# Mechanisms of Legal Effect: Perspectives from Economics

*A Methods Monograph*

PHLR

Making the Case for Laws that Improve Health

PUBLIC HEALTH LAW RESEARCH

March 15, 2012

Robert Wood Johnson Foundation

# Mechanisms of Legal Effect: Perspectives from Economics

A Methods Monograph
for the
Public Health Law Research Program (PHLR)
Temple University Beasley School of Law

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*PHLR is a national program of the Robert Wood Johnson Foundation*

## 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 or producers;
- alter the characteristics of a product, alter 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 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 illustrate the potential for impact. Subsidies, tax credits and tax deductions and a variety of 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 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.

## Introduction

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, subject to the prices they face for goods and services in the market, time constraints, 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 improved allocation of resources than 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. However, 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 facing limited competition will likely supply less of a good to the market and charge more for it than would be optimal from a societal perspective. Where such market failures exist, the changes in

consumption and/or production decisions that result from laws and regulations 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. Almost half of all deaths in the United States are the result of modifiable behaviors, including tobacco use, poor diets and physical inactivity, alcohol and other drug use, unhealthy sexual activity and violence (Mokdad et al., 2004, 2005). Over the past few decades, health economists have made substantial contributions to our understanding of how laws, regulations and other policies can address market failures in order to improve public health. This monograph provides an introduction to 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. The last section summarizes and provides some concluding comments. 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 man" is at the heart of much of classical economic theory (Persky, 1995). By seeking to maximize one's own self-interest subject to constraints around him, his interactions with other economic men will lead to the efficient allocation of society's scarce resources.

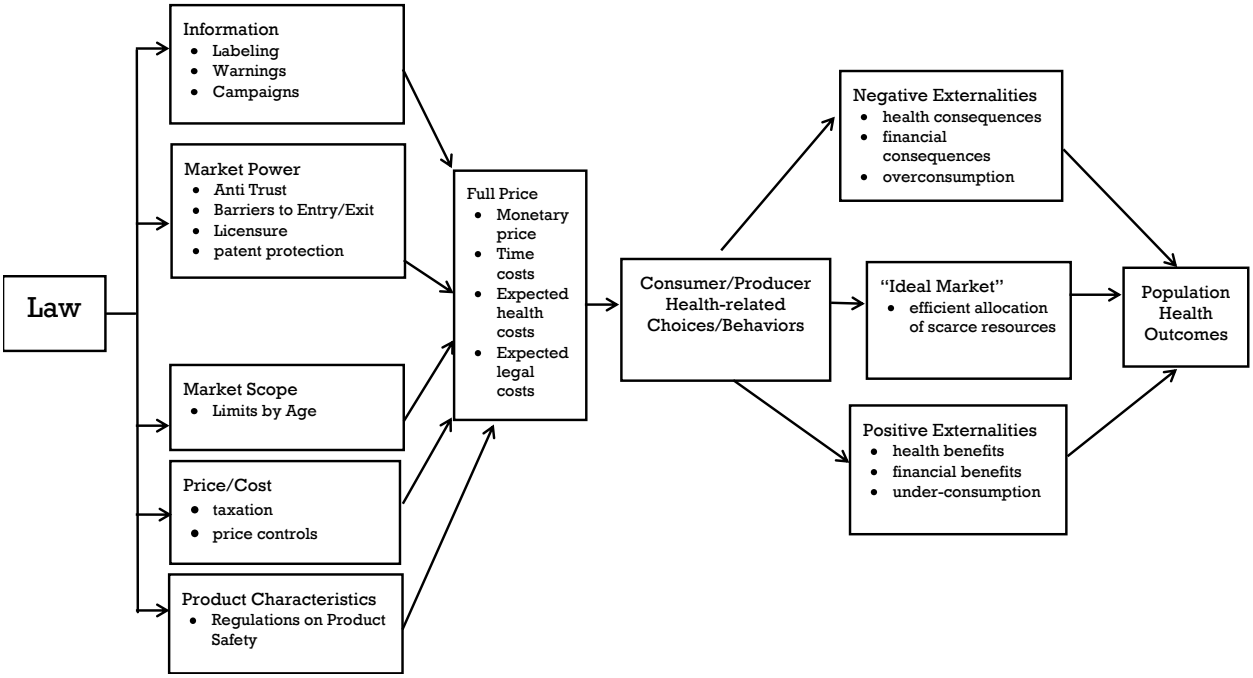


*Figure 1*. How Economic Laws and Regulations Affect Health Decision-Making.

Laws and regulations will alter the conditions under which economic man makes these decisions, as illustrated in Figure 1. Law can change the information environment by mandating more information 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 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 create or constrain the market power of producers or consumers. Antitrust laws aim to prevent producers from gaining significant market power and/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 create 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. Exclusive territory policies provide market power within a given geographic area while limiting the ability of firms to compete outside of that area.

The scope of a particular market can also be changed by laws and regulations. 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 and regulations can also alter the characteristics of a product. Some may prohibit various ingredients, while others may mandate certain product safety features.

Finally, laws and regulations can directly alter the prices of a product or key inputs into the production of that product, while others can affect the costs associated with consuming that product. Excise taxes add to the price consumers pay for particular 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.

That resources will be optimally allocated by the interactions of unfettered supply and demand depends on several key assumptions: that individuals have 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 or consumer has market power that allows them to influence prices.

## Market Failures

Economists refer to situations where one or more of these key assumptions are violated as "market failures" that 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, the existence of market failures provides an economic rationale for governments to adopt policies that change the outcomes that would result from a free market. Example of these market failures and key legal mechanisms for addressing them are described below.

### Information Failures

One market failure that generates considerable public health consequences is imperfect or asymmetric information regarding the health risks that result from consuming a variety of products. Perhaps the clearest example is cigarette smoking. Cigarette smoking in the U.S. 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 and/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, despite the information provided in school-based substance abuse prevention classes and through other sources, significant proportions of U.S. eighth grade students do not report "great risk" from using marijuana regularly (32%), taking LSD regularly (61.4%), taking ecstasy occasionally (55.0%), having five or more drinks once or twice each weekend (42.8%), or smoking one or more packs of cigarettes daily (39.1%) (Meyer, 2010).

This 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 youth 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 substance use, 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), addicted individuals 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 et al., 2004). Similarly, while only three percent 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 et al., 2011).

**Externalities**

Externalities occur when individual consumers and/or producers do not bear the full costs of their consumption/production (negative externalities) or when there are benefits from consumption/production that go beyond the individual consumer/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 that generate sizable public health consequences, from lung cancers, cardiovascular diseases and other adverse health effects non-smokers experience when exposed to tobacco smoke pollution, to violence caused by alcohol and drug abuse that kills or injures innocent bystanders. Similarly, when there are negative externalities in production, there are costs to society that are not reflected in the costs paid by producers that result in overproduction and lower than optimal market prices. Perhaps the best example of a negative externality in production is the air and water pollution that results from emissions/discharges during production that causes numerous health consequences among those exposed to various toxins.

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. 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 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.

Health behaviors that create significant public health consequences can also generate sizable financial externalities. There are many estimates of the economic costs of behaviors like cigarette smoking, excessive alcohol use, and illicit drug use, as well as of the obesity that results from poor diets and physical inactivity. CDC, for example, estimates that cigarette smoking resulted in average annual health care costs of $96 billion over the period from 2001 through 2004, while smoking-attributable productivity losses amounted to an additional $96.8 billion each year.

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 non-smokers 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 non-smokers (for example, Manning, 1991).

**Internalities**

More recent economic models have incorporated the experimental evidence from behavioral economics in models that imply that much of what have traditionally been considered internal costs are more appropriately treated as external costs (for example, Gruber & Koszegi, 2008). These "internalities" result from the time inconsistency inherent in individual's preferences. Traditional 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 Koszegi (2008) show that optimal cigarette taxes could be 20 or more times higher based on this approach as they would be using traditional economic models.

**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 not are a good substitute for the branded drug (for example, Institute of Medicine Committee on the Assessment of the U. S. Drug Safety System et al., 2007).

## Policy Interventions to Address Market Failures

When considering laws and other policies that would reduce the public health consequences of market failures described above, economists distinguish between "first-best" and "second-best" interventions (Jha et al., 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 based on a product's caloric, fat, and nutrient content.

However, a one-to-one correspondence between market failures and interventions does not always exist, or the first-best intervention that does exist fails to reach key populations. In these cases, second-best interventions, that typically take a blunter approach and have broader impact, 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 supply side of the market. This section provides an overview of key policy domains and provides examples where 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 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 year 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. 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). The impact of higher taxes and prices on overall cigarette smoking in the U.S. over the past several decades are illustrated in Figure 2.

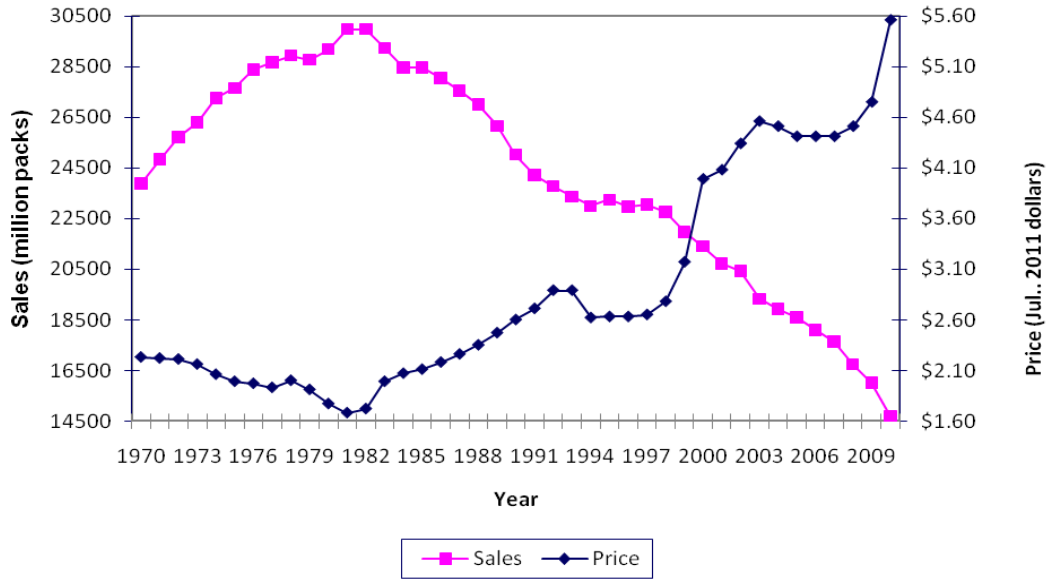


Figure 2. Cigarette prices and cigarette sales, United States, 1970-2010.

*Source*: Tax Burden on Tobacco, Bureau of Labor Statistics, and author's calculations

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, 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 five-fold since 1990, while the federal tax has increased more than six-fold.

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 (Xu & Chaloupka, 2011).

The public health success with tobacco excise taxes, coupled with increased recognition of the obesity epidemic in the U.S., 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). 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 above. 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 & Koszegi, 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 in an effort 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 U.S. 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, as a means 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 policies setting a minimum retail price for cigarettes (Centers for Disease Control and Prevention [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 policies appear to have little impact 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 in the handful of 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 and/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 above, 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.

Policies like these, while indirectly raising prices and reducing consumption of targeted products, are likely to have less of an impact than tax policies that directly increase prices. The revenue generated from tax

increases goes to governments, some of whom 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 non-smokers' exposure to tobacco smoke pollution, directly addressing one of the externalities caused by smoking (IARC, 2009).

**Perceived Health Costs.** As discussed above, imperfect and/or asymmetric information creates a market failure that can negatively affect public health. Governments can address information failures by adopting policies that disseminate information on the health impact of various products/behaviors or by limiting producers' ability to spread such information. 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 impact 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 U.S.,

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 Study's (ITC) (2009) recent 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 U.S. 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 are less harmful to health or less addictive than others, and to view these products as alternatives to quitting. The FDA recently implemented a ban on the use of these descriptors in the U.S. 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 and/or packaging to suggest similar concepts, leading some 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 protection of free 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 et al., 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 a short term, but not sustained effects and that the largest and most rigorous intervention reviewed produced no evidence of a long-term impact 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 to develop 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. 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. Increasing either factor raises the expected legal costs and, as a result, reduces targeted behaviors and their public health consequences.

Policies targeting drinking and driving are good examples of laws that raise anticipated legal costs in a way that promotes public health and that address the related negative externalities. Policies implementing sobriety checkpoints and breath testing and/or 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 have reduced the likelihood of drinking and driving, the traffic crashes that result from it and, as a result, have improved public health.

### 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 18th amendment banning 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 consequences. These consequences result from the profit opportunities created by supply constraints. This is most apparent in the markets for illicit drugs where 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. Whether or not the benefits in reduced use and its consequences are worth the additional costs is much debated.

**Supply Stimuli.** Similarly, there are a variety of policies that seek to increase the supply of some goods and services in order 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 in order to reduce obesity. Communities are offering tax incentives and changing zoning policies in order 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 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 policies 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

As discussed above, 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 a variety of detailed information on the 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 based on quantity and quality of the product. Nevertheless, economists have tried to develop price measures for illegal products; most notably illicit drugs, based on information collected from undercover purchase and seizures, as well as from individual self-reporting.

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 based 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 like 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/or 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. 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 impact of drunk driving policies, for example, capture these multiple dimensions of expected legal costs with indicators for policies like 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 variety of public health law. 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 like tobacco, alcohol, and sugar-sweetened beverages, resulting in a variety of health, economic, and social consequences. Other information failures result in under-consumption of products like 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 the prices of various goods and services, such as taxes on unhealthy products and subsidies for healthier options. Other interventions that raise the 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/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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*Please cite this document as:*

Chaloupka, F.J. (2012). Mechanisms of legal effect: Perspectives from economics. *PHLR Methods Monograph Series*.