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Tax Evasion and Illicit Cigarettes in California: Prevalence and Demand-Side Correlates

James Prieger
Pepperdine University, james.prieger@pepperdine.edu

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James E. Prieger

Professor
Pepperdine University
School of Public Policy
24255 Pacific Coast Highway
Malibu, CA 90263-7490
James.Prieger@pepperdine.edu
ORCID iD: https://orcid.org/0000-0002-5521-5557

Abstract

Unlike some areas of crime, participation in illicit tobacco markets is not rare and spans most sociodemographic groups. Measurement of the scale of illicit trade in cigarettes usually are for markets with recently increased (or continually increasing) excise taxes. This study examines survey data from adult cigarette smokers in California at a time when prices and taxes had been fairly stable for many years. Even with no recent price shocks in the market, the results indicate that one-third of cigarette packs may lack a valid tax stamp and that between 18% to 25% of smokers avoided taxes by bringing cigarettes into the state from elsewhere in the past month (36% in the past year). Over 10% of packs were purchased for a suspiciously low price and 24% to 32% of smokers think they might have bought untaxed cigarettes in the past month. Furthermore, 20% think they may have consumed counterfeit cigarettes in the past month. There is a low incidence of illegal sales of single cigarettes. Men, smokers who roll their own cigarettes, e-cigarette users, younger smokers, and those with more income and education are all more likely to engage in at least some of the suspect market behaviors examined. The results show that many smokers from all segments of society participate in the illicit market for cigarettes—wittingly or not— which complicates efforts to reduce illicit trade.

Keywords: illicit trade in tobacco products, counterfeit cigarettes, tax evasion, item count technique

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The survey instrument is posted in an appendix:

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Data and code availability

The data and Stata code used for the analysis are posted in the OSF online repository:

Prieger, J. (2022, April 27). Tax Evasion and Illicit Cigarettes in California: Prevalence and Demand-Side Correlates (Data and Stata Code). Retrieved from osf.io/d9jkq

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I.   Introduction

Many studies of crime and criminals are motivated by the fascination with the "other," whether explicitly as in the older criminological approaches of symbolic interactionism and labeling theory (Denzin, 1974; Goode, 2014) or tacitly today.[1] Most people are not criminals and therefore questions about the correlates of criminal behavior are part of the search for why these individuals are different from those who live in conformity with laws and the social norms of the dominant group (e.g., the approach in psychology of contrasting criminals with "normal" controls, as in Sinha (2016), or Durkheim's (1984) sociological notion of asocial criminal deviance rooted in anomie). Even theories linking crime to culture, as in social-structure and sociological positivist theories of crime in sociology and cultural criminology, while recognizing that criminals may hold their own set of rules and social values, still typically discuss them as a *sub*-culture (Tonkonoff, 2014). Furthermore, the act of offending is typically described as rare and the length of the time spent offending as short (Curiel, 2018; Van Halem et al., 2016). Exceptions to these conceptions of crime therefore are interesting to study. This study considers an area of law-breaking that is measured to be relatively common, engaged in by a cross-section of society that spans gender, income, race, and ethnicity, and (for a certain definition of "offending") occurs up to 20 or more times a day per offender: tax evasion and consumer participation in illicit markets for cigarettes.

To discourage smoking, lessen harm to public health, and raise revenue in a manner that enjoys wide popular support, most governments tax tobacco products. Tobacco tax rates are often among the highest for any taxed item (good, service, labor or other forms of income, or capital gains) in a nation or subnational jurisdiction. Even in the United States, where tobacco taxes are lower than in parts of the

world such as Europe that follow the World Health Organization's (2021) recommendation that taxes compose at least 75% of the retail price of cigarettes, federal and state taxes make up between 23% and 57% of the retail price of a pack (Orzechowski & Walker, 2020). The high taxes create an incentive for consumers of tobacco to avoid and evade taxes through casual bootlegging involving travel to lower-taxed jurisdictions or purchasing from illicit markets, whether sourced through the internet, under-the-table transactions from otherwise legitimate retailers, or on the street (Guindon et al., 2014; Joossens & Raw, 2012; Kulick, 2017). Participating in illicit markets for cigarettes is widely accepted in certain communities (Shelley et al., 2007; Stead et al., 2013), even though the search for untaxed cigarettes can expose buyers to counterfeit tobacco products. Euromonitor (2021) estimates that 8% of cigarettes consumed worldwide in 2020 were illicit. For the U.S., estimates of illicit sales of cigarettes range from 4% to 21% market share (Reuter and Majmundar, 2015; Kulick et al., 2016). One source estimates that about a third of cigarettes consumed in California, the location of the present study, are from sources outside the state, and thus involves tax avoidance, tax evasion, or direct participation in underground markets (LaFaive et al., 2018).

Participation in illicit tobacco markets has received relatively little attention from researchers in criminology, compared with other areas of crime (Aziani et al., 2021), despite the fact that ITTP has been linked to terrorism and organized crime.[2] On the other hand, there are many studies of particular countries or regions estimating the level of illicit activity in tobacco sales, most often by economists or

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[2] ITTP in the U.S. has been linked to criminal organizations ranging from small gangs to the Genovese, DeCavalcante, and other crime families of La Casa Nostra and international smuggling rings (Bender & Palmer, 2016, US Attorney, 2015; *Genovese family mobsters*, 2012). In California, in 2005 the FBI took down an Asian smuggling ring for importing counterfeit cigarettes and other crimes (FBI, 2005). ITTP has also been linked in various ways to al Qaeda, Hezbollah, Hamas, ISIL, FARC, and other terrorist groups (*Exploring the Financial Nexus*, 2018). However, much ITTP also appears to be perpetrated by nonviolent individuals without otherwise-criminal backgrounds (Beare, 2002).

public health researchers, but they typically examine either periods shortly after a tax increase or jurisdictions in which there are frequent and continual tax increases.[3] Illicit trade in cigarettes—typically defined to consist of trade in smuggled, untaxed, contraband legitimate or counterfeit product—is often measured to be low after a tax increase (Little et al., 2020; Maldonado et al., 2020), to have changed little (Kaplan et al., 2018; van der Zee et al., 2020), or even to have fallen (Nguyen & Nguyen, 2020). It can take time for criminal markets to form or expand, however, or for consumers to adjust their behavior toward illicit markets. A particularly little-studied question is the prevalence and correlates of tax evasion and illicit trade in tobacco markets with stable taxes and prices, which is the present focus.

This study investigates the crimes of evading excise taxes on cigarettes and illicit trade in tobacco products (ITTP), as well as tax avoidance.[4] We employ novel survey data from smokers in California to estimate the prevalence of tax evasion, ITTP, and tax avoidance and to explore demographic factors associated with their prevalence. At the time of the survey in early 2017, there had been no increase in the excise tax on cigarettes sold in the state since 2009, when the federal tax rose by $0.62 per pack, and there had been no state cigarette tax increase since 1999. Cigarette prices were level or declining in real terms since 2009 and excise tax as a fraction of average retail price remained

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[3] Studies performed after a tax increase include, e.g., Maldonado et al. (2020) for Colombia, Little et al. (2020) for Georgia, Nguyen & Nguyen (2020) for Vietnam, and Kaplan et al. (2018) for Turkey. Studies of regions with frequent tax increases include Aziani et al. (2020) and Prieger & Kulick (2018) for Europe, Calderoni (2014) for Italy, Chionis & Chalkia (2016) for Greece, and Vellios et al. (2020) for South Africa.

[4] The distinction commonplace in the tax compliance literature is to use the term *evasion* to refer to illegal activity and *avoidance* to refer to (at least nominally) legal actions taken to escape taxation. However, as will be described below, the measure called *tax avoidance* studied here may also involve lawbreaking.

mostly steady as around one-third,[5] enabling study of a stable (albeit slightly shrinking)[6] market with only a moderately high level of taxation. We find that some forms of tax avoidance, evasion, and ITTP are relatively common. A self-reported one-third of packs lacks a valid California tax stamp. Between 18% to 25% of smokers in California avoided taxes in the past month by bringing cigarettes into the state from elsewhere and that 36% of them engaged in tax avoidance in the past year. Over 10% of currently smoked packs were purchased for a suspiciously low price and between 24% and 32% of smokers think they might have bought untaxed cigarettes in the past month. Furthermore, 20% think they may have consumed counterfeit cigarettes in the past month.

The present work adds to the literature on participation in illicit markets. The focus here is on measuring prevalence and characterizing participants on the demand side of the market, since the supply side has received much more attention in the criminology literature (Barrera et al., 2019; Beare, 2002; Décary-Hétu et al., 2018; Lauchs and Keane 2017; Munksgaard et al., 2021; van Duyne, 2003).[7] However, the survey results also indirectly reveal information about illicit supply by asking about untaxed sales and the (typically unwitting) purchase of counterfeit cigarettes. Only a few quantitative studies of individuals are available regarding the correlates of participation in illicit tobacco markets (Cantrell et al., 2008; Joossens et al., 2014; van der Zee et al., 2020). There is more work, mainly by economists, on tobacco-tax avoidance by individuals, which may or may not involve law-breaking.[8] Most studies of individual who evade taxes study income taxes only (e.g., Allingham & Sandmo, 1972;

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[5] From November 2009 to November 2016, the average price per pack sold in California rose 10.2% (Orzechowski & Walker, 2020), while the consumer price index for all goods and services (CPI-U) rose 11.4%. The federal and state excise tax as a percentage of average retail price was 31.6% in 1999 and 33.5% in 2016, although it briefly rose to 37% in 2009 when the federal tax increased.

[6] In 2009, adults smoking prevalence was 13.6%; in 2016 is was 11.9% (data taken from the California Health Interview Survey; see ask.chis.ucla.edu).

[7] See also the many citations to earlier literature in Aziani et al. (2018).

[8] See DeCicca, Kenkel, & Liu (2013) and the many other studies cited in Prieger & Kulick (2018).

Slemrod, 2007). Finally, there is a literature on why consumers turn to markets for counterfeit goods (Eisend & Schuchert-Güler, 2006; Bian & Moutinho, 2009; Casola et al., 2009; Bian et al., 2016). Unlike these studies, which typically involve stated preferences, we examine data on actual market transactions (albeit self-reported). Another contrast is that unlike for luxury consumer goods such as handbags, smokers typically do not want to buy counterfeit cigarettes.[9]

We examine many demographic factors associated with purchase of counterfeits and other forms of ITTP and tax evasion. Although the results vary across the market activities, generally speaking men, younger smokers, those with higher income, high-volume smokers, and consumers of menthol cigarettes and e-cigarettes are more likely to engage in some of the suspect behaviors examined. Compared to black, Hispanic, and Asian smokers, white smokers have a lower prevalence of packs without a proper tax stamp, illicit single cigarette purchases, tax avoidance, and purchase of untaxed and suspected counterfeit cigarettes. Black smokers have the highest prevalence of packs without proper tax stamps and purchase of suspected counterfeit cigarettes. Asian and Native American smokers have the highest prevalence of tax avoidance, and the latter group has the highest prevalence of cross-state tax evasion and purchase of untaxed cigarettes. The most striking result, however, is that packs without proper tax stamps, tax avoidance, and buying untaxed or counterfeit cigarettes are relatively widespread across *all* demographic groups, however defined.

The rest of the paper is as follows. Section II describes the survey instrument and the methods of analysis. Section III presents the results for the prevalence of ITTP, tax avoidance, and tax evasion and also examines how smoking behavior and demographic factors are associated with tax avoidance. A final section summarizes and discusses the results.

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[9] Counterfeit cigarettes taste "stale", "nasty", and "disgusting," and are more likely to give the smoker headaches and a sore throat (Von Lampe et al., 2016).

II.   Methods

To measure smokers' behavior regarding tax evasion, tax avoidance, and ITTP, 4,934 adult smokers were surveyed in March 2017.[10] The target population of the online survey was current smokers in California aged 18 to 74 who are literate in English. Survey weights were computed to match the demographics of target population, and all estimates of proportions to follow are weighted and the confidence intervals account for the impact of the weights on the variance of the estimates. The online appendix shows that the survey represents a typical sample of smokers in terms of smoking intensity, brand choice, and use of e-cigarettes, and that after weighting the demographics of the sample generally align with the demographics of the target population. Estimates are computed with Stata 17.

The descriptive estimates are free from overt bias due to differences in the distribution of demographics factors accounted for by the weights, but the estimates are potentially susceptible to other sources of bias. If tobacco users do not report their behavior truthfully, there will be bias in the estimates for the population. Self-reports of tobacco use have been shown to be generally reliable and valid in the past (Velicer et al., 1992; Patrick et al., 1994), with the exception that frequency of use is underreported, but there is evidence that underreporting of tobacco consumption is rising as smoking becomes more stigmatized (Fendrich et al., 2005). Online surveys may elicit more accurate self-reporting. Ramo et al. (2011) find that reported frequency of smoking is higher in online surveys and suggest that "the relative anonymity of online or electronic questionnaires may lessen social desirability bias…, as there are no interviewer effects." Thus, online surveying may be an effective tool to overcome the tendency to underreport tobacco use.

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[10] The survey was commissioned by BOTEC Analysis, and was issued a certificate of exemption by the Western Institutional Review Board due to the anonymity of the respondents. The survey ran from March 10 to March 30, 2017. For more information about the survey, including the script, see the online appendix.

Despite some advantages over traditional survey modes, Internet-based surveys are subject to concerns about self-selection bias if the online panels of respondents differ systematically in their behavior compared to other smokers. However, information on smoking gathered by online surveying has been found to have strong reliability and validity and to be comparable to face-to-face modes of interviewing (Klein, Thomas, & Sutter, 2007) and research employing online panels to study smokers' attitudes and behavior has been published in top public health journals (e.g., Thrasher et al., 2015).

To further immunize against social-desirability bias, for two questions regarding potentially sensitive subjects the survey employed the *item count technique* (ICT) technique (Droitcour et al., 1991; Dalton et al., 1994). ICT, also known as the unmatched-count technique (UCT), is a method designed to elicit truthful responses to sensitive questions, and generally has been found in the literature to work well (Tsuchiya et al., 2007; Coutts & Jann, 2011). A control sample of half the respondents are presented with a short list of non-threatening behaviors and asked only the total number of how many they did in the past month.[11] The remaining respondents compose the treatment group, who are shown the same list but with the sensitive behavior of interest added, and asked the same question. Since respondents are not asked to admit to doing any particular one of the items on the list, the psychic cost of truthful reporting is likely low even if some items are sensitive. The difference in the mean counts between the treatment and control groups is the estimate of the prevalence of the sensitive behavior. The sensitive behaviors explored here are bringing cigarettes from out of state into California and purchasing untaxed cigarettes from legitimate retailers, the Internet, or on the street.[12] These questions were answered before respondents knew the survey would ask about tax avoidance, evasion, or ITTP.

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[11] See survey questions 3 and 4 in the online appendix.

[12] The exact wording of the first item was: "Brought cigarettes into California that were purchased outside the state". The second item was: "Have bought cheap (untaxed) cigarettes or from an individual selling them independently."

III.   Measures of tax evasion and ITTP

The survey asked respondents about a number of practices related to tax avoidance, tax evasion, and ITTP. With one exception, none of our survey questions asks directly about illegal behavior on the part of the respondents. In California, the crimes involved with ITTP are only on the part of the seller. That is, there is no law against *buying* untaxed or counterfeit cigarettes in California; the laws criminalize only the *sale* of such.[13] The exception is our question about California taxes paid on cigarettes purchased from out of the state. When bringing more than 400 cigarettes into the state the buyer bears the legal obligation to pay the excise tax and a "use tax" in lieu of the sales tax, although the obligation is virtually unenforceable. Some buyers may seek out untaxed product or bootleg from outside the state, while others may buy counterfeit or untaxed tobacco unawares. Furthermore, in most cases the product itself is legitimate and legal (apart from the tax issues). As Vander Beken et al. (2008) put it, ITTP and its participants "blur the line between criminality and non-criminality."

We collected measures of tax avoidance, evasion, and ITTP as a set of variables, some pertaining to the current pack being smoked and others pertaining to behavior in the past 30 days or year. Measures pertaining to the current cigarettes being smoked include whether the pack has a proper tax stamp, whether the cigarettes were purchased singly as "loosies" (which is illegal on the part of the seller), and whether the reported price paid for a premium brand was lower than would be likely if taxes were included.[14]

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[13] The same is true of including underage smokers in the survey (those of age 18 to 20). While it is illegal to sell cigarettes to persons under the age of 21 in the state (outside of military bases), there is no law against consumption by those under 21.

[14] The price threshold is $4, a conservative one for fully taxed premium-branded cigarettes. Per numbeo.com, a pack of Marlboro cigarettes costs at least $6 in California in early 2017, and much more in some cities. However, the state sets no minimum retail price for cigarettes and below-cost coupons are not prohibited (Tobacconomics,

Table 3 shows the names and definitions of the behaviors we investigate by direct questioning. Each is a binary variable, and the table shows their proportions in the sample and estimated proportions in the population. The estimates of the population proportions, which are also shown in Figure 3, range from 0.6% (for the currently smoked cigarettes being purchased as loosies) to 35.7% for tax avoidance by purchasing outside the state in the past year (variable *TaxAvoidance*). For packs being currently smoked, 31.6% lack a stamp that looks correct to the respondent (*NoStamp2*; based on a picture presented in the survey), a high proportion but in line with other estimates of untaxed consumption in California (LaFaive et al., 2018). However, only 6.7% of packs were purchased within the state but have no California stamp at all (real or counterfeit; variable *NoStamp1*).[15] The other measures with high incidence include a prevalence of 23.6% for *Untaxed* (having possibly bought untaxed cigarettes in the past 30 days)[16] and 19.8% for *Counterfeit* (having possibly bought counterfeit cigarettes in the past 30 days).[17] While the latter figure may seem implausibly large, the implied probability that any one pack is counterfeit is only 1.3% (with a 95% confidence interval of [1.2, 1.5]).[18]

2016), so some off-brand cigarettes could potentially be sold legally for less than $4. For this reason the variable *PriceTooLow* is calculated only for the subpopulation whose usual brand is premium.

[15] The large difference between the means of *NoStamp1* and *NoStamp2* suggests a substantial amount of poorly counterfeited stamps. However, it may be the case that respondents had difficulty seeing the detail on the tax stamps on their packs well, since they are small (21 mm by 13 mm). Both of these variables miss the possibility that a pack with another state's stamp affixed was purchased within California, a feature of the survey questions that may bias these measures downward.

[16] For *Untaxed*, this figure breaks down as 14.4% "yes" and 9.2% "maybe." See survey question 36 in the appendix.

[17] For *Counterfeit*, this figure breaks down as 9.7% "yes" and 10.1% "maybe."

[18] Let the probability that a pack is counterfeit be p, let the number of packs consumed per month by respondent i by n_i, and let y_i be 1 if at least one pack consumed in the month is counterfeit ($y_i = 0$ otherwise). Then the probability that $y_i = 1$, based on the binomial distribution, is $[1 - (1 - p)^{n_i}]$. From this expression we calculated the weighted maximum likelihood estimate of p from the data, which is 0.0133 (SE = 0.0006). This calculation assumes that the probability of encountering counterfeits is the same for all smokers and that consumers purchase them randomly instead of intentionally.

There is a large discrepancy between the prevalences of *TaxAvoidance* and *TaxEvasion*. Some of the difference is because the former question asked about *any* purchases outside the state while the latter asked about buying more than 400 cigarettes (20 packs or two cartons). It is important to note that the *TaxEvasion* measure therefore likely greatly underestimates actual tax evasion, since the 20-pack threshold triggering the tax obligation applies only to the excise tax; the use tax obligation in lieu of sales taxes applies to any packs brought back into the state.

The proportions estimated from the direct questions can be compared with the prevalences estimated from the item count technique. Using the ICT, the incidence of purchasing cigarettes outside California and bringing them into the state in the past 30 days is 23.5% [15.9, 31.1].[19] These are close to but larger than the estimates from the similar answer to a direct question (18.5% [17.0, 20.0]).[20] Thus the ICT estimates for the population are 27% (5 percentage points) higher than the direct-question estimates. The estimates from the ICT are expected to be larger if the method improved the candor of the respondents. There is thus some evidence of underreporting in answers to the direct question. For the second question asked via the ICT, the estimate of the incidence of buying untaxed cigarettes in the past 30 days is 31.9% [23.8, 39.9]. The figures from the similar direct question (variable *Untaxed* in Table 3) is 23.6% [22.0, 25.3] for the population estimate (as reported in Table 3). The discrepancy between the ICT and direct estimates is larger than for the previous question; the ICT estimates are about 35% higher than the direct estimates. Note that the item in the ICT question was stated definitely and focused on the action of the buyer (see footnote 12) while the measure from the direct question includes answers of "maybe" purchasing untaxed cigarettes and is focused more on the sellers (see

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[19] The estimates are the difference in mean counts between the control and treatment groups (Tsuchiya et al., 2007). All figures in square brackets are 95% confidence intervals.

[20] The relevant direct measure is from answer 33.1 to question 33 (see the appendix), calculated as a proportion out of those not answering "Don't know/Can't say."

footnote 16). If the direct question were identical to the ICT question the difference in the estimated

prevalence of buying untaxed cigarettes would likely be even larger.

IV.   Correlates of tax evasion and ITTP

The associations among various smoking and vaping behaviors and the measures of

questionable market activity are shown in Table 4 and Table 5. Only statistically significant associations

are discussed here.[21] Heavier smokers are more likely to report paying a suspiciously low price for

premium cigarettes (*PriceTooLow* in Table 4), to avoid (*TaxAvoidance*) and evade (*TaxEvasion*) taxes in

the past year (Table 5), and to possibly have purchased untaxed (*Untaxed*) and counterfeit (*Counterfeit*)

product in the past 30 days. For the latter four outcomes in Table 5, smokers who roll their own

cigarettes or who have no brand preference[22] have the highest proportions, followed generally by

smokers of premium cigarettes. In addition, smokers in the roll-your-own (RYO)/no brand preference

category are most likely to have bought loosies.

Compared to smokers of unflavored cigarettes, smokers of menthol cigarettes were less likely to

have a proper California tax stamp on their latest pack (*NoStamp2*), and more likely to have purchased

loosies or to have avoided cigarette taxes (*TaxAvoidance*). Menthol smokers were also more likely to

have purchased possibly counterfeit cigarettes. While Marlboro is the most counterfeited brand in the

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[21] Significance is assessed with a Pearson chi-square test for independence of the smoking, demographic factor, or
economic variable and the response in question.

[22] Most of the 403 respondents in the category of *RYO/no brand preference* roll their own cigarettes. The rest (103
respondents) answered that they had no regular brand of cigarettes that they smoked the most.

world (WCO, 2014)[23] and most Marlboros sold are not mentholated,[24] there are also many reports of counterfeit Newport menthol cigarettes in the United States (e.g., USDOJ, 2016).

Compared to smokers who do not vape, users of e-cigarettes[25] are less likely to have a proper tax stamp on their current pack (*NoStamp1*), and more likely to have paid less than $4 for their premium-brand pack (*PriceTooLow*) and to have evaded taxes (*TaxEvasion*). Dual users are twice as likely to report avoiding taxes and three times as likely to report having purchased possibly untaxed or counterfeit product as cigarette-only smokers.

Table 6 and Table 7 show the associations among various demographic factors and tax evasion, tax avoidance, and ITTP. Compared to women, male smokers are far more likely to engage in behaviors *PriceTooLow*, *TaxAvoidance*, *TaxEvasion*, *Untaxed*, and *Counterfeit*. This is consistent with earlier findings that men are more prone than women to evade other sorts of taxes (Baldry, 1987; Torgler, 2007, p.34).

Older smokers are more likely to report that their current pack did not have a proper tax stamp (*NoStamp1* and *NoStamp1*), in accord with DeCicca et al.'s (2013) similar finding that older people are more likely to cross a border to buy cigarettes. However, it may also be that it was more difficult for older respondents in our survey to see the stamps.[26] In contrast, all other behaviors in Tables 6 and 7 are most prevalent for those in the 21-to-24 age group, with the youngest smokers (18–20 years old) most often coming in second.

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[23] The Marlboro brand dummy is positively associated with *Counterfeit* but only at the 10% level, perhaps because Philip Morris USA, the manufacturer, cracked down on then-prevalent counterfeiting in California in the 2000s (Strasburg, 2003).

[24] Among survey respondents who smoke Marlboro cigarettes, non-menthol smokers outnumber menthol smokers by about three to one.

[25] Since the target population is smokers, vapers who do not also smoke are not in the survey.

[26] The survey showed an enlarged picture of a California tax stamp, but the actual stamps on the packs are only 21 mm by 13 mm.

Compared to whites, *NoStamp2* and *Untaxed* are more prevalent among blacks, Hispanics, Asians, and Native Americans. Blacks have the highest odds, by many multiples,[27] of buying loosies, although the overall prevalence is still low (2.7%). Compared to whites and blacks, *TaxAvoidance* and *TaxEvasion* are more likely among Hispanics, Asians, and Native Americans. Blacks, Hispanics, and Asians are most likely to report running across possibly counterfeit cigarettes.

Those without a high-school diploma are most likely to buy loosies, pay a suspiciously low price, or buy suspected counterfeits. Those with college or higher degrees have the greatest probability of *NoStamp2*, *TaxAvoidance*, and *TaxEvasion*. For *PriceTooLow*, *Untaxed* and *Counterfeit*, the lowest and the highest educational-attainment groups have the highest prevalence. The lack of consistent, monotonic relationships between educational attainment and tax compliance may stem from competing results from education. Higher education may correspond to a greater stake in conventional behavior or more knowledge of the social good provided by tax revenue (which may include funding for tobacco-control measures in the case of excise taxes on cigarettes). But the more educated may better understand the opportunities for and benefits of noncompliance (Torgler, 2007). With all these results, however, it is important to note that there are only a few individuals in the survey without a high-school degree and the confidence intervals for that group are wide.

Education is also correlated with income.[28] Among respondents who stated their income levels, smokers with household income less than $25,000/year are most likely to buy loosies. For *PriceTooLow*, *TaxAvoidance*, *TaxEvasion*, and *Untaxed*, the prevalence rises monotonically with income. DeCicca et al. (2013) had a similar result for border-crossing to buy cigarettes. Interestingly, *Counterfeit* is most likely for the highest income group (more than $75,000/year).

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[27] The odds ratio of blacks (relative to whites) for buying loosies is 11.8.

[28] Goodman and Kruskal's gamma (a measure of rank correlation) for the income and education categories is 0.706.

Notwithstanding the discussion of how the prevalence of the various measures related to ITTP varies by smoking behavior and among demographic groups, it is important to note that several of the measures have high prevalences across *all* groups. For example, *NoStamp2* has a prevalence of almost one in five for the *lowest*-prevalence ethnic group, over a quarter of the lowest-prevalence age group engages in *TaxAvoidance*, even one in six women think they bought *Untaxed* product, and the lowest-prevalence education and income groups have a prevalence of *Counterfeit* of over 16%.

V.   Summary and discussion

A significant proportion of the smoking population in California engages in tax avoidance (36% in the past year), but far fewer admit to outright tax evasion by getting large numbers of cigarettes outside the state, bringing them home, and failing to pay use tax (only 3% in the past year). When asked in a more neutral fashion, however—asking whether they had purchased from *sellers* who did not pay taxes—many more thought that they were exposed to ITTP (27% in the past month). Tax avoidance and evasion appear to be more prevalent, with increases in the range of 27% to 35% versus direct questioning, when estimated using an honesty-inducing technique (ICT). Some forms of ITTP are less common: fewer than 7% of packs purchased in the state had no California tax stamp at all, fewer than 1% of the last-smoked cigarettes were purchased as illegally-sold single cigarettes, and the implied probability that a randomly selected pack is counterfeit is estimated to be only 1.3%. In summary, while the only direct estimate of the prevalence of admitted illegal behavior on the part of the consumers—outright tax evasion on large purchases from outside the state—is low, there appears to have been a moderately sized illicit market in cigarettes in California, notwithstanding that there had been no significant increases in taxes or prices in many years.

The correlates of the suspect behaviors examined here suggest that tax evasion and exposure to ITTP, while more common for some groups, span all demographic groups to some degree. Smokers who

roll their own cigarettes and vapers have a higher prevalence of some of the suspect behaviors. Vaping

and RYO may be prompted by the same desire to lower the cost of smoking that prompts tax avoidance,

and equivalently high taxes on those goods may discourage substitution away from illicit markets.

Younger people also appear more willing to seek out untaxed cigarettes and to encounter counterfeits.

One policy implication may be that youth-oriented messaging to counter ITTP on the demand side may

be a useful avenue to explore, although experience with illicit drug markets has shown that it can be

difficult to design effective messaging (Hornik et al., 2008).

Given the focus in the literature on ITTP in certain low-income communities (Shelley et al., 2007;

Von Lampe et al., 2016), it is interesting that income is positively associated with most forms of tax

avoidance and evasion studied here (except buying single cigaretts). Higher-income smokers may have

more opportunity to buy untaxed or lower-taxed cigarettes while traveling. The results for income,

along with the finding that those with high educational attainment also have a high prevalence of some

forms of tax evasion, suggest that exposure to ITTP is not restricted to less-affluent price searchers or

the stereotypical "criminal classes".

That well-educated and higher-income smokers as well as more disadvantaged smokers engage

in tax avoidance and evasion may signal any number of widespread attitudes that would make

counteracting ITTP difficult. Such attitudes may include the feeling that tobacco taxes unfairly target

smokers, a robust finding in surveys of smokers (Carlson, 2005; Dugan 2014; Saad, 2002), or that

evading "sin taxes" is a victimless crime or otherwise morally acceptable. Participation in ITTP (on both

sides of the market) can occupy a "moral blind spot" for these reasons (Vander Beken et al., 2008), and

tobacco excise taxes are often viewed as more illegitimate that efforts to evade them (i.e., as "hurdles

to avoid rather than moral imperatives to obey"; Beare, 2002). The perceived unfairness of tobacco

taxes has also been shown to help smokers rationalize cheating others (Kenchington et al., 2021).

Regardless of the reasons for involvement, it is clear that ITTP is an area of crime that includes participants from across society and is neither rare across individuals nor necessarily involving only short, isolated periods of offending for individuals involved (as long as the act of smoking untaxed cigarettes is included in the notion of offending). Other research has found that many traders and smugglers on the supply side of ITTP—"criminal entrepreneurs"—often do not have criminal backgrounds otherwise (Van Duyne, 2003). Participants on both sides of ITTP appear to be best characterized as not the "other" but rather "another one of us" who uses a variety of ways, legal and illegal, to try to reduce the cost of smoking.

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Table 1: Behavior regarding tax evasion, tax avoidance, and ITTP

| Variable | Description | Proportions | | | Subpopulation |
		Sample	Population estimate	95% CI for pop. estimate	
NoStamp1	Current pack was purchased in CA but lacks any type of CA stamp	6.15	6.69	[5.52,8.09]	Packs with intact wrapper
NoStamp2	Current pack was purchased in CA but lacks a stamp matching a picture of a valid stamp	29.50	31.58	[29.35,33.89]	Packs with intact wrapper
Loosies	Current cigarettes were purchased as singles (loosies)	0.61	0.62	[0.37,1.04]	Not "don't know/refuse to answer"
PriceTooLow	Price paid for current pack was less than $4	12.02	10.55	[9.44,11.78]	Premium-brand packs with price known
TaxAvoidance	Bought cigarettes outside CA and brought them into CA in the past year, or last pack doesn't have a CA stamp of any kind	39.91	35.74	[33.88,37.63]	Not "don't know/can't say," unless current pack is missing a CA stamp
TaxEvasion	Bought more than 400 cigarettes outside CA and brought them into CA in the past year and did not pay use tax	3.04	3.39	[2.72,4.20]	Not "don't know/can't say" for location of purchase AND same for use tax.
Untaxed	Bought untaxed cigarettes in the past 30 days ("yes" or "maybe")	26.77	23.62	[21.98,25.34]	Not "don't know/can't say"
Counterfeit	Bought counterfeit cigarettes in the past 30 days ("yes" or "maybe")	22.46	19.81	[18.25,21.47]	Not "don't know/can't say"

Notes: The population estimates use the survey weights.

Table 2: Behavioral factors and association with tax evasion, tax avoidance, and ITTP, I

	NoStamp1		NoStamp2		Loosies		PriceTooLow	
	Pop. estimate	95% CI	Pop. estimate	95% CI	Pop. estimate	95% CI	Pop. estimate	95% CI
Cigarettes/day								
Up to 5	7.50	[5.5,10.3]	34.50	[30.0,39.4]	1.30	[0.7,2.2]	11.40**	[9.5,13.7]
6 - 10	6.30	[4.3,9.1]	32.10	[28.0,36.5]	0.50	[0.1,2.2]	8.60**	[6.7,10.8]
11 - 15	6.20	[4.0,9.5]	30.20	[25.6,35.1]	0.20	[0.0,1.0]	9.10**	[6.9,11.8]
16 - 24	8.30	[5.2,13.0]	29.70	[24.5,35.4]	0.20	[0.0,1.3]	10.60**	[7.7,14.5]
25 - 35	3.00	[1.2,7.2]	28.00	[18.9,39.4]	0.00		10.00**	[5.7,16.9]
36 or more	3.00	[0.8,11.0]	23.90	[13.5,38.8]	0.50	[0.1,3.5]	34.40**	[23.6,47.2]
Brand type								
Discount	8.20	[4.9,13.5]	33.10	[26.0,41.1]	1.10**	[0.4,3.0]	0.00**	
Premium†	6.40	[5.1,7.9]	30.80	[28.4,33.3]	0.30**	[0.1,0.5]	12.80**	[11.5,14.3]
Roll your own/none‡	8.00	[4.1,14.9]	38.60	[29.6,48.5]	3.10**	[1.2,7.4]	0.00**	
Cig. flavor								
Non-menthol	6.40	[5.0,8.2]	29.90*	[27.1,32.8]	0.40	[0.2,0.8]	10.90	[9.4,12.5]
Menthol	7.40	[5.3,10.1]	35.30*	[31.2,39.6]	1.00	[0.5,2.3]	9.60	[7.8,11.7]
Vaping								
No vaping/e-cig use	7.30	[5.9,8.9]	31.60	[29.1,34.4]	0.50	[0.2,0.9]	8.00**	[6.9,9.3]
Vapes/uses e-cigs	4.70	[2.9,7.5]	31.30	[27.2,35.8]	1.20	[0.6,2.5]	19.60**	[16.7,22.9]

*Pearson chi-square test statistic for independence of factors and responses has *p*-value less than 0.05.   ** Chi-square *p*-value less than 0.01.

†For list of premium brands, see footnote **Error! Bookmark not defined.**.

‡Category includes those who mostly roll their own cigarettes and those who have no usual brand preference of pre-packaged cigarettes.

Note: Estimates are for the percentage of smokers in the subpopulation defined by the row heading for which the variable in the column heading equals one.

Table 3: Behavioral factors and association with tax evasion, tax avoidance, and ITTP, II

	TaxAvoidance		TaxEvasion		Untaxed		Counterfeit	
	Pop. estimate	95% CI	Pop. estimate	95% CI	Pop. estimate	95% CI	Pop. estimate	95% CI
Cigarettes/day								
Up to 5	39.80**	[36.3,43.3]	3.20*	[2.1,4.7]	29.00**	[25.7,32.4]	21.00**	[18.2,24.1]
6 - 10	29.80**	[26.6,33.2]	2.40*	[1.5,4.0]	19.20**	[16.6,22.1]	19.50**	[16.6,22.8]
11 - 15	32.00**	[28.1,36.1]	3.00*	[1.8,4.8]	18.20**	[15.1,21.9]	16.10**	[13.1,19.7]
16 - 24	40.80**	[35.7,46.1]	6.20*	[4.0,9.6]	21.80**	[17.7,26.6]	16.30**	[12.8,20.5]
25 - 35	36.30**	[26.8,47.0]	3.70*	[1.3,10.6]	32.50**	[23.1,43.6]	20.40**	[13.6,29.5]
36 or more	57.90**	[44.0,70.6]	2.50*	[0.6,9.5]	51.40**	[37.9,64.7]	51.60**	[38.0,64.9]
Brand type								
Discount	27.00**	[21.4,33.4]	3.60	[1.7,7.6]	13.60**	[9.5,19.1]	9.30**	[6.3,13.6]
Premium†	35.80**	[33.8,37.9]	3.10	[2.4,3.9]	23.40**	[21.6,25.2]	19.70**	[18.0,21.5]
Roll your own/none‡	42.20**	[35.5,49.3]	6.00	[3.4,10.3]	34.30**	[27.8,41.4]	29.90**	[23.6,37.2]
Cig. flavor								
Non-menthol	33.10**	[30.8,35.5]	3.60	[2.8,4.8]	20.60**	[18.6,22.7]	15.50**	[13.8,17.4]
Menthol	40.00**	[36.6,43.5]	2.60	[1.8,3.9]	27.20**	[24.2,30.5]	26.80**	[23.7,30.2]
Vaping								
No vaping/e-cig use	29.10**	[27.1,31.2]	3.20	[2.4,4.1]	17.50**	[15.8,19.3]	13.80**	[12.3,15.5]
Vapes/uses e-cigs	59.10**	[55.1,63.0]	4.20	[2.9,6.0]	45.10**	[41.2,49.1]	40.50**	[36.6,44.6]

*Pearson chi-square test statistic for independence of factors and responses has *p*-value less than 0.05.　　　** Chi-square *p*-value less than 0.01.

†For list of premium brands, see footnote **Error! Bookmark not defined.**.

‡Category includes those who mostly roll their own cigarettes and those who have no usual brand preference of pre-packaged cigarettes.

Note: Estimates are for the percentage of smokers in the subpopulation defined by the row heading for which the variable in the column heading equals one.

Table 4: Demographic factors and association with tax evasion, tax avoidance, and ITTP, I

	NoStamp1		NoStamp2		Loosies		PriceTooLow	
	Pop. estimate	95% CI	Pop. estimate	95% CI	Pop. estimate	95% CI	Pop. estimate	95% CI
Gender								
Male	6.10	[4.6,8.2]	32.70	[29.6,36.1]	0.50	[0.3,1.0]	12.40**	[10.8,14.2]
Female	7.50	[5.9,9.4]	29.90	[27.1,32.9]	0.70	[0.3,1.7]	7.70**	[6.4,9.4]
Age								
18 - 20	5.40**	[1.4,19.3]	14.90**	[7.1,28.6]	1.80	[0.4,7.0]	16.20**	[9.3,26.6]
21 - 24	4.20**	[2.2,7.7]	34.10**	[26.2,42.9]	1.80	[0.4,7.4]	16.40**	[12.3,21.4]
25 - 34	4.00**	[2.8,5.7]	26.30**	[22.7,30.2]	1.00	[0.5,2.1]	13.20**	[11.2,15.6]
35 - 44	4.90**	[3.2,7.6]	32.20**	[27.8,36.9]	0.30	[0.1,0.8]	10.50**	[8.4,13.1]
45 - 54	7.70**	[5.1,11.6]	31.00**	[26.0,36.5]	0.30	[0.1,1.0]	8.70**	[6.3,11.7]
55 - 64	11.80**	[8.2,16.7]	35.80**	[30.1,42.0]	0.20	[0.0,1.2]	5.40**	[3.6,8.2]
65 - 74	7.80**	[3.5,16.4]	42.90**	[32.5,53.8]	0.00		9.70**	[5.4,16.8]
Race/Ethnicity								
White	5.60	[4.3,7.4]	28.70*	[25.9,31.6]	0.10**	[0.1,0.4]	11.00	[9.5,12.6]
Black	7.20	[4.0,12.7]	40.90*	[32.8,49.5]	2.20**	[0.8,5.9]	8.20	[5.1,12.9]
Hispanic	7.20	[4.6,11.1]	33.60*	[28.4,39.2]	1.20**	[0.6,2.4]	10.60	[8.2,13.4]
Asian	6.10	[3.5,10.6]	34.40*	[27.5,42.0]	0.00**		11.90	[8.4,16.6]
Native American	8.80	[3.6,19.8]	19.50*	[10.0,34.8]	0.00**		12.90	[5.8,26.0]
Other	13.20	[7.5,22.3]	28.80*	[20.4,38.8]	0.40**	[0.1,1.6]	6.80	[3.8,11.9]
Education								
Less than high school	7.80	[2.0,26.4]	31.30	[16.5,51.2]	2.90	[0.4,18.0]	11.60**	[4.4,27.1]
High school	6.70	[5.4,8.3]	30.20	[27.7,32.9]	0.50	[0.3,0.9]	9.10**	[7.8,10.5]
College	7.40	[5.1,10.7]	38.40	[33.4,43.5]	0.70	[0.3,1.4]	12.50**	[10.1,15.4]
Higher/profess'l degree	4.20	[2.4,7.4]	34.80	[29.4,40.6]	0.30	[0.1,1.3]	23.80**	[20.3,27.7]
Income								
Less than $25,000	7.50	[5.4,10.3]	32.60	[28.5,37.1]	1.10*	[0.5,2.5]	7.90**	[5.9,10.5]
$25-50,000	7.40	[4.9,10.9]	30.80	[26.2,35.8]	0.30*	[0.1,0.9]	9.80**	[7.6,12.7]
$50-$75,000	5.60	[3.6,8.5]	29.70	[25.0,34.8]	0.20*	[0.1,1.1]	9.90**	[7.8,12.5]
More than $75,000	5.30	[3.6,7.5]	32.10	[28.3,36.1]	0.40*	[0.2,0.9]	14.30**	[12.3,16.6]
Declined to state	19.30	[4.3,56.1]	22.90	[6.4,56.6]	2.50*	[0.3,16.2]	5.10**	[1.7,14.1]

*Pearson chi-square test statistic for independence of factors and responses has *p*-value less than 0.05.   ** Chi-square *p*-value less than 0.01.

Note: Estimates are for the percentage of smokers in the subpopulation defined by the row heading for which the variable in the column heading equals one.

Table 5: Demographic factors and association with tax evasion, tax avoidance, and ITTP, II

	TaxAvoidance		TaxEvasion		Untaxed		Counterfeit	
	Pop. estimate	95% CI	Pop. estimate	95% CI	Pop. estimate	95% CI	Pop. estimate	95% CI
Gender								
Male	41.60**	[39.0,44.3]	4.60**	[3.5,5.9]	27.80**	[25.5,30.3]	22.60**	[20.4,25.0]
Female	26.80**	[24.5,29.2]	1.60**	[1.1,2.3]	17.10**	[15.1,19.3]	15.50**	[13.5,17.7]
Age								
18 - 20	42.40**	[31.6,53.9]	4.40	[1.6,6.9]	43.70**	[32.8,55.2]	34.30**	[24.2,46.1]
21 - 24	50.20**	[43.5,56.8]	3.70	[1.9,3.3]	43.00**	[36.6,49.7]	38.70**	[32.2,45.6]
25 - 34	44.90**	[41.5,48.4]	3.70	[2.5,9.4]	34.20**	[30.9,37.6]	32.00**	[28.6,35.5]
35 - 44	39.30**	[35.5,43.3]	3.40	[2.2,4.0]	23.80**	[20.7,27.3]	23.20**	[19.8,27.1]
45 - 54	26.00**	[22.1,30.3]	3.70	[2.2,6.9]	14.10**	[11.1,17.8]	11.10**	[8.4,14.5]
55 - 64	26.90**	[22.5,31.9]	2.20	[1.2,3.3]	11.90**	[8.7,16.1]	5.70**	[3.5,9.2]
65 - 74	25.90**	[19.0,34.3]	3.10	[1.2,9.4]	10.10**	[5.4,18.1]	1.60**	[0.6,4.6]
Race/Ethnicity								
White	33.90**	[31.6,36.3]	2.70**	[2.1,3.7]	21.10**	[19.2,23.2]	16.60**	[14.8,18.5]
Black	29.30**	[23.4,35.9]	1.90**	[0.8,4.3]	27.00**	[21.1,33.9]	24.50**	[18.8,31.3]
Hispanic	39.10**	[34.8,43.5]	5.10**	[3.4,7.6]	27.90**	[24.1,32.1]	23.90**	[20.2,28.0]
Asian	46.70**	[40.4,53.1]	4.10**	[2.3,7.1]	24.80**	[19.9,30.4]	24.40**	[19.2,30.5]
Native American	46.70**	[29.1,65.2]	14.90**	[2.8,51.7]	40.00**	[22.1,61.0]	14.40**	[6.4,29.5]
Other	31.00**	[23.8,39.4]	0.50**	[0.2,1.4]	16.80**	[10.9,25.2]	14.80**	[10.4,20.6]
Education								
Less than high school	41.10**	[26.1,58.1]	2.80	[0.4,17.2]	42.40**	[26.9,59.5]	51.80**	[34.7,68.5]
High school	30.30**	[28.2,32.5]	2.80	[2.1,3.8]	19.70**	[17.9,21.6]	16.70**	[15.0,18.5]
College	47.20**	[43.3,51.2]	5.50	[3.9,7.7]	26.90**	[23.6,30.6]	19.00**	[16.3,22.1]
Higher/profess'l degree	72.10**	[67.2,76.6]	6.00	[4.0,9.1]	52.50**	[47.7,57.3]	41.30**	[36.9,46.0]
Income								
Less than $25,000	25.90**	[22.6,29.5]	1.70**	[1.0,2.8]	19.50**	[16.5,23.0]	19.50*	[16.4,23.0]
$25-50,000	30.20**	[26.5,34.3]	2.70**	[1.5,4.8]	19.50**	[16.4,23.1]	16.20*	[13.4,19.6]
$50-75,000	35.10**	[31.0,39.5]	4.70**	[2.9,7.6]	22.70**	[19.2,26.6]	18.20*	[15.0,21.8]
More than $75,000	49.50**	[46.2,52.9]	5.00**	[3.7,6.8]	31.20**	[28.3,34.4]	22.90*	[20.3,25.7]
Declined to state	52.00**	[31.5,71.9]	3.30**	[0.5,17.8]	16.40**	[5.6,39.2]	33.40*	[14.0,60.8]

*Pearson chi-square test statistic for independence of factors and responses has *p*-value less than 0.05.   ** Chi-square *p*-value less than 0.01.

Note: Estimates are for the percentage of smokers in the subpopulation defined by the row heading for which the variable in the column heading equals one.

Figure 1: Past behavior regarding tax evasion, tax avoidance, and ITTP

Note: data are weighted to reflect the population of adult smokers in California