Taxing Addiction in Hard Times: Cigarette Taxes and Smoking During Recessions*

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Abstract

This paper examines whether individuals' behavioral responses to cigarette taxes shifted during the Great Recession. Using repeated cross-sectional data from the Behavioral Risk Factor Surveillance System (BRFSS) between 2003 and 2009, we estimate linear probability models to assess the association between cigarette tax increases and smoking cessation behaviors before, during, and after the recession. Our empirical strategy exploits variation in state-level cigarette taxes and their interaction with a recession-period indicator, while controlling for demographic characteristics, state and year fixed effects, and state unemployment insurance generosity. Contrary to standard economic predictions, we find that individuals were less responsive to cigarette tax increases during the recession, even though overall quit attempts modestly increased. Heterogeneity analyses reveal that this diminished responsiveness was particularly evident among lower-income individuals and those without health insurance - groups more vulnerable to financial and psychological stress. These results suggest that economic downturns may constrain individuals' capacity to respond to price-based health policies, with important implications for the timing, equity, and effectiveness of tobacco control strategies.

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1 Introduction

Smoking remains a major public health challenge, contributing to chronic diseases, premature mortality, and hefty economic costs. It is the leading cause of preventable death in the United States, claiming about 480,000 American lives annually (Centers for Disease Control and Prevention, 2024a). The financial toll of smoking is enormous, exceeding $600 billion per year in the U.S. when combining direct healthcare expenditures (over $240 billion) and lost productivity (nearly $372 billion) (Centers for Disease Control and Prevention, 2024b). In response, cigarette excise taxes have become one of the most widely adopted policy tools to curb tobacco use. All 50 states (and Washington, DC) levy cigarette excise taxes (Group, 2011), and extensive research links higher cigarette taxes or prices to lower smoking prevalence and increased quitting. In fact, raising tobacco taxes is often cited as the single most effective strategy for reducing smoking rates (Le and Jaffri, 2022). Empirical studies show that when cigarette prices rise (often via tax hikes), smoking participation declines and more smokers attempt to quit (Le and Jaffri, 2022). Beyond their health effects, cigarette taxes also serve an important fiscal role: states generated on the order of $19 billion in tobacco tax revenues during a recession year (Romm, 2009). These revenues are often earmarked for public programs - common allocations include state Medicaid budgets and tobacco control or education programs (Clason, 2022; Smith, 2025). Because cigarette taxes influence both individual behavior and public finances, understanding the conditions under which they are most effective is critical for broader policy evaluation. In particular, it is important to ask whether the impact of cigarette taxes on smoking behavior is consistent across different economic contexts. If the strength of the tax response varies by context, policymakers need to account for that in designing and justifying tobacco control measures.

Economic downturns provide a relevant context in which the effectiveness of cigarette taxes might shift. Recessions put pressure on state budgets by reducing revenues from income, sales, and property taxes, even as demand for safety-net spending (like Medicaid) rises (Gordon and Center, 2011). During the Great Recession of 2008-2009, the most severe U.S. downturn in decades, states faced especially large fiscal shortfalls. In response, many state governments turned to "sin taxes" such as cigarette excise taxes as one way to raise revenue quickly. Indeed, in 2009 alone, 15 states (including DC) enacted increases in their cigarette tax rates (Centers for Disease Control and Prevention, 2010). Stateline reporting at the time noted that seven U.S. states enacted cigarette tax hikes in 2009 to help fill budget gaps, up from two states in 2008, and more than 20 other states actively debated following suit (Romm, 2009). While the historical record is clear that numerous states raised cigarette taxes during the recession (often explicitly to address budget shortfalls), the broader implications for public health are less documented. This raises a crucial policy question:

What happens when governments raise taxes on addictive goods like cigarettes during an economic downturn? The answer may depend on whether the primary goal is revenue generation or smoking reduction.

If the goal is to boost revenue, taxing a relatively inelastic good such as cigarettes can be effective – smokers tend to cut back less than proportionately to price increases, so tax hikes can yield more revenue (Centers for Disease Control and Prevention, 2010). In fact, one analysis estimated that a hypothetical $1 per-pack increase in every state's cigarette tax would generate about $9.1 billion in additional revenue per year, even after accounting for the resulting decline in cigarette sales (Centers for Disease Control and Prevention, 2010). If the goal is to reduce smoking, however, the effectiveness of tax hikes might be altered by recessionary conditions. On one hand, consumers have lower incomes during recessions, which could increase price sensitivity and encourage smokers to quit or cut back more than usual. On the other hand, recessions bring heightened stress and economic uncertainty, which might diminish smokers' willingness or ability to quit. Smoking may serve as a coping mechanism, and the hardship of job loss or fear of unemployment could weaken the behavioral response to price increases. From a behavioral perspective, these opposing forces suggest that the impact of cigarette taxes on smoking cessation could shift in a downturn. There is some evidence to support both channels: higher unemployment rates have been linked to modest reductions in smoking prevalence in prior decades (i.e. smoking tended to decline when the economy faltered) (Asare, 2024), yet micro-level studies of the Great Recession indicate that individuals who lost jobs were actually more likely to smoke, presumably due to stress-related factors (Golden and Perreira, 2015). In short, economic downturns could simultaneously make smokers more price-conscious (via income effects) and less able to quit (via psychological stress), potentially leading to a muted net effect of cigarette tax hikes on smoking behavior during recessions.

This paper examines whether the relationship between cigarette taxes and smoking cessation behavior indeed changes during recessions. In particular, we investigate how the association between state cigarette excise taxes and individuals' attempts to quit smoking differed during the Great Recession relative to non-recessionary periods. Our analysis uses repeated cross-sectional survey data from the Behavioral Risk Factor Surveillance System (BRFSS) covering the years 2003 through 2009. This time frame includes several years before the recession, the recessionary period itself (late 2007 through 2009), and the immediate post-recession period. Focusing on this window allows us to observe any shifts in tax responsiveness as economic conditions worsened and then began to recover. We measure smoking cessation behavior by whether current smokers reported making a quit attempt in the past 12 months, an indicator of active efforts to stop smoking. The core empirical strategy is to estimate linear probability models for quit attempts that include an interaction between each state's cigarette tax rate and an indicator for the recession period (roughly 2008–2009). The coefficient on this interaction term captures the differential association between taxes and quitting behavior during the recession versus other times. By comparing the tax-quit attempt relationship in recessionary vs. non-recessionary periods (within the same states and controlling for other factors), our approach aims to isolate whether macroeconomic conditions altered the effectiveness of cigarette taxes as a smoking cessation incentive.

Our analysis uncovers several noteworthy patterns. First, we find evidence that the positive association between cigarette taxes and smoking cessation (quit attempts) was diminished during the Great Recession compared to the rest of the 2000s. In other words, higher cigarette taxes were still associated with more quit attempts overall, but this relationship was significantly weaker in 2008–2009 when economic conditions were most dire. This suggests that smokers were less responsive to cigarette tax incentives during the recession. Second, subgroup analysis reveals that the drop in tax responsiveness was not uniform across the population. Notably, we observe a smaller impact of taxes on quit attempts for women than for men during the recession, and similarly smaller impacts among smokers of lower income and education levels. These patterns are consistent with the idea that financial or psychological stressors in a downturn can particularly constrain more vulnerable groups from quitting. For instance, lower-income individuals facing economic hardship might find it especially difficult to give up nicotine despite higher taxes, and stress-related barriers to cessation may be higher for certain demographics.

We interpret our results with caution: our estimates are associative and not definitively causal, since tax changes were not randomly assigned and could coincide with other state-level interventions or unmeasured factors. Nonetheless, the observable shift in the tax–quitting relationship during the recession is striking. It implies that behavioral responses to cigarette taxes are not constant over time – they can vary systematically with macroeconomic conditions. Importantly, while we find that smoking cessation became less responsive to price incentives in the recession, this does not mean cigarette tax hikes lost all their purpose. Even if fewer smokers quit than expected, higher taxes would still generate revenue for states in the short run (because many smokers continued buying cigarettes and paying the tax). In fact, one could argue that the very factor limiting cessation - the inelasticity of demand under stress - would ensure stable or increased tax revenues during recessions. Thus, from a fiscal standpoint, cigarette tax increases likely succeeded in raising revenue even when their public health impact (in terms of prompting quits) was blunted by the recession (Centers for Disease Control and Prevention, 2010). This dual outcome highlights a potential trade-off: in hard economic times, tobacco taxes may function more as revenue-generating tools than as effective health-promoting tools.

Our study contributes to the literature on tobacco control and on economic determinants of health behaviors in several ways. First, we add new evidence to the extensive body of research on cigarette taxation by demonstrating that the association between taxes and quitting behavior can vary with the broader economic environment. Most existing studies of cigarette taxes implicitly assume a stable responsiveness, that a given tax increase will have a similar effect on smoking behavior regardless of when or where it is applied. We show that this relationship is context-dependent, weakening during an economic downturn. This finding aligns with a need to incorporate external shocks into policy analysis: if something as fundamental as a recession can alter how consumers respond to a tax, then policymakers and researchers should account for such nonlinear effects. In this respect, our work echoes and extends prior research on recessions and health behaviors (Golden and Perreira, 2015; Gallus et al., 2016). A growing literature in public health and health economics examines how economic cycles influence outcomes like diet, exercise, substance use, and general health status (Golden and Perreira, 2015; Asare, 2024). We contribute to this literature by focusing on a specific health behavior (smoking cessation attempts) and a specific policy lever (tobacco taxation), providing descriptive evidence on how these interact under recessionary pressure.

Second, our results speak to issues of equity and heterogeneity in tobacco control. By exploring subgroup differences, we highlight that the impact of cigarette taxes may not be uniform, especially in the context of economic stress. The fact that lower-income and less-educated smokers in our sample appeared less responsive to tax hikes during the recession raises potential equity concerns. Cigarette taxes are often criticized for being regressive, lower-income smokers spend a larger share of their resources on the tax. If those same smokers are also the ones less able to quit when economic conditions are harsh, the tax's burden on vulnerable groups could be exacerbated in tough times. In line with other research, we find that tobacco tax increases tend to disproportionately affect low-income individuals (Le and Jaffri, 2022), which could deepen socioeconomic disparities in smoking outcomes during a downturn. Our study thus contributes to an understanding of how external economic shocks might differentially impact public health policies' effectiveness across population subgroups. In sum, by combining insights from the tobacco tax literature and the economics of recessions, we offer a more nuanced view of tobacco tax effectiveness and raise questions about fairness and efficiency that merit further investigation.

Finally, our findings carry several policy implications for public health and fiscal policy. Policymakers frequently turn to cigarette excise taxes during recessions, whether as a public health measure or as a way to bolster budget revenues in a politically feasible manner (Romm, 2009). Our analysis suggests that these two goals: reducing smoking and raising revenue, may not align perfectly during economic downturns. If smokers are less responsive to price hikes in recessions, then the expected health gains (fewer smokers and smoking-related harms) from a tax increase may be smaller than in normal times. This does not mean raising the tax is futile, but it does imply that the primary outcome in a recession could be revenue generation rather than behavior change. Indeed, from a revenue perspective, a recession might be an opportune time to raise cigarette taxes because many smokers will continue to buy cigarettes despite higher prices, yielding steady tax receipts.

The rest of the paper is organized as follows: Section II describes our data. Section III illustrates our empirical strategy. We report our main results in Section IV and discuss the heterogeneity of these results in Section V. Section VI concludes.

2 Data

Our analysis relies on data from the Behavioral Risk Factor Surveillance System (BRFSS), a state-representative, cross-sectional survey conducted annually by the Centers for Disease Control and Prevention.[1] The BRFSS interviews a large sample of adults aged 18 and older across all 50 states, with a consistent survey design that enables comparability over time. Its primary strength lies in capturing state-level health behaviors, including smoking, alongside rich demographic and socioeconomic information such as age, race, education, household income, and marital status. The size and structure of the dataset make it particularly valuable for studying how individual behaviors respond to state-level policy changes and macroeconomic fluctuations. In what follows, we describe cigarette tax data, unemployment measures, policy controls, as well as the construction of our primary outcome variable on smoking.

2.1 Cigarette excise taxes

We construct a panel of monthly state cigarette excise tax rates using data from Orzechowski and Walker (2014), cross-validated using annual records from the *CDC State Tobacco Activities Tracking and Evaluation (STATE) System*.[2] Both sources provide implementation dates and tax amounts, which we merge with BRFSS microdata at the state-month level to minimize measurement error. All values are converted to real 2003 dollars.

[1] BRFSS data are publicly available at `https://www.cdc.gov/brfss/data_documentation/index.htm`

[2] CDC data accessed from The Tax Burden on Tobacco, 1970–2019. Our findings are robust to using annual average tax rates in place of monthly implementation dates.

Between 2008 and 2009, 18 states increased cigarette excise taxes.[3] For example, Rhode Island raised its tax by \$1.00 to \$3.46, Connecticut by \$1.00 to \$3.00, and Florida by \$1.00 to \$1.34. The average real state tax increased from \$0.89 (SD = 0.57) in 2007 to \$1.15 (SD = 0.72) in 2009, while the minimum and maximum nominal rates ranged from \$0.07 (South Carolina) to \$3.46 (Rhode Island). Prior research finds that most recession-era hikes were implemented in response to budget shortfalls rather than public health goals, consistent with broader evidence of increased tobacco tax responsiveness to fiscal stress after 2001 (DeCicca and McLeod, 2008; Maag and Merriman, 2008).

2.2 Unemployment and policy variables

To capture variation in local economic conditions, we use the annual state unemployment rate from the Local Area Unemployment Statistics (LAUS) published by the Bureau of Labor Statistics. This metric serves as a proxy for labor market distress and has been widely adopted in studies of health behavior during economic downturns (Ruhm, 2015). A binary indicator defines the Great Recession period as December 2007 through 2009. In our sample, the average unemployment rate across states during this period was 6.9 percent. All models are estimated using both the continuous unemployment rate and the binary recession indicator, with results robust to either specification.

We further include two relevant state policy measures. To account for differences in safety net provisions, we incorporate data from the U.S. Department of Labor on unemployment insurance (UI) generosity, measured as the real value of the maximum weekly UI benefit in 2003 dollars. To adjust for variation in tobacco control efforts, we construct a panel of smokefree indoor air laws using quarterly data from the CDC STATE System.[4] These laws cover three venue types - private worksites, restaurants, and bars - and are coded on a five-point ordinal scale: no provision, designated areas, designated smoking areas, separate ventilated areas, and full bans. Each venue is coded separately, and all three indicators are included in baseline regressions to adjust for concurrent changes in state tobacco regulation.

2.3 Smoking measures

The BRFSS collects consistent information on smoking behavior through a sequence of questions covering smoking history, current use, and recent cessation efforts. Respondents are first asked

[3] Several states enacted increases in both 2008 and 2009. A full list of tax changes and effective dates is provided in Table A1.

[4] Compiled by the Centers for Disease Control and Prevention, the STATE System provides quarterly legislative data on tobacco control policies across U.S. states. We use the smokefree indoor air component, which tracks venue-specific laws beginning in 1995. The dataset is publicly available at https://chronicdata.cdc.gov.

whether they have ever smoked at least 100 cigarettes in their lifetime. Those who answer yes are classified as ever-smokers and are then asked whether they currently smoke cigarettes every day, some days, or not at all. Current smokers are further asked whether they have stopped smoking for at least one day in the past 12 months because they were trying to quit. This structure allows us to construct indicators for smoking status and a binary measure of quit attempts, available uniformly across survey years.

While quit attempts do not indicate successful cessation, they are widely regarded as a meaningful proxy for cessation effort and motivation. Public health research consistently shows that most smokers require multiple attempts before permanently quitting, with estimates ranging from 6 to 14 attempts depending on the data and method used (Chaiton et al., 2016). Although the BRFSS measure does not capture long-term abstinence, it reflects deliberate engagement with cessation behavior. Prior studies find that making a quit attempt is a strong predictor of future success, especially when accompanied by higher levels of motivation and prior planning (Vangeli et al., 2011).

2.4 Sample Construction

The analysis uses repeated cross-sectional survey data from the BRFSS spanning years 2003–2009, which covers periods before, during, and immediately after the Great Recession. This timeframe allows comparison of smoking cessation behavior in pre-recession years versus the recession period, across states with different cigarette tax trajectories. Chris will specify the steps to build the analysis sample (e.g., age restrictions) to improve clarity.

2.5 Descriptives

Table A1 documents state-level cigarette tax increases during the period 2008–2010, coinciding with the Great Recession. Several states enacted substantial tax hikes. For example, New York raised its cigarette excise tax by $1.60 in 2010, resulting in the highest tax rates nationwide at $4.35 per pack. Washington also introduced a $1.00 increase in 2010, reaching $3.03 per pack. Smaller but still notable increases occurred in states such as South Carolina (from $0.07 to $0.57) and Arkansas (from $0.59 to $1.15). The timing of these increases varied, with some clustered around 2009 as states sought additional revenue sources. These patterns highlight that tax policy was actively used during the recessionary period, with both large and incremental increases across different states. Similarly, Figure A1 illustrates state-level cigarette tax rates across the U.S. in 2003 and 2009. The maps reveal a clear upward trend: in 2003, most states had relatively low tax rates, concentrated below $1.00 per pack. By 2009, many states, particularly in the Northeast and

West, had substantially higher rates exceeding \$2.00 per pack, with some exceeding \$3.00. This visual evidence confirms a nationwide trend toward higher cigarette excise taxation, though with strong geographic heterogeneity. As prior studies suggest, tax increases during downturns are often motivated by revenue needs rather than purely public health goals (Gallus et al., 2015; Golden and Perreira, 2015). These policy motivations make it especially relevant to assess whether the behavioral impact of such taxes is reduced when enacted in an economically distressed environment.

Figure A2 depicts cigarette tax trajectories between 2000 and 2010. Panel A shows states that increased taxes during the Great Recession (e.g., New York, Massachusetts, Wisconsin). These states experienced pronounced upward shifts in both nominal and real tax rates. Panel B shows states that did not raise taxes in this period; their cigarette tax trajectories remain flat, aside from gradual erosion in real terms due to inflation. This divergence provides a natural comparison between "treatment" states with active policy changes and "control" states without. Furthermore, Figure A3 presents state-level cigarette tax revenue over time. Among states that raised taxes during the recession (Panel A), revenue generally increased in both nominal and real terms, despite the economic downturn. For example, New York and Florida show sharp upward jumps in revenue after tax increases. In contrast, states without tax hikes (Panel B) show relatively stable or declining revenue paths, reflecting stagnant tax rates and possible declines in consumption. These revenue dynamics reinforce the fiscal importance of cigarette taxation during periods of economic stress.

Table A2 presents mean characteristics of the BRFSS respondents before (2003–2007) and during (2008–2009) the Great Recession. The average age of respondents increased slightly, from 48.5 to 51.4 years. Gender composition remained stable, with about 61% of the full sample identifying as female. Educational attainment showed a modest increase in the share with college education and above, while the share of high school or less declined slightly. Household income increased somewhat, with the share earning below \$35k decreased from 36% to 33% while the share earning above \$75k increased from 22% to 26%. Employment status reflects recessionary conditions: the share employed for wages dropped from 53% to 49%, while unemployment rose from 4% to 6%. Among current smokers, the share of everyday smokers fell slightly (from 76% to 74%), while "someday" smokers increased (from 24% to 26%). Quit attempts became more common in the later period, increasing from 54% to 56%. These descriptive changes suggest both compositional shifts in the population during the recession and evolving smoking behavior, which motivate the subsequent empirical analysis.

3 Empirical Strategy

We investigate whether the impact of cigarette taxes on smoking cessation behavior changed during the Great Recession (late 2007–2009). In essence, it asks: Do cigarette tax increases prompt the same quitting response during an economic downturn as they do in normal times, or is this relationship altered by the recession? To answer this, we employ a difference-in-differences (DiD) strategy leveraging temporal variation from the Great Recession and cross-state variation in cigarette tax levels.

Importantly, the Great Recession serves as a natural experiment: many U.S. states raised their cigarette excise taxes around 2008–2009 (often to address budget shortfalls), while other states did not change taxes in that period. This variation creates a treatment contrast that the DiD approach can exploit. By comparing changes in quit attempts in states that experienced large tax hikes during the recession to changes in states with smaller or no tax changes, the analysis can isolate the interaction effect of economic downturn and tax policy. The identifying assumption is that, absent the recession, the difference in quitting behavior between high-tax and low-tax states would have followed parallel trends, so any divergence during 2008–2009 can be attributed to the recession's influence on tax responsiveness. Including state fixed effects to control for persistent differences between states, such as baseline smoking rates or tobacco control environments, and year fixed effects to control for national trends in cessation behavior over time further strengthens this quasi-experimental design.

While our regression design incorporates interaction terms between cigarette taxes and economic conditions, we do not interpret these estimates as causal effects. This is because state decisions to raise cigarette taxes during the recession are not random and may be endogenously related to unobserved economic or political factors that also affect smoking behavior. Similarly, the onset and intensity of the recession across states may correlate with other unmeasured determinants of health behaviors. As such, we focus on documenting associational patterns rather than making causal claims.

To mitigate confounding to the extent possible, we include rich controls such as individual demographics, state and year fixed effects, and policy variables like state unemployment insurance generosity and smoke-free laws. These adjustments help ensure that our estimates reflect conditional associations between tax policy, recessionary conditions, and smoking cessation behavior, even though full identification of causal effects is beyond the scope of this study.

The empirical model is a linear probability model (LPM) for the probability that a smoker made a quit attempt in the past year. Simplified, the regression can be expressed as:

$$QuitAttempt_{ist} = \alpha + \beta_1 Tax_{st} + \beta_2 Recession_t + \beta_3 Tax_{st} \times Recession_t + \mathbf{X}_{ist}\Gamma + \mu_s + \lambda_t + \epsilon_{ist} \quad (1)$$

where i indexes individuals, s indexes states, and t indexes year. $Recession_t$ is an indicator equal to 1 for the recession years 2008–2009, and 0 for pre-recession years like 2003–2007. Tax_{st} is the state cigarette excise tax rate (inflation-adjusted to 2003 dollars) in state s and year t. The term $Tax_{st} \times Recession_t$ is the interaction capturing the differential effect of the tax during the recession period. μ_s are state fixed effects and λ_t are year fixed effects, which absorb all time-invariant differences across states and all nation-wide year shocks, respectively. $\mathbf{X}_{ist}$ represents individual-level demographic controls (such as age, gender, race, education, etc.), and possibly other state-level controls that vary over time. The error term ϵ_{ist} is clustered at the state level to allow for serial correlation within states.

Crucially, β_3, the coefficient on the interaction term, is the DiD estimator. It tells us how the effect of the state tax on the probability of a quit attempt in the past year changed during the recession relative to non-recession times. A significantly non-zero β_3 indicates that the recession modified the influence of cigarette taxes on quitting behavior. Meanwhile, β_1 captures the "normal-times" effect of cigarette taxes on quit attempts (i.e., the association in years outside 2008–09), and β_2 captures any general difference in quit attempt rates during the recession period.

The model includes a rich set of controls to account for other factors affecting cessation. All specifications include basic demographics (e.g., age, sex, race/ethnicity, education) and can include additional economic controls. In particular, we add a control for state unemployment insurance (UI) generosity – specifically the log of the average weekly UI benefit in the state – to account for differing economic conditions and safety-net strength across states. This UI generosity measure serves as a proxy for how cushioned households were from the recession's income shocks; including it helps ensure that the tax–quit attempt relationship is not conflated with states' economic stress levels or policy responses to unemployment. By controlling for UI benefits, the analysis "accounts for changing household circumstances" during the downturn, isolating the tax effect. In one specification, we also control for the presence of state-level smoke-free air laws to account for differences in social norms and the broader policy environment surrounding smoking behavior across states. All monetary values are inflation-adjusted to 2003 USD for consistency. All specifications apply sampling weights provided by the BRFSS to ensure representativeness of the estimates. It's worth noting that a linear probability model is used here to facilitate the interpretation of the interaction term and fixed effects. The linear specification means coefficients can be read as percentage-point changes in quit attempt probability. We further validate our main approach by employing an alternative measure of economic conditions. Specifically, we use the state-level unemployment rate as a continuous measurement of economic downturn, and interact it with cigarette tax rates to assess the robustness of our findings based on the binary recession indicator.

To examine whether the effects of cigarette taxes and economic recessions vary across smokers with different levels of addiction, we divide our sample into two groups: everyday smokers and someday smokers. We repeat our main analysis separately for each group to assess heterogeneity in responses. Additionally, we explore heterogeneous effects across key demographic characteristics, including gender, educational attainment, and household income level. To do so, we estimate our preferred specification on these various subgroups to identify potential differences in behavioral responses.

We also investigate the health implications of cigarette taxes during the Great Recession. Using data from the BRFSS, we construct three health-related outcome variables: (i) self-reported health, measured on a five-point scale from poor (1) to excellent (5); (ii) an indicator for poor physical health, equal to one if the respondent reported at least one day of poor physical health in the past 30 days; and (iii) an indicator for poor mental health, equal to one if the respondent reported at least one day of poor mental health in the past 30 days. We estimate our main specification using these health outcomes instead of smoking cessation as the dependent variable. This exercise is conducted for both the full sample and the subset of current smokers, allowing us to explore whether the health effects of cigarette taxation differ by smoking status. Finally, we test the relationship between state cigarette taxes and smoking cessation behavior during the Great Recession by examining changes in the probability of being a current smoker and everyday smoker.

4 Results

Table 1 presents our main specification, where the key variable of interest is the interaction between state cigarette taxes and an indicator for the Great Recession (2008–2009). The interaction term is consistently negative and statistically significant across all specifications. We treat Column 3 as our preferred specification, as it includes a rich set of demographic controls and both state and year fixed effects, allowing us to account for compositional differences and time trends without over-controlling for potentially endogenous policy responses such as smoke-free laws or changes in UI generosity. These additional controls are explored in later columns as robustness checks, and the consistency of results across specifications supports the validity of our main findings.

In column 3, the coefficient is -0.013, indicating that the effectiveness of cigarette taxes in prompting quit attempts was reduced during the recession. This is consistent with behavioral evidence showing that stress and economic insecurity can reduce smokers' capacity to respond to price signals. For instance, Ferrer et al. (2018) found that smokers with high levels of behavioral disengagement under stress were significantly less responsive to cigarette tax increases. Likewise, job loss and financial anxiety have been linked to increased smoking among vulnerable populations during the Great Recession (Golden and Perreira, 2015; Currie et al., 2015).

Turning to other main effects, we find that cigarette taxes are positively associated with quit attempts in the full sample, consistent with prior evidence that higher tobacco prices reduce consumption and increase cessation behavior (Organization, 2015; Boyle et al., 2019; Le and Jaffri, 2022). For example, in column 3, a $1 increase in cigarette tax is associated with a 2.3% increase in the likelihood of a smoker attempting to quit. These results are in line with prior estimates of cigarette price elasticities in high-income countries (Culyer and Newhouse, 2000; Group, 2011) and recent U.S. based studies showing that smokers, especially younger adults, are responsive to tax-induced price changes (Le and Jaffri, 2022). We also find that the recession period itself is associated with an increase in quit attempts, though the estimate only appears to be significant in column 1. In column 3, the recession dummy is associated with a 1.5% increase in the probability of a quit attempt. This finding contributes to a growing literature suggesting that recessions may promote certain health behaviors, possibly due to income constraints, more free time, or changes in time preference (Ruhm, 2005; Ásgeirsdóttir et al., 2016). It is also consistent with evidence from Iceland and parts of the U.S. showing short-term reductions in smoking and other risky behaviors during the Great Recession (Ásgeirsdóttir et al., 2016; Gallus et al., 2016), though our estimates based on a U.S. national sample are not always significant. Our estimates remain consistent and robust after including additional controls for state unemployment insurance (UI) generosity and smoke-free policies.

Table 2 replaces the recession indicator with the state-level unemployment rate to account for variation in economic hardship across states and years. Crucially, the interaction between unemployment rates and cigarette taxes is negative and statistically significant in most specifications. The magnitude is small but consistent (–0.002 to –0.003), suggesting that as state-level unemployment rises, the marginal effect of tax increases on quit attempts declines. This again supports the view that financial or psychological stress during recessions can attenuate responsiveness to price-based policy interventions (Golden and Perreira, 2015; Ferrer et al., 2018). The consistency across both the binary and continuous recession measures further strengthens our argument that economic downturns weaken the effectiveness of cigarette taxes.

Again, we find that cigarette taxes are positively associated with quit attempts (e.g., 2.9% per $1 increase in column 3), and that unemployment is also modestly associated with increased quit attempts in some specifications. These patterns are broadly in line with the pro-cyclical hypothesis, where tighter economic conditions limit discretionary spending and reduce cigarette use (Ruhm, 2005; Kaiser et al., 2017).

To examine whether smoking frequency moderates tax responsiveness during the recession, we disaggregate the sample into everyday smokers (columns 1–3) and someday smokers (columns 4–6) in Table 3. Among both groups, we find a positive association between taxes and quit attempts, while the results are only statistically significant among everyday smokers. Nevertheless, the interaction term between the recession indicator and the cigarette tax is negative and statistically significant for both groups. The dampened responsiveness is a little more pronounced among everyday smokers, who are more likely to be nicotine-dependent and thus less responsive to price shocks under stress. This aligns with findings in Le and Jaffri (2022), which suggest that more heavily addicted smokers (including many low-income or daily users) may find it harder to quit despite price increases, especially in economically challenging contexts. Additionally, the coping-stress model proposed by Ferrer et al. (2018) suggests that smokers under higher psychological strain are less likely to translate policy nudges into behavioral change. Our results reinforce that everyday smokers, who may bear more brunt of economic stress, respond less to tax incentives during recessions.

Table 4 reports subgroup analyses based on gender, educational attainment, and household income, which are three dimensions strongly associated with both economic vulnerability during recessions and heterogeneity in smoking behavior. We find that the interaction between cigarette taxes and the recession is significantly negative for most groups (except for the highest income group), but the magnitude of the attenuation varies, revealing meaningful heterogeneity in tax responsiveness during economic downturns.

Among gender groups (columns 1-2), women exhibit a notably larger drop in responsiveness to cigarette taxes during the recession. The interaction term is -0.015 for women versus –0.008 for men. This aligns with findings in the behavioral health literature that women are more susceptible to recession-related stress, which can impair smoking cessation success (Currie et al., 2015; Gallus et al., 2016). It may also reflect differences in labor market outcomes: women were more likely than men to experience reduced work hours or increased caregiving burdens during the Great Recession, potentially constraining their ability to quit smoking despite price increases. Educational attainment reveals a non-linear pattern in tax responsiveness during the recession (columns 3–5). The largest negative interaction is observed among individuals with high school or less (-0.014), followed by college graduates (–0.012), and those with some college education (–0.011). While all three education groups exhibit statistically significant attenuation in tax responsiveness during the recession, the pattern suggests that lower education groups (column 3) may have been especially vulnerable to economic disruptions without the financial or informational resources that higher-educated groups (column 5) possess. Meanwhile, individuals with less than a college degree may face higher nicotine dependence and reduced access to cessation support, limiting the effectiveness of price-based incentives. These findings echo earlier studies showing that smokers with lower or moderate education levels tend to be more price-sensitive on average, but also face more structural barriers to quitting successfully during periods of stress (Cruces et al., 2022; Le and Jaffri, 2022). Columns 6–8 focus on household income. We find that the dampening effect of the recession on cigarette tax responsiveness is concentrated among lower- and middle-income smokers. The interaction coefficient is –0.017 for individuals earning less than \$35k and –0.012 for those earning \$35k–\$75k, both statistically significant. In contrast, for higher-income smokers (\$75k+), the interaction effect is smaller in magnitude (–0.003) and not statistically significant. The results align with recent evidence from Le and Jaffri (2022), who found muted tax responsiveness among low-income smokers, and reinforce broader findings that economic insecurity can interfere with health behavior change (Golden and Perreira, 2015; Ferrer et al., 2018). In our setting, the lack of significant interaction among higher-income smokers implies that this group may have had greater financial and psychological resilience during the recession, allowing them to respond to tax signals more consistently.

Tables 5 and 6 present our main results on health outcomes and smoking behavior during the Great Recession. Table 5 shows that the interaction terms between cigarette taxes and the recession period are generally small and statistically insignificant, suggesting that higher cigarette taxes did not have a differential impact on health outcomes specifically during the recession. However, we do find some evidence that the recession itself is associated with an increase in the likelihood of reporting poor physical health in both samples. Turning to Table 6, we find that higher cigarette taxes are consistently associated with a reduction in both the probability of being a current smoker and being a daily smoker, confirming the effectiveness of cigarette taxation as a tobacco control policy. Yet, the recession–tax interaction terms remain insignificant across specifications, indicating that the absolute number of smokers did not statistically differ during the recession. Overall, these results suggest that while cigarette taxes reduce smoking and the recession worsened certain health outcomes, we do not detect robust evidence that the recession materially altered the effectiveness of cigarette tax policies.

5 Discussion

Table A3 shows how the effect of cigarette taxes during the Great Recession varies across age groups. The results suggest that younger and early middle-aged adults (ages 18–39) did not significantly adjust their quit attempts in response to cigarette taxes during the recession, while middle-aged groups (40–49) exhibit stronger responsiveness. For example, the interaction with the recession is negative and significant in column 3, suggesting that the recession dampened the tax effect for this age group. Likewise, the older cohorts (50–75) continue to show a significantly negative association between the tax-recession interaction term and quit attempts. Overall, the results highlight that the recession may have undermined the effectiveness of cigarette taxes, particularly among middle-aged and senior adults.

Table A4 explores differences across demographic subgroups. The results reveal notable heterogeneity by race: while White respondents show a strong positive effect of cigarette taxes on quit attempts, the estimates for Black, Hispanic, and Asian/Other groups are smaller and less precise, with the interaction terms for White and Black turning negative significantly. This suggests that tax policies during the recession may have had unequal effects across racial groups, potentially reflecting differences in income shocks or smoking norms. Turning to household and marital status, the results indicate that individuals in households with children and married respondents were more responsive to cigarette taxes compared to single or childless individuals. The interaction terms are significantly negative among both subgroups (columns 5-8), revealing a consistent dampened effect of the cigarette tax during the recession. This pattern implies that family responsibilities and financial constraints may amplify the impact of cigarette price increases, especially during economic downturns.

Table A5 explores whether the effect of cigarette taxes on quit attempts during the Great Recession depends on unemployment insurance (UI) generosity. While Fu and Liu (2019) document that UI benefits can significantly promote smoking cessation, our analysis does not reveal comparable effects in the context of the recession. The three-way interaction term between state cigarette taxes, the unemployment rate, and the log of UI generosity, as well as the two-way interaction between cigarette taxes and the unemployment rate, are consistently small and statistically insignificant across all models. This indicates that cigarette tax effects on cessation behavior do not vary meaningfully with UI generosity or the unemployment rate during the recession. However, some other variables are noteworthy. The unemployment rate itself is positively and significantly associated with quit attempts, suggesting that higher unemployment increased smoking cessation efforts during the recession. In addition, UI generosity is positively and significantly correlated with quit attempts in some specifications, pointing to a potential supportive role of social safety nets in encouraging cessation. State cigarette taxes remain positively signed, but their coefficients are generally not statistically significant once controls are added.

6 Policy Implication

In our analysis, a one-dollar increase in state cigarette taxes is associated with a 2.3 percentage point increase in the probability of attempting to quit smoking (column 3 of Table 1). This estimate aligns with prior evidence suggesting that cigarette demand is relatively inelastic in high-income countries, particularly on the extensive margin of quitting behavior (Chaloupka IV and Wechsler, 1995; Group, 2011; Centers for Disease Control and Prevention, 2014; Le and Jaffri, 2022). The limited behavioral response observed in our data implies that most smokers continue purchasing cigarettes despite price increases, which in turn suggests scope for raising excise taxes without substantially contracting the tax base. Although our data do not capture reductions in smoking intensity among continuing smokers, prior meta-analyses estimate total price elasticities in the range of –0.3 to –0.5 (Culyer and Newhouse, 2000; Group, 2011), implying that the intensive margin is somewhat more responsive. Under a simple price-based linear demand model,[5] current cigarette taxes appear well below the peak of the Laffer curve, suggesting room for further increases in many states, *although we omit important economic and social factors from the model*. Specifically, our simulations do not incorporate cross-border purchases, illicit trade, substitution toward alternative nicotine products, differential pass-through of taxes into retail prices, or heterogeneity across demographic groups. Nor do we consider long-run behavioral adjustments such as smoking initiation or relapse. The exercise should therefore be viewed as an illustrative demonstration of how the revenue-maximizing tax rises as demand becomes more inelastic, rather than as a precise quantitative forecast of optimal tax policy.

[5] See model details in Appendix.

Estimated Revenue-Maximizing Cigarette Tax under Different Price Elasticities (Price-Based Linear Demand)

Elasticity	Optimal Tax ($)	Additional Tax ($)	Q* (B packs)	Total Tax R (B$)	Max R (Index)
–0.50	8.00	6.00	6.29	50.29	25
–0.40	9.75	7.75	6.13	59.75	29
–0.30	12.67	10.67	5.97	75.64	37
–0.20	18.50	16.50	5.81	107.56	53
–0.15	24.33	22.33	5.74	139.57	69
–0.10	36.00	34.00	5.66	203.66	100

Notes: Baselines: retail price $P_0 = \$7.00$ per pack, specific tax $\tau_0 = \$2.00$, pre-tax price $c = P_0 - \tau_0 = \$5.00$, and annual sales $Q_0 = 11$ billion packs (Centers for Disease Control and Prevention (2023); U.S. Department of the Treasury, Alcohol and Tobacco Tax and Trade Bureau (2025)). Demand is linear in the *retail price* $P = c + \tau$: $Q(P) = a - bP$, calibrated so the point elasticity at (P_0, Q_0) equals ε; thus $b = -\varepsilon Q_0/P_0$ and $a = Q_0 + bP_0$. Tax revenue is $R(\tau) = \tau Q(c + \tau) = \tau [a - b(c + \tau)]$. The revenue-maximizing tax is $\tau^* = \left(Q_0/b + \tau_0\right)/2 = \left(P_0/|\varepsilon| + \tau_0\right)/2$, which decreases with $|\varepsilon|$. Quantities Q^* and revenues are evaluated at τ^*. 'Max R (Index)' normalizes to the largest revenue across rows (100 at $\varepsilon = -0.10$).

Our findings also highlight that the fiscal effectiveness of cigarette taxes depends critically on macroeconomic conditions. During the Great Recession, the responsiveness of smokers to cigarette tax increases fell by more than half: from 2.3 percentage points in normal times to approximately 1.0 percentage point during the downturn. This attenuation is consistent with behavioral theories emphasizing the role of stress, loss aversion, and self-control lapses under financial pressure (Golden and Perreira, 2015; Ferrer et al., 2018). If this reduced responsiveness also applies to the intensive margin of cigarette use, then the effective elasticity of demand becomes more inelastic during recessions. Our simple simulation exercise illustrates this dynamic: as elasticities move closer to zero, the revenue-maximizing tax rises sharply. For example, when elasticity is –0.3, the optimal tax is about \$12.67 per pack and annual revenue is roughly \$75.6 billion, while if elasticity falls to –0.15, the optimal tax more than doubles to \$24.33, with revenues increasing to \$139.6 billion. These numbers again should be interpreted as demonstrations of the mechanism rather than precise forecasts, but they underscore how recessions may allow states to raise cigarette taxes more aggressively without sacrificing fiscal returns, albeit with weaker public health gains in the short run.

Taken together, these results underscore a fundamental tension in excise tax policy: in economic downturns, cigarette taxes may be more effective as revenue-raising instruments than as levers for behavioral change. Nonetheless, even modest reductions in smoking, whether through cessation or reduced consumption, yield substantial long-run health and fiscal benefits, including lower health care costs, improved worker productivity, and reduced morbidity (Group, 2011; Le and Jaffri, 2022). Moreover, higher taxes remain a critical deterrent to smoking initiation among youth and provide resources for public health programs. From an equity perspective, however, our findings raise concerns that lower-income and less-educated smokers bear disproportionate tax burdens while being less likely to quit during recessions. To mitigate these inequities and enhance the behavioral impact of taxation, tax increases should be paired with expanded access to cessation services, nicotine replacement therapies, and stress-management programs, especially during periods of economic stress. Ultimately, our simple model illustrates that the revenue-maximizing tax rises as demand becomes more inelastic, but optimal policy must balance fiscal objectives with long-run public health and equity goals.

7 Conclusion

This paper investigates whether the behavioral response to cigarette taxation varies with macroeconomic conditions. Using repeated cross-sections from the BRFSS (2003–2009) and exploiting cross-state, over-time variation in cigarette excise taxes, we estimate linear probability models with state and year fixed effects, rich demographics, and controls for state unemployment insurance (UI) generosity and smoke-free policies. Our analysis uncovers several noteworthy patterns. First, we find that the positive association between cigarette taxes and smoking cessation (measured by quit attempts) is diminished during the Great Recession. Put differently, higher taxes remain associated with more quit attempts overall, but the tax–cessation gradient is significantly weaker in 2008–2009 when economic conditions were most adverse. The same qualitative attenuation appears when we replace the recession indicator with a continuous measure of unemployment, indicating that smokers were less responsive to tax incentives in states/years with worse labor market conditions.

Second, subgroup analyses show that this reduction in tax responsiveness is not uniform. The attenuation is more pronounced for women than for men, and for smokers with lower income and lower educational attainment. These patterns are consistent with the notion that financial and psychological stressors during downturns constrain the ability of more vulnerable groups to translate price signals into cessation behavior. For example, lower-income smokers facing tighter liquidity or heightened stress may struggle to quit despite higher taxes, and individuals with less education may encounter greater barriers to accessing effective cessation support (Le and Jaffri, 2022). In contrast, the highest-income group shows little evidence of a recession-specific attenuation, suggesting greater resilience to economic shocks. Supplementary analyses further indicate that, for ancillary outcomes (smoking status and self-reported health), recession–tax interaction terms are generally small and statistically indistinguishable from zero, while the main tax effects continue to operate in the expected direction.

These findings have two sets of implications. From a public health perspective, cigarette excise taxes remain a cornerstone of tobacco control, but our evidence suggests that their behavioral impact can be muted in severe downturns. A practical corollary is that tax increases enacted during recessions should be paired with supportive measures, for example, widely accessible quit aids, counseling, and stress-management resources, to overcome recession-related frictions and maintain cessation momentum (Le and Jaffri, 2022). From a distributional perspective, cigarette taxes are often criticized as regressive; the attenuation we document among low-income and less-educated smokers implies that the financial burden may rise precisely when health gains are hardest to realize, potentially aggravating regressivity (Koch, 2018; Le and Jaffri, 2022). Policymakers weighing cigarette tax hikes during downturns should therefore consider not only the standard health–revenue trade-off, but also the likelihood that behavior change is unusually subdued among financially constrained populations.

In sum, the effectiveness of cigarette taxation is not fully time-invariant: macroeconomic stress weakens tax-induced cessation, with stronger attenuation among vulnerable groups. Recognizing this context dependence can improve the design and timing of sin taxes. In good times and bad, excise taxes remain an essential instrument for curbing tobacco use and generating revenue, but their optimal deployment likely requires tailoring to the economic environment and complementing with targeted cessation support to achieve health and equity objectives more effectively.

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Tables and Figures

Table 1. Effect of State Cigarette Taxes on Smoking Cessation Attempts During the Recession

Dependent Variable: Quit Attempt	(1)	(2)	(3)	(4)	(5)
Economic Recession × State Cigarette tax	-0.013***	-0.014***	-0.013***	-0.013***	-0.013***
	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)
Economic Recession	0.029***	0.014	0.015	0.015	0.015
	(0.005)	(0.010)	(0.010)	(0.009)	(0.009)
State Cigarette Tax	0.027***	0.022***	0.023***	0.022***	0.024***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Sample Mean	0.546	0.546	0.546	0.546	0.546
N	441,043	441,043	441,043	441,043	441,043
R^2	0.001	0.003	0.025	0.025	0.025
Year Fixed Effects		✓	✓	✓	✓
State Fixed Effects		✓	✓	✓	✓
Demographic Controls			✓	✓	✓
State UI Benefit				✓	✓
Smoke-Free Policies					✓

Notes: This table reports estimates from OLS regressions examining the relationship between state cigarette tax and smoking cessation behavior during the Great Recession (2008–2009). The analysis draws on data from the Behavioral Risk Factor Surveillance System (BRFSS) and restricts the sample to survey years 2003–2009. The dependent variable is an indicator for whether the respondent reported having stopped smoking for one day or longer in the past 12 months in an attempt to quit. The key regressor is the interaction between an indicator for the Great Recession period and the state-level cigarette tax. Column (1) includes no additional controls. Column (2) includes year and state fixed effects. Column (3) adds demographic covariates. Column (4) adds the log of state unemployment insurance generosity. Column (5) adds state-level smoke-free policies. All specifications cluster standard errors at the state level. All monetary values are adjusted to 2003 dollars. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2. Effect of Unemployment Rate on Smoking Cessation Attempts

Dependent Variable: Quit Attempt	(1)	(2)	(3)	(4)	(5)
Unemployment Rate × State Cigarette tax	-0.002	-0.003***	-0.002***	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Unemployment Rate	0.006***	0.004**	0.003	0.002	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
State Cigarette Tax	0.036***	0.030***	0.029***	0.029***	0.032***
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
Sample Mean	0.546	0.546	0.546	0.546	0.546
N	441,043	441,043	441,043	441,043	441,043
R^2	0.001	0.003	0.025	0.025	0.025
Year Fixed Effects		✓	✓	✓	✓
State Fixed Effects		✓	✓	✓	✓
Demographic Controls			✓	✓	✓
State UI Benefit				✓	✓
Smoke-Free Policies					✓

Notes: This table reports OLS estimates of the relationship between state cigarette taxes and smoking cessation, where the effect of taxes is allowed to vary with the state unemployment rate. The analysis draws on data from the Behavioral Risk Factor Surveillance System (BRFSS) and restricts the sample to survey years 2003–2009. The dependent variable is an indicator for whether the respondent reported having stopped smoking for one day or longer in the past 12 months in an attempt to quit. The key regressor is the interaction between an indicator for the Great Recession period and the state-level cigarette tax. Column (1) includes no additional controls. Column (2) includes year and state fixed effects. Column (3) adds demographic covariates. Column (4) adds the log of state unemployment insurance generosity. Column (5) adds state-level smoke-free policies. All specifications cluster standard errors at the state level. All monetary values are adjusted to 2003 dollars. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3. Effect of State Cigarette Taxes During the Recession by Smoking Status

Dependent Variable: Quit Attempt	Everyday Smoker			Somedays Smoker		
	(1)	(2)	(3)	(4)	(5)	(6)
Economic Recession × State Cigarette tax	-0.014***	-0.014***	-0.012***	-0.012**	-0.013***	-0.015***
	(0.005)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Economic Recession	0.017	0.018*	0.017	0.009	0.010	0.011
	(0.011)	(0.010)	(0.010)	(0.013)	(0.013)	(0.013)
State Cigarette Tax	0.023***	0.024***	0.026***	0.010	0.010	0.012
	(0.007)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Sample Mean	0.481	0.481	0.481	0.749	0.749	0.749
N	333,984	333,984	333,984	107,059	107,059	107,059
R^2	0.002	0.026	0.026	0.004	0.024	0.024
Year Fixed Effects	✓	✓	✓	✓	✓	✓
State Fixed Effects	✓	✓	✓	✓	✓	✓
Demographic Controls		✓	✓		✓	✓
State UI Benefit			✓			✓
Smoke-Free Policies			✓			✓

Notes: This table reports estimates from OLS regressions examining the relationship between state cigarette tax and smoking cessation behavior during the Great Recession (2008–2009). The analysis draws on data from the Behavioral Risk Factor Surveillance System (BRFSS) and restricts the sample to survey years 2003–2009. The dependent variable is an indicator for whether the respondent reported having stopped smoking for one day or longer in the past 12 months in an attempt to quit. The key regressor is the interaction between an indicator for the Great Recession period and the state-level cigarette tax. Columns (1)–(3) restrict the sample to everyday smokers; Columns (4)–(6) restrict the sample to somedays smokers. All models include year and state fixed effects. Columns (2) and (4) additionally control for demographic covariates. Columns (3) and (6) further add the log of state unemployment insurance generosity and state-level smoke-free policies. All specifications cluster standard errors at the state level. All monetary values are adjusted to 2003 dollars. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4. Effect of State Cigarette Taxes During the Recession by Characteristics

Dependent variable: Quit Attempt	Gender		Educational Background			Household Income		
	(1) Men	(2) Women	(3) HS or Less	(4) Some College	(5) College+	(6) <$35k	(7) $35k–$75k	(8) $75k+
Economic Recession × State Cigarette tax	-0.008*	-0.015***	-0.014***	-0.011**	-0.012**	-0.017***	-0.012*	-0.003
	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)	(0.003)	(0.006)	(0.007)
Economic Recession	0.020*	0.011	0.009	0.028**	0.010	0.009	0.018	0.009
	(0.012)	(0.011)	(0.015)	(0.011)	(0.016)	(0.009)	(0.017)	(0.020)
State Cigarette Tax	0.025***	0.024***	0.033***	0.019**	0.006	0.029***	0.028***	-0.001
	(0.007)	(0.007)	(0.008)	(0.009)	(0.009)	(0.006)	(0.009)	(0.010)
Sample Mean	0.521	0.564	0.541	0.561	0.540	0.564	0.530	0.530
N	182,654	258,389	235,718	128,837	76,488	216,632	124,240	56,807
R^2	0.030	0.021	0.027	0.027	0.024	0.026	0.024	0.023
Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
State Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Demographic Controls	✓	✓	✓	✓	✓	✓	✓	✓
State UI Benefit	✓	✓	✓	✓	✓	✓	✓	✓
Smoke-Free Policies	✓	✓	✓	✓	✓	✓	✓	✓

Notes: This table reports estimates from OLS regressions examining the relationship between state cigarette tax and smoking cessation behavior during the Great Recession (2008–2009). The analysis draws on data from the Behavioral Risk Factor Surveillance System (BRFSS) and restricts the sample to survey years 2003–2009. The dependent variable is an indicator for whether the respondent reported having stopped smoking for one day or longer in the past 12 months in an attempt to quit. The key regressor is the interaction between an indicator for the Great Recession period and the state-level cigarette tax. All specifications are estimated separately by gender, educational background, and household income, and include year and state fixed effects, demographic covariates, the log of state unemployment insurance generosity, and state-level smoke-free policies. All specifications cluster standard errors at the state level. All monetary values are adjusted to 2003 dollars. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5. Effect of State Cigarette Taxes on Health During the Recession

Dependent variable: Health Status	Full sample			Current smoker		
	(1) Self-Reported Health	(2) Poor Physical Health	(3) Poor Mental Health	(4) Self-Reported Health	(5) Poor Physical Health	(6) Poor Mental Health
Economic Recession × State Cigarette tax	0.004	-0.002	-0.007	0.004	-0.004	-0.010
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)
Economic Recession	-0.006	0.015**	0.006	0.002	0.017**	0.013
	(0.006)	(0.006)	(0.006)	(0.014)	(0.008)	(0.008)
State Cigarette tax	0.005	-0.006	0.010	0.004	0.010	0.014**
	(0.004)	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)
Mean	3.522	0.362	0.337	3.210	0.419	0.434
Number of obs	2,167,557	2,142,745	2,145,556	440,581	435,245	434,867
R-squared	0.211	0.047	0.072	0.200	0.080	0.088
Year fixed effects	✓	✓	✓	✓	✓	✓
State fixed effects	✓	✓	✓	✓	✓	✓
Demographic controls	✓	✓	✓	✓	✓	✓
State UI benefit	✓	✓	✓	✓	✓	✓
Smoke-free policies	✓	✓	✓	✓	✓	✓

Notes: This table reports estimates from OLS regressions examining the relationship between state cigarette tax and smoking cessation behavior during the Great Recession (2008–2009). The analysis draws on data from the Behavioral Risk Factor Surveillance System (BRFSS) and restricts the sample to survey years 2003–2009. The dependent variables are: (i) self-reported health, measured on a five-point scale from poor (1) to excellent (5); (ii) poor physical health, an indicator equal to one if the respondent reported at least one day of poor physical health in the past 30 days; and (iii) poor mental health, an indicator equal to one if the respondent reported at least one day of poor mental health in the past 30 days. The key regressor is the interaction between an indicator for the Great Recession period and the state-level cigarette tax. Columns (1)–(3) use the full sample; Columns (4)–(6) restrict the sample to current smokers. All specifications control for year and state fixed effects, demographic covariates, the log of state unemployment insurance generosity, and state-level smoke-free policies. All specifications cluster standard errors at the state level. All monetary values are adjusted to 2003 dollars. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6. Effect of State Cigarette Taxes on Smoking Status During the Recession

Dependent Variable: Smoking Status	Dep. Var.: Current Smoker			Dep. Var.: Everyday Smoker		
	(1)	(2)	(3)	(4)	(5)	(6)
Economic Recession × State Cigarette tax	0.001	-0.001	-0.001	0.002	0.000	-0.000
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Economic Recession	-0.004	0.001	0.001	-0.004	0.000	0.000
	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
State Cigarette Tax	-0.007**	-0.004	-0.003	-0.007**	-0.005*	-0.004*
	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)
Sample Mean	0.204	0.204	0.204	0.154	0.154	0.154
N	2,167,097	2,167,097	2,167,097	2,167,097	2,167,097	2,167,097
R^2	0.007	0.093	0.093	0.007	0.081	0.081
Year Fixed Effects	✓	✓	✓	✓	✓	✓
State Fixed Effects	✓	✓	✓	✓	✓	✓
Demographic Controls		✓	✓		✓	✓
State UI Benefit			✓			✓
Smoke-Free Policies			✓			✓

Notes: This table reports estimates from OLS regressions examining the relationship between state cigarette tax and smoking cessation behavior during the Great Recession (2008–2009). The analysis draws on data from the Behavioral Risk Factor Surveillance System (BRFSS) and restricts the sample to survey years 2003–2009. Columns (1)–(3) report regressions where the dependent variable is an indicator for being a current smoker (smokes every day or some days), and Columns (4)–(6) use an indicator for being a daily smoker (smokes every day). The key regressor is the interaction between an indicator for the Great Recession period and the state-level cigarette tax. All models include year and state fixed effects. Columns (2) and (4) additionally control for demographic covariates. Columns (3) and (6) further add the log of state unemployment insurance generosity and state-level smoke-free policies. All specifications cluster standard errors at the state level. All monetary values are adjusted to 2003 dollars. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

A Appendix Tables and Figures

Table A1. State Cigarette Tax Changes (2008–2010)

			Tax Rate (USD)		
Year	State	Effective Date	Increase	Previous	New
2010	Hawaii	Jul 2010	0.40	2.60	3.00
	New Mexico	Jul 2010	0.75	0.91	1.66
	New York	Jul 2010	1.60	2.75	4.35
	South Carolina	Jul 2010	0.50	0.07	0.57
	Utah	Jul 2010	1.01	0.69	1.70
	Washington	May 2010	1.00	2.03	3.03
2009	Arkansas	Mar 2009	0.56	0.59	1.15
	Connecticut	Oct 2009	1.00	2.00	3.00
	Delaware	Aug 2009	0.45	1.15	1.60
	Washington, D.C.	Oct 2009	0.50	2.00	2.50
	Florida	Jul 2009	1.00	0.34	1.34
	Hawaii	Jul 2009	0.60	2.00	2.60
	Kentucky	Apr 2009	0.30	0.30	0.60
	Mississippi	May 2009	0.50	0.18	0.68
	New Hampshire	Jul 2009	0.45	1.33	1.78
	New Jersey	Jul 2009	0.13	2.58	2.70
	North Carolina	Sep 2009	0.10	0.35	0.45
	Pennsylvania	Nov 2009	0.25	1.35	1.60
	Rhode Island	Apr 2009	1.00	2.46	3.46
	Vermont	Jul 2009	0.25	1.99	2.24
	Wisconsin	Sep 2009	0.75	1.77	2.52
2008	Washington, D.C.	Oct 2008	1.00	1.00	2.00
	Hawaii	Sep 2008	0.20	1.80	2.00
	Maryland	Jan 2008	1.00	1.00	2.00
	Massachusetts	Jul 2008	1.00	1.51	2.51
	New Hampshire	Oct 2008	0.25	1.08	1.33
	New York	Jun 2008	1.25	1.50	2.75
	Wisconsin	Jan 2008	1.00	0.77	1.77
	Vermont	Jul 2008	0.20	1.79	1.99

Notes: All values are reported in nominal dollars. Data source: Campaign for Tobacco-Free Kids (2025), *Cigarette Tax Increases by State per Year 2000–2025*, available at https://assets.tobaccofreekids.org/factsheets/0275.pdf.

Table A2. Summary Statistics

	Full Sample		Current Smokers	
	03-07	2008-2009	2003-2007	08-09
Age	48.47	51.43	45.72	48.81
Female	0.61	0.61	0.58	0.59
Race/Ethnicity				
White	0.80	0.80	0.79	0.78
Black	0.08	0.08	0.08	0.09
Hispanic	0.07	0.07	0.06	0.06
Asian	0.02	0.02	0.01	0.01
Other	0.04	0.04	0.06	0.06
Educational Background				
HS or less	0.39	0.38	0.54	0.53
Some College	0.27	0.27	0.29	0.30
College and above	0.34	0.35	0.17	0.17
Marital Status				
Married/unmarried couple	0.61	0.62	0.49	0.49
Divorced/separated/widowed	0.25	0.25	0.34	0.35
Never married	0.14	0.13	0.18	0.16
Number of children in household				
No children	0.63	0.67	0.61	0.66
1 child	0.15	0.13	0.17	0.15
2 children	0.14	0.13	0.14	0.12
3 or more children	0.08	0.08	0.08	0.08
Employment Status				
Working for wage	0.53	0.49	0.53	0.47
Self-employed	0.10	0.10	0.09	0.08
Unemployed	0.04	0.06	0.08	0.10
Not in labor force	0.33	0.36	0.31	0.35
Household Income				
<$35k	0.36	0.33	0.49	0.49
$35k–$75k	0.31	0.30	0.29	0.27
$75k+	0.22	0.26	0.12	0.14
Unknown	0.11	0.11	0.10	0.10
Smoking Status				
Everyday Smoker	0.16	0.14	0.76	0.74
Someday Smoker	0.05	0.05	0.24	0.26
Former smoker	0.27	0.29	0.00	0.00
Never smoked	0.52	0.53	0.00	0.00
Quit attempt	0.54	0.56	0.54	0.56
N	1,437,554	737,177	306,142	135,981

Notes: The table reports mean values from the Behavioral Risk Factor Surveillance System (BRFSS). Statistics are shown separately for the full sample of adults and for the subsample of current smokers, and are reported for the pre-recession period (2003–2007) and the Great Recession period (2008–2009). Quit attempt is an indicator of whether the respondent reported having stopped smoking for at least one day in the past 12 months in an effort to quit. Sample sizes reflect individual-level observations and are unweighted

Table A3. Effect of State Cigarette Taxes During the Recession by Age Group

Dependent variable: Quit Attempt	(1) 18-29	(2) 30-39	(3) 40-49	(4) 50-64	(5) 65-75
Economic Recession × State Cigarette tax	-0.008	-0.006	-0.019***	-0.009**	-0.022**
	(0.009)	(0.006)	(0.007)	(0.004)	(0.009)
Economic Recession	-0.012	-0.004	0.006	0.028**	0.034
	(0.021)	(0.025)	(0.016)	(0.011)	(0.024)
State Cigarette Tax	0.036***	0.026***	0.027***	0.016**	0.022
	(0.011)	(0.008)	(0.010)	(0.007)	(0.017)
Sample Mean	0.641	0.580	0.531	0.519	0.492
N	60,529	76,482	109,572	146,588	47,872
R^2	0.011	0.018	0.021	0.025	0.024
Year Fixed Effects	✓	✓	✓	✓	✓
State Fixed Effects	✓	✓	✓	✓	✓
Demographic Controls	✓	✓	✓	✓	✓
State UI Benefit	✓	✓	✓	✓	✓
Smoke-Free Policies	✓	✓	✓	✓	✓

Notes: This table reports estimates from OLS regressions examining the relationship between state cigarette tax and smoking cessation behavior during the Great Recession (2008–2009). The analysis draws on data from the Behavioral Risk Factor Surveillance System (BRFSS) and restricts the sample to survey years 2003–2009. The dependent variable is an indicator for whether the respondent reported having stopped smoking for one day or longer in the past 12 months in an attempt to quit. The key regressor is the interaction between an indicator for the Great Recession period and the state-level cigarette tax. All specifications are estimated separately by age group and include year and state fixed effects, demographic covariates, and the log of state unemployment insurance generosity. and state-level smoke-free policies. Standard errors are clustered at the state level. All monetary values are adjusted to 2003 dollars. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A4. Effect of State Cigarette Taxes During the Recession by Characteristics

Dependent variable: Quit Attempt	Race				Marital Status		Children in Household	
	(1) White	(2) Black	(3) Hispanic	(4) Asian/Other	(5) Married	(6) Single	(7) None	(8) Yes
Economic Recession × State Cigarette tax	-0.012***	-0.016**	-0.002	-0.016	-0.013***	-0.012***	-0.011**	-0.015***
	(0.004)	(0.007)	(0.013)	(0.009)	(0.004)	(0.004)	(0.004)	(0.004)
Economic Recession	0.017	-0.005	0.029	0.002	0.016	0.013	0.029**	-0.011
	(0.011)	(0.023)	(0.033)	(0.027)	(0.012)	(0.011)	(0.011)	(0.013)
State Cigarette tax	0.027***	0.022	-0.007	0.021	0.025***	0.023***	0.021***	0.030***
	(0.006)	(0.015)	(0.014)	(0.014)	(0.007)	(0.007)	(0.007)	(0.006)
Mean	0.524	0.665	0.625	0.589	0.544	0.549	0.520	0.590
Number of obs	346,847	38,577	24,798	30,821	213,960	227,083	275,627	165,416
R-squared	0.019	0.011	0.017	0.024	0.023	0.028	0.023	0.020
Year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
State fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Demographic controls	✓	✓	✓	✓	✓	✓	✓	✓
State UI benefit	✓	✓	✓	✓	✓	✓	✓	✓
Smoke-free policies	✓	✓	✓	✓	✓	✓	✓	✓

Notes: This table reports estimates from OLS regressions examining the relationship between state cigarette tax and smoking cessation behavior during the Great Recession (2008–2009). The analysis draws on data from the Behavioral Risk Factor Surveillance System (BRFSS) and restricts the sample to survey years 2003–2009. The dependent variable is an indicator for whether the respondent reported having stopped smoking for one day or longer in the past 12 months in an attempt to quit. The key regressor is the interaction between an indicator for the Great Recession period and the state-level cigarette tax. All specifications are estimated separately by race, marital status, and presence of children in the household, and include year and state fixed effects, demographic covariates, the log of state unemployment insurance generosity, and state-level smoke-free policies. Standard errors are clustered at the state level. All monetary values are adjusted to 2003 dollars. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

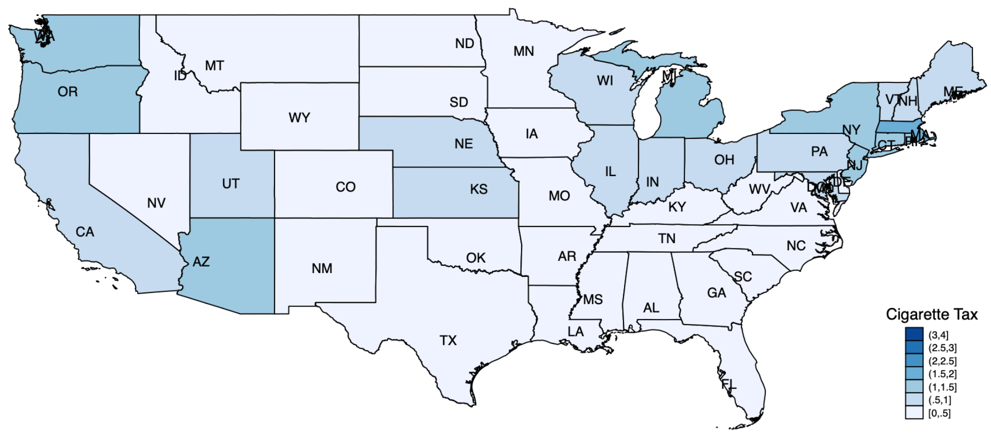
Table A5. Effect of Cigarette Taxes Conditional on Unemployment Insurance Generosity

Dependent variable: Quit Attempt	(1)	(2)	(3)	(4)
Log(UI) × Unemployment Rate × State Cigarette tax	0.002	0.004	0.003	0.002
	(0.004)	(0.004)	(0.003)	(0.003)
Unemployment Rate × State Cigarette tax	-0.014	-0.026	-0.021	-0.016
	(0.026)	(0.022)	(0.021)	(0.021)
Log(UI) × Unemployment Rate	-0.015**	-0.009**	-0.008**	-0.007**
	(0.006)	(0.004)	(0.003)	(0.003)
Unemployment Rate	0.094***	0.055**	0.048**	0.044**
	(0.034)	(0.022)	(0.019)	(0.018)
State Cigarette tax	0.084	0.334*	0.284	0.238
	(0.168)	(0.168)	(0.171)	(0.160)
Log(UI)	0.064*	0.062*	0.044	0.043
	(0.036)	(0.036)	(0.033)	(0.033)
Mean	0.546	0.546	0.546	0.546
Number of obs	441,043	441,043	441,043	441,043
R-squared	0.001	0.003	0.025	0.025
Year fixed effects		✓	✓	✓
State fixed effects		✓	✓	✓
Demographic controls			✓	✓
Smoke-free policies				✓

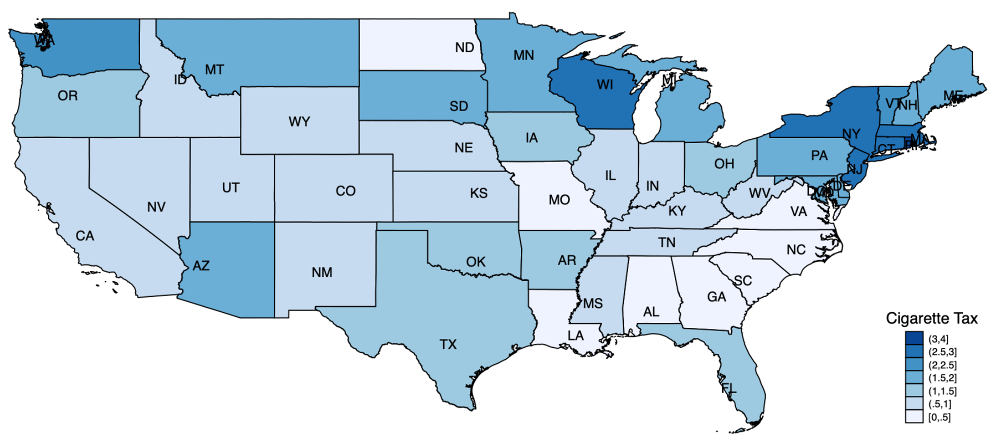
Notes: This table reports estimates from OLS regressions examining the relationship between state cigarette tax and smoking cessation behavior during the Great Recession (2008–2009). The analysis draws on data from the Behavioral Risk Factor Surveillance System (BRFSS) and restricts the sample to survey years 2003–2009. The dependent variable is an indicator for whether the respondent reported having stopped smoking for one day or longer in the past 12 months in an attempt to quit. The key regressor is the three-way interaction between log unemployment insurance generosity, the state unemployment rate, and the state cigarette tax. Column (1) includes no additional controls. Column (2) includes year and state fixed effects. Column (3) adds demographic covariates. Column (4) adds state-level smoke-free policies. All specifications cluster standard errors at the state level. All monetary values are adjusted to 2003 dollars. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure A1. State Cigarette Taxes

(a) Panel A: State Cigarette Tax Rates in 2003



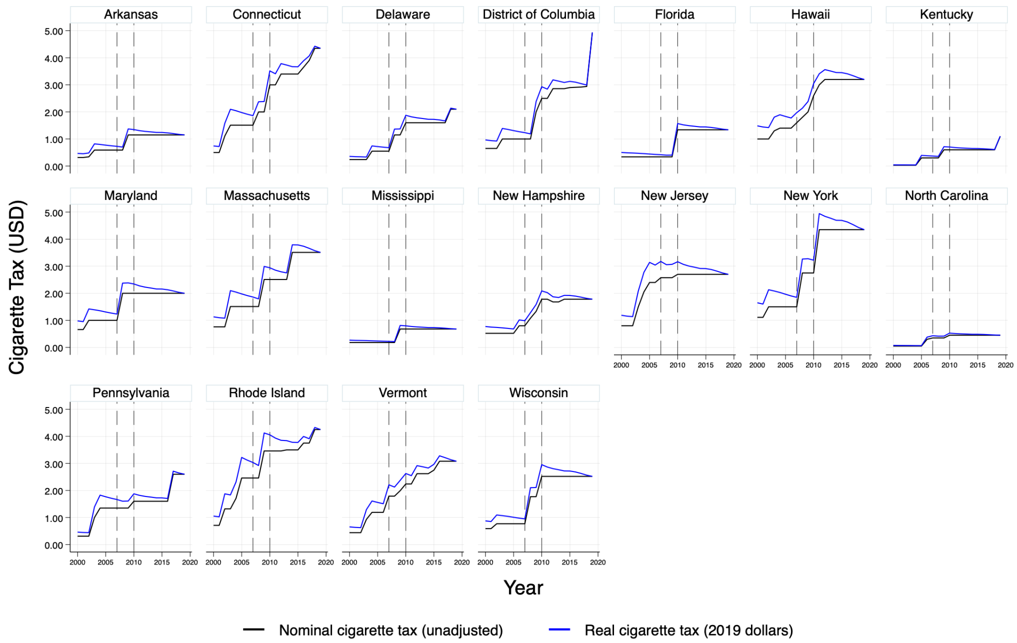
(b) Panel B: State Cigarette Tax Rates in 2009



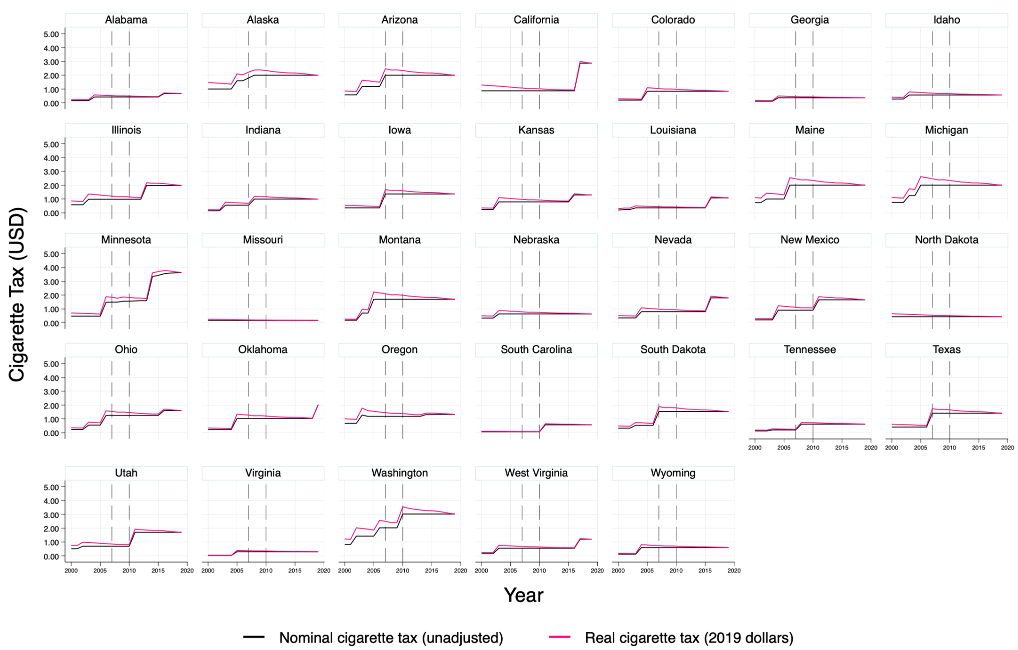
Notes: The figure shows state cigarette excise tax rates (USD per pack of 20 cigarettes) in 2003 (Panel A) and 2009 (Panel B). Darker shading denotes higher tax rates. All values are reported in nominal terms.

Figure A2. State Cigarette Tax Trends During the Great Recession

(a) Panel A: States That Increased Cigarette Taxes During the Great Recession



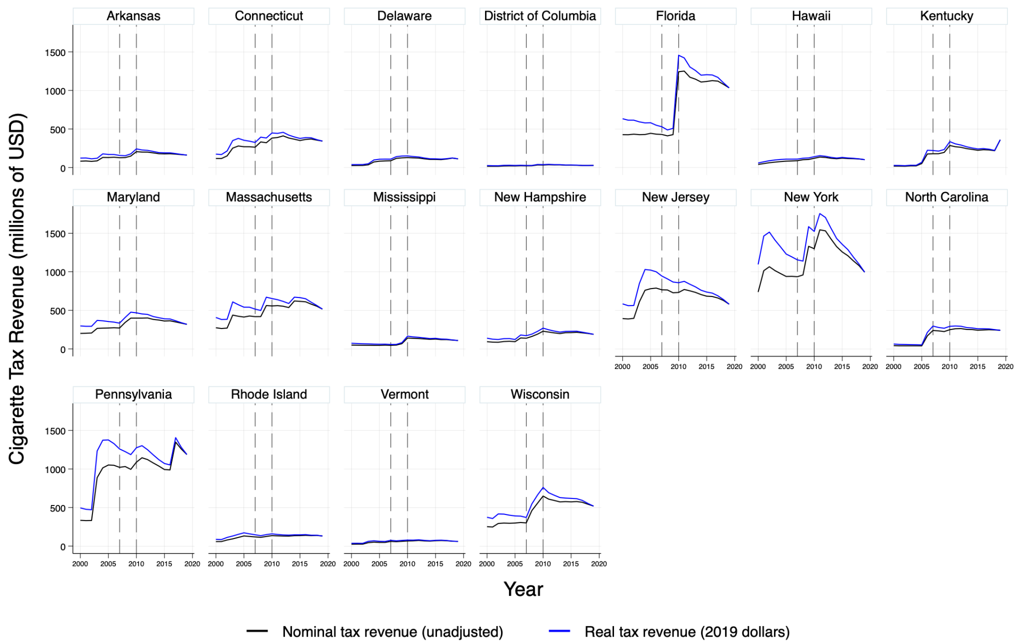
(b) Panel B: States That Did Not Increase Cigarette Taxes During the Great Recession



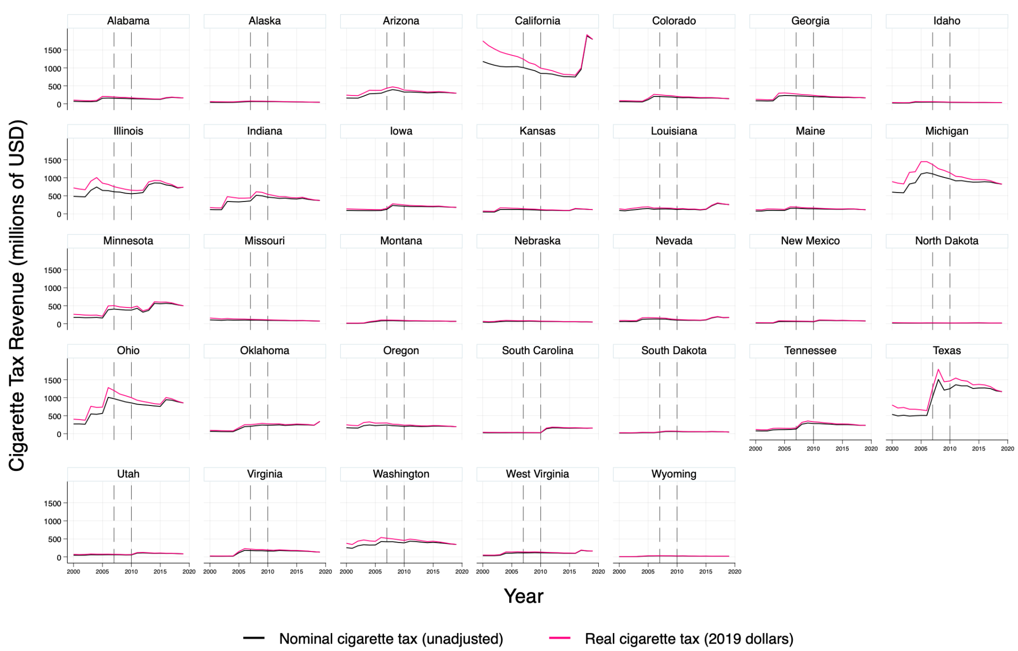
Notes: This figure plots annual state cigarette tax rates (USD) from 2000 to 2019. Panel A includes states that increased their cigarette taxes in 2008 or 2009; Panel B includes those that did not. Vertical lines indicate 2007 and 2010.

Figure A3. State Cigarette Tax Revenue Trends During the Great Recession

(a) Panel A: States That Increased Cigarette Taxes During the Great Recession



(b) Panel B: States That Did Not Increase Cigarette Taxes During the Great Recession



Notes: This figure plots annual state cigarette tax revenue (millions of USD) from 2000 to 2019. Panel A includes states that increased cigarette taxes in 2008 or 2009; Panel B includes those that did not. Vertical lines indicate 2007 and 2010.

Appendix: Calculation of the Revenue-Maximizing Cigarette Tax

A.1 Baselines and Notation

We take as given the following baseline objects:

- Baseline retail price (tax-inclusive): $P_0 = \$7.00$ per pack.
- Baseline specific excise tax: $\tau_0 = \$2.00$ per pack.
- Baseline pre-tax (producer) price: $c = P_0 - \tau_0 = \$5.00$ per pack.
- Baseline annual sales: $Q_0 = 11$ billion packs (see Centers for Disease Control and Prevention (2023); U.S. Department of the Treasury, Alcohol and Tobacco Tax and Trade Bureau (2025)).
- Benchmark price elasticity of demand at (P_0, Q_0): $\varepsilon \in \{-0.50, -0.40, -0.30, -0.20, -0.15, -0.10\}$.

A.2 Demand Specification and Calibration

We model demand as linear in the *retail price* $P = c + \tau$:

$$Q(P) = a - bP. \tag{2}$$

We calibrate (a, b) so that the point elasticity of demand at (P_0, Q_0) equals the target ε. By definition,

$$\varepsilon \equiv \frac{dQ}{dP} \cdot \frac{P_0}{Q_0} = (-b) \cdot \frac{P_0}{Q_0} \quad \Rightarrow \quad b = -\,\varepsilon\,\frac{Q_0}{P_0}. \tag{3}$$

Imposing $Q(P_0) = Q_0$ in (2) implies

$$Q_0 = a - bP_0 \quad \Rightarrow \quad a = Q_0 + bP_0. \tag{4}$$

Equations (3)–(4) determine (a, b) for any chosen ε.

A.3 Tax Revenue and the Optimal Tax

Let τ denote the specific excise tax per pack; the retail price is $P = c + \tau$. Tax revenue is

$$\begin{aligned} R(\tau) &= \tau \cdot Q(c+\tau) \;=\; \tau\,[\,a - b(c+\tau)\,] \\ &= \tau\,[\,a - bc\,] \;-\; b\,\tau^2. \end{aligned} \tag{5}$$

The revenue-maximizing tax τ^* solves the first-order condition $R'(\tau) = 0$, i.e.,

$$R'(\tau) \;=\; [\,a - bc\,] \;-\; 2b\tau \;=\; 0 \quad\Rightarrow\quad \tau^* = \frac{a - bc}{2b}\,. \tag{6}$$

Using (3)–(4) and $c = P_0 - \tau_0$, a convenient closed form is

$$\tau^* \;=\; \frac{Q_0/b + \tau_0}{2} \;=\; \frac{P_0/|\varepsilon| + \tau_0}{2}\,, \tag{7}$$

which makes transparent that more elastic demand (larger $|\varepsilon|$) implies a smaller τ^*.

A.4 Quantities and Revenues at the Optimum

Given τ^* from (6) (or (7)), the implied retail price is

$$P^* = c + \tau^*, \tag{8}$$

the optimal quantity is

$$Q^* = Q(P^*) = a - bP^*, \tag{9}$$

and optimal revenue is

$$R^* = \tau^* \cdot Q^*. \tag{10}$$

We report Q^* in billions of packs and R^* in billions of dollars.

A.5 Step-by-Step Example: $\varepsilon = -0.30$

(i) Calibrate demand.

$$b = -(-0.30)\cdot\frac{11}{7} = 0.471429 \quad \text{(B packs/\$)}, \qquad a = 11 + 0.471429 \times 7 = 14.3000 \quad \text{(B packs)}.$$

(ii) Optimal tax.

$$\tau^* = \frac{P_0/|\varepsilon| + \tau_0}{2} = \frac{7/0.30 + 2}{2} = \frac{23.3333 + 2}{2} = 12.6667 \approx \$12.67.$$

(iii) Optimal price, quantity, revenue.

$$P^* = c + \tau^* = 5 + 12.6667 = 17.6667, \qquad Q^* = 14.3000 - 0.471429 \times 17.6667 = 5.97 \text{ B packs},$$

$$R^* = 12.6667 \times 5.97 = 75.64 \text{ B\$}.$$

A.6 Replication for Each Elasticity

Repeat the steps above for each ε:

1. Compute $b = -\varepsilon\, Q_0/P_0$ and $a = Q_0 + bP_0$.
2. Compute $\tau^* = (P_0/|\varepsilon| + \tau_0)/2$.
3. Compute $P^* = c + \tau^*$, then $Q^* = a - bP^*$, and $R^* = \tau^* Q^*$.

For convenience, the resulting values used in Table ?? are:

ε	-0.50	-0.40	-0.30	-0.20	-0.15	-0.10
τ^* (\$)	8.00	9.75	12.67	18.50	24.33	36.00
Q^* (B)	6.29	6.13	5.97	5.81	5.74	5.66
R^* (B\$)	50.29	59.75	75.64	107.56	139.57	203.66

The "Max R (Index)" in the table normalizes R^* by the maximum across rows and multiplies by 100 (thus equals 100 at $\varepsilon = -0.10$ in our calibration).

A.7 Discussion and Caveats

Two modeling choices drive the finite interior solution: (i) demand depends on the *retail price* $P = c + \tau$ (not on the tax alone), and (ii) demand has a finite choke price (here via linearity). Using an isoelastic demand in *tax* alone, $Q(\tau) = Q_0(\tau/\tau_0)^{\varepsilon}$, yields no interior revenue maximum for $-1 < \varepsilon < 0$ because $R(\tau) = \tau Q(\tau)$ is monotone in τ. Our linear price-based calibration avoids that pathology and aligns with standard public-finance treatments of excise taxation.