In contrast, clove cigarettes show heterogeneous effects, depending on the elasticity assumptions. Under lower-bound elasticities, the results

show that the net effect of clove tax policy is negative and regressive. In the case of the medium-bound elasticity, the tax is progressive, with positive gains among the poorest 20 percent of the population. For upper-bound elasticity, the tax would have a positive effect on most income groups and a progressive pattern. Further research into the heterogeneity of results and possible substitution effects is needed to formulate appropriate policy responses that curtail tobacco consumption altogether, avoiding substitution to cheaper (and often lower-quality) tobacco products.

Bosnia and Herzegovina

The case of Bosnia and Herzegovina provides some evidence to question the traditional view of tobacco as a highly price inelastic product, particularly among lower-income groups. Based on data from the 2015 Household Budget Survey, Fuchs, Cancho, and Orlic (2019) simulate the impact of increasing cigarettes prices by 25 percent, a similar increase to the one registered on the average 20-pack of cigarettes between 2015 and 2018, according to the Indirect Taxation Authority. When faced with increases in tobacco prices, households with the least financial resources reduce consumption considerably more than those with more resources. After an increase of 10 percent in price, people at the lowest income curtail consumption by up to 10 percent, while people at the highest income reduce consumption by only 3 percent. In fact, the distribution of elasticities found in Bosnia and Herzegovina suggests that the poorest 10

percent of households have elasticities above unit (in absolute value). Because of their high sensitivity to prices, households at the lower end of the income distribution change their consumption not only to reduce the quantity of cigarettes, but also to allocate less money to cigarette purchases than before the increase.

Similar to the findings in other countries, in considering the two additional effects derived from the decrease in tobacco consumption, households would see their welfare eventually increase. For example, households could save resources with a reduction in health expenditures on a lower incidence of tobacco-related illnesses. Moreover, additional income brought about by an increase in life expectancy means that the bottom 60 percent of the income distribution could end up with more resources than before the price increase.

Ukraine

Reducing medical expenses is the main mechanism driving the progressive effects of raising taxes on cigarettes in most case studies on middle-income countries. In line with patterns in other country cases, Fuchs and Meneses (2017) find that the results in Ukraine are mixed and highly dependent on the assumptions of price elasticities. Under a lower-bound elasticity scenario whereby the population has low responsiveness to the price changes, the net effect is negative across all households though the incidence is progressive, with a smaller shock on lower-income groups. In the case of a medium-bound elasticity, the

tax has a progressive impact, with net income gains among lower-income groups and a negative effect on higher-income groups. In the case of the upper-bound elasticity, incidence is progressive, and the income effects are mostly positive. Only the highest income groups face long-term income losses.

The progressive effect is mostly driven by the offsetting effect of reduced medical costs. The same mechanism is found in the ECBA on most countries, except Bangladesh. Reducing medical bills is highly progressive because treating a tobacco disease would represent a much higher share of the budget among lower-income households. In addition, lower-income individuals may have less access to risk management instruments, and, thus, should catastrophe occur, this group will suffer even more than the rest. On the other hand, available data still present limitations on capturing the exact smoking-related medical expenses across income groups. Finding ways to estimate the distribution of medical expenses more accurately across the population is key to improving the knowledge on the equity effects of tobacco tax policy, as well as interventions in the health system to tackle possible catastrophic expenses associated with tobacco-related diseases.

Russian Federation

In Russia, the reduction in medical expenses is also the most relevant channel of transition to improve household welfare by increasing taxes on tobacco. Despite gradual reductions in recent years, smoking is still common in Russia,

particularly among men and lower-income households (Fuchs, Matytsin, and Obukhova 2018). Tobacco-related medical expenses are likely to be a considerable burden on Russian households. Medical expenses for tobacco-related diseases are estimated at Rub 418 billion in 2017. Averting these medical expenses has a much larger effect on average household welfare than the short-term negative impact of increasing tobacco prices. If reduced tobacco consumption translates directly into improved health outcomes, the poorest 10 percent of households in Russia could increase their available household budgets by over 1 percent when facing a 25 percent price increase in cigarettes. The equivalent elasticity-adjusted price shock on these households would be less than a 10th of the benefits from reduced medical bills (a 0.01 percent income loss). Hence, Fuchs, Matytsin, and Obukhova (2018) find that taxing tobacco in Russia exerts a net positive and progressive long-term effect on household incomes. However, as theory and empirical applications suggest, the magnitude depends on the structure of price elasticities. If the population is more responsive to tobacco price changes, it will experience greater gains from the medical and extended work-life benefits.

Moldova

In Moldova, simulations show a potentially progressive impact, despite data limitations and only a partial view of the ECBA. Tobacco-related diseases are the leading cause of premature adult deaths.

Consistent with other country cases, Fuchs and Meneses (2018) find that the net effect of increasing taxes on tobacco in Moldova would be progressive, ultimately benefiting low-income households most. The gains in reduced medical expenses seem to be sufficiently large to offset the negative price effect on household budgets, with a pro-equity result. The ECBA is estimated in Moldova to account for the direct price shock, as well as reductions in tobacco-related out-of-pocket medical expenses.

Information on the years of life lost because of tobacco-related premature deaths is not incorporated because of limitations in the mortality data. Despite this, under the long-term (high elasticity) scenario, the bottom 40 percent of the population would capture net positive gains in income. The progressive effect is driven by two factors that are common in most country studies. First, lower-income households capture higher benefits because they are most likely to reduce smoking given their higher elasticities of demand. Second, reducing the high costs of treatment represents a large share of the lower income base among the poorer households. While the progressive findings are impressive, accounting for the change in medical expenses as well as other channels is fundamental to acquiring a full picture.

Bangladesh

The results in Bangladesh highlight the need to improve the estimation and prediction of medical expenses and underline that the progressivity of tobacco taxes may depend on allowing lower-income

households to respond firmly to the price changes. First, increasing the price of cigarettes in Bangladesh has only small consumption impacts. The effect on poverty and inequality would be negligible. Relative to other country studies, the lack of progressive effects seems to stem from a more uniform distribution of elasticities among less and more well-off households. Second, in contrast to other countries, reducing medical bills seems to be less significant in Bangladesh. However, this finding may be driven by an underestimation of tobacco-related medical expenses. Even if medical expenses are correctly calculated, given the low household incomes in Bangladesh, they are likely to increase in the future as incomes rise and the epidemiological transition toward NCDs kicks in.

There are relevant policy implications. While elasticities are taken as exogenous parameters in the ECBA methodology, policy may still aim to influence responsiveness to tobacco price changes. For example, complementing tax reforms with other programs to support quitting among smokers may increase the overall magnitude of the effects. Reaching lower-income households through these efforts would likely improve equity and poverty reduction.

South Africa

Efforts to reduce tobacco consumption can feed back into future consumer behavior and become increasingly difficult, highlighting the need to complement tobacco taxes and other policy interventions to maximize impact. The price responsiveness of smokers seems less in

South Africa than in other countries. Fuchs, Del Carmen, and Mukong (2018) calculate elasticities of tobacco demand in South Africa, using longitudinal data with repeated observations on the cigarette purchases of individuals over time, allowing an improvement on earlier calculations based on more aggregated time series data. They find that the poorest decile has a medium-bound elasticity of -0.36 , whereas the richest has an elasticity of -0.22 . Such estimates are below the range of -0.4 and -0.8 usually estimated for developing countries (Chaloupka et al. 2000). Despite low elasticity estimates, Fuchs, Del Carmen, and Mukong (2018) continue to find a progressive net effect of increasing taxes on tobacco. And aggregate welfare gains are positive among the bottom five deciles (under the medium-bound elasticity scenario).

Possible explanations for the more inelastic tobacco consumption in South Africa are the country's past in substantial antitobacco policies and the changing structure of the tobacco market in recent years. Following profound changes in tobacco legislation, smoking prevalence decreased by over 10 percentage points. Today, smoking prevalence is lower in South Africa than in other developing countries. While these are highly desirable policy outcomes, they seem also to indicate that impactful policy interventions will become increasingly more difficult to achieve. It is likely that people who continue to smoke are more addicted and possibly less sensitive to price changes. Despite this, it is essential that policies be focused on reducing the

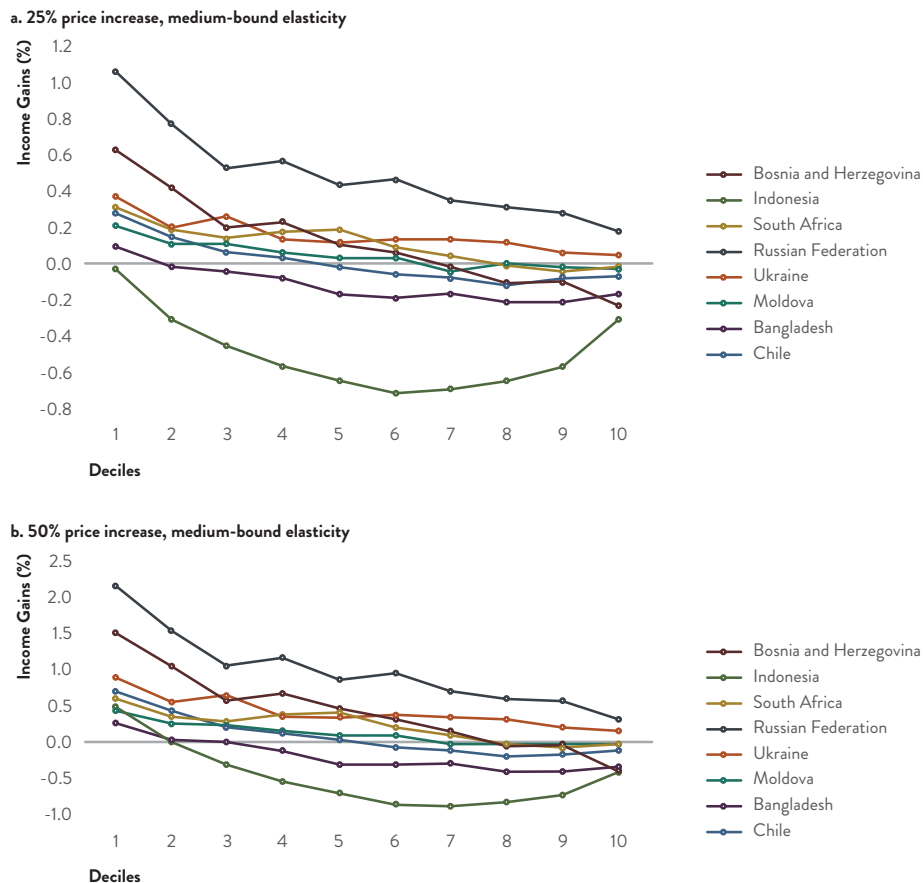
likelihood of smoking initiation among younger individuals. A uniform increase in tobacco taxes should not be the only policy in place to reduce tobacco consumption in South Africa. Along with price increases, complementary policies to induce quitting will likely be required.

New Comparative Evidence

Fuchs et al. (2019) have conducted a comparative study to simulate tax policy changes in the eight low- and middle-income countries in (circa) 2016. Using updated and comparable data sources across countries, they confirm previous findings of a progressive net distributional effect of raising taxes on cigarettes. Similar to the previous country studies, they find that elasticities help mediate the direct price shock among lower-income households. Incorporating the reductions in medical expenditures and the additional years of working life because of lower premature mortality help offset the negative price effects in all countries. However, this depends on the initial distribution of smokers and price elasticities. Figure 7 shows the net effects under 25 percent and 50 percent price shock scenarios, assuming a medium-bound price elasticity scenario.

In sufficiently high price shocks and elasticity scenarios, incidence is progressive, and net welfare changes are positive among a large proportion of the population. Half the population in these countries could potentially benefit in the medium term from net household income

Figure 7. Comparative Net Income Effects of Increasing Tobacco Prices



Source: Fuchs et al 2019

Note: Deciles calculated from household per capita consumption (excluding identifiable rent and lumpy expenses). Years of life lost calculated from death events related to the risk of smoking tobacco.

gains—in addition to health and quality of life improvements and the potential benefits from increased revenues—if cigarette prices rose by 50 percent. The updated evidence collected on the eight countries supports the view that resolute tax policy, combined with actions to induce behavioral changes among smokers, can generate progressive, pro-poor and welfare-improving outcomes in the long term.

Limitations of the Empirical Findings

The main theoretical limitation of the ECBA methodology is the partial equilibrium approach, while data limitations continue to constrain empirical applications in many countries. The second-round effects and general equilibrium changes of increasing taxes on tobacco are excluded from the model and may be

significant. For example, the ECBA does not cover additional behavioral changes among economic agents that could unleash economy-wide reactions that are difficult to predict. Other effects, such as labor productivity gains, reductions in secondhand smoking, or time allocation to care for sick family members, can be potentially incorporated in the ECBA at higher complexity and data requirements. The incorporation of nonlinearities in elasticities could also be complex. Data limitations and higher theoretical and estimation complexities have prevented such efforts thus far. Moreover, lack of data continues to be a constraint on the application of empirical estimations of the ECBA to other development settings.





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KEY TAKEAWAYS

A growing body of evidence in different countries finds no support for the claims that the impacts are regressive and highlights the relevance of the long-term benefits of increasing taxes on tobacco.

Increasing taxes on tobacco can generate health and equity improvements and help mobilize additional domestic resources to expand the fiscal space for priority investments and programs that benefit the entire population, particularly the poor. The results in eight countries show that, for large price shocks, the aggregate benefits of tobacco taxes can exceed increased tax liabilities, with progressive effects that particularly improve the welfare of lower-income households. The net income and distributional effects of increasing taxes on tobacco depend on the distribution of smoking prevalence and the magnitude and distribution of price elasticities across income groups.

Tobacco taxes are recognized as an effective policy tool to reduce tobacco consumption and improve health outcomes; however, policy makers often hesitate to use them because of their perceived regressive effects, that is, poorer households are disproportionately more affected than richer households when faced with increased prices due to higher taxes. This policy note summarizes the findings on the effects of tobacco taxes on distributional and fiscal outcomes across several countries. It presents results from the application

of the ECBA to eight low- and middle-income countries. To simulate the distributional impact of increasing taxes on cigarettes, the methodology allows for different consumer responses across income groups, and it incorporates both the negative budget shock and the benefits derived from improved health and productivity. The results on these countries contradict the regressivity claim. Increasing taxes of tobacco is in general pro-poor even without taking into account of all important benefits for the poor—therefore a progressive policy.

To assess the net welfare gains of this policy, one must consider the behavioral responses of consumers facing a price change, look beyond the direct impact on household budgets, and assess other benefits derived from lower tobacco use and consumption. Considered by itself, a price increase in tobacco through higher taxes generates negative income variations across all groups in the population. However, if price elasticities are incorporated, these results no longer hold because the poorest individuals tend to have higher price elasticities than their richest peers. As individuals reduce tobacco consumption, reductions in medical expenses and gains in potential working years also work to offset the direct negative income changes.

Several channels translate the increase in tobacco taxes into health and economic

improvements among households, particularly households at lower income.

It is well established that reducing tobacco consumption improves health outcomes and the quality of life among smokers and their family members. Moreover, by increasing prices and discouraging consumption, taxes on tobacco also affect household economic welfare through several channels. Lower smoking prevalence reduces the tobacco-related burden of disease, freeing households from medical bills and averting premature deaths. In addition to the intrinsic value of human lives (conservatively not taking into account of here), averting the premature deaths also increases the potential earnings of workers, both by increasing their productivity (not covered here), as well as extending their working lifetimes. The ECBA allows for the incorporation of these mechanisms—averted medical bills and additional working—to estimate the changes in household welfare. To the extent that lower-income households face higher relative burdens of tobacco, the benefits will be progressive. Other transmission channels—for example, increases in productivity because of reduced days of sickness or the effects of curtailing secondhand smoking among children—can generate additional welfare benefits.

Tobacco consumption affects household welfare and equity in societies negatively mostly through medical expenses.

The reduction in medical expenses is the main driver of the increase in net incomes. However, current estimates of medical expenses are associated with

methodological problems. There is a clear need to refine the methods used to estimate the medical costs of tobacco (Lightwood et al. 2000). Improving the estimation of these costs and understanding their burden across population groups will be key in the research agenda. Implementing policies to shield the poor from these catastrophic expenses will be necessary during a transition period.

Policies should aim to induce and leverage the behavioral responses among consumers by complementing tax increases and other policy interventions to reduce smoking.

Higher elasticities increase the potential gains from reducing health expenses and years of working life lost (Fuchs and Del Carmen 2018). Hence, long-term positive gains from tobacco taxes require inducing relevant behavioral changes in consumers that allow health-related benefits to kick in. After a few decades, it is expected that the impact of the tax policy would resemble the upper-bound elasticity scenario. High price shocks and targeted tobacco control policies (on groups with higher smoking rates) may be justified to reach welfare-improving and progressive policy outcomes. Taxes will be most effective if they are complemented by policies such as smoking cessation programs or media campaigns. A population that is not sensitive to tobacco price changes will not reduce consumption sufficiently to allow health and work benefits to offset cost increases.

Short- and long-term policy outcomes will likely differ. While it is possible that tobacco taxes will remain regressive in the short run

because health effects take time to kick in, the results of this report are helpful as lower- and upper-bound estimates of the benefits of tobacco taxation. Adult smokers tend to exhibit small changes in their behavior if price increases, while younger groups show more elastic demand. After a few decades, the impact of the tax policy would be expected to resemble the upper-bound elasticity scenario.

Tobacco control policy should target the most vulnerable groups. The heterogeneity in price responsiveness that has been found across a variety of country cases highlights the opportunity to maximize policy impact by targeting specific population groups. For example, governments may consider complementing tax policies with tailored interventions to leverage higher price responsiveness among youth or women to prevent smoking initiation. And tax systems must be well designed to ensure that affordability is reduced across all tobacco products, with attention to potentially cheaper substitutes to cigarettes that may disproportionately affect the most vulnerable groups.

Smart policy design and implementation can also help to maximize health impacts and to raise support for tobacco tax policies. As shown by the experience in countries such as Botswana, Colombia, Ecuador, Republic of Korea, Philippines, and the United States, “soft” earmarking of public funds—for example, linking increased taxes to increased health spending or other priority programs and investments that benefit low-income populations—helps generate

grassroots support for proposed tobacco tax hikes, as well as enhance the progressivity of tobacco taxation (Furman 2016; Marquez and Moreno-Dodson 2017).

Improved data availability and further research should build on the quality and specification of the model. While an extensive research on the health and economic effects of tobacco has accumulated, knowledge on the distributional effects of tobacco is still nascent in many developing settings. Collecting relevant data to understand the distribution of tobacco consumption and elasticities across population groups is fundamental to implementing policy reforms and to help smokers and poor households to overcome the burden of tobacco. Exploring other mechanisms through which tobacco affects equity will be fundamental.



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CONCLUSION

The key take-away message to convey to policy makers and other actors is that higher prices of cigarettes provide more health and financial gains to the poorest than to the richest groups of the population. As such, higher excise taxes that lead to higher prices and reduced consumption and health risks associated with tobacco-attributable diseases support the targets of the sustainable development goals on non-communicable diseases and poverty, and provides financial protection against illness.

Indeed, as shown by the results of a recent study on which we collaborated, a 50 percent increase in cigarette prices would lead to about 450 million years of life gained across 13 diverse middle income countries (lower middle income, India, Indonesia, Bangladesh, the Philippines, Vietnam, and Armenia, and upper middle income, China, Mexico, Turkey, Brazil, Colombia, Thailand, and Chile) from smoking cessation. Half of these are estimated in China. Across all countries, men in the bottom income group (poorest 20 poorest of the population) would gain 6.7 times more life years than men in the top income group (richest 20 percent of the population; 155 v 23 million).

The average life years gained from cessation for each smoker in the bottom income group was 5.1 times that of the top group (1.46 v 0.23 years). Of the US\$157billion

in averted treatment costs, the bottom income group would avert 4.6 times more costs than the top income group (US\$46 billion v US\$10 billion). About 15.5 million men would avoid catastrophic health expenditures in a subset of seven countries without universal health coverage. As result, 8.8 million men, half of them in the bottom income group, would avoid falling below the World Bank definition of extreme poverty. These 8.8 million men constitute 2.4 percent of people living in extreme poverty in these countries. In contrast, the top income group would pay twice as much as the bottom income group of the US\$122 billion additional tax collected. Overall, the bottom income group would get 31 percent of the life years saved and 29 percent each of the averted disease costs and averted catastrophic health expenditures, while paying only 10 percent of the additional taxes (Global Tobacco Economics Consortium 2018).

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Address of site of the World Bank Group Tobacco Control Program:

<http://www.worldbank.org/en/topic/tobacco>

ANNEX

A. Model

This section describes the partial equilibrium approach used to simulate the impact on consumption of an increase in the price of cigarettes. This approach is used to evaluate the first-order effects of a change in prices. It relies mainly on household expenditure patterns. The focus is on the impact of a rise in the price of cigarettes, a common target of tobacco tax reform.

To assess the distributional impact of an increase in the price of cigarettes, the simulation allows for differences in the responses across consumption deciles to reflect the fact that poor households likely have different price elasticities relative to households with more resources. The different elasticities, combined with the initial consumption patterns across deciles, explain whether a price reform will be more regressive, more neutral, or more progressive.

The loss of real consumption arising from the price increases in a product i is obtained as follows:

$$(\omega_{ij,0} + \Delta\omega_{ij}) * \frac{\Delta p}{p_0}, \quad (\text{A.1})$$

where ω_{ij} is the share of product i in total household expenditure for a household in decile j ; Δp_i is the price increase; and $\Delta\omega_{ij}$ is the change in consumption of the good that depends on price elasticity.⁷

Change in Tobacco Expenditures

To estimate the variation in cigarette consumption after the price increase, the model considers the change in prices (Δp), the tobacco price elasticity (ϵ_j) for decile j , and the share of cigarette expenditure in period 0 ($\omega_{ij,0}$). The change in the expenditure of household i in decile j is presented as a share of total expenditure and averaged by decile to quantify the overall impact, as follows:

$$\Delta \text{Expenditure}_{i,j} = (1 + \Delta p)(1 + \epsilon_j * \Delta p)^{-1} * \frac{\omega_{ij0}}{\text{Total expenditure}_{ij0}} \quad (\text{A.2})$$

⁷ For a detailed discussion of the methodology, see Coady et al. (2006); Kpodar (2006).

Medical Expenditures

The change in medical expenditures associated with tobacco-related diseases is estimated using equation A.3, for which the cost of treatment of tobacco-related diseases for income decile i is obtained from administrative data. The cost of tobacco-related medical expenditures is distributed across income decile i according to the share of households that consume tobacco in decile i . Equation A.3 shows the income gains associated with the reduction in medical expenditures because of reduced tobacco consumption over the long term.

$$\Delta \text{ Medical expenditure}_{i,j} = (1 + \varepsilon_j * \Delta P) - 1 * \frac{\text{Cost Treat. Tobacco-Related Diseases}_i}{\text{Total expenditure}_{j0}} \quad (\text{A.3})$$

A reduction in tobacco consumption in the long run would be strongly related to a reduction in tobacco-related diseases. The model assumes that the health effects of tobacco-related diseases will diminish with the reduction in tobacco consumption. Even though this assumption is implausible in the short term because changes in the effects of tobacco-related diseases take time to materialize, it provides an upper-bound estimate of the effects of tax increases.

The Increase in Working Life Years

The model estimates the impact on income arising from the increase in working years (equation A.4). To estimate the increase in working years, the years of life lost, YLL , from tobacco-related diseases are distributed across deciles i proportionally to the number of households that consume tobacco (equation A.5). Subsequently, the income lost is estimated as the average income per household in decile i . Overall, the model anticipates that income will increase as the number of years lost because of premature deaths from tobacco consumption declines.

$$\Delta \text{ Income}_i = (1 + \varepsilon_j * \Delta P) - 1 * \frac{\text{Working Years}_i * \text{Total Expenditure}_i}{\text{Total expenditure}_i} \quad (\text{A.4})$$

$$\text{Working Years}_i = (YLL_i * \text{Share of Smokers}_i) / \text{Population}_i \quad (\text{A.5})$$

The total income gains in each income group are estimated by adding the results of the increase in tobacco expenditures, the reduction in medical expenditures, and the gain in working years.

B. Tobacco Price Elasticity, by Decile

Let Q_{id} be defined as the average quantity of cigarettes smoked per day by individual i in income decile d ; P the average price per cigarette (unit value of tobacco use); D_i the

consumption decile of individual i ; and X_{id} the individual characteristics. Then, the smoking intensity equation is written as follows:

$$\ln Q_{id} = \beta_0 + \beta_1 \ln P * D_i + \beta_3 X_{id} + \mu_{id} \quad (\text{A.6})$$

intensity, price, and income. $\ln Q_{id}$ is observed if and only if the individual in a given decile d is a current smoker.

Several models have been tested to determine the best fit for each country.

