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# Unintended consequences of cigarette prohibition, regulation, and taxation

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## Highlights:

- Laws that prohibit, regulate, or tax cigarettes can generate illicit markets.
- Illicit trade in tobacco is significant worldwide and in the United States.
- Law enforcement against black markets can create additional harms such as violence.
- Most empirical studies associate increased enforcement with more violent crime.
- Tobacco control policy should account for the indirect social costs of regulation.


## Abstract

Laws that prohibit, regulate, or tax cigarettes can generate illicit markets for tobacco products. Illicit markets both reduce the efficacy of policies intended to improve public health and create harms of their own. Enforcement can reduce evasion but creates additional harms, including incarceration and violence. There is strong evidence that more enforcement in illicit drug markets can spur violence. The presence of licit substitutes, such as electronic cigarettes, has the potential to greatly reduce the size of illicit markets.

We present a model demonstrating why enforcement can increase revenues in the illicit market, show that states with higher tobacco taxes have larger illicit markets, and apply the findings to discussion of public policy toward a potential ban on menthol cigarettes. The social calculus involved in determining public policy toward tobacco cigarettes should include the harms from both consumption and control. We conclude by highlighting areas where more research is needed for effective policymaking.



## Keywords

Illicit trade in tobacco, Black markets, Enforcement, Violence, Violent crime

# 1. Introduction

Cigarette smoking and other uses of tobacco damage health. Restrictions—regulations, taxes, or (in the extreme) prohibition—are intended to reduce that damage. Full prohibition of tobacco would be expected to create some of the negative consequences of the prohibitions of other drugs: illicit markets and the costs of enforcement (Reuter, 2013). Regulations and taxes can be thought of as lesser prohibitions, and create to some extent similar opportunities for profitable evasion.

As stricter controls on cigarettes are implemented, basic economic analysis as well as historical evidence suggest that we should expect to see an expansion of tobacco smuggling, tax avoidance, and counterfeiting. Large markets already exist in the United States for cigarettes transported in violation of laws, most notably cigarettes that are licitly produced, sold in low-tax states, and smuggled into higher-tax states. Illicit transactions reduce the ability of taxes and regulations to reduce consumption and thus protect health, in addition to generating damage to health and the social welfare on their own account. While the focus below is on violence as an unintended consequence of prohibition and enforcement; other authors suggest that illicit markets may also lead to corruption, the negative social consequences following from increased incarceration rates, and degradation of collective social capital (Kleiman, 2009). Optimal decision-making about taxes and regulations would weigh the health and other harms from illicit markets against the health gains from reduced smoking.

We discuss some of the unintended consequences of regulating and taxing cigarettes. Our methodology includes a formal review of the literature on enforcement against illicit drugs and violence (section 2.3) and presentation of an economic model showing why a positive association between enforcement and illicit revenue might exist (section 3.3). On the theoretical side, we focus on the harms caused by law enforcement against illicit markets, most notably increased violence from more active enforcement. In our application to public policy, we pay particular attention to a potential ban on menthol cigarettes, currently under consideration in the United States. Section 2 discusses these

unintended consequences and reviews what is known about the link between enforcement against illicit drug markets and violence. Section 3 presents a simple model of a market for a contraband product and the increased market revenue that might follow, which can increase violence. Policy implications of the analysis for cigarette regulation are discussed in section 4. In deciding whether to tighten controls on cigarettes in various ways, a key question facing policymakers becomes: How much health benefit will a tighter rule in fact create, once the effects of evasion are considered, and would that gain in health justify the increase in cost and damage from criminal activity and enforcement? A final section points out areas in which further research is needed to inform policymakers and concludes.

# 2. Consequences of Stricter Regulation and Taxation

Before delving into the formal modeling in the next section, we explore some of the consequences of regulating tobacco discussed in the literature. In section 2.1, we discuss how smokers respond to higher prices induced by regulation or taxes. The characteristics, modalities, and scale of illicit trade in cigarettes are reviewed in the following section. In section 2.3, we conduct a systematic review of empirical literature and find that most studies find a positive association between violent crime and enforcement against illicit drug markets.

## 2.1. Responses by Smokers to Higher Prices

Consumers employ a variety of legal and illegal strategies to reduce the price they pay for cigarettes (Chaloupka, 2013; Xu et al., 2013). Taxation raises prices; regulations banning specific product types make those products either entirely unavailable on the licit market or more costly to procure by requiring travel to another jurisdiction. In response to a ban, smokers could switch to lower-taxed licit tobacco product, switch to e-cigarettes, quit tobacco altogether, evade taxes by crossing jurisdictional borders, or purchase untaxed or banned products in the black market. According to survey respondents in the United States, UK, Canada, and Australia, 8% of smokers reported buying from lower-tax or untaxed sources in response to increased cigarette taxes, 36% switched to discount or generic brands, and 14% used loose tobacco (“roll your own”) (Licht et al., 2011). Respondents who use these price-

minimizing strategies are less likely to make attempts to quit smoking and less likely overall to succeed when they do attempt to quit. Should tax increases further raise the retail price of cigarettes, such smokers would potentially constitute an expanded market for illicit product, as we discuss in the following section. Stehr (2005) examines what happens after there is an increase in cigarette excise tax rates and estimates that up to 85% of the the change in taxes paid may be due to tax avoidance rather than reduced consumption.

Cigarette smokers can also switch from cigarettes to other tobacco products because of the higher taxes or prohibitions on the former, trading one source of health hazards for another. By comparing U.S. Department of Treasury and Department of Agriculture sales data for various tobacco products over the 2000–2007 period, and imputing cigarette equivalencies to the other products, Connolly and Alpert (2008) attributed nearly a third of the decline in legal cigarette sales in the United States over the previous decade to switching to tobacco products such as small cigars, moist snuff, and loose tobacco. The U.S. GAO (2012) reports that in the three years after the increase in federal taxes on cigarettes in 2009, sales of pipe tobacco rose to over twelve times their previous level[1] (from 1.5B to 18B cigarette-stick equivalents, compared with a decline in cigarette consumption of 50B sticks in the same period). Tynan et al. (2012) conclude that large tax differentials between cigarettes and other tobacco products lessen the impact of taxes on smoker behavior and public health. The popularity of flavored cigars, particularly little cigars and cigarillos,[2] increased markedly after flavored cigarettes other than menthol were banned in the United States in 2009. Little cigars, which look and perform like cigarettes, are especially popular among groups of particular public-health concern such as youth and

[1] Before 2009, pipe tobacco and roll-your-own [RYO] tobacco were taxed at the same rate ($1.10/lb). The 2009 increase in cigarette taxes was accompanied by increases in taxes for pipe (to $2.31/lb) and RYO tobacco (to $24.78/lb); pipe and RYO tobacco are effectively interchangeable (Manfreda, 2014).

[2] Little cigars are the same size as cigarettes, have filters, come 20 to a pack, and otherwise are designed to mimic cigarettes. Cigarillos are shorter, slimmer versions of the large cigar shape, but otherwise look like traditional cigars. The statutory distinction between cigars and cigarettes is that the former is wrapped in tobacco leaf and the latter is wrapped in paper.

African Americans (Delnevo et al., 2014; King et al., 2014). Sales of little cigars grew 240% from 1997 to 2007; about four out of five little cigars are flavored (King et al., 2014).

## 2.2. Illicit Trade

There is a large literature from criminologists and other on illicit trade in tobacco products (Andreas and Wallman, 2009; Blecher, 2010; Pelfrey, 2015; Reuter, 2013; Reuter and Majmundar, 2015; Shelley and Melzer, 2008; Von Lampe, 2002; Shen, Antonopoulos, and Von Lampe 2010; Von Lampe, Kurti, and Bae, 2014). Von Lampe et al. (2014) divide illicit trade in tobacco into four types: 1) "casual" smuggling or bootlegging, where consumers save money by buying cigarettes in lower-tax jurisdictions,[3] 2) large-scale or "commercial" smuggling, 3) trafficking in counterfeit cigarettes, and 4) trade in brands produced solely for illegal sales ("cheap whites"). Product for commercial smuggling can be either cigarettes purchased in bulk in a lower-tax area for tax-free illicit resale in higher-tax areas, or cigarettes not taxed because they are certified for re-export that are illegally diverted to illicit channels. The former source is most common in the United States, while the latter source from the "in-transit system" is most common in Europe (Joossens et al., 2000). Counterfeit cigarettes and cheap whites are much less common in the United States than elsewhere.

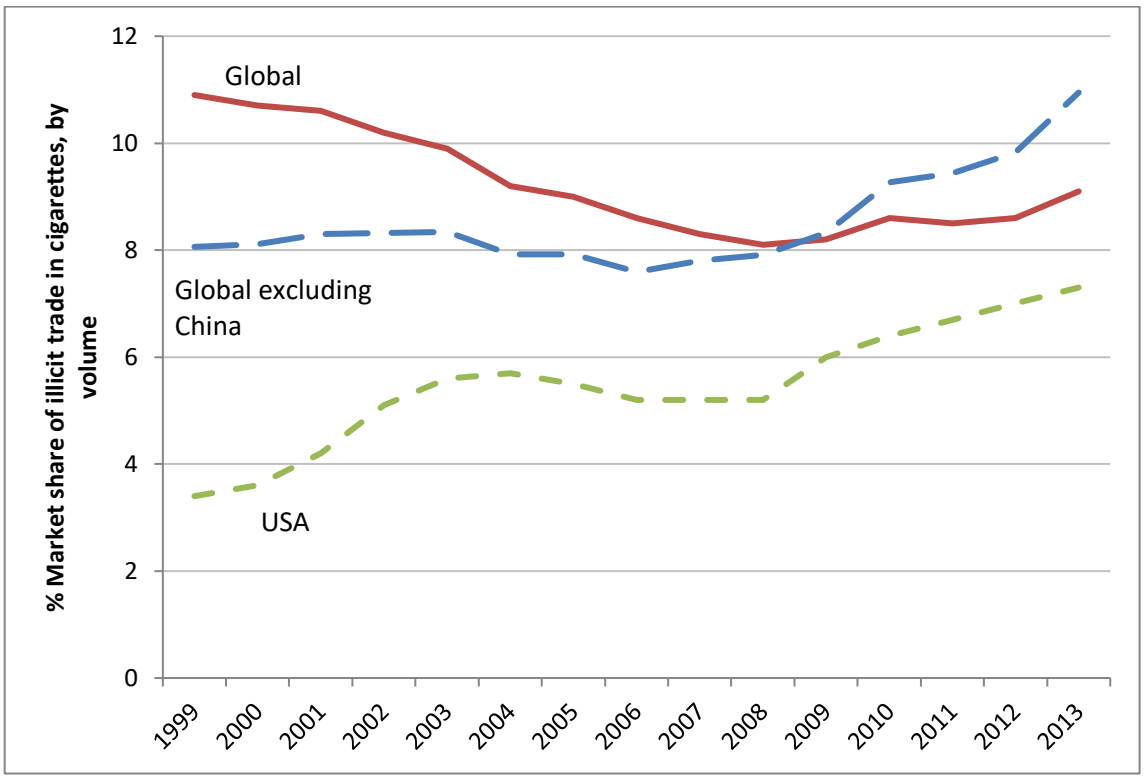
Tobacco-tax evasion and smuggling are widespread, although as with any black-market activity the scale is much more difficult to estimate than for licit markets. In 2013, Euromonitor (2014b) estimated global illicit trade in tobacco to be a $39B market with a market share of 9.1%. Estimates of the prevalence of illicit trade in tobacco are contested in the literature (Blecher, 2010; Blecher et al., 2015; Stoklosa and Ross, 2014), and estimates from different sources can vary widely. For example, the Euromonitor data presented in Figure 1 show global illicit trade to be lower in 2007 (at 8.3%) than Joossens et al.'s (2010) estimate of 11.6% for that year. Nevertheless, Euromonitor provides the only comprehensive time series data on illicit trade that covers most countries in the world. Figure 1 shows

[3] Such behavior is not necessarily illegal: small quantities of cigarettes imported for personal use are exempt from federal excise taxation, and most states exempt small quantities from use taxation.

that from 1999 to 2008, the market share of global illicit trade in cigarettes was shrinking, almost entirely due to diminishing illicit activity in China (Euromonitor, 2015). In the rest of the world, the illicit-trade share was more or less flat at around 8%. However, after 2006 the market share of illicit trade grew rapidly outside of China, rising to 10.9% by 2013.

Figure 1 also shows that illicit activity in the United States is lower than elsewhere, but has also risen steadily since 2008, to 7.3% by 2013. The most significant component of illicit tobacco trade in the United States is the shipment of tobacco products from low-tax states to high-tax states to evade state and local taxes (U.S. Department of the Treasury, 2010), activity encouraged by the widely varying state and local taxes on cigarettes (DeCicca et al., 2013; LaFaive and Nesbit, 2014, 2013; Lovenheim, 2008). However, in studies of global tobacco markets, Joossens et al. (2010) state that cigarette taxes have

**Figure 1. Estimated global market share of illicit trade in cigarettes**




Note: the data source for the illicit and total trade volumes is Euromonitor (2015); the ratios are calculated by the authors.

less impact than other factors (such as corruption, the presence of organized criminal networks, and easy opportunity for street-selling) on the level of illicit trade.

The actual scale of illicit trade in the United States can be measured only indirectly, and we found no recent estimates of smuggling at the state level published in peer-reviewed journals (but see Thursby and Thursby (2000) for estimates through 1990). However, a recent National Research Council (NRC) report commissioned by the FDA (Reuter and Majmundar, 2015) estimates that the percentage of consumption subject to tax avoidance and evasion varied widely across the states in 2010-2011. Expressed as net illicit inflows as a fraction of consumption, Washington state and New York have the highest incidence of tax-not-fully-paid consumption at 45% each. The largest net illicit outflow is 79%, from New Hampshire, with South Carolina a close second at 72%. The report also finds that generally speaking, "the higher the state cigarette excise tax, the higher the ratio between adjusted consumption and tax-paid sales or tax evasion and avoidance" (p.4-15). A similar positive correlation between state cigarette taxes and the size of illicit markets was noted by LaFaive and Nesbit (2014;calculated using the methodology of LaFaive et al., 2008). While such findings do not establish a causal relationship, and the extent of illicit markets of any sort may depend on other factors such as corruption and the presence of existing criminal networks, they do highlight the strong positive correlation between states' cigarette taxes and the size of the illicit market in the United States.

The impact of evasion on tax revenue and cigarette consumption, and thus on health, appears to be substantial, but its extent is controversial. Joossens and Raw (2012, 2008) estimate that illicit transactions lead to $40 to $50 billion in lost revenue from tobacco taxes globally.[4] The U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) (2009) estimates that tobacco diversion among states costs over $5 billion in revenue from unpaid excise taxes annually in the United States.

[4] Such a large estimate of lost tax revenue is not necessarily at odds with the Euromonitor (2014b) estimate of global illicit trade in tobacco of less than $40B. Black market cigarettes are priced much lower than licit product; if demand is highly inelastic then under the hypothetical situation in which illicit tobacco is unavailable, most consumers would continue purchasing licit product at much higher (taxed) prices, generating a large amount of additional tax revenue.

Merriman et al. (2000) and Yürekli and Sayginsoy (2010) conclude that, despite illicit trade, higher cigarette taxes create more tax revenue and lower consumption.

## 2.3. Enforcement and Violence

By definition, black markets are supplied by criminals, and with criminal activity comes the potential for other associated crimes and violence, though to an extent that varies widely by product, area, and period. Illicit drug markets seem particularly prone to violence (Andreas and Wallman, 2009; Goldstein, 1985). The value of illegal goods coupled with the lack of recourse to the legal system to settle conflicts creates inherent instabilities, uncertainties, and distrust in the market. This is exacerbated by illicit-market participants' pre-existing experiences with violence; participants tend to be recruited from communities with above-average rates of violence (Moeller and Hesse, 2013).

For illicit tobacco markets in particular, Shen et al. (2009) argue that violence is not an integral feature. The NRC report (Reuter and Majmundar, 2015) asserts that "the illicit tobacco market is not associated with violence" based on experience in Europe. In part the European case may reflect the relatively stable relationships among participants in its illicit markets, as previous research has shown that violence is a sign of market dysfunction and instability (Pearson and Hobbs, 2001). However, the NRC report later states that instances of violence, though rare, have been noted in street markets for illicit tobacco in Greece (Antonopoulos, 2008). Von Lampe (2002) describes a period in Berlin in the mid 1990s when gang involvement in cigarette smuggling (and in extortion of smugglers) led to violent feuds and "a virtual gangland war" (p. 154), although again such instances appear to have been the exception rather than the rule to date in Europe. Illicit cigarette markets in China have also been marked by violence, and Shen et al. (2010) state that "the role of corruption and violence in the [Chinese] cigarette counterfeiting business is not to be underestimated." The NRC report also notes that analogous research on violence has not been performed in the United States and does not discuss domestic incidents such as "murder for hire" schemes in 2009 and 2013. In November 2009, 14 people

tied to a contraband cigarette ring were arrested in Virginia. Members of the ring had asked undercover investigators to murder two of their competition, and the investigators obliged with faked deaths (Johnson, 2010). In 2013, two men in jail for trafficking illegal cigarettes attempted to arrange for the murder of two individuals they believed were cooperating with officials (NY AG, 2013).

There is earlier precedent for a violent illicit tobacco market in the United States as well, when in the 1960s an official from New York City described bootleg cigarettes as the "principal stoking facility of the engine of organized crime" (Fleenor, 2003, p. 7) and as constantly confronting workers with personal violence. In Virginia, the primary source for the illicit market for cigarettes in New York City, trafficking appears to be conducted mostly by (often small) gangs (Green, 2015a). However, with the potential profits to be made, and the history of other forms of organized crime such as firearm and human trafficking, experts there expect organized-crime networks to expand their market share (Green, 2015a; Pelfrey, 2015). The U.S. Attorney's Office states that trafficking has become increasingly violent in Virginia as competition increases between various trafficking organizations.[5] It is important to note that despite these expectations and assertions, in the United States tobacco-related crime is not tracked systematically and it is impossible to assess objectively its trend overall, much less to measure how it changes with the scale of illicit trade or enforcement against smuggling.

In some cases in the United States, profits from illicit trade in cigarettes helped fund terrorist organizations (Reuter and Majmundar, 2015; Sanderson, 2004; Shelley and Melzer, 2008; U.S. Dept. of State, 2015). As with the connection to violence, the importance of the link between the illicit tobacco market and terrorism is contested. Reuter and Majmundar (2015) find that it "appears to be minor" (p. 1–8) in the United States, based on cases examined from 2004 and 2005.[6] More recently, some law-

[5] The memorandum, which had been sealed by the court, was reviewed by a reporter and described in Green (2015).
[6] In one case linked to terror, money earned from illegal sales of cigarettes in the United States was used to procure military equipment for Hezbollah (Sanderson, 2004). Reuter and Majmundar (2015) state that of 291 ATF investigations into illicit trade in tobacco in 2004 and 2005, only 8 involved links to terrorist organizations. We could not find more recent comprehensive statistics, but in ad hoc personal communication with the authors, law-enforcement personnel in Virginia indicated that the link between tobacco trafficking and terrorism is perceived by law enforcement to be a serious problem. We did not verify this perception via formal means.

enforcement personnel and official government sources indicate that the problem is larger. In 2007 and 2008, officials in New York and from the ATF estimated that cigarette smugglers earned, in the aggregate, between $200,000 and $300,000 per week (i.e., up to $15.6 million per year) in New York, with a large fraction of the money "believed to be sent back to the Middle East, where it directly or indirectly finances groups such as Hezbollah, Hamas, and al Qaeda" (U.S. House, 2008, p. 4). Even more recently, the ATF (2015) stated that "[o]rganized criminal groups, including those with ties to terrorist organizations, have increasingly engaged in the illegal trafficking of tobacco products…." A U.S. Department of State (2015) report adds that cigarette smuggling is "a lucrative crime for some terrorist groups and a potential revenue source to finance acts of terror" and "encourages a convergence between organized crime, terrorist groups, and other threat networks" (p.2). However, it remains the case that evidence on the nexus of illicit trade in cigarettes and terrorism is based on case studies (Shelley and Melzer, 2008) and the isolated occurrences that appear in the media. Interpol (2014) notes that various international taskforces are undertaking projects to examine and verify the links between cigarette smuggling and terror groups "on a solid evidentiary basis" and it will be illuminating to review the results when available. One such international report documented some contemporary examples of illicit tobacco funding terrorism in and near Syria and Iraq, for the benefit of ISIL other Al-Qaeda affiliates (OECD, 2015).

While it may seem that stricter enforcement of tobacco policies would clamp down on potential violence in illicit markets, the experience of Prohibition and the War on Drugs in the United States suggests that the opposite can happen. The empirical literature on the relationship between drug-law enforcement and violence largely bears this out. The most extensive systematic review of the relevant literature is by Werb et al. (2011). We expand and update this review, but our inclusion criteria deviate from theirs in several ways:

1. Search parameters: Following the search methods and sources used by Werb et al. (2011),

which relied on conventional search techniques of English-language articles, we use the same search terms ("violence," "drug-related violence," "drug-market violence," "enforcement," "drug gangs," and "drug crime") plus the additional term "prohibition".

2. Period of study: Our review includes studies published from August 1988 through 2015. The start of this period was chosen to coincide with the earliest studies found by Werb et al. (2011).
3. Type of publication: We restrict our review to studies published in peer-reviewed journals.
4. Qualifying studies: We include only studies that present the results of quantitative research (cross sectional, time series, or longitudinal).

Drug-market violence is taken to include any violent crime that stems from the illegal market, except that we exclude violence by police. Most studies examine homicide or violent assaults. General law-enforcement intensity is taken to include any reasonable proxy; these included number of drug arrests, drug arrests as a proportion of all arrests, expenditures on enforcement, drug-seizure rates, number of police officers, and indicator variables for legal prohibition. Not all measures of enforcement were scaled to the size of the market, but the measures of violent crime generally were (to avoid spurious correlation driven by enforcement and violence varying in proportion to market size).

Our search yielded several studies meeting inclusion criteria that were not included in the earlier review. Nineteen studies meet our inclusion criteria,[7] with considerable variation in methods, reporting periods, and measures of enforcement and violence. Fifteen study the United States, three study Mexico, and one looks at Denmark. Of those in the United States, seven used homicides as the measure of violence and eight included a broader range. Twelve had study periods within 1983–2000

[7] Compare with the fifteen studies that met the criteria of Werb et al. (2011). Our list includes several newer studies and a study they did not include, and excludes four that they included because they contain only theoretical or qualitative results.

(an especially violent period for domestic drug markets) and three within 1900–1940 (which includes the Prohibition Era). These differences, particularly those of definition of the variables, preclude the estimates from being summarized via meta-analysis.

Furthermore, the data examined are not independent among the set of studies,[8] which means that the proportion of studies reaching a particular conclusion is not an estimate of how often that conclusion holds in the population of enforcement actions. Researchers may also have chosen to study markets with unusually significant crime, violence, and enforcement activity. Publication bias against statistically insignificant results may inflate the proportion of studies finding a significant association between enforcement and violence. Additionally, the methodology employed in the studies ranges from examining simple correlations to regression specifications with stronger claims to uncovering causal links between variables (such as fixed-effects and difference-in-differences estimators and regression discontinuity design). Keeping these cautions in mind, we nevertheless find that the weight of the evidence points toward a significant positive association between enforcement and violence. One of the studies reviewed (Owens, 2011) found no association between levels of enforcement and violent crime, although the same author came to the opposite conclusion in a later study using more refined methodology (Owens, 2014). The remaining 18 studies found a positive association between enforcement and crime. A summary of the studies reviewed and a description of their findings are provided in the Appendix.[9]

[8] For example, the studies by Rasmussen and coauthors both examine data from Florida, two studies by Owens examine related data in the United States from around Prohibition, and two other studies examine the same data set on drug killings in Mexico.

[9] To concentrate on the partial effect of enforcement, we exclude studies on crime-reduction programs that involve more than just increased levels of traditional law enforcement. For example, holistic "focused deterrence" programs couple selective enforcement against violence-prone repeat offenders with increased community involvement and the provision of social services (Braga et al., 2008; Kennedy, 1997). When implemented correctly, such programs can successfully reduce crime (Braga and Weisburd, 2012), but they do not always work. We found four case studies of such "Pulling Levers" programs aimed at illicit drug markets (as opposed to gun violence or gangs). However, only one study found that the program reduced violent crime (Corsaro et al., 2012), while the other three found no statistically significant impact (Corsaro and Brunson, 2013; Corsaro, Brunson, and McGarrell, 2013; Corsaro and McGarrell, 2009).

# 3. The Theoretical Relationship between Enforcement and Violence

## 3.1. Overview

What might account for the empirical evidence showing that violence often increases with enforcement in illicit markets? As noted, the quality of the statistical work in the studies varies, particularly in ability of the estimations to uncover causal mechanisms, and the association may merely be spurious. However, at least some of the studies are carefully designed and use credible methodology to find causal relationships from observational data. Furthermore, the theoretical literature suggests three explanations why the relationship may be causal. First, increased enforcement disrupts the market. Destabilizing established hierarchies—by removing a drug lord who controlled an area, for example—renews competition and violence can follow as participants jostle for turf and market share (Costa Storti and De Grauwe, 2011; Kuziemko and Levitt, 2004; Papachristos, 2009; Rasmussen and Benson, 1994). Reuter (2009) points to this mechanism as a main possible reason for the uptick in violence in Mexican drug markets after enforcement increased in the mid 2000s.

Second, stricter enforcement increases the risk of detection and punishment, which in turn increases the risk premium and therefore profitability of sales. Profit margins become worth fighting for: Increasing the share of total cost attributed to enforcement risk can increase the incentive for violence insofar as violence deters enforcement agencies and potential informants (Caulkins et al. 2010; Kleiman, 2011; Reuter, 2009). Blumstein and Cork (1996) note that since individuals operating in illicit markets cannot rely on police protection, their product and revenues are highly vulnerable to theft. The resulting self-protection usually takes the form of arming oneself with a handgun, which contributes to violent crime among this population. Compounding the problem are the selection effects: If violence succeeds in fending off enforcement by intimidating potential witnesses, surviving organizations and individual members in them will be selected for their capacity to use violence effectively to survive (Blumstein and Cork, 1996).

Third, as a consequence of the previous point, enforcement raises the amounts of cash in the hands of illicit market participants on the street. At least some of the factors associated with drug violence identified by Goldstein (2003) are closely related to revenue. For example, robberies of drug dealers (and the violent responses in retribution) are triggered by expectations that dealers carry large amounts of cash or valuable product on their person. For example, in January 2015 in Virginia two traffickers loading cigarettes into a vehicle were accosted at gunpoint by robbers, who drove off with $90,000 worth of cigarettes and $25,000 in cash (Green, 2015a). Similarly, areas known for traffic in illicit substances are attractive targets for robberies in general (not just of known dealers) since more people on the street will be buyers carrying substantial amounts of money.

Finally, enforcement against illicit markets can lead to greater violence by transferring resources from other areas of crime fighting and criminal justice (Kuziemko and Levitt, 2004). As one example, overcrowding of prisons and jails due in part to enforcement against drug markets may lead to the early release of inmates or reduced incarceration of criminals, some of whom may commit violent crime upon release. Similarly, resources for policing and the court system are finite, and criminal justice assets diverted toward enforcement in illicit markets become less available for use in countering other crimes.

The potential relationships between enforcement and violence discussed above do not imply that a greater intensity of law enforcement will have the same impacts on all illicit markets. Reuter (2009) points to certain market features such as geographic specificity ("turf"), competition for the services of corrupt officials, the youth of market participants, and high value of the product that increase the proneness to violent outcomes. Some of these factors (e.g., those related to corruption) would likely apply if Mexican drug trafficking organizations were to become involved in the illicit cigarette trade following a product ban in the United States (as we discuss below in section 4.5). Other factors would not: even if banned, it is likely that no particular tobacco product would approach the

level of street value enjoyed by cocaine or heroin.

## 3.2. Background on the Economics of Smoking

The elasticities of demand and supply for cigarettes are key parameters for the modeling in the next section of enforcement and market revenue, and so their empirical estimates are reviewed here.[10] Chaloupka and Warner (2000) summarize the econometric literature as finding results in the broad range of −0.14 to −1.23 for demand elasticity, with nearly all estimates falling in the narrower band between −0.3 and −0.5. More recently, Chiou and Muehlegger (2008) report demand elasticities for cigarette consumption of −0.29 to −0.56. Thus, demand for cigarettes is typically measured to be well inside the inelastic region. An important consequence for the model in the next section is that while cigarette smoking has some sensitivity to price, it is highly inelastic, implying that increases in prices will increase revenue.

There are few econometric studies of demand for menthol cigarettes in particular. In the first such, Tauras et al. (2010) draw data from the 2003 and 2006/07 Tobacco Use Supplements to the Current Population Survey and estimate the demand for menthol smoking conditional on being a current smoker. They conclude that menthol and non-menthol cigarettes are not close substitutes; a 10% increase in the price of menthol cigarettes would prompt only 2.4% of menthol smokers to switch to non-menthol cigarettes. Another study, albeit sponsored by a tobacco company and not peer-reviewed, also came to the conclusion that demand for menthol cigarettes is relatively insensitive to price (Compass Lexecon, 2011). Other studies relying on stated preferences instead of market data also find the menthol demand is highly inelastic. O'Connor et al. (2012) estimated from stated-preference data that menthol smokers' demand for menthol cigarettes was nearly completely insensitive to prices (at least in the moderate range of prices examined). Thus, whether for regular or menthol cigarettes, the model below will assume that demand is inelastic, which plays an important

[10] Demand elasticity measures the percentage change in the quantity demanded from a 1% increase in price; elasticities between 0 and −1 are said to be "inelastic." Supply elasticity is analogously defined.

role in the results. A caveat regarding all these estimates is that as e-cigarettes grow in popularity, the historical relationships between combustible cigarette consumption and price may not adequately reflect the present or future elasticities.

The supply of cigarettes is likely to be much more elastic than demand, at least in the long run, whether the final sales are licit or illicit. There are no great diseconomies of scale in the tobacco-products industry (which would reduce the supply elasticity), and the supply of unprocessed tobacco leaves is elastic. Licit production of tobacco and cigarettes has been found to result in elastic (i.e., highly price-responsive) supply (FAO, 2003; Fulginiti and Perrin,1993; Sumner and Wohlgenant, 1985). Given the easy conversion in the production process from menthol to non-menthol cigarettes, it is quite likely that the supply function for menthol cigarettes is similarly highly elastic. Production and distribution for illicit sales will have higher costs, due to the risk premium if for no other reason, but there is nothing inherent about enforcement that will necessarily change the *shape* of the supply curve (and therefore the elasticity may change little). Possible sources of illicit supply after a ban are explored in section 4.5.

## 3.3. A Simple Economic Model of Enforcement and Market Size

In this section we draw on standard economic analysis and modeling performed for other drugs to analyze how enforcement can increase prices, market size, and revenue. The purpose of focusing on the relationship between enforcement and revenue is that larger markets may be associated with more violence, as discussed below (Goldstein, 1985). Consider a retail market for menthol cigarettes that would be competitive in the absence of taxes or a ban. While some studies examine noncompetitive illicit-drug markets (e.g., Caulkins et al., 2006), assuming a competitive market allows intuitive analysis with the basic economic tools of supply and demand curves, as in Becker et al. (2006) and Prieger and Kulick (2014, 2015). The other assumptions are these:

1. On the supply side of the illicit market, the quantity supplied $Q$ is an upward sloping

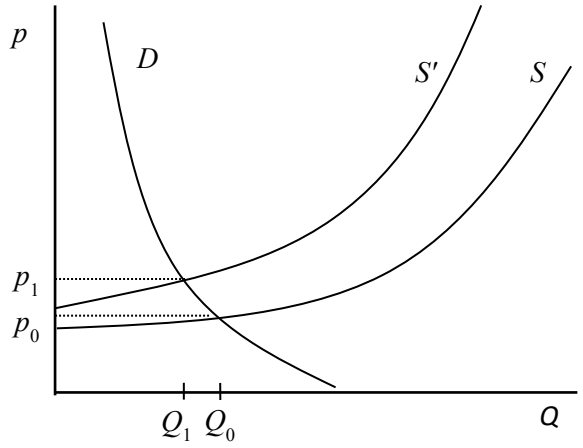
function of $p$, the price sellers receive. Enforcement of the ban raises the effective marginal cost of doing business. These additional costs include the monetization of the perceived risks of arrest, sanction, fine, and incarceration, as well as any supply-disruptive activity following from enforcement, such as product seizure, as discussed in Reuter and Kleiman (1986). It is assumed that the additional costs rise with greater levels of enforcement, so that the supply curve shifts up as enforcement rises.

2. The quantity demanded in the absence of a ban is a downward-sloping function of the price consumers must pay. Given the empirical evidence reviewed above on demand elasticities and the low cross elasticity of demand between menthol and non-menthol cigarettes, we assume that demand is inelastic in the relevant range of prices. If enforcement targets users, then the consumers treat this like a "risk tax," where it is assumed that the risk tax rises with the level of enforcement. If so, the perceived risk-inclusive price of the product rises and the demand curve shifts in.

The conclusions of the model are straightforward under the realistic further assumption that enforcement is aimed more at sellers than buyers. The War on Drugs, for example, focuses mainly on interdiction and prosecuting drug traffickers. Enforcement in the current illicit tobacco market also appears to mainly target traffickers.[11] For ease of presentation we therefore present the rest of the analysis assuming that there is no demand-side enforcement (Figure 2). When enforcement of the ban increases, the effect of the increased marginal costs is to shift the supply curve up; for any given quantity the minimum price necessary to elicit supply of the marginal unit rises. With the higher supply curve, the price increases greatly in percentage terms, from $p_0$ to $p_1$. Given that demand is inelastic, revenue rises. Prieger and Kulick (2014, 2015) show in a formal mathematical investigation of this

[11] We base this assertion on our informal review of news articles and ad hoc conversations with tobacco-enforcement and tobacco-industry personnel in Virginia.

**Figure 2. Equilibrium price in an illicit market with only supply-side enforcement.**




model that the same conclusions hold even with demand-side enforcement, changes in demand upon imposition of a ban,[12] and other extensions (as long as assumptions that are plausible for cigarette markets hold). In particular, if demand is less elastic than supply and enforcement has more impact on the supply side than on the demand side, then the market price will rise with more enforcement.[13]

Since the insights of Goldstein (1985), it is common in models of illicit drug markets to assume that violence rises with illicit revenue earned in the market. Assuming that violence increases with market size sets aside any direct beneficial effect of enforcement effort on reduction in violence, or at least assumes any such effect is small enough not to reverse the positive association between the two. In part, the latter assumption is maintained to focus on the economic effects on violence through the price mechanism. However, our treatment here is also in line with the empirical literature reviewed in section 2.3 finding that enforcement activity often is associated with more, rather than less, drug violence.

The conclusion from this simple model is straightforward: increased enforcement leads to

[12] Due to, for example, advertising bans or the exit from the market of law-abiding consumers.
[13] The transaction-cost model of illicit drug markets of Lee (1993) finds that penalizing users for possession would also raise prices, even in the absence of supply-side enforcement. This behavior differs from the results of the simpler model presented here.

more revenue. If violence indeed rises with market size, then increased enforcement would also lead to more violence unless the enforcement is specifically designed to be violence-reducing. However, the magnitude of the impact of enforcement on revenue or violence is indeterminate. The current illicit tobacco market appears to have low enforcement and low but increasing levels of associated violence (Green, 2015a,b), although this cannot be quantified due to lack of systematic data on tobacco-related crime. Increasing enforcement might tend to increase violence over a fairly wide range. Without estimates of the sensitivity of consumer demand to prices, smokers' propensities to abide by the law, and other parameters of the model, it is impossible to determine the optimal degree of enforcement to minimize violence or to maximize net social benefits (a point to which we return in sections 4.2 and 5 below).

We note in passing that the exact mechanisms by which enforcement might spur violent crime—assuming the empirical relationship between the two is indeed causal—have yet to be isolated empirically. Pollack and Reuter (2014) note that evidence linking enforcement to prices is weak, but also that the methodology of existing studies is unconvincing, so that better empirical studies are called for. Bright and Ritter (2010) also note that the relationship between enforcement of drug laws and the retail price of illicit drugs is more complex than is modeled here. Nevertheless, the basic operation of supply and demand presented here highlights one possible mechanism by which increased enforcement can lead to more violence.

# 4. Policy Implications

## 4.1. Menthol cigarettes

Menthol cigarettes face current bans in Brazil and Nova Scotia, imminent bans in the European Union (Dalton and Esterl, 2013) and other Canadian provinces, and possible prohibition by the FDA in the United States (Tavernise, 2013). Brazil's ban of menthol cigarettes took effect in 2013; Nova Scotia's ban took effect in May 2015. The EU ban on menthol cigarettes will be fully in effect by 2020. Menthol cigarettes constituted 28% of total cigarette sales in 2013 in the United States, with a further 3% of

market share garnered by capsule cigarettes, which release menthol flavor when capsules in the filter are crushed.[14] Menthols account for approximately $25 billion in annual retail sales (Esterl, 2011). Twenty-nine percent of menthol smokers are African American and a further 9.5% are Hispanic, and Pearson et al. (2012) report strong support for a potential menthol ban in these communities. Our analysis of U.S. data from the 2010–2011 Tobacco Use Supplement to the Current Population Survey show that an estimated 70% of African-American smokers smoke menthol cigarettes, compared with 25% of white smokers. Menthol smokers exhibit especially strong brand loyalties (Anderson, 2011), which may account in part for the low demand elasticities discussed above.

Congress exempted menthol when it banned non-tobacco flavorings in cigarettes in 2009 in the Family Smoking Prevention and Tobacco Control Act ("Tobacco Control Act"), but mandated study of the matter by the U.S. Food and Drug Administration (FDA). A report by FDA's Tobacco Products Scientific Advisory Committee (TPSAC, 2011) concluded that banning menthol cigarettes "would benefit public health in the United States."[15] An industry-perspective report submitted to the FDA at the same time (Heck et al., 2011) argued that there is no scientific basis for regulating menthol cigarettes differently since they are no more hazardous than other cigarettes. On July 23, 2013, the FDA released a report (U.S. FDA, 2013a) acknowledging that there is no evidence that menthol cigarettes are inherently more harmful than non-menthol cigarettes on a unit basis, but stating that menthol makes it easier to start smoking and more difficult to cut back or quit. The report was posted for public comment for several months to allow the FDA to "determine what, if any, regulatory action with respect to menthol in cigarettes is appropriate" (U.S. FDA, 2013b). Despite the passage of two years since closure of the comment period, the FDA has yet to propose new regulations regarding menthol cigarettes.[16]

[14] Capsule cigarettes thus give the smoker the option of menthol or non-menthol flavor. Capsule cigarettes have experienced high volume growth in the United States since their introduction in 2008 (Euromonitor, 2014a).
[15] Subsequently, a court ruling prohibited the FDA from using the TPSAC report, ruling that three anti-tobacco members of the Committee had financial conflicts of interest (Lorillard Inc. et al. v. United States Food and Drug Administration, No. 11-440, July 21, 2014).
[16] The delay is probably caused in part by the court ordering the FDA to reconstitute the TPSAC (see previous footnote), although the agency is not obliged to act on TPSAC's recommendations.

If menthols were banned, we might expect to see some switching to non-menthol brands of cigarettes, migration to other tobacco products or e-cigarettes, quitting tobacco altogether, and smuggling. Hartman (2011), O'Connor et al. (2012), and Pearson et al. (2012) report that 35–40% of menthol smokers say they would quit smoking altogether if menthol cigarettes were no longer available. In a more recent study, however, Wackowski et al. (2015) found that only 28% said they would quit. Stated intentions to quit a highly addictive product are overoptimistic. O'Connor et al. (2012) also report that 25% said they would "find a way to buy a menthol brand," indicating their willingness to purchase menthol cigarettes on the black market. The potential number of buyers of illicit menthol cigarettes under a ban may be larger than these statistics suggest, given the well-known tendency of survey respondents to underreport socially undesirable intentions such as engaging in criminal activity.) Social desirability bias "has been found to occur in virtually all types of self-report measures and across nearly all social sciences literatures" (Fisher, 1993, p. 303).

Consider now what the simple model presented above predicts if menthol cigarettes were banned in the United States. Federal drug-enforcement policy has always been more oriented towards pursuing high-visibility or large players on the supply side than the demand side (Reuter and Kleiman, 1986), which has the case shown in Figure 2 in the limit. The evidence discussed in section 3.2 suggests that demand is highly inelastic, that regular cigarettes are not close substitutes for menthol cigarettes,and that the supply curve of the illicit good would be highly elastic. Under such circumstances and the assumptions of the model, Prieger and Kulick (2014, 2015) show that increased enforcement of a ban will lead to greater illicit revenue, and hence (if the two are indeed positively associated) more violence. Refer also to Prieger and Kulick (2015) for additional cited evidence that a menthol ban fits the assumptions of the model presented here.

Is policy captive to the inexorable economics of the model? No. Several parameters of the model are susceptible to manipulation by public policy, apart from the choice of enforcement level. One of the most obvious is the possibility of increasing the elasticity of demand for menthol cigarettes by

public-health information campaigns, perhaps targeted at communities with above-average usage rates (e.g., African-Americans, Asian-Americans, and youth). Some previous mass-media campaigns directed at public health have been shown to have at least "small to moderate effects" on behavior (Noar, 2006), although as the pool of remaining smokers dwindles their resistance to persuasion may increase. Increasing the elasticity of demand will both shrink the market more rapidly and—if demand elasticity increases enough relative to supply elasticity—reverse the relationship between price and revenue that drives the pessimistic results above.

Shifting some enforcement to the demand side from the supply side may also reverse the conclusions of the model, as long as consumers are sensitive enough to enforcement to modify their behavior greatly (Prieger and Kulick, 2015, 2014). Such activity may be politically unpopular, however, and hugely undesirable on other grounds, since it would mean more arrests of minority-group members for what many regard as trivial offenses.

## 4.2. Electronic Cigarettes

Electronic cigarettes ("e-cigarettes") are a rapidly growing segment of the U.S. tobacco-products market. They produce a nicotine-laced vapor, rather than smoke, and currently are allowed to be used in many circumstances where smoking is prohibited. Analysts estimate that retail sales of e-cigarettes in the United States were $3.5 billion in 2013 (Euromonitor, 2014c) and may reach $10 billion (approximately 10% of the combined conventional and e-cigarette market) by 2018 (Drill, 2013). The FDA attempted to ban e-cigarettes as unapproved drug/device combination products but was overruled by the U.S. Court of Appeals in 2010 (Deyton, 2011). The court ruled that e-cigarettes and other products made or derived from tobacco can be regulated by the FDA as "tobacco products" under the Tobacco Control Act, but are not drug/device combinations unless they are marketed for therapeutic purposes. The FDA released a set of proposed rules for e-cigarettes in April 2014.[17] The

[17] 79 Fed. Reg. 23142 (April 25, 2014) (amending 21 C.F.R. Parts 1100, 1140, and 1143).

proposed rules deem e-cigarettes to be within the scope of "tobacco products" covered by the Tobacco Control Act and prohibit sales to minors under 18. Furthermore, manufacturers would be required to provide warning labels regarding nicotine's risk of addiction, disclose ingredients and harmful constituents, and obtain permission from the FDA prior to marketing a new product. The FDA did not propose to ban flavors in general or menthol in particular, but sought public comment and research on whether flavors make e-cigarettes more attractive to youths. The FDA has not issued its final regulations as of June 2015. Since 2012, 42 states have prohibited sales of e-cigarettes to minors (NCSL, 2015).[18] In three states (New Jersey, North Dakota, Utah), e-cigarettes are banned wherever smoking is banned (ANRF, 2015).

The health effects of e-cigarettes are a matter of debate due to a paucity of peer-reviewed research on the subject (Goniewicz et al., 2014; Henningfield and Zaatari, 2010). Argument over the public-health consequences of e-cigarettes does not fit neatly into a narrative of "industry vs. public health advocates"; the World Health Organization (WHO, 2014) states that e-cigarettes "are the subject of a public health dispute among bona fide tobacco-control advocates that has become more divisive as their use has increased" (p.1). It is plausible—yet unproven—that e-cigarette smoking has only a fraction of the risks of conventional smoking due to the absence of particulates, carcinogenic "tars," and hot gases. The WHO (2014) concludes that "it is very likely that average ENDS [electronic nicotine delivery system, i.e., e-cigarettes] use produces lower exposures to toxicants that (*sic*) combustible products" (p.4). For example, Goniewicz et al. (2014) find that levels of toxicants examined from cigarette smoke were 9–450 times higher than in e-cigarettes.

However, clinical studies are rare and long-term studies are nonexistent; Farsalinos and Polosa (2014) summarize the scant evidence from clinical studies and research surveys as showing that e-

[18] States not banning e-cigarette sales to minors as of May 2015 are Maine, Massachusetts, Michigan, Montana, Nevada, New Mexico, Oregon, Pennsylvania, and Texas. Many of the state laws are aimed at nicotine in particular rather than all e-cigarettes, which can be used with liquids containing no nicotine.

cigarette use is "relatively safe" compared to cigarette smoking. Absorption of nicotine (the addictive component of tobacco) from e-cigarettes has been found to be much less than from cigarettes (Henningfield and Zaatari, 2010). Kozlowski (2013a, 2007) claims that e-cigarettes are proven smoking-cessation aids, serve harm reduction in existing smoking populations due to e-cigarettes' lack of contaminants and adulterants, and promote public health due to the absence of smoke or secondhand smoke. Burstyn (2014) finds that e-cigarette users' exposure to contaminants in the inhaled vapor is well below workplace-safety standards for involuntary exposure. Other evidence also suggests that they are not as harmful to the user's health as combustible cigarettes (Cahn and Siegel, 2011; Hajek et al., 2014).

If menthol combustible cigarettes were banned, switching to menthol-flavored e-cigarettes might be a popular choice for menthol smokers, if they were available. Recent surveys find that 12–15% of menthol smokers say they would switch to menthol e-cigarettes if menthol cigarettes were banned (D'Silva et al., 2015; Wackowski et al., 2015). If e-cigarettes create fewer health risks than traditional cigarettes and are reasonably attractive to a large share of smokers, then allowing or even encouraging their use may diminish the unexpected consequences of increased regulation on tobacco by allowing non-quitting smokers to become "vapers" instead, diverting them from black markets. If that choice were popular the public-health benefits of a menthol ban might increase while the costs from illicit markets would shrink. However, this analysis depends on whether the FDA forbears from banning menthol flavoring in e-cigarettes.

E-cigarettes, however, may present an alternative not only to smoking, but also to quitting. If e-cigarettes make it less likely for smokers to quit altogether, then to the extent that e-cigarette use is not risk-free, the public-health benefits of increased tobacco regulation would not be as compelling (Benowitz and Goniewicz, 2013). There is no evidence to date that indicates whether e-cigarettes act as a net substitute or complement to combustible cigarettes. On a related topic, some advocates contend

that e-cigarettes induce youth to use nicotine and thereby act as a gateway to smoking (Grana, 2013; Kelland and Hirschler, 2013). Whether the availability of e-cigarettes indeed leads to greater smoking initiation among youth or others is an active area of current research. Even less certain is whether non-smoking adults will take up e-cigarettes in significant numbers, and how that should enter the social calculus.

## 4.3. Optimal Enforcement

An optimal policy for regulation and enforcement would account for both the social costs and benefits under the resultant regime. A variety of approaches to optimal enforcement of drug laws is present in the literature (Baveja et al., 2000; Becker et al., 2006; Coulson et al., 2015; Garoupa, 1997; Poret, 2009; Tragler et al., 2001; Yunker, 2012). The goal common to all economic approaches is to determine the level of regulation that maximizes net social benefits (or, equivalently, that minimizes net social costs). The social calculus therefore depends on estimates of the intended benefits (principally improved health and reduced mortality), unintended consequences as discussed above (including the social costs of enforcement and violence), and the costs of enforcing the regime.[19] Many of the valuations required for optimization are largely unknown, given how little is known about the expected scale of illicit trade and violence under different levels of regulation and enforcement. Elsewhere, the present authors issue a more extensive call for research on these topics (Kleiman et al., 2015).

Viewed through the lens of net social benefits, it is clear from the model above that an optimal policy would not necessarily seek to eradicate the illicit market with ever more enforcement. If stricter regulation or higher taxation leads to more evasion, increased law enforcement does not automatically

[19] A particularly controversial issue is whether to include the consumption benefits of smoking in social welfare. The FDA incorporated the lost consumer surplus from quitting smoking in its analysis of the proposed rules for e-cigarettes, which prompted sharp rebuttals from public health advocates and others. The FDA subsequently backed away from its analysis and commissioned experts to study the proper treatment of such hedonic benefits (Begley and Clarke, 2015).

restore the status quo but can create new problems. The tension between the harms caused by the illicit market and the harms caused by fighting it requires addressing the policy question of how much of a black market society is willing to tolerate in exchange for the health benefits of stricter regulation on cigarettes. Furthermore, the analytical challenge is even greater than suggested here, since there may be multiple equilibria to which the regulation/enforcement system may settle (Caulkins and Reuter 2010; Feichtinger and Tragler, 2002; Kleiman, 1992).

## 4.4. Precede Regulation with Enforcement

Illicit markets exhibit other phenomena not modeled above, for example "enforcement swamping" (Kleiman, 2009, 1993; Kleiman and Kilmer, 2009). To understand the implications for policy, consider an incentive-based view of crime. Potential violators respond to the expected personal costs imposed by enforcement, which are a function of the probability of detection and arrest and the negative consequences following therefrom. The probability of punishment is in turn an increasing function of enforcement resources expended and a negative function of the size of the illicit market (because for a fixed amount of enforcement effort, the risk facing any particular violator is reduced).

Now suppose that participation in the market for illicit cigarettes increases (as a result of a menthol ban, for instance), with no concomitant increase in enforcement. The higher the overall violation rate, the smaller the risk of punishment for any individual violator. This relation yields a positive-feedback loop[20]—a vicious cycle of "enforcement swamping" in the parlance of Kleiman (1993) as follows. The reduced individual risk of punishment prompts others to join the illicit market, increasing the number of violators, whereupon the cycle begins anew. This feedback magnifies the effect of the initial increase in illicit activity and, depending on the circumstances of the illicit market, can "tip" the market into a high-violation equilibrium that is difficult and costly to disrupt.

It may therefore be more expensive to break up an established market than to prevent its

[20] "Positive," in this sense, means self-reinforcing. See Prieger and Kulick (2015) for another model incorporating such feedback.

emergence. The implication for policy: Increased enforcement will be more efficacious and less costly, and will yield fewer pernicious side effects, if applied *before* market growth than after a market is well established. For example, in the case of a menthol ban, the probability of punishment could be increased in the illicit cigarette market *prior* to prohibition. This can reduce the total enforcement cost because the new illicit market never has a chance to take hold, and the social costs associated with enforcement are never realized. Such increase in ex ante enforcement need not be permanent.

Detection and punishment are both expensive. The upfront investment in enforcement prior to the ban can have an enduring effect on violation rates if it ensures that the system stays in a low-violation equilibrium (any given violation is easier to detect, and punishment resources are available to be meted out).

## 4.5. Possible Sources of Supply After a Ban

With a product ban—or with uniformly high taxes across states so that interstate smuggling becomes much less prominent—we might expect new flows of smuggled product from Canada, Mexico, and elsewhere to materialize. Smuggling routes already exist between Canada and the United States; given Canada's high federal and provincial cigarette taxes there is much smuggling from the United States, particularly from reservations that straddle the border (RCMP, 2008). Due to differences in consumers' tastes between the countries, cigarettes currently legally sold in Mexico may find little market in the United States. However, if price differentials grow large enough, Mexican drug trafficking organizations may attempt to enter markets in the United States, since Mexico already has a thriving black market in cigarettes largely controlled by the drug cartels (Zinsmeister, 2015). As a recent U.S. State Department (2015, p.6) report notes, "illicit tobacco is often trafficked through the same routes as drugs, weapons, and other illicit forms of trade." It is impossible in advance to know the costs such organizations would face to smuggle cigarettes into the United States, and whether the possibilities for profit would be high enough to stimulate large-scale smuggling. Illicit cigarettes, after all, would

generate less revenue per unit of weight or volume than cocaine, heroin, or even cannabis. On the other hand, experience from Europe and elsewhere indicates that at least under some circumstances, large-scale cross border smuggling of tobacco can be highly profitable to attempt (Joossens and Raw, 1998, Joossens et al., 2000). The lower penalties for smuggling cigarettes also make it an attractive alternative (or complement) to drug trafficking (Europol, 2011).

Illicit supply from Indian reservations in the United States and border areas may also increase. Although tobacco production and sales on reservations are subject to various federal, state, and tribal regulations, these vary by tribe and treaty and some attempted regulations from outside the reservations remain under litigation (Bondaryk et al., 2015). It is thus not clear whether a federal ban on menthol cigarettes could or would apply to Indian reservations, how much tribal opposition there would be to a ban, or how quickly matters would be resolved by treaty or by the courts.

Another possible source of supply is product intended for export but illegally diverted in transit (Joossens et al., 2000). Yurekli & Sayginsoy (2010, p. 551) state that the majority of smuggled cigarettes worldwide are transported "under the camouflage of legal trade." This so-called gray-market has played a larger role in European illicit trade than in the United States to date, but that could change in response to tightened regulations or bans. For example, tobacco products could be produced by a legitimate manufacturer for consumption abroad, but somewhere along the supply chain (often in free-trade zones) be diverted to for smuggling back into the country, sometimes without the knowledge of the manufacturer. In the past, large numbers of cigarettes manufactured in the United States have ended up in illicit distribution channels in China, Europe, and South America (Joossens and Raw 1998; Von Lampe, Kurti, and Bae, 2014); reimportation may be a viable channel for illicit product (but only time—after a ban—will tell).

The current large volume of untaxed cigarettes in the United States (as shown in Figure 1), does not by itself demonstrate that a similarly large market would emerge for illicitly manufactured menthol cigarettes in the face of a ban. For one thing, illicit menthol cigarettes after a ban may be

easier for law enforcement and border officials to detect than the illicit sales of otherwise legal product today. On the other hand, it is easy to detect that cocaine, cannabis, and heroin are illicit substances, yet they are all readily obtainable in American markets.

Furthermore, consumers of cigarettes smuggled interstate today can rely on the product quality associated with licit manufacturers. Consumers of illicitly manufactured cigarettes cannot. Chinese manufacturers can accurately counterfeit packaging but generally do not reproduce product quality; counterfeiters have little incentive to maintain the quality reputation of the brand being mimicked. Counterfeit cigarettes in the United States are likely to contain higher levels of toxic heavy metals, which can adversely affect product taste and also create greater health risks than genuine cigarettes (He et al., 2015). Apparently, street vendors of counterfeit cigarettes have lost much of their market share to storefront sellers of smuggled genuine product because participants in that market have failed to solve the collective-action problem caused by the reputational externality.[21] Buyers seeking to evade taxation seem to prefer more expensive genuine smuggled product to the cheap and poor-tasting cigarettes formerly available on the street (LaFaive and Nesbit, 2013).

In the long run, however, potential profits make illicit supply highly likely—if not from Chinese counterfeiters, then from Indian reservations, smugglers of Canadian or Mexican menthol cigarettes, foreign illicit brands (menthol "cheap whites"), or other sources as yet unforeseen.

## 5. Conclusions

Our research has uncovered that many aspects of tobacco regulation in general and a potential ban on menthol cigarettes in particular require much more research for policymakers to make well informed decisions. An abbreviated list of questions for research follows; a more detailed research agenda to inform policymakers is laid out in Kleiman et al. (2015).

[21] Sources from industry and law enforcement indicated in personal communication to the authors that counterfeit cigarettes have become much less prevalent recently along the Eastern US smuggling corridor.

- How would smokers of menthol cigarettes respond to stricter regulation or a ban? Experimental or econometric studies are needed to strengthen the survey-based studies in the literature.
- How much is the illicit tobacco trade likely to expand under a menthol ban, and how much will that offset the ban's benefits to public health from reduced smoking?
- What would be the nature of illicit trade in the face of a menthol ban? Would the market look like current tax evasion and smuggling, in which there is a relatively low level of associated violence? Would it look more like the market for illicit marijuana in the United States, where violence is not great, or that for cocaine, where enforcement and violence are high?
- What are the risks from Mexican drug-trafficking organizations entering trade in tobacco after a ban? Drug cartels, notorious for their propensity to violence, apparently already dominate the large Mexican black market in cigarettes (Zinsmeister, 2015).
- How can we better understand the many factors essential to the modeling laid out here? Estimation of the effects of alternative policies will require better baseline data on the kinds and extent of violence attendant to the illicit cigarette trade, the levels and cost of enforcement, the sizes of illicit cigarette markets, and the characteristics of illicit distribution channels.

Despite the pressing need for more research in these areas, the modeling and discussion above lead to some conclusions. The risks of evasion and the need for enforcement complicate the social calculus of tobacco regulation. Higher taxes and tighter regulations, especially those that create strong gradients across easily-crossed borders, may have substantial unintended and unwanted consequences, and at some point the costs of further tightening might exceed the benefits.

Banning specific product types (such as menthol cigarettes) will tend to shift some demand to illicit substitutes. To some extent, health gains from reduced consumption due to such bans will be

offset by health and other losses from illicit markets. Allowing competing nicotine vehicles such as e-cigarettes to remain available will tend to reduce sales of both licit and illicit cigarettes, and more so if menthol e-cigarettes in particular remain available.

Current penalties against tobacco smuggling appear to be too low to prevent the large volume of trafficking in the United States. This suggests the need for greater enforcement to lower illicit-market shares. Illicit markets have positive feedbacks through enforcement swamping and normalization. Increased enforcement will be more efficacious and less costly in terms of expenditures and side effects if applied before market growth than after market growth. It might therefore be advantageous to delay the introduction of potentially illicit-market-enhancing regulatory changes until adequate enforcement capacity has been put in place. Also, enforcement should not be viewed as unidimensional (as, admittedly, in the simple modeling above). Policymakers have an expanded set of options beyond choosing more versus less enforcement. Alternatives to brute force—consequence-focused approaches to crime control such as "dynamic concentration" and "pulling levers" strategies—are available to reduce crime and violence, and have shown promise in some settings (Kleiman, 2009).

Too much remains unknown to predict the likely consequences of a ban in a manner sufficient to formulate policy. We propose further research that would provide better estimates than are currently available of the demand function for menthol cigarettes, which would allow for predicting the behavioral response to a ban. The violence attendant to existing markets for illicit drugs compels a better understanding of the relationships among law enforcement, revenues, and violent competition for market share.

## References

Americans for Nonsmokers' Rights (ANRF). "U.S. State and Local Laws Regulating Use of Electronic Cigarettes: As of April 2, 2015." Retrieved June 3, 2015 from ANRF website: no-smoke.org/pdf/ecigslaws.pdf. April 1, 2015.

Anderson, Stacey J. “Menthol Cigarettes and Smoking Cessation Behaviour: A Review of Tobacco Industry Documents.” *Tobacco Control*. **20**(Suppl. 2):ii49–ii56. 2011.

Andreas, Peter, and Joel Wallman. “Illicit Markets and Violence: What Is the Relationship?” *Crime, Law and Social Change*. **52**(3):225–229. 2009.

Antonopoulos, G. A. “The Greek Connection(s): The Social Organisation of the Cigarette Smuggling Business in Greece.” *European Journal of Criminology*. **5**: 263–88. 2008.

Baveja, A., F. Gustav, R.F. Hartl, J.L. Haunschmied, and P.M. Kort. “A Resource-Constrained Optimal Control Model for Crackdown on Illicit Drug Markets.” *Journal of Mathematical Analysis and Applications*. **249**(1):53–79. 2000.

Becker, Gary S., Kevin M. Murphy, and Michael Grossman. “The Market for Illegal Goods: The Case of Drugs.” *Journal of Political Economy*. **114**(1):38–60. 2006.

Begley, Sharon, and Toni Clarke. “Exclusive: U.S. to Roll Back ‘Lost Pleasure’ Approach on Health Rules.” Reuters.com. March 18, 2015.

Benowitz, Neal L., and Maciej L. Goniewicz. “The Regulatory Challenge of Electronic Cigarettes.” *Journal of the American Medical Association*. **310**(7):685–686. 2013.

Benson, Bruce L., David W. Rasmussen, and Iljoon Kim. “Deterrence and Public Policy: Trade-Offs in the Allocation of Police Resources.” *International Review of Law and Economics*. **18**(1):77–100. 1998.

Benson, Bruce, Ian Sebastian Leburn, and David W. Rasmussen. “The Impact of Drug Enforcement on Crime: An Investigation of the Opportunity Cost of Police Resources.” *Journal of Drug Issues*. **31**(4):989–1006. 2001.

Blecher, Evan. “A Mountain or a Molehill: Is the Illicit Trade in Cigarettes Undermining Tobacco Control Policy in South Africa?” *Trends in Organized Crime.* **13**:299–315. 2010.

Blecher, Evan, Alex Liber, Hana Ross, and Johanna Birckmayer. “Euromonitor Data on the Illicit Trade in

Cigarettes". *Tobacco Control*. **24**(1):100–101. 2015.

Blumstein, Alfred, and Daniel Cork. "Linking Gun Availability to Youth Gun Violence." *Law and Contemporary Problems.* **59**(1):5-24. 1996.

Bondaryk, Matthew, Janet Okamoto, Patricia Nez Henderson, and Scott Leischow. "Master Settlement Agreement Compliance Tobacco Directories: A Tool to Track Tribally Manufactured Cigarettes." Nicotine & Tobacco Research. Advance online version, doi:10.1093/ntr/ntv185. 2015.

Braga, Anthony A., David Hureau, and Christopher Winship. "Losing Faith—Police, Black Churches, and the Resurgence of Youth Violence in Boston. *Ohio State Journal of Criminal Law.* **6**(1):141–172. 2008.

Braga, Anthony A., and David L. Weisburd. "The Effects of Focused Deterrence Strategies on Crime: A Systematic Review and Meta-Analysis of the Empirical Evidence." *Journal of Research in Crime and Delinquency* **49**(3):323–358. 2012.

Bright, David A., and Alison Ritter. "Retail Price as an Outcome Measure for the Effectiveness of Drug Law Enforcement." *International Journal of Drug Policy*. **21**:359–363. 2010.

Brumm, Harold J., and Dale O. Cloninger. "The Drug War and the Homicide Rate: A Direct Correlation?" *The Cato Journal.* **14**(3):509–517. 1995.

Burstyn, Igor. "Peering through the Mist: Systematic Review of What the Chemistry of Contaminants in Electronic Cigarettes Tells Us about Health Risks." *BMC Public Health*. **14**:18. 2014.

Cahn, Zachary, and Michael Siegel. "Electronic Cigarettes as a Harm Reduction Strategy for Tobacco Control: A Step Forward or a Repeat of Past Mistakes?" *Journal of Public Health Policy.* **32**:16–31. 2011.

Caulkins, Jonathan P., Mark A.R. Kleiman, and Jonathan D. Kulick. "Drug Production and Trafficking, Counterdrug Policies, and Security and Governance in Afghanistan." Center on International

Cooperation, New York University. 2010.

Caulkins, Jonathan P., and Peter Reuter. "What Price Data Tells Us About Drug Markets." *Journal of Drug Issues*. **28**(3):593–513. 1998

Caulkins, Jonathan P., Peter Reuter, and Lowell J. Taylor. "Can Supply Restrictions Lower Price? Violence, Drug Dealing and Positional Advantage." *Contributions to Economic Analysis & Policy*. **5**(1):Article 3 (n.p.). 2006.

Chaloupka, Frank J. "Maximizing the Public Health Impact of Alcohol and Tobacco Taxes." *American Journal of Preventive Medicine*. **44**(5):561–562. 2013.

Chaloupka, Frank J., and Kenneth E. Warner. "The Economics of Smoking." In A.J. Culyer and J.P. Newhouse (Eds.), *Handbook of Health Economics, Vol.1B*. Amsterdam: Elsevier, pp. 1539–1627. 2000.

Coulson, N. Edward, Ping Wang, and Sheng-Wen Chang. "Optimal Drug Policy in Low-Income Neighborhoods." *Journal of Public Economic Theory*. Advance online version, doi:10.1111/jpet.12147. 2015.

Chiou, Lesley, and Erich J. Muehlegger. "Crossing the Line: The Effect of Cross-Border Cigarette Sales on State Excise Tax Revenues" *BE Journal – Economic Analysis and Policy (Contributions)*. **8**:1. Article 48. 2008.

Compass Lexecon. "Estimating Consequences of a Ban on the Legal Sale of Menthol Cigarettes." 2011. Available at fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/TobaccoProductsScientificAdvisoryCommittee/UCM243622.pdf.

Connolly, Gregory N., and Hillel R. Alpert. "Trends in the Use of Cigarettes and Other Tobacco Products 2000–2007." *Journal of the American Medical Association*. **299**(22):2629–2630. 2008.

Corsaro, Nicholas and Rod K. Brunson. "Are Suppression and Deterrence Mechanisms Enough?

Examining the 'Pulling Levers' Drug Market Intervention Strategy in Peoria, Illinois, USA." *International Journal of Drug Policy*. **24**(2):115–121. 2013.

Corsaro, Nicholas, Eleazer D. Hunt, Natalie Kroovand Hipple, and Edmund F. McGarrell. "The Impact of Drug Market Pulling Levers Policing on Neighborhood Violence." *Criminology & Public Policy*. **11**(2):167–199. 2012.

Corsaro, Nicholas, and Edmund F. McGarrell. "An Evaluation of the Nashville Drug Market Initiative (DMI) Pulling Levers Strategy." Drug Market Intervention Working Paper, School of Criminal Justice, Michigan State University. 2009.

Costa Storti, Cláudia, and Paul De Grauwe. "Modeling Disorganized Crime: The Cannabis Market." *Bulletin on Narcotics: Measurement Issues in Drug Policy Analysis*. Vol. LX, 2008.. Vienna: UNODC, pp. 79–100. 2011.

Dalton, Matthew, and Mike Esterl. "Cigarette Bans to Hit Europe." *Wall Street Journal*. p. B1. July 11, 2013.

DeCicca, Philip, Donald S. Kenkel, and Feng Liu. "Excise Tax Avoidance: The Case of State Cigarette Taxes." *Journal of Health Economics*. **32**(6):1130–1141. 2013.

Dell, Melissa. "Trafficking Networks and the Mexican Drug War." *American Economic Review*. **105**(6):1738–1779. 2015.

Delnevo, Cristine D., Daniel P. Giovenco, Bridget K. Ambrose, Catherine G. Corey, and Kevin P. Conway. "Preference for Flavoured Cigar Brands among Youth, Young Adults and Adults in the USA." *Tobacco Control.* Advance online version, doi:10.1136/tobaccocontrol-2013-0514082014. 2014.

Deyton, Lawrence R., and Janet Woodcock. "Stakeholder Letter: Regulation of E-Cigarettes and Other Tobacco Products." Retrieved from FDA website: fda.gov/NewsEvents/PublicHealthFocus/ ucm252360.htm. April 25, 2011.

Dickenson, Matthew. "The Impact of Leadership Removal on Mexican Drug Trafficking Organizations." *Journal of Quantitative Criminology*. **30**(4):651–676. 2014

Drill, Stephen. "FDA Discusses Banning Online Sales of E-Cigarettes." *Wall Street Journal*. Aug. 23, 2013. Retrieved June 3, 2015 from online.wsj.com/article/ SB10001424127887323980604579028872575240180.html.

D'Silva, Joanne, Michael S. Amato, and Raymond G. Boyle. "Quitting and Switching: Menthol Smokers' Responses to a Menthol Ban." *Tobacco Regulatory Science*. **1**(1):54–60. 2015.

Esterl, Mike. "Cigarette Sales May Be off, but Lorillard Still Rolls on." Dec. 2, 2011. *Wall Street Journal*. Retrieved June 3, 2015 from online.wsj.com/article/ SB10001424052970204517204577046730800881956.html.

Euromonitor International. "Cigarettes in the US." Report retrieved from the Passport database. August 2014a.

Euromonitor International. "Illicit Trade in Tobacco Products 2013." Report retrieved June 3, 2015 from the Passport database. September 2014b.

Euromonitor International. "Tobacco 2014: New Insights and System Refresher." Report retrieved from the Passport database June 3, 2015. September 2014c.

Euromonitor International. "Tobacco Industry Illicit Trade Penetration." Data set retrieved from the Passport database June 3, 2015.

Farsalinos, Konstantinos E., and Riccardo Polosa. "Safety Evaluation and Risk Assessment of Electronic Cigarettes as Tobacco Cigarette Substitutes: A Systematic Review." *Therapeutic Advances in Drug Safety.* **5**(2):67–86. 2014

"Family Smoking Prevention And Tobacco Control Act of 2009." Public Law 111–31: 123 STAT. 1776. June 22, 2009.

Feichtinger, Gustav, and Gernot Tragler. “Multiple Equilibria in an Optimal Control Model for Law Enforcement.” *Proceedings of the Steklov Institute of Mathematics*. **236**:449–460. 2002.

Fleenor, Patrick. “Cigarette Taxes, Black Markets, and Crime Lessons from New York’s 50-Year Losing Battle.” Washington: Cato Institute. Feb. 6, 2003.

Food and Agriculture Organization (FAO) of the United Nations. *Issues in the Global Tobacco Economy: Selected Case Studies.* Rome: FAO. 2003

Fulginiti, Lilyan E., and Richard K. Perrin. “The Theory and Measurement of Producer Response under Quotas.” *The Review of Economics and Statistics.* **75**:97–106. 1993.

Garoupa, Nuno. “Optimal Law Enforcement and the Economics of the Drug Market: Some Comments on the Schengen Agreements.” *International Review of Law and Economics*. **17**(4):521–535. 1997.

Goldstein, Paul J. “The Drugs/Violence Nexus: A Tripartite Conceptual Framework.” *Journal of Drug Issues*. **15**(4):493–506. 1985.

Goldstein, Paul J. “The Drugs/Violence Nexus.” Ch. 79 in *Crime: Critical Concepts in Sociology, Vol. IV* (ed. P. Bean). London and New York: Routledge. 2003.

Goldstein Paul J., Henry H. Brownstein, Patrick J. Ryan, and Patricia A. Bellucci. “Crack and Homicide in New York City. 1988: A Conceptually Based Event Analysis.” *Contemporary Drug Problems*. **16**(4):651–687. 1989.

Goniewicz, M.L., J. Knysak, M. Gawron, L. Kosmider, and A. Sobczak. “Levels of Selected Carcinogens and Toxicants in Vapour from Electronic Cigarettes.” *Tobacco Control*. **23**(2):133–139. 2014.

Government Accountability Office (GAO). “Tobacco Taxes: Large Disparities in Rates for Smoking Products Trigger Significant Market Shifts to Avoid Higher Taxes.” GAO-12-475. April 18, 2012.

Grana, Rachel A. “Electronic Cigarettes: A New Nicotine Gateway?” *Journal of Adolescent Health*.

**52**(2):135–136. 2013.

Green, Frank. “Cigarette Trafficking Spawning Other Crimes and Possibly Violence.” *Richmond Times-Dispatch.* March 28, 2015. Retrieved June 3, 2015 from: richmond.com/news/local/crime/article_e101477f-1c3d-5117-bcce-f8839f52485c.html.

Green, Frank. “Major player in cigarette trafficking to be sentenced Tuesday.” *Richmond Times-Dispatch.* December 19, 2015. Retrieved February 3, 2015 from: richmond.com/news/article_e85af023-e991-5b1c-9316-25676430c38b.html.

Hajek, Peter, Jean-François Etter, Neal Benowitz, Thomas Eissenberg, and Hayden McRobbie. “Electronic Cigarettes: Review of Use, Content, Safety, Effects on Smokers and Potential for Harm and Benefit.” *Addiction.* **109**(11):1801–1810. 2014.

Hartman, Anne M. “What Menthol Smokers Report They Would Do if Menthol Cigarettes Were No Longer Sold.” Powerpoint presentation to FDA Tobacco Products Scientific Advisory Committee Meeting. Jan. 10–11, 2011.

He, Yi, Klaus von Lampe, Laura Wood, and Marin Kurti. “Investigation of Lead and Cadmium in Counterfeit Cigarettes Seized in the United States.” *Food and Chemical Toxicology.* **81**:40–45. 2015.

Heck, Jonathan Daniel, Luby Arnold Hamm, and John H. Lauterbach. “The Industry Menthol Report. Menthol Cigarettes: No Disproportionate Impact on Public Health.” Non-Voting Industry Representatives of the Tobacco Products Scientific Advisory Committee. Mar. 23, 2011.

Henningfield, Jack E., and G.S. Zaatari. “Electronic Nicotine Delivery Systems: Emerging Science Foundation for Policy.” *Tobacco Control.* **19**(2):89–90. 2010.

Johnson, Carrie. “Trade in Black-Market Cigarettes: Hot, Dangerous.” September 19, 2010. Retrieved June 3, 2015 from: npr.org/templates/story/story.php?storyId=129934561.

Joossens, Luk, and Martin Raw. “Cigarette Smuggling in Europe: Who Really Benefits? *Tobacco Control*. **7**(1), 66–71. 1998.

Joossens, Luk, Frank Chaloupka, David Merriman, and Ayda Yurekli. “Issues in the Smuggling of Tobacco Products.” In P. Jha and F. Chaloupka (Eds.), *Tobacco Control in Developing Countries*. Oxford: Oxford University, pp. 393–406. 2000.

Joossens, Luk, David Merriman, Hana Ross, and Martin Raw. “The Impact of Eliminating the Global Illicit Cigarette Trade on Health and Revenue.” *Addiction.* **105**(9):1640–1649. 2010.

Joossens, Luk, and Martin Raw. “Progress in Combating Cigarette Smuggling.” *Tobacco Control*. **17**(6):399–404. 2008.

Joossens, Luk, and Martin Raw. “From Cigarette Smuggling to Illicit Tobacco Trade.” *Tobacco Control*. **21**(2):230–234. 2012.

Kelland, Kate, and Ben Hirschler. “E-Cigarettes Gain Steam, but Health Experts Wary It Could Serve as ‘Gateway’ to Tobacco Smoking.” Reuters. June 13, 2013.Retrieved June 3, 2015 from: huffingtonpost.com/2013/06/13/e-cigarettes-electronic-tobacco-smoking-help-smokers-quit_n_3433791.html.

Kennedy, David M. “Pulling Levers: Chronic Offenders, High-Crime Settings, and a Theory of Prevention.” *Valparaiso University Law Review.* **31**(2):449–484. 1997

King, Brian A., M.A. Tynan, S.R. Dube, and R. Arrazola. “Flavored-Little-Cigar and Flavored-Cigarette Use Among U.S. Middle and High School Students.” *Journal of Adolescent Health*. **54**(1):40–46. 2014.

Kleiman, Mark A.R. “Enforcement Swamping: a Positive-Feedback Mechanism in Rates of Illicit Activity.” *Mathematical and Computer Modeling*. **17**(2):65–75. 1993.

Kleiman, Mark A.R. *When Brute Force Fails: How to Have Less Crime and Less Punishment*. Princeton:

Princeton University. 2009.

Kleiman, Mark A.R. "Surgical Strikes in the Drug Wars," *Foreign Affairs*. Sep./Oct.:89–101. 2011.

Kleiman, Mark A.R., Jonathan D. Kulick, and James E. Prieger. "Countervailing Effects: What the FDA Would Have to Know to Evaluate Tobacco Regulations." Pepperdine University School of Public Policy Working Paper 53. 2015.

Kozlowski, Lynn T. "Effect of Smokeless Tobacco Product Marketing and Use on Population Harm from Tobacco Use: Policy Perspective for Tobacco-Risk Reduction." *American Journal of Preventive Medicine*. **33**(6):S379–S386. 2007.

Kozlowski, Lynn T. "9 Things to Think About When Thinking About E-Cigarettes." *Huffington Post.* June 24, 2013a. Retrieved June 3, 2015 from: huffingtonpost.com/lynn-t-kozlowski-phd/e-cigarettes_b_3492528.html.

Kuziemko, Ilyana, and Steven D. Levitt. "An Empirical Analysis of Imprisoning Drug Offenders." *Journal of Public Economics*. **88**(9–10):2043–2066. 2004.

LaFaive, Michael, Patrick Fleenor, and Todd Nesbit. "Cigarette Taxes and Smuggling: A Statistical Analysis and Historical Review." Midland, Mich.: Mackinac Center for Public Policy. 2008.

LaFaive, Michael, and Todd Nesbit. "Higher Cigarette Taxes Create Lucrative, Dangerous Black Market." Midland, Mich.: Mackinac Center for Public Policy. Jan. 8, 2013.

LaFaive, Michael, and Todd Nesbit. "Cigarette Smuggling Still Rampant in Michigan, Nation." Feb. 17, 2014. Retrieved June 3, 2015 from: mackinac.org/19725.

Levitt, Steven D., and Sudhir Alladi Venkatesh. "An Economic Analysis of a Drug-Selling Gang's Finances." *Quarterly Journal of Economics*. **115**(3):775–789. 2000.

Licht, Andrea S., Andrew J. Hyland, Richard J. O'Connor, Frank J. Chaloupka, Ron Borland, Geoffrey T. Fong, Nigar Nargis, and K. Michael Cummings. "Socio-Economic Variation in Price Minimizing

Behaviors: Findings from the International Tobacco Control (ITC) Four Country Survey." *International Journal of Environmental Research and Public Health*. **8**(1):234–252. 2011.

Lovenheim, Michael F. "How Far to the Border?: The Extent and Impact of Cross-Border Casual Cigarette Smuggling." *National Tax Journal*. **61**(1):7–33. 2008.

Manfreda, John J. Hearing before the Senate Committee on Finance. July 29, 2014.

Merriman, David, Ayda Yurekli, and Frank J. Chaloupka. "How Big Is the Worldwide Cigarette-Smuggling Problem?" In P. Jha and F. Chaloupka (Eds.), *Tobacco Control in Developing Countries*. Oxford: Oxford University, pp. 365–392. 2000.

Miron, Jeffrey A. "Violence and the U.S. Prohibitions of Drugs and Alcohol." *American Law and Economics Review*. **1**(1–2):78–114. 1999.

Miron, Jeffrey A. "Violence, Guns, and Drugs: A Cross-Country Analysis." *The Journal of Law and Economics*. **44**(2):615–633. 2001.

Moeller, Kim, and Morten Hesse. "Drug Market Disruption and Systemic Violence: Cannabis Markets in Copenhagen." *European Journal of Criminology*. **10**(2):206–221. 2013.

National Conference of State Legislatures (NCSL). "Alternative Nicotine Products: Electronic Cigarettes." Retrieved from ncsl.org/research/health/alternative-nicotine-products-e-cigarettes.aspx. April 20, 2015.

New York City Sheriff's Office. "Tobacco Task Force." January 31, 2014. Retrieved June 3, 2015 from: mass.gov/dor/tax-professionals/news-and-reports/illegal-tobacco-commission/commission-resources/nyc-tobacco-task-force-presentation.pdf..

Noar, Seth M. "A 10-Year Retrospective of Research in Health Mass Media Campaigns: Where Do We Go from Here?" *Journal of Health Communication*. **11**(1):21–42. 2006.

O'Connor, Richard J., Maansi Bansal-Travers, Lawrence P. Carter, and K. Michael Cummings. "What

Would Menthol Smokers Do if Menthol in Cigarettes Were Banned? Behavioral Intentions and Simulated Demand." *Addiction*. **107**(7):1330–1338. 2012.

OECD. "Illicit Trade: Converging Criminal Networks." Preliminary version, 2015. Retrieved Feb. 7, 2016 from the OECD website: http://www.oecd.org/gov/risk/illicit-trade-converging-criminal-networks.pdf

Owens, Emily G. "Are Underground Markets Really More Violent? Evidence from Early 20th Century America." *American Law and Economics Review*. **13**(1):11–44. 2011.

Owens, Emily G. "The American Temperance Movement and Market-Based Violence." *American Law and Economics Review*. **16**(2):433 2014.

Papachristos, Andrew V. "Murder by Structure: Dominance Relations and the Social Structure of Gang Homicide in Chicago." *American Journal of Sociology*. **115**(1):74–128. 2009.

Pearson, G. and D.Hobbs. *Middle-Market Drug Distribution*. HORS 227. London: Home Office. 2001.

Pearson, Jennifer L., David B. Abrams, Raymond S. Niaura, Amanda Richardson, and Donna M. Vallone. "A Ban on Menthol Cigarettes: Impact on Public Opinion and Smokers' Intention to Quit." *American Journal of Public Health*. **102**(11):E107–E114. 2012.

Pelfrey, William V., Jr. "Cigarette Trafficking, Smurfing, and Volume Buying: Policy, Investigation, and Methodology Recommendations From a Case Study." *Criminal Justice Policy Review*. **26**(7):713–726. 2015.

Pollack, Harold A., and Peter Reuter. "Does Tougher Enforcement Make Drugs More Expensive?" *Addiction.* **109**(12):1959–1966. 2014.

Poret, Sylvaine. "An Optimal Anti-Drug Law Enforcement Policy." *International Review of Law and Economics*. **29**(3):221–228. 2009.

Prieger, James E., and Jonathan D. Kulick. "Unintended Consequences of Enforcement in Illicit

Markets." *Economics Letters.* **125**:295–297. 2014.

Prieger, James E., and Jonathan D. Kulick. "Violence in Illicit Markets: Unintended Consequences and the Search for Paradoxical Effects of Enforcement." *The B.E. Journal of Economic Analysis & Policy* (Contributions). Advance online version doi:10.1515/bejeap-2014-0184. 2015.

Rasmussen, David W., and Bruce L. Benson. *The Economic Anatomy of a Drug War: Criminal Justice in the Commons*. Lanham, Mary.: Rowman & Littlefield. 1994.

Rasmussen, David W., Bruce L. Benson, and David L. Sollars. "Spatial Competition in Illicit Drug Markets: The Consequences of Increased Drug War Enforcement." *Review of Regional Studies.* **23**:219–236. 1993.

Resignato, Andrew J. "Violent Crime: A Function of Drug Use or Drug Enforcement?" *Applied Economics*. **32**(6):681–688. 2000.

Reuter, Peter. "Systemic Violence in Drug Markets" *Crime, Law and Social Change.* **52**:275–284. 2009.

Reuter, Peter. "Can Tobacco Control Endgame Analysis Learn Anything from the US Experience with Illegal Drugs?" *Tobacco Control*. **22**(Suppl. 1):i49–i51. 2013.

Reuter, Peter, and Malay Majmundar (Eds.). Understanding the U.S. Illicit Tobacco Market: Characteristics, Policy Context, and Lessons from International Experiences. Committee on the Illicit Tobacco Market: Collection and Analysis of the International Experience, National Research Council and Institute of Medicine. Washington, D.C.: The National Academies Press. 2015.

Reuter, Peter, and Mark A.R. Kleiman. "Risks and Prices: An Economic Analysis of Drug Enforcement." In M. Tonry and N. Morris (Eds.), *Crime and Justice Vol. 7*. Chicago: University of Chicago, pp. 289–340. 1986.

Riley, K. Jack. "Homicide and Drugs: A Tale of Six Cities." *Homicide Studies.* **2**(2):176–205. 1998.

Rios, Viridiana. "Why Did Mexico Become So Violent? A Self-Reinforcing Violent Equilibrium Caused by

Competition and Enforcement." *Trends in Organized Crime*. **16**(2):138–155. 2013.

Royal Canadian Mounted Police (RCMP). "2008 Contraband Tobacco Enforcement Strategy." 2008. Retrieved June 3, 2015 from RCMP website: rcmp-grc.gc.ca/pubs/tobac-tabac/tobacco-tabac-strat-2008-eng.htm.

Sanderson, Thomas M. "Transnational Terror and Organized Crime: Blurring the Lines." *SAIS Review.* **24**(1):49–61. 2004.

Shelley, Louise I., and Sharon A. Melzer. "The Nexus of Organized Crime and Terrorism: Two Case Studies in Cigarette Smuggling." *International Journal of Comparative and Applied Criminal Justice*. **32**(1):43–63. 2008.

Shen, Anqi, Georgios A. Antonopoulos, and Klaus Von Lampe. "'The Dragon Breathes Smoke': Cigarette Counterfeiting in the People's Republic of China." *British Journal of Criminology*. **50**:239–258. 2010.

Shepard, Edward M., and Paul R. Blackley. "Drug Enforcement and Crime: Recent Evidence from New York State." *Social Science Quarterly*. **86**(2):323–342. 2005.

Shepard, Edward M., and Paul R. Blackley. "The Impact of Marijuana Law Enforcement in an Economic Model of Crime." *Journal of Drug Issues*. **37**(2):403–424. 2007.

New York State Office of the Attorney General (NY AG). "A.G. Schneiderman Announces New Charges After Foiled Murder-for-hire Plot In Massive Eastern Seaboard Cigarette Trafficking Case." Press release dated Oct. 17, 2013. Retrieved Feb. 7, 2016 from: ag.ny.gov/press-release/ag-schneiderman-announces-new-charges-after-foiled-murder-hire-plot-massive-eastern

Stehr, Mark. "Cigarette Tax Avoidance and Evasion." *Journal of Health Economics.* **24**(2):277–297. 2005.

Sumner, Daniel A., and Michael K. Wohlgenant. "Effects of an Increase in the Federal Excise Tax on

Cigarettes." *American Journal of Agricultural Economics*. **67**(2):235–242. 1985.

Tauras, John A., David Levy, Frank J. Chaloupka, Andrea Villanti, Raymond S. Niaura, Donna Vallone, and David B. Abrams. "Menthol and Non-Menthol Smoking: The Impact of Prices and Smoke-Free Air Laws." *Addiction*. **105**(Suppl. 1):115–123. 2010.

Tavernise, Sabrina. "F.D.A. Closer to Decision about Menthol Cigarettes." *New York Times*. p. A15. July 24, 2013.

Tax Foundation. "State Cigarette Excise Tax Rates, 2009–2013." February 27, 2013. Retrieved from: taxfoundation.org/article/state-cigarette-excise-tax-rates-2009-2013.

Thursby, J.G., and M.C. Thursby. "Interstate Cigarette Bootlegging: Extent, Revenue, Losses, and Effects of Federal Intervention." *National Tax Journal*, **53**(1):59–77. 2000.

Tobacco Products Scientific Advisory Committee (TPSAC). "Menthol Cigarettes and Public Health: Review of the Scientific Evidence and Recommendations." Washington: U.S. Food and Drug Administration. 2011.

Tragler, Gernot, Jonathan P. Caulkins, and Gustav Feichtinger. "Optimal Dynamic Allocation of Treatment and Enforcement in Illicit Drug Control." *Operations Research*. **49**(3):352–362. 2001.

Tynan, Michael A., Tim McAfee, Gabbi R. Promoff, and Terry Pechacek. "Consumption of Cigarettes and Combustible Tobacco—United States, 2000–2011." *Morbidity and Mortality Weekly Report*. **61**(30):565–569. 2012.

U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). "The Bureau of Alcohol, Tobacco, Firearms and Explosives' Efforts to Prevent the Diversion of Tobacco." Washington: U.S. Department of Justice. Sep. 2009.

U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). "Fact Sheet: Tobacco Enforcement." Febr. 2015.Retrieved June 3, 2015 from ATF website: atf.gov/publications/factsheets/factsheet-

tobacco-enforcement.html.

U.S. Department of State. “The Global Illicit Trade in Tobacco: A Threat to National Security”. Dec. 2015. Retrieved from State Dept. website: www.state.gov/documents/organization/250513.pdf.

U.S. Department of the Treasury. “Department of the Treasury Report to Congress on Federal Tobacco Receipts Lost Due to Illicit Trade and Recommendations for Increased Enforcement.” Feb. 4, 2010.

U.S. Food and Drug Administration (FDA). “Preliminary Scientific Evaluation of the Possible Public Health Effects of Menthol versus Nonmenthol Cigarettes.” 2013a.

U.S. House. Committee on Homeland Security. Republican Staff. “Tobacco and Terror: How Cigarette Smuggling is Funding our Enemies Abroad.” July 24, 2013b. Retrieved June 3, 2015 from: documentcloud.org/documents/412462-tobacco-and-terror-how-cigarette-smuggling-is.html.

U.S. Food and Drug Administration (FDA). “Menthol in Cigarettes, Tobacco Products; Request for Comments.” *Federal Register*. **78**(142):44484.

Von Lampe, Klaus. “The Trafficking in Untaxed Cigarettes in Germany: A Case Study of the Social Embeddedness of Illegal Markets.” In P.C. van Duyne et al. (Eds.), *Upperworld and Underworld in Cross-border Crime*. Nijmegen, The Netherlands: Wolf Legal Publishers, pp. 141-162. 2002.

Von Lampe, Klaus, Marin Kurti, and John Bae. “Land of Opportunities: The Illicit Trade in Cigarettes in the United States.” In P.C. van Duyne et al. (Eds.), *Corruption, Greed and Crime-Money : Sleaze and Shady Economy in Europe and Beyond*. Oisterwijk, The Netherlands: Wolf Legal Publishers, pp. 267–289. 2014.

Wackowski, Olivia A., Cristine D. Delnevo, and Jennifer L. Pearson. “Switching to E-Cigarettes in the Event of a Menthol Cigarette Ban.” *Nicotine & Tobacco Research.* Advance online version, doi: 10.1093/ntr/ntv021. 2015.

Wang, Yanwen, Michael Lewis, and Vishal Singh. "The Unintended Consequences of Countermarketing Strategies: How Particular Antismoking Measures May Shift Consumers to More Dangerous Cigarettes." *Marketing Science*. Advance online version doi:10.1287/mksc.2015.0910. 2015.

Werb, Dan, Greg Rowell, Gordon Guyatt, Thomas Kerr, Julio Montaner, and Evan Wood. "Effect of Drug Law Enforcement on Drug Market Violence: A Systematic Review." *International Journal of Drug Policy*. **22**(2):87–94. 2011.

World Health Organization. "Electronic Nicotine Delivery Systems." Report to the Conference of the Parties to the WHO Framework Convention on Tobacco Control. September 1, 2014. Retrieved June 3, 2015 from: apps.who.int/gb/fctc/PDF/cop6/FCTC_COP6_10Rev1-en.pdf?ua=1.

World Trade Organization. "United States—Measures Affecting the Production and Sale of Clove Cigarettes. Dispute Settlement: Dispute DS406." August 23, 2013. Retrieved June 3, 2015 from: wto.org/english/tratop_e/dispu_e/cases_e/ds406_e.htm.

Xu, Xin, Michael F. Pesko, Michael A. Tynan, Robert B. Gerzoff, Ann M. Malarcher, and Terry F. Pechacek. "Cigarette Price-Minimization Strategies by U.S. Smokers." *American Journal of Preventive Medicine*. **44**(5):472–476. 2013.

Yunker, James A. "Estimated Optimal Drug Law Enforcement Expenditures Based on U.S. Annual Data." *Journal of Policy Modeling*. **34**(3):356–371. 2012.

Yürekli, A. and Sayginsoy, Ö. "Worldwide Organized Cigarette Smuggling: An Empirical Analysis." *Applied Economics*, **42**: 545–561. 2010.

Zinsmeister, Jeffrey E. "The Mexican Cigarette Market: A Cautionary Case Study for Legalization of Marijuana." *Journal of Political Risk*. **3**(3). 2015. Retrieved June 3, 2015 from jpolrisk.com/the-mexican-cigarette-market-a-model-for-marijuana-legalization.

## Appendix: Studies Reviewed and a Description of Their Findings

| *Study* | *Location* | *Study Design* | *Study Period* | *Main Findings* |
|---|---|---|---|---|
| Goldstein, Brownstein, Ryan, and Bellucci, 1989 | New York City | Longitudinal observational study of 414 homicide events | 8-month period in 1988 | Enforcement was positively associated with homicides. Nearly 40% of all homicides and 74% of drug-related homicides were "systemic." This was regarded as primarily due to prohibition. |
| Rasmussen, Benson, and Sollars, 1993 | Florida | Cross-sectional observational study of 67 Florida counties | 1989 | Increased enforcement had spillover effect; it increased the size of the market in adjoining jurisdiction, resulting in higher violent crime. |
| Brumm and Cloninger, 1995 | USA | Cross-sectional observational study of 57 cities | 1985 | Increased drug enforcement (drug arrests as the fraction of total arrests) decreases the homicide arrest rate, which increases the homicide rate. |
| Benson, Rasmussen, and Kim, 1998 | Florida | Longitudinal observational study of 67 counties | 1983–1987 | Changes in arrests for drug crimes are positively and significantly associated with the non-drug crime rate (including violent crime). |
| Riley, 1998 | 6 US cities | Longitudinal observational study of 6 cities | 1995 | Changes in enforcement were positively associated with changes in homicide rates in 4 of the 6 cities studied. |
| Miron, 1999 | USA | Longitudinal observational study at the national level | 1900–1995 | Enforcement is positively and significantly related to the homicide rate over the study period. |
| Levitt and Venkatesh, 2000 | Chicago | Longitudinal observational study in Chicago | 4-year period in the 1990s | Enforcement and the lack of formal dispute-resolution mechanisms in illicit markets prompted a high level of violent crime. |
| Jensen, 2000 | USA | Time series analysis of the US | 1900-1945 | The number of states that criminalized alcohol markets was positively and significantly associated with the homicide rate. |
| Resignato, 2000 | USA | Longitudinal observational study of 24 cities | Oct. 1992–Sep. 1993 | Enforcement was positively and significantly associated with violence. |
| Benson, Leburn, and Rasmussen, 2001 | Florida | Longitudinal observational study of 67 counties | 1994–1997 | Increases in the rate of drug arrests were associated with an increase in violent crime. |

| *Study* | *Location* | *Study Design* | *Study Period* | *Main Findings* |
|---|---|---|---|---|
| Miron, 2001 | USA | Longitudinal observational study in the US | 1993–1996 | 6 of 9 enforcement proxies were positively and significantly related to the homicide rate. |
| Shepard and Blackley, 2005 | New York state | Longitudinal observational study of 62 counties | 1996–2000 | |
| Shepard and Blackley, 2007 | USA | Longitudinal observational study of 1,300 counties | 1994–2001 | Enforcement was positively and significantly associated with all crime, including violent crime. |
| Owens, 2011 | USA | Longitudinal observational study of all homicides at the state level | 1900–1936 | Greater enforcement during Prohibition was not associated with an increase in homicides. |
| Moeller and Hesse, 2013 | Denmark | Longitudinal observational study of 269 jurisdictions | 2000–2009 | A significant relationship between a policy crackdown (which led to an increase in arrests) and charges for serious violent crime in the year that followed. |
| Rios, 2013 | Mexico | Longitudinal observational study of drug-related homicides at the state level | 2006–2010 | Targeted executions linked to drug-trafficking operations are associated with greater enforcement (proxied by confrontations [casualties from turf battles between traffickers or between authorities and traffickers as a result of enforcement] and aggressions [casualties from traffickers assassinating authorities in planned attacks]). |
| Dickenson, 2014 | Mexico | Longitudinal observational study of drug-related homicides at the state level | 2006–2010 | Targeted removals of Mexican DTO leaders (a particular form of enforcement) are followed by increases in drug-related murders. |
| Owens, 2014 | USA | Longitudinal observational study of age-group-specific homicides at the state level | 1900–1940 | Criminalizing alcohol markets was associated with an increase in homicides for 20 year olds relative to those at the tails of the age distribution, which is “evidence consistent with an increase in market-based violence” (p. 449). Furthermore, results “suggest that market-based violence certainly increased, by anywhere from 60% to 250%” (p. 466). |
| Dell, 2015 | Mexico | Longitudinal observational study of drug-related and all homicides at the city level. | 2007-2010 | Homicide rates in a city are positively and significantly associated with election of a pro-enforcement mayor. |