

# 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 violence, 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.

## 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: violence, corruption, incarceration, 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. 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 primary 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 violent crime that might follow. 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**

### **2.1. Responses by Smokers to Higher Prices**

Smokers 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 entirely unavailable on the licit market. In response, 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” [RYO]) (Licht et al., 2011). The same smokers report that those 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) estimates that up to 85% of the “tax paid sales response” to increases in cigarette excise taxes in the United States 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. 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<sup>1</sup> and sales of large cigars more than doubled. 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, increased markedly after flavored cigarettes other than menthol were banned in the United States in 2009. Little cigars, which look and perform like cigarettes,<sup>2</sup> are especially popular among groups of particular public-health concern such as youth and 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

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,<sup>3</sup> 2) large-scale or “commercial” smuggling, where operators buy cigarettes in bulk in a lower-tax area and sell them tax-free in higher-tax areas, 3) trafficking in counterfeit cigarettes, and 4) trade in brands produced solely for illegal sales (“cheap whites”). The latter two forms are much less common in the United States than elsewhere.

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<sup>1</sup> Before 2009, pipe tobacco and 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).

<sup>2</sup> The statutory distinction is that a cigar is wrapped in tobacco leaf and a cigarette is wrapped in paper (26 U.S. Code § 5702).

<sup>3</sup> 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.

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 markers.<sup>4</sup> In 2013, Euromonitor (2014b) estimated global illicit trade in tobacco to be a \$39B market with a market share of 9.1%. Figure 1 shows 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. The Figure shows that illicit activity in the United States is lower than elsewhere, but has also risen steadily since 2008, to 7.3% by 2013. LaFaive and Nesbit (2013) report that over half of cigarettes smoked in New York, Arizona, and New Mexico are smuggled, and that Virginia, Delaware, West Virginia, Missouri, and Wyoming had estimated net total smuggling exports that exceeded 10% of total state consumption.

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.<sup>5</sup> 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. The most significant component of illicit tobacco trade in the United States is the shipment of tobacco products

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<sup>4</sup> Estimates of the prevalence of illicit trade in tobacco is contested in the literature, and estimates from different sources can vary widely (Blecher, 2010; Blecher et al., 2015; Stoklosa and Ross, 2014). For example, the Euromonitor data presented here 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.

<sup>5</sup> 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.

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. LaFaive and Nesbit (2013) find that smuggling rates generally rise in states after they adopt large cigarette-tax increases. DeCicca et al. (2013) find that differentials among state cigarette taxes in the United States result in significant cross-border purchasing (bootlegging), which accords with the analysis of LaFaive and Nesbit (2014, 2013). Lovenheim (2008) finds that 13% to 25% of U.S. consumers purchase cigarettes in border locations, greatly reducing the potential health and revenue gains from cigarette taxation. However, in studies of global tobacco markets, Joossens et al. (2010) state that cigarette taxes have less impact than other factors on the level of illicit trade, and Merriman et al. (2000) conclude that higher cigarette taxes create more tax revenue and lower consumption.

The actual scale of illicit trade in the United States can be measured only indirectly, and we found no estimates of smuggling at the state level published in peer-reviewed journals. However, estimates for net smuggling by state for 2012 are available from the Mackinac Center for Public Policy, calculated using the methodology of LaFaive et al. (2008).<sup>6</sup> Figure 2 plots state-level data to show the relationship between the state excise tax per pack and the size of the illicit market. The latter is expressed as a percentage of total consumption and is in terms of net illicit inflows; negative values for states such as Virginia indicate net outflows. The data show a positive relationship between the magnitude of the cigarette tax and the size of the illicit market.<sup>7</sup> The expected value of net smuggling calculated from these data rises by 14.1 percentage points with each dollar increase in excise taxes. Summarizing the relationship another way, we can also say that the expected value of net smuggling

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<sup>6</sup> While the model was not published in a journal, the authors state that it was “peer reviewed by doctorate-level economists” (LaFaive and Nesbit, 2014).

<sup>7</sup> Data on cigarette excise taxes are for a 20-stick pack as of January 1, 2012, from Tax Foundation (2013).

rises by 4.2 percentage points with each 10% increase in excise taxes.<sup>8</sup> While these estimates do not establish causality, they do highlight the strong positive correlation between states' cigarette taxes and the size of the illicit market in the United States.

### 2.3. Enforcement and Violence

With black markets come organized crime and violence, though to an extent that varies widely by product, area, and period. Illicit drug markets are inherently 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, a National Research Council report commissioned by the FDA (Reuter and Majmundar, 2015) asserts that "the illicit tobacco market is not associated with violence" based on experience in Europe.<sup>9</sup> The report also notes that analogous research has not been performed in the United States and does not discuss domestic incidents such as a "murder for hire" scheme in 2009.<sup>10</sup> On the other hand, 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,

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<sup>8</sup> The slope from the Ordinary Least Squares (OLS) regression of the smuggling rate on the excise tax is 14.2; the slope from the OLS regression of the smuggling rate on the log excise tax is 42.3.

<sup>9</sup> However, the report later states that instances of violence, though rare, have been noted in street markets for illicit tobacco in Greece.

<sup>10</sup> 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).

2015). 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, 2015; Pelfrey, 2014).

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). 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.<sup>11</sup> More recently, some law-enforcement personnel 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...”

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

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<sup>11</sup> 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 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.

literature is by Werb et al. (2011). We expand and update this review,<sup>12</sup> but our inclusion criteria deviate from theirs in several ways:

1. Period of study: Our review includes studies published from August 1988 to April 2015.<sup>13</sup>
2. Type of publication: We restrict our review to studies published in peer-reviewed journals.
3. 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, expenditures on enforcement, drug-seizure rates, and number of police officers.

Seventeen studies meet our inclusion criteria,<sup>14</sup> with considerable variation in methods, reporting periods, and measures of enforcement and violence. 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,<sup>15</sup> 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. Additionally, the methodology employed in the studies

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<sup>12</sup> We follow the search methods and sources used by Werb and colleagues, which relied on conventional search techniques of English-language articles (see Werb et al. (2011) for an elaboration of search tools), and we use the same search terms (“violence,” “drug-related violence,” “drug-market violence,” “enforcement,” “drug gangs,” and “drug crime”). Our search yielded four studies meeting inclusion criteria that were not included in the earlier review.

<sup>13</sup> The start of this period was chosen to coincide with the earliest studies found by Werb et al. (2011).

<sup>14</sup> Compare with the fifteen studies that met the criteria of Werb et al. (2011). Our list includes six newer studies and excludes four that they included because they contain only theoretical or qualitative results.

<sup>15</sup> 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.

ranges from examining simple correlations to regression specifications such as difference-in-differences with stronger claims to uncovering causal links between variables. Such caution notwithstanding, the weight of the evidence indicates that there is a significant positive association between enforcement intensity and violence. Two of the studies reviewed (12%) found no association between levels of enforcement and violent crime, although the author of one of these studies (Owens, 2011) came to the opposite conclusion in a later study using more refined methodology (Owens, 2014). The remaining 15 studies (88%) 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.<sup>16</sup>

### **3. The Theoretical Relationship between Enforcement and Violence**

#### **3.1. Overview**

What accounts for the empirical evidence showing that violence often increases with enforcement in illicit markets? Three explanations stand out in the literature. 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). Furthermore, low levels of enforcement tend to result in

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<sup>16</sup> 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).

monopolistic markets, dominated by a few well-organized suppliers who avoid violence to prevent attracting the attention of authorities (Moeller and Hesse, 2013). However, pressure from law enforcement that stimulates competition among rivals has made well-behaved, concentrated industries unusual in illegal drug markets (Reuter, 1983).

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). Compounding the problem are the selection effects: If violence succeeds in fending off enforcement by intimidating potential witnesses, surviving organizations will be selected for their capacity to use violence effectively to survive.

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, 2015). 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.

### 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 violence, and so their empirical estimates are reviewed here.<sup>17</sup>

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  $-0.5$ .<sup>18</sup> Thus, demand for cigarettes is typically measured to be well inside the inelastic region. More recently, Chiou and Muehlegger (2008) report demand elasticities for cigarette consumption of  $-0.29$  to  $-0.56$ . Thus, an important conclusion for the present work is that while cigarette smoking has some sensitivity to price, it is highly inelastic.

There are few econometric studies of demand for menthol cigarettes in particular. In the first such, Tauras et al. (2010) conclude that menthol and non-menthol cigarettes are not close substitutes. They estimate that a 10% increase in the price of menthol cigarettes would prompt only 2.4% of menthol smokers to switch to non-menthol cigarettes.<sup>19</sup> Another study, albeit sponsored by a tobacco company and not peer-reviewed, also came to the conclusion that demand for menthol cigarettes is

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<sup>17</sup> 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.

<sup>18</sup> Estimates of long-run elasticities tend to be at the high end of these ranges, and short-run elasticities at the low end.

<sup>19</sup> Tauras et al. (2010) do not estimate the decisions to smoke nor how many menthol cigarettes to smoke. However, adding their result for the switching decision to the range of estimates for the other decisions from Chaloupka and Warner (2000) would still leave the all-inclusive demand elasticity for menthol cigarettes in the inelastic region.

relatively insensitive to price. Compass Lexecon (2011) found that a 10% increase in the effective price<sup>20</sup> of illegal menthol cigarettes under a ban would be associated with a 1% decline in overall smoking, and that a 50% increase in the price would reduce smoking by only 3.5%. 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 elasticity for menthol cigarettes was only 0.005.

Estimates of supply elasticities are rarer. However, the supply of cigarettes is likely to be much more elastic than demand, at least in the long run. 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. Fulginiti and Perrin (1993) estimate the supply elasticity of tobacco without production quotas (which ended in 2004 in the United States) to be about 7.0, far into the elastic region.<sup>21</sup> Sumner and Wohlgenant (1985) found in a rigorous study of supply and demand conditions for cigarettes in the United States that "the derived supply curve for cigarettes is nearly horizontal" (thus implying a nearly infinite supply elasticity; p. 241), even when the domestic supply of raw tobacco is inelastic due to agricultural quotas. Given the easy conversion from producing menthol to non-menthol cigarettes, it is quite likely that the supply function for menthol cigarettes is similarly highly elastic.

### **3.3. A Simple Economic Model of Enforcement and Violence**

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.,

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<sup>20</sup> The effective price includes not only the purchase price, but also the costs to the consumer of participating in the black market.

<sup>21</sup> Furthermore, FAO (2003) states that the supply elasticity for tobacco may be expected to be "large, particularly in the long run, since tobacco uses a small proportion of the arable land in the world as well as in any country and the net return from growing tobacco is several times that from growing the next best alternative crops in many countries" (p.99).

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 (2015, 2014). 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, 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.
3. Violence rises with illicit revenue earned in the market.

Assumption 3 sets aside any direct beneficial effect of enforcement effort on reduction in violence. In part this is 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 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 on interdiction and prosecuting drug traffickers, while largely ignoring drug users. Enforcement in the

current illicit tobacco market also mainly targets traffickers.<sup>22</sup> Following Becker et al. (2006), for ease of presentation we therefore present the rest of the analysis assuming that there is no demand-side enforcement (Figure 3). When enforcement of the ban increases, shifting the supply curve up, the price increases greatly in percentage terms, from  $p_0$  to  $p_1$ . Given that demand is inelastic, revenue and therefore violence also rise. Prieger and Kulick (2015, 2014) show in a formal mathematical investigation of this model that the same conclusions hold even with demand-side enforcement 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.

While the conclusion from this simple model is unequivocal—increased enforcement leads to more violence unless the enforcement is specifically designed to be violence-reducing—the magnitude of the impact is indeterminate. The current illicit tobacco market appears to have low enforcement and low but increasing levels of associated violence (Green, 2015); 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 spurs violent crime 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

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<sup>22</sup> We base this assertion on our review of news articles, conversations with tobacco-enforcement personnel in Virginia, and discussions with tobacco-industry personnel.

basic operation of supply and demand presented here should capture at least the first-order effect of enforcement on 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).<sup>23</sup> 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.<sup>24, 25</sup> 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. An estimated 70% of African-American smokers smoke menthol cigarettes, compared with 25% of white smokers.<sup>26</sup> Menthol smokers exhibit especially strong brand loyalties (Anderson, 2011), which may account in part for the low demand elasticities discussed above.

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<sup>23</sup> Other non-tobacco flavorings are prohibited in the United States under the Family Smoking Prevention and Tobacco Control Act (FSPTCA) of 2009, but the law specifically exempted menthol. The EU ban on menthol cigarettes will be fully in effect by 2020. Brazil's ban of menthol cigarettes was enacted into law in 2012 and took effect in 2013. Nova Scotia's ban took effect in May 2015.

<sup>24</sup> Other studies also find that menthols compose approximately one-third of the overall U.S. cigarette market (e.g., O'Connor et al., 2012).

<sup>25</sup> 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).

<sup>26</sup> These statistics are from the authors' calculations using U.S. data from the 2010–2011 Tobacco Use Supplement to the Current Population Survey.

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 a 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.”<sup>27</sup> 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.<sup>28</sup>

If menthols were banned, we might expect to see some switching to non-menthol brands of cigarettes, “channeling” 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

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<sup>27</sup> 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).

<sup>28</sup> 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.

menthol cigarettes on the black market. Given the well-known tendency of survey respondents to underreport socially undesirable intentions such as engaging in criminal activity,<sup>29</sup> the potential number of buyers of illicit menthol cigarettes under a ban may be larger than these statistics suggest. 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 3 in the limit. The evidence discussed in section 3.2 suggests that demand is highly inelastic and the supply curve of the illicit good would be highly elastic. Under such circumstances and the assumptions of the model, Prieger and Kulick (2015, 2014) show that increased enforcement of a ban will lead to more violence.<sup>30</sup>

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.

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<sup>29</sup> Fisher (1993) reports that “social desirability bias and has been found to occur in virtually all types of self-report measures and across nearly all social sciences literatures” (p. 303).

<sup>30</sup> Refer also to Prieger and Kulick (2015) for additional cited evidence that a menthol ban fits the assumptions of the model presented here.

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.<sup>31</sup> The 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

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<sup>31</sup> 79 Fed. Reg. 23142 (April 25, 2014) (amending 21 C.F.R. Parts 1100, 1140, and 1143).

2012, 42 states have prohibited sales of e-cigarettes to minors (NCSL, 2015).<sup>32</sup> 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 than (*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-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

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<sup>32</sup> 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.

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.<sup>33</sup>

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<sup>33</sup> 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.<sup>34</sup> 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.<sup>35</sup> If stricter regulation or higher taxation leads to more evasion, increased law enforcement does not automatically 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

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<sup>34</sup> 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).

<sup>35</sup> 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).

black market society is willing to tolerate in exchange for the health benefits of stricter regulation on cigarettes.

#### 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<sup>36</sup>—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 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

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<sup>36</sup> “Positive,” in this sense, means self-reinforcing. See Prieger and Kulick (2015) for another model incorporating such feedback.

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. Tax Harmonization to Reduce Incentives to Smuggle

Incentives to evade taxes depend not only on the absolute levels of taxes and regulations but on their differences across jurisdictions, especially over easily crossed borders such as state lines in the U.S., as indicated by the empirical evidence discussed in section 2.2. This point is generally conceded even by advocates of high tobacco taxes.<sup>37</sup> Smugglers buy cigarettes in low-tax jurisdictions and transport them to high-tax jurisdictions. Profits from interstate cigarette smuggling are high compared to current enforcement activity, which means that for most smugglers the benefits outweigh the risks.

Consider New York City as an illustration. Marlboros that sell for \$5.00 per pack retail in Virginia can be resold wholesale in New York City for \$8.00 (compared to the fully taxed retail price of about \$13.00); a truck containing 50,000 cartons (500,000 packs) yields a gross margin of \$1.5 million for a drive of less than 300 miles.<sup>38</sup> The penalty in New York State, if caught, is \$600 per carton,<sup>39</sup> plus

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<sup>37</sup> E.g., Joossens et al. 2012, who are against lowering tobacco taxes in Europe, state that “[a]lthough a *high tax margin may provide the initial incentive to smuggle*, the data show that it is not the only factor” (p.232, emphasis added).

<sup>38</sup> Other estimates are even higher. The ATF (cited in VSCC, 2012) estimates that a single truckload of cigarettes smuggled from Virginia to New York City would garner a margin of \$4.08 million (based on a difference of \$8.50 in prices per pack between the states).

<sup>39</sup> As of June 1, 2013 (New York State Department of Taxation and Finance, 2013).

additional penalties in New York City of up to \$5,000 per violation and up to \$200 per carton.<sup>40</sup> In expected-value terms, the smuggler breaks even on a carton if the expected profit from the sale of a carton (gross profits here would be  $\$3/\text{pack} \times 10 \text{ packs}/\text{carton} = \$30/\text{carton}$ ) equals the expected costs if caught. The expected cost is the size of the fine, multiplied by the probability of detection. Equating the expected costs and profit yields the breakeven probability of detection. For example, for a small car load of 480 cartons, the smuggling is profitable if the probability of detection is less than 3.7%.<sup>41</sup> The actual probability of detection must be low, since despite increases in recent years the law-enforcement resources devoted to tobacco enforcement in New York remain modest (Campbell, 2015).<sup>42</sup> The volume of illicit cigarettes moving into New York City is massive (conservatively estimated at five million cartons per year),<sup>43</sup> and chasing cigarette smugglers has been a relatively low priority for law enforcement. The size of the illicit market, as well as statements from traffickers,<sup>44</sup> reveal that smugglers feel the chance of detection is low compared to the potential profits.

The point that these calculations illustrate is anything but merely academic. LaFaive and Nesbit (2013) estimate that nearly 61% of cigarettes sold in New York State are not fully taxed. Kurti et al.

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<sup>40</sup> As of January 18, 2014 (New York City Council, 2013; New York City Department of Finance, 2014).

<sup>41</sup> Denote the probability of detection as  $d$ . The expected costs from detection are  $(\$5,000 + \$800/\text{carton} \times 480 \text{ cartons}) \times d$  and the profit from sales is  $\$30/\text{carton} \times 480 \text{ cartons}$ . Equating the two yields the breakeven probability  $d = 14,400/389,000 = 3.70\%$ .

<sup>42</sup> As of 2013, the city devoted only 5 sheriff's deputies, 2 fraud investigators, and a lieutenant to tobacco control (Caruso, 2013). In 2014, this complement was increased to an undersheriff, a lieutenant, 8 deputies, 4 investigators, and an intel unit with 2 investigators, an intelligence analyst, and a financial auditor (New York City Sheriff's Office, 2014).

<sup>43</sup> Authors' calculation with data from the Mackinac Center and John Dunham and Associates (2012).

<sup>44</sup> A convicted tobacco trafficker in New York turned informant stated in 2007 "We do not fear law enforcement. They will pull us over, seize the load, and maybe we get arrested; but most likely we do not.... A small fish like me can make \$50,000 a month working only a few hours each week" (U.S. House, 2008).

(2013) find that 76% of cigarette packs discarded in the South Bronx area of New York City were not properly taxed. A 2012 study commissioned by the New York Association of Convenience Stores estimates that cigarette-tax evasion robs the state of \$1.7 billion in tax revenues each year and 6,200 jobs (John Dunham and Associates, 2012).

If differential pricing drives smuggling, then it can be attacked from either side of the price gap. Raising taxes in Virginia could reduce smuggling between Virginia and New York, and so could reducing taxes in New York. Brief consideration of the smuggling ecosystem shows that the implications for flows of smuggled product are asymmetric, however. Equalizing taxes across states at a high level, while eliminating interstate smuggling for tax evasion, would invite other sources of untaxed cigarettes. With uniformly high taxes across states, we might expect the supply from Indian reservations to increase and new flows from Canada,<sup>45</sup> Mexico,<sup>46</sup> and elsewhere to materialize. On the other hand, harmonization at a low level, while it would reduce illicit-market activity, would also increase smoking-related harms.

The size of the market in untaxed cigarettes does not by itself demonstrate that a large market would emerge for illicitly manufactured menthol cigarettes in the face of a ban. Today, consumers of cigarettes smuggled interstate 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

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<sup>45</sup> Canada's high federal and provincial cigarette taxes prompt much smuggling from the United States, particularly from reservations that straddle the border (RCMP, 2008). Illicit cigarettes had an estimated 17% market share in Canada, compared to a 7.3% market share in the United States. (Euromonitor, 2015).

<sup>46</sup> 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).

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.<sup>47</sup> 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. Furthermore, the availability and price of alternatives such as menthol small cigars and e-cigarettes will also affect the size of an illicit market if menthols were to be banned, as discussed above.

## 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 includes:<sup>48</sup>

- 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?

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<sup>47</sup> 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.

<sup>48</sup> A more detailed research agenda to inform policymakers is laid out in Kleiman et al. (2015).

- 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 a large volume of trafficking spurred by existing price differentials; indeed, Reuter and Majmundar (2015) estimate that tax evasion and avoidance in the market for cigarettes in the U.S. has grown from 3.2 percent in the past

two decades. This suggests the need for greater enforcement or harmonized taxes 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.

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

<i>Study</i>	<i>Location</i>	<i>Study Design</i>	<i>Study Period</i>	<i>Main Findings</i>
Goldstein, Brownstein, Ryan, and Bellucci, 1989	New York City	Longitudinal observational study of 414 homicide events	8-month period in 1988	Positive association between enforcement and 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	Longitudinal observational study of 67 Florida counties	1989	Increased drug enforcement has spillover effect; it increases the size of the market in adjoining jurisdiction, resulting in higher violent crime.
Brumm and Cloninger, 1995	USA	Longitudinal observational study of 57 cities	1985	No significant association between enforcement and violence.
Benson, Rasmussen, and Kim, 1998	Florida	Longitudinal observational study of 67 counties	1983–1987	Measures of enforcement were significantly and positively related with violent crime.
Riley, 1998	6 US cities	Longitudinal observational study of 6 cities	1995	Increased enforcement was associated with increased 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	Drug-law enforcement and the lack of formal dispute-resolution mechanisms in illicit markets prompted a high level of violence.

<i>Study</i>	<i>Location</i>	<i>Study Design</i>	<i>Study Period</i>	<i>Main Findings</i>
Resignato, 2000	USA	Longitudinal observational study of 24 cities	Oct. 1992– Sep. 1993	Drug enforcement positively 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.
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]).

<i>Study</i>	<i>Location</i>	<i>Study Design</i>	<i>Study Period</i>	<i>Main Findings</i>
Dickenson, 2014	Mexico	Longitudinal observational study of drug-related homicides at the state level	2006–2010	Targeted removals of Mexican DTO leaders 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 the homicide rate 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, “a simple back of the envelope calculation suggests that market-based violence certainly increased, by anywhere from 60% to 250%” (p. 466).

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

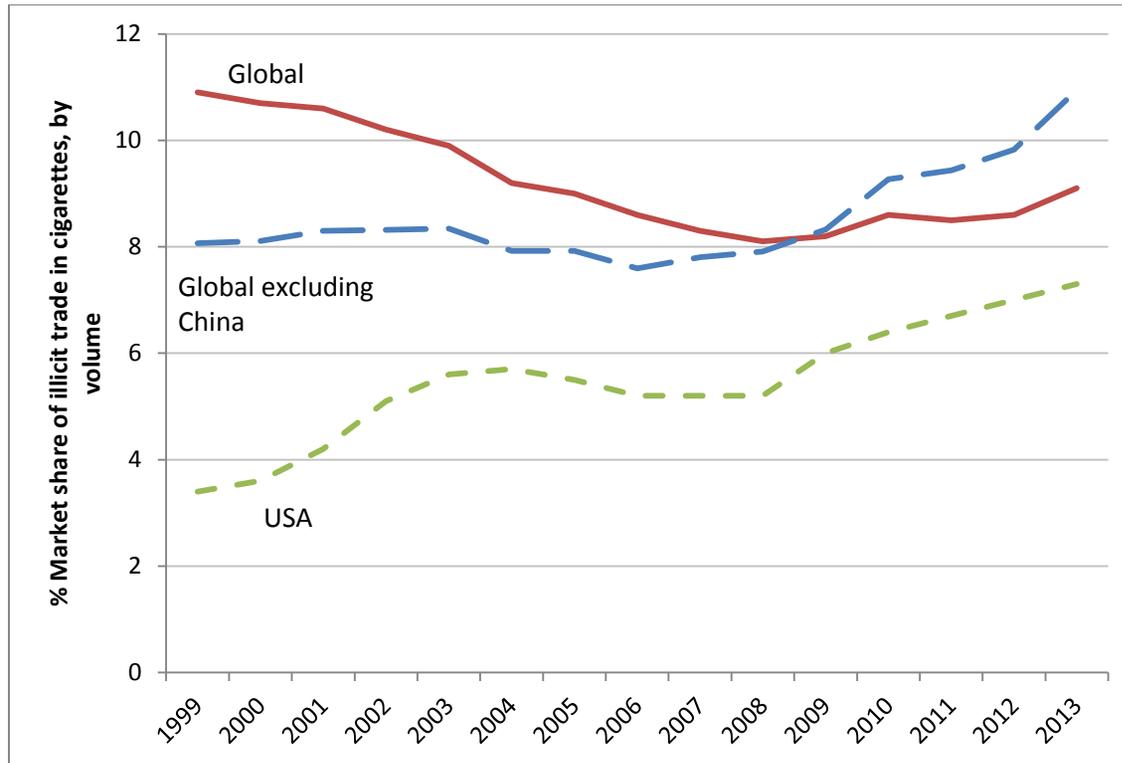
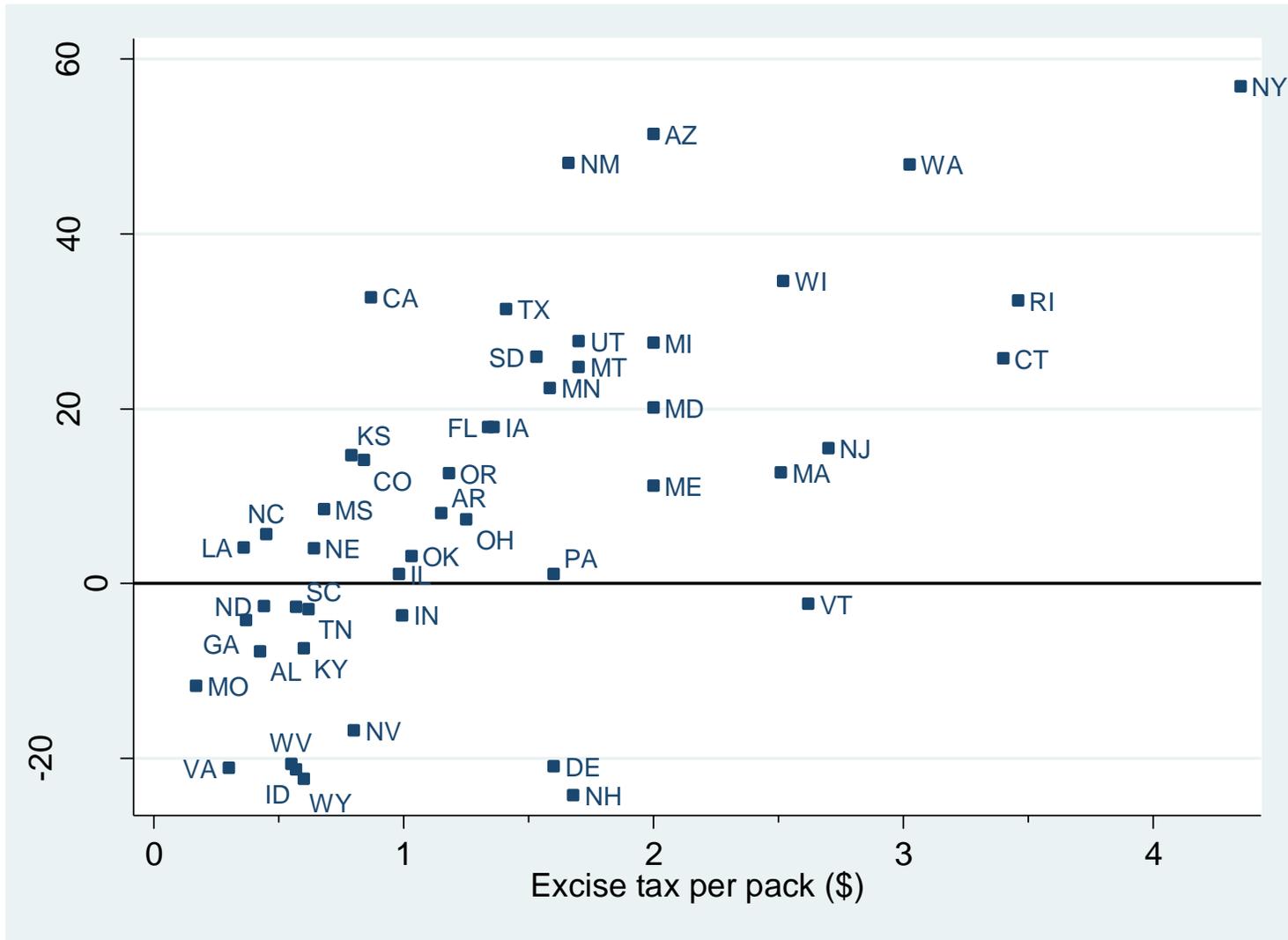


Figure 2. Illicit markets and cigarette taxes, 2012.



**Figure 3. Equilibrium price in an illicit market with only supply-side enforcement.**

