# Early Cigarette Prohibition During War and Peace*

Rachel Y. L. Fung† Lauren Hoehn-Velasco‡ Michael F. Pesko§

March 2026

**Abstract:** Cigarette smoking, a leading cause of preventable death in the United States, rose to widespread popularity in the early 20th century. Between 1893 and 1921, sixteen states enacted laws prohibiting the sale of cigarettes, but all such bans were repealed by 1927. We examine the impact of these repeals using data from the U.S. Veterans Mortality (Dorn) Study, collected in the 1950s, which allows for a retrospective analysis of early cigarette use. Using a staggered adoption difference-in-differences design, we find that repealing cigarette bans increased smoking initiation before ages 20 and 25 by over 13%. We also show that the distribution of cigarettes to soldiers during World War I increased smoking uptake among men from states with active bans at the time of enlistment. In both settings, increased access shifted initiation to younger ages without increasing lifetime participation. Accordingly, we do not find evidence that these increases in early cigarette use translated into higher later-life mortality. Taken together, our findings suggest that the abandonment of early efforts to restrict cigarettes played a role in shaping smoking initiation, although short-lived regulation was insufficient to produce detectable long-run mortality effects.

**JEL codes:** I12, I18, N31, N32, N41, N42

**Keywords:** Cigarette regulations; smoking; long-term; mortality.

*We thank participants at the American Society of Health Economists Annual Conference and the Kansas Health Economics Conference for helpful feedback and suggestions. We also thank the University of Missouri's Social Impact Lab for administrative support. Research reported in this publication was supported by the National Institute On Drug Abuse of the National Institutes of Health under Award Number R01DA045016. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

†Corresponding author. University of Missouri, Department of Economics. Email: rachelfung@missouri.edu

‡Georgia State University Department of Economics, Andrew Young School of Policy Studies, and IZA. Email: lvelasco@gsu.edu

§University of Missouri, Department of Economics, and IZA. Email: peskom@missouri.edu

# 1 Introduction

Smoking is the leading cause of preventable death in the United States, linked to chronic diseases ranging from cancer to cardiovascular conditions (U.S. Department of Health and Human Services, 2014). The 1964 Surgeon General's Report established a clear link between smoking and chronic disease, significantly expanding public awareness of the dangers of smoking (U.S. Department of Health, Education, and Welfare, 1964). Today, the health risks of smoking are widely recognized, supported by decades of research and public health campaigns (Chaloupka and Warner, 2000; Cutler and Glaeser, 2005).

In the early twentieth century, however, health behavior surrounding smoking was shaped in a very different environment. During this period, life expectancy was just 47 years (National Center for Health Statistics, 2020) and infectious diseases posed more immediate risks, making the long-run health consequences of smoking less salient. According to the Grossman model of health demand, limited health technology is theorized to reduce health investment and, by extension, increase risky behaviors (Grossman, 1972). The "Mickey Mantle effect," where individuals take fewer precautions when expecting to die young, was likely stronger in this era as well (Fang et al., 2007; Khwaja et al., 2009).

Cigarette use rose to dominance in this environment. Per-capita consumption increased from near zero in 1900 to more than 1,000 cigarettes per adult per year by the mid-1920s, with production exceeding 100 billion annually by 1930 (Shopland and Burns, 1997). Cigarettes rapidly displaced chewing tobacco and cigars, reflecting both changing consumer preferences and the success of mass advertising campaigns (Shopland and Burns, 1997; Tate, 1999). By World War I, smoking had become deeply embedded in social life, with nearly one-third of 19-year-old men already smokers.[1]

[1] Author's calculations.

Policymakers responded with Progressive-Era bans on cigarette sales in sixteen states between 1893 and 1921, reflecting anxieties about vice and youth smoking (Alston et al., 2002; Brandt, 2007; Tate, 1999). Most bans were short-lived, and their repeal created sharp cross-state variation in legal access. Our analysis of newspaper coverage from the period reveals that repeals were followed by sharp increases in advertising. This rise in visibility and commercial activity offers a pathway through which legal access to cigarettes could influence behavior and health outcomes. Together, the rapid adoption of cigarettes, limited health knowledge, shorter life expectancy, and weak socioeconomic gradients in smoking form a setting where regulation, rather than information, likely played a central role in shaping behavior (Grossman, 1972; Fang et al., 2007; Khwaja et al., 2009; Cutler and Glaeser, 2005).

In this paper, we examine whether the repeal of early twentieth-century cigarette laws influenced cigarette use and long-run health.[2] The rapid adoption of cigarettes over the early 20th century, combined with limited health information about smoking, makes this era unique for studying how regulation affects health behaviors. We use two complementary empirical strategies. First, we use a staggered adoption difference-in-differences design to directly examine the impact of repealing cigarette bans by comparing outcomes before and after repeals in states with and without bans.[3] Our data on cigarette use comes from the U.S. Veterans Mortality Study, which surveyed individuals who served in the armed forces between 1917 and 1940.

Our results suggest that smoking initiation increased significantly after cigarette bans were lifted. Repealing a cigarette ban prior to age 20 increased the probability of smoking before age 20 by 4.5 percentage points, a 14.5% increase. Repeal before age 25 increased initiation before age 25 by 5.6 percentage points, a 13.5% increase. However, we find no increases in

[2]We focus on repeals rather than enactments, as our data provide far richer before-and-after variation for repeals. Among individuals residing in states that had cigarette bans at some point, 41% turned 19 after repeal of the ban, compared to only 12% before enactment. The pre-period for studying enactments, therefore, contains too few respondents to yield reliable estimates.

[3]We estimate our difference-in-differences models using the Callaway-Sant'Anna estimator which is robust to staggered treatment adoption (Callaway and Sant'Anna, 2021).

lifetime initiation, suggesting that the repeals only shifted initiation to younger ages. These results show that legal access to cigarettes increased smoking among young adults, highlighting the role of state-level policy in shaping behavior and health risk.

Our second strategy exploits "pseudo repeals" generated by the widespread distribution of cigarettes to soldiers during World War I. Enlistment effectively nullified state-level cigarette bans by granting men access to cigarettes regardless of where they lived. While service likely raised smoking initiation for all recruits, the increase should be largest among men from states where access was otherwise restricted. Because this variation arises from a single exogenous historical shock, with no staggered timing, we are able to isolate the role of cigarette access from broader market or policy changes by comparing enlistment effects across ban and non-ban states.

Using enlistment in WWI as the treatment, we find that men enlisting in WWI from states with active cigarette bans were more likely to begin smoking. Men ages 17–24 were 16–20% more likely to start smoking upon enlistment than their counterparts coming from states without bans, again with no effects on lifetime initiation. The provision of cigarettes through WWI enlistment played a key role in the initiation of smoking among men who otherwise would have had limited access to cigarettes.

We do not find that increased cigarette use led to higher later-life mortality, which is consistent with our findings that the short-lived regulation did not affect lifetime initiation into cigarettes. We use survival rates imputed from cohort population counts in census data to compare men old enough to enlist with those too young to enlist in states that had bans in 1917, contrasting them with states without such bans. We reject at the 5% level mortality effects over 1.3%. Compared to related settings, e-cigarette deregulation reduced mortality by 2% (Pesko and Saenz, 2025), a $1 cigarette tax at ages 14–17 lowered adult mortality by 4% (Friedson et al., 2023), and being born in a "wet" state during Prohibition raised later-life mortality by 3.3% (Jacks et al., 2024).

This paper makes several important contributions to the literature. First, our study is among the first to examine the health and behavioral effects of historical regulations on risky behaviors. Related work has documented the effects of similar historical regulations on health outcomes. Law and Marks (2020); Jacks et al. (2021, 2023, 2024) find both historical and contemporary effects of alcohol prohibition on mortality, although direct evidence on the impact on alcohol consumption remains limited. An important contribution in our setting is the unique ability to examine the effect of historical regulations on both consumption and the subsequent health effects.

Second, we present new evidence of the effects of tobacco control policies in historical settings. The existing literature has focused primarily on tobacco control policies implemented after the 1960s, such as taxes and minimum legal access laws for cigarettes and e-cigarettes, e.g., Evans and Ringel (1999); Farrelly et al. (2004); Gruber and Kőszegi (2004); Lien and Evans (2005); O'Donoghue and Rabin (2006); DeCicca and McLeod (2008); Nesson (2017); Meier et al. (2021); Hoehn-Velasco et al. (2023); Friedson et al. (2023, 2024). DeCicca et al. (2022) reviews the modern literature, showing that while cigarette taxes deter youth smoking, adult demand is relatively inelastic. DeCicca et al. (2022) also shows that place-based bans in bars, restaurants, and workplaces show mixed efficacy. We instead study cigarette prohibition laws in the early twentieth century, a more extreme form of tobacco control than contemporary policies. This historical regulation has received comparatively little empirical attention, and allows us to study regulation in a period before the health risks of smoking were widely recognized. This setting offers important insights into how policy can shape behavior even when individuals underappreciate long-term risks.

Third, we reassess early cigarette prohibition laws, which prior work has often dismissed due to weak enforcement and the perception that cigarettes were not yet widely used in the states that enacted bans (Tate, 1999; Segrave, 2005).[4] Prior work has examined the political

[4]While enforcement challenges were inevitable, analogous contemporary policies with imperfect enforcement, such as minimum legal access laws for cigarettes and e-cigarettes, are nevertheless effective at reducing

and institutional drivers of cigarette bans (Alston et al., 2002), and historical narratives have described the moral and cultural opposition to cigarettes (Gottsegen, 1940; Tate, 1999; Brandt, 2007), but little is known about their effects on health or behavior. Using evidence from the Dorn data, we show that cigarette use among young people was substantial during the time of our study. In 1917, 30% of men who served in the military had begun smoking cigarettes by age 19, prior to enlisting. Our study demonstrates that these early prohibition laws, despite their limitations, measurably influenced smoking behavior and later-life mortality.

Fourth, our findings highlight the role of military service as a key channel through which health behaviors form and influence long-term health. Similarly, Bedard and Deschênes (2006) shows that military service during World War II and the Korean War led to excess veteran deaths due to heart disease and lung cancer attributable to military-induced smoking. Deza and Mezza (2025) finds that fathers' Vietnam War draft eligibility increases the risk of substance use among children. We focus on the effect of cigarette access through military service for men from ban states, rather than military-induced smoking common across all states. Nonetheless, our results show that military service significantly increased take-up of cigarettes.

Finally, our findings provide historical lessons for tobacco control policy discussions today. Countries such as New Zealand and the Maldives have recently passed "tobacco-free generation" laws, which prohibit the sale of combustible tobacco to individuals born after a certain date, gradually creating *de facto* prohibition. However, New Zealand recently repealed its law, paralleling the historical experience of U.S. states that initially prohibited cigarettes but later repealed their bans. Bhutan also implemented a nationwide ban on all tobacco sales in 2004, though the policy was repealed in 2021 due to concerns that black market activity was fueling the spread of COVID-19 (Tobacco Control Blog, 2023). In the United States, some localities have begun to explore similar restrictions: Santa Cruz County in California became

consumption (Hansen et al., 2023; Pesko, 2023; Abouk et al., 2024).

the first county to ban the sale of filtered cigarettes and cigars, while cities like Beverly Hills and Manhattan Beach implemented broader bans on the sale of tobacco products.

The remainder of the paper is structured as follows. The next section presents background information on the cigarette industry, cigarette bans, and World War I. Section 3 examines the first stage effects on advertising. Section 4 describes the main analysis data. Section 5 outlines our empirical strategies, which exploit (i) variation in the timing of repeals of state-level cigarette prohibition laws, and (ii) pseudo repeals where WWI veterans gained access to cigarettes through enlistment. Section 6 presents the main results on smoking initiation and Section 7 reports robustness checks. Section 8 examines later-life mortality outcomes. Section 9 concludes.

# 2 Historical Background

## 2.1 Cigarette Industry

Prior to the rise of cigarettes, chewing tobacco was the dominant form of tobacco consumption in the United States, accounting for 58% of total tobacco consumed in 1880, with cigars a distant second (Tate, 1999). Several key developments contributed to the growth of cigarette use (Cummings et al., 2022). In the 1830s, tobacco producers in North Carolina began using flue-curing techniques, which produced a milder tobacco more suitable for inhalation and enhanced the absorption of nicotine into the bloodstream, a factor that may help explain why cigarettes became more popular than earlier forms of tobacco (Pesko et al., 2025). At the same time, rising urbanization led to changing norms around hygiene and public decorum. Spitting, an integral part of chewing tobacco use, became increasingly stigmatized in city environments, creating an opportunity for more sanitary forms of tobacco use—such as cigarettes—to gain popularity (Tate, 1999).

James Buchanan Duke, widely regarded as a pioneer of modern cigarette manufacturing, entered the cigarette business in early 1880, anticipating that a federal tax cut would reduce production costs (Brandt, 2007). In 1884, he became the first in the industry to employ cigarette rolling machines, which dramatically increased production capacity and further reduced costs. Despite this early success, Duke himself reportedly did not believe cigarettes would ultimately dominate the tobacco market in the long run (Tate, 1999). This skepticism highlights that the rise of cigarettes was not widely anticipated at the time, but rather reflected a confluence of factors.

The rise of cigarettes attracted the attention of social reformers. Early cigarette use in the U.S. was concentrated among immigrants, working-class men, and others considered socially marginal or morally suspect (Tate, 1999). The low prices and ease of access made cigarettes particularly appealing to young men, and reformers viewed this uptake as particularly troubling. The appeal of cigarettes to youth became a central argument for regulation. Despite rapid expansion, with production doubling between 1880 and 1885, and again by 1890, cigarettes still made up a relatively small share of the tobacco market, accounting for just 2.2% of total tobacco consumed in 1900 and 12.6% by 1916, shortly before the U.S. entered World War I[5] (Milmore and Conover, 1956). Figure 1 shows the trends in the amount of tobacco leaf used in the production of cigarettes, cigars, and other tobacco products. Total production of cigarettes remained modest in the early 1900s, with production increasing over 100-fold from 1900 to the post-war peak. Still, by the first decade of the 20th century, cigarette smoking had become a common and socially accepted practice, particularly among men in urban areas (Segrave, 2005). Consistent with this, we find that by 1917, 30% of men who had turned 19 had already begun smoking cigarettes.

Unlike today, where there is a clear negative correlation between education and smoking

[5]Based on estimates of unstemmed-processing weight of tobacco used in production; figures do not account for home use of natural leaf for chewing and smoking. Because cigarette use in the early 20th century was heavily concentrated among young men (Brandt, 2007), the cigarette share within that demographic would have been considerably higher.

prevalence (Centers for Disease Control and Prevention, 2022), this socioeconomic gradient did not exist historically. Although cigarette smoking was initially concentrated among immigrants and working-class men, it rapidly diffused across the broader population as the industry expanded. de Walque (2010) find that smoking prevalence was similar across education groups in 1940. Roughly 35–40% of adults smoked regardless of whether they had less than a high school education, completed high school, attended some college, or graduated from college.

## 2.2 Cigarette Prohibition Laws

Between 1893 and 1921, sixteen states enacted laws banning the sale of cigarettes, which were all repealed by 1927 (Table 1). We construct a new dataset documenting these laws by systematically reviewing archival state legislative records, using the State Session Laws and State Statutes databases via HeinOnline. We identify both the enactment and repeal years, as well as the exact legal language of each statute. See details in Appendix B. We find that all of these laws also include prohibitions on cigarette papers, effectively targeting the use of roll-your-own products in addition to manufactured ones. For instance, Nebraska's 1905 law declared "[t]hat it shall be unlawful on and after the date this act shall go into effect to manufacture sell give away or willingly allow to be taken any cigarettes or the material for their composition known as cigarette paper within the State of Nebraska".

A few states had policy adoption and repeal that occurred in quick succession. Illinois enacted a law prohibiting cigarettes in 1907, but it was declared unconstitutional and never went into effect (Gottsegen, 1940). Similarly, Idaho prohibited cigarettes in 1921, but the law was repealed just ten days later (Tate, 1999). Washington instead enacted and repealed a cigarette ban twice. In our empirical analyses of staggered repeals, we classify Illinois as never having implemented a cigarette ban, and we exclude Idaho and Washington from the

estimation sample. In Section 7.2, we show that our results are robust to including Idaho and Washington.

Our legal review differs from existing historical accounts based on Gottsegen (1940), which in some cases omit states or misspecify effective dates. For instance, we identify cigarette prohibition legislation in Florida and Utah that have not been documented in prior studies. By recovering the exact legal language and correcting gaps in the historical record, our dataset offers a more complete foundation for analyzing early tobacco regulation, which has received limited empirical attention.

## 2.3 Political Economy and Development of Cigarette Bans

During this period, cigarettes were widely viewed as morally suspect, and opposition to them was part of the broader Progressive Movement's concern with vice and social discipline. Progressive states were more likely to bring cigarette prohibition bills to the floor (Alston et al., 2002). At the same time, the growing cigarette industry mounted strong opposition. American Tobacco, for example, challenged statutes and lobbied legislators—sometimes through bribery—to vote against anti-cigarette laws (Tate, 1999). Alston et al. (2002) also find that the likelihood of a cigarette prohibition bill passing declined as cigarette production increased, highlighting the role of industrial influence.

Although public health arguments were sometimes invoked, the anti-cigarette movement was primarily moralistic. In *The Cigarette as a Physician Sees It*, Dr. Daniel H. Kress, an officer of the Anti-Cigarette League warned that "[t]he cigarette is the most dangerous form in which tobacco is used", claiming that it caused impairments of the senses, stomach ulcers, tuberculosis, elevation of blood pressure, cardiovascular ailments, and other "evil effects . . . in the smoker's heart, blood vessels, kidneys, liver, stomach, and brain"(Kress, 1931, pp. 24, 28). While Kress emphasized numerous health harms, he also quotes Dr. John D. Quackenbos to

assert that "the gravest of all the evils resulting from cigarette addiction is the lessening or complete loss of moral sensibility, with a conspicuous tendency to falsehood and theft. . . . The victim degenerates into a sallow, unmanly, irresponsible incompetent, in splendid fettle for the penitentiary or the asylum" (Kress, 1931, p. 68).

Cigarettes were frequently linked in public discourse to alcohol, hard drugs, crime, and prostitution. Industrialist Henry Ford, who strongly opposed cigarettes and refused to hire cigarette smokers at his company, claimed that "[i]f you will study the history of almost any criminal, you will find that he is an inveterate cigarette smoker. . . . The cigarette drags them down" (Ford, 1914, p. 1). Notably, opposition during this period was directed specifically at cigarettes rather than at tobacco use more generally. Many of the reformers who pushed for anti-cigarette legislation smoked cigars themselves (Tate, 1999).

The early anti-cigarette movement achieved some success. While the reformers did not succeed in a national cigarette ban, they pushed through early legislation banning cigarette sales to minors and restricting use in public places or near schools (Segrave, 2005; Tate, 1999; Brandt, 2007). However, age-restriction laws proved largely ineffective due to minimal or nonexistent enforcement, leading reformers to redirect efforts toward outright cigarette bans (Segrave, 2005).

## 2.4 World War I and the Expansion of Cigarette Access

While cigarette use was already on the rise before World War I, the war marked a turning point for the industry (Tate, 1999; Brandt, 2007). In part because the military sought to ban more disruptive vices like alcohol and prostitution, cigarettes were tolerated—viewed as a "necessary evil" that could help soldiers cope with the hardships of war (Brandt, 2007). Cigarettes were made widely available to soldiers through both military rations and subsidized sales, facilitated by the government and private organizations such as the YMCA and

the American Red Cross. The government sent more than 5.5 billion manufactured cigarettes to soldiers overseas during the war. To ensure a steady supply of cigarettes for the war effort, cigarette manufacturing was designated as an essential industry (Tate, 1999). General John Pershing reportedly underscored the importance of tobacco to the military effort, stating that to win the war, America needed "tobacco as much as bullets" (Cummings et al., 2022, p. 14). Reflecting broader public support, many also donated to "smoke funds" to send cigarettes to troops overseas (Brandt, 2007).

Cigarettes quickly became symbolically associated with the war effort and with patriotism, and opposition towards cigarettes was viewed as unpatriotic (Tate, 1999). Public opinion changed after the war, and attempts to revive the anti-cigarette movement were largely unsuccessful. Tobacco companies also capitalized on this shift, using imagery of veterans and wartime service in advertising campaigns throughout the interwar period.

# 3 First Stage Effects: Cigarettes in Newspapers

Before turning to smoking outcomes, we first examine whether repeals altered the visibility and commercial presence of cigarettes. If repeals truly relaxed constraints on access, we should observe corresponding increases in newspaper coverage and brand advertising. Such a shift would provide a direct channel through which repeals of smoking bans could influence smoking initiation.

We collect historical newspaper data from the Chronicling America collection, which is accessible through the Library of Congress. The collection includes newspapers selected to reflect local history, geographic coverage, and major events. We focus on the 1,300 English-language titles published between 1886 and 1930 that we observe for at least two years. We perform a keyword-based search of the OCR-extracted text, identifying mentions of "cigarette"

or "cigarettes" in each issue per newspaper. We consider three measures of cigarette advertising: (1) all cigarette mentions ("Cigarettes"); (2) cigarette mentions excluding the legal and policy-related terms ("Cigarettes—Excl. Legal");[6] and (3) direct brand mentions ("Cigarette Ads", e.g., Lucky Strike, Camel, Chesterfield).[7]

While we observe a large number of unique titles over the sample period, most titles are only available for a subset of years. On average, a title appears in 9.7 years, and around half of the titles are observed for five years or fewer. To construct a state-year measure of keyword mentions that is robust to these compositional changes, we proceed as follows. First, for each keyword group $k$ and title $p$ in state $s$ and year $t$, we compute the share of issues that contain at least one mention of the keyword groups, multiplied by 1,000. This yields $\text{Countk}_{pst}$, the number of keyword-positive issues per 1,000 published issues. We then regress this measure on year and title fixed effects,

$$\text{Countk}_{pst} = \alpha_p + \alpha_t + \varepsilon_{pst},$$

and subtract the title fixed effects $\hat{\alpha}_p$ to obtain a demeaned measure of mentions at the title-year level:

$$\widetilde{\text{Countk}}_{pst} = \text{Countk}_{pst} - \hat{\alpha}_p.$$

Finally, we compute average mentions at the state-year level:

$$\text{Countk}_{st} = \frac{1}{n_s} \sum_{p=1}^{n_s} \widetilde{\text{Countk}}_{pst}.$$

On average across the sample period, cigarettes are mentioned in 13.00 per 1,000 issues.

[6] This second measure excludes instances where any of the keywords "ban", "legislation", "unlawful", "illegal", "enact", "repeal", or "law" are also present.

[7] This measure includes the phrases "lucky strike cigarettes", "camel cigarettes", "chesterfield cigarettes", "sweet caporal cigarettes", "fatima cigarettes", "piedmont cigarettes", and "helmar cigarettes." The selection of cigarette brands is based on historical prominence around 1920 (Tate, 1999; Brandt, 2007).

Excluding instances tied to legal or policy terms, the rate falls by around half to 6.76 per 1,000 issues. Mentions of specific cigarette brands are much less frequent, averaging just 0.13 per 1,000 issues. By comparison, chewing tobacco is mentioned at a rate of 0.69 per 1,000 issues, indicating that cigarettes were far more visible in the press overall, although direct brand advertising was still relatively limited in this early period. We then estimate the effect of the repeal of cigarette bans on keyword mentions using Callaway-Sant'Anna difference-in-differences.

Table 2 shows that the total number of mentions of cigarettes increased after repeal. Column (1) reveals an increase by 5.5 mentions of cigarettes per 1,000 issues (a 38.7% increase over a mean of 14.32) following the repeal of cigarette bans. This result does not appear to be driven solely by references to cigarette legislation. Column (2) shows that mentions unrelated to legislation increased by 2.9 mentions per 1,000 issues (a 37.0% increase over a mean of 7.72). Lastly, column (3) shows that direct mentions of cigarette brands increased almost threefold, with a coefficient of 0.484 over a mean of 0.165 mentions per 1,000 issues.

These results suggest that repeals of cigarette bans increased market presence and commercial reach of cigarettes, rather than merely increasing public discourse. The heightened visibility implies greater public exposure and access, providing a pathway through which legal access to cigarettes could influence behavior. In particular, increases in brand-name mentions likely reflect expanded advertising, which affects smoking initiation and eventual health outcomes. In the next sections, we show that greater exposure translated into earlier smoking initiation and, ultimately, reduced survival later in life.

# 4 Main Analysis Data

## 4.1 Tobacco Use

We employ data on tobacco use from the U.S. Veterans Mortality Study, which was initiated by Harold Dorn and is also known as the Dorn Study (Dorn, 1959). This dataset studies policyholders of U.S. Government Life Insurance, which insured individuals who served in the armed forces between 1917 and 1940. Surveys were mailed in 1954 to approximately 291,800 active policyholders, and a second round was sent in 1957 to nonrespondents. The overall response rate was around 85%, yielding a sample size of around 250,000. Over 99% of respondents were men, and all respondents were aged 30 or older when surveyed. The seminal paper by Harold Dorn showed that cigarette smokers had significantly higher death rates from various diseases, including lung cancer and cardiovascular conditions (Dorn, 1959). Subsequent studies using this dataset confirmed these findings, showing increased mortality risks associated with cigarette smoking (Kahn, 1966; Rogot, 1974). To the best of our knowledge, our study is the first study in the economics literature to use these data.

Since the sample consists of veterans, it is selected based on year of birth. Figure A.1 shows the distribution of birth cohorts in the dataset. The bulk of the data is for cohorts who were in their prime ages during World War I, with those born in 1886–1900 (ages 17–31 in 1917) accounting for over 97% of the sample. The dataset includes a variable for state of residence at the time of the survey, which we use to measure exposure to cigarette bans in our analysis. One concern here is measurement error, since we do not observe state of residence during respondents' adolescence but only later in life. We demonstrate in Section 7.1 that there is no evidence of selective migration, thereby alleviating concerns over mismatched policy environments.

Respondents report historical and current use of cigarettes, cigars, pipes, and chewing tobacco or snuff. Specifically, they report the age range at which they started using each type of tobacco product. Figure A.2 shows that respondents were most likely to have started using cigarettes at ages 15–19 and 20–24. Using these responses, we construct variables to determine whether respondents started using each type of tobacco product before age 20, 25, or ever. This allows us to construct a panel dataset from the cross-sectional dataset, using tobacco use data by ages 20 and 25 for respondents born in different years.

One potential concern is that the survey was conducted in 1954, decades after the cigarette bans had been repealed. If early cigarette access led to increased mortality, individuals most affected may not have survived to be included in the sample, introducing selection bias. This form of selection would likely attenuate our estimates, since the most affected individuals may be systematically underrepresented. Hence, our estimates should be interpreted as lower bounds on the true effects.

Figure 2 plots the fraction of respondents in each birth cohort who reported using cigarettes before age 20, separately for states that did and did not enact cigarette prohibition laws. Consistent with the historical account, cigarette use was less common in states that did not enact bans. However, the gap closes for cohorts born around 1900 and after—those who turned 19 after WWI. The rate of cigarette use before age 20 was around 20% for cohorts born before 1890, who would have turned 19 before 1910. The figure shows substantial cigarette use even in states with bans, in part because the sample includes individuals in treated states who were unaffected since bans were not yet enacted before they turned 20, as well as those who initiated smoking before bans were enacted. Nevertheless, the persistent differences between states with and without bans suggest that the bans reduced cigarette use.

We also benchmark our mean cigarette use statistic against another dataset. Starting in 1970, the National Health Interview Survey (NHIS) asked respondents whether they used cigarettes and the age at which they started. Figure A.3 plots the average cigarette use by age

19 for the Dorn sample and the sample of men in NHIS. The rates of cigarette use appear comparable across the two datasets, which gives us confidence that the higher-than-expected rates of cigarette use by age 19 are not merely a feature of the Dorn dataset, reflecting cigarettes to be more widespread than previously assumed.

Since the Dorn sample primarily consists of men born between 1886 and 1900, we observe relatively few respondents who turned 19 before cigarette bans were enacted in their state. Overall, only around 12% of respondents from ban states reached age 19 prior to enactment, and pre-treatment cohorts account for less than 5% of the sample in four treated states. Given this data limitation, we are unable to credibly estimate the effects of enactments and focus our analysis on the effects of repeals.

## 4.2 Mortality

We use the 1870–2000 Census to construct cohort-level measures of survival profiles by state and year of birth. This provides a consistent measure of mortality across cohorts over time and allows us to study later-life mortality outcomes.

We rely on Census-imputed survival rates because existing mortality datasets are insufficient for our purposes. Our analysis requires state-by-cohort mortality measures over time. The NCHS Multiple Cause of Death files are available only beginning in 1959, while the repeal of cigarette bans and psuedo-repeal from WWI occurred several decades earlier. As a result, standard mortality data do not allow us to consistently observe long-run mortality across a range of ages for the affected cohorts.

### 4.3 Other datasets

We include state-level alcohol prohibition as controls, measured using indicators for whether a state was dry in a given year (Sechrist, 2012; Jacks et al., 2021). Our descriptive data on tobacco production is drawn from the *Reports of the Commissioner of Internal Revenue*, which we digitized for the years 1890–1936. The reports provide annual total consumption of cigarettes and other tobacco products, computed as national production plus imports less exports. Because cigarette production was highly concentrated in a few states and taxation occurred in the state of production, these data cannot be used to measure state-level consumption. Instead, we use them descriptively to illustrate national trends in tobacco use over time.

## 5 Empirical Method

We examine the effects of cigarette prohibition laws using two methods. First, we examine the effects of repealing these laws by comparing cigarette use before and after repeal, in states with and without bans. This approach directly measures the impact of legislation and provides policy-relevant estimates of how state-level prohibitions affected cigarette use.

Second, we leverage pseudo-repeals from soldiers' exposure to cigarettes during WWI, comparing the effect of enlistment on cigarette use and mortality for those from states with and without bans in 1917 when they enlisted. This method focuses on respondents who served in WWI, who make up the vast majority of the Dorn sample. As a result, we have a larger estimation sample and greater statistical power compared to the analysis that directly estimates the impact of repeals. Moreover, we leverage variation that occurred at a single point in time—1917—rather than relying on staggered repeals that took place during a period of expansion in the cigarette industry. This allows us to better isolate the impact of cigarette ac-

cess from broader industry trends and reduces concerns about confounding policy or market shifts that coincided with the repeals.

## 5.1 Repeal of Cigarette Prohibition Laws

To examine the direct effect of repeals on cigarette use, we estimate the staggered adoption difference-in-differences regression below using methods proposed by Callaway and Sant'Anna (2021):

$$\text{Cigarette Use before } k_{isy} = \beta \text{ Repeal } k_{sy} + \lambda X_{sy} + \delta_s + \delta_y + \varepsilon_{isy}, \tag{1}$$

where Repeal $k_{sy}$ is a dummy for individual $i$ born in state $s$ in year $y$ being younger than age $k$ when cigarette bans were repealed; $X_{sy}$ controls for teen exposure to alcohol prohibition; and $\delta_s$ and $\delta_y$ are state and cohort fixed effects. We estimate unweighted regressions[8] and we cluster standard errors at the state level.

We impose several restrictions on the estimation sample. First, we isolate the effect of repeals from the direct effects of enlistment and military service. WWI veterans mostly enlisted in 1917 and 1918, and the official enlistment age was 18 (or 17 with parental consent). We impute age in 1917 using the reported year of birth and assume that those aged 17 or older in 1917 served during WWI. Based on this rule, we exclude respondents whose outcome variable would be determined following enlistment. In practice, this means excluding those born between 1898 and 1900 when studying cigarette use before age 20, and those born between 1893 and 1900 when studying cigarette use before age 25. Second, we exclude pre-period cohorts who had not yet been treated before enactment. Third, we limit the sample to exclude cohorts more than ten periods before enactments or after repeals. Finally, we exclude Idaho, whose ban was repealed within a year, and Washington, which enacted and repealed a ban over two separate periods. In Section 7, we show that our estimates are not sensitive to the

[8]There are no weights for the Dorn study.

sample selection above.

## 5.2 Pseudo-Repeal from Enlistment in WWI

WWI veterans gained access to cigarettes through military service, which effectively "repealed" any existing bans for enlisted men. We exploit this variation, along with differences in ban status across states in 1917, when most WWI veterans likely enlisted.[9] While enlistment likely increased cigarette use broadly through distribution of and access to cigarettes, these military-induced effects are common across all states. By contrast, cigarette bans would have depressed baseline smoking rates prior to enlistment for men from states with bans, implying larger increases in smoking initiation at enlistment for this group. Accordingly, the differential increase in initiation between men from states with and without bans at the time of enlistment can be interpreted as the effect of cigarette bans.

For men who enlisted after age 19 (or 24), smoking status by age 19 (24) cannot be influenced by enlistment. If World War I enlistment increased cigarette use, then men who were 19 (24) or younger at the time of enlistment should exhibit higher smoking initiation rates. Conversely, if cigarette bans reduced use, then the gap in smoking rates between younger (affected) and older (unaffected) cohorts should be larger in states with bans in 1917. We

[9]Seven states (Arkansas, Iowa, Kansas, Nebraska, North Dakota, South Dakota, and Tennessee) had bans in place in 1917.

estimate:

$$\text{Started Smoking at 15–19}_{isy} = \alpha_{1,1}\text{Age 17–19}_{isy} \times \text{Ban 1917}_s + \lambda X_{sy} + \delta_s + \delta_y + \varepsilon_{isy}; \tag{2}$$

$$\begin{aligned}\text{Started Smoking at 20–24}_{isy} = {} & \alpha_{2,1}\text{Age 17–19}_{isy} \times \text{Ban 1917}_s \\ & + \alpha_{2,2}\text{Age 20-24}_{isy} \times \text{Ban 1917}_s + \lambda X_{sy} + \delta_s + \delta_y + \varepsilon_{isy};\end{aligned} \tag{3}$$

$$\begin{aligned}\text{Started Smoking at 25–29}_{isy} = {} & \alpha_{3,1}\text{Age 17–19}_{isy} \times \text{Ban 1917}_s \\ & + \alpha_{3,2}\text{Age 20-24}_{isy} \times \text{Ban 1917}_s \\ & + \alpha_{3,3}\text{Age 25-29}_{isy} \times \text{Ban 1917}_s + \lambda X_{sy} + \delta_s + \delta_y + \varepsilon_{isy},\end{aligned} \tag{4}$$

where Started Smoking at $15–19_{isy}$, Started Smoking at $20–24_{isy}$, Started Smoking at $20–25_{isy}$ are indicator variables for individual $i$ born in year $y$ residing in state $s$ having started smoking cigarettes at ages 15–19, 20–24, and 25–29 respectively. Age $17–19_{isy}$, Age $20–24_{isy}$, Age $25–29_{isy}$ are indicator variables for individual $i$ being ages 17–19, 20–24, 25–29 respectively in 1917; Ban $1917_s$ is an indicator for state $s$ having a cigarette ban in place in 1917; $X_{sy}$ are state-level controls; and $\delta_s$ and $\delta_y$ are state-of-residence and year-of-birth fixed effects. We again control for teen exposure to alcohol prohibition at the state-cohort level. Standard errors are clustered at the state level.

We use respondents' year of birth to impute their age in 1917 and restrict the estimation sample to those ages 17–45 in 1917. To improve precision, we exclude cohorts whose birth years place them ambiguously between age groups—those who could have been either 19 or 20, 24 or 25, or 29 or 30 in 1917.

# 6 Effect of Repeals on Cigarette Use

## 6.1 Effect of State-Level Repeals

The state-level repeal of cigarette bans accelerated smoking initiation among adolescents and young adults. Figure 3 shows that individuals who turned 20 after the repeal of a cigarette ban in their state were 4.5 percentage points more likely to have started smoking before age 20. This represents a 14.5% increase relative to the baseline mean, where 31% of respondents had started smoking before age 20. Similarly, those who turned 25 after a repeal were 5.6 percentage points more likely to have started smoking before age 25, a 13.5% increase relative to the baseline rate of 42%. The event studies show no evidence of differential pre-trends in smoking behavior leading up to the repeals, supporting a causal interpretation of the effect.

Next, we test whether repeals led to a higher overall incidence of smoking or simply shifted initiation earlier. Figure A.5 shows the effects of a repeal on smoking before ages 20, 25, 30, and over the life course. The estimated effects decline steadily with age and become statistically insignificant when we consider lifetime smoking. In other words, repeals accelerated initiation in early adulthood, but did not increase the share of individuals who ever smoked. Because the Dorn survey was conducted in 1954, decades after the repeals, individuals who died earlier are not included in the sample. To the extent that early cigarette access reduced survival, these individuals are systematically underrepresented, which would lead the initiation effects to be attenuated.

Finally, we examine whether repeals affected the use of other tobacco products. The results in Figure A.6 show that repeals did not affect initiation into cigar, pipe, or chewing tobacco. These results, considering non-cigarette tobacco products, suggest limited substitution or complementarity across product types.

Taken together, these results show that legal access to cigarettes caused individuals to begin smoking earlier in their lives, rather than changing whether they ever smoked. Even if the total smoking prevalence remains unchanged, earlier initiation has been linked to greater addiction and heavier lifetime use (U.S. Department of Health and Human Services, 2012), which could imply higher health and mortality risks.

## 6.2 Effect of Pseudo-Repeals

World War I provides a sharper test of how legal access shaped smoking. In 1917, cigarettes became freely available to soldiers regardless of their home state's ban status, creating a natural experiment for young men from ban states. Table 3 presents estimates using this variation in access to cigarettes created by WWI enlistment. The results show that men from states with cigarette bans were significantly more likely to begin smoking once they enlisted, even after controlling for state and year-of-birth fixed effects. The effects were strongest in absolute terms for those just reaching enlistment age: men who were 17—19 in 1917 were 3.3 percentage points (16.9%) more likely to start smoking between ages 15-–19. For older groups, the absolute effects were smaller, but because baseline initiation rates were lower, the relative effects were large: men who were 20–24 in 1917 were 19.3% more likely to start smoking at those ages, and those aged 25–29 were 40.2% more likely.

The results in Table 3 also suggest that the rise in smoking among enlistees from ban states was not merely a matter of earlier initiation. The coefficients on the upper-right triangle of Table 3 are small but positive, implying that the increase in initiation into cigarettes following enlistment was not offset by reductions in smoking initiation at older ages. However, the estimates in Column (1) of Table A.1 show that while men who enlisted from states with active cigarette bans in 1917 were more likely to have ever smoked cigarettes, the difference is not statistically significant. This result is consistent with our findings from the staggered re-

peal analysis, where legal access shifted the timing of initiation but did not expand the overall share of lifetime smokers.

In Figure A.7, we test for effects on initiation into other tobacco products. During WWI, soldiers could choose between a ration of manufactured cigarettes, loose tobacco with cigarette paper for hand-rolling, or chewing tobacco, but few selected the latter. Cigars and pipes were not available through rations (as these were more expensive and harder to transport), but were available for purchase at subsidized prices (Tate, 1999). We find no effects on initiation into pipe and chewing tobacco or snuff use, but a *reduction* in cigar initiation between ages 20–24. The results suggest some substitution between cigarettes and cigar during the war. However, we find no comparable effect in the staggered repeal specification in the previous subsection, implying that this substitution likely reflects reduced cigar availability and popularity in the military rather than broader substitution effects.

Compared to the state-level repeal of cigarette bans, we find similar but larger effects among men who gained legal access to cigarettes through enlistment in World War I. Whereas state-level repeals occurred when cigarette markets were still emerging—limiting availability—military service marked an abrupt shift from prohibition to full access. In the military, cigarettes were rationed, sold at low cost, and actively promoted as a staple of soldier life.

In the contemporary U.S. context, marijuana is a major substance that has recently undergone widespread legalization. A recent review by Anderson and Rees (2023) concludes that there is little evidence that marijuana legalization increases use among youth. However, Hollingsworth et al. (2022) use a difference-in-differences framework and find that recreational marijuana laws increased marijuana use by 25% among adults and 10% among adolescents, consistent with our results for cigarette prohibition repeal. The historical and policy contexts of the two settings may explain the difference in effects. Marijuana legalization occurred in a modern policy environment and introduced legal access to a previously illicit substance, whereas the repeal of cigarette prohibition involved a differentiated product within a

well-established tobacco marketplace, which may have accelerated the adoption of cigarettes following repeal.

# 7 Robustness

## 7.1 Measurement Error and Selective Migration

Because the Dorn survey records state of residence in the 1950s, rather than state of birth or residence during adolescence, our treatment assignment may be mismeasured if individuals migrated. Under classical measurement error, our estimates will be biased towards zero. However, if migration is correlated with ban status or with propensity to smoke, the error would be non-classical, and estimates may be biased. In particular, men from states without bans were more likely to start smoking early. If younger men disproportionately moved from non-ban states to ban states, mismeasurement in the state variable may make it appear that younger cohorts "treated" by repeals in ban states had higher smoking rates, when in fact the pattern reflects selective migration rather than policy effects.

We test for selective migration in our state repeals specification using the sample of men from the 1950 and 1960 Censuses, which report both state of birth and state of residence. We construct estimation samples analogous to those used in the estimation of Equation (1). In these data, about 65 percent of men live in their state of birth. Since the Census includes immigrants who entered the U.S. after World War I, true migration rates in the Dorn sample are likely lower.

We define a migration indicator equal to one if the state of residence differs from the state of birth. We then estimate Equation (1) with Callaway-Sant'Anna difference-in-differences using this migration indicator as the outcome variable. This regression tests for whether in-

migration rates—measurement error in the state variable—are higher in ban states for "treated" cohorts who turned 19 or 24 after the repeal of a ban, compared to states without bans. The estimates in Table 5 Column (1) show no evidence of differential in-migration rates.

While overall migration rates do not differ, the direction of migration could still matter. If younger cohorts—who had higher smoking rates—disproportionately moved from non-ban states to ban states, our estimates may erroneously attribute this selection to the effect of repeals. To test this, we construct a second indicator variable for individuals migrating from a state without a ban—defined as individuals being born in a state without a ban and residing in a different state—and again estimate Equation (1). The estimates are reported in Table 5 Column (2) and suggest that this migration pattern is not correlated with treatment status.

Taken together, these results suggest that migration is unlikely to generate non-classical measurement error in our treatment variable. Both overall in-migration rates and migration from non-ban states are uncorrelated with treatment status, reducing concern that selective migration biases our main results.

## 7.2 Alternative Specifications and Samples

We test the robustness of our staggered repeal results using several alternative specifications and report the average treatment effects in Figure 4. First, we relax each of our sample restrictions: (i) including outcomes determined after 1917 that may have been affected by enlistment in WWI; (ii) including outcomes determined prior to the enactment of bans; (iii) including cohorts more than ten periods before or after treatment; (iv) including Idaho, where the ban lasted only ten days, and Washington's second ban enacted in 1909; and (v) relaxing all restrictions. The estimated effects remain stable across all specifications except case (i). When post-1917 outcomes are included, the estimated impact diminishes, as expected, since state repeals were effectively superseded for veterans who gained access to cigarettes through

WWI.

Second, we use Census data from 1950 and 1960 to construct sample weights such that the Dorn dataset is representative of the US-born male population at the state-of-birth by year-of-birth level. The results are robust to applying these weights. Third, we estimate the model using two-way fixed effects and stacked difference-in-differences (Wing et al., 2024). The estimates remain consistent with our baseline but are somewhat smaller in magnitude under these alternative estimators. Third, we conduct a "leave-one-out" analysis where we sequentially exclude each state from the estimation sample to assess sensitivity. As shown in Figure A.8, the results remain robust when individually excluding each state, suggesting that the effects are not driven by one large state with an active policy environment.

Fourth, we implement placebo simulations in which repeal dates are randomly reassigned across states. Figure 5 plots the estimated effects from 500 placebo regressions alongside the true estimates. The actual estimates lie far to the right of the placebo distribution, indicating that the observed effects are unlikely to arise from spurious policy timing.

Finally, Table A.2 presents results for our World War I specification using alternative specifications or samples. Columns (1) and (2) build up our preferred specification in column (3), by adding controls for teenage exposure to alcohol prohibition and region of birth by year of birth fixed effects sequentially. In Column (4), we restrict the sample to states that have ever had a cigarette ban in place. Here, the reduction in sample size limits the power, as we continue to find positive coefficients, albeit smaller in magnitude and not statistically significant. Figure 5 also reports estimates from placebo simulations, which show the estimates are unlikely to reflect chance differences across cohorts or states.

Overall, these robustness checks demonstrate that our main results are not contingent upon specific modeling choices or sample definitions, thereby reinforcing the credibility of our core findings.

# 8 Effects of Pseudo-Repeals on Later-Life Mortality

## 8.1 Computing Survival Rates

To study later-life mortality impacts, we use Census data to impute a consistent measure of survival across birth cohorts and over their lifetime. We draw on the largest available Census samples from IPUMS: the full-count datasets for 1870–1950, the two 1% metro samples for 1970, and the 5% samples for the remaining Census years from 1960–2000. We count the population by state of birth, year of birth, and sex in each census year. We then interpolate for intracensal years to obtain population sizes at each age $a$ by state $s$, birth cohort $y$, and sex $f$ $\text{Population}_{asyf}$. We then define the survival rate for each state $s$, birth cohort $y$, and sex $f$ at each age $a$ as the fraction that are alive conditional on being alive at age 19.

$$\text{Survival}_{asyf} = \frac{\text{Population}_{asyf}}{\text{Population}_{19,syf}}.$$

We use age 19 as the baseline because it aligns with the outcomes for smoking initiation and corresponds to the end of adolescence. Conditioning on survival to age 19 also avoids confounding from infant and child mortality, which was high in the early 20th century and largely unrelated to cigarette access. Our analysis focuses on cohorts born between 1890 and 1910, spanning the ten cohorts before and after the WWI enlistment eligibility cutoff.

We validate our constructed survival profiles by plotting the average imputed cohort survival rates for men against the 1930 U.S. life tables for white men (Appendix Figure A.4). The profiles align closely through midlife, but our measure yields higher survival rates at older ages beyond 65. This discrepancy may reflect improvements in health and rising life expectancy after 1930 that are captured in our cohort-based measure but not in period life tables. Overall, the comparison suggests that our Census-based approach captures broad mortality

patterns while providing consistent survival measures across birth cohorts in our sample, enabling analysis of long-run mortality effects.

Our approach is similar to the mortality measures used by Lleras-Muney (2005), who constructs ten-year death rates by birth cohort from adjacent Census rounds. We extend this method by imputing survival rates at each single year of age, which allows us to trace survival profiles continuously over the life course. Specifically, we measure survival from age 19 to each subsequent age using interpolated population counts across multiple Census years. This approach avoids implausible negative mortality rates and yields smaller relative measurement error, since mortality is higher when measured over longer horizons. Using multiple Censuses also helps smooth over measurement error, producing more stable survival profiles than those based only on decade-to-decade changes. Black et al. (2015) improve on the Lleras-Muney (2005) method by incorporating vital statistics to refine estimates. However, such data are not available for the time period we study.

## 8.2 Empirical Strategy

To estimate later-life mortality effects, we compare men who were just old enough to enlist in 1917 (age 17 and over) to those who were just too young, in states with and without active bans in 1917. We estimate:

$$\text{Survival}_{asy} = \beta \text{Eligible}_y \times \text{Ban 1917}_s + \delta_a + \delta_s + \delta_y + \delta_{sa} + \varepsilon_{asy}, \tag{5}$$

where $\text{Survival}_{asy}$ is the survival rate at age $a$ for those born in state $s$ in year $y$; $\text{Eligible}_y$ is an indicator variable for cohort $y$ being ages 17 or over in 1917 and hence eligible to enlist in WWI; $\delta_a$, $\delta_s$, $\delta_y$, $\delta_{r(s)a}$ are age, state-of birth, year-of-birth, and state-by-age fixed effects. The estimation sample includes survival rates at ages 31 to 80 for cohorts born between 1873 and 1911. We weight regressions by cohort population at age 19, and cluster standard errors

at the state level.

We focus on mortality effects among men. The vast majority of WWI veterans were male, and men were more directly targeted with repeals than women. To assess whether the estimated effects reflect other confounding factors unrelated to cigarette access and veteran status, we also estimate the regressions for women as a placebo test.

## 8.3 Results: Repeals Reduce Survival

We do not find evidence that access to cigarettes during World War I reduced survival later in life for men from repeal states. Table 4 presents results from estimating Equation 5. In Column (1), the 95% confidence interval ranges from −0.0119 to 0.0155, allowing us to rule out, at the 5% level, that men from ban states who were just old enough to enlist in 1917 experienced an increase in mortality at ages 31–80 of more than 1.3% relative to men just too young to enlist.[10]

Columns (2)–(6) break the results into 10-year age bands. We do not find differences in survival rates at any of the age ranges. These results are consistent with our findings on cigarette use, where pseudo-repeals accelerated initiation without substantially altering lifetime use of cigarettes. Panel B reports coefficient estimates for women, who were not directly treated by the pseudo-repeals. We again find no difference in survival rates for women aged 17 and over in 1917 compared to younger cohorts, in states with and without cigarette bans in 1917.

For comparison, Jacks et al. (2024) show that being born in a "wet" state during Prohibition raised later-life mortality by 3.3%. Friedson et al. (2023) focus on the contemporary period

[10] A 1.19 percentage point decline in survival between ages 31 and 80 corresponds to an average annual mortality gain of 0.02 percentage points. Survival is measured from age 19; the implied annual mortality is calculated as $1 - (1 - 0.0119)^{1/50} \approx 0.000239$. Relative to the average annual mortality rate of 1.5% in 1900, this corresponds to a 1.3% increase.

and find that a one-dollar increase in cigarette taxes at ages 14–17 reduces adult mortality by 4%, concentrated among men over 60. The cigarette bans we study were relatively short-lived compared to these policies.

Although we find that repeals of the bans and pseudo-repeals through enlistment in WWI accelerated initiation into cigarette use, we do not find increases in lifetime use. Overall, the policies we examine were less widespread and less intensively enforced than these later interventions, which may explain the absence of long-run mortality effects.

# 9 Discussion and Conclusion

In this paper, we establish that early 20th-century cigarette bans shaped smoking behavior. State-level repeals increased cigarette use before age 20 by 14.5% and before age 25 by 13.5%. We also explore the pseudo-repeal of cigarettes through World War I enlistment, when military service granted men access to cigarettes despite state bans. These repeals raised smoking initiation between ages 17—19 by 16.9%. Together, these repeals reveal the crucial role of regulation in shaping smoking behavior. The sharp rise in initiation following repeal emphasizes that cigarette bans effectively curbed smoking uptake.

These legal changes occurred in a period when the long-run health risks of tobacco were poorly understood. Because life expectancy was only 47 years and infectious disease posed a more immediate threat than smoking (National Center for Health Statistics, 2020), this setting allows us to study how regulation shapes behavior and health in an environment that predates the widespread recognition of smoking as the leading cause of preventable death in the United States (U.S. Department of Health, Education, and Welfare, 1964). We do not find that increased cigarette uptake driven by World War I enlistment translated into long-run mortality effects. Taken together, our findings demonstrate that cigarette access, shaped

by the legal environment, played a decisive role in smoking uptake. However, short-lived regulation was insufficient to affect long-term mortality.

The magnitude of these effects is substantial. The total population under the cigarette bans at age 19 was approximately 4.6 million. Based on our pseudo-repeal estimates, this implies that the bans prevented 153,000 men from initiating smoking before age 20.[11] The back-of-the-envelope calculation suggest that bans had meaningful effects on cigarette use.

By focusing on repeals, our study provides some of the first direct evidence that early cigarette prohibition laws had lasting consequences. Like modern excise taxes and minimum-age laws, repeals increased smoking initiation and worsened health outcomes. Though, the effect of cigarette bans emerged in a very different context, life expectancy was short, infectious disease posed the greater threat, and smoking's risks were poorly understood (Cutler and Glaeser, 2005). Yet despite weaker enforcement and limited knowledge, even short-lived bans measurably reduced smoking, showing that legal restrictions on harmful products can be effective even when individuals underappreciate the long-term risks.

Finally, our findings also speak to contemporary debates over prohibitions. Several countries have recently considered or adopted "tobacco-free generation" laws, which prohibit the sale of combustible tobacco to individuals born after a certain date, gradually creating *de facto* prohibition. The United Kingdom is currently considering such legislation, while New Zealand recently repealed its version, echoing the historical experience of U.S. states that initially banned cigarettes but later rescinded those laws. In the United States, localities such as Santa Cruz County, Beverly Hills, and Manhattan Beach have enacted bans on the sale of cigarettes and tobacco products. These modern bans and reversals parallel the U.S. experience a century ago, reinforcing the importance of our conclusion. Cigarette prohibition policies, even if short-lived, can meaningfully shape behavior, and their repeal can carry lasting con-

[11] Based on cohort population in ban states at age 19 from the 1% samples of Census data, 4,647,379 men were exposed to bans. 4,647,379 men exposed $\times$ 3.3pp effect on smoking by age 19 $=$ 153,364 fewer men smoking before age 20.

sequences.

# References


Abouk, R., P. De, and M. F. Pesko (2024). Estimating the effects of tobacco-21 on youth tobacco use and sales. *Journal of Health Economics 94*, 102860.

Alston, L. J., R. Dupré, and T. Nonnenmacher (2002). Social reformers and regulation: the prohibition of cigarettes in the united states and canada. *Explorations in Economic History 39*(4), 425–445.

Anderson, D. M. and D. I. Rees (2023, March). The public health effects of legalizing marijuana. *Journal of Economic Literature 61*(1), 86–143.

Bedard, K. and O. Deschênes (2006, March). The long-term impact of military service on health: Evidence from world war ii and korean war veterans. *American Economic Review 96*(1), 176–194.

Black, D. A., Y.-C. Hsu, and L. J. Taylor (2015). The effect of early-life education on later-life mortality. *Journal of Health Economics 44*, 1–9.

Blewett, L. A., J. A. Rivera Drew, M. Griffin, M. L. King, and K. C. W. Williams (2019). Ipums health surveys: National health interview survey, version 6.4. https://doi.org/10.18128/D070.V6.4. Minneapolis, MN: IPUMS.

Brandt, A. M. (2007). *The Cigarette Century: The Rise, Fall, and Deadly Persistence of the Product That Defined America*. New York: Basic Books.

Bureau of the Census (1936). *United States Life Tables: 1929-1931*. Washington, D.C.: U.S. Government Printing Office.

Callaway, B. and P. H. Sant'Anna (2021). Difference-in-differences with multiple time periods. *Journal of Econometrics 225*(2), 200–230. Themed Issue: Treatment Effect 1.

Centers for Disease Control and Prevention (2022). Cigarette smoking in the united states. Accessed: 2025-06-05.

Chaloupka, F. J. and K. E. Warner (2000). The economics of smoking. In A. J. Culyer and J. P. Newhouse (Eds.), *Handbook of Health Economics*, Volume 1B, pp. 1539–1627. Elsevier.

Cummings, K. M., A. Brown, and B. Philipson (2022). *History of the Evolution of Tobacco Products*, Chapter Chapter 1, pp. 1–47.

Cutler, D. M. and E. Glaeser (2005, May). What explains differences in smoking, drinking, and other health-related behaviors? *American Economic Review 95*(2), 238–242.

de Walque, D. (2010). Education, information, and smoking decisions. *Journal of Human Resources 45*(3), 682–717.

DeCicca, P., D. Kenkel, and M. F. Lovenheim (2022, September). The economics of tobacco regulation: A comprehensive review. *Journal of Economic Literature 60*(3), 883–970.

DeCicca, P. and L. McLeod (2008). Cigarette taxes and older adult smoking: Evidence from recent large tax increases. *Journal of health economics 27*(4), 918–929.

Deza, M. and A. Mezza (2025). The intergenerational effects of the vietnam draft on risky behaviors. *Journal of Labor Economics 43*(1), 247–292.

Dorn, H. F. (1959). Tobacco consumption and mortality from cancer and other diseases. *Public health reports 74*(7), 581.

Evans, W. N. and J. S. Ringel (1999). Can higher cigarette taxes improve birth outcomes? *Journal of public Economics 72*(1), 135–154.

Fang, H., M. Keane, A. Khwaja, M. Salm, and D. Silverman (2007, May). Testing the mechanisms of structural models: The case of the mickey mantle effect. *American Economic Review 97*(2), 53–59.

Farrelly, M. C., C. T. Nimsch, A. Hyland, and M. Cummings (2004). The effects of higher cigarette prices on tar and nicotine consumption in a cohort of adult smokers. *Health economics 13*(1), 49–58.

Ford, H. (1914). *The Little White Slaver*. Dearborn, MI: Dearborn Publishing Company.

Friedson, A., M. Li, K. Meckel, D. I. Rees, and D. W. Sacks (2023). Cigarette taxes, smoking, and health in the long run. *Journal of Public Economics 222*, 104877.

Friedson, A., M. Li, K. Meckel, D. I. Rees, and D. W. Sacks (2024). Exposure to cigarette taxes as a teenager and the persistence of smoking into adulthood. *Health Economics 33*(9), 1962–1988.

Gottsegen, J. J. (1940). *Tobacco: A Study Of Its Consumption In The United States*. Pitman Publishing Corporation.

Grossman, M. (1972). On the concept of health capital and the demand for health. *Journal of Political Economy 80*(2), 223–255.

Gruber, J. and B. Kőszegi (2004). Tax incidence when individuals are time-inconsistent: the case of cigarette excise taxes. *Journal of Public Economics 88*(9-10), 1959–1987.

Hansen, B., J. J. Sabia, D. McNichols, and C. Bryan (2023). Do tobacco 21 laws work? *Journal of Health Economics 92*, 102818.

Hoehn-Velasco, L., M. F. Pesko, and S. Phillips (2023). The long-term impact of in utero cigarette taxes on adult prenatal smoking. *American journal of health economics 9*(4), 605–648.

Hollingsworth, A., C. Wing, and A. C. Bradford (2022). Comparative effects of recreational and medical marijuana laws on drug use among adults and adolescents. *The Journal of Law and Economics 65*(3), 515–554.

Jacks, D. S., K. Pendakur, and H. Shigeoka (2021). Infant mortality and the repeal of federal prohibition. *The Economic Journal 131*(639), 2955–2983.

Jacks, D. S., K. Pendakur, and H. Shigeoka (2023). Urban mortality and the repeal of federal prohibition. *Explorations in Economic History 89*, 101529.

Jacks, D. S., K. Pendakur, H. Shigeoka, and A. Wray (2024). Later-life mortality and the repeal of federal prohibition. *Journal of Public Economics 238*, 105192.

Kahn, H. A. (1966). The dorn study of smoking and mortality among us veterans: report on eight and one-half years of observation. *Epidemiologic approaches to the study of cancer and other chronic diseases. National Cancer Institute Monograph 19*, 1–25.

Khwaja, A., D. Silverman, F. Sloan, and Y. Wang (2009). Are mature smokers misinformed? *Journal of Health Economics 28*(2), 385–397.

Kress, D. H. (1931). *The Cigarette As a Physician Sees It.* Mountain View, CA: Pacific Press Publishing Association.

Law, M. T. and M. S. Marks (2020). Did early twentiwth-century alcohol prohibition affect mortality. *Economic Inquiry 58*(2), 680–697.

Library of Congress (2024). Chronicling america: Historic american newspapers. https://www.loc.gov/collections/chronicling-america/about-this-collection/technical-information/. National Endowment for the Humanities and Library of Congress.

Lien, D. S. and W. N. Evans (2005). Estimating the impact of large cigarette tax hikes the case of maternal smoking and infant birth weight. *Journal of Human resources 40*(2), 373–392.

Lleras-Muney, A. (2005, 01). The relationship between education and adult mortality in the united states. *The Review of Economic Studies 72*(1), 189–221.

Meier, A. N., R. Odermatt, and A. Stutzer (2021). Tobacco sales prohibition and teen smoking. *Journal of Economic Behavior  Organization 188*, 998–1014.

Milmore, B. K. and A. G. Conover (1956). Tobacco consumption in the united states, 1880 to 1954. *Agricultural Economics Research 8*(1), 9–13.

National Cancer Institute (2007). U.S. Veterans Mortality Study. National Archives and Records Administration Catalog ID 1150924.

National Center for Health Statistics (2020). Life Expectancy in the U.S., 1900–2018. https://blogs.cdc.gov/nchs/2020/11/20/7035/. Accessed: April 14, 2025.

Nesson, E. (2017). Heterogeneity in smokers' responses to tobacco control policies. *Health economics 26*(2), 206–225.

O'Donoghue, T. and M. Rabin (2006). Optimal sin taxes. *Journal of Public Economics 90*(10-11), 1825–1849.

Pesko, M. and C. Saenz (2025). Pharmaceutical drug regulation and mortality: Evidence from e-cigarettes. Technical report.

Pesko, M. F. (2023). Effects of e-cigarette minimum legal sales ages on youth tobacco use in the united states. *Journal of Risk and Uncertainty 66*(3), 261–277.

Pesko, M. F., J. Hartmann-Boyce, R. Y. Fung, and N. L. Benowitz (2025). E-cigarettes in historical context—innovation, risk, and regulation. In *JAMA Health Forum*, Volume 6, pp. e254629–e254629. American Medical Association.

Rogot, E. (1974). *Smoking and general mortality among US veterans, 1954-1969*, Volume 74. Department of Health, Education and Welfare, Public Health Service, National ....

Ruggles, S., S. Flood, M. Sobek, D. Backman, G. Cooper, J. A. R. Drew, S. Richards, R. Rodgers, J. Schroeder, and K. C. W. Williams (2025). Ipums usa: Version 16.0 [dataset]. Minneapolis, MN: IPUMS.

Sechrist, R. P. (2012). Prohibition movement in the united states, 1801-1920. Inter-university Consortium for Political and Social Research [distributor].

Segrave, K. (2005). *Women and Smoking in America, 1880–1950*. Jefferson, NC: McFarland & Company.

Shopland, D. R. and D. M. Burns (1997). *Changes in cigarette-related disease risks and their implication for prevention and control*, Volume 8. National Institutes of Health, National Cancer Institute.

Tate, C. (1999). *Cigarette Wars: The Triumph of "The Little White Slaver"*. Oxford University Press.

Tobacco Control Blog (2023, February). Bhutan reverses sales ban on tobacco. https://blogs.bmj.com/tc/2023/02/01/bhutan-reverses-sales-ban-on-tobacco/. Accessed: 2025-08-18.

U.S. Commissioner of Internal Revenue (1980–1930). Annual report of the commissioner of internal revenue. U.S. Government Printing Office.

U.S. Department of Health and Human Services (2012). *Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

U.S. Department of Health and Human Services (2014). The health consequences of smoking—50 years of progress: A report of the surgeon general. Technical report, U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Na-

tional Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, Atlanta.

U.S. Department of Health, Education, and Welfare (1964). Smoking and health: Report of the advisory committee to the surgeon general of the public health service. Technical Report PHS 1103, U.S. Public Health Service, Washington, D.C. U.S. Government Printing Office.

Wing, C., S. M. Freedman, and A. Hollingsworth (2024, January). Stacked difference-in-differences. Working Paper 32054, National Bureau of Economic Research.

# 10 Tables and Figures

Table 1: Cigarette Prohibition Laws–Effective Date and Repeal Date

| State | Ban Effective | Ban Repealed |
|---|---|---|
| Arkansas | 1908 | 1921 |
| Florida | 1899 | 1903 |
| Idaho | 1921 | 1921[a] |
| Illinois | 1907 | 1907[b] |
| Indiana | 1905 | 1909 |
| Iowa | 1896 | 1921 |
| Kansas | 1909 | 1927 |
| Minnesota | 1909 | 1913 |
| Nebraska | 1905 | 1919 |
| North Dakota | 1913 | 1925 |
| Oklahoma | 1901 | 1915 |
| South Dakota | 1909 | 1917 |
| Tennessee | 1897 | 1921 |
| Utah | 1921 | 1923 |
| Washington | 1893/1907[c] | 1895/1911 |
| Wisconsin | 1905 | 1915 |

*Note:* Data compiled from State Session Laws and State Statutes on HeinOnline.
a. Ban was repealed the same month.
b. Declared unconstitutional by the Illinois Supreme Court and never came into effect (Gottsegen, 1940).
c. Ban enacted and repealed twice.

Table 2: Effect of Repeal of Cigarette Ban on Mentions of Cigarettes in Newspapers

| | (1) | (2) | (3) |
|---|---|---|---|
| | Cigarettes | Cigarettes—Excl. Legal | Cigarette Ads |
| Repeal | 5.300** | 2.660* | 0.424** |
| | (2.064) | (1.419) | (0.212) |
| Ban state mean in period −1 | 14.34 | 7.74 | 0.16 |
| Observations | 866 | 866 | 866 |

*Notes:* Table reports ATEs from estimating regressions analogous to Equation 1 using Callaway-Sant'Anna difference-in-differences. The outcome variables are state-level keyword mentions for (1) "cigarette" or "cigarettes"; (2) "cigarette" or "cigarettes", but excluding instances where "ban", "legislation", "unlawful", 'illegal", "enact", "repeal", or "law" are also present; and (3) "lucky strike cigarettes", "camel cigarettes", 'chesterfield cigarettes", "sweet caporal cigarettes", "fatima cigarettes", "piedmont cigarettes", and "helmar cigarettes". The event is the repeal of cigarette bans. Regressions are unweighted. Standard errors clustered at the state level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3: Effect of WWI Enlistment on Cigarette Use
Effect Captures a Pseudo-Repeal of Cigarette Ban

| | (1) | (2) | (3) |
|---|---|---|---|
| | Started cigarette-use between 15–19 | Started cigarette-use between 20–24 | Started cigarette-use between 25–29 |
| Ages 17–19 in 1917 | 0.0315** | -0.00592 | 0.0108 |
| × Ban State 1917 | (0.0124) | (0.0123) | (0.00783) |
| Ages 20–24 in 1917 | | 0.0232*** | 0.0119 |
| × Ban State 1917 | | (0.00830) | (0.00726) |
| Ages 25–29 in 1917 | | | 0.0224*** |
| × Ban State 1917 | | | (0.00723) |
| Observations | 170,204 | 170,204 | 170,204 |
| Ban State Pre-WWI Mean | 0.233 | 0.158 | 0.0270 |

*Notes:* Table reports coefficients from estimating Equations 2–4 using TWFE. The outcome variables are indicators for respondents who reported starting cigarette use at ages 15–19, 20–24, and 25–29, respectively. Regressions control for state FE, cohort FE, census-region-by-cohort FE, and state-level alcohol prohibition. The estimation sample includes all respondents ages 17–45 in 1917 who likely served in WWI. Regressions are unweighted. Standard errors are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Later-Life Mortality Effects from Cigarette Access through WWI Enlistment

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| VARIABLES | Ages 31–80 | Ages 31–40 | Ages 41–50 | Ages 51–60 | Ages 61–70 | Ages 71–80 |
| *Panel A: Male* | | | | | | |
| Age 17+ in 1917 × Ban State 1917 | 0.00183 | -0.00460 | 0.00338 | 0.00973 | 0.00294 | -0.00233 |
| | (0.00682) | (0.00876) | (0.00793) | (0.00993) | (0.00686) | (0.00476) |
| Observations | 49,000 | 9,800 | 9,800 | 9,800 | 9,800 | 9,800 |
| *Panel B: Female* | | | | | | |
| Age 17+ in 1917 × Ban State 1917 | 0.00266 | 1.74e-05 | 0.00811 | 0.00677 | -0.00424 | 0.00267 |
| | (0.0127) | (0.0117) | (0.0123) | (0.0166) | (0.0146) | (0.0103) |
| Observations | 49,000 | 9,800 | 9,800 | 9,800 | 9,800 | 9,800 |

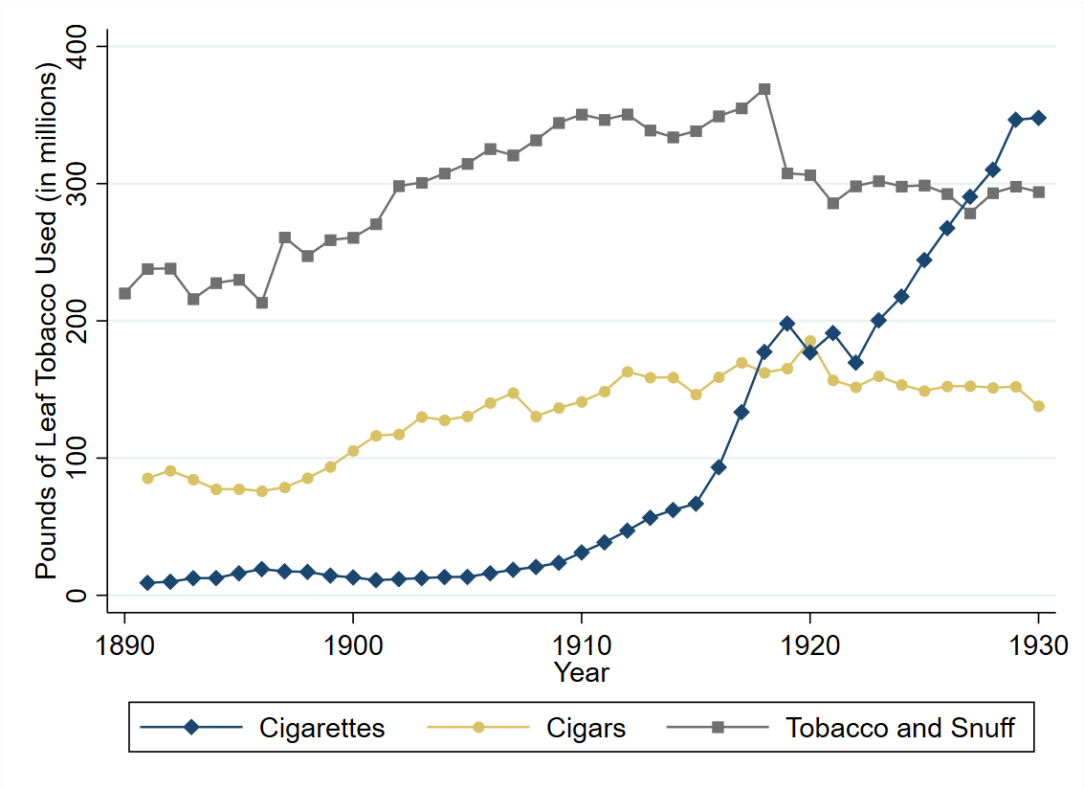
*Notes:* Table reports coefficients from estimating Equation 5 using TWFE. The outcome variable is survival rate, defined as the population count in each state-of-birth by year-of-birth cell at ages 31–80 divided by the population count at age 19. Regressions control for state FE, cohort FE, age FE, and state-by-year FE. The estimation sample includes cohorts born in the U.S. between 1890–1910. Regressions are weighted by cohort population at 19. Standard errors clustered at the state level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 5: Tests for Selective Migration by Exposure to Cigarette Bans

| | (1) | (2) |
|---|---|---|
| VARIABLES | Migrated | Migrated from non-ban state |
| *Panel A: Repeal by Age 19* | | |
| Repeal | -0.0176 | -0.0179 |
| | (0.0162) | (0.0156) |
| Observations | 477,496 | 477,496 |
| *Panel A: Repeal by Age 24* | | |
| Repeal | -0.0256 | -0.0309 |
| | (0.0221) | (0.0231) |
| Observations | 321,054 | 321,054 |

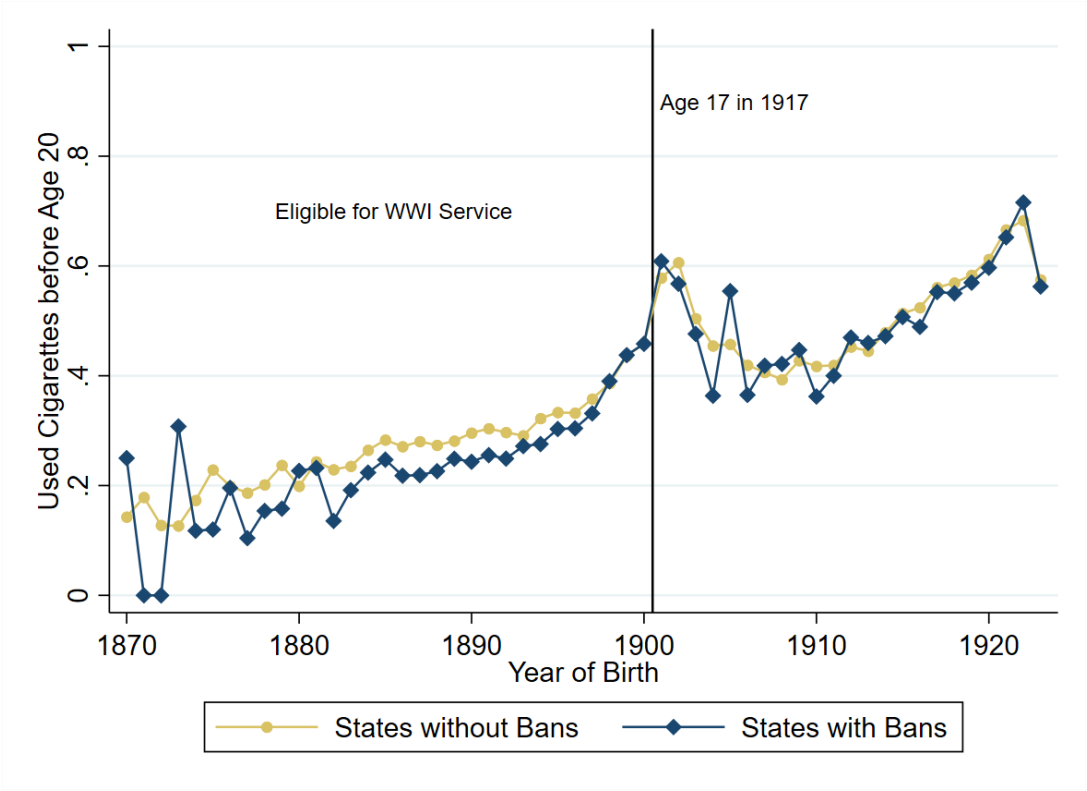
*Notes:* Table reports ATEs from estimating Equation 1 using Callaway-Sant'Anna difference-in-differences. The outcome variables are indicator variables for an individual being born in a different place than his state of residence, and an individual being born in a different place than his state of residence, and his state of birth not having had a cigarette ban. The estimation sample includes men born in the U.S. between 1873–1911. Regressions use sample weights. Standard errors clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1.

Figure 1: National Production of Tobacco by Type of Tobacco Product




*Notes:* Data from the Reports of the Commissioner of Internal Revenue. Shows the production of each tobacco product–cigarettes, cigars, and tobacco/snuff over time.

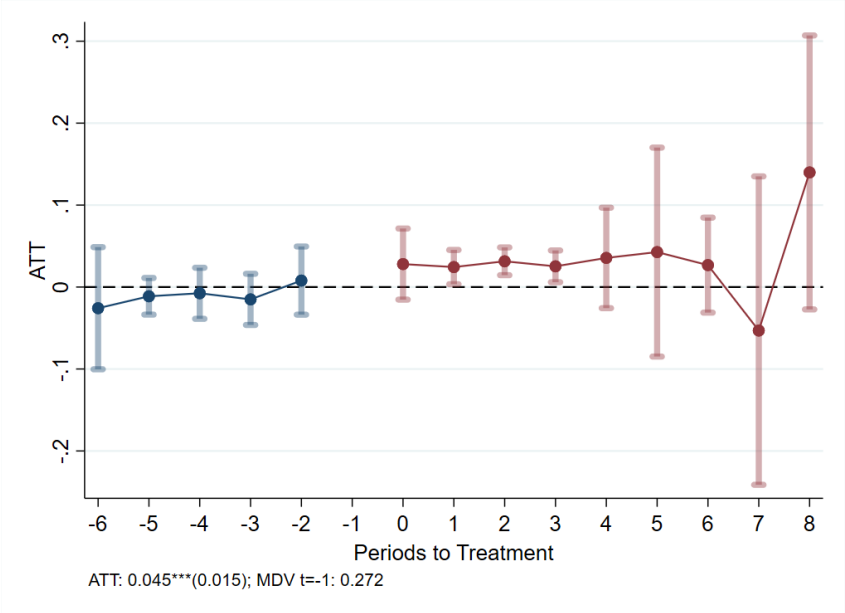
Figure 2: Cigarette Use before Age 20 by State-level Cigarette Bans



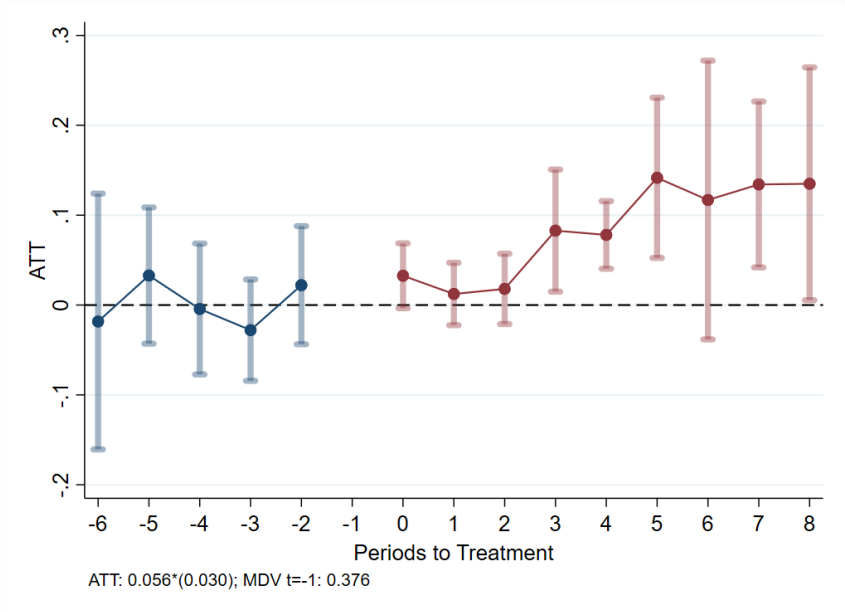

*Notes:* Data from the U.S. Veterans Mortality Study. Lines plot the fraction of respondents from each birth year who reported starting cigarette use before age 20, for states that did and did not have cigarette bans.

Figure 3: Repeals of Cigarette Bans and Cigarette Use

(a) Repeal before age 20

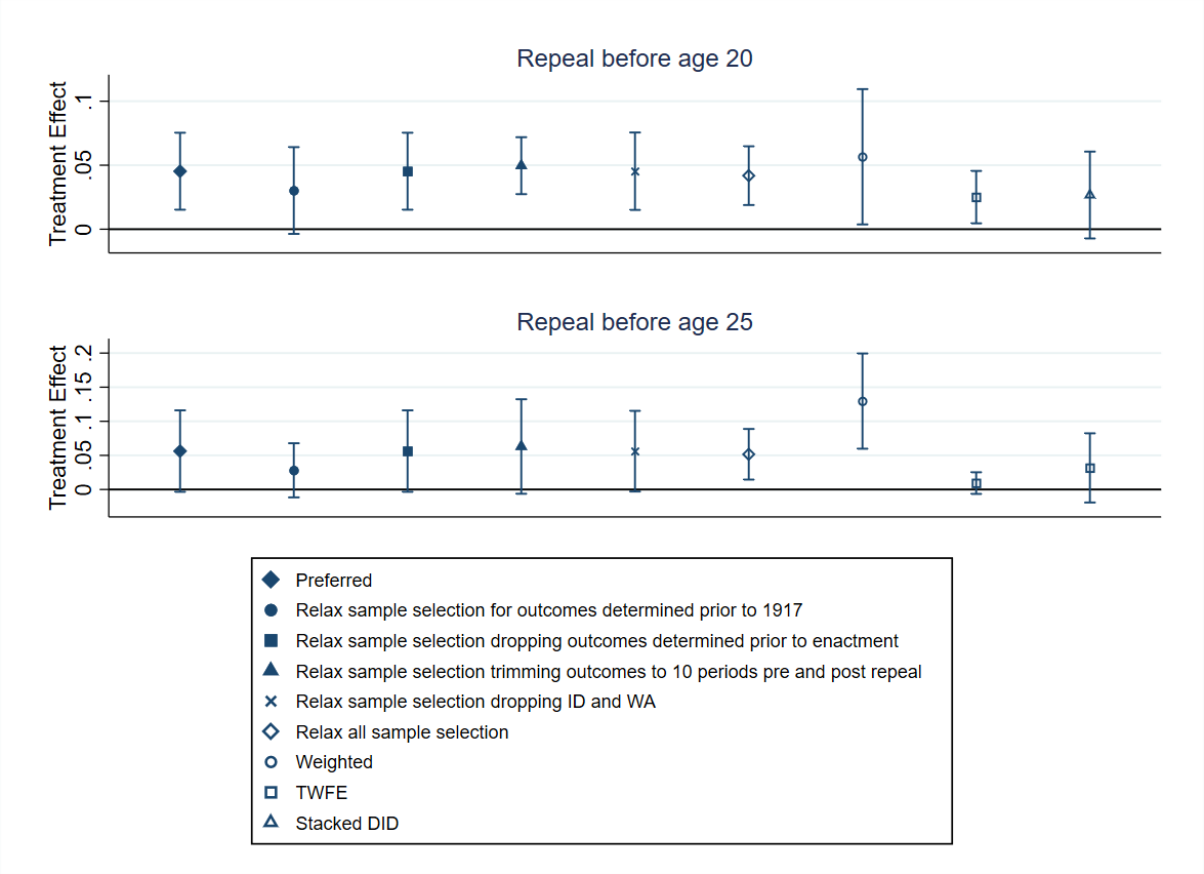



(b) Repeal before age 25



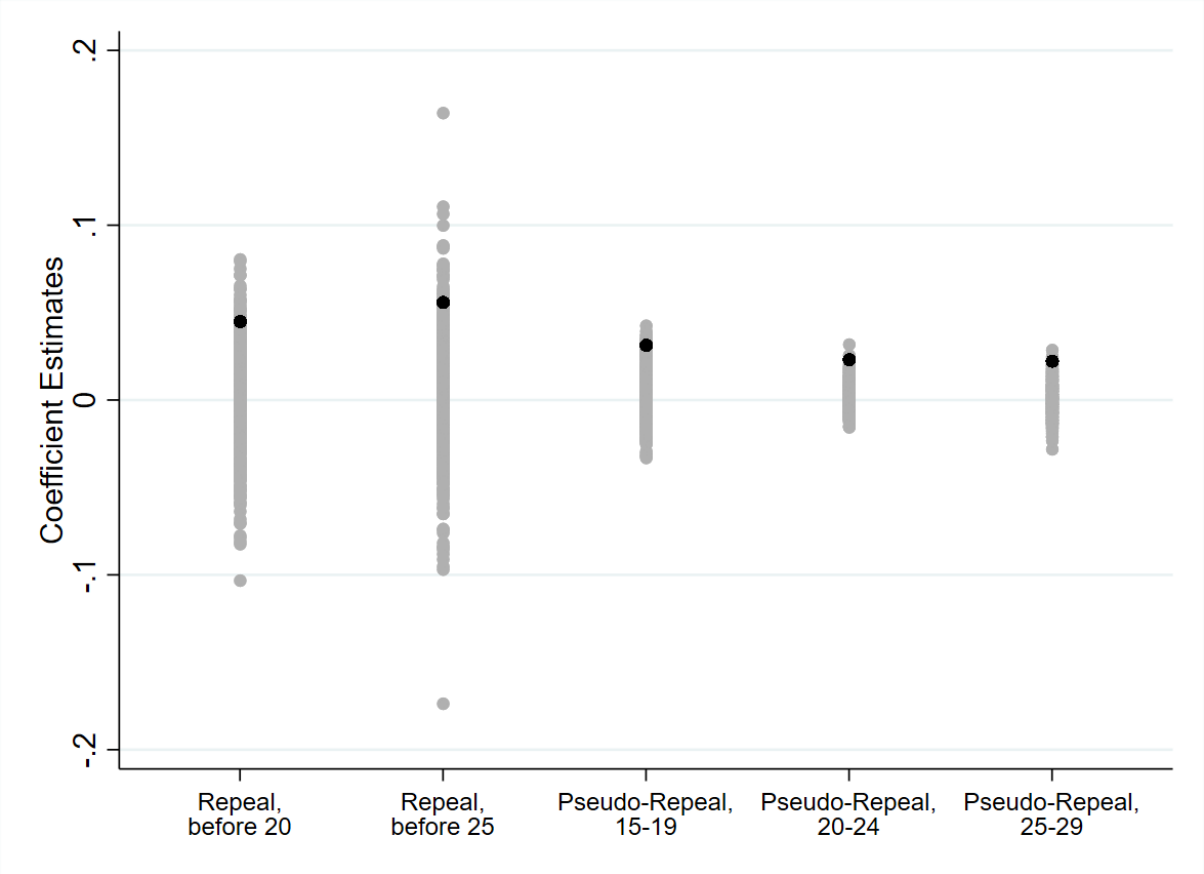

*Notes:* Figure plots coefficients from estimating Equation 1 using Callaway-Sant'Anna difference-in-differences. The outcome variables are indicators for cigarette use before ages 20 and 25, and the events are repeal of cigarette bans before ages 20 and 25, respectively. Regressions control for teenage exposure to alcohol prohibition and are unweighted. The omitted period is $-1$, the period before cigarette bans are repealed. Circles represent the beta coefficient estimates, and vertical lines indicate 95% confidence intervals that account for within-state clustering.

Figure 4: Repeals of Cigarette Bans and Cigarette Use: Robustness to Samples and Specifications




*Notes:* Figure plots coefficients from estimating Equation 1 using Callaway-Sant'Anna difference-in-differences. The outcome variables are indicators for cigarette use before ages 20 and 25, and the events are repeal of cigarette bans before ages 20 and 25, respectively. Regressions control for teenage exposure to alcohol prohibition and are unweighted The omitted period is $-1$, the period before cigarette bans are repealed. Specifications are indicated in the legend. Markers represent the ATT from separate regressions, vertical lines indicate 95% confidence intervals that account for within-state clustering.

Figure 5: Effect of Repeals on Cigarette Use: Placebo Simulations




*Notes:* Figure plots in gray the coefficients from 500 placebo simulations for the regressions shown in Figure 3 and Table 3, in which repeal dates are randomly reassigned across states. The true coefficient estimate is overlaid in black.

# Appendix

# A Supplementary Tables and Figures

Table A.1: Long Run Effect of Enlistment on Smoking and Cigarette Use

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | Started Ever | Max 10 per day | Max 20 per day |
| Ages 17–19 in 1917 × Ban State 1917 | 0.0197 | 0.0241 | 0.0147 |
| | (0.0215) | (0.0287) | (0.0180) |
| Ages 20–24 in 1917 × Ban State 1917 | 0.00710 | 0.0105 | 0.00123 |
| | (0.0211) | (0.0236) | (0.0164) |
| Ages 25–29 in 1917 × Ban State 1917 | 0.0135 | 0.0114 | 0.00547 |
| | (0.0152) | (0.0214) | (0.0159) |
| Observations | 170,204 | 153,553 | 153,553 |
| Ban State Pre-WWI Mean | 0.585 | 0.354 | 0.0920 |

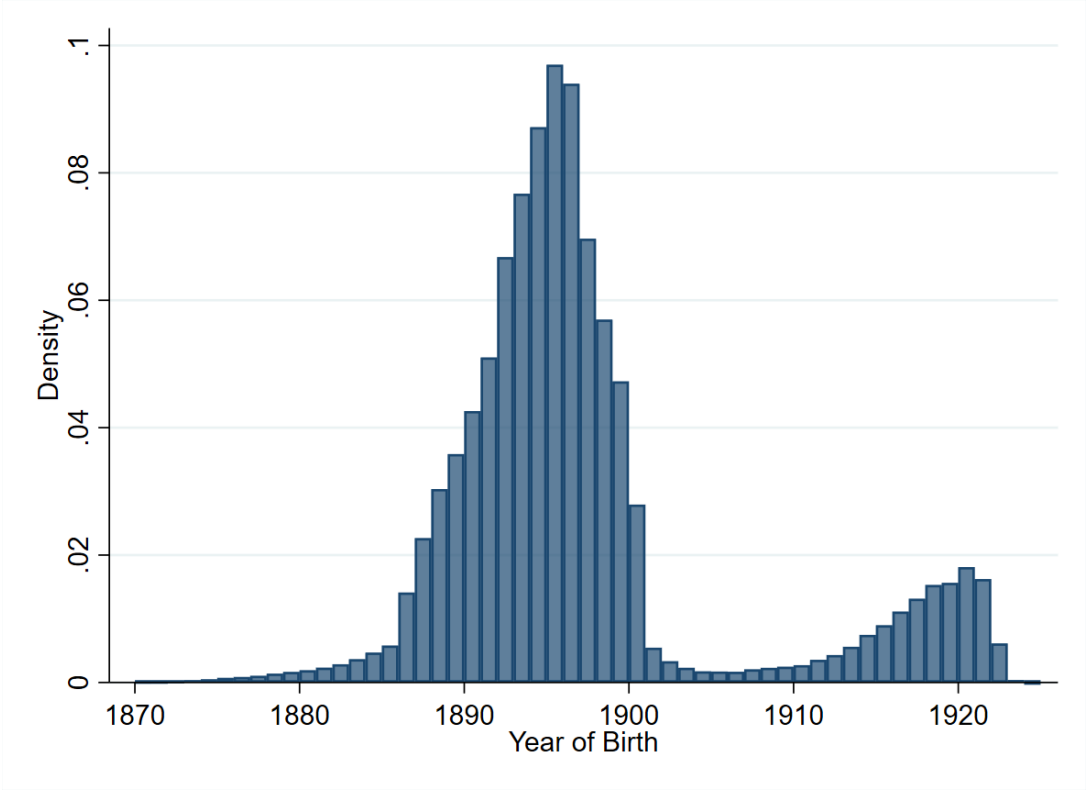
*Notes:* Table reports coefficients from estimating the analogous of Equation 4 using TWFE. The outcome variables are indicators for respondents ever using cigarettes, ever using over 10 cigarettes per day, and ever using over 20 cigarettes per day. Regressions control for state-level alcohol prohibition. The estimation sample includes all respondents ages 17–45 in 1917 who likely served in WWI. Standard errors clustered at the state level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A.2: Alternative Specifications: Effect of Enlistment on Cigarette Use

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Panel A: Started Smoking Between Ages 15–19* | | | | |
| Ages 17–19 in 1917 x Ban in 1917 | 0.0437** | 0.0469*** | 0.0315** | 0.0199 |
| | (0.019) | (0.017) | (0.012) | (0.012) |
| N | 170,204 | 170,204 | 170,204 | 36,412 |
| Ban State Pre-WWI Mean | 0.23 | 0.23 | 0.23 | 0.23 |
| *Panel B: Started Smoking Between Ages 20–24* | | | | |
| Ages 20–24 in 1917 x Ban in 1917 | 0.0293*** | 0.0300*** | 0.0232*** | 0.0131 |
| | (0.010) | (0.010) | (0.008) | (0.010) |
| N | 170,204 | 170,204 | 170,204 | 36,412 |
| Ban State Pre-WWI Mean | 0.16 | 0.16 | 0.16 | 0.16 |
| *Panel C: Started Smoking Between Ages 25–29* | | | | |
| Ages 25–29 in 1917 x Ban in 1917 | 0.0216*** | 0.0215*** | 0.0224*** | 0.00341 |
| | (0.006) | (0.006) | (0.007) | (0.010) |
| N | 170,204 | 170,204 | 170,204 | 36,412 |
| Ban State Pre-WWI Mean | 0.03 | 0.03 | 0.03 | 0.03 |
| State & YOB FE | Yes | Yes | Yes | Yes |
| Controls | No | Yes | Yes | Yes |
| Region-by-YOB FE | No | No | Yes | Yes |
| Sample | All states | All states | All states | Ever-treated states |

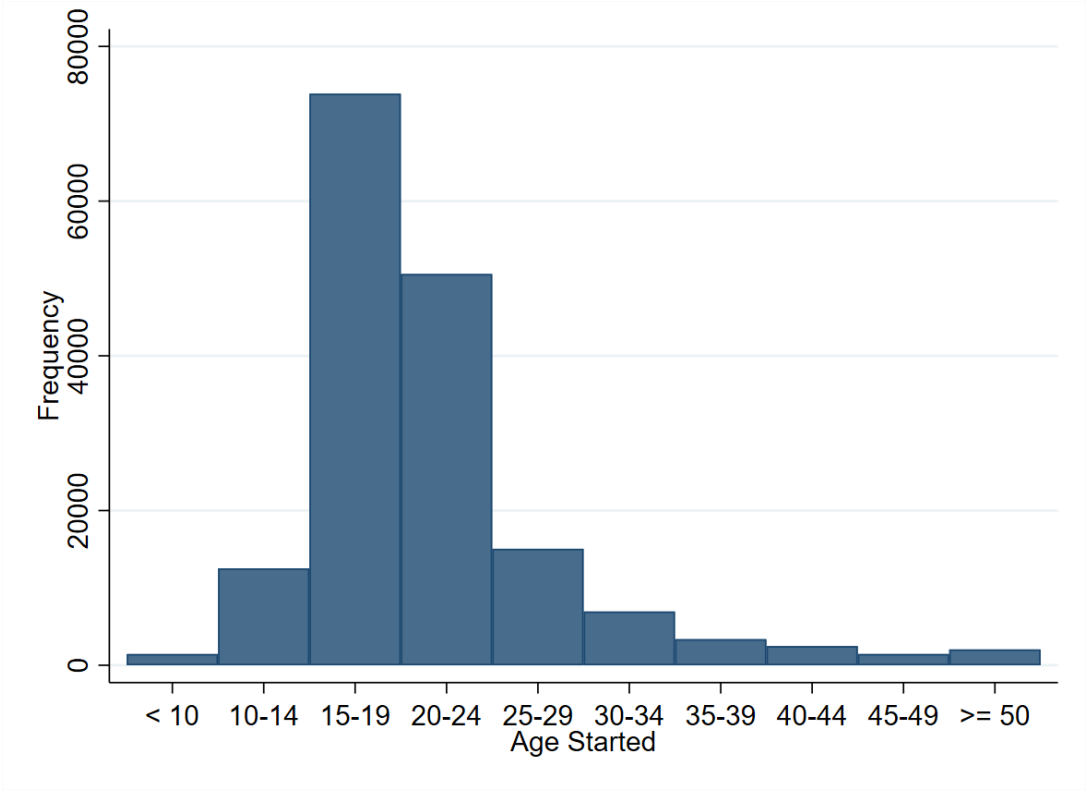
*Notes:* Table reports coefficients from estimating Equations 2–4 using TWFE. The outcome variables in Panels A, B, and C are indicators for respondents who reported starting cigarette use at ages 15–19, 20–24, and 25–29, respectively. Regressions control for state-level alcohol prohibition. The estimation sample includes all respondents ages 17–45 in 1917 who likely served in WWI. Standard errors clustered at the state level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Figure A.1: Year of Birth for the Dorn Study Sample Cohorts



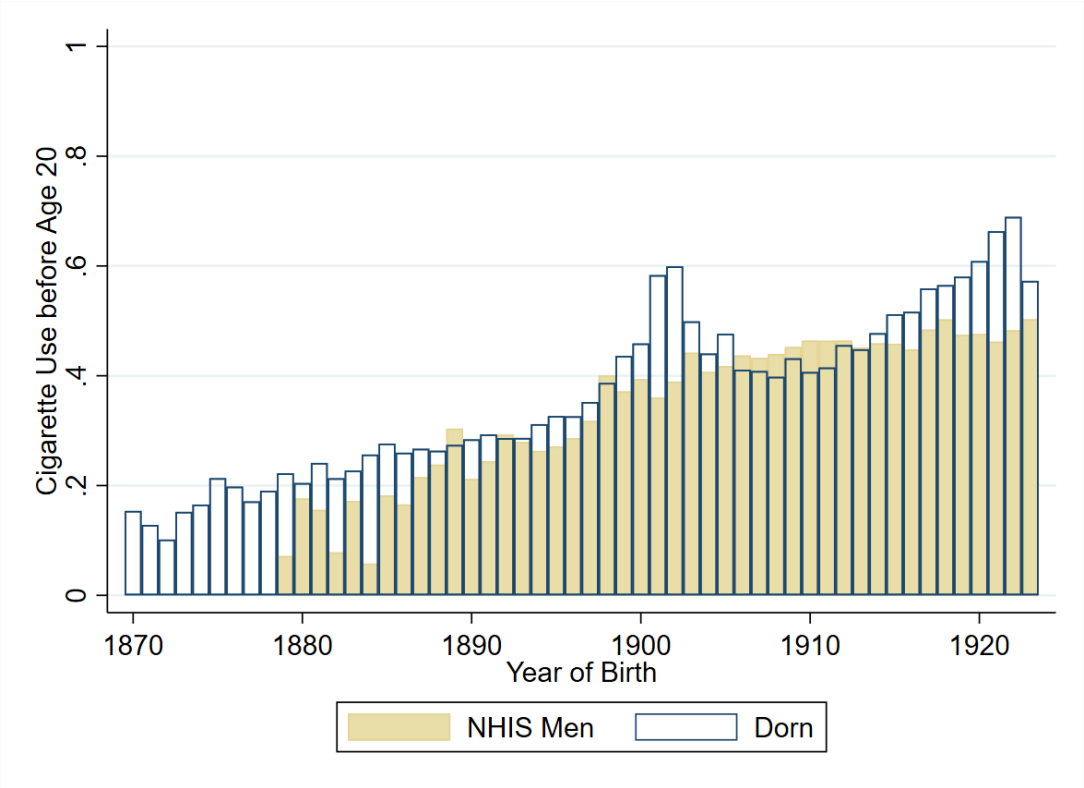

*Notes:* Data from the U.S. Veterans Mortality Study or the Dorn Study. Shows the distribution of the sample cohorts' birth years.

Figure A.2: Age Initiated Smoking in the Dorn Study



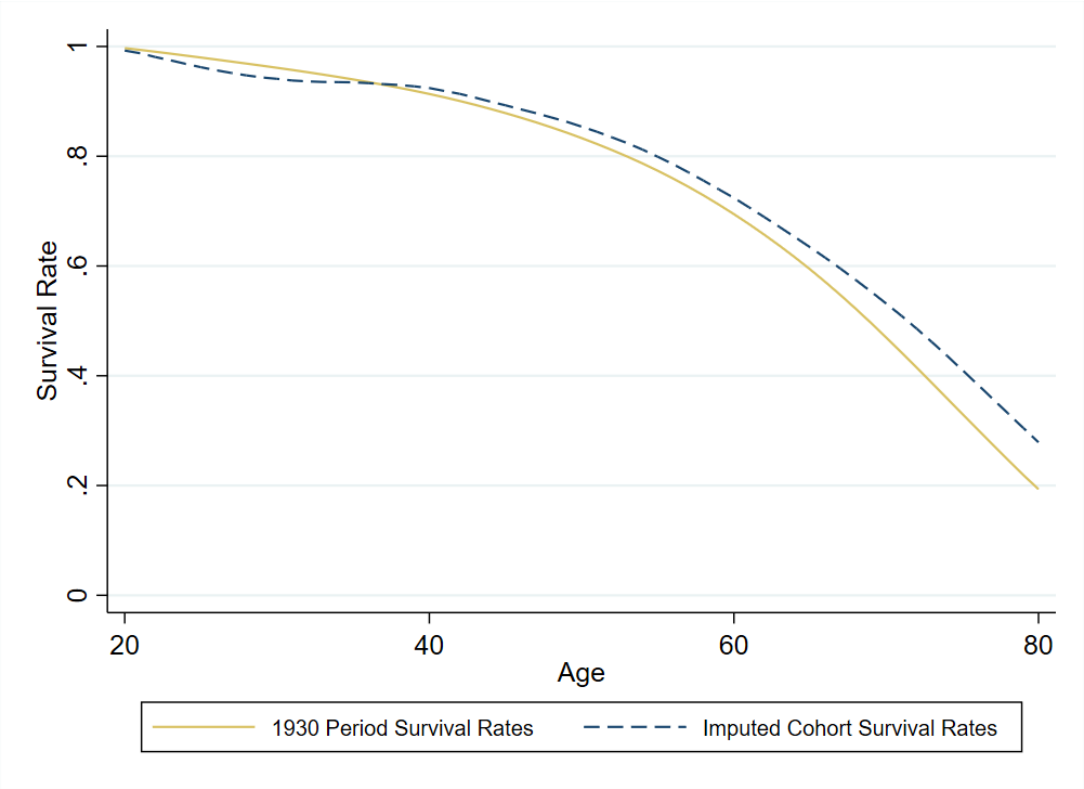

*Notes:* Data from the U.S. Veterans Mortality Study or the Dorn Study. Bars plot the number of respondents who reported starting cigarette use during each age range.

Figure A.3: Cigarette Use before Age 20, Dorn Data and NHIS



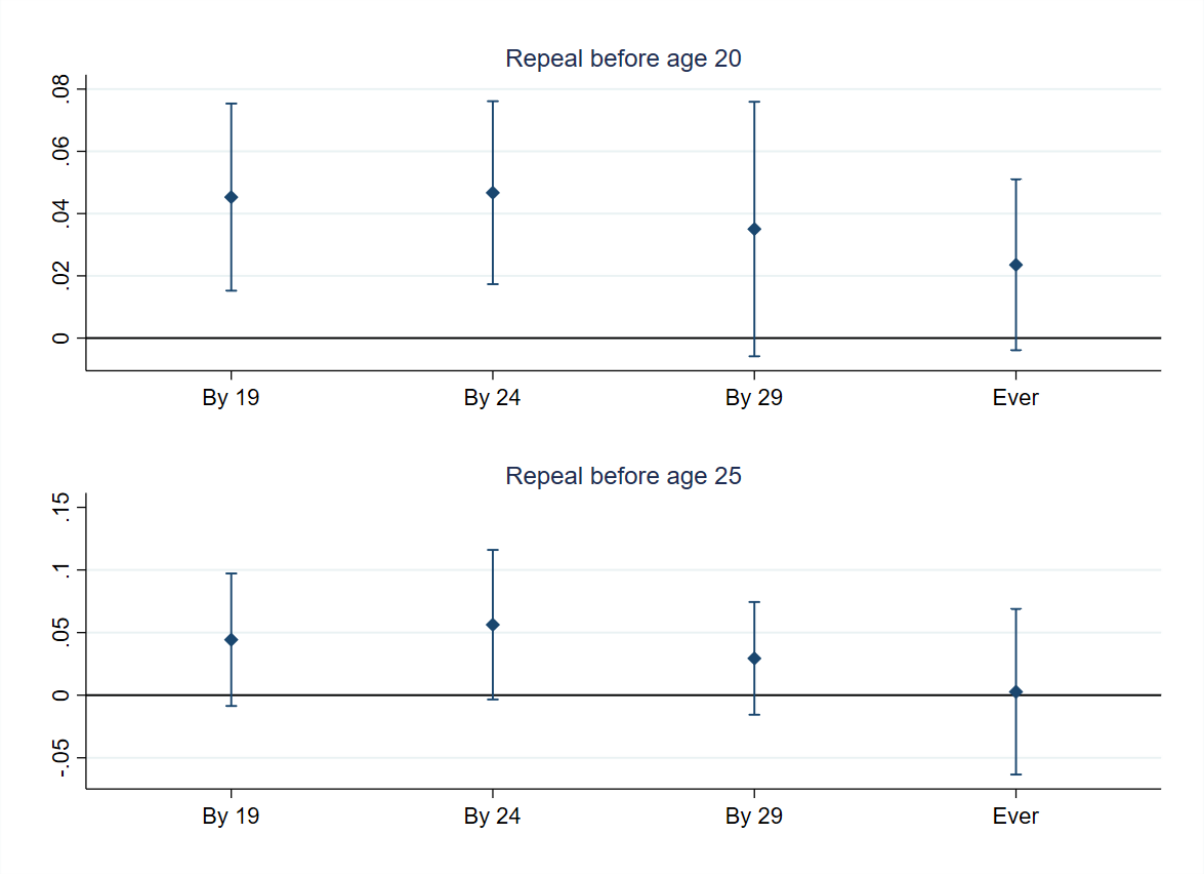

*Notes:* Data from the U.S. Veterans Mortality Study and the National Health Interview Survey. Bars plot the fraction of respondents from each birth year who reported starting cigarette use before age 20.

Figure A.4: Imputed Cohort Survival Profile vs. 1930 Period Survival Profile



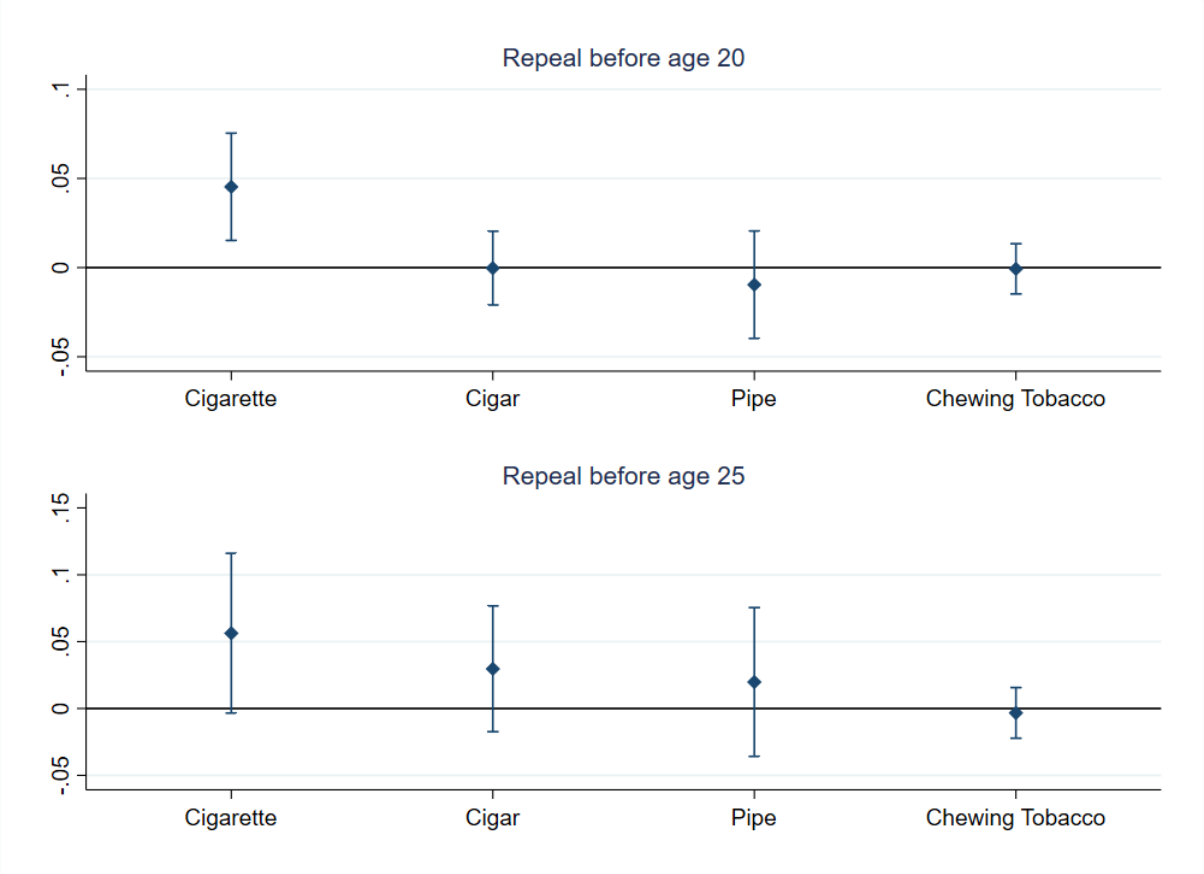

*Notes:* 1930 period survival rates are for white males from Bureau of the Census (1936). Imputed cohort survival rates from 1870–2000 Census, sample includes men born in the contiguous U.S between 1890–1910, weighted by population.

Figure A.5: Repeal of Cigarette Bans and Cigarette Use



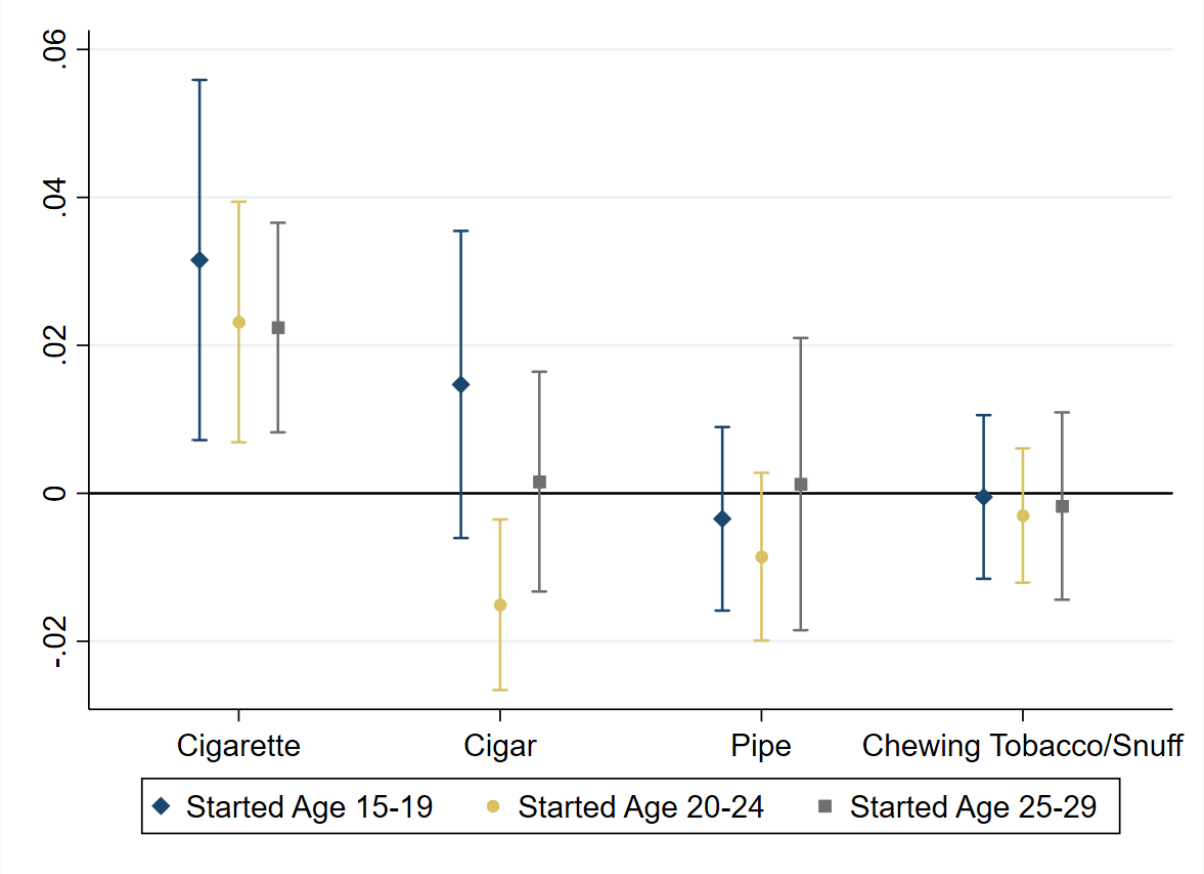

*Notes:* Figure plots coefficients from estimating Equation 1 using Callaway-Sant'Anna difference-in-differences. The outcome variables are indicators for cigarette use before ages 20, 25, 30, and ever, and the events are repeal of cigarette bans before ages 20 and 25, respectively. Regressions control for teenage exposure to alcohol prohibition. The omitted period is −1, the period before cigarette bans are repealed. Circles represent the beta coefficient estimates, and vertical lines indicate 95% confidence intervals that account for within-state clustering.

Figure A.6: Repeal of Cigarette Bans and Other Tobacco Use



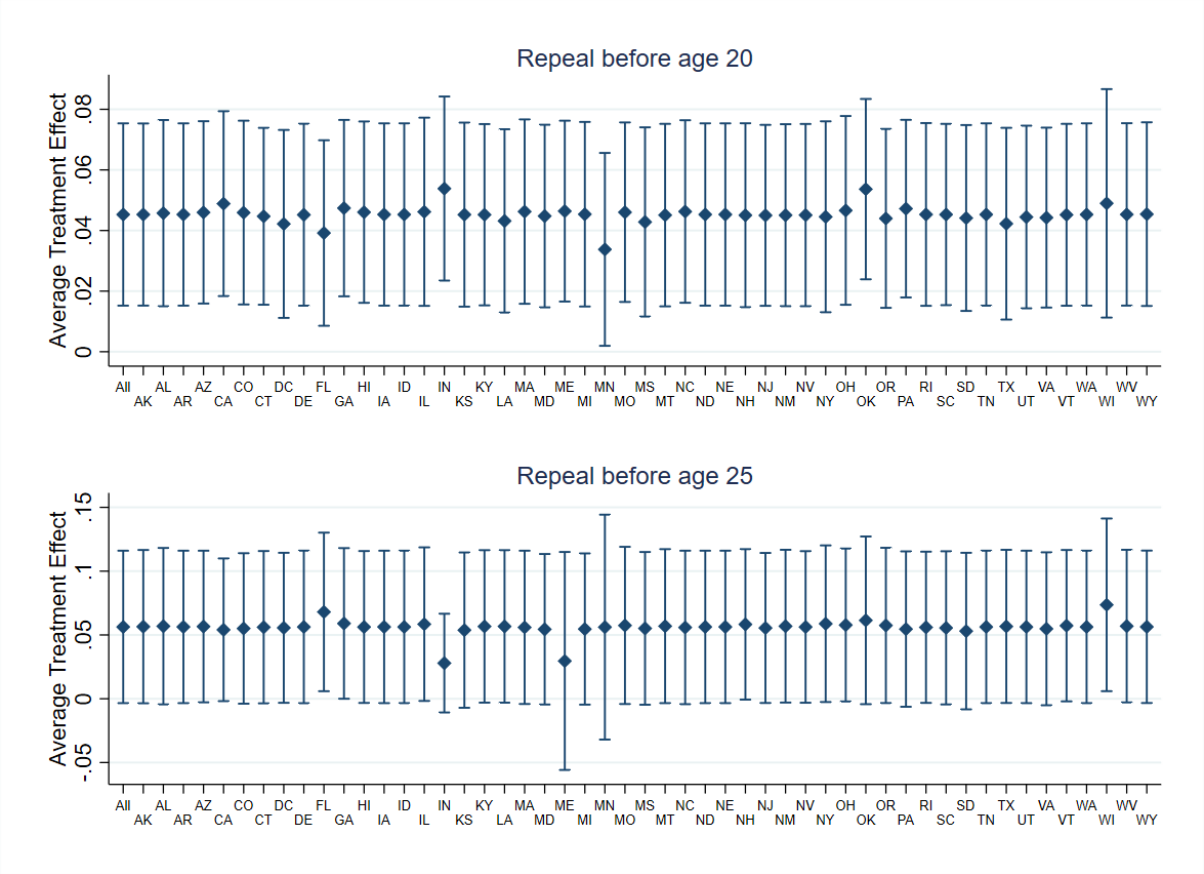

*Notes:* Figure plots coefficients from estimating Equation 1 using Callaway-Sant'Anna difference-in-differences. The outcome variables are indicators for cigarette, cigar, pipe, and chewing tobacco or snuff use before ages 20 and 25, and the events are repeal of cigarette bans before ages 20 and 25, respectively. Regressions control for teenage exposure to alcohol prohibition. The omitted period is −1, the period before cigarette bans are repealed. Circles represent the beta coefficient estimates, and vertical lines indicate 95% confidence intervals that account for within-state clustering.

Figure A.7: Effect of Enlistment on Other Tobacco Use



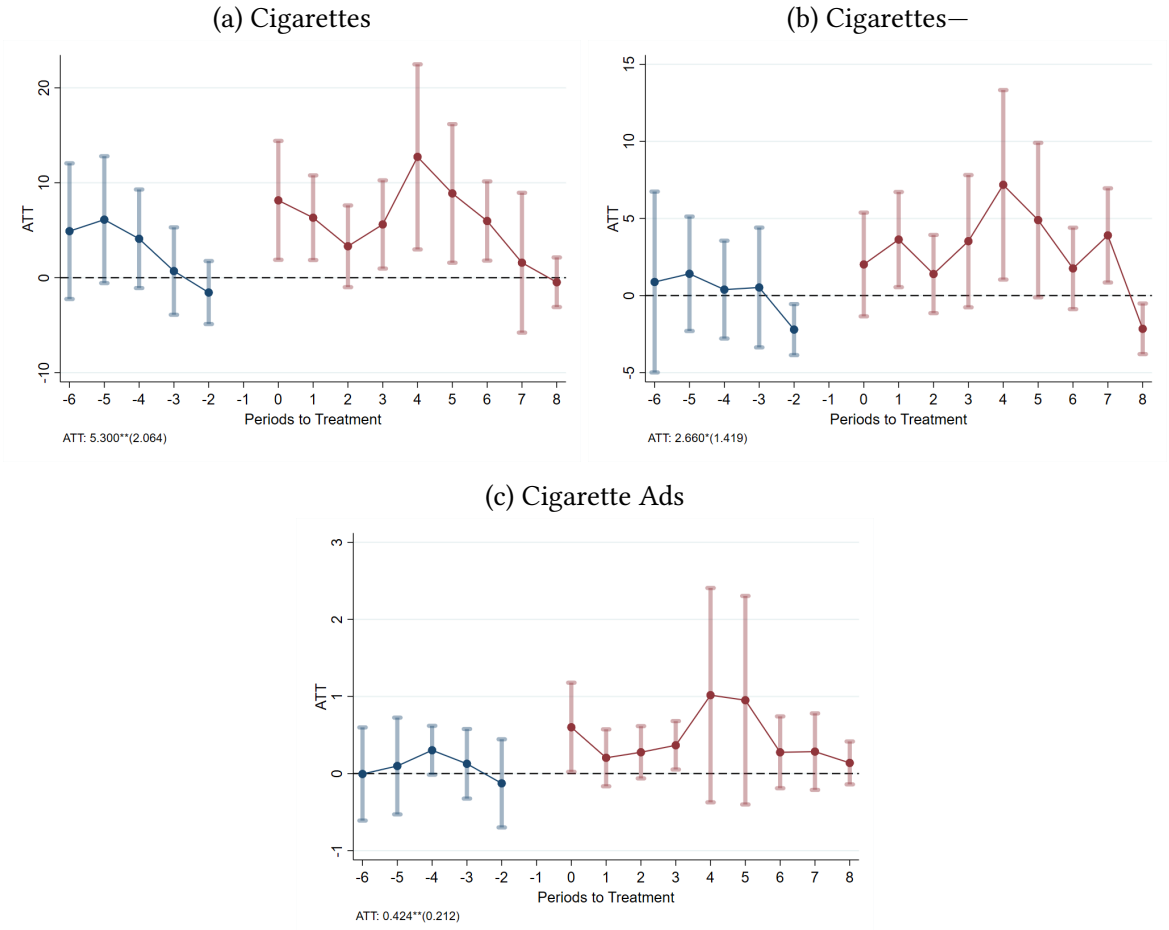

*Notes:* Figure plots coefficients from estimating Equations 2–4 using TWFE. The outcome variables are indicators for respondents who reported starting cigarette, cigar, pipe, or chewing tobacco use at ages 15–19, 20–24, and 25–29, respectively. Regression control for state FE, cohort FE, census-region-by-cohort FE, and state-level alcohol prohibition. The estimation sample includes all respondents ages 17–45 in 1917 who likely served in WWI. Regressions are unweighted. Standard errors are clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1.

Figure A.8: Repeal of Cigarette Bans and Cigarette Use: Leave-One-Out




*Notes:* Figure plots coefficients from estimating Equation 1 using Callaway-Sant'Anna difference-in-differences. The outcome variables are indicators for cigarette use before ages 20 and 25, and the events in panels (a) and (b) are repeal of cigarette bans before ages 20 and 25, respectively. Regressions control for teenage exposure to alcohol prohibition. Markers represent the ATT from separate regressions excluding each state from the estimation sample, vertical lines indicate 95% confidence intervals that account for within-state clustering.

Figure A.9




*Notes:* Figure plots coefficients from estimating regressions analogous to Equation 1 using Callaway-Sant'Anna difference-in-differences. The outcome variables are state-level keyword mentions for cigarettes, cigarettes excluding legislation, and cigarette brands. The event is the repeal of cigarette bans. Regressions control for state-level alcohol prohibition. The omitted period is −1, the period before cigarette bans are repealed. Circles represent the beta coefficient estimates, and vertical lines indicate 95% confidence intervals that account for within-state clustering.

# B Cigarette Prohibition Laws

Table B.3: Legal Text for Enactment and Repeal of Cigarette Prohibition Laws

| State | Legislation | Source | Legal Text |
|---|---|---|---|
| Arkansas | Enactment | Acts of 1907, No. 280 | "It shall be unlawful for any person, firm or corporation acting either as principal or agent to sell, give away, or offer for sale or to give away or to have in possession on or about their premises for the purpose of selling or giving away or to make or manufacture, to attempt to make or manufacture or to [in] any way assist in making or manufacturing for the purpose of selling or giving away any cigarette, cigarettes or cigarette wrappers or papers to any person or persons." |
| | Repeal | Acts of 1921, No. 490 | "It shall be unlawful for any person to sell, barter or give away cigarettes or cigarette papers in the original retail package in the State of Arkansas **without first obtaining a license** to conduct such business from the State Board of Health; provided, that any person operating more than one such place of business as herein mentioned shall procure a license for each such place of business." |
| Florida | Enactment | Laws of Florida, Chapter 4732 | "The manufacture or sale of cigarettes or cigarette paper in any form is hereby prohibited within the State of Florida." |
| | Repeal | Laws of Florida, Chapter 5149 | "It shall be unlawful to sell, barter, exchange or give to **any minor under eighteen years of age** any cigarettes or cigarette tobacco or cigarette paper, or any substitute for either of them, and any person who violates any of the provisions of this act shall be guilty of a misdemeanor..." |

| | | | |
|---|---|---|---|
| Idaho | Enactment | Laws of 1921, Chapter 185 | "It shall not be lawful for any merchant, trader, peddler, pharmacist, druggist, apothecary, or any other person or persons, male or female, in this state, with or without a license, to import for sale, or to have in his possession for sale or to sell by wholesale or retail, or give away, directly or indirectly, to any person or persons, male or female, within the State of Idaho, cigarettes for smoking, or any cigarette papers or wrappers, or any paper made or prepared for the purpose of making cigarettes, or the compounds of tobacco used in the filling or makeup of cigarettes." |
| | Repeal | Laws of 1921, Chapter 262 | "Any person, firm or corporation bartering, selling or having in possession for sale, any cigars, cigarettes, smoking tobacco, chewing tobacco or any tobacco or product or compound of tobacco in any form, or any cigarette papers or wrappers, or any paper prepared or made for the purpose of making cigarettes, **without having previously secured from the Commissioner of Law Enforcement of the State of Idaho a license permitting the same**, as hereinafter provided, and without having such a license conspicuously displayed at the place where goods, wares or merchandise of the above enumerated kinds or descriptions are bartered, sold or kept for sales, is guilty of a misdemeanor..." |
| Illinois | Enactment | Acts of 1907, Senate Bill No. 82 | "That every person who shall manufacture, sell or give away any cigarette containing any substance deleterious to health, including tobacco, shall be punished by a fine not exceeding one hundred dollars ($100), or by imprisonment in the county jail for a period not to exceed thirty (30) days." |
| | Unconstitutional | New York Times, December 19, 1907 | "The Supreme Court to-day declared the anti-cigarette law, passed by the last Legislature, unconstitutional on technical grounds. The law prohibited the sale of cigarettes." |

| | | | |
|---|---|---|---|
| Indiana | Enactment | Laws of 1905, Chapter 52 | "That it shall be unlawful for any person, by himself, clerk, servant, employe or agent, directly or indirectly, upon any pretense or by any device, to manufacture, sell, exchange, barter, dispose of or give away, or keep for sale, any cigarettes, cigarette paper or cigarette wrappers, or any paper made or prepared for the purpose of being filled with tobacco for smoking; or keep or own, or be in any way concerned, engaged or employed in owning or keeping any such cigarettes, cigarette paper or wrappers, and any person for violation of the same shall be guilty of a misdemeanor..." |
| | Repeal | Laws of 1909, Chapter 28 | "It shall be unlawful for any person, by himself, clerk, servant, employe, or agent, directly or indirectly, upon any pretense or by any device, to sell, exchange, barter, dispose of or give away, or keep for sale, to any minor, any cigarettes, cigarette paper or cigarette wrappers, or any paper made or prepared for the purpose of being filled with tobacco for smoking; or keep or own, or be in any way concerned, engaged or employed in owning or keeping any such cigarettes, cigarette paper or wrappers, for sale **to minors**, and any person for violation of the same shall be guilty of a misdemeanor..." |

| | | | |
|---|---|---|---|
| Iowa | Enactment | Laws of 1896, Chapter 96 | "No one, by himself, clerk, servant, employe, or agent, shall, for himself of any person else, directly or indirectly, or upon any pretense, or by any device, manufacture, sell, exchange, barter, dispense, give in the consideration of the purchase of any property, or of any services, or in evasion of the statute, or keep for sale any cigarettes, or cigarette paper, or cigarette wrappers, or any paper made or prepared for the purpose of making cigarettes, or for the purpose of being filled with tobacco for smoking; or own, or keep, or be in any way concerned, engaged or employed, in owning or keeping any such cigarettes or cigarette paper, or wrappers with intent to violate any provision of this chapter; or authorize or permit the same to be done." |
| | Repeal | Laws of 1921, Chapter 203 | "Any person who shall furnish to **any minor under twenty-one years of age**, by gift, sale or otherwise, any cigarette or cigarette paper or wrapper, or any paper made or prepared for the purpose of making cigarettes, shall be guilty of a misdemeanor." |
| Kansas | Enactment | Session Laws of 1909, Chapter 257 | "It shall be unlawful for any person, company or corporation to sell or give away any cigarettes or cigarette papers or to have any cigarettes or cigarette papers in or about any store or other place for free distribution or sale." |
| | Repeal | Session Laws of 1927, Chapter 171 | "It shall be unlawful for any person, company or corporation to sell or give away to **any minor under 21 years of age** any cigarettes, cigars, cigarette papers, tobacco or any other such materials connected with the smoking of tobacco." |

| | | | |
|---|---|---|---|
| Minnesota | Enactment | General Laws of 1909, Chapter 194 | "That it shall be unlawful for any person by himself, clerk, servant, employee, or agent, directly or indirectly upon any pretense or by any device to manufacture, sell, exchange, barter, dispose of or give away, or keep for sale any cigarettes, cigarette paper or cigarette wrappers, or any paper made or prepared for the purpose of being filled with tobacco for smoking and any person violating the provisions of this act shall be guilty of a misdemeanor..." |
| | Repeal | General Laws of 1913, Chapter 580 | "That it shall be unlawful for any person and any clerk, servant, employee or agent of any person, directly or indirectly, upon any pretense or by any device to sell, exchange, barter, dispose of or give away **to any minor** any cigarettes, cigarette paper or cigarette wrappers or any paper made or prepared for the purpose of being filled with tobacco for smoking or any tobacco prepared for smoking in the form of cigarettes." |
| Nebraska | Enactment | Session Laws of 1905, Chapter 198 | "That it shall be unlawful on and after the date this act shall go into effect to manufacture sell give away or willingly allow to be taken any cigarettes or the material for their composition known as cigarette paper within the State of Nebraska." |
| | Repeal | Session Laws of 1919, Chapter 180 | "That it shall be unlawful for any person, partnership or corporation, to sell, keep for sale, or give away, any cigars, tobacco, cigarettes or cigarette material, to any one, **without first obtaining a license** as hereinafter provided..." |
| North Dakota | Enactment | Session Laws of 1913, Chapter 69 | "That it shall be unlawful for any person, by himself, clerk, servant, employee, or agent, directly or indirectly, upon any pretense or by any devise, to manufacture, sell, exchange, barter, dispose of, or give away, or keep for sale any cigarettes, cigarette paper or cigarette wrappers, or any paper made or prepared for the purpose of being filled with tobacco for smoking." |

| | | | |
|---|---|---|---|
| | Repeal | Session Laws of 1925, Chapter 107 | "No person, firm or corporation shall sell cigarettes or cigarette papers in the state of North Dakota **without first obtaining a permit**..." |
| Oklahoma | Enactment | Session Laws of 1901, Chapter 13 | "That it shall be a misdemeanor for any person, firm or corporation to sell, offer to sell, or to bring into the Territory for the purpose of selling, giving away or otherwise disposing of, any cigarettes, cigarette paper or substitute for the same..." |
| | Repeal | Session Laws of 1915, Chapter 190 | "That any person who shall furnish **to any minor** by gift, sale or otherwise, any cigarettes or cigarette papers, shall be guilty of a misdemeanor..." |
| South Dakota | Enactment | Session Laws of 1909, Chapter 142 | "That it shall be unlawful for any person, by himself, clerk, servant, employe, or agent, directly or indirectly, upon any pretense or by any device, to manufacture, sell, exchange, barter, dispose of, or give away, or keep for sale any cigarettes, cigarette paper or cigarette wrappers, or any made or prepared for the purpose of being filled with tobacco for smoking..." |
| | Repeal | Session Laws of 1917, Chapter 153 | "It shall be unlawful for any person by himself, clerk, servant, employee or agent, or any clerk, servant, employee or agent of any person, directly or indirectly, upon any pretense or by any devise to sell, exchange, barter, dispose of or give away to **persons under the age of twenty-one years** any cigarettes, cigarette papers, cigarette wrappers prepared or designed to be used for filling with tobacco for smoking." |
| Tennessee | Enactment | Acts of 1897, Chapter 30 | "That it shall be a misdemeanor for any person, firm or corporation to sell, offer to sell or to bring into the State for the purpose of selling, giving away or otherwise disposing of any cigarettes, cigarette paper or substitute for the same..." |

| | | | |
|---|---|---|---|
| | Repeal | Acts of 1921, Chapter 5 | "That ... 'An Act to prohibit the sale or offering for sale or bringing into the State for the purpose of sale or giving away of any cigarettes, cigarette papers or substitute thereof,' ... be and the same are hereby repealed." |
| Utah | Enactment | Session Laws of 1921, Chapter 145 | "It shall be a misdemeanor for any person, company, or corporation to barter, sell, keep for sale, furnish or give away, any cigarettes or cigarette papers, or any disguise or subterfuge of either of these, or to have any cigarettes or cigarette papers in or about any store or other place for barter, sale or free distribution." |
| | Repeal | Session Laws of 1923, Chapter 52 | "It shall be unlawful for any person, firm or corporation to barter, sell or offer for sale, cigarettes or cigarette papers in the State of Utah, **without first having obtained a permit** therefor..." |
| Washington | Enactment | Session Laws of 1893, Chapter 51 | "That it shall be unlawful for any person or persons whomsoever, to manufacture, buy, sell, give or furnish to any one cigarettes, cigarette paper or cigarette wrapper." |
| | Repeal | Session Laws of 1895, Chapter 70 | "Hereafter it shall be unlawful for any person or persons to sell cigarettes made of tobacco in combination with any substance or material, covering or wrapper, or containing any substance or material other than tobacco, **until such person or persons shall have obtained a license therefor**." |
| | Enactment | Session Laws of 1907, Chapter 148 | "That it shall be unlawful for any person, by himself, clerk, servant, employe or agent, directly or indirectly, upon any pretense or by any device, to manufacture, sell, exchange, barter, dispose of or give away, or keep for sale, any cigarettes, cigarette paper, or cigarette wrappers, or any paper made or prepared for the purpose of being filled with tobacco for smoking; and any person, for violation of the same, shall be guilty of a misdemeanor..." |

| | | | |
|---|---|---|---|
| | Repeal | Session Laws of 1911, Chapter 133 | "Every person who ... [s]hall sell or give, or permit to be sold, or given to **any person under the age of twenty-one years** any intoxicating liquor, cigar, cigarette, cigarette paper or wrapper, or tobacco in any form ... [s]hall be guilty of a gross misdemeanor." |
| Wisconsin | Enactment | Laws of 1905, Chapter 82 | "Any person who shall, by himself, his servant or agent, or as the servant or agent of any other person, directly or indirectly, or upon any pretense, or by any device, manufacture, sell, offer for sale, keep for sale, give away, or otherwise dispose of, or bring into this state for the purpose of selling, offering for sale, giving away, or otherwise disposing of any cigarettes, cigarette paper or cigarette wrappers, or any substitute therefor, or any paper made or prepared for the purpose of making cigarettes or any substitute therefor, or for the purpose of being filled with tobacco for smoking; or who shall own, keep or be in any way concerned, engaged or employed in, owning or keeping any such cigarettes, cigarette paper, cigarette wrappers, or substitute therefor; or who shall authorize or permit the same to be done with the intent to violate any provisions of this section, shall be guilty of a misdemeanor..." |
| | Repeal | Laws of 1915, Chapter 139 | "Any person who shall, by himself, his servant or agent, or as the servant or agent of any other person, directly or indirectly, or upon any pretense, or by any device, sell, give away or otherwise dispose of **to any minor** any cigarettes, cigarette paper or cigarette wrappers, or any substitute therefor, or any paper made or prepared for the purpose of making cigarettes or any substitute therefor, or for the purpose of being filled with tobacco for smoking shall be guilty of a misdemeanor..." |