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THE IMPACT OF THE 2009 FEDERAL TOBACCO EXCISE TAX INCREASE ON YOUTH TOBACCO USE

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ABSTRACT

This study examined the impact of the 2009 federal tobacco excise tax increase on the use of cigarettes and smokeless tobacco products among youth using the Monitoring the Future survey, a nationally representative survey of 8th, 10th, and 12th grade students. The results of this analysis showed that this tax increase had a substantial short-term impact. The percentage of students who reported smoking in the past 30 days dropped between 9.7% and 13.3% immediately following the tax increase, depending on model specifications, and the percentage of students who reported using smokeless tobacco products dropped between 16% and 24%. It is estimated that there would have been approximately 220,000 – 287,000 more current smokers and 135,000 – 203,000 more smokeless tobacco users among middle school and high school students (age 14 – 18) in the United States in May 2009 had the federal tax not increased in April 2009. The long-term projected number of youth prevented from smoking or using smokeless tobacco that resulted from the 2009 federal tax increase could be much larger given the resulting higher tobacco prices would deter more and more children from initiating smoking and smokeless tobacco use over time.

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Introduction

In February 2009, the Children's Health Insurance Program Reauthorization Act (CHIPRA) was approved by Congress and signed by President Obama. CHIPRA increased federal excise tax rates on tobacco products, effective April 1, 2009, to fund the Children's Health Insurance Program (CHIP) (formerly the State Children's Health Insurance Program (SCHIP)), a program that helps states insure low-income children who are ineligible for Medicaid but cannot afford private insurance (TTB 2010). The increase of federal tobacco product excise tax rates after CHIPRA is summarized in Table 1.

Table 1. Federal Excise Tax Rates on Selected Tobacco Products

Product	Pre-CHIPRA tax rate	Post-CHIPRA tax rate (Effective April 1, 2009)	Floor Stocks Tax Rate
Small Cigarettes - Class A *(Weigh 3 lbs. or less per 1,000)*	$19.50 per 1,000 equivalent to: $0.39 per pack	$50.33 per 1,000 equivalent to: $1.0066 per pack	$30.83 per 1,000 equivalent to: $0.6166 per pack
Large Cigarettes - Class B *(Weigh more than 3 lbs. per 1,000)*	$40.95 per 1,000	$105.69 per 1,000	$64.74 per 1,000
Small Cigar *(Weigh 3 lbs. or less per 1,000)*	$1.828 per 1,000	$50.33 per 1,000	$48.502 per 1,000
Large Cigars *(Weigh more than 3 lbs. per 1,000)*	20.719% of sales price but not to exceed $0.04875 per cigar	52.75% of sales price but not to exceed $0.4026 per cigar	Not part of floor stocks tax
Chewing Tobacco	$0.195 per pound	$0.5033 per pound	$0.3083 per pound
Snuff	$0.585 per pound	$1.51 per pound	$0.925 per pound
Pipe Tobacco	$1.0969 per pound	$2.8311 per pound	$1.7342 per pound
Roll-your-own Tobacco	$1.0969 per pound	$24.78 per pound	$23.6831 per pound
Cigarette Papers	$0.0122 per 50	$0.0315 per 50	$0.0193 per 50
Cigarette Tubes	$0.0244 per 50	$0.0630 per 50	$0.0386 per 50

Source: Alcohol and Tobacco Tax and Trade Bureau, U.S. Department of Treasury, 2010

In addition to the tax increase, CHIPRA imposed a floor stocks tax of the difference between the new tax rate and the old tax rate on all tobacco products (except large cigars) held for sale on

April 1, 2009. This tax was imposed on the inventories of wholesalers and retail dealers, as well as manufacturers and importers, to prevent stockpiling.

The 2009 federal tobacco excise tax increase was significant both in terms of its magnitude and its impact on tobacco product retail prices. For example, the new tax rate on a pack of 20 cigarettes (100.66 cents per pack) is 61.66 cents higher than the old rate (39 cents per pack) and represents a 158% increase. To put this into context, the federal cigarette excise tax had increased only five other times since 1951[1], and none of these increases were comparable to the 2009 increase in its size. All five of these increases were no more than 10 cents per pack in magnitude. The only one that came close in terms of percent increase was a 1983 tax increase where the federal cigarette excise tax rate doubled from 8 cents to 16 cents. The significance of the 2009 federal tobacco excise tax increase was also evident when compared to state average cigarette excise tax rates of approximately 120 cents per pack in April 2009.

More important, the 2009 federal tobacco tax increase resulted in an immediate jump in tobacco product prices. As reported by the Bureau of Labor Statistics of the U.S. Department of Labor, cigarette price jumped 22% from February to April 2009. In addition, price for other tobacco products increased 12% during the same period (BLS, 2009).

This paper investigates the changes in youth current smoking prevalence and use of smokeless tobacco following the April 2009 federal tobacco excise tax increases using the Monitoring the Future (MTF) survey, a nationally representative survey of 8th, 10th, and 12th grade students. It

examines the differences in youth smoking prevalence and use of smokeless tobacco before and after the tax increase, controlling for a wide range of individual, familial, and school level characteristics, as well as for state level tobacco control policies.

This research contributes to the youth smoking literature in a number of ways. It is the first study to investigate the impact of the largest federal tobacco tax increases in U.S. history on youth tobacco use. By examining youth tobacco use immediately before and after the tax increase, taking advantage of the coincidence of the timing of the Monitoring the Future survey and the tax increase, this study was able to pinpoint the behavioral changes due to the 2009 tax increase. In addition, it examined the short-term/immediate impact of a tax increase, an important issue that previous studies using annual data were not able to address. The pre- and post-tax increase research design used in this study alleviated, though may not completely eliminate, much of the impact of the simultaneity bias and the omitted variable bias that arise from the complex relationships between smoking behavior, state level tobacco control policies, and (usually unobserved) state anti-smoking sentiment.

Because the tax increase was at the national level, this study also avoided the problem of cross state/county/city border cigarette purchasing behavior that arises from the differential tax rates in different jurisdictions, an issue that has not received adequate attention in some previous studies[2]. Additionally, by taking advantage of the sampling strategy of MTF, we were able to corroborate our results by employing a difference-in-difference model, using students who were

[1] Federal cigarette excise tax increased from 8 cents per pack to 16 cents in 1983; to 20 cents in 1991; to 24 cents in 1993; to 34 cents in 2000; and to 39 cents in 2002.

not affected by the tax increase as a control group, to tease out the differences in smoking due to time trend and group difference. Finally, this study examined the impact of this tax increase on youth smokeless tobacco product use, a topic that few previous studies have looked at.

The next section of this paper briefly discusses a selected number of previous studies on youth smoking, placing this study in the context of the relevant literature. It is followed by a section that describes the data and statistical models used in this research. After that, the results from this study's analyses are presented. This paper concludes by discussing the implications from these results, and by summarizing the impact of the 2009 federal tobacco tax increase on youth smoking and the use of smokeless tobacco products.

Background and Context

There are a large and growing number of studies that examine the impact of cigarette price on youth smoking behavior in the U.S. Conducting a detailed literature review is beyond the scope of this study, however chapter 6 of the IARC monograph on the impact of tobacco tax and price on tobacco use (IARC 2011) provides an excellent and comprehensive review on this topic. One of the consistent findings from many previous studies is that cigarette prices have a negative impact on youth smoking prevalence. The price elasticity of smoking prevalence among youth in the U.S. has been found to be more elastic than that among adults, ranging from -0.1 to -1.2, with most of studies falling on the higher end (in absolute value) of the range -0.6 to -1.2[3]. With few

[2] It is worth noting, however, that cross border purchase behavior is more of an issue for adults than it is for adolescents.

[3] For example, among studies that using cross-sectional data, the price elasticity of smoking prevalence among youth in the U.S. was found to be -1.2 in Lewit et al., (1981) for those age 12 to 17; -0.74 in Lewit & Coate (1982) for those age 20 -25; -0.68 in Chaloupka & Grossman

exceptions, these studies have examined youth smoking behavior by taking advantage of natural experiments that result from government changes in tobacco product taxes and/or prices, which resulted in the significant spatial (i.e. state and local) and temporal (i.e. over time) changes in tobacco taxes in the U.S. over the past several decades.

Much of the earlier work on this topic used cross-sectional data and consistently found that higher cigarette prices reduce youth smoking prevalence (Lewit et al., 1981; Lewit & Coate, 1982; Chaloupka & Grossman, 1996; Chaloupka & Wechsler, 1997; CDC, 1998; Evans & Farrelly, 1998; Harris and Chan, 1999; Chaloupka & Pacula, 1999). One of the limitations of using cross-sectional data is state cigarette taxes and other tobacco control policies are likely to be correlated with individuals' smoking attitudes and sentiment in those states. If not properly addressed, a typical cross-section analysis biases the impact of cigarette prices upward, attributing too much explanatory power to taxes and other tobacco control policies.

(1996) for those age 14 – 18; -0.54 in Chaloupka & Wechsler (1997) among college students; -0.87 in Lewit et al. (1997) among 9th graders; -0.37 in a CDC report (CDC 1998) for those age 18 -24; -0.58 in Evans & Farrelly (1998) for those age 18-24; -0.93 in Chaloupka & Pacula (1999) among high school students in the MTF surveys; -0.83 in Harris & Chan (1999) among those age 15-17; close to -0.1 in Dee (1999) among high school students in the 1985 – 1992 MTF sample; -0.83 in Emery et al. (2001) among those age 14-22; -0.33, -0.66 and -1.5 in Gruber & Zinman (2001) using Vital Statistic Natality data, MTF data, and Youth Risk Behavior Surveys (YRBS) data, respectively; -0.3 in Farrelly et al. (2001) among those age 18-24; -0.27 in Sloan and Trogdon (2004) for those age 18-20; -0.35 in Ross & Chaloupka (2004, 2005) among high school students; and -0.56 in Carpenter & Cook (2008) among those age 14 and above in YRBS. In addition, among studies using longitudinal data, the price elasticity of youth smoking prevalence was found to be -0.1 in Tauras & Chaloupka (1999) among high school students; and -0.31 in Tauras et al. (2005) among those age 12-16. Additionally, there are a couple studies that found no significant statistical price impact on youth smoking prevalence (DeCicca et al. 2008a and 2008b).

Researchers have long recognized this omitted variables bias problem and have used a variety of methods to address it. A typical way to alleviate this bias is by including a control that measures state anti-smoking sentiment, such as a composite index that measures state aggregated smoking beliefs and attitudes, an indicator for tobacco growing states, or other proxy measures such as the percentage of state residents who are religious. An alternative approach is to use quasi-experimental methods exploiting changes of state level tobacco control policies within a state over time by including year and state fixed effects. To the extent that anti-smoking sentiment does not change over time in a state, this approach can purge tax/price and other policy estimates from this bias.

Studies that used quasi-experimental methods have also found a significant negative impact of cigarette prices on youth smoking prevalence (Farrelly et al., 2001; Gruber and Zinman, 2001; Sloan and Trogdon, 2004; Tauras et al.,2005; Carpenter & Cook, 2008). Unlike the price elasticity estimates from early studies, the estimates from those studies using quasi-experimental methods tend to be smaller, ranging from -0.3 to -0.5. One of the explanations for the smaller estimates from quasi-experimental studies is that year and state fixed effects generally explain a vast proportion of variations in state price/tax, and as a result absorb much more price/tax impact in the model. In addition, a fixed effects model relies on within-state price/tax variations, which until recently have been relatively small. As a result, it is difficult to detect the impact of price/tax policies using fixed effects models. While a fixed effects model can address the omitted variable bias, it is an inadequate method in dealing with the simultaneity bias if smoking behavior changes lead to changes in state tobacco control policies and state anti-smoking sentiment.

Another issue that has not received much attention from the previous studies is the cross state/county/city border cigarette purchasing behavior that arises from the differential tax rates in different jurisdictions. Researchers have long been aware of this issue, and a number of earlier studies have explicitly addressed this issue by restricting samples to those who do not live close to state borders (Lewit & Coate, 1982; Chaloupka & Grossman, 1996; Chaloupka & Wechsler, 1997). If not properly addressed, cross-border purchases tend to bias the estimates of price/tax upward, attributing too much of the decline in cigarette consumption in higher tax jurisdictions to price/tax policies. It is worth noting, however, that cross border purchase behavior is more of an issue for adults than it is for adolescents.

This study examines youth tobacco use immediately before and after the 2009 tax increase, controlling for a rich set of individual, familial, and school level characteristics as well as state level tobacco control measures, including state cigarette tax, smoke-free air policies, and tobacco control funding. Since national level anti-smoking sentiment is unlikely to vary significantly in such a short period of time, its estimates are less likely to be biased by the omitted anti-smoking sentiment variable. In addition, because this study was able to examine behavior right before and after the tax increase, its results are less likely to suffer from simultaneity bias or reverse causality between policy change and behavioral change. Moreover, because the tax increase was at a national level, this study avoids the bias from cross state/county/city border cigarette purchasing behavior that arises from the differential tax rates in different jurisdictions[4]. Given the large magnitude of this tax increase, it allowed better measurement of its impact. This

provided an advantage over recent quasi-experimental studies that utilize fixed effects models relying on within-state variations in tax over time, which have tended to be small in size until recent years.

Data

Data on youth smoking and use of smokeless tobacco come from the 2008 and 2009 Monitoring the Future (MTF) surveys. MTF is an ongoing long-term study of drug use among American adolescents that has been conducted annually by the University of Michigan's Institute for Social Research since its inception in 1975[5] and is funded by the National Institute on Drug Abuse. The MTF survey uses a multistage sampling design to obtain nationally representative samples of 8th-, 10th-, and 12th-grade students, with modal ages of 14, 16, and 18 years, respectively. In 2009, MTF surveyed about 46,000 8^{th}, 10^{th}, and 12^{th} grade students in 389 secondary schools nationwide. The smoking variable used in this study is derived from a question from the MTF survey "How frequently have you smoked cigarettes during the past 30 days?" A dichotomous variable was created, taking the value of 1 if a respondent reported any days of smoking, and zero otherwise. A similar dichotomous variable was created for use of smokeless tobacco products, employing the question "How frequently have you used smokeless tobacco (snuff, plug, dipping tobacco, chewing tobacco) during the past 30 days?" Unlike the current smoking question, which was asked among all survey respondents, the smokeless tobacco question was

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[4] There still may be cross country border purchasing behavior, i.e. purchasing tobacco products by crossing U.S.-Canada or U.S.-Mexico borders.

[5] MTF has conducted in-school surveys of nationally representative samples of 12th-grade students each year since 1975 and 8th- and 10th-grade students each year since 1991. In addition, beginning with the class of 1976, the project has conducted follow-up mail surveys on representative subsamples of the respondents from each previously participating 12th-grade class. These follow-up surveys now continue well into adulthood.

only asked randomly among one sixth of all MTF respondents due to the survey design. As a result, the analysis on use of smokeless tobacco products was only performed on the sample that was asked about their use of smokeless tobacco products.

The MTF survey is conducted from February through May each year. As a result, the 2009 MTF survey coincided with the 2009 federal tobacco tax increase. Given the nature of the smoking and smokeless tobacco questions, which asked about respondents' behavior in the past 30 days, and the date the tax increase became effective, three different methods were used to distinguish the pre- and post-tax increase respondents. In the first version, respondents who were surveyed before April 16, 2009 were classified as pre-tax increase respondents, while those surveyed on and after April 16, 2009 were classified as post-tax increase respondents. A dichotomous variable capturing the post-tax increase respondents was then created with the value of 1 indicating a respondent was surveyed after April 16 2009, and a value of 0 otherwise. In the second version, those who were surveyed before a cutoff date of May 1 2009 were considered pre-tax respondents, and those surveyed on and after May 1 2009 were considered otherwise. In the third version, students surveyed in the month of April 2009 were dropped from analysis, those surveyed before April 1 2009 were considered pre-tax increase respondents, and those surveyed on and after May 1 were considered post-tax increase respondents.

Each MTF school is surveyed twice in two consecutive years, and each year MTF rotates out one nationally representative, replicate half-sample of the schools on the panel, so in any given year that half of the schools are in for the first time and half for the second time. As a result, half of the schools surveyed in 2008 were also surveyed in 2009. Taking advantage of this unique

feature of MTF, and using the half sample surveyed in both 2008 and 2009, a control group was constructed from schools that were surveyed anytime in 2008 but were surveyed before the tax increase in 2009, as well as a treatment group of schools that were surveyed anytime in 2008 but were surveyed after the tax increase in 2009.

Using a difference-in-difference approach, comparing youth smoking prevalence and use of smokeless tobacco in two groups in 2008 and 2009, the impact of secular trend and other confounding factors could be teased out. The influence of secular trend was examined by controlling for the differences in tobacco use among students surveyed in 2008 and in 2009 using a year indicator in the regression. In addition, tests could be done to examine whether the drop in tobacco use among the treatment group in 2009 was due to unobserved characteristics of individuals, schools, or communities that may cause tobacco use in treatment group systematically different from that among the control group. In this case, similar between-group differences in tobacco use should have been observed in 2008 as well, which could be tested.

In addition to the pre- and post-tax increase indicators, this study included a rich set of individual, familial, school, and state level controls. Individual level controls included gender, age, the grade the students were in, students' race/ethnicity, and weekly income. The living arrangement (living alone, with one's mother only, with one's father only, and with both parents) of students were also included, as well as mothers' education and working status. School characteristics included public versus private school, and the type of high school (prep high schools, general high schools, vocational schools). The analysis also controlled for whether students live in an urban versus a rural area.

State level tobacco control policy data, state excise tax rates on tobacco products, state smoke-free air polices, and state tobacco control funding came from the Bridging the Gap (BTG) /ImpacTeen project's State Tobacco Control Policy Surveillance system, which tracks state level tobacco control policies such as price/tax/funding, youth access laws, smoke-free air laws, and smoke-free air preemption laws, as well as state smoking prevalence. BTG/ImpacTeen is led by a research team at the Health Policy Center at the University of Illinois at Chicago. Its goal is to improve the understanding of how policies and environmental factors affect diet, physical activity and obesity among youth, as well as youth tobacco use.

Because BTG/ImpacTeen tracks the exact date a new state tax or smoke-free air policy becomes effective, the state level tax and smoke-free air policy data could be merged to the MTF student data based on the date a student was surveyed and the state a student lives in. State excise tax rate was the tax rate on the date a student was surveyed in the state a student lived in, expressed in cents per pack for cigarettes and in percentage of the wholesale/manufacture price for smokeless tobacco. The smoke-free air policy variable was an index that captured state smoke-free air laws and preemption laws at private workplaces, restaurants, and bars. This was also merged to MTF student data based on the date a student was surveyed and the state a student lived in. The tobacco control funding variable measured the monthly funding a state committed to tobacco control activities, calculated based on annual funding from various sources with different funding years. This data was also merged to the MTF data based on month and state.

Statistical Model

A straightforward econometric model was used to estimate differences in smoking and use of smokeless tobacco before and after the 2009 tax increase. The two dependent variables are two dichotomous variables that capture smoking and use of smokeless tobacco in the preceding 30 days before the survey, as described in the previous section. Specifically, the following model was estimated:

$$\text{Tobacco Use} = \beta_0 + \beta_1 * \text{PostTax} + \beta_2 * X + \beta_3 * Z + \varepsilon \quad (1)$$

PostTax was a dichotomous variable that captured the post-tax increase period as described earlier in this paper, which had three different versions depending on the cutoff dates and whether the April 2009 sample was included or not. β_1 captured the changes in smoking and use of smokeless tobacco after the tax increase. It measured the impact of the 2009 tax increase on youth smoking and use of smokeless tobacco products. X was a vector of individual, familial and school level characteristics described in the data section. Z was a vector of state level tobacco control policies, which included state excise tax rates on tobacco products, state smoke-free air policies, and state tobacco control funding. ε was the idiosyncratic error term. Due to the nature of the dependent variables, the model could be estimated using Probit, Logit or OLS models. However, it turned out that the results were independent of the choice of these three models, with the estimated coefficients from OLS practically identical to the marginal effects from Probit and Logit models. For the ease of interpretation of the results, only the OLS results are presented. All analyses in this paper have taken into account the complex survey design of MTF and clustered at the school level.

The reason to control for a rich set of individual, familial, school, and state level characteristics was to ensure that differences in youth smoking and use of smokeless tobacco was a result of the federal tax increase, and not driven by the variations in individual, familial, school and state characteristics that may confound the impact of the federal tax increase. One of the concerns was that students who were surveyed after the tax increase may be systematically different from those who were surveyed before the tax increase, in ways that may affect their smoking behavior and use of smokeless tobacco products. Controlling for a variety of individual, familial, school and state level characteristics was designed to mitigate its impact on the study's estimates[6]. Nevertheless, a difference-in-difference approach was employed to corroborate the result, as discussed above in the previous section, to tease out the impact of secular trend and other confounding factors.

The method looked at the differences in use of cigarettes and smokeless tobacco products within each group between 2008 and 2009, and differences across groups in both years. The hypothesis was that, after controlling for secular trend and observed individual, familial, school, and state characteristics, use of cigarettes and smokeless tobacco should not be different between the control group and the treatment group in 2008; however, use of cigarettes and smokeless tobacco would be lower among the treatment group in 2009, compared to the control group. Specifically, the following difference-in-difference model was estimated:

[6] The observed characteristics between the pre-tax and post-tax group were similar. In addition, the month of being surveyed in 2009 for a school did not predict its month of being surveyed in 2008.

$$\text{Tobacco Use} = \beta_0 + \beta_1 * \text{Year 2009} + \beta_2 * \text{Treatment Group} + \beta_3 * (\text{Year 2009} * \text{Treatment Group}) + \beta_4 * X + \beta_5 * Z + \varepsilon \quad (2)$$

Year 2009 was a dichotomous indicator of being surveyed in 2009, which captured the difference in use of cigarettes and smokeless tobacco between 2008 and 2009. The "Treatment Group" was a dummy variable that indicated whether a student was in the treatment group, i.e. schools which were surveyed after the tax increase. β_2 captured the difference between the control group and the treatment group. β_3 captured the interaction between year dummy and the treatment group, representing the difference between the control group and the treatment group between 2008 and 2009 (difference-in-difference) and the key parameter of interest.

Results

The summary statistics are presented in the appendix table. In the 2009 MTF sample, about 13% of the 8^{th}, 10^{th}, and 12^{th} grade students reported smoking in the past 30 days. The prevalence of smokeless tobacco use in the preceding month among students is 5%. This sample was evenly split between boys and girls, with an average age of 15.5. 8^{th}, 10^{th} and 12^{th} graders each consist of about one third of the sample. 58% of students identify themselves as White, 16% as Hispanic, 12% as Black, and 13% as other race/ethnicity. The vast majority of schools surveyed were public schools (92%) in urban areas (82%). Approximately 44% are prep high schools, a quarter are general high schools, and 5% are vocational schools. Most students live with both parents (72%), and 61% of mothers work full time. About 11% of mothers do not have a high school degree.

Table 2. Smoking and Use of Smokeless Tobacco Before and After the 2009 Federal Tobacco Tax Increase

	Pre Fed Tax Increase		Post Fed Tax Increase				
4/16/2009 as Cutoff Date	Obs	Mean	Obs	Mean	Diff. in Mean	Pct. Decrease	
Cigarette Smoking	18238	13.44%	25151	12.36%	-1.08%	8.06%	**
Smokeless Tobacco	6884	6.08%	9481	4.99%	-1.09%	17.90%	***
5/1/2009 as Cutoff Date							
Cigarette Smoking	29175	13.46%	14214	11.48%	-1.98%	14.68%	***
Smokeless Tobacco	10689	6.06%	5676	4.22%	-1.84%	30.37%	***
April 2009 Obs. Dropped							
Cigarette Smoking	12288	13.40%	14214	11.48%	-1.92%	14.29%	***
Smokeless Tobacco	4804	6.06%	5676	4.22%	-1.83%	30.29%	***

Note: * significant at 0.05 level; ** significant at 0.01 level; *** significant at 0.001 level.

Table 2 presents the percent of 8^{th}, 10^{th} and 12^{th} students in the 2009 MTF who reported smoking in the past 30 days, as well as the percent of students who reported use of smokeless tobacco in the past 30 days, before and after the tax increase. The top panel shows the results using April 16 2009 as the cutoff date. Before April 16 2009, 13.44% of students reported smoking in the past 30 days, after April 16 2009, the percent of students who reported smoking dropped to 12.36%, an 8% decrease. Use of smokeless tobacco among the MTF students dropped 18% after the tax increase, decreasing from 6.08% to 4.99%. The middle panel of Table 2 presents the similar comparisons using May 1 2009 as the cutoff date. Among students surveyed before May 1 2009, 13.66% reported smoking in the past 30 days, and 6.06% reported using smokeless tobacco. Among those surveyed after May 1 2009, 11.48% reported smoking and 4.22% reported using smokeless tobacco, equivalent to a 14% drop in smoking and a 30% drop in the use of smokeless tobacco.

The third panel in Table 2 shows the prevalence of current smoking and use of smokeless tobacco among students who were surveyed before April 1 2009, in comparison with the

prevalence among those who were surveyed after May 1 2009. The prevalence of current smoking among the MTF students decreased by 14% after the federal tobacco tax increase, as did the prevalence of smokeless tobacco use, which dropped by 30%. The changes in smoking and use of smokeless tobacco prevalence before and after the federal tobacco excise tax increase presented in Table 2 represent simple differences without adjusting for other observed characteristics. Table 3 presents the differences in smoking before and after the tax increase, controlling for a rich set of individual, familial, school, and state level characteristics.

Table 3. Smoking Prevalence: 2009 MTF Sample

	Model 1			Model 2		
	April 16 2009 as cutoff date	May 1 2009 as cutoff date	April 2009 sample dropped	April 16 2009 as cutoff date	May 1 2009 as cutoff date	April 2009 sample dropped
Post Fed Tax Increase	-0.012**	-0.012*	-0.017**	-0.009*	-0.010*	-0.013*
	0.006	0.006	0.008	0.005	0.006	0.007
State Cigarette Tax				-0.00005	-0.00005	-0.00005
				0.00004	0.00004	0.00004
State SFA Policy Index				-0.004***	-0.004***	-0.003**
				0.001	0.001	0.001
State Tobacco Ctrl Funding				-0.00007	-0.00007	-0.00007
				0.0001	0.0001	0.0001
Observations	43389	43389	26502	43389	43389	26502

All models include the following covariates: age, grade level (8th and 10th grader indicators (12th grader as reference category)), gender (female indicator), public school, high school type (prep (reference category), general, vocational, other type), race/ethnicity (Non-Hispanic whites (reference category), non-Hispanic blacks, non-Hispanic other, Hispanics), urban/rural indicator, living arrangement (living with both parents (reference category), living with father, living with mother, living with others, living alone), mother's education, mother's employment status, and student's weekly income.
*p<0.10, **p<0.05, ***p<0.01

Two different sets of models were estimated in Table 3. The first set of models did not control for state level tobacco control policies, while the second set controlled for state smoke-free air policies and state tobacco control funding as well as state level cigarette excise tax rates. Each set of models were estimated three times using three different definitions of pre- and post-tax increase as discussed in the previous section.

Results in Table 3 indicate the rate of smoking in the past 30 days among the MTF students dropped after the 2009 federal tobacco tax increase. The estimated magnitude of this drop was close to 1.3 percentage points, representing a 9.7% decrease in current smoking prevalence. The estimated coefficient of the post tax increase variable ranges from -0.9 to -1.7 (in percentage points), with the majority concentrated around -1.3 percentage points, regardless of cutoff dates or whether April 2009 sample was included or not. Controlling for state level tobacco control polices reduced the magnitude of the coefficient of the tax increase slightly by about 0.3 percentage points, however, it did not qualitatively alter the importance of the impact of the federal tax increase. The estimated coefficients of the tax increase were bigger (in absolute value) in the models when the April 2009 sample was dropped, and smaller in the models using April 16 as cutoff date. This was consistent with the timing of the tax increase and how the smoking question was phrased, because a portion of the students surveyed in April 2009 may not have been affected by the federal tax increase given the questions asked about their smoking behavior in the past thirty days.

Table 4 presents the results that used both the 2008 and 2009 MTF surveys. The inclusion of the 2008 MTF data tested the sensitivity of the results in Table 3, ensuring that the drop in smoking prevalence was due to the tax increase and not a result of unobserved patterns that are unique to the 2009 MTF data, which may confound the results. In addition, adding the 2008 MTF increased the sample size for the analysis, particularly for the analyses related to use of smokeless tobacco products, as the smokeless tobacco question was only asked among one sixth of all MTF students, and the rate of use of smokeless tobacco was low (only about 6%) to begin

with. The analysis with both 2008 and 2009 MTF data included a dichotomous variable that indicated the year in which students were surveyed. Students from 2008 MTF were classified as pre-tax increase respondents.

Table 4. Smoking Prevalence: 2008 and 2009 MTF Sample

	Model 1			Model 2		
	April 16 2009 as cutoff date	May 1 2009 as cutoff date	April 2009 sample dropped	April 16 2009 as cutoff date	May 1 2009 as cutoff date	April 2009 sample dropped
Post Fed Tax Increase	-0.012**	-0.013*	-0.018**	-0.010*	-0.012*	-0.014*
	0.006	0.007	0.008	0.006	0.007	0.007
State Cigarette Tax				-0.00006*	-0.00006*	-0.00006*
				0.00003	0.00003	0.00003
State SFA Policy Index				-0.003***	-0.003***	-0.003***
				0.001	0.001	0.001
State Tobacco Ctrl Funding				-0.0003	-0.0003	-0.0002
				0.0009	0.0009	0.0009
Observations	87343	87343	70456	87343	87343	70456

All models include the following covariates: age, grade level (8th and 10th grader indicators (12th grader as reference category)), gender (female indicator), public school, high school type (prep (reference category), general, vocational, other type), race/ethnicity (Non-Hispanic whites (reference category), non-Hispanic blacks, non-Hispanic other, Hispanics), urban/rural indicator, living arrangement (living with both parents (reference category), living with father, living with mother, living with others, living alone), mother's education, mother's employment status, and student's weekly income.
*p<0.10, **p<0.05, ***p<0.01

The results presented in Table 4 are almost identical to those presented in Table 3. The rate of smoking in the past thirty days dropped between 1 and 1.8 percentage points after the 2009 federal tobacco tax increase, with most models indicating a drop by 1.3 percentage points. The estimated coefficients of the tax increase dummy were slightly higher (about 0.1 percentage point) than those in Table 3. The fact that results in Table 4 are almost identical to those in Table 3 provides strong corroborative evidence of the impact of the 2009 tax increase on youth smoking prevalence.

Analyses of smokeless tobacco use are presented in Table 5 (2009 MTF) and Table 6 (2008 and 2009 MTF). The results in Table 5 indicate the percent of students who reported using smokeless tobacco in the past 30 days dropped between 1 and 1.3 percentage points, depending on model specifications after the tax increase, representing a 16% to 25% decrease in the rate of smokeless tobacco use among youth. Similar to the analysis of smoking, the magnitude of the estimated coefficient for the tax increase was larger in the models without the April 2009 sample, and smaller in models using April 16 2009 as the cutoff date. The coefficient for the tax increase dummy was statistically significant in the models without state level tobacco control polices, but not statistically significant in the models with state level tobacco control polices. The lack of statistical significance is most likely due to the small sample size of smokeless tobacco users.

Table 5. Smokeless Tobacco Prevalence: 2009 MTF Sample

	Model 1			Model 2		
	April 16 2009 as cutoff date	May 1 2009 as cutoff date	April 2009 sample dropped	April 16 2009 as cutoff date	May 1 2009 as cutoff date	April 2009 sample dropped
Post Fed Tax Increase	-0.011*	-0.010*	-0.013*	-0.01	-0.009	-0.012
	0.007	0.006	0.008	0.007	0.006	0.008
State Tax on Smokeless Tobacco				-.00005	-0.00005	-0.00006
				0.0004	0.0004	0.0004
State SFA Policy Index				-0.001	-0.001	-0.002**
				0.001	0.001	0.001
State Tobacco Ctrl Funding				-0.00009	-0.00009	-0.0001
				0.0001	0.0001	0.0001
Observations	16863	16863	10820	16863	16863	10820

All models include the following covariates: age, grade level (8th and 10th grader indicators (12th grader as reference category)), gender (female indicator), public school, high school type (prep (reference category), general, vocational, other type), race/ethnicity (Non-Hispanic whites (reference category), non-Hispanic blacks, non-Hispanic other, Hispanics), urban/rural indicator, living arrangement (living with both parents (reference category), living with father, living with mother, living with others, living alone), mother's education, mother's employment status, and student's weekly income.
*p<0.10, **p<0.05, ***p<0.01

In Table 6, when 2008 MTF data were added, the coefficients of the tax increase variable became statistically significant in models with state level tobacco control policies. The

magnitude of the coefficient of the tax increase variable was extremely close to that presented in Table 5, an indication of the robustness of the results. The estimated coefficient for the year 2009 dummy was positive and statistically significant, suggesting use of smokeless tobacco products among middle school and high school students increased between 2008 and 2009. This increase is likely due to the emergence and aggressive marketing of a variety of new smokeless tobacco products by tobacco industry during this time period (Foulds, 2009; R.J.Reynolds, 2010; Lindenberg 2010).

Table 6. Smokeless Tobacco Prevalence: 2008 and 2009 MTF Sample

	Model 1			Model 2		
	April 16 2009 as cutoff date	May 1 2009 as cutoff date	April 2009 sample dropped	April 16 2009 as cutoff date	May 1 2009 as cutoff date	April 2009 sample dropped
Post Fed Tax Increase	-0.01	-0.011*	-0.014*	-0.009	-0.010*	-0.012*
	0.007	0.006	0.007	0.007	0.006	0.007
State Tax on Smokeless Tobacco				-.00005	-0.00005	-0.00006
				0.0004	0.0004	0.0004
State SFA Policy Index				-0.001	-0.001	-0.002***
				0.001	0.001	0.001
State Tobacco Ctrl Funding				-0.00009	-0.00009	-0.0001
				0.0001	0.0001	0.0001
Year 2009	0.013**	0.014***	0.017***	0.014***	0.015***	0.017***
(Ref Category: 2008)	0.005	0.004	0.006	0.005	0.004	0.006
Observations	33625	33625	27582	33625	33625	27582

All models include the following covariates: age, grade level (8th and 10th grader indicators (12th grader as reference category)), gender (female indicator), public school, high school type (prep (reference category), general, vocational, other type), race/ethnicity (Non-Hispanic whites (reference category), non-Hispanic blacks, non-Hispanic other, Hispanics), urban/rural indicator, living arrangement (living with both parents (reference category), living with father, living with mother, living with others, living alone), mother's education, mother's employment status, and student's weekly income.
*p<0.10, **p<0.05, ***p<0.01

To the extent that students/schools surveyed after the 2009 tax increase may be systematically different from those who were surveyed before the tax increase, estimates of the impact of the tax increase may be biased. While this study controlled for a variety of individual, familial and school level characteristics in its analysis, to further corroborate the results, it used a difference-

in-difference model linking 2008 and 2009 MTF data using school IDs to investigate whether the changes in smoking and use of smokeless tobacco were due to unobserved individual or group (school/community) differences. This difference-in-difference model, specified in the previous data section, allowed us to examine whether changes in smoking and use of smokeless tobacco were due to the difference between the control group and the treatment group (β_2) or due to the drop in the treatment group after the tax increase (β_3). The results from the difference-in-difference model are presented in Table 7 (smoking) and Table 8 (smokeless tobacco).

Results in Table 7 provide strong corroborating evidence that the drop in smoking prevalence among MTF students was driven primarily by the decline in smoking among the treatment group after the tax increase, as indicated by the statistically significant coefficients of the interaction term, and was not driven by the difference between the control and treatment group and year-specific factors. The control and treatment group do not differ in their smoking prevalence, as shown by the estimated coefficients of the treatment group indicator, which are not statistically differ from zero in all model specifications. The magnitude of the estimated coefficients of the interaction term was comparable to that of the coefficients of the tax increase variable in Table 3 and Table 4, further corroborating the robustness of these results. The estimated coefficient of the interaction term suggests that after the tax increase, the smoking prevalence in the experiment group dropped between 1.2 and 2.1 percentage points, representing a 9% to 16% decrease in smoking prevalence.

Table 7. Smoking Prevalence: Difference-in-Difference Model

	Model 1			Model 2		
	April 16 2009 as cutoff date	May 1 2009 as cutoff date	April 2009 sample dropped	April 16 2009 as cutoff date	May 1 2009 as cutoff date	April 2009 sample dropped
Year 2009	0.01	0.006	0.012	0.011*	0.007	0.011
	0.006	0.005	0.007	0.006	0.005	0.007
Treatment Group	0.003	0.002	0.003	0.003	0.001	0.003
	0.006	0.006	0.006	0.006	0.006	0.006
Year 2009*Treatment Group.	-0.015*	-0.014	-0.021**	-0.013*	-0.012	-0.017*
	0.008	0.009	0.01	0.008	0.008	0.008
State Cigarette Tax				-0.00006*	-0.00006*	-0.00006*
				0.00003	0.00003	0.00003
State SFA Policy Index				-0.003***	-0.003***	-0.003***
				0.001	0.001	0.001
State Tobacco Ctrl Funding				-0.00004	-0.00004	-0.00003
				0.00009	0.00009	0.00009
Observations	87343	87343	70456	87343	87343	70456

All models include the following covariates: age, grade level (8th and 10th grader indicators (12th grader as reference category)), gender (female indicator), public school, high school type (prep (reference category), general, vocational, other type), race/ethnicity (Non-Hispanic whites (reference category), non-Hispanic blacks, non-Hispanic other, Hispanics), urban/rural indicator, living arrangement (living with both parents (reference category), living with father, living with mother, living with others, living alone), mother's education, mother's employment status, and student's weekly income.
*p<0.10, **p<0.05, ***p<0.01

Table 8 presents the analysis of use of smokeless tobacco using the difference-in-difference model. Similar to the analysis of smoking, the treatment group did not differ from the control group in terms of the use of smokeless tobacco, as indicated by the statistically nonsignificant coefficients before the treatment group variable. The magnitude of the estimated coefficients of the interaction term tended to be smaller than that of the coefficients of the tax increase in Table 5 and Table 6, and they were not statistically significant. Small sample size of smokeless tobacco users and multicollinearity between year dummy and the interaction term may explain the lack of statistical significance for the interaction term.

Table 8. Smokeless Tobacco Prevalence: Difference-in-Difference Model

	Model 1			Model 2		
	April 16 2009 as cutoff date	May 1 2009 as cutoff date	April 2009 sample dropped	April 16 2009 as cutoff date	May 1 2009 as cutoff date	April 2009 sample dropped
Year 2009	0.011*	0.013***	0.015**	0.011*	0.014***	0.015**
	0.007	0.005	0.007	0.006	0.005	0.007
Treatment Group	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
	0.005	0.005	0.005	0.005	0.005	0.005
Year 2009*Treatment Group.	-0.005	-0.007	-0.01	-0.005	-0.006	-0.008
	0.008	0.008	0.009	0.008	0.008	0.009
State Tax on Smokeless Tobacco				-0.00006	-0.00006	-0.00007
				0.00004	0.00004	0.00004
State SFA Policy Index				-0.001	-0.001*	-0.002***
				0.001	0.001	0.001
State Tobacco Ctrl Funding				-0.00004	-0.00004	-0.00003
				0.00009	0.00009	0.00009
Observations	33625	33625	27582	33625	33625	27582

All models include the following covariates: age, grade level (8th and 10th grader indicators (12th grader as reference category)), gender (female indicator), public school, high school type (prep (reference category), general, vocational, other type), race/ethnicity (Non-Hispanic whites (reference category), non-Hispanic blacks, non-Hispanic other, Hispanics), urban/rural indicator, living arrangement (living with both parents (reference category), living with father, living with mother, living with others, living alone), mother's education, mother's employment status, and student's weekly income.
*p<0.10, **p<0.05, ***p<0.01

Discussion and Summary

This analysis revealed that the short-term impact of the 2009 federal tobacco tax increase on youth tobacco use was substantial. Taking the estimated percentage point decrease in smoking and use of smokeless tobacco from models that controlled for state level tobacco control policies, Table 9 summarizes the impact of the 2009 federal tobacco tax increase on youth smoking and use of smokeless tobacco.

The top panel of Table 9 shows that immediately following the 2009 tax increase, students who reported smoking in the past 30 days dropped between 1.3 and 1.7 percentage points, compared to the pre-tax increase youth current smoking prevalence, representing a 9.7% to 13.3% decrease

in rates of current smoking among 8th, 10th and 12th grade students. Given the magnitude of cigarette price increases following the tax increase, as reported by the Bureau of Labor Statistics of the U.S. Department of Labor (USDOL, 2009), this translates to a price elasticity of smoking prevalence of -0.44 to -0.60, implying that a 10% increase in cigarette price will reduce the smoking prevalence among youth by about 4.4% to 6%. The estimated magnitude of the price elasticity of smoking prevalence in this study is close to those in earlier cross-sectional studies (Chaloupka & Grossman, 1996; Chaloupka & Wechsler, 1997; Lewit et. al, 1997; Evans & Farrelly, 1998; Harris and Chan, 1999; Chaloupka & Pacula, 1999).

This study's estimates of the price elasticity of youth smoking prevalence were somewhat larger than those found in recent studies that used quasi-experimental methods, which concentrate on the range of -0.3 to -0.5 (Farrelly et al., 2001; Gruber and Zinman, 2001; Sloan and Trogdon, 2004; Tauras et al.,2005; Carpenter & Cook, 2008). One possible explanation is that the 2009 federal cigarette excise tax increase caused a significant jump in average cigarette prices, and the magnitude of this change was comparable to the interstate price/tax variations, usually large in size, which were used by early cross-sectional studies to identify the impact of cigarette price/tax on youth smoking. In quasi-experimental studies, year and state fixed effects generally account for much of the variation in state price/tax, as a result absorbing part of the price/tax impact in the model. Additionally, the quasi-experimental studies usually relied on changes in price/tax within a state over time, which tended to be small in size until recently years, hence showing a smaller impact on smoking behavior.

Table 9. Impact of the 2009 Federal Tobacco Tax Increase

Cigarette Smoking (Pre-tax: before April 1, 2009; Post-tax: on or after May 1, 2009)	2009 MTF Model 2	2008 and 2009 MTF Model 2	DD Model 2
Pre Tax Increase Mean (%)	13.4%	12.8%	12.8%
Estimated Percentage Point Decrease after Tax Increase	-1.3	-1.4	-1.7
Estimated Percent Decrease in Smoking after Tax Increase	-9.7%	-11.0%	-13.3%
Estimated Price Elasticity	-0.44	-0.50	-0.60
Number of FEWER Students (age 14 - 18) Smoking in the Past 30 Days Due to the Tax Increase (in 1,000)	220	237	287
Smokeless Tobacco (Pre-tax: before April 1, 2009; Post-tax: on or after May 1, 2009)	**2009 MTF Model 2**	**2008 and 2009 MTF Model2**	**DD Model 2**
Pre Tax Increase Mean (%)	6.1%	5.0%	5.0%
Estimated Percentage Point Decrease after Tax Increase	-1.2[1]	-1.2	-0.8[1]
Estimated Percent Decrease in Use of Smokeless Tobacco after Tax Increase	-19.8%	-24.0%	-16.0%
Estimated Price Elasticity[2]	-1.46	-1.84	-1.23
Number of FEWER Students (age 14 - 18) Using Smokeless Tobacco in the Past 30 Days Due to the Tax Increase (in 1,000)	203	203	135

1. Not statistically significant.
2. The percent of increase in price for smokeless tobacco is based on the CPI data for "Tobacco Products Other Than Cigarettes" published by the Bureau of Labor Statistics of the U.S. Department of Labor (USDOL, 2009), which most likely underestimated the actual price increase for smokeless tobacco product. As a result, the estimated price elasticity for smokeless tobacco products may be overestimated in this table.

The lower panel of Table 9 summarizes the impact of the 2009 federal tobacco tax increase on use of smokeless tobacco in the past 30 days among youth. This study's estimates revealed that immediately after the tax increase, the percent of students who reported used smokeless tobacco in the past 30 days fell by 0.8 to 1.2 percentage points. Given the prevalence of current use of smokeless tobacco among 8th, 10th and 12th grade students before the tax increase, this implies a drop of 16% to 24% in prevalence of current use of smokeless tobacco.

While it is difficult to precisely pinpoint the percentage increase in prices for smokeless tobacco products, based on the CPI data on "tobacco products other than cigarettes" published by the Bureau of Labor Statistics of the U.S. Department of Labor (USDOL, 2009), this study estimated

the price elasticity of smokeless tobacco prevalence as being between -1.2 and -1.8. It implied that a 10% increase in smokeless tobacco product prices will reduce the rate of using smokeless tobacco among youth by about 12% to 18%. The price elasticity estimates for smokeless tobacco were larger than those found in the previous study (Tauras et al., 2007). One possible explanation is gender differences in price elasticity. Previous studies (Cawley et al., 2004) have found that boys are more sensitive to price than girls. While the cigarette elasticity reflects the average for boys and girls, the smokeless tobacco elasticity found in this study reflects more for boys, as smokeless tobacco use among American adolescents is almost exclusively a male behavior. For example, the 30-day prevalence rates among males were 6.3%, 11.1%, and 15.8% in grades 8, 10, and 12 in the 2009 MTF survey, respectively, versus 1.4%, 2.0%, and 1.7% among females (Johnston et al., 2010).

To put the impact of the 2009 federal tobacco tax increase in context, this study estimated the number of students (age 14 - 18) who would have otherwise reported smoking in the past 30 days had the federal tobacco tax not been increased, as well as the number of students (age 14 - 18) who would have otherwise reported using smokeless tobacco in the past month in the absence of the 2009 federal tobacco tax increase, using the estimates from the analysis above and the middle school and high school student population (age 14 - 18) from the Census Bureau[7]. It is estimated that because of the 2009 federal tobacco excise tax increase, there were approximately 220,000 - 287,000 fewer students who reported smoking in the past 30 days, as well as 135,000 – 203,000 fewer students who reported use smokeless tobacco in the past 30

[7] Estimates of the impact of the 2009 tax increase were based on 8th, 10th, and 12th grade students, corresponding to the age group 14 to 18. The number of students (age 14 - 18) enrolled

days. Those estimates reveal the substantial short-term beneficial impact of the 2009 federal tobacco tax increase on American youth. The focus of this paper is on the short-run impact of the 2009 tax increase, therefore, these estimates represent only a snapshot, or a portion of what the total prevented youth projection would be. It is noteworthy that the impact of this tax increase will grow over time as the higher prices that result over time deter more and more children from initiating smoking and smokeless tobacco use. As a result, the long-term health impact of the 2009 tax increase on youth would be even more substantial than its short-term impact.

The analysis in this paper also showed that a large national tax increase can influence youth tobacco use prevalence within a very short time period. Adolescents not only respond to tax policy changes, but the speed of their response is fast. The prevalence of smoking and use of smokeless tobacco among 8^{th}, 10^{th}, 12^{th} grade students dropped immediately following the 2009 federal tax increase, and statistically significant and meaningful changes could be measured and detected within 30 days of the tax increase.

The 2009 federal tobacco excise tax increased federal government revenues on tobacco products by about 147%, from $7.1 billion in the 12 month preceding the 2009 tax increase to $17.5 billion in the 12 months following the tax increase (TBOT 2010; TTB 2010). These funds were used to finance the expansion of the Children's Health Insurance Program and improve children's health and wellbeing as stipulated by CHIPRA. In addition, the 2009 tax increase substantially reduced prevalence rates of smoking and using smokeless tobacco among American middle school and high school students. It prevented between 220,000 and 287,000 students who would

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in middle school and high school in 2009 was approximately 16.9 million. See

have otherwise smoked cigarettes, and resulted in between 135,000 and 203,000 fewer smokeless tobacco users among the middle school and high school students in the U.S. The long-term projected number of youth prevented from smoking or using smokeless tobacco that resulted from the 2009 federal tax increase could be much larger given the resulting higher tobacco prices would deter more and more children from initiating smoking and smokeless tobacco use over time. It demonstrated that a well-designed, across-the-board tobacco tax policy can deliver both economic and health benefits, and has implications for policymakers at all levels when considering effective tobacco control policies to reduce tobacco use among youth.

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Appendix Table: Summary Statistics

	2009 MTF Sample					2008 and 2009 MTF Sample				
Variable	Obs	Mean	Std. D	Min	Max	Obs	Mean	Std. D	Min	Max
Smoking Prevalence	43389	0.13	0.33	0	1	87343	0.13	0.33	0	1
Smokeless Tobacco Prevalence	16365	0.05	0.23	0	1	32819	0.05	0.22	0	1
Year 2008						87343	0.50	0.50	0	1
Year 2009	43389	1.00	0.00	1	1	87343	0.50	0.50	0	1
Public School	43389	0.92	0.27	0	1	87343	0.92	0.27	0	1
High School: Prep/Acad	43389	0.44	0.50	0	1	87343	0.44	0.50	0	1
High School: General	43389	0.25	0.43	0	1	87343	0.25	0.43	0	1
High School: Voc/Tech	43389	0.05	0.21	0	1	87343	0.04	0.20	0	1
High School: Other	43389	0.25	0.43	0	1	87343	0.25	0.43	0	1
High School: Type Missing	43389	0.02	0.15	0	1	87343	0.02	0.15	0	1
8th Graders	43389	0.33	0.47	0	1	87343	0.34	0.47	0	1
10th Graders	43389	0.36	0.48	0	1	87343	0.35	0.48	0	1
12th Graders	43389	0.31	0.46	0	1	87343	0.31	0.46	0	1
Age	43389	15.59	1.69	10	22	87343	15.58	1.71	10	23
Gender: Male	43389	0.48	0.50	0	1	87343	0.48	0.50	0	1
Gender: Female	43389	0.50	0.50	0	1	87343	0.50	0.50	0	1
Gender: Missing	43389	0.02	0.13	0	1	87343	0.02	0.13	0	1
Race/Ethnicity: Blacks	43389	0.12	0.32	0	1	87343	0.12	0.33	0	1
Race/Ethnicity: Whites	43389	0.58	0.49	0	1	87343	0.57	0.49	0	1
Race/Ethnicity: Hispanics	43389	0.16	0.36	0	1	87343	0.15	0.36	0	1
Race/Ethnicity: Other	43389	0.13	0.33	0	1	87343	0.13	0.33	0	1
Race/Ethnicity: Missing	43389	0.02	0.15	0	1	87343	0.02	0.15	0	1
Rural	43389	0.18	0.39	0	1	87343	0.18	0.38	0	1
Urban/Rural Missing	43389	0.03	0.17	0	1	87343	0.03	0.17	0	1
Live with Both Parents	43389	0.72	0.45	0	1	87343	0.71	0.45	0	1
Live Alone	43389	0.01	0.08	0	1	87343	0.01	0.08	0	1
Live with Father	43389	0.04	0.20	0	1	87343	0.04	0.20	0	1
Live with Mother	43389	0.19	0.39	0	1	87343	0.19	0.39	0	1
Live with NP others	43389	0.04	0.20	0	1	87343	0.04	0.20	0	1
Living Arrgt: Missing	43389	0.01	0.08	0	1	87343	0.01	0.08	0	1
Weekly Income: Missing	43389	0.03	0.18	0	1	87343	0.03	0.17	0	1
Weekly Income: 0	43389	0.18	0.38	0	1	87343	0.17	0.37	0	1
Weekly Income: 1- 10	43389	0.31	0.46	0	1	87343	0.31	0.46	0	1
Weekly Income: 10 -20	43389	0.17	0.38	0	1	87343	0.17	0.37	0	1
Weekly Income: 20-30	43389	0.07	0.26	0	1	87343	0.08	0.27	0	1
Weekly Income: 30-40	43389	0.03	0.16	0	1	87343	0.03	0.17	0	1
Weekly Income: 40-50	43389	0.06	0.24	0	1	87343	0.06	0.24	0	1

Weekly Income: 50-60	43389	0.08	0.28	0	1	87343	0.09	0.29	0	1
Weekly Income: > 60	43389	0.06	0.24	0	1	87343	0.07	0.25	0	1
Mother's ED: Less than 8th	43389	0.03	0.18	0	1	87343	0.03	0.18	0	1
Mother's ED: Some HS	43389	0.08	0.27	0	1	87343	0.08	0.27	0	1
Mother's ED: HS	43389	0.22	0.41	0	1	87343	0.22	0.41	0	1
Mother's ED: Some College	43389	0.18	0.38	0	1	87343	0.18	0.38	0	1
Mother's ED: College	43389	0.27	0.45	0	1	87343	0.27	0.44	0	1
Mother' ED: Grad School	43389	0.13	0.34	0	1	87343	0.13	0.34	0	1
Mother's ED: Missing	43389	0.09	0.28	0	1	87343	0.09	0.28	0	1
Mother's Work Full Time	43389	0.61	0.49	0	1	87343	0.62	0.49	0	1
Mother's Work Part Time	43389	0.18	0.39	0	1	87343	0.18	0.39	0	1
Mother's WS Missing	43389	0.20	0.40	0	1	87343	0.20	0.40	0	1
State Cigarette Tax	43389	119.62	75.03	7	313	87343	112.26	67.18	7	313
State SFA Policy Index	43389	5.19	3.55	0	9	87343	4.99	3.51	0	9
State Tobacco Ctrl Funding	43389	26.85	27.46	0.98	82	87343	28.62	28.13	0.98	88
Post Fed Tax Increase: 4/16/09 cutoff	43389	0.56	0.50	0	1	87343	0.28	0.45	0	1
Post Fed Tax Increase: 5/1/09 cutoff	43389	0.32	0.47	0	1	87343	0.16	0.36	0	1
Experiment Group 2: Schools Surveyed after 4/16/09 and Their Corresponding Observations In 2008						87343	0.57	0.49	0	1
Experiment Group 3: Schools Surveyed after 5/1/09 and Their Corresponding Observations In 2008						87343	0.31	0.46	0	1
Interactions between Post Tax Dummy and Experiment Group 2						87343	0.28	0.45	0	1
Interactions between Post Tax Dummy and Experiment Group 3						87343	0.16	0.36	0	1