TESTIMONY OF:
Jodi L. Radke
Regional Director
Campaign for Tobacco-Free Kids

IN SUPPORT OF THE
TOBACCO TAX INCREASE PROPOSAL
BEFORE THE
HOUSE COMMITTEE ON TAXATION

Topeka, KS
February 19, 2015

Good afternoon. I'm Jodi Radke, and I am the Regional Director at the Campaign for Tobacco-Free Kids in Washington, DC. Our mission is to reduce tobacco use and its devastating effects, particularly among kids.

My thanks to the members of the House Taxation Committee for allowing me to address a few of the key issues being discussed not only here in Kansas, but across the nation, in states also considering tobacco tax increases. There is a lot of misinformation being shared regarding the impacts of tobacco tax increases. I hope today I can offer some clarification and provide some reference to independent studies that have been done to analyze these concerns.

Tobacco companies know what we know. Tobacco tax increases are effective. They work. They significantly reduce tobacco use, especially amongst youth and pregnant women. Tobacco companies know they need to recruit users at an early age because 90 percent of adult smokers start before the age of 18. In fact, each year the tobacco industry spends nearly $71 million, (the same amount generated by the last increase in Kansas' tobacco tax and equivalent to the projections by the Kansas Department of Revenue this session), to market its deadly products in Kansas, often using strategies that are proven to be successful with children and adolescents.

Public health groups, such as ours, have worked aggressively to shed light on the tobacco industry's tactics, including exposure of its political strategies and lack of evidence to support the misleading claims used

in states across the country to deter states from passing tobacco tax increases.

Sustainability

The first issue I would like to address today is sustainability of revenues.

A common tobacco industry myth is that cigarette tax increases are not a reliable source of revenue. This is false. The good news is we have over 100 tobacco tax increases that have happened across the nation over the past 10+ years, so we have an abundance of evidence on what happens after a state increases their tobacco tax. This data clearly demonstrates the predictability and sustainability of these revenues.

Every state that has significantly increased its cigarette tax has shown substantial increases in revenue, even while reducing smoking. Put simply, after a cigarette tax increase, the revenue gains on each cigarette pack sold far outweigh the revenue losses from declines in total cigarette sales. This has been true 100% of the time.

We have over 100 examples to choose from, but I think the most meaningful example is looking back to 2002 and 2003, the time of the last tobacco tax increase in Kansas. The last time Kansas increased its tobacco tax, the state collected more than $70 million in new revenue, which, at the time, was a 151 percent increase in pack price, even as cigarette pack sales fell by 26 percent. This only accounts for pack sales and

revenues, not the healthcare dollars saved by instituting the tax.

With this session's proposed increase, the Kansas Department of Revenue estimates that the rate increase will generate more than $71 million in new revenues for the state. On top of that projection, the Campaign for Tobacco-Free Kids and the American Cancer Society Cancer Action Network estimates that the $1.50 per pack cigarette tax increase in Kansas will prevent 24,500 kids from becoming smokers, prompt 25,800 smokers to quit, prevent 14,900 smoking-caused deaths and save $1 billion in long-term health care costs.

I have included with my written testimony additional documentation, Appendix A, which includes a chart specific to the history in Kansas and the results of the tax increase over a period of 13 years. The data speaks for itself. Appendix B shows charts of tobacco tax revenue streams over time in multiple states, which clearly demonstrate the reliability of this tax, not only here in Kansas, but across the nation.

I am happy to share additional examples from specific states if needed.

<u>Crossborder Sales</u>

The second issue I'd like to address today is crossborder sales.

Another common myth important to address is the idea that people will rush across state lines to purchase tobacco products in lower-tax states. In reality, the

evidence shows that again, the state that raises its tobacco tax always does better than a neighboring state that does not. Despite cigarette tax increases in almost all of the states surrounding Missouri (which includes Illinois, Nebraska, Tennessee, Kansas and Arkansas), during the period when Kansas increased its cigarette tax rate, in contrast, cigarette tax revenues in Missouri only increased by $7 million (an 8% increase). Revenues in the surrounding states increased by much more than Missouri, despite its lower tax rate (IL: $264.1 million increase; NE: $24.1 million increase; TN: $34.9 million increase; AR: $51.2 million increase, KS: $72.3 million increase). In summary, Missouri saw only a $7 million increase, and realized no public health benefits.

I have provided in my testimony a few examples of this in written form, but the one I'd like to highlight today is the most recent tobacco tax increase from Minnesota, which included a $1.60/pack increase.

1) **Minnesota increased its cigarette tax rate by $1.60 per pack, to $2.83 per pack, on July 1, 2013, raising its cigarette tax rate higher than all of its neighboring states. As a result, it received more than $204 million in new revenue (a 56% increase) in the first 12 months after the increase. In nearby Iowa and Wisconsin, revenues and cigarette sales actually decreased during that time, while North Dakota and South Dakota's revenues only collectively increased by 2.7 percent.**
2) **When Washington and Montana increased their tobacco taxes in 2005, both states generated significant amounts of new revenue. Although nearby Idaho's revenues did increase slightly,**

Washington and Montana's increases were many times greater than Idaho's minimal increase. And when Idaho last increased its cigarette tax rate in 2003, most of the other surrounding states (all but Washington) also increased their tax rates so that almost everyone gained new revenue that year (but not Washington).

3) **As another example, in the twelve months after Florida increased its cigarette tax rate by $1.00 on July 1, 2009, Florida's revenues increased 194 percent (or over $800 million in new revenue) while neighboring Georgia's revenues DECREASED by 5.1 percent (or $10 million). Florida's pack sales also declined as expected, by 28.2 percent, as did Georgia's. The difference in tax rates between Florida and Georgia is now 96.9 cents. Alabama's cigarette tax revenues also declined, so it's clear Florida smokers were not swarming across the border to buy cigarettes.**

Research demonstrates that since raising its tobacco tax, Minnesota has recorded record lows of youth smoking, fewer adult smokers and that quit attempts since the tax was implemented total 62.8% of those who use.

I have included the policy analysis with my testimony for your reference, "Get the Facts: Minnesota's 2013 Tobacco Tax Increase is Improving Health". This is noted in Appendix C.

A common argument is that a tobacco tax increase will harm businesses and therefore the state's economy by reducing cigarette sales and related employment and retailer revenues. False again. In a published research study, health economists from the University of Illinois at Chicago found that the number of convenience stores in states do not decline after cigarette tax increases. This finding follows previous studies showing that declines in cigarette consumption do not reduce overall tobacco retail employment in states. The tobacco industry fails to cite or acknowledge the shift in spending habits, and assumes this is an absolute revenue loss. In fact, research shows that people who no longer smoke or smoke fewer cigarettes are instead using this money to buy other goods and services or are increasing their savings.

This study is identified as Appendix D.

Smuggling

The third issue I'd like to address is smuggling.

Past U.S. smuggling studies indicate that organized cigarette smuggling (with wholesaler or retailer participation) accounts for roughly three to five percent of all cigarettes purchased in the United States. Informal cross-border cigarette purchases by consumers and small-time smugglers who travel into lower-tax states to buy their cigarettes account for approximately one percent.

The percentages may surprise you given the exaggerated claims by the industry that smuggling

accounts for a much higher percentage; however, it's important to note that roughly two-thirds of all cigarettes sold in the United States are sold by the single pack, not cartons. The single-pack purchases show that smokers are much more interested in convenience than in crossing state borders or seeking out black market vendors to buy their cigarettes by the carton or to save per pack.

This information is not to say some initial tax-avoidance will not occur, rather to say, they will soon fade away as continuing smokers go back to their regular ways of purchasing cigarettes. The evidence and history of tobacco tax increases supports this statement.

The good news is there are several ways states can enhance efforts to deter smuggling, which include options as high-tech tax stamps, increased partnership with enforcement agencies and neighboring tribal reservations, amongst a few to consider.

I am happy to share information on these policy options if desired.

What the cigarette companies have not shared, despite the relentless opposition to tobacco tax increases and their threats of increased smuggling, is that since 1998, the companies themselves have raised their prices by more than one dollar per pack. These price hikes are the very hikes they claim will prompt massive increases in smuggling. When they raise their prices, they do not express any concern around increased smuggling or black markets. They simply raise the price. More importantly, these price increases do not appear to have

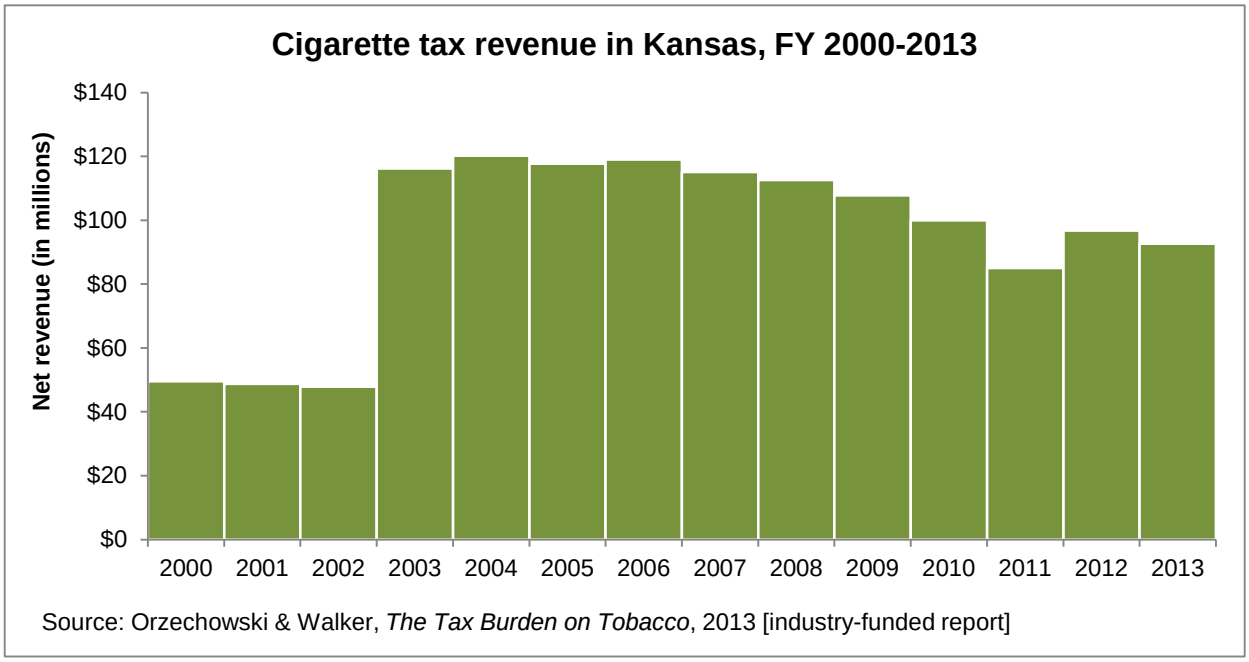
prompted any significant increase in cigarette smuggling or black market sales in the United States.

In closing, a systematic review of 34 peer-reviewed studies found that most arguments the tobacco industry uses to influence tobacco taxes such as the ones highlighted today are unsupported by scientific, peer-reviewed studies or evidence.

The tobacco industry opposes tobacco tax increases for the same reasons my organization, and other public health organizations do, we all know these policies work and will keep Kansas kids from becoming lifetime tobacco users, which is what the industry truly fears.

Thank you, and I will be glad to answer any questions.

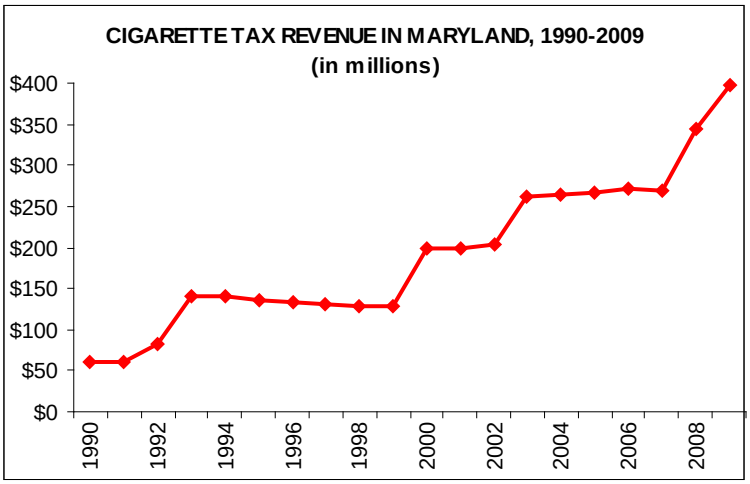
Appendix A

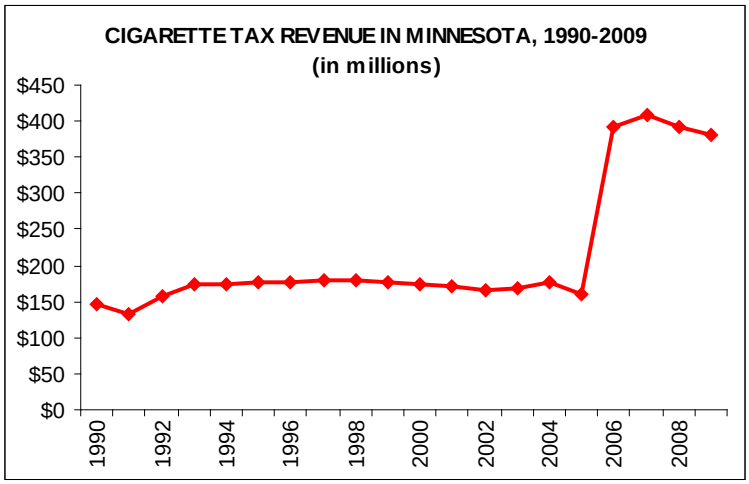


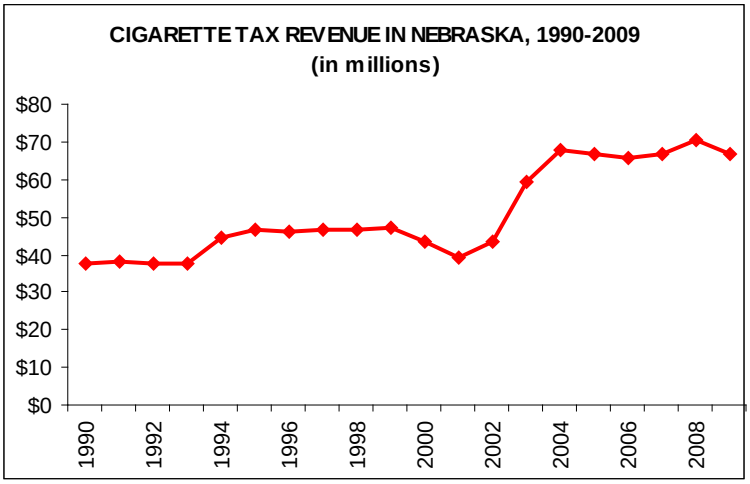
Source: Orzechowski & Walker, *The Tax Burden on Tobacco*, 2013 [industry-funded report]

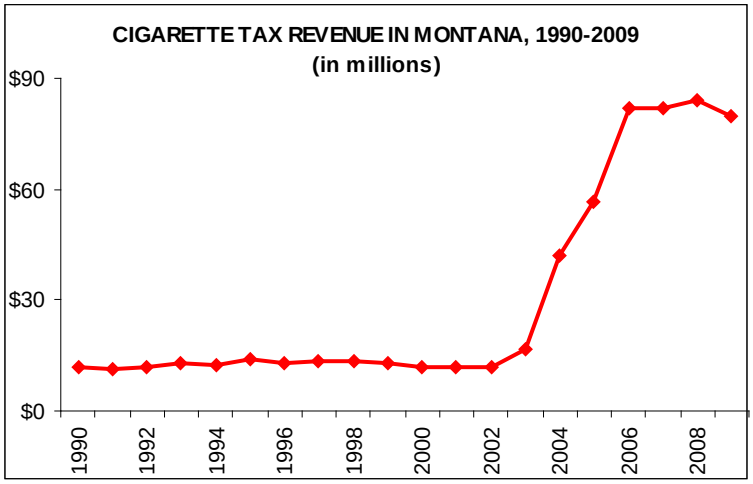
TOBACCO TAX INCREASES ARE A PREDICTABLE SOURCE OF SUBSTANTIAL NEW STATE REVENUE

The following charts show how consistent cigarette tax revenue collections have been in four states. In all cases, the steep incline in the line denotes a significant tax rate increase, followed by years of relatively stable revenue collection until the next rate increase. These charts are only a few of the many examples of the predictable revenue collected by states that have increased their cigarette tax rates.









State Cigarette Tax Rate Increases Since 1990:

Maryland
- June 1, 1991: 3-cent increase to 16 cents per pack
- May 1, 1992: 20-cent increase to 36 cents per pack
- July 1, 1999: 30-cent increase to 66 cents per pack
- June 1, 2002: 34-cent increase to $1.00 per pack
- January 1, 2008: $1.00 increase to $2.00 per pack

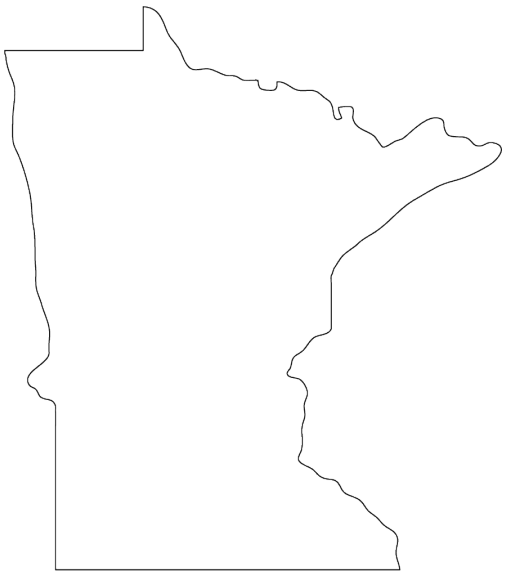
Nebraska
- July 1, 1993: 7-cent increase to 34 cents per pack
- October 1, 2002: 30-cent increase to 64 cents per pack

Minnesota
- June 1, 1991: 5-cent increase to 43 cents per pack
- July 1, 1992: 5-cent increase to 48 cents per pack
- August 1, 2005: $1.05 cent increase to $1.485 per pack

Montana
- August 15, 1992: 1.26-cent increase to 19.26 cents per pack
- August 15, 1993: 1.26-cent increase to 18 cents per pack
- May 1, 2003: 52-cent increase to 70 cents per pack
- January 1, 2005: $1.00 increase to $1.70 per pack

Source: Orzechowski & Walker, *The Tax Burden on Tobacco*, 2009 [industry-funded state tax report].

Get the Facts:
Minnesota's 2013 Tobacco Tax Increase is Improving Health



February 10, 2015

Lisa R. Mattson, MD
Frank J. Chaloupka, PhD
Raymond Boyle, PhD, MPH

Overview

The tobacco industry has a well-known track record of selling dangerous, addictive products and misleading the public about their health effects. That was true in the past and is still true today. Smoking continues to be a leading cause of preventable death and disease in Minnesota. Each year, more than 5,100 Minnesotans die from tobacco-related diseases, while the annual cost of smoking in Minnesota is estimated to be $2.87 billion in direct health care costs.[1] In addition, more than 55,000 Minnesota middle and high school students are using tobacco.[2]

Tobacco companies know they need to hook users at an early age because 90 percent of adult smokers start before age 18.[3] In fact, each year the tobacco industry spends more than $164 million in Minnesota alone marketing its deadly products, often using strategies that are proven to be successful with children and adolescents.[4]

Public health groups have worked aggressively to shed light on the tobacco industry's tactics, including exposing its political strategies. A recent example of a tobacco industry tactic is a June 2014 report from Dunham and Associates titled, "The Economic Consequences of the Recent Cigarette Tax Increase in Minnesota." This report is consistent with the industry's past efforts to fight tobacco price increases. It fails to meet accepted standards for economic research, and a quick look at real-time data suggests the report's assumptions and conclusions are not based on the actual experiences in Minnesota and its border states.

What Data Demonstrate

Research has proven that tobacco price increases are one of the most effective ways of reducing smoking prevalence, preventing youth from starting and saving lives. Strong data now available following the implementation of the 2013 Minnesota tobacco tax increase of a $1.60 per pack of cigarettes provides further proof of what was already known: raising the price of tobacco benefits the health of all Minnesotans. Several contributing factors describe the success of the tobacco tax increase:

- **Fewer Minnesota youth are smoking.** Since 2011, smoking among Minnesota high school students dropped from 18.1 percent to 10.6 percent.[2] This is the sharpest decline ever recorded by the Minnesota Youth Tobacco Survey (MYTS) and means thousands fewer Minnesota youth will become addicted adults.
- **Fewer adult Minnesotans are smoking.** The 2014 Minnesota Adult Tobacco Survey (MATS) shows that 14.4 percent of adult Minnesotans now smoke. This is the lowest rate ever recorded in the state and a sharp decline from 16.1 percent in 2010, the last time the rate was measured.[5]
- **More Minnesota smokers are quitting.** According to MATS, increasing the price of tobacco supports smokers in quitting. Among smokers who quit in the past year, majorities said that the price increase helped them to make quit attempts (62.8 percent) and to stay smoke-free (62.7 percent).[5]

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[1] Blue Cross and Blue Shield of Minnesota. Health Care Costs and Smoking in Minnesota: The Bottom Line. 2010.
[2] Minnesota Department of Health. Teens and Tobacco in Minnesota, 2014 Update: Minnesota Youth Tobacco Survey. 2014.
[3] U.S. Department of Health and Human Services. Results from the 2013 National Survey on Drug Use and Health: Summary of National Findings. Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality. 2013.
[4] Campaign for Tobacco-Free Kids. The Toll of Tobacco in Minnesota. 2015/http://www.tobaccofreekids.org/facts_issues/toll_us/Minnesota. 2015.
[5] ClearWay Minnesota[SM], Minnesota Department of Health. Minnesota Adult Tobacco Survey: Tobacco Use in Minnesota: 2014 Update. 2015.

- **Tobacco sales have decreased.** Minnesota experienced a 24 percent reduction in cigarette sales, or 54.6 million packs, in the 12 months following implementation of the tobacco tax increase compared to the same 12 months of the previous year.[6]
- **While tobacco sales are down, tax revenue is up.** Minnesota generated more than $204 million in new tax revenue—a 56 percent increase over the previous year—while simultaneously 54.6 million fewer packs of cigarettes were sold.[6]

The tobacco industry's typical response to tobacco tax increases is to assert that they hurt business. In the June 2014 report from Dunham and Associates, tobacco companies attempted to once again make the case that Minnesota is better off supporting the sales of deadly products than improving health and protecting youth from addiction.

Yet, based on actual data from Minnesota and surrounding states, there is little evidence of substantial economic harm from the recent tobacco tax increase:

- **Other states are not benefiting at Minnesota's expense.** A common argument—repeated in the Dunham and Associates report—following a state tobacco tax increase is that people who live or work near the state border will simply travel to a neighboring state to purchase their tobacco products. The report provided no hard evidence of the shift in sales. On the contrary, cigarette sales and tax revenue data in states bordering Minnesota do not demonstrate a significant shift in sales to outside of Minnesota. When comparing the 12 months after implementation of the tax with the same 12 months of the previous year, researchers found:
    - Cigarette revenue and sales in Iowa and Wisconsin actually decreased.[6]
    - In the two border states that saw an increase during this period—North Dakota and South Dakota—collectively, revenues only increased by 2.7 percent ($2 million) in tobacco tax revenue, compared to Minnesota's 56 percent increase in revenue. Looking at actual packs sold, Minnesota sold 54.6 million fewer packs—a 24 percent reduction—while new sales in these two states only amounted to a total of 4.4 million additional packs (a 5.1 percent increase).[6]
- **There is no evidence of an unemployment problem in Minnesota border counties**. Research demonstrates that unemployment continues to fall below the statewide average in most border counties. Data for December 2014 from the Minnesota Department of Employment and Economic Development shows that 26 of 30 border counties in Minnesota have non-seasonal adjusted unemployment rates below 5 percent.[7] The lowest rate is Rock County at 2.1 percent, which is located next to two border states.

Analysis

Evidence that holds up through independent verification should be counted as fact. In this case, the tobacco industry's purpose with the Dunham and Associates report is to deceptively promote its profits before Minnesotans' health. After all, tobacco companies will see their profits fall when more people quit, fewer youth become addicted and Minnesotans' health improves.

The tobacco industry does not offer a comprehensive representation of the facts. For example, if Minnesotans are purchasing fewer cigarettes in state, the industry asserts that they must be buying

[6] Orzechowski & Walker. The Tax Burden on Tobacco monthly reports. 2014.
[7] Minnesota Department of Employment and Economic Development. County Unemployment Rates. http://mn.gov/deed/data/current-econ-highlights/county-unemployment.jsp. 2014.

them outside of Minnesota, off the Internet, on Native American reservations or illegally. The better, fact-driven assumption is that Minnesotans are smoking less, especially when the research shows that cigarette sales are down, quit attempts are up and fewer Minnesotans are smoking.

Additionally, the tobacco industry does not seek to determine how Minnesotans who are smoking less are using their money. It is highly likely that people who no longer smoke or smoke fewer cigarettes are instead using this money to buy other goods and services or increasing their savings.[8,9] Unlike tobacco industry-sponsored studies, economic-based studies consider the employment impact of shifting consumer spending from tobacco products to other expenditures that are more likely to be produced locally.

A systematic review of 34 peer-reviewed studies found that most arguments the tobacco industry uses to influence tobacco taxes are unsupported by the evidence.[8] This includes the industry argument that tax increases will negatively impact local businesses and lead to cross-border sales.[8,10] Research shows that convenience stores are more profitable in states with higher tobacco taxes, also likely reflecting shifts in spending from tobacco products to other products, as well as the store markups that raise prices by more than tax increases. As a result, tobacco revenues are maintained even as sales fall.[10]

The Dunham and Associates report—a single study commissioned by the tobacco industry and not subject to peer-review—cannot stand up to independent science. Furthermore, the Dunham and Associates report does not account for the economic benefit of healthier Minnesotans. Minnesota's decision to adopt the $1.60 per pack increase is proving to be advantageous to the overall health and wellness of the state, and economic-based studies predicted this outcome before the tax increase's passage.

Maintaining and increasing the price of tobacco is an important component of a multi-pronged successful strategy to prevent Minnesotans, and especially the state's youngest and most vulnerable populations, from starting to smoke. Every 10 percent increase in the real price of tobacco reduces the number of youth who smoke by more than 5 percent[11] and the number of youth who start smoking by 10 percent.[12] Youth are two to three times more responsive than the general population to price increases and are more likely to quit or cut back on smoking in order to avoid the cost.[13]

According to credible data, the 2013 tobacco tax increase shows that price increases work. The tobacco industry does not agree, but the facts say differently.

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[8] IARC Handbooks of Cancer Prevention. Effectiveness of Tax and Price Policies for Tobacco Control. Tobacco Control. Vol. 14. 2011.

[9] Warner, et al. Employment Implications of Declining Tobacco Product Sales for the Regional Economies of the United States. Journal of the American Medical Association. 275(16): 1241-1246. 1996.

[10] Huang J, Chaloupka FJ. The economic impact of state cigarette taxes and smoke-free air policies on convenience stores. Tobacco Control. 22(2): 91-96. 2013.

[11] Chaloupka FJ, et al. The Impact of Price on Youth Tobacco Use: Changing Adolescent Smoking Prevalence. Tobacco Control. Monograph 14. 2001.

[12] Tauras JA, et al. Effects of Price and Access Laws on Teenage Smoking Initiation: A National Longitudinal Analysis. National Bureau of Economic Research. 2001.

[13] United States Department of Health and Human Services. Reducing Tobacco Use: A Report of the Surgeon General. 2000.

About the Authors

Lisa R. Mattson, MD, is the Director of the Women's Clinic at Boynton Health Service at the University of Minnesota. Dr. Mattson serves in a leadership role within the greater Twin Cities area's health and health services communities, including with the Twin Cities Medical Society. Dr. Mattson completed her education at Mayo Medical School in Rochester, Minn. She is a published author.

Frank J. Chaloupka, PhD, is a professor of economics at the University of Illinois at Chicago and director of the Health Policy Center at the Institute for Health Research and Policy. He is a distinguished author in the areas of economic and policy influences on tobacco and other health behaviors, including contributing to the 2012 Surgeon General's Report, Preventing Tobacco Use Among Youth and Young Adults.

Raymond Boyle, PhD, MPH, is the Director of Research Programs at ClearWay Minnesota[SM]. Dr. Boyle has devoted the majority of his research career to answering questions in tobacco control, including smokeless tobacco, population-based interventions, and tobacco treatment in health systems. He has published 75 scientific papers.

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The economic impact of state cigarette taxes and smoke-free air policies on convenience stores

Jidong Huang,[1] Frank J Chaloupka[2]

[1]Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago, Chicago, Illinois, USA
[2]Department of Economics, College of Liberal Arts & Sciences, Division of Health Policy and Administration, School of Public Health, University of Illinois at Chicago, Chicago, Illinois, USA

Correspondence to
Dr Jidong Huang, Health Policy Center, University of Illinois at Chicago, 1747 West Roosevelt Road, Room 422, Chicago, IL 60608, USA;
jhuang12@uic.edu

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ABSTRACT

Objectives To investigate whether increasing state cigarette taxes and/or enacting stronger smoke-free air (SFA) policies have negative impact on convenience store density in a state, a proxy that is determined by store openings and closings, which reflects store profits.

Methods State-level business count estimates for convenience stores for 50 states and District of Columbia from 1997 to 2009 were analysed using two-way fixed effects regression techniques that control for state-specific and year-specific determinants of convenience store density. The impact of tax and SFA policies was examined using a quasi-experimental research design that exploits changes in cigarette taxes and SFA policies within a state over time.

Results Taxes are found to be uncorrelated with the density of combined convenience stores and gas stations in a state. Taxes are positively correlated with the density of convenience stores; however, the magnitude of this correlation is small, with a 10% increase in state cigarette taxes associated with a 0.19% ($p<0.05$) increase in the number of convenience stores per million people in a state. State-level SFA policies do not correlate with convenience store density in a state, regardless whether gas stations were included. These results are robust across different model specifications. In addition, they are robust with regard to the inclusion/exclusion of other state-level tobacco control measures and gasoline prices.

Conclusions Contrary to tobacco industry and related organisations' claims, higher cigarette taxes and stronger SFA policies do not negatively affect convenience stores.

INTRODUCTION

Raising tobacco taxes/prices and implementing comprehensive smoke-free air (SFA) policies have been shown to be effective in reducing tobacco use, as well as non-smokers' exposure to tobacco smoke.[1–6] Indeed, in the USA, inflation-adjusted state cigarette excise taxes have more than tripled since the early 1980s, and significant taxes have been adopted in several localities. Since 2002, 47 states, the District of Columbia and several US territories have increased their tax rates a total of >100 times.[7] In addition, since mid-1990s, a total of 35 states and District of Columbia have adopted laws that require 100% smoke-free workplaces and/or restaurants and/or bars (26 of these states had laws in effect that require 100% smoke-free workplaces, restaurants and bars as of 31 December 2010).[8] Moreover, according to Americans for Non-smokers' Rights, 949 municipalities currently have a 100% SFA provision in effect at the local level in workplaces and/or restaurants and/or bars (468 municipalities require workplaces, restaurants and bars to be 100% smoke-free as of 1 July 2011).[9]

While tobacco products are sold in a wide variety of retail establishments in the USA,[10] in 2002, approximately 51% of the annual total retail sales of tobacco products, or about US$26 billion, occurred in convenience stores.[11] Vast majority of convenience stores (95%) sell tobacco products.[11 12] Sales of tobacco products represented 12.4% of the total sales in convenience stores in 2002.[11] The reduction in cigarette consumption has economic implications for the retail establishments that sell cigarettes and other tobacco products. Not surprisingly, retailers and tobacco-backed retail organisations have often argued against higher cigarette taxes, stronger SFA policies and other tobacco control policies. The anti-cigarette tax rhetoric intensified recently as a number of states and localities were considering increasing tobacco taxes to curb youth smoking and generate additional tax revenues to fill budget gaps.[13–15] Indeed, a simple Google search using keywords 'cigarette tax hurt convenience store' generated >60 000 results as of 10 June 2011. The central thesis of this argument is that higher cigarette taxes reduce the sales of cigarettes and therefore negatively affect the business of convenience stores.

In the context of this debate, it is important to empirically investigate the economic impact of state cigarette taxes and SFA policies on convenience stores. In a seminal study, Ribisl and colleagues[11] examined the economic implications of the reduction in cigarette consumption in the USA for the retail establishments that sell tobacco products. Using data from the Census of Employment and Wages, they found that cigarette sales affect neither the employment nor the number of establishments of convenience stores. In addition, they found that decreasing consumption of cigarettes does not negatively influence the overall employment and number of retail establishments in the retail sector, and the decline in employment in tobacco stores are offset by the increase in employment in beer, wine and liquor stores.[11]

In this study, we investigate how state cigarette taxes and SFA policies affect convenience store density by examining their impact on the number of convenience stores per million people in a state. Convenience store density is determined by the entry of new stores and exit of existing stores, both of which are ultimately determined by the profits of convenience stores. Our research builds on Ribisl and colleagues' study and improves the literature in a number of ways. First, we use panel data of the estimates of convenience stores for 50 states and District of Columbia during the time period

between 1997 and 2009, examining the impact of state cigarette taxes by taking advantage of the significant within-state variations in taxes over this time period. Second, in addition to taxes, we investigate the economic impact of state SFA policies on convenience stores, a topic that has not been examined by previous literature. Furthermore, our estimates of convenience store establishments are based on a commercial database that has been validated by a number of studies using direct field observations. It helps capture the convenience store establishments that may have been overlooked by the Census of Employment and Wages, which does not collect data on establishments that are not covered by State Unemployment Insurance laws—usually small business or self-employed, a segment which may be important to the analysis of convenience stores. Our research thus provides new empirical evidence to inform the current debate.

METHODS

Data

The dependent variable in our analysis—convenience store density or the number of convenience stores per million people in a state—is constructed using Dun & Bradstreet (D&B) Marketplace data. D&B Marketplace data provide the estimates of the number of business establishments in a specific industry using a variety of sources including yellow pages, government registries, payment data, verified company financial information, courts and legal filing offices, trade references, newspapers and publications, telephone interviews, direct investigations and more. The completeness and accuracy of the commercial database such as D&B have been validated by a number of recent studies using direct field observations.[16 17] The classification of industry in D&B Marketplace data is based on standard industrial classification (SIC) codes. A business is self-classified into a primary SIC category in D&B Marketplace data. Several secondary SIC categories can be specified for a business in addition to its primary SIC category in situations when a business participates in additional industries. Primary SIC category was used to estimate convenience store counts for 50 states and DC. Annual state-level estimates were constructed for the time period from 1997 to 2009. Our analytical panel data thus consist of 663 observations, 13 years of data for 50 states and District of Columbia.

To accurately measure convenience store density, we use two variables to capture the number of convenience stores in a state. The first one only captures convenience stores (eg, 7—Eleven, White Hen, ampm), both chain and independent. The second one broadens the first to include gas stations (both gas service and gas filling stations) and gas stations with convenience stores. In addition, we also conducted analyses that look only at gas stations. The total number of stores in a state in a given year was then divided by the total population in that state and year, multiplied by 1 million, to generate store density variables.

The key explanatory variables in this study are state cigarette excise taxes and SFA policies. These data are taken from the Bridging the Gap/ImpacTeen project's State Tobacco Control Policy Surveillance system which tracks state-level tobacco control policies, such as price/tax, tobacco control funding, youth access laws, SFA laws and SFA pre-emption laws, as well as state smoking prevalence.

State tax is the annual average of cigarette excise tax rates in a state. If the tax rate changed in a given year, we used the average of the old and new rate, weighed by the period of months each rate was in effect. State tax as well as other income and price variables were adjusted by the Consumer Price Index published by the Bureau of Labor Statistics to account for inflation and were expressed in 2009 dollars.

State SFA polices are measured by two SFA indices. The first SFA index captures state SFA laws and pre-emption laws at private workplaces, restaurants and bars. The second SFA index broadens the first one to include state SFA laws and pre-emption laws at government buildings or workplaces, childcare centres, healthcare facilities, recreational facilities, public transit, shopping malls, hotels, and public and private schools. For SFA laws, each venue was coded using a value from 0 to 3, with 0 indicating no SFA laws, 1 indicating restrict smoking to designated smoking areas or require separate ventilation with exemptions for locations of a certain size, 2 indicating that smoking was restricted to separately ventilated areas or a ban with exemptions for certain locations where only a restriction applies and 3 indicating a comprehensive smoke-free policy that bans smoking at all times. In addition, to account for state pre-emption of stronger local policies, a dichotomous variable was used for each venue with 0 indicating no pre-emption laws and 1 indicating having pre-emption laws. The SFA index was constructed by summing up the values of SFA laws, subtracting the total values of pre-emption laws, in all venues. The effective dates of SFA and pre-emption laws were taken into account when constructing the SFA and pre-emption indices; as a result, the actual value of these indices may not be an integer.

In order to capture the impact of gasoline prices on convenience stores, we used the state-level motor gasoline price estimates in the transportation sector from the State Energy Data System, which is provided by the US Energy Information Administration. Prices are retail prices (usually service station prices). Prices are expressed using Btu prices, which are computed by converting the physical unit prices in dollars per gallon to dollars per barrel (42 gallons per barrel). The prices are then converted to dollars per million Btu by using a variable annual factor. More details on the gasoline price variable can be found at the US Energy Information Administration's website.[18]

State economic indicators, such as per capita personal income and unemployment rates, were obtained from the Federal Reserve Bank of St Louis's FRED database.[19] Finally, we created mutually exclusive but all-inclusive dichotomous indicators for each state and each year. The dichotomous state indicators capture all time-invariant state-level unobserved heterogeneity. The year indicators account for overall time trend and year-specific heterogeneity.

Statistical methods

This quasi-experimental study used two-way fixed effects regression techniques that control for state-specific and year-specific determinants of convenience store density in a state. The state effects control for state characteristics that are constant over time within a state but vary across states. The year effects capture the influences on convenience store density that are common to all states but vary over time. Specifically, we estimate the following pooled cross-sectional time series multivariate equation:

$$Y_{it} = TAX_{it}\beta + SFA_{it}\lambda + ECONOMIC_{it}\delta + s_i + y_t + e_{it}.$$

Y represents one of the three dependent variables (the density of convenience stores, gas stations, and combined convenience stores and gas stations) for state i in year t. TAX is the state cigarette excise tax rate in state i and in year t. SFA represents the value of comprehensive SFA index in state i and year t. ECONOMIC are economic indicators, such as inflation adjusted

per capita personal income, unemployment rate or gasoline prices, in state i, in year t. Finally, s represents the state fixed effects and y the year fixed effects. e is the idiosyncratic error term.

Given the nature of the dependent variables, which are count variables, the appropriate statistical methods to estimate the parameters in the models are Poisson and negative binomial regressions.[20] Negative binomial regression is used for over-dispersed count data. It can be considered as a generalisation of Poisson regression given it has the same mean structure as Poisson regression and has an extra parameter to model the overdispersion. A likelihood ratio test can be performed to determine whether negative binomial or Poisson regression should be used. Based on the likelihood ratio tests, models analysing convenience stores were estimated using negative binomial regression. Models analysing gas stations and combined stores were estimated using Poisson models. Finally, the SEs in all the models were constructed so as to allow for arbitrary correlations in errors within a state over time and across states in a given year.

RESULTS

Summary statistics are presented in table 1. The average density of convenience stores in a state was 220 stores per million people for the period from 1997 to 2009. Figure 1 shows the time trend of convenience store density. Despite declines around 2000 and 2007, the overall trend was upward, with the average convenience store density in a state increasing from 207 in 1997 to 230 in 2009. The average density of gas stations in a state in our study period was 259 stations per million people. Average inflation-adjusted state tax rates were 79 cents (in 2009 dollar), and the average comprehensive SFA index was 11. Average state tax rates have gone up from 47 cents in 1997 to 127 cents in 2009 (figure 2), reflecting the tax increases in states since 1997. The comprehensive SFA index increased from 5 in 1997 to 22 in 2009 (figure 3), reflecting the increasingly stronger SFA policies across states. In addition, during the same time period, gasoline prices saw significant increases (figure 4). Inflation-adjusted gasoline price has gone up from $13 per million Btu in 1997 to $26 per million Btu in 2008.

Regression results are summarised in table 2. The top panel in table 2 presents the estimated coefficients from the analysis of convenience stores using negative binomial regressions. The middle panel presents the estimated coefficients for the analysis of gas stations using Poisson regressions. The bottom panel presents the results for the combined convenience stores and gas

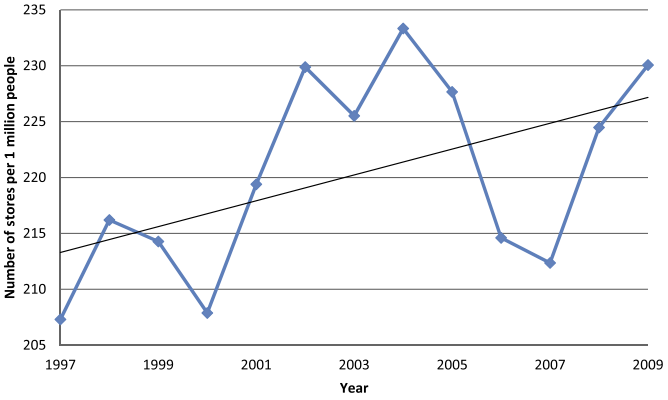

Figure 1 Average number of convenience stores in a state.

stations from Poisson regressions. Each set of analyses consists of four different models. Model 1 looks at the impact of state tax alone, and model 2 looks at the impact of state tax and SFA polices. Model 3 is similar to model 1, and model 4 is similar to model 2, with the differences being that the last two included the gasoline price in the analysis.

Results in the top panel of table 2 indicate that state taxes are positively associated with convenience store density in a state. This association is marginally significant ($p<0.05$) in all four model specifications. The magnitude of the estimated coefficients is fairly stable across different models. The estimated coefficients of negative binomial models can be interpreted as the difference in the logs of expected counts of the response variable caused by a one-unit change in the predictor variable. Given the tax variable is also in log form, the estimated coefficient can be interpreted as the tax elasticity. In the models without SFA policies, the estimated coefficients imply that a 1% increase in state tax is associated with a 0.017% increase in convenience store density. In the models with SFA policies, a 1% increase in state tax is associated with a 0.019% increase in convenience store density.

SFA policies do not appear to be correlated with convenience store density. The estimated coefficient of SFA index is positive; however, it is only statistically significant in model 2. The estimated coefficients for the state per capita personal income variable are also positive but statistically insignificant. Gasoline price is found to be negatively associated with convenience store density. The estimated coefficients for the gasoline variables are highly significant ($p<0.001$).

Table 1 Summary statistics

Variable name	Number of observation	Mean	SD	Min	Max
Number of convenience stores per million people in a state	663	220	81	84	441
Number of gas stations per million people in a state	663	259	69	102	515
Combined number of gas stations and convenience stores per million people	663	480	124	241	801
Inflation-adjusted state per capita personal income, in 2009 dollars	663	37 070	6245	25 234	66 268
State unemployment rate	663	5	2	2	14
Inflation-adjusted gasoline price, dollars per million Btu, in 2009 dollars	612	17	5	9	29
Inflated-adjusted state cigarette excise tax, in 2009 cents	663	79	59	3	318
Comprehensive smoke-free air policy index	663	11	12	−9	39

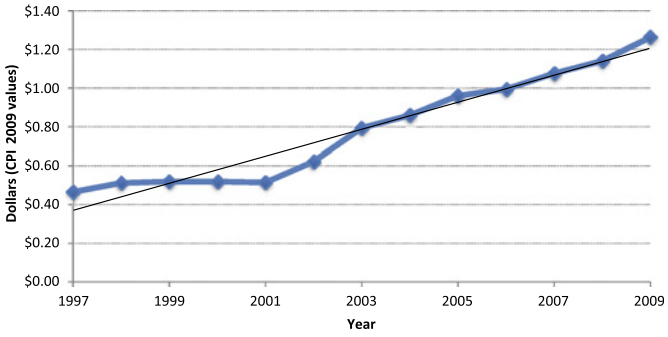

Figure 2 Average state inflation adjusted cigarette tax rates. CPI, Consumer Price Index.

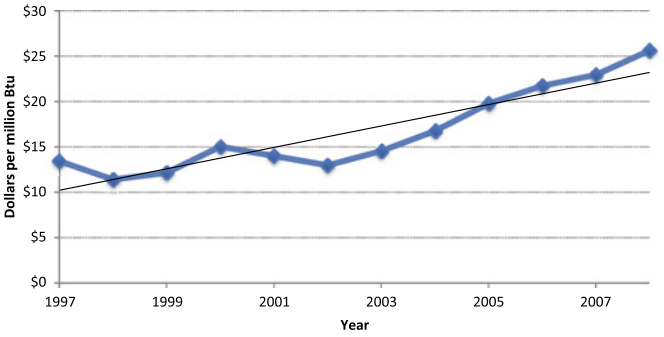

Figure 4 Average state-level gasoline price, dollars per million Btu.

The second panel of table 2 presents the results for the analysis of gas stations. Unlike the analysis for convenience stores, models analysing gas stations were estimated using Poisson regressions. Neither state taxes nor SFA policies are correlated with the number of gas stations, as neither of their estimated coefficients are statistically significant. The estimated coefficients for gasoline price are negative but not statistically significant. State per capita personal income is found to be negatively correlated with gas station density. The estimated coefficients for state per capita personal income are marginally significant ($p<0.05$) in models 3 and 4.

The last panel in table 2 summarises the analysis for the combination of convenience stores and gas stations. State taxes and SFA policies are found to be positively, but not significantly, correlated with the number of these stores. Given the quasi-experimental research design, it indicates that neither state taxes nor SFA policies negatively affects the combined number of convenience stores and gas stations in a state. Similarly, state per capita personal income is also found to be uncorrelated with these stores. Gasoline prices, however, are found to be negatively correlated with the number of these stores, with a 1% increase in gasoline price associated with a 0.18% decrease in the number of stores per million people in a state.

To assess the robustness of the results presented in table 2, we employed alternative modelling techniques such as linear regressions. In addition, the comprehensive SFA index was replaced with a narrowly defined SFA index that only captures the SFA polices at private workplaces, restaurants and bars. Furthermore, a measure of state tobacco control funding was included in all the models. Finally, state unemployment rates were added to the models to capture the aspects of state economic environment that were not captured by state per capita personal income. None of those changes altered the signs and magnitude of the estimated coefficients for the variables presented in table 2 in a substantial way (all results mentioned above are available upon request).

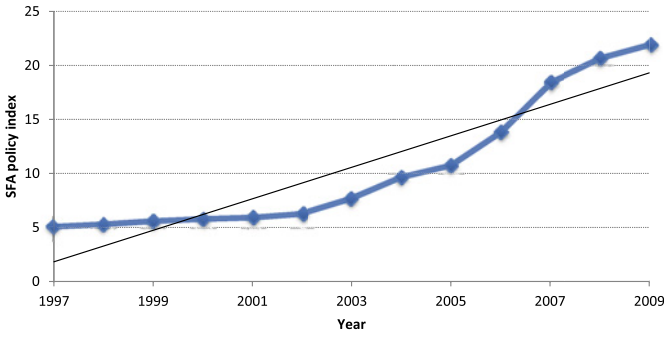

Figure 3 Average state-level smoke-free air (SFA) policy index.

Our analyses indicate that state taxes are not correlated with the number of gas stations and the combined number of convenience stores and gas stations. State taxes are positively correlated with the number of convenience stores; however, the magnitude of this correlation is small, with a 10% increase in state taxes associated with a 0.19% increase in the number of convenience stores per million people in a state and is significant only at the 0.05 level. Our results also show that state SFA policies do not correlate with convenience store and gas station densities, regardless examined as separate categories or in combination. Our finding that state cigarette excise taxes and SFA polices do not negatively affect convenience store density in a state is robust across different model specifications. It is not sensitive to whether gas stations were included as convenience stores. In addition, it is robust with regard to the inclusion/exclusion of other state-level tobacco control measures and gasoline prices.

DISCUSSIONS AND CONCLUSIONS

The results of our study clearly demonstrated that higher state taxes and stronger SFA policies have had no negative impact on gas stations and convenience stores, examined as separate categories and in combination. Our results are consistent with the study done by Ribisl *et al*, who found that the reduction in cigarette consumption has had no impact on overall employment and the number of establishments in the retail sector in the USA between the time period 1990 and 2004. While we found a positive correlation between state taxes and convenience store density, as discussed earlier, this positive correlation is weak both in terms of statistical power and its magnitude. Given that, we cannot conclusively demonstrate that higher state taxes increase convenience store density in a state. More studies are needed to better assess the implications of the policies that complement cigarette tax increase and limit tobacco retailer density.

There are a number of possible explanations that can explain why higher taxes and stronger SFA polices do not negatively affect convenience stores. It is well documented that tobacco industry price discounting strategies, price-reducing marketing activities and lobbying efforts mitigate the impact of tobacco excise tax increases.[21] According to a recent Federal Trade Commission report,[22] in 2006, tobacco industry spent $12.5 billion (down from $13.1 billion in 2005) on advertising and promotions, among which the largest single category was price discounts paid to cigarette retailers or wholesalers in order to reduce the price of cigarettes to consumers. This one category

Table 2 The impact of state cigarette tax and SFA policy on convenience stores

	Model 1	Model 2	Model 3	Model 4
Number of narrowly defined convenience stores per million people (estimated coefficients from negative binomial regression)				
Log inflation-adjusted state cigarette tax	0.017* (0.007)	0.019* (0.007)	0.017* (0.008)	0.019* (0.008)
SFA policy index		0.001* (0.0005)		0.001 (0.001)
Log inflation-adjusted per capita personal income	0.203 (0.109)	0.165 (0.116)	0.151 (0.124)	0.123 (0.131)
Log inflation-adjusted gas price			−0.703*** (0.130)	−0.684*** (0.130)
Number of gas stations per million people (estimated coefficients from Poisson regression)				
Log inflation-adjusted state cigarette tax	−0.004 (0.005)	−0.005 (0.005)	−0.002 (0.005)	−0.002 (0.005)
SFA policy index		−0.0003 (0.0004)		0.0006 (0.0004)
Log inflation-adjusted per capita personal income	−0.252** (0.078)	−0.244** (0.078)	−0.205* (0.083)	−0.204* (0.085)
Log inflation-adjusted gas price			−0.003 (0.077)	−0.005 (0.077)
Number of broadly defined convenience stores (including gas stations) per million people (estimated coefficients from Poisson regression)				
Log inflation-adjusted state cigarette tax	0.003 (0.005)	0.004 (0.005)	0.004 (0.005)	0.004 (0.005)
SFA policy index		0.0004 (0.0003)		0.0004 (0.0003)
Log inflation-adjusted per capita personal income	−0.089 (0.067)	−0.099 (0.070)	−0.075 (0.077)	−0.087 (0.080)
Log inflation-adjusted gas price			−0.188** (0.062)	−0.179** (0.061)
Number of observation	663	663	612	612

The gasoline price variable is included in models 3 and 4 but not in models 1 and 2. Models 3 and 4 cover only the time period 1997-2008, as gasoline price data in 2009 were not available at the time of this study. As a result, the number of observations in models 3 and 4 are 612 (51*12). SFA policy index is included in models 2 and 4 but not in models 1 and 3. All four models include state fixed effects and year fixed effects. The likelihood ratio tests were performed to examine whether Poisson or negative binomial regressions should be used. For the analysis of narrowly defined convenience stores, the probability that the estimated overdispersion coefficients differ from zero was less than 0.001 for all four models, hence, negative binomial models were used. For the analysis of gas stations and broadly defined convenience stores, the likelihood ratio tests indicated that the overdispersion coefficients do not differ from zeros; as a result, Poisson models were used. Missing cells represent the variables are not included in the model. SEs in parentheses. The SEs in all the models were constructed so as to allow for arbitrary correlations in errors within a state over time and across states in a given year. Significance levels: ***p<0.001, **p<0.01, *p<0.05. Inflation was adjusted to 2009 dollars.
SFA, smoke-free air.

accounted for $9.2 billion (or 73.7%) of the total advertising and promotional expenditures by tobacco industry in 2006. To put this into context, the total revenue states received from cigarette excise taxes in 2006 was $13.8 billion, up from $12.2 billion in 2005. Thus, tobacco industry's marketing spending on reducing cigarette prices was equivalent to two thirds of the total cigarette tax revenues states received. It outweighed and offset the $1.6 billion tax increase, which largely resulted from the increase of cigarette tax rates in a number of states between 2005 and 2006. Because the price-reducing promotions and discounts were used to soften the impact of state and federal tax increases, the impact of higher state cigarette taxes on cigarette prices was mitigated, so did their impact on the sale of cigarettes.

Additionally, while higher cigarette taxes that increase prices reduce cigarette consumption, and hence the sales of cigarettes, it does not mean that higher cigarette taxes reduce the total sales in a convenience store. Money previously spent on tobacco products will be spent on other goods and services, such as gasoline and coffee, creating alternative sales. As a result, total sales in a convenience store may or may not be affected by higher cigarette tax.

Furthermore, as standard economic theory predicts, the success of a convenience store depends on its profits, not sales. The profits of a convenience store may well be increased when a cigarette tax increase was over-shifted to consumers, meaning that the tax increase was passed through to consumer prices at a rate higher than one-for-one. For instance, when a state increased its cigarette excise tax rate, a convenience store might sell fewer packs per day because of smokers quitting and curtailing consumption. However, the profits of the store may not be affected if the store raises prices to make up for the unsold packs. And if the percent increase in price is bigger than the percent decrease in sales, the profits may even go up. Indeed, substantial evidence from the studies that examine the relationship between cigarette taxes and retail prices points to this direction.[25–27] For example, a recent study in 2008 estimated that a $1 increase in state cigarette excise tax increases cigarette prices by $1.10–$1.13.[27] With over-shifting of cigarette taxes, the profits of a convenience store could increase, despite of the decline in cigarette sales. This implies higher cigarette tax may have a positive impact on convenience store profits.

Similar arguments can be made regarding adopting stronger SFA policies. After SFA policies were enacted, money that used to be spent on cigarettes does not disappear from the economy, instead, it will be spent on other goods and services in convenience stores. As a result, enacting stronger SFA policies may not have a substantial impact on a convenience store's total sales and profits. Indeed, a number of previous studies found that reduction in tobacco use leads to no or small net positive impact on state employment and income, as money once spent on tobacco products would be spent on other goods and services, which leads to increased economic activity and employment in other sectors.[28 29] In addition, when stronger SFA policies become effective, convenience stores can make up for the reduction in cigarette sales by raising cigarette prices. The findings from our study showing stronger SFA policies have had no negative impact on convenience store density support these hypotheses.

Our study is subject to at least two limitations. We were unable to examine store-level sales and profits directly and unable to investigate variations in convenience store profits within a state (eg, the profits of convenience stores that are close to state borders may be more affected by cigarette tax differentials between states than stores far away from state borders) due to lack of such data. Future researches can improve the analysis by incorporating store-level sales and profits data. Despite these limitations, our study provide new evidence that shows higher cigarette taxes and stronger SFA policies do not negatively affect convenience store density in a state, a proxy that reflects the entry of new stores and exit of existing stores, which are ultimately determined by convenience store profits.

These findings from our study clearly counter tobacco industry and related organisations' claims that higher cigarette taxes and stronger comprehensive smoke-free policies have a negative economic impact on convenience stores. Our results provide new evidence to state and local policymakers on the

What this paper adds

- Very limited research has been conducted on the economic impact of cigarette taxes and smoke-free air policies on convenience stores.
- Results show, contrary to what tobacco industry and related organisation claim, neither higher cigarette taxes nor stronger smoke-free air policies has a negative economic impact on convenience stores.

economic benefits of raising cigarette taxes and enacting SFA policies. In addition, our study also helps inform policymakers in other countries where the opposition of enacting stronger tobacco control policies are based in part on the fears of the negative economic impact on their retail sectors.

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Competing interests None.

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Jidong Huang and Frank J Chaloupka

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