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MECHANISM OF LEGAL EFFECT: ECONOMIC THEORY

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Summary

Economics is the study of how society allocates scarce resources. Modern economic theory rests on the assumption that individuals seek to maximize their own well-being, subject to the constraints they face. Under ideal conditions, in freely operating markets, this will result in an efficient allocation of scarce resources. Economics, law, and public health intersect because many markets do not operate under ideal conditions. Instead, there are a variety of "market failures" leading to an inefficient allocation of resources—and negative public health consequences.

Market failures include imperfect information and informational asymmetries, negative and positive externalities, time inconsistencies in individual preferences (internalities), and excessive market power. Law can address market failures by changing the relative costs and benefits that influence the decisions consumers and producers make. Law can also

- Change the information environment by mandating or restricting information;
- Create or constrain the market power of producers or consumers;
- Change the scope of a market by prohibiting participation by certain purchasers, certain producers, or certain products;
- Alter the characteristics of a product, the prices of a product, key inputs into the production of that product, or the costs associated with consuming that product.

Laws targeting market failures that generate significant public health consequences address failures that occur on both the demand side and the supply side of the market. On the demand side of the market, economists emphasize the concept of full price as the mechanism through which these policies influence health-related behaviors and their consequences. Full price includes not just the monetary cost but other costs associated with obtaining and using a product. The experience of excise taxes on cigarettes and alcohol illustrates the potential for impact. Subsidies, tax credits and tax deductions, and various other mechanisms may also be used to influence

consumption decisions. Policies that raise the full price of consumption by adding time, inconvenience, or expected legal costs associated with the behavior can similarly reduce consumption in a way that improves public health.

Supply-side policies use economic levers to increase the supply of healthy products and decrease the supply of unhealthy ones. Policies that constrain supply can take many forms, from prohibition to efforts to control distribution through licensing, legal sanctions, and other approaches. Supply stimuli used in public health include tax incentives and zoning changes. These types of supply constraints or stimuli ultimately affect consumption of targeted products through their impact on several aspects of full price. Measures of full price are essential to economic analysis of legal interventions in public health. The role of economic structures in creating inequities in income, education, and access to the broad range of social opportunities necessary for optimum health and well-being has recently begun to gain renewed attention, and deserves to be an increasingly important focus of legal epidemiologists and economists interested in discovering effective ways to improve population health.

Learning Objectives

- Identify how economic theory intersects with public health law.
- Evaluate effects of economic incentives and disincentives on public health outcomes.
- Examine information failure, externalities, internalities, and market power as they affect a public health problem.

Economics is the study of how society allocates scarce resources. Economic players interact through the supply of and demand for various goods and services. A key assumption of modern economic theory is that individuals are seeking to maximize their own well-being subject to the constraints they face. Individual consumers aim to maximize the satisfaction ("utility," in the language of economics) they gain from consuming goods and services, subject to the prices they face in the market, time constraints, health and/or legal risks, and their own incomes and wealth. Producers aim to maximize the profits they receive from supplying goods and services to the market, subject to the costs of inputs into production, available production technologies, and demand for the products they produce. Under ideal conditions, the result of economic players acting to maximize their own well-being in freely operating markets will be an efficient allocation of scarce resources. When markets are not operating under ideal conditions, laws and regulations can change the relative costs and benefits that influence decisions consumers and producers make and, as a result, lead to an allocation of resources improved from that which would result from unregulated markets. If the market is operating under ideal conditions, laws and regulations will

result in a less optimal allocation of resources compared to that which would result from the free market.

Economics, law, and public health intersect because many markets do not operate under ideal conditions. Instead, there are a variety of "market failures" that lead to an inefficient allocation of resources in a way that creates public health consequences. Economic agents are assumed to have full information and to act rationally when making decisions. Full information about the short- and long-term costs and benefits of consuming or producing some products is often limited, and individuals make choices they later regret. The full costs of consuming or producing are often not borne by those making the consumption or production decisions (negative externalities). Conversely, consumption or production of some goods or services generates benefits that go beyond the individual consumer or producer (positive externalities). Producers benefiting from limited competition due to extensive regulation and/or licensing requirements (barriers to entry) and economies of scale will supply less of a good to the market and charge more for it than would be optimal from a societal perspective. As with full information, the rationality of agents has been shown to be limited, particularly when making decisions that are complex or involve psychological factors, like strong emotions (Kahneman, 2011; Thaler & Sunstein, 2008). When faced with these more difficult situations, agents tend to succumb to status quo bias, framing effects, misperception of risks, and heuristics to make their decision rather than objective factors or information. When such market failures exist, laws and regulations can effectively lead to changes in consumption decisions, production decisions, or both that can lead to a more optimal allocation of resources than would result from the free market.

The public health consequences that result from market failures are enormous. Drug overdose fatalities arise in part from imperfect information about the risks of substances in legal markets and the contents of substances obtained through illicit market (Alpert, Powell, & Pacula, 2018; Pacula and Powell, 2018; Powell and Pacula, 2021). Driven by overdose, unintentional injuries became the third leading cause of death since 2015, at least until pandemic hit (Ahmad and Anderson, 2021), generating a decline in US life expectancy for the first time in six decades (Case & Deaton, 2020). Other chronic diseases, such as heart disease, cancer, respiratory disease, and diabetes remain leading causes of death and disability in the United States (Ahmad and Anderson, 2021; Heron, 2021), in part a result of lifestyle choices and health behaviors, including smoking, low physical activity, poor nutrition, high blood pressure, and excessive drinking (Mokdad et al., 2018).

Over the past few decades, health economists have made substantial contributions to our understanding of how laws, regulations, and other policies can address the market failures that continue to lead to poor health behaviors and therefore improve public health. Economists have also contributed, through behavioral economics, to a better understanding of how regulations and law might reduce the influence of psychological factors impairing decision making and improve the context in which people make choices, nudging them to make better decisions when it comes to health behaviors. This chapter introduces the concepts used by economists in this research. It

begins by providing a discussion of the economic rationale for government intervention in a variety of markets where individual behaviors lead to public health consequences. This is followed by a discussion of policy interventions that address these market failures, beginning with demand-side approaches to promoting public health through legal interventions and emphasizing the concept of the "full price" of consumption. Legal approaches to addressing the supply side of these markets are then briefly reviewed. Examples of where economic theory and research has helped inform public health law are provided throughout.

Laws, Regulations, and Economic Behavior

Homo Economicus, the informed, rational, and self-interested economic agent (i.e. individual or firm) is at the heart of much of classical economic theory (Persky, 1995). By seeking to maximize their own self-interest subject to constraints, interactions with other economic agents will lead to the efficient allocation of society's scarce resources.

Laws and regulations will alter the conditions under which the economic agent makes these decisions, as illustrated in Figure 7.1. Law can change the information environment by mandating more information of a particular kind or by restricting the flow of other information. Laws can require that the contents of particular products are listed on product packaging, while others can require that packages include standard dosing or warnings about the consequences of consumption. Mass media and other public education campaigns provide information that can alter consumers' perceptions of the relative costs and benefits they receive from consuming a given product, resulting in different consumption choices. Other policies can restrict producers from conveying information by limiting the content of or channels through which they advertise their products or how these products are labeled.

Laws and regulations can influence the choice architecture in which the consumers or producers make decisions, thereby making it easier for agents to make choices that improve their welfare (Thaler and Sunstein, 2008). In the case of public health, applications have been applied in the design of school lunch cafeterias, where healthy food options are placed at the start of a buffet line or at eye level for youth (Metcalfe, Ellison, Hamdi, Richardson, & Prescott, 2020; Skov, Lourenco, Hansen, Mikkelsen, & Schofield, 2013); star ratings on food of high nutritious quality in grocery stores (Rahkovsky, Lin, Lin & Lee, 2013); adding caloric intake on menus (Krieger et al., 2013), and nudging Medicare enrollees to enroll in higher quality health insurance plans (Howell et al., 2017). Laws and regulations supporting such programs and policies effectively seek to retain the individual's opportunity to choose but create a choice environment ("architecture") around the individual that *nudges* them toward healthier behaviors.

Laws and regulations can enhance or constrain the market power of producers or consumers. Antitrust laws aim to prevent producers from gaining significant market power or abusing the

market power that they do have. At the same time, collective bargaining laws allow unions to gain market power that enables them to offset the "monopsony" power that large firms have. By erecting entry barriers that reduce the number of firms in a given market, policies can increase market power for those that are operating in the market. Licensure requirements that establish density standards, for example, will limit the number of firms in a given market, reducing competition from potential entrants and generating market power for those with licenses. In many countries, governments monopolize a variety of product markets, in some places to limit exposure to a product (e.g. for alcoholic beverages), and in others to benefit from efficiencies that can occur due to economies of scale (e.g. tap water, or broadband internet access). Exclusive-territory policies provide market power within a given geographic area while limiting the ability of firms to compete outside of that area.

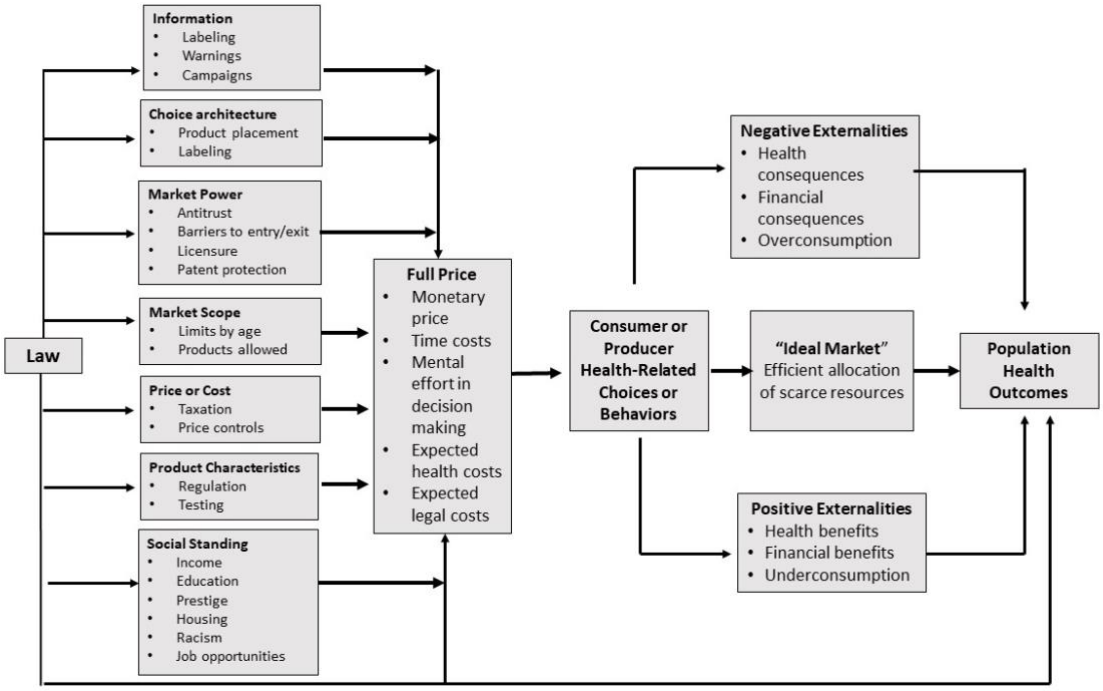

Figure 7.1. The Legal Determinants of Population Health Model.

The scope of a particular market is something else that can be changed via law and regulation. Laws can prohibit some from participating in given markets by setting minimum age requirements for purchase or use of particular products. Likewise, labor laws may set minimum and maximum ages for workers in particular fields. Laws can also alter the characteristics of a product. Some may prohibit various ingredients, while others may mandate certain product safety features.

Laws and regulations can directly alter the prices of a product or key inputs into the production of that product, or can affect the costs associated with consuming that product. Excise taxes add to the price consumers pay for products, while subsidies reduce prices. Minimum wage laws raise the labor costs faced by firms, while rent control laws limit the price received by property owners. Tax

credits for education reduce the costs of schooling for students and their families. Minimum price laws or bans on quantity discounts raise consumer prices.

The theory that resources will be optimally allocated by the interactions of unfettered supply and demand depends on several key assumptions: that individuals have all of the information that they need to make fully informed choices; that they fully understand and can adequately process this information; that they behave rationally, weighing the short- and the long-run costs and benefits of their decisions; that the individual consumer bears the full costs and receives the full benefits of his or her consumption; that the individual producer likewise bears the full costs and gains the full benefits of producing; and that neither the producer nor the consumer has market power that allows them to influence prices. Of course, absent from these theories of market efficiency is the notion of social equity, or consideration of the initial endowment point ("standing") from which consumers and sellers enter the market for exchange. Greater attention is now being given to the problem of social inequity, with a growing body of RCT, natural experiments, and long-term observational data demonstrating the degree to which income, education, housing, and race influence the economic opportunities, education, and health that individuals experience later in life (Campbell et al., 2016; Chatterji, Kim, & Lahiri, 2014; Chetty et al., 2020, 2017, 2016a, 2016b, 2014; Cutler and Vogl, 2011; Sanbonmatsu et al., 2011). Similarly, research shows that race, prestige, and housing influence the full cost people face when obtaining or consuming particular goods, for example the legal risk of using illicit drugs (Eckel & Grossman, 2008; Geller & Fagan, 2010; Goel et al., 2016), purchase of fresh fruits and vegetables (Cantor et al., 2020; Dubowitz et al., 2015; Powell et al., 2010, 2007), and health care received (Ayanian, Weissman, Chasan-Taber, & Epstein, 1999; Trivedi, Zaslavsky, Schneider, & Ayanian, 2006; Yearby, 2018). Perfectly competitive markets focused on efficiency alone do a poor job of addressing these various types of inequities (Sen, Sen, Foster, Amartya, & Foster, 1997), which some have argued provides justification for government intervention to redistribute wealth, income, or social opportunities (Feldstein, 2012; Folland, Goodman & Stano, 2016). Debates continue in the economics literature as to whether income redistribution represents a superior tool to other available policies (e.g. price subsidies, free health insurance) for addressing public health needs, given disincentives such income supports can create. Rebecca Blank (2002) has argued that under certain conditions income redistribution can be an important complement to other policies aimed at addressing social inequities.

Market Failures

Economists refer to situations in which one or more of the key assumptions generating efficiency in perfect competition are violated as market failures, which result in an inefficient allocation of resources. This is where economics, law, and public health intersect. While laws and regulations are adopted for a variety of reasons, including redistribution, the existence of market failures provides an economic rationale for governments to intervene in markets to improve efficiency as well. Examples of market failures and key legal mechanisms for addressing them are described next.

INFORMATION FAILURES

Imperfect or asymmetric information regarding the health risks that result from consuming a variety of products is one market failure that generates considerable public health consequences. Perhaps the clearest example is cigarette smoking. Cigarette smoking in the United States rose rapidly in the first half of the twentieth century and, given the lags between onset of smoking and onset of lung cancer and other diseases caused by smoking, it wasn't until the 1950s that strong evidence linking cigarette smoking to lung cancer first appeared in the scientific literature. Consequently, individuals made decisions to smoke with far from full information about the health risks from smoking. In the decades since, the evidence linking cigarette smoking to an ever-increasing number of diseases has grown, but many individuals continue to underestimate this risk, particularly in low- and middle-income countries. Moreover, many of those who have a general appreciation of these population risks fail to adequately internalize the threat to their own health.

This information failure has been further complicated by information asymmetries among consumers and producers. The release of millions of pages of internal tobacco company documents in various lawsuits provided clear evidence that cigarette companies were aware of these risks and altered product design in a way that alleviated consumers' health concerns while failing to significantly reduce or eliminate these risks. Filtered low tar and nicotine cigarettes were marketed as less harmful but were, in fact, as deadly as the cigarettes that they replaced. Despite the increasing scientific evidence to this effect, many smokers continue to see these as less harmful than full-flavored cigarettes.

Market failures due to imperfect or asymmetric information are further complicated in many markets by the fact that initiation of use for many of these products begins in childhood or adolescence, a time when many are prone to heavily discount the short- and long-term health consequences that result from consumption. For example, past year prevalence rates of nicotine and cannabis vaping doubled between 2017 and 2019, according to data from the Monitoring the Future Survey, with nicotine vaping rates reaching 35.1% of all high school seniors (Miech et al., 2019), and past year cannabis vaping rates reaching 20.8% of high school seniors (Miech et al 2020). Data for 2020 show a leveling off at these higher rates for nicotine but continued small increases in adolescent cannabis vaping (Miech et al., 2021a, 2021b). While the scientific evidence examining the long-term health effects of vaping is uncertain at this time, there is growing evidence that use of either substance during adolescence is associated with several negative health outcomes, including greater risk of addiction to each (American College of Pediatricians, 2018; US Department of Health and Human Services, 2012). Moreover, cannabis use during adolescence has been found in a couple of recent studies to be associated with subsequent onset of nicotine and cigarette use (McElrath et al., 2021; Weinberger, Zhu, Lee, Xu, & Goodwin, 2021), raising the possibility that long term gains achieved with reductions of youth smoking may be offset by the latest vaping trend.

Discounting of risk among young people is even further complicated by an under-appreciation of the addictiveness or habitualness of the use of harmful products. Orphanides and Zervos (1995) provide a nice theoretical framework for how "imperfect foresight" can result in many youths experimenting with addictive substances, with some becoming addicted. In their model, the risk of becoming addicted varies among individuals, as do each individual's subjective beliefs about his or her potential to become addicted. As an individual experiments with a potentially addictive substance, this subjective belief is updated through a Bayesian learning process. Those who underestimate their potential for addiction can end up addicted. Thus, rather than the "happy addict" implied by economic models that assume well-informed individuals making rational decisions with perfect foresight (Winston, 1980), individuals who become addicted to substances regret ever having started. Empirical evidence is consistent with this type of "learning and regret," with considerable majorities of adult smokers, for example, wishing that they had never started smoking (Fong, Hammond, Laux, et al., 2004) and favoring higher cigarette taxes as such taxes induce them to quit (Gruber & Mullainathan, 2005). Similarly, while only 3% of those smoking daily as high school seniors thought that they would definitely be smoking in five years, almost two-thirds were still smoking seven to nine years later (Johnston, O'Malley, Bachman, & Schulenberg, 2011).

EXTERNALITIES

Externalities occur when individual consumers or producers do not bear the full costs of their consumption or production (negative externalities) or when there are benefits from consumption or production that go beyond the price paid by the individual consumer or the income accrued to the producer (positive externalities). From a societal perspective, when externalities exist, economic agents left to their own devices will generate an inefficient allocation of resources. The inefficiencies that arise in the presence of various externalities create public health consequences.

When there are negative externalities in consumption, there are costs that result from consumption that are not borne by the individual consumer, resulting in greater-than-optimal consumption at a lower-than-optimal price. There are countless examples of negative externalities from individuals' consumption that generate sizable public health consequences. Nonsmokers, for example, experience lung cancers, cardiovascular diseases, and other adverse health effects when exposed to tobacco smoke pollution (Carreras et al., 2019). Innocent bystanders experience violence and/or death caused by excessive alcohol consumption (Cook, 2007) and drug consumption (Dobkin & Nicosia, 2009). Poor diet and low physical activity increase risks of diabetes and obesity, which cause negative externalities on others through higher medical costs paid for by public and private third-party payers (Cawley, 2015).

Negative externalities can also occur in the production of goods, specifically when there are costs to society that are not reflected in the input costs paid by producers. There are numerous examples of air pollution, water pollution, and soil pollution caused by producers of goods who emit various toxins with massive health consequences (Clay, Lewis & Severnini, 2016; Smit &

Heederik, 2017), the costs of which are not considered in their production process nor are they incorporated into the market price of the products sold by them. This leads producers to over produce these goods.

Alternatively, positive externalities in consumption imply that persons other than the individual consumer of a given good or service benefit from that consumption. Positive externalities in consumption lead to under-consumption of a product. One example of a positive externality in consumption is the reduction in the risk of infectious disease to others that results from an individual receiving a vaccination for that disease, which has led to vaccinations being heralded as one of the 10 great public health achievements (CDC, 2011). Early evidence suggests that vaccines for COVID-19 have similarly reduced the spread and severity associated with it (Gupta et al, 2021; Scobie et al., 2021). Thus, the benefits to society are considerably larger than those to the individual. Positive externalities in production occur when a producer does not receive the full benefit of production, resulting in less-than-optimal output at a higher-than-optimal price. Pharmaceutical drugs that reduce the public health burden caused by numerous diseases, such as COVID-19, provide examples of positive externalities in production. A pharmaceutical company concerned that the substantial investment it needs to make in developing a new drug would not be recouped if its competitors could easily copy and market the drug once it hit the market will under-invest in research and development, leading to fewer such drugs being supplied. Investment and/or subsidies provided by the government can increase incentives for such investment.

Health behaviors that create significant public health consequences can also generate sizable financial externalities. The magnitude and persistence of opioid drug overdose deaths, for example, has led not only to three years of consecutive declines in US life expectancy recently (Case & Deaton 2017, 2020), but also substantial losses in terms of lost employment (Aliprantis, Fee, & Schweitzer, 2019; Kaestner & Ziedan, 2019); increases in foster care placements and reductions in child welfare (Crowley, Connell, Jones, & Donovan, 2019); and the spread of hepatitis C and other infectious diseases (Alpert et al., 2019; Liang & Ward, 2017). All these consequences impose costs on social welfare and social insurance systems.

While many in the public health community focus on the overall economic costs that result from various health behaviors, economists generally distinguish between internal costs (those borne by individual consumers) and external costs (those borne by others). This distinction has important implications for policy. For example, smokers' higher health insurance premiums, greater out-of-pocket costs, and lower wages, at least for the most part, do not constitute a market failure but rather reflect the increased health risks they incur by smoking, their greater use of health care, and the lost productivity that results from the increased absences resulting from diseases caused by smoking. Financial externalities are limited to the lost productivity and costs of treating the consequences of exposure to tobacco smoke pollution among nonsmokers and the costs of treating smoking-attributable diseases in smokers that are paid for through public health insurance programs. Some economists have gone further to look at net external costs, offsetting the increased

costs at a point in time with the reductions in social security payments and Medicare spending that result from smokers dying younger than nonsmokers (for example, Manning, 1991).

INTERNALITIES

More recent economic models have incorporated the experimental evidence from behavioral economics that imply that much of what have traditionally been considered internal costs are more appropriately treated as "within-person externalities" (Bhargava & Loewenstein, 2015; Hernstein et al., 1993) caused by an individual's failure to fully consider the effect of current behavior on future outcomes, thereby imposing external costs on oneself (for example, Gruber & Köszegi, 2008). These "internalities" result from at least two factors: the time inconsistency inherent in individual's preferences, and systematic biases that occur when people make psychologically difficult choices.

Traditional economic models assume that individuals exponentially discount the future costs and benefits of their consumption decisions, implying that their decisions will be consistent over time. Behavioral economic experiments, however, demonstrate that preferences are not consistent over time and that individuals are conflicted between their desire for short-run gratification and their recognition of long-term consequences. These more recent models allow for hyperbolic discounting of future costs and benefits, producing a more accurate depiction of how individuals actually behave, and capturing the conflict between short-run gratification and long-run regret reflected in many health behaviors. In these models, the long-run consequences to the individual that result from unhealthy choices in the short run can be viewed as external to that individual's future self. This new approach has significant implications for public health policies in that it implies greater scope for government intervention than implied by traditional models. For example, Gruber and Köszegi (2008) show that on the basis of this approach, optimal cigarette taxes could be 20 or more times higher than they would be using traditional economic models.

Ongoing developments in behavioral economics have also acknowledged people's cognitive limitations when faced with complex or psychologically burdensome choices. Founded on the principles of prospect theory developed by Kahneman and Tversky (1979), these models assume economic agents behave in a manner more consistent with *bounded rationality,* in that they tend to unconsciously fall back on heuristics, framing, loss aversion, and reference points to make cognitively difficult decisions. Richard Thaler and Cass Sunstein (2008) provided numerous examples of how very small changes in the choice architecture facing individuals in these situations can nudge them to make healthier choices, such as placing leafy green vegetables at the start of the buffet line in school lunch cafeterias and replacing sweets at the checkout counter with fresh fruit. A number of recent efforts have been undertaken to integrate these sorts of nudges into broader policymaking (Matjasko, Cawley, Baker-Goering, & Yokum, 2016). In the case of public health, applications have been applied in the use of star ratings on food of high nutritious quality in grocery stores (Cawley et al., 2015; Rahkovsky, et al., 2013); adding caloric intake on menus (Krieger et al., 2013), and improving the quality of health insurance plans in Medicare (Howell et al., 2017). The evidence on the effectiveness of some of these nudges on broad population behaviors is limited

(Ledderer, Kjær, Madsen, Busch, & Fage-Butler, 2020; Metcalfe et al., 2020; Skov et al., 2013), in part due to lack of consideration to the mechanisms leading to the poor health behaviors in particular instances as well as cultural sensitivities to nudging (Ledderer et al., 2020). However, the idea of using public health law to influence choice architecture to nudge healthier choices remains a popular notion in that such interventions overcome the problems caused by bounded rationality, reducing the influence of emotions, impulsiveness, environment, decision fatigue, and other circumstance that cause individuals to make unhealthy choices, while maintaining the individual's choice.

MARKET POWER

Economists consider perfectly competitive markets to be optimal in that these lead to the most efficient allocation of resources – one in which the marginal benefits from consuming are equated to the marginal costs of producing. When producers are faced with more limited competition, they are said to have market power. This market power allows them to charge higher prices than would result in a more competitive market, while less is produced and consumed.

While ideal in theory, perfectly competitive markets rarely exist in the real world; some degree of market power is inevitable, and the extent of this market power can have public health implications. For example, in the pharmaceutical industry, some have argued that the branding of prescription drugs and the extensive direct-to-consumer marketing of these drugs results in a market failure by creating perceptions among consumers that comparable, less costly generic drugs are not a good substitute for the branded drug (for example, Institute of Medicine Committee on the Assessment of the US Drug Safety System, Baciu, Stratton, & Burke, 2007).

Policy Interventions to Address Market Failures

When considering laws and other policies that would reduce the public health consequences of market failures such as those just described, economists distinguish between "first best" and "second best" interventions (Jha, Musgrove, Chaloupka, & Yurekli, 2000). First-best interventions are those that narrowly target the market failure at issue and do not have broader effects. For example, mandating nutrition labeling on packaged foods and beverages is a way of providing consumers with information to make better, informed choices on the basis of a product's caloric, fat, and nutrient content.

However, a one-to-one correspondence between market failures and interventions does not always exist, or sometimes the first-best intervention that does exist fails to reach key populations. In these cases, second-best interventions, which typically take a blunter approach and have broader effects, may be more effective. Policies such as taxes and subsidies that alter prices of healthier and less healthy options are perhaps the best examples of a highly effective, second-best intervention.

Laws, regulations, and other policies targeting market failures that generate significant public health consequences address failures that occur on both the demand side and the supply side of the

market. This section provides an overview of key policy domains and provides examples in which economic research has played an important role in policy development and implementation.

DEMAND-SIDE POLICIES

When it comes to public health laws that target the demand side of the market, economists emphasize the concept of *full price* as the mechanism through which these policies influence health-related behaviors and their consequences. Full price includes not just the monetary cost of a product but also the other costs associated with obtaining and using that product. Particularly important among these other costs are time costs and the potential health and legal consequences of consumption.

Excise Taxes

In *An Inquiry into the Nature and Causes of the Wealth of Nations*, the father of modern economics Adam Smith (1776) wrote, "Sugar, rum, and tobacco are commodities which are nowhere necessaries of life, which are become objects of almost universal consumption, and which are therefore extremely proper subjects of taxation." Smith was focused on the revenue-generating potential of taxes, but in recent years it has become clear that taxes are also a highly effective policy for improving public health. Pigou (1962) was the first to suggest that levying taxes on products that generated negative externalities in consumption would improve economic efficiency. However, conventional wisdom long held that consumption of harmful, addictive substances such as tobacco, alcohol, and other drugs would be unresponsive to the changes in prices resulting from taxes and other factors. Extensive economic research conducted over the past few decades, however, clearly demonstrates that higher taxes and prices lead to significant improvements in public health by reducing the use of harmful products – even addictive substances. Given the huge public health burden it causes, much of the economic research has focused on cigarette smoking and other tobacco use, showing that higher tobacco product taxes and prices lead adult tobacco users to quit, keep former users from restarting, prevent initiation and uptake among young people, and lead to reductions in consumption by those who continue to consume (International Agency for Research on Cancer [IARC] & World Health Organization, 2011). Effects of higher taxes and prices on overall cigarette smoking in the United States over the past several decades is illustrated in Figure 7.2.

Several studies go further in showing that higher tobacco taxes, because of declines in tobacco use that result from them, lead to reductions in the public health and economic consequences of tobacco use (IARC & World Health Organization, 2011). The extensive evidence base demonstrating the effectiveness of tobacco taxes in reducing tobacco use has contributed to nearly every state and the federal government increasing their cigarette and other tobacco taxes over the past two decades, with average state cigarette taxes rising nearly fivefold since 1990, while the federal tax has increased more than sixfold.

Similarly, numerous studies have found that increases in alcoholic beverage prices that result from higher alcoholic beverage excise taxes reduce the prevalence, frequency, and intensity of

drinking (Cook, 2007; Wagenaar, Salois, & Komro, 2009). Additional research shows that higher taxes and prices improve public health by reducing the consequences of excessive alcohol use, including motor vehicle traffic crashes and other injuries, liver cirrhosis and other alcohol attributable mortality, violence and other crime, and risky sex and sexually transmitted disease rates (Wagenaar, Tobler, & Komro, 2010; Xu & Chaloupka, 2011). Despite this evidence and in contrast to the sharp rise in tobacco taxes observed over the past two decades, average alcoholic beverage taxes have declined after accounting for inflation, contributing to increases in drinking and its consequences (Xuan et al., 2015; Xu & Chaloupka, 2011).

The public health success with tobacco excise taxes, coupled with increased recognition of the obesity epidemic in the United States, has increased interest in using taxes as a policy tool for improving diet by reducing consumption of high-calorie, low-nutrient-density foods and beverages. Much of the debate to date has focused on sugar-sweetened beverages, given their relatively high levels of consumption, evidence that their consumption contributes to weight gain, their low or no nutritional value, and economic research demonstrating that beverage consumption responds to price (Chaloupka, Powell, & Chriqui, 2011; Dubois, Flay, & Fagen, 2020). Currently, most states tax these beverages under their sales tax systems, with a few states levying small excise or similar taxes. However, existing taxes are small, and sugar-sweetened beverages are taxed the same as artificially or unsweetened beverages. As a result, existing economic research finds that existing taxes have little to no impact on weight outcomes; estimates from some studies, however, do indicate that more significant taxes (for example, one or two cents per ounce) would likely lead to population-level reductions in obesity (Powell & Chriqui, 2011). Studies of tobacco and alcohol demand that account for the addictive aspects of consumption conclude that the long-run impact of tax and price increases is greater than the short-run impact. In general, and consistent with economic theory, studies that have looked at the differential impact of taxes and prices on population subgroups find that young people, less-educated populations, and those on low incomes are relatively more responsive to price. With respect to cigarette smoking, for example, estimates suggest that youth smoking is two to three times more sensitive to price than is adult smoking. The finding that lower socioeconomic groups respond more to price is particularly important in the context of the more recent economic modeling that allows for time-inconsistent preferences described earlier. Specifically, it implies that low-income populations benefit the most from the self-control that results from higher taxes so that these taxes are progressive, rather than regressive as implied by conventional models (Gruber & Köszegi, 2008).

Finally, nearly all estimates of the price elasticity of overall demand for tobacco products, alcoholic beverages, and sugar-sweetened beverages indicate that demand is in the inelastic range, implying that a given price increase leads to a less-than-proportional reduction in aggregate consumption. This, combined with the fact that taxes account for only a portion of prices, implies that increases in taxes on these products will generate significant new revenues in the short-to-medium term. Some states, particularly with respect to tobacco, have earmarked a portion of tax

revenues to support some of their other prevention, treatment, and control efforts, adding to the public health benefits of higher taxes.

Subsidies

Increasing the consumption of products that improve public health can be accomplished by reducing prices of these products through subsidies. Given costs associated with their implementation however, subsidies to promote healthier behaviors have not been as widely used as taxes have been to discourage unhealthy consumption. Nevertheless, some governments do use subsidies to promote public health, typically targeting them to narrow segments of the population. Perhaps the best examples are the various food assistance programs run by the US Department of Agriculture aimed at preventing food insecurity and its consequences, including the Supplemental Nutrition Assistance Program (SNAP); the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); and the National School Lunch and Breakfast Programs. More recently, in efforts to promote healthier diets and curb obesity, some states and localities have begun experimenting with additional subsidies within these programs that further lower the prices of fruits, vegetables, and other healthier options. Limited economic research indicates that reductions in the prices of fruits and vegetables lead to increases in their consumption and at the same time result in healthier weight outcomes in at least some populations, suggesting that efforts to expand these subsidies may be an effective approach for reducing obesity (Powell & Chriqui, 2011).

Experimental evidence, however, raises some questions about the effectiveness of subsidies, particularly relative to taxation, to improve diet and reduce obesity. Using an experimental grocery store selling widely purchased foods and beverages, Epstein and colleagues (2010) found that taxing less-healthy products led to reductions in purchases of these products, overall calories purchased, and proportion of fat purchased. In contrast, subsidies on healthier products, while increasing purchases of these products, led to increased purchases of less-healthy products as well, resulting in an increase in overall calories purchased while not improving the overall nutrient composition of foods purchased, suggesting that subsidies would be ineffective in reducing obesity. While a clearly artificial setting that forced participants to spend the savings they accrued on the subsidized product on other items in the experimental store rather than on other necessities, this does suggest that subsidies will likely have a smaller overall effect than taxes, given the income effect created by the subsidy.

Tax Credits and Deductions

Income tax credits and deductions are another tax policy that can be used to reduce the price of healthy behaviors in a way that promotes public health. For example, a recent paper by von Tigerstrom and colleagues (2011) describes the national and provincial income tax credits introduced in Canada that are designed to promote physical activity. Credits are provided that offset the costs of enrolling in various organized physical fitness, sports, and other recreational programs, as well as for the costs of public transit. While little empirical evidence exists on effects

of these credits, the authors nicely describe why such credits are unlikely to have population-level effects on activity and obesity. Among the factors they note are the lag of a year or more between the time when costs are incurred and the benefit is received, the modest size of the credit relative to the costs of the programs it covers, the likelihood that it will be largely taken advantage of by those already enrolled in programs rather than increasing participation in these programs, and the likelihood that many new program participants will simply be substituting from other forms of physical activity to activity in programs covered by the tax credit.

Other Pricing Policies

Governments have a variety of other policy options for manipulating prices in a way that promotes public health. Many states, for example, have adopted laws setting a minimum retail price for cigarettes (CDC, 2010). If the minimum price were set higher than the prices that would otherwise result from a freely operating market, cigarette smoking and its consequences could be reduced. In practice, however, these laws appear to have little effect on cigarette prices, with prices in the states that have adopted them similar to prices in states without them, after accounting for differences in state cigarette taxes. The one exception is the few states that include price promotions in their policies, keeping price-reducing promotions from lowering the price below the minimum.

Similarly, as a part of the three-tier system states adopted for alcohol distribution following the repeal of prohibition, a number of states implemented policies setting minimum prices or requiring minimum markups on alcoholic beverages at various points in the distribution chain, while others banned quantity discounts at the wholesale level. One result of these policies is higher retail prices for alcoholic beverages which, given the evidence discussed, will result in reductions in harmful drinking and its consequences (Chaloupka, 2004). These policies, however, have come under increasing attack in recent years, given the limits they place on competition, with some states repealing them and court rulings in others invalidating them, despite their benefits for population health.

Policies like these, while indirectly raising prices and reducing consumption of targeted products, are likely to have smaller effects than tax policies that directly increase prices. The revenue generated from tax increases goes to governments, some of which use these revenues to support programs that add to the public health benefits of the tax. In contrast, policies that set higher-than-free-market-level prices generate additional profits for those involved in manufacturing and distribution of those products. These additional profits can be used to support increased marketing and other efforts that increase demand, partially offsetting the reductions in consumption that result from the higher prices.

Time Costs

Policies that raise the full price of consumption by adding time or inconvenience can similarly reduce consumption in a way that improves public health. For example, comprehensive smoke-free policies that ban smoking in private workplaces increase the cost of smoking by requiring smokers to leave their workplace and go outdoors to smoke, adding both time and inconvenience, particularly in inclement weather. Growing evidence clearly shows that comprehensive smoke-free policies are effective in reducing both adult and youth smoking, while at the same time reducing nonsmokers' exposure to tobacco smoke pollution, directly addressing one of the externalities caused by smoking (IARC & World Health Organization, 2009).

Perceived Health Costs

As discussed earlier, imperfect or asymmetric information creates a market failure that can have a negative effect on public health. When clear science is available regarding real health risks, governments can address information failures by adopting policies that disseminate information on the health impact of various products or behaviors or by limiting producers' ability to spread inaccurate or unsupported information about the health benefits of their products. Some of these options are highly cost-effective, given their low cost of implementation and broad reach. Others are costly but still cost-effective, given the effects of the information on behavior. Still others have proven to be relatively cost-ineffective, given their high costs and lack of demonstrated effect. How effective and cost-effective these information interventions are depends on the type of information provided, the channels used to provide that information, and the audience being targeted.

Mandating the provision of information on product packaging, advertising, or elsewhere is one relatively low-cost approach to addressing information failures. For example, requiring health warning labels on all cigarette packages provides information about the harms that can result from smoking. In the United States, however, these labels have had little or no impact on smoking, given that the labels are not that visible and the information provided on them is relatively well known. International experiences, however, provide more support for the potential of pack warnings to reduce smoking. The International Tobacco Control Policy Evaluation Project's (ITCPEP) (2009) review of the evidence on warning labels produced several clear conclusions, including that pictorial warning labels are more effective than text-only warnings in raising and sustaining awareness about the risks of tobacco use; larger and more comprehensive (for example, more rotating messages) warning labels increase knowledge about the harms from tobacco use; and pictorial warnings increase motivation to quit, including strengthening quit intentions and increasing the likelihood of a quit attempt. Larger, graphic warning labels of this type will soon be coming to the United States as a result of a mandate by the Food and Drug Administration (FDA).

Alternatively, governments can limit the provision of potentially misleading information that leads to reduced risk perceptions. For example, there is considerable evidence that the use of misleading descriptors on tobacco product packaging and advertising (for example, light, low tar, mild) leads some users to perceive some products as less harmful to health or less addictive than others, and to view these products as alternatives to quitting. In 2010, the FDA implemented a ban

on the use of these descriptors in the United States. However, such bans may not go far enough, as tobacco companies have adapted to the ban on descriptors by using colors in their product names or packaging to suggest similar concepts, leading some tobacco control professionals to call for "plain" or "generic" packaging that would eliminate all brand-related imagery.

Governments can go further and limit or prohibit a variety of advertising and other marketing efforts that can similarly distort risk perceptions, although how far such policies can go is questionable, given First Amendment protections of free speech in the United States, which have been expanded by the courts in recent years to include commercial speech. To date, most such efforts have been voluntary, industry-initiated limits that aim to reduce children's exposure, such as the Children's Food and Beverage Advertising Initiative (CFBAI) that aims to reduce television advertising of less healthy foods and beverages during children's programming. Given the narrow focus of the CFBAI on children's programming, there has been little improvement in the nutritional quality of the products youth are seeing advertised on television, suggesting that such voluntary initiatives have little public health impact (Powell, Schermbeck, Szczypka, Chaloupka, & Braunschweig, 2011).

Alternatively, public education campaigns can be implemented to raise awareness of the harms from consumption of tobacco, alcohol, other drugs, and other products, or to raise awareness of the benefits of healthier behaviors such as physical activity. These can take many forms, from school-based education programs aimed at influencing youth behavior to large-scale, mass-media campaigns that target broader audiences and that can influence social norms. A mix of such efforts has been widely implemented for tobacco, with comparable, albeit more limited efforts targeting other health behaviors. Evidence is mixed with respect to the effectiveness of school-based programs in promoting healthier youth behavior. For example, Thomas and Perera's (2006) comprehensive review of school-based tobacco education programs found that some programs had short-term but not sustained effects and that the largest and most rigorous intervention reviewed produced no evidence of a long-term effect on smoking behavior. School-based programs that have been found to be successful in the short term tend to emphasize the role of social influences and development of specific skills to resist these influences; such programs are most effective when implemented as part of a more comprehensive strategy that includes control policies and broader education efforts. In contrast, mass-media campaigns that use a variety of communications channels (including television, radio, print, billboards, and the Internet) have repeatedly been shown to reduce tobacco use (National Cancer Institute [NCI], 2008).

Expected Legal Costs

Policies that raise the expected legal costs of engaging in a particular behavior will add to full price, reducing the likelihood and frequency of engaging in that behavior if enforced (Becker & Stigler, 1974). Economic theories of crime emphasize two key factors that influence expected legal costs: the probability of being caught and convicted and the swiftness and severity of the penalty imposed

(see Chapter 5) (Becker, 1968; Cook et al., 2012). Increasing either factor raises the expected legal costs and, as a result, reduces targeted behaviors and their public health consequences. The legal costs could apply to producers and/or sellers (covered below) but are frequently applied to consumers of both legally regulated consumption goods and illicit goods.

Policies targeting drinking and driving are good examples of laws that raise anticipated legal costs in a way that promotes public health and that addresses the related negative externalities. Policies implementing sobriety checkpoints and breath testing and other efforts to detect drunk drivers raise the probability of detection, while lowered *per se* illegal blood alcohol content laws increase the probability of conviction. Policies that specify mandatory minimum fines or jail terms can raise expected penalties, while administrative license revocations increase the swiftness of the penalty. Extensive research by economists and other social scientists has demonstrated that these types of laws, particularly those that involve swift and certain penalties (Midgette et al., 2021; Wagenaar & Maldonado-Molina, 2007), have reduced the likelihood of drinking and driving and the traffic crashes that result from it, and, as a result, have improved public health.

However, there is also a growing literature that suggests that there is a downside to using legal costs as a way of raising the full price of unhealthy behavior. It is clear in the case of drug laws, for example, that these policies have disproportionately targeted people of color (Geller & Fagan, 2010; Tonry, 1994). Moreover, it is frequently argued that illicit markets allow the sale of less safe consumer products due uncertain quality (Galenianos, Pacula, & Persico, 2012). The health risks associated with criminalization are not limited to drugs. Several studies have found that the criminalization of other behaviors, in particular prostitution, can generate significant health risks in terms of the spread of sexually transmitted diseases (Cameron, Seager, & Shah, 2021; Immordino & Russo, 2015), thus imposing an even larger burden on already marginalized populations.

SUPPLY-SIDE POLICIES

Laws, regulations, and other policies targeting the supply side of the market also have considerable potential to influence public health. These policies work to increase supply and to reduce the monetary and time costs of a given product, leading to increased consumption, while those that restrict supply work in the opposite direction, resulting in a higher full price and reduced consumption.

Supply Constraints

Policies that constrain supply can take many forms, from outright prohibition to efforts to control distribution through licensing, legal sanctions, and other approaches. Some such efforts are broad-based, such as the short-lived Eighteenth Amendment, which banned the manufacture, distribution, and transportation of alcoholic beverages or the current policies that make sale and distribution of a wide variety of drugs illegal. Others can be more narrowly focused, such as bans on the sale of alcohol to those under 21 years of age and the increasingly prevalent restrictions on the sale of at least some sugar-sweetened beverages in schools. The number of outlets selling a particular

product can be restricted by requiring a license to operate and restricting the number of licenses available, as many jurisdictions do with alcoholic beverages. Similarly, the location of outlets can be limited through zoning laws that prohibit certain types of establishments in residential areas or near schools. In the case of alcoholic beverages, some states further constrain supply by monopolizing the wholesale and, in some cases, retail distribution of some beverages.

These types of supply constraints ultimately affect consumption of targeted products through their effects on several aspects of full price. Those that limit the number or location of outlets raise the time costs associated with consumption by reducing physical access. Those that prohibit the sale or distribution of various products can add to the expected legal costs. By reducing competition, constraints on supply result in higher prices. Numerous studies by economists, social scientists, public health researchers, and others have shown that constraints on supply, by increasing full price, reduce consumption and associated public health consequences.

However, at least some policies that constrain supply can create other health, social, and economic problems, in addition to the desired impact in reducing demand and its public health benefits. These consequences result from the profit opportunities created by supply constraints. This is most apparent in the markets for illicit drugs, in which high profits from the sale and distribution of these drugs result in considerable violence as existing suppliers try to protect their position and new players try to gain a foothold (Grogger & Willis, 2000). However, the unintended consequences of supply constraints have also been seen recently in restrictions on prescription opioids through medical channels, which caused many legitimate medical consumers in need of pain relief to seek alternatives through illicit markets (Alpert et al., 2018; Powell, Alpert, & Pacula, 2019). Thus, the actual benefit of some supply restrictions is much debated.

Supply Stimuli

Similarly, there are a variety of laws that seek to increase the supply of some goods and services to improve public health. By increasing supply, time costs are reduced and increased competition can lower prices, thereby increasing use. Various supply-side policies are being employed, for example, in efforts to promote healthier eating and increased activity to reduce obesity. Communities are offering tax incentives and changing zoning policies to attract supermarkets and other stores offering a greater variety of higher-quality, lower-priced fruits, vegetables, and other healthier foods and beverages in food deserts – neighborhoods where residents have little or no access to healthier options. Similar approaches are being used to attract physical fitness clubs and other establishments offering sport and recreational opportunities. Others are requiring or investing in changes to the built environment that increase the venues in which their residents can be active, from local park and recreation facilities to increased presence of sidewalks and trails.

Other laws aim to stimulate the supply of new drugs to promote public health by treating a variety of non-infectious diseases and preventing the spread of infectious diseases. Particularly important is patent protection afforded to producers who develop new drugs in exchange for

disclosing the science behind it. By granting monopoly control over the distribution of a drug for a limited period of time, patents generate profits that offset the research and development costs that led to the new discovery. At the same time, the information disclosed as part of the patent increases the likelihood of additional advances.

Measurement Issues

Much of the economic analysis of public health law focuses on how law alters the full price of health-related behaviors. Consequently, developing measures of full price is central to economic analysis of these behaviors. Some aspects of full price are relatively easy to measure, while others can be more challenging.

Monetary prices of products that are legally consumed are readily available in various databases. Particularly useful are the scanner-based databases that record the monetary prices of all transactions, along with detailed information on characteristics of products and various price-reducing promotions. Prices for some products can also be derived from consumer expenditure survey data, directly obtained in surveys of individuals or collected observationally at the point of sale. For products subjected to excise taxes, the taxes themselves can be a good proxy for price in the absence of significant geographic differences in the costs of production and distribution, as in the case of cigarettes or alcoholic beverages. Prices for illegal products are more challenging to collect and are subject to considerable variation depending on the quantity and quality of the product. Nevertheless, economists have tried to develop price measures for illegal products, most notably illicit drugs, on the basis of information collected from undercover purchases and seizures, as well as from individual self-reporting (Caulkins, 2007; Dobkin & Nicosia, 2009).

The time costs of consuming are another key component of full price. For legally available products, economists often use measures of outlet density as a proxy for time costs, with greater physical density reflecting lower costs of obtaining a given product. For example, many economic analyses of drinking and its consequences control for alcohol outlet density, which can vary considerably across jurisdictions depending on differences in alcohol control policies. Others will use measures derived from questions about perceived availability collected in surveys, particularly for illegal products.

Expected health costs are a more challenging component of full price to measure. Economic time-series studies of health behaviors often use indicators of health “shocks” as proxies for new information about the health consequences of a particular behavior. Many economic time-series studies of cigarette demand, for example, included indicators for things such as the release of the 1964 Surgeon General’s report and televised advertising about the health consequences of smoking broadcast under the Fairness Doctrine in the late 1960s. More recent studies have tried to capture exposure to mass-media counter advertising campaigns and other public education campaigns, with exposure varying both cross-sectionally and over time. For example, exposure to campaigns

that highlight the consequences of illicit drug use is assessed using Nielsen data on gross or targeted rating points measuring potential exposure to the televised advertising that is a key part of these campaigns. Still others use measures of perceived harm obtained from various surveys.

Economic theories of crime provide a nice foundation for developing measures of expected legal costs (see Chapter 5). These theories emphasize the importance of the risks of being caught and convicted, along with the swiftness and severity of the sanctions levied upon conviction. Economic analysis of the effects of drunk driving policies, for example, capture these multiple dimensions of expected legal costs with indicators for policies such as preliminary breath test laws (that increase the probability of arrest), per se illegal BAC laws (that raise the probability of conviction), administrative license sanctions (that impose relatively swift sanctions), and mandatory minimum penalty laws (that can increase the severity of the sanctions).

Conclusion

Economic theory provides a helpful framework for assessing effects of a number of public health laws. It highlights market failures that exist in the markets for a variety of goods and services, the use of which have considerable implications for population health. Information failures lead to overconsumption of products such as tobacco, alcohol, and sugar-sweetened beverages, resulting in many health, economic, and social consequences. Other information failures result in under-consumption of products such as fruits and vegetables, condoms, and smoking cessation services that, if consumption were increased, would improve public health. Similarly, use of many products can have harmful effects on others, while use of other products can create benefits among those that go beyond the individual consumer. Market failures create a clear economic rationale for governments to intervene through the use of laws, regulations, and other policies so as to minimize the inefficiencies that result and, by doing so, to improve public health.

Economic theory provides guidance on the types of policies likely to be effective in addressing market failures and in improving public health. The key economic mechanism through which these policies work is by affecting the full price of a behavior. Policies that increase the full price of unhealthy behaviors or reduce the "full price" of healthier behaviors have the potential to significantly improve public health. Particularly important are policies that directly influence prices of various goods and services, such as taxes on unhealthy products and subsidies for healthier options. Other interventions that raise time costs associated with obtaining and consuming, alter perceived health consequences and benefits of consumption, and raise the expected legal costs of consuming can also change behaviors in a way that improves public health. Laws that create incentives for increased supply of goods or services with public health benefits, thereby lowering the prices and the time costs of using them, can similarly improve the public's health.

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