Frank J. Chaloupka, Ph.D.
Written Testimony on the Effects of the Tobacco Tax Increase Proposal

Before the House Finance Committee
March 26, 2015, 9:00am

## Background and Qualifications

I am pleased to submit these written comments on the likely effects of the proposal to increase tobacco excise taxes in Ohio.

I am a distinguished professor of Economics at the University of Illinois at Chicago, where I direct the UIC Health Policy Center. I am the director of the World Health Organization's Collaborating Center on the Economics of Tobacco and Tobacco Control and co-director of Bridging the Gap: Research Informing Policies and Practices for Healthy Youth. I also direct Tobacconomics, a group of economists and other policy researchers focused on the economics of tobacco and tobacco control. I specialize in the field of health economics, with an emphasis on the role of policy and environmental influences on health behaviors. I have written numerous studies, book chapters, and other publications that evaluate efforts to prevent and reduce tobacco use, with a special focus on the impact of cigarette and other tobacco product tax increases.

## Overview

In January, my colleague Jidong Huang and I released a report examining the expected impact of increasing the cigarette excise tax in Ohio. As noted in our report, state cigarette and other tobacco tax revenues are among the most predictable, steady, and reliable revenues that states receive. While these revenues do decline gradually over time as smoking and other tobacco use declines, the reductions in revenue are modest, predictable, and more than offset by the related reductions in public and private sector health care costs and other economic costs caused by smoking. In addition, while there may be some tax avoidance and evasion in response to increases in cigarette and other tobacco product taxes, the additional revenue from a significant increase in the tobacco tax will more than offset any reduction in sales due to smokers cutting back, quitting smoking or any efforts to avoid the tax. In short, a significant increase in the cigarette tax in Ohio will generate significant public health and revenue gains.

## Tobacco Taxes Are a Reliable Revenue Source

As shown in our report, every state that has passed a significant cigarette tax increase has enjoyed a substantial, sustained increase in its state cigarette tax revenues. This revenue increase occurs, despite the significant declines in smoking rates and tax-paid cigarette sales caused by the cigarette tax rate increase, because the increased tax per pack brings in much more new revenue than is lost by the declines in the number of packs sold and taxed.

In general, state cigarette tax revenues increase sharply following a significant increase to a state's cigarette tax rates (despite the smoking declines prompted by the tax increase and any related increases in tax avoidance or evasion), and then decline slowly year to year as cigarette

smoking continues to go down in response to other factors (e.g. stronger public policies targeting tobacco use). However, any decline in revenues from smoking reductions will be offset by related declines in tobacco-related healthcare costs burdening the state.

**Impact of Prior Cigarette Tax Increases in Ohio**

Ohio, like other states, has enjoyed substantial revenue increases each time it has raised its cigarette tax rate. Ohio has increased its cigarette tax rate five times since 1970. In the attached slides, you will see that each of those rate increases produced significant amounts of new revenue, despite related pack sales declines.

When Ohio last increased its cigarette tax by 70 cents on July 1, 2005, it generated a large and sustained increase to the state's cigarette excise tax revenues. Despite the considerable stockpiling that occurred in anticipation of the tax increase, the tax rate increase generated $437.6 million in new cigarette excise tax revenue in Ohio.

In the years following the most recent tax increase, state revenues – after first rising very sharply – have declined somewhat in each subsequent year. These declines reflect not only ongoing background declines in smoking but also the additional smoking declines caused by the December 2006 implementation of Ohio's strong, new, voter approved smoke-free law, and by the significant increase in the federal cigarette excise tax in April 2009. It is also likely that Ohio is also losing revenues as cigarette smokers avoid the higher cigarette tax by shifting to other much lower-taxed tobacco products, such as roll-your-own cigarettes, cigarette-like "little cigars," or regular cigars. Even with the out-year revenue declines caused by ongoing smoking reductions, Ohio's cigarette tax revenues several years after the last cigarette tax increase are still substantially larger than the revenue levels before the increase – and much higher than what the revenue levels would have been today absent any cigarette tax increase. In fact, despite these declines in smoking, revenues in fiscal year 2014 were still more than $210 million higher than revenues in fiscal year 2005, right before the last cigarette tax increase which included the extra-normal revenues caused by the stockpiling leading up to the 2005 increase.

This is because year to year, state cigarette and other tobacco tax revenues are more predictable and less volatile than most other state revenue sources, such as state personal income taxes or corporate income taxes, which can vary considerably from year to year because of nationwide or regional recessions or state economic slowdowns. In contrast, absent a strong tobacco control policy intervention, sharp drops in cigarette or other tobacco tax revenues from one year to the next are rare. This is in large part due to the addictive nature of cigarette smoking and other tobacco use.

That same basic pattern, with large amounts of new state revenues in every future year, would occur again if Ohio increased its cigarette tax rate significantly in 2015. Even if Ohio's cigarette sales declined by five percent a year, a more rapid decline than in recent years, after the initial $337.1 million in new revenues estimated by the Ohio Office of Management and Budget from the rate increase, the state would still be receiving more than $270 million in additional new annual cigarette tax revenues five years after the increase compared to what it received in 2015, and would have received more than $1.5 billion in total new annual revenues over that five year

period compared to what it would receive with no rate increase. The new revenues would be even larger if Ohio also equalized all its tobacco product tax rates at the same time.

**The State Will Gain Revenue Despite Any Increase in Tax Evasion**

While there may be some tax avoidance and evasion in response to increases in cigarette and other tobacco product taxes, these tax increases will still generate significant public health and revenue gains. This is evident from Ohio's experience following the 2005 tax increase that raised the state cigarette tax from 55 cents to $1.25 per pack. Cigarette tax revenues in Ohio rose by $437.6 million (an increase of 78.9 percent), while tax paid sales fell by 21 percent. Adult smoking prevalence in Ohio fell from 25.8 percent in 2004, the last full year before the tax increase to 22.5 percent in 2006, a more than 12 percent decline.

In contrast to the significant revenue increase in Ohio, neighboring states saw minimal increases in their cigarette tax revenues, suggesting modest, at best, tax avoidance and evasion in response to the Ohio cigarette tax increase. Revenues rose by 3.5 percent in Indiana, 3.3 percent in Michigan, 0.5 percent in Pennsylvania, and 9.9 percent in West Virginia. Kentucky experienced a 218.4 percent rise in revenues, but this is almost entirely the result of its own cigarette tax increase, from 3 to 30 cents per pack. The last Ohio cigarette tax increase that was not accompanied by an increase in Kentucky occurred in July 2002, when the tax was raised from 24 to 55 cents per pack. That tax increase led to an increase of $281.6 million in Ohio's cigarette tax revenues in the year following the increase, while Kentucky's cigarette tax revenues rose by $3.6 million. Again, this suggests at best modest tax avoidance and evasion.

This pattern holds for other states as well: a state that increases its tobacco tax rates benefits to a much higher degree than the states surrounding it. In Minnesota, where the tobacco industry sponsored a report that purportedly showed that consumers purchased tobacco products in other states to avoid the $1.60 cigarette tax increase that went into effect there in July 2013, I released a white paper co-authored with several others demonstrating that Minnesota generated more than $200 million in new cigarette tax revenue in the year after the increase, while cigarette tax revenues in two of its neighboring states declined and the small increase in revenues in the other two neighboring states combined amounted to only one percent ($2 million) of what Minnesota received. The same basic pattern was observed in New England, where states are small and borders are easily crossed; in Florida, where the rate difference between it and its two neighboring states is nearly $1 per pack; and with subsequent increases in Illinois, where additional local taxes boost the difference between it and nearby Indiana to more than $5 per pack.

If Ohio is concerned about the impact of tobacco tax increases on smuggling and tax evasion, there are a number of steps that the state could take to protect or even increase its tobacco tax revenues over time and to maximize the public health impact of the increases. For example, Ohio could implement high-tech tax stamps to ensure that taxes are paid and to prevent cigarette smuggling and tax evasion. The state could also minimize tobacco product smuggling and other tax evasion through such measures as making sure smokers understand the state's laws pertaining to tobacco tax evasion, increasing penalties for smuggling and other tax evasion, and directing a portion of all penalties to help fund expanded enforcement (which would bring in both more penalty payments and more tobacco tax revenues).

## Impact of Tobacco Taxes on the Retail Environment

In addition to arguments about smuggling and tax avoidance, opponents of tobacco taxes often claim that increasing the tobacco tax will negatively impact convenience stores and the retail economy. In a published research paper, my colleague Jidong Huang and I looked at the number of convenience stores over time, before and after tobacco tax increases. We found that, in contrast to what the tobacco industry and tobacco retailers claim, higher cigarette taxes do not negatively affect convenience stores. Instead, we observed a small increase in convenience store business in states with higher cigarette excise taxes. Other research in this area has found that decreased cigarette consumption does not negatively affect overall employment, but rather leads to a net increase in jobs in a state like Ohio with very limited tobacco growing and manufacturing.

## Projected Public Health Benefits of Increasing the Tobacco Tax in Ohio

Increasing tobacco excise taxes brings substantial fiscal and health benefits, including lower medical costs and fewer smoking-caused deaths. Each year, Ohio spends $5.6 billion on health care costs caused by tobacco use, $1.7 billion of which is paid by the state through the Medicaid program. According to the U.S. Centers for Disease Control and Prevention, each year 20,200 Ohioans die from a smoking-caused disease.

The Campaign for Tobacco-Free Kids and the American Cancer Society Cancer Action Network project that a $1.00 per pack increase will save the state $2.6 billion in long-term health care costs while preventing 40,100 future smoking-caused deaths. Further, the proposed increase will prevent 65,000 youth from becoming adult smokers and encourage 73,100 adults to quit.

## Conclusions

State cigarette and other tobacco tax revenues are among the most predictable and reliable revenues that states receive. In every state that has adopted a significant cigarette tax increase, cigarette tax revenues increased significantly and remained much higher than revenues prior to the increase for many years afterwards. While these revenues do decline gradually over time as smoking and other tobacco use declines, the reductions in revenue are modest, predictable, and more than offset by the related reductions in public and private sector health care costs and other economic costs caused by smoking. Despite any tax evasion and avoidance, states that increase taxes consistently fare better than the states around them, even if the difference in rates is large.

Evidence from many states show the benefits from increasing tobacco taxes hold true over and over again. Ohio will be no different if it enacts a significant tobacco tax increase in 2015.

tobacconomics

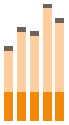
Economic Research Informing Tobacco Control Policy

# A Significant Cigarette Tax Rate Increase in Ohio Would Produce a Large, Sustained Increase in State Tobacco Tax Revenues

Frank J. Chaloupka, Distinguished Professor, Department of Economics
Director, Health Policy Center, University of Illinois at Chicago

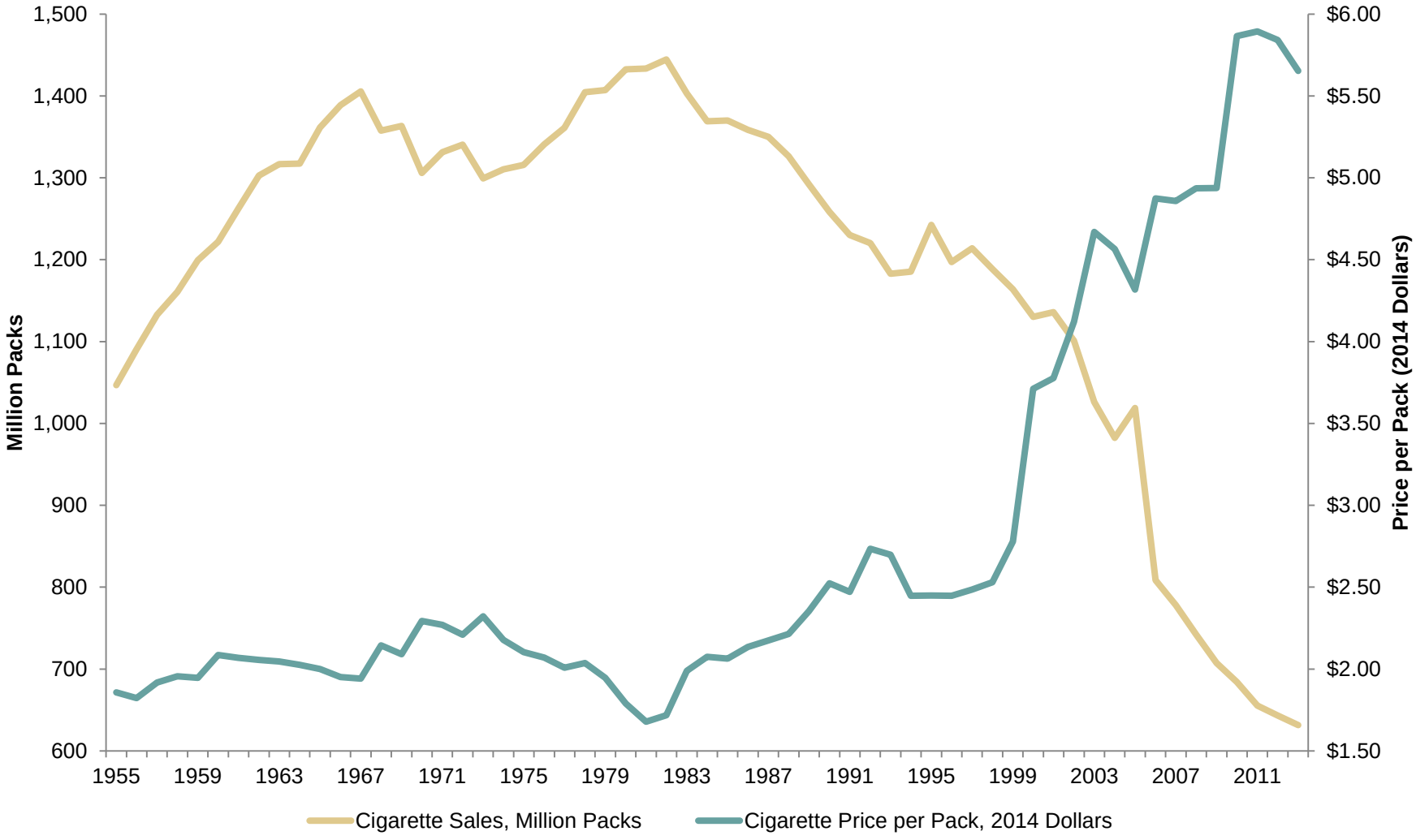
January 27, 2015

**Cigarette and other tobacco tax increases lead to significant reductions in tobacco use and its health and economic consequences**



# Cigarette Prices and Cigarette Sales

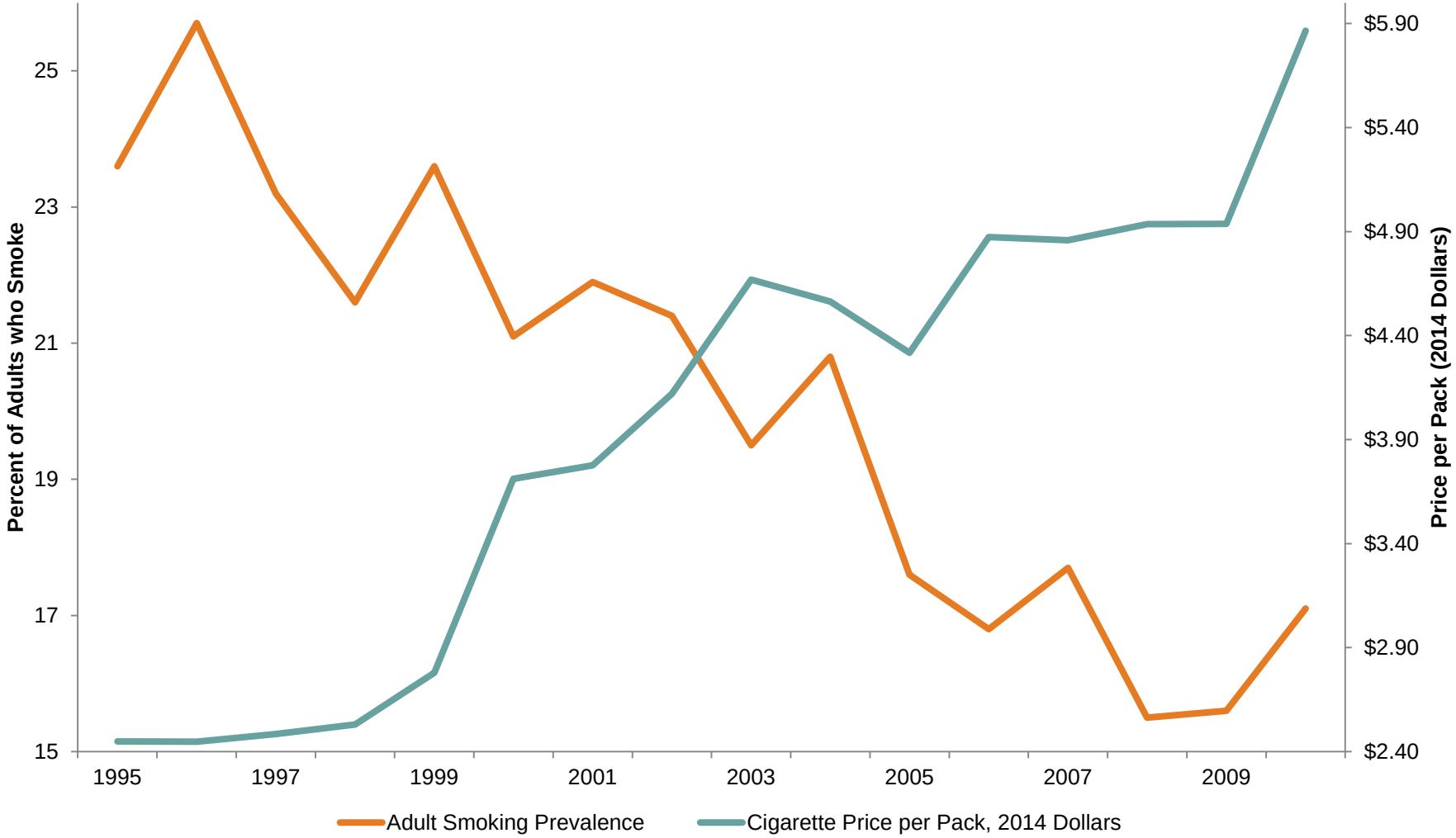
## Ohio, 1955-2013, Inflation Adjusted




Sources: Tax Burden on Tobacco, 2013; Bureau of Labor Statistics; and Authors' Calculations

# Cigarette Prices and Adult Smoking

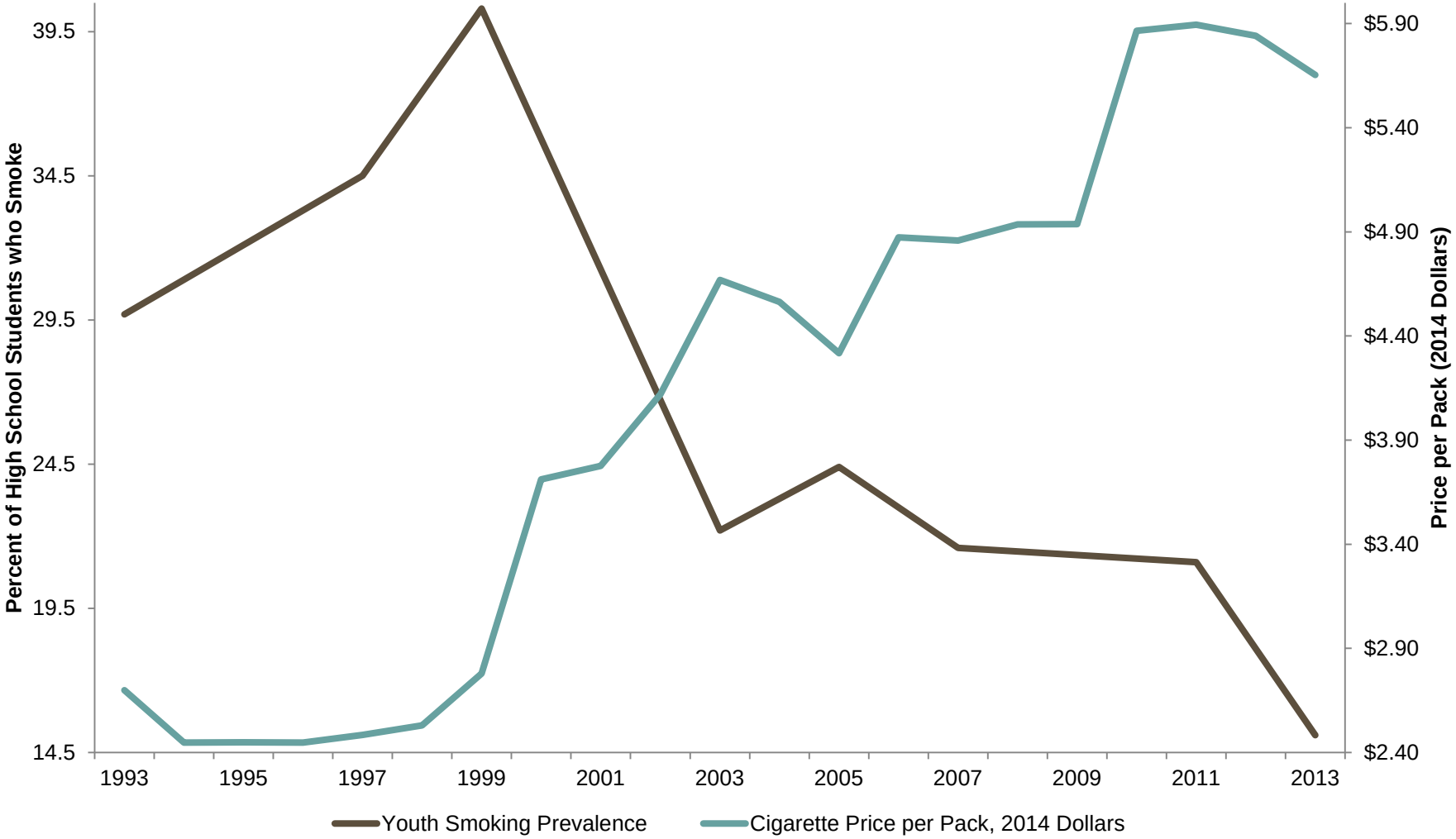
## Ohio, 1995-2010, Inflation Adjusted




Sources: Behavioral Risk Factor Surveillance System; Tax Burden on Tobacco, 2013; Bureau of Labor Statistics; and Authors' Calculations

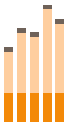
# Cigarette Prices and Youth Smoking

## Ohio, 1993-2013, Inflation Adjusted



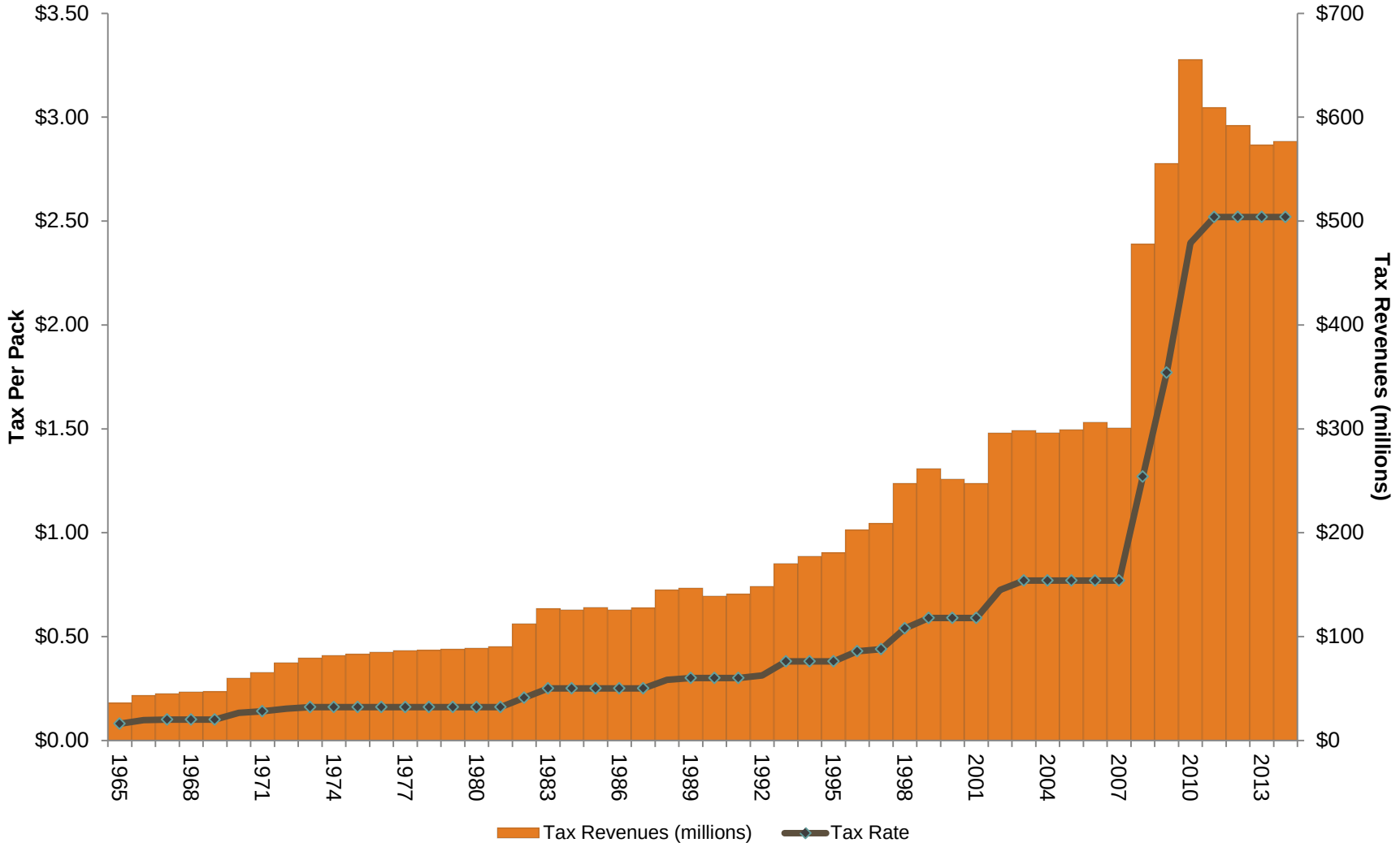

Sources: Youth Risk Behavior Survey; Tax Burden on Tobacco, 2013; Bureau of Labor Statistics; and Authors' Calculations

**Cigarette and other tobacco tax revenues are much more predictable and stable than many other state revenues**



# Cigarette Tax and Tax Revenues

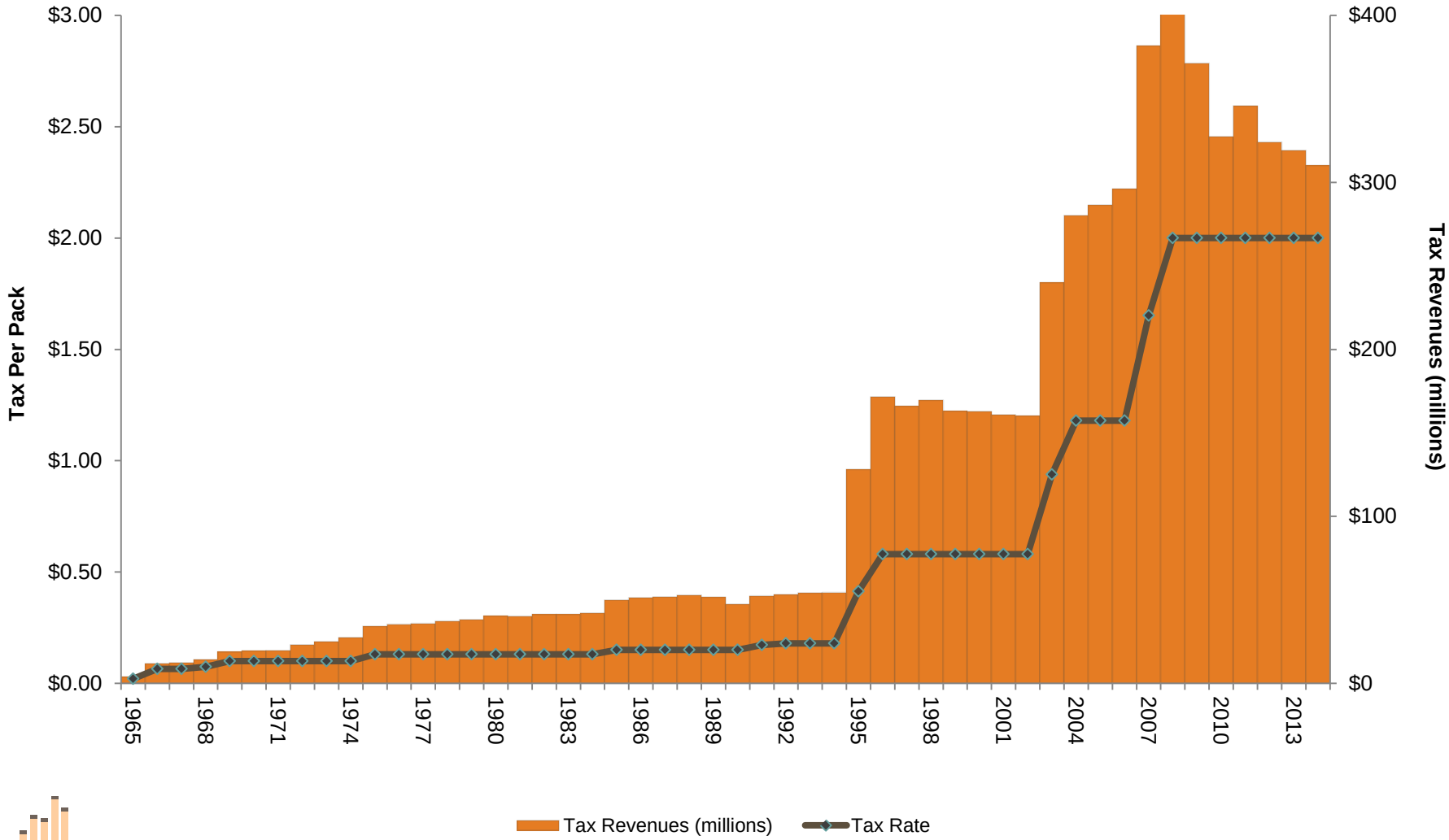
## Wisconsin, 1965-2014




Sources: Tax Burden on Tobacco, 2013, and Authors' Calculations

# Cigarette Tax and Tax Revenues

## Arizona, 1965-2014

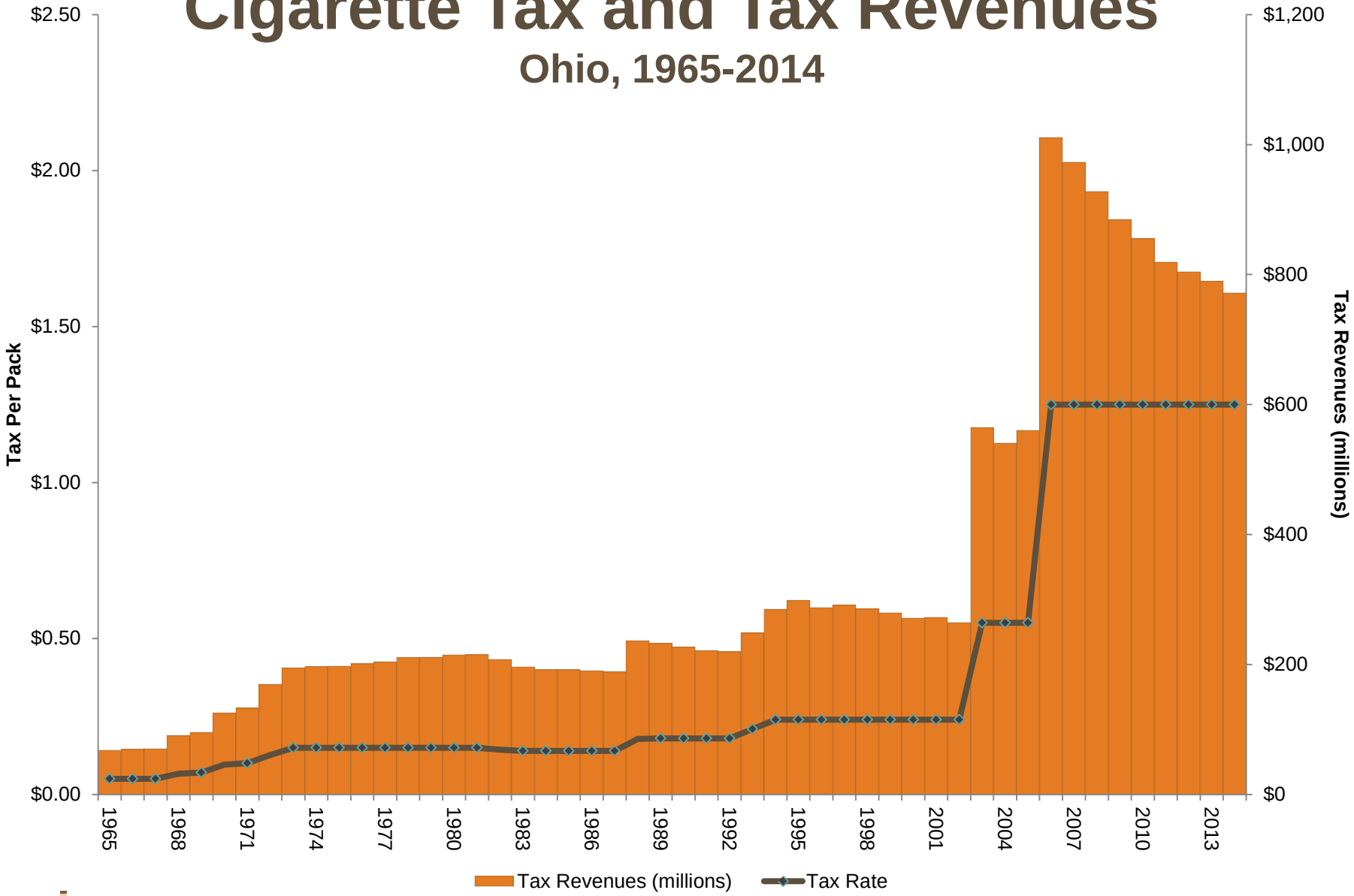



Sources: Tax Burden on Tobacco, 2013, and Authors' Calculations

# Ohio's Past Experience with Cigarette Tax Increases

# Cigarette Tax and Tax Revenues

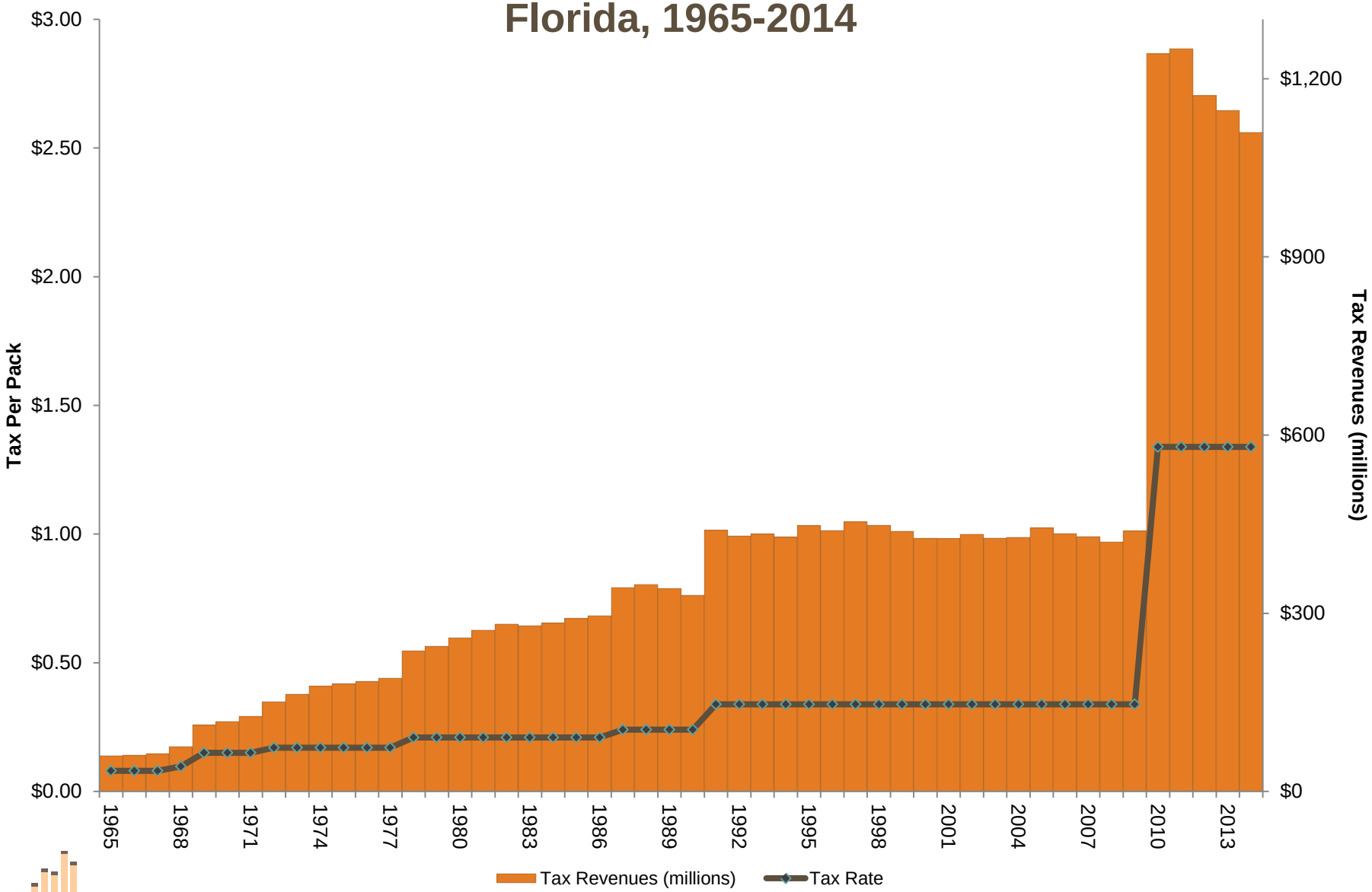
## Ohio, 1965-2014



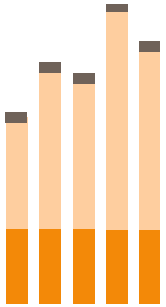

Sources: Tax Burden on Tobacco, 2013, and Authors' Calculations

# Cigarette Tax and Tax Revenues

## Florida, 1965-2014

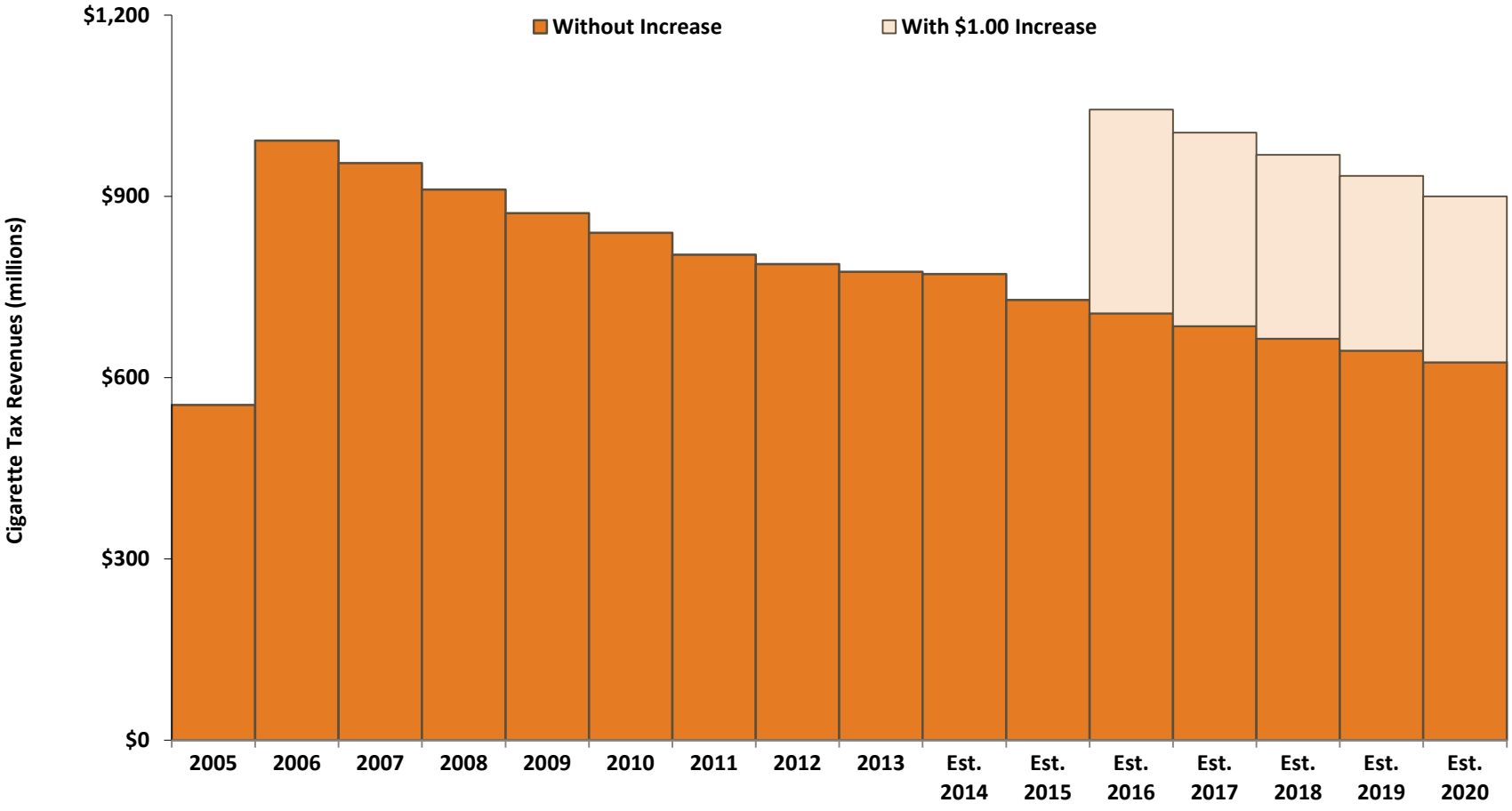



Sources: Tax Burden on Tobacco, 2013, and Authors' Calculations



# What Could Ohio Expect From a Tobacco Tax Increase

# Recent and Estimated Future Cigarette Tax Revenues Ohio

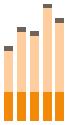



Note: Data are for fiscal years ending June 30.

Sources: Tax Burden on Tobacco, 2013, Ohio Office of Management and Budget and Authors' Calculations

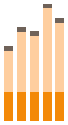
**Smoking declines produce enormous public benefits. A $1.00 per pack cigarette tax increase in Ohio will:**

- Prevent 65,000 youth from becoming smokers
- Encourage 73,100 adult smokers to quit
- Prevent 40,100 future deaths from smoking
- Save $2.67 billion in future health care costs



## Ohio can implement other strategies to increase revenues:

- Regularly increase tobacco tax rates
- Tax other tobacco products rates at equivalent rates
- Implement initiatives such as high-tech tax stamps to prevent cigarette smuggling and other tax evasion



# A SIGNIFICANT CIGARETTE TAX RATE INCREASE IN OHIO WOULD PRODUCE A LARGE, SUSTAINED INCREASE IN STATE TOBACCO TAX REVENUES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**January 27, 2015**

## About the Authors

Dr. Frank Chaloupka is a Distinguished Professor of Economics at the University of Illinois at Chicago's College of Liberal Arts & Sciences and its School of Public Health's Division of Health Policy and Administration. He also directs the University's Health Policy Center, is a Research Associate in the National Bureau of Economic Research's Health Economics Program and Children's Research Program. He is the Director of ImpacTeen, a research program involving nationally-recognized experts dedicated to studying youth tobacco use, other substance abuse, and other health behaviors; and he is Director of Tobacconomics, a group of economists and other policy researchers focused on the economics of tobacco and tobacco control globally. Dr. Chaloupka has written numerous studies, book chapters, and other publications that evaluate efforts to prevent and reduce tobacco use, with a special focus on the impact of cigarette and other tobacco product tax increases.

Dr. Jidong Huang is a research specialist at the Health Policy Center of the University of Illinois at Chicago working closely with Dr. Chaloupka on a variety of tobacco control policy focused analyses.


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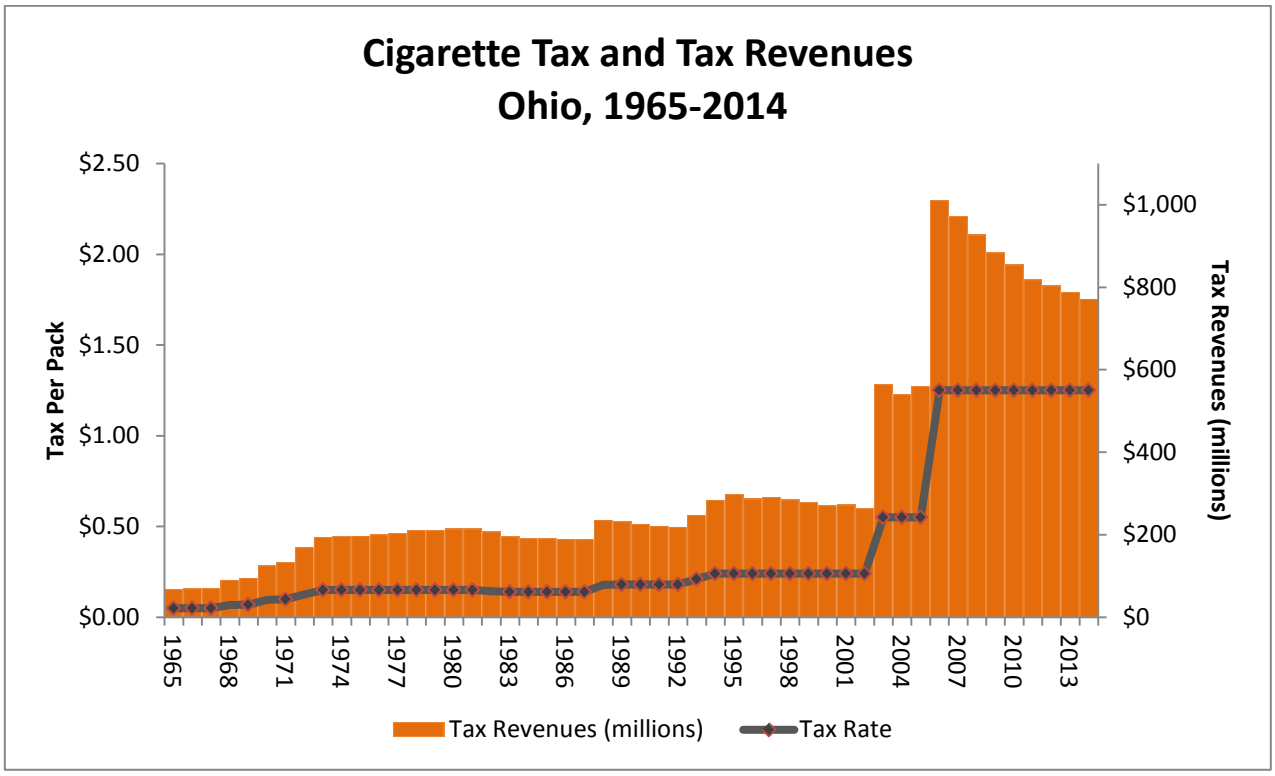
## EXECUTIVE SUMMARY

State cigarette and other tobacco tax revenues are among the most predictable, steady, and reliable revenues that states receive. While these revenues do decline gradually over time as smoking and other tobacco use declines, the reductions in revenue are modest, predictable, and more than offset by the related reductions in public and private sector health care costs and other economic costs caused by smoking.

In general, state cigarette tax revenues increase sharply following a significant increase to a state's cigarette tax rates (despite the smoking declines prompted by the tax increase and any related increases in tax avoidance or evasion), and then tend to decline slowly year to year as cigarette smoking continues to go down in response to other factors (e.g. stronger public policies targeting tobacco use). However, any decline in revenues from smoking reductions will be offset by related declines in tobacco-related healthcare costs burdening the state. For instance, the Campaign for Tobacco-Free Kids and the American Cancer Society Cancer Action Network project that a $1.00 per pack cigarette tax increase in Ohio will prevent 65,000 youth from becoming adult smokers, encourage 73,100 adults to quit, prevent 40,100 future smoking-caused deaths, and save the state $2.67 billion in future health care costs.

As shown in the chart below, Ohio, like other states, has enjoyed substantial revenue increases each time it has raised its cigarette tax rate. Due to other factors following the last state tax increase, Ohio's cigarette tax revenues declined greater than typically expected each year. This can be explained by ongoing smoking declines in the state, fortified by the statewide smoke-free law implemented in December 2006 and by the large federal tobacco tax increases in early 2009, which significantly reduced smoking and other tobacco use nationwide. But it also appears that Ohio's revenue declines in each of the years since its last increase in 2005 were even larger because Ohio failed to raise its tax rates on all other tobacco products when it raised its cigarette tax. Because of those unequal rates, some regular cigarette smokers have likely been evading the new, higher cigarette tax rate by switching to much lower taxed roll-your-own cigarettes, little cigars and the like – and every time a regular smoker switches to some other lower-taxed tobacco product Ohio loses revenue. Setting Ohio's tobacco tax rates so that all tobacco products are taxed at parallel levels would eliminate that problem and bring in additional state revenues. The Campaign for Tobacco-Free Kids and the American Cancer Society Cancer Action Network estimates that raising Ohio's low 17 percent wholesale price tax rate on other tobacco products to parallel a new $2.25 per pack cigarette tax rate would bring in another $93 million per year in new state revenues.



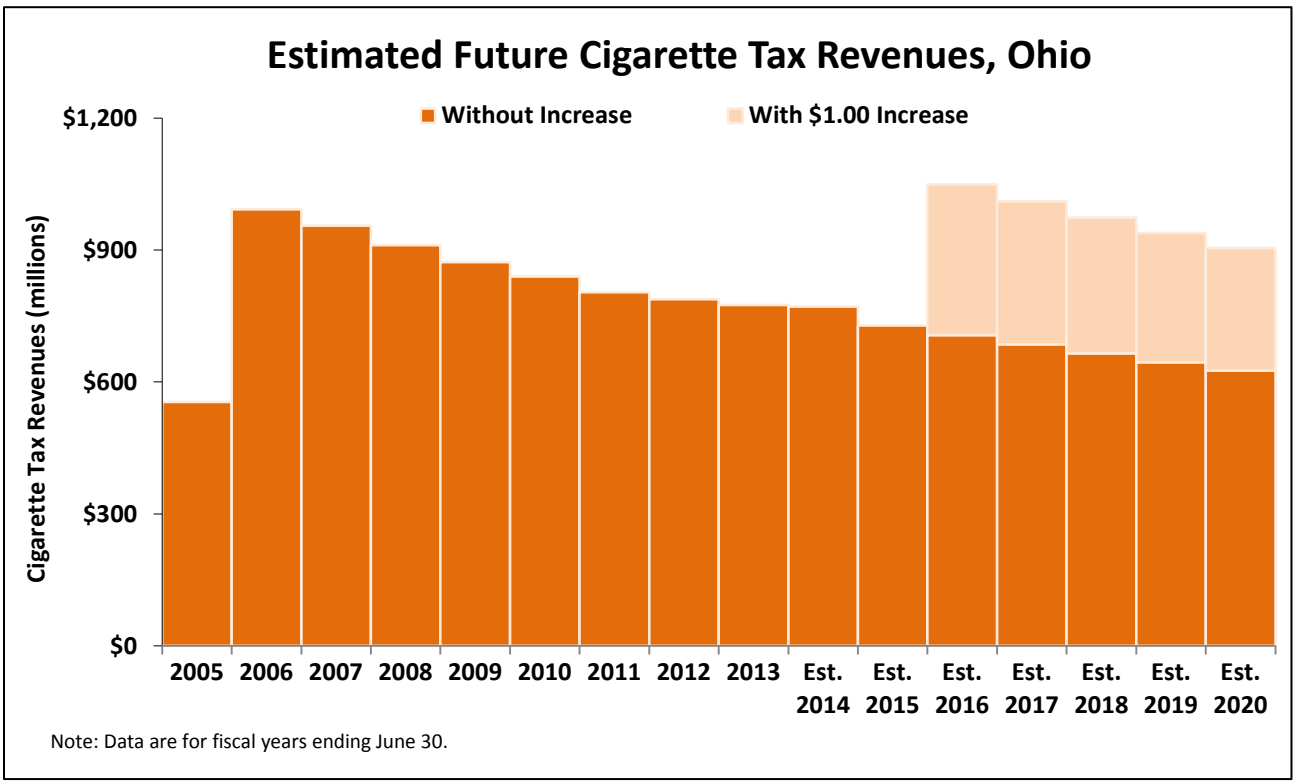

Note: Data are for fiscal years ending June 30.

In addition to increasing its cigarette tax rate and creating tax equity among all tobacco products, there are a number of steps that Ohio could take to protect or even increase its tobacco tax revenues over time. For example, Ohio could implement high-tech tax stamps to ensure that taxes are paid and to prevent cigarette smuggling and tax evasion. States can also minimize tobacco product smuggling and other tax evasion through such measures as making sure smokers understand the state's laws pertaining to tobacco tax evasion, increasing penalties for smuggling and other tax evasion, and directing a portion of all penalties to help fund expanded enforcement (which would bring in both more penalty payments and more tobacco tax revenues).

Despite the declines, Ohio is still receiving additional new cigarette tax revenues in excess of $200 million per year compared to what it received right before it last increased its cigarette tax rate. That same basic pattern, with large amounts of new state revenues in every future year, would occur again if Ohio increased its cigarette tax rate significantly in 2015 – and the new revenues would be even larger if Ohio also equalized all its tobacco product tax rates at the same time.

The chart shows what the Campaign for Tobacco-Free Kids projects that the $1.00 per pack increase would generate in new cigarette tax revenues over each of the next five years. Even if Ohio's cigarette sales declined by five percent a year after the initial $342 million in new revenues estimated from the rate increase, the state would still be receiving more than $275 million in additional new annual cigarette tax revenues five years after the increase compared to what it

received in 2015, and would have received more than $1.5 billion in total new annual revenues over that five year period compared to what it would receive with no rate increase.



# A SIGNIFICANT CIGARETTE TAX RATE INCREASE IN OHIO WOULD PRODUCE A LARGE, SUSTAINED INCREASE IN STATE TOBACCO TAX REVENUES

Every state that has passed a significant cigarette tax increase has enjoyed a substantial, sustained increase in its state cigarette tax revenues. This revenue increase occurs, despite the significant declines in smoking rates and tax-paid cigarette sales caused by the cigarette tax rate increase, because the increased tax per pack brings in much more new revenue than is lost by the declines in the number of packs sold and taxed. Exhibits A and B show many examples from actual state cigarette tax increases.

Exhibit A presents a list of significant state cigarette tax increases between 2002 and 2013 (increases of 50 cents or more per pack) and shows the amount of the tax increase, the decline in tax-paid cigarette sales, compared to the decline in sales nationally over the same time period, and the revenue change from the twelve months before the tax increase to the twelve months after the tax increase. In every state that significantly increased its tax, there were both sharp reductions in total packs sold and large increases in total net new revenues in the year following the rate increase, compared to the year before it.

Exhibit B is a short report that examines the sustainability of revenues generated from cigarette tax increases. This report considered every major cigarette tax increase (50 cents or more per pack) between 2000 and June 2009 and looked at state cigarette tax revenues before the tax increase and for at least five years following the increase, with analyses for states with and without well-funded comprehensive tobacco control programs. In every state that raised its tax during that time period, cigarette tax revenues increased significantly and remained much higher than revenues prior to the tax for many years after the tax increase.

Accordingly, Exhibits A and B provide direct evidence from actual state experiences that confirms that significant cigarette tax increases have always produced substantial amounts of new revenues (compared to what the state would have received without the increase), both immediately and over extended periods of time, and despite any and all related decreases in taxed state pack sales.

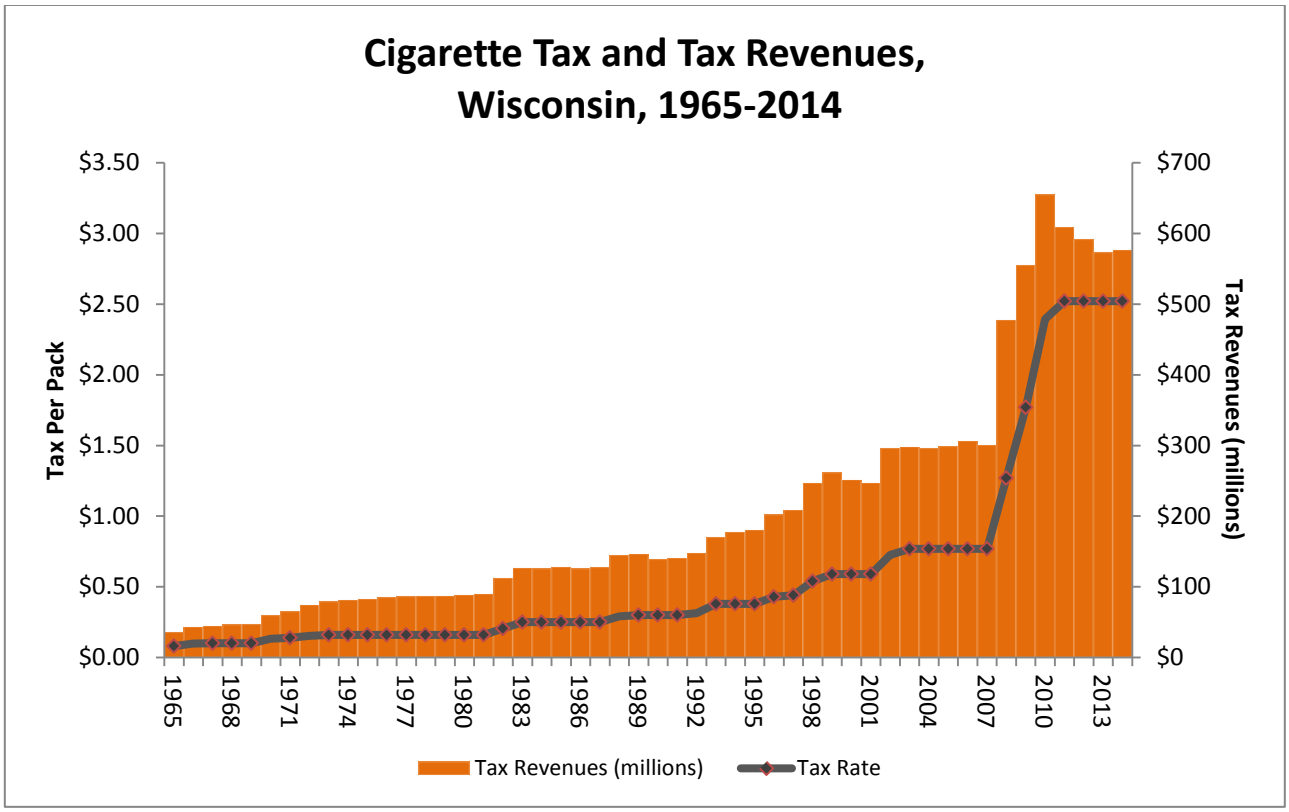
## Cigarette and Other Tobacco Tax Revenues Are Much More Predictable and Stable Than Many Other State Revenues

Year to year, state cigarette and other tobacco tax revenues are more predictable and less volatile than most other state revenue sources, such as state personal income taxes or corporate income taxes, which can vary considerably from year to year because of nationwide or regional recessions or state economic slowdowns.

In contrast, sharp drops in cigarette or other tobacco tax revenues from one year to the next are rare, in large part due to the addictive nature of cigarette smoking and other tobacco use. Long term trends in tobacco use show modest declines from year to year, both nationally and at the state level. These declines can be accelerated by comprehensive tobacco prevention efforts, but will generally be no more than a few percentage points each year. The exception to this will be the large smoking declines and related cigarette tax revenue declines that result from large nationwide increases in cigarette prices, such as the large cigarette company price increases prompted by the 1998 Master Settlement Agreement and the April 1, 2009 increase in federal excise taxes on cigarettes and other

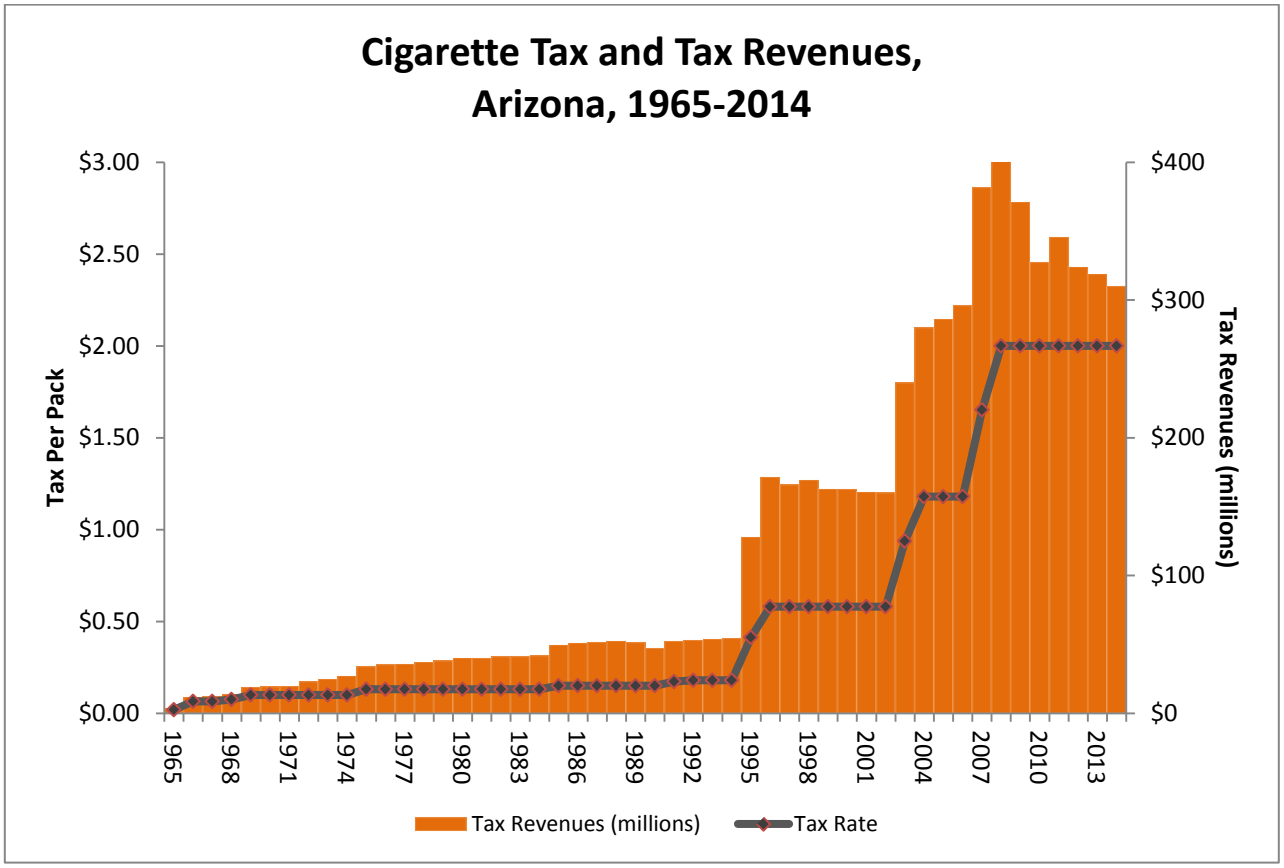
tobacco products. The only other large year-to-year changes to state cigarette tax revenues are the large revenue increases when a state significantly increases its own cigarette tax rates.

In states where taxes have been increased regularly over time, each increase in the tax leads to a significant and sustained increase in tax revenues. As shown in the figure below, for example, Wisconsin has increased its cigarette excise tax several times over the past few decades, with each increase generating new, sustained revenues.




Note: Data are for the fiscal year ending June 30.

The same pattern holds even in states where a share of the new revenues generated by the tax increase is used to fund a comprehensive tobacco control program. Arizona, for example, has increased its cigarette excise tax multiple times over the past few decades. In November 1994, Arizona voters approved the Tobacco Tax and Health Care Act that raised the cigarette tax by 40 cents per pack and dedicated a portion of the new revenues to the state's tobacco control program. As the figure below shows, each subsequent tax increase in Arizona led to a significant and sustained increase in revenues, despite the greater declines in smoking that result from the funding for the state program.




Note: Data are for the fiscal year ending June 30.

Additional examples of the relative stability of revenues from other state cigarette tax increases in states with and without well-funded tobacco control programs are contained in Exhibit B.

**Smoking Declines Produce Enormous Public and Private Sector Savings That More Than Offset Any State Revenue Reductions from Fewer Packs Being Sold**

As described above, gradual reductions in cigarette smoking and other tobacco use in the years after increases in state cigarette and other tobacco taxes will produce slow declines in state tobacco tax revenues (in the absence of additional tax increases). These declines in revenues, however, will be offset by reductions in public and private spending on health care to treat diseases caused by smoking, and by the reductions in the other economic costs caused by tobacco use. Some declines in costs, such as those resulting from smoking during pregnancy, will be seen almost immediately. Over time, these reduced costs will grow considerably, given that most of the health and other consequences of tobacco use occur after many years.

When smoking rates decline among pregnant women and lower income smokers (among the groups whose smoking behavior is most sensitive to changes in tax and price), costs to state Medicaid programs subsequently decline. Decreasing smoking rates among workers will decrease public and private sector employee healthcare costs.

Increasing tobacco taxes in Ohio will raise revenue while also lowering the healthcare cost burden on the state. Each year, Ohio spends $5.64 billion on health care costs caused by tobacco use, $1.72

billion of which is paid by the state through the Medicaid program. A decline of one percentage point in adult smoking rates will save the state $980 million in healthcare costs, including millions in state Medicaid costs related to tobacco use over time. And preventing kids from starting to smoke will save the state even more in health care costs.

In addition, the reductions in smoking from state cigarette and other tobacco product tax increases will produce other economic benefits for the state, including increased productivity in government and private sector workforces as fewer employees miss work because of smoking-caused sick days and cigarette breaks or have their productive work-lives interrupted or cut short by smoking-caused disability or premature death. Other economic benefits include reduced property losses from smoking-caused fires, and reduced cleaning and maintenance costs caused by smoking.

It is important to note that small rate increases or a rate increase that is split into smaller multi-stage increases would reduce the public health benefits and cost savings, and Ohio would not collect as much revenue as from a one-time, larger rate increase. This is because the tobacco industry can easily offset small increases with price cuts, coupons, and other price-reducing promotions. For instance, the Campaign for Tobacco-Free Kids and the American Cancer Society Cancer Action Network project that a $1.00 per pack increase will prevent 65,000 youth from becoming adult smokers, encourage 73,100 adults to quit, prevent 40,100 smoking-caused deaths, and save $2.67 billion in long-term health care costs. However, a small increase would not generate as many public health benefits or cost savings.

**States Can Implement Other Effective Strategies to Maintain and Increase Their Cigarette and Other Tobacco Tax Revenues**

If gradually declining state tobacco tax revenues are a concern for Ohio – despite the benefits and cost savings from the related smoking and other tobacco use declines discussed above – the state can periodically increase its tobacco tax rates to offset any declines in revenue. Alternatively, Ohio could implement legislation that allows for administrative increases in state tobacco tax rates following any significant decline in annual state tobacco tax revenues (or in total state tobacco revenues, including tobacco settlement payments).

Another important strategy is to make sure that all taxes on other tobacco products are set at rates that parallel the state's cigarette tax rate. Creating tax equity among all the tobacco tax products sold in the state will make the revenues even more reliable – Ohio will not lose revenues if tobacco users switch to tobacco products taxed at lower rates. But most states, including Ohio, have unequal rates so that the state loses revenues each time a cigarette smoker switches to smoking roll-your-own (RYO) tobacco or small cigars or starts using other cheaper and less-taxed tobacco products. But even with a comparable percentage tax rate for other tobacco products, some lower priced tobacco products will be taxed at a much lower level compared to cigarettes on a per-use or per-package basis.

> RYO cigarettes, for example, are much cheaper than manufactured cigarettes; and most state percentage-of-price tax rates subject them to much lower taxes, per pack, than manufactured cigarettes. That tax inequity could be fixed by taxing a cigarette pack's worth of RYO tobacco (0.65 ounces) at the same tax rate as a regular pack of cigarettes as a minimum tax to complement the percentage-of-price basic rate.

> Similarly, the tax-equity minimum tax on a standard 1.2 ounce can of smokeless tobacco would be an amount equal to the state tax on a pack of 20 cigarettes.

A similar cigarette pack tax amount tax could be placed on standard five-packs of cigarillos, blunts and other small cigars. But the big tax revenue loser for states in relation to cigars usually comes from cigarettes being packaged and sold as "little cigars" to escape the state's higher tax on cigarettes. That problem can be eliminated by amending the state law "cigarette" definitions to reach any and all cigarettes, no matter how they are labeled or packaged (without reaching any bona fide cigars). One way to do that would be to add the following phrase to the existing "cigarette" definitions: "and includes any other roll for smoking containing tobacco that weighs no more than four and a half pounds per thousand, unless it is wrapped in whole tobacco leaf and does not have a filter."

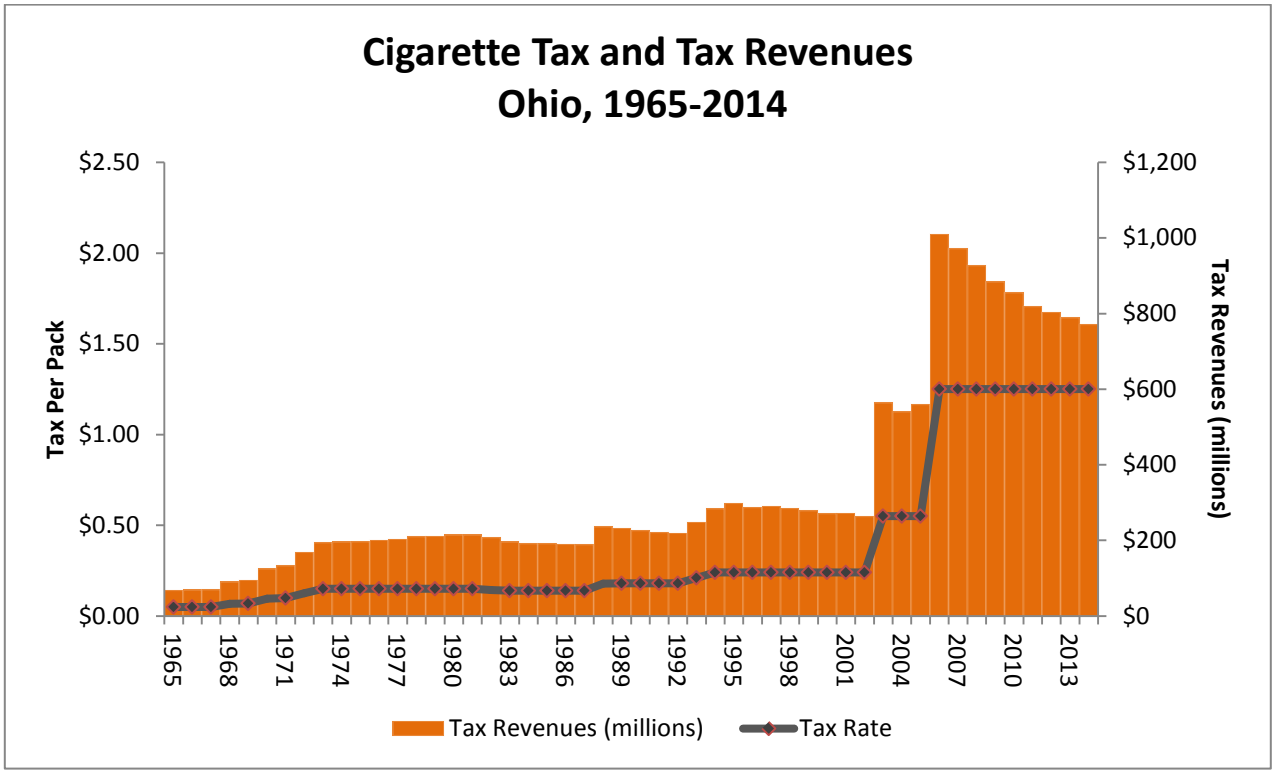
States can also increase their cigarette and other tobacco tax revenues by implementing initiatives to prevent and reduce cigarette smuggling and other forms of tobacco tax evasion – such as adopting new, high-tech tax stamps. California, the first state to adopt a high-tech tax stamp, enjoyed a $100 million increase in cigarette tax revenues in the first 20 months after the new tax stamp was introduced.

Additional cost-effective strategies to protect tobacco tax revenues include increasing penalties and fines; educating smokers about applicable state laws (such as limits on the number of packs that may be brought into the state from other states); and increasing enforcement efforts – perhaps allowing the enforcing agencies to keep half of all fines and penalties they collect to fund expanded new enforcement efforts (with general revenues receiving the other half, along with all of the recouped tax revenues). Other states have reduced tax avoidance and increased collections by targeting tax collection efforts at smokers who purchase cigarettes on the Internet without paying the state tax or by entering into special tax compacts with Native American tribes located in the state so that they impose and collect equivalent taxes on all reservation cigarette sales.

## Ohio's Past Experience with Cigarette Tax Increases

Ohio most recently increased its cigarette tax rate by 70 cents on July 1, 2005, to its current rate of $1.25 per pack. This came a few years after a more than doubling of the state cigarette tax from 24 cents per pack to 55 cents per pack on July 1, 2002. As shown in the figure below, both of these tax increases generated large and sustained increases in the Ohio's cigarette excise tax revenues.

In the years following the most recent tax increase, state revenues – after first rising very sharply – have declined somewhat in each subsequent year. These declines reflect not only ongoing background declines in smoking but also the additional smoking declines caused by the December 2006 implementation of Ohio's strong, new, voter approved smoke-free law, and by the significant increase in the federal cigarette excise tax in April 2009. It is also likely that Ohio is also losing revenues as cigarette smokers evade the higher cigarette tax by shifting to other much lower-taxed tobacco products, such as roll-your-own cigarettes, cigarette-like "little cigars," or regular cigars. Despite these declines in smoking, Ohio revenues in fiscal year 2014 were still more than $210 million higher than revenues in fiscal year 2005, right before the last cigarette tax rate increase.




Note: Data are for the fiscal year ending June 30.

This graph illustrates several points. First, state cigarette tax revenues can decline somewhat after the large revenue gains that following state tax rate increases because of ongoing gradual declines in smoking which can be accelerated by other factors. For example, the subsequent year-to-year revenue declines following the revenue boost from the last Ohio cigarette tax rate increase were largely the result of smoking declines prompted by the statewide smoke-free law implemented in December 2006 and by the significant federal cigarette tax increase that took effect on April 1, 2009.

Second, leaving the state tax rate on other tobacco products low while increasing the state cigarette tax leaves revenues on the table and also reduces tobacco tax revenues. Because it failed to increase the tax rate on other tobacco products when the state last increased its cigarette tax rate, Ohio not only missed its opportunity to increase its other tobacco tax revenues, but is also losing revenue each time a regular cigarette smoker evades the higher cigarette tax by switching to much lower-taxed roll-your-own cigarettes, little cigars, or other tobacco products.

Third, even with the out-year revenue declines caused by ongoing smoking reductions, state cigarette tax revenues several years after the last cigarette tax increase are still substantially larger than the revenue levels before the increase – and much higher than what the revenue levels would have been today absent any cigarette tax increase. For example, despite some year-to-year revenue declines after 2006, Ohio is still receiving additional new cigarette tax revenues in excess of $200 million per year compared to what it received in 2005, right before it last increased its cigarette tax rate.

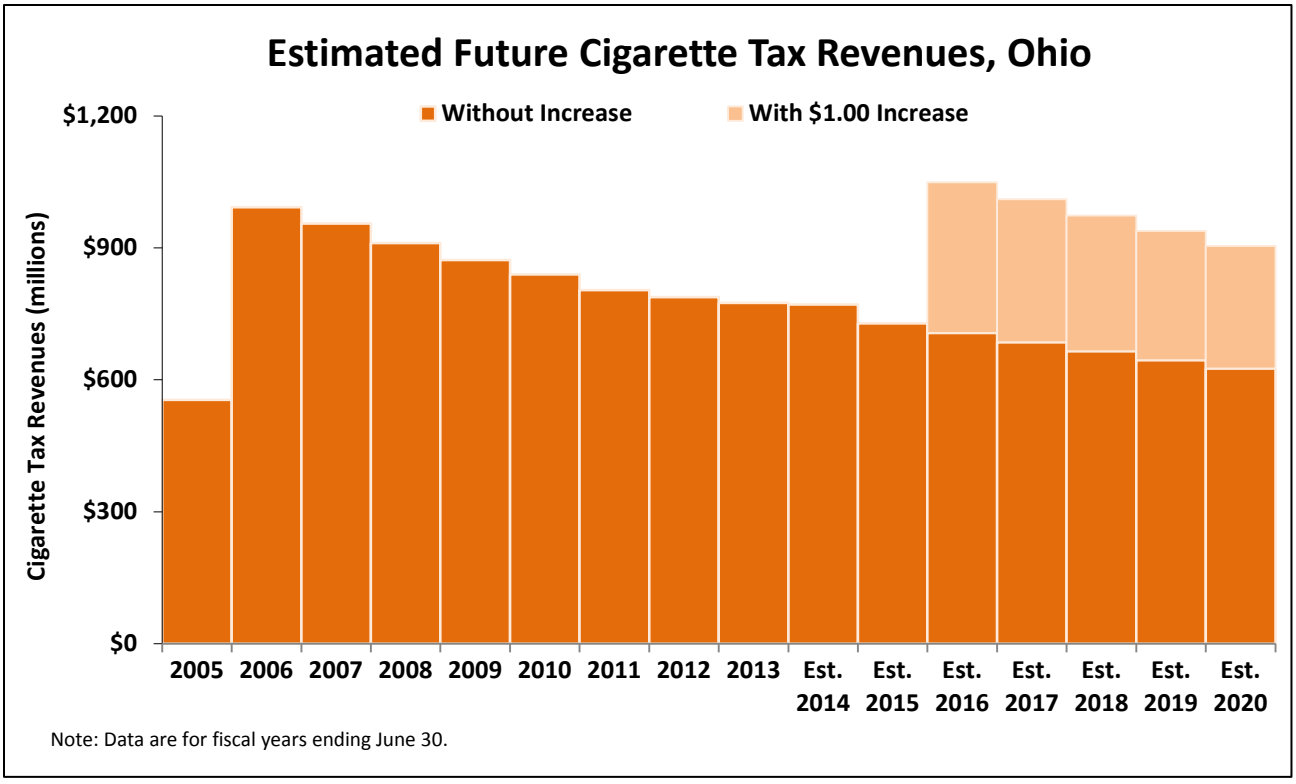
Fourth, periodic increases in a state's cigarette tax will more than offset the revenue declines from underlying downward trends in smoking, or new smoking declines from other factors, and produce substantially more revenue.

## What Ohio Could Expect from a Tobacco Tax Increase

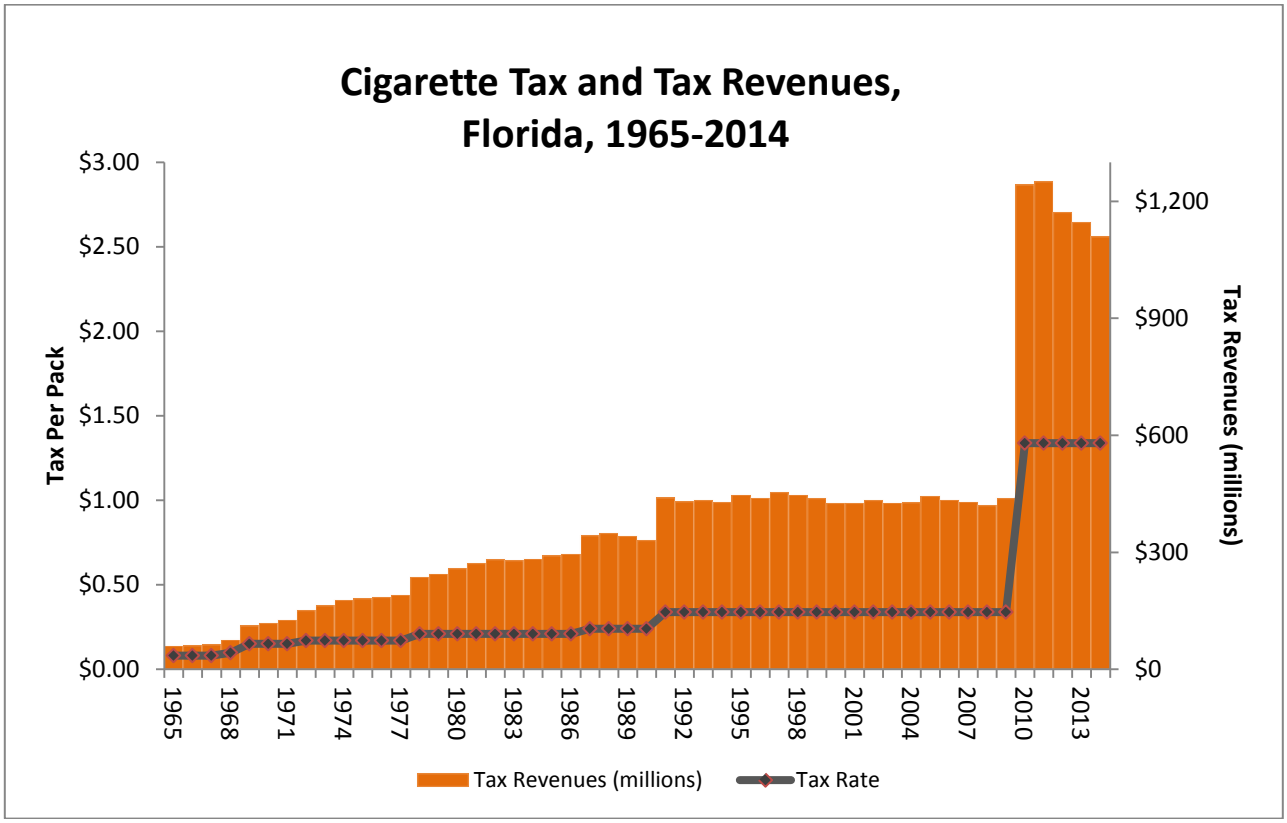
If Ohio increases its cigarette tax significantly in 2015, its revenues should follow the same basic patterns that occurred after its last cigarette tax increases, bringing the state substantial new revenues.

For example, the Campaign for Tobacco-Free Kids and the American Cancer Society Cancer Action Network project that a $1.00 per pack increase in Ohio's cigarette tax will generate more than $342 million in new revenues in the first 12 months of the increase, despite reductions in smoking rates as a result of the rate increase. In addition, if Ohio increased its tax rate on other tobacco products and implemented a minimum tax rate to match the new cigarette tax rate at the same time, the state could collect more than $93 million in additional revenue, while also gaining public health benefits and savings in health care costs because of reduced tobacco use.

Even if Ohio's cigarette sales declined by five percent a year after the initial surge in new revenues after a $1.00 rate increase, the state would still be receiving more than $275 million in additional new annual cigarette tax revenues five years after the increase compared to what it received in 2015, and would have received more than $1.5 billion in total new annual revenues over that five year period compared to what it would receive with no rate increase.




The pattern predicted for Ohio directly parallels what has happened in other states that have significantly increased their cigarette tax rates. For example, Florida increased its cigarette tax rate by $1.00 per pack, effective July 1, 2009, from a starting cigarette tax of 33.9 cents per pack. As shown in the chart below, preliminary cigarette sales and tax revenue data indicate that Florida will see pack sale declines of 28 percent or less over the first year after the increase, with revenues increasing by more than 195 percent.




Note: Data are for the fiscal year ending June 30. 2010 data are annualized projections based on revenues for the first ten months following the tax increase.

This Florida chart also provides another example of how state cigarette taxes provide a stable source of funding, with no major changes year-to-year, except when revenues go up sharply because of significant rate increases. Over time, cigarette tax revenues will decline slowly as smoking rates continue to fall, but revenues will remain considerably higher for many years and the declines will be gradual and predictable. Moreover, the substantial health benefits that result from the declines in smoking caused by the tax increase and the resulting reductions in health care costs should be considered.

As noted earlier, every single state that has significantly increased its cigarette taxes has, like Ohio, enjoyed substantial new cigarette tax revenues. Indeed, every state cigarette tax increase has produced an increase to state revenues above what the state would have received with no tax increase.[*]

[*] In rare cases, a small state cigarette tax increase might not bring in enough new revenue to make up for significant state pack sales and revenue declines caused by other factors. For example, after New Jersey increased its $2.40 per pack cigarette tax by another 17.5¢ in 2006 (which amounted to only a 3% increase to the average pack price), its total cigarette tax revenues declined somewhat over the following year. This decline was almost certainly the result of ongoing smoking declines in the state as well as additional reductions in cigarette consumption caused by the state's Smoke-Free Air Act that went into effect in April 2006. Without the small cigarette tax increase, the state's cigarette tax revenues would have dropped much more sharply. In every other instance besides New Jersey in 2006, state cigarette tax rate increases have been followed by significant net increases to annual state tax revenues – despite any ongoing or new smoking declines unrelated to the cigarette tax increase – and in every instance, including New Jersey, the state cigarette tax increase has brought the state more revenues than it would have received without any rate increase. See, e.g., Exhibits A and B.

## EXHIBIT A

## STATE EXPERIENCES WITH LARGE CIGARETTE TAX INCREASES 2002-2013

## REDUCED PACK SALES AND INCREASED REVENUES

| State | Effective Date | Tax Increase Amount (per pack) | New State Tax Rate (per pack) | State Pack Sales Decline | Nationwide Pack Sales Trend | Revenue Increase | New Revenues (millions) |
|---|---|---|---|---|---|---|---|
| *Alaska* | 1/1/05 | 60¢ | $1.60 | - 23.2% | - 4.2% | + 22.8% | + $9.3 |
| *Arkansas* | 3/1/09 | 56¢ | $1.15 | - 27.8% | - 10.2% | + 33.5% | + $46.5 |
| *Arizona* | 12/8/06 | 82¢ | $2.00 | - 32.5% | - 4.4% | + 13.6% | + $44.5 |
| *Colorado* | 1/1/05 | 64¢ | 84¢ | - 24.3% | - 4.2% | + 220.2% | + $131.0 |
| *Connecticut* | 4/3/02 | 61¢ | $1.11 | - 12.6% | - 4.7% | + 116.1% | + $133.6 |
| *Delaware* | 7/31/07 | 60¢ | $1.15 | - 35.1% | - 4.9% | + 35.1% | + $31.7 |
| *Washington, DC* | 10/1/08 | $1.00 | $2.00 | - 25.9% | - 7.0% | + 57.3% | + $13.2 |
| *Florida* | 7/1/09 | $1.00 | $1.339 | - 27.4 % | - 8.4% | + 193.2% | + $828.8 |
| *Hawaii* | 7/1/09 | 60¢ | $2.60 | - 11.3% | - 8.4% | + 14.5% | + $15.1 |
| *Illinois* | 6/24/12 | $1.00 | $1.98 | - 31.2% | -2.3% | + 39.0% | + $229.2 |
| *Iowa* | 3/15/07 | $1.00 | $1.36 | - 30.6% | - 4.7% | + 140.2% | + $128.0 |
| *Kansas* | 7/1/02 | 55¢ | $0.79 | - 21.6% | - 4.9% | + 142.7% | + $68.4 |
| *Maine* | 9/19/05 | $1.00 | $2.00 | - 12.3% | - 1.8% | + 76.5% | + $71.5 |
| *Maryland* | 1/1/08 | $1.00 | $2.00 | - 27.1% | - 4.2% | + 45.8% | + $126.9 |
| *Massachusetts* | 7/1/08 | $1.00 | $2.51 | - 19.1% | - 5.3% | + 34.2% | + $143.3 |
| *Michigan* | 8/1/02 | 50¢ | $1.25 | - 11.5% | - 5.6% | + 47.4% | + $273.7 |
| *Michigan* | 7/1/04 | 75¢ | $2.00 | - 15.2% | - 1.7% | + 28.1% | + $238.9 |
| *Minnesota* | 8/1/05 | 75¢ | $1.23 | - 16.1% | - 1.8% | + 160.7% | + $258.4 |
| *Minnesota* | 7/1/13 | $1.60 | $2.83 | - 24.0% | - 4.7% | + 56.0% | + $204.1 |
| *Mississippi* | 5/15/09 | 50¢ | $0.68 | - 22.8% | - 9.5% | + 188.3% | + $88.9 |
| *Montana* | 5/1/03 | 52¢ | $0.70 | - 7.3% | - 2.9% | + 259.8% | + $30.5 |
| *Montana* | 1/1/05 | $1.00 | $1.70 | - 42.0% | - 4.2% | + 36.5% | + $18.8 |
| *New Jersey* | 7/1/02 | 70¢ | $1.50 | - 17.6% | - 4.9% | + 51.0% | + $199.8 |
| *New Jersey* | 7/1/03 | 55¢ | $2.05 | - 9.0% | - 2.3% | + 26.6% | + $157.4 |
| *New Mexico* | 7/1/03 | 70¢ | $0.91 | - 32.3% | - 2.3% | + 191.8% | + $39.2 |
| *New Mexico* | 7/1/10 | $0.75 | $1.66 | - 7.8% | - 2.6% | + 67.5% | + $37.5 |
| *New York* | 6/3/08 | $1.25 | $2.75 | - 15.2% | - 5.8% | + 40.3% | + $377.4 |
| *New York* | 7/1/10 | $1.60 | $4.35 | - 24.8% | - 2.6% | + 18.8% | + $244.6 |
| *Ohio* | 7/1/05 | 70¢ | $1.25 | - 20.6% | - 1.6% | + 78.9% | + $437.6 |
| *Oklahoma* | 1/1/05 | 80¢ | $1.03 | - 34.7% | - 4.2% | + 98.2% | + $81.6 |
| *Rhode Island* | 7/1/04 | 75¢ | $2.46 | - 18.7% | - 1.7% | + 16.9% | + $18.7 |
| *South Dakota* | 1/1/07 | $1.00 | $1.53 | - 25.8% | - 4.9% | + 115.4% | + $31.8 |
| *Rhode Island* | 4/10/09 | $1.00 | $3.46 | - 14.7% | - 11.1% | + 15.1% | + $17.8 |
| *South Carolina* | 7/1/10 | 50¢ | $0.57 | + 7.8%[†] | - 2.6% | + 434.2% | + $116.8 |
| *Texas* | 1/1/07 | $1.00 | $1.41 | - 21.0% | - 4.9% | + 191.7% | + $1,003.7 |
| *Utah* | 7/1/10 | $1.005 | $1.70 | - 24.5% | - 2.6% | + 85.0% | + $47.0 |
| *Vermont* | 7/1/06 | 60¢ | $1.79 | - 14.6% | - 3.0% | + 30.0% | + $13.8 |
| *Washington* | 1/1/02 | 60¢ | $1.425 | - 18.8% | - 2.6% | + 42.1% | + $99.6 |
| *Washington* | 7/1/05 | 60¢ | $2.025 | - 8.4% | - 1.6% | + 29.1% | + $95.5 |
| *Washington* | 5/1/10 | $1.00 | $3.025 | - 20.5% | - 3.9% | + 17.0% | + $62.0 |
| *Wisconsin* | 1/1/08 | $1.00 | $1.77 | - 15.0% | - 4.2% | + 93.9% | + $283.0 |

Sources: Orzechowski & Walker, *Tax Burden on Tobacco*. U.S. Alcohol and Tobacco Tax and Trade Bureau. Consumption declines and revenue increases are for the 12 months before and after the tax increase. Nationwide consumption declines are for the 50 states and DC. Trends for rate increases after January 2008 include the impact of the 61.66-cent federal cigarette tax increase (effective April 1, 2009).

[†] The increased pack sales is largely due to a surge in pack sales in July 2010 because SC's new tax rate was not implemented until August 2010.

## EXHIBIT B

## SUSTAINABILITY OF CIGARETTE TAX REVENUES OVER TIME FOLLOWING CIGARETTE TAX RATE INCREASES

***Introductory Points:***

- Cigarette consumption is generally trending down. During the period from 1990 to 2014, total sales for the U.S. fell by 2.6 percent, on average, per year. During this same period, sales in Ohio fell by an average of 2.8 percent per year, with the larger decline reflecting the impact of two significant tax increases in Ohio in the 2000s. In the absence of cigarette tax increases, revenues from cigarette taxes will also be on a downward trend given the underlying trends in cigarette consumption.

- Cigarette tax increases will generate reductions in cigarette smoking and increases in revenues. Estimates indicate that the short run elasticity of cigarette demand is approximately –0.4, implying that a price increase of 10 percent will reduce total cigarette consumption by 4 percent. Because of the addictive nature of cigarette smoking, smokers' adjustments to the tax increases will occur over time, with the effect of a permanent, inflation adjusted tax increase rising so that the reductions in consumption that result will increase over time; estimates of the long run (after many decades) price elasticity of cigarette demand are –0.8. This implies that the gains in revenue that results from a tax increase will fall (although still be substantial) over time; however, the effects of inflation will erode the value of the tax increase, dampening the growth in the decline in smoking and lessening the drop in revenues.

- In states that use some of the revenues from tax increases to fund comprehensive tobacco control programs, these efforts lead to further reductions in smoking beyond those resulting from the tax increase. The implications for revenues are that the revenues generated from the tax increase will be lower in years after the comprehensive program is implemented compared to before.

- Historically, every significant state cigarette excise tax increase has resulted in a significant increase in cigarette tax revenues.

***Data Sources:***

Monthly tax paid cigarette tax revenues, by state, 1999-2014, provided by USDA and CDC Tax Burden on Tobacco monthly reports; cigarette tax rates and dates of change, *Tax Burden on Tobacco,* 2013. Note that the revenues for later periods described below (post November 1998) are lower relative to the general trend because of sharp reductions in smoking resulting from industry initiated cigarette price increases in the wake of the Master Settlement Agreement and, more recently, the significant increase in the federal cigarette excise tax in 2009. Tobacco control funding and CDC recommended funding amounts from CDC and the Campaign for Tobacco-Free Kids.

***Approach:***

- Analyzed significant tax changes – those that increased the state tax cigarette excise tax rate by at least 50 cents per pack over the period from 2000 through June 2009.

- Computed tax revenues for the 12 months preceding tax change and for as many 12 month periods as possible after tax change, for a minimum of five years; if tax was changed mid-month, then the last 12 full months and subsequent 12 full month periods were examined.

***Findings:***

**States With At Least 5 years of Post-Tax Increase Data Available, and the Average State Tobacco Control Funding as a Percent of the CDC Recommendation less than 50%:**

- Arizona – tax increases from 58 cents to 118 cents per pack, 11/26/2002, and to 200 cents per pack, 12/8/2006:
  - Revenues 12/1/2001 – 11/30/2002: $177.7 million
  - Revenues 12/1/2002 – 11/30/2003: $244.8 million
  - Revenues 12/1/2003 – 11/30/2004: $280.5 million
  - Revenues 12/1/2004 – 11/30/2005: $286.2 million
  - Revenues 12/1/2005 – 11/30/2006: $325.9 million
  - Revenues 12/1/2006 – 11/30/2007: $370.4 million
  - Revenues 12/1/2007 – 11/30/2008: $391.4 million
  - Revenues 12/1/2008 – 11/30/2009: $348.3 million
  - Revenues 12/1/2009 – 11/30/2010: $324.5 million
  - Revenues 12/1/2010 – 11/30/2011: $323.6 million
  - Revenues 12/1/2011 – 11/30/2012: $319.2 million
  - Revenues 12/1/2012 – 11/30/2013: $310.7 million
  - Average annual revenues, 12/2002 – 11/2013: $320.5 million
- ❖ Arizona – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 45.8%

- California – tax increase from 37 cents to 87 cents per pack, 1/1/1999:
  - Revenues 1/1/1998 – 12/31/1998: $646.6 million
  - Revenues 1/1/1999 – 12/31/1999: $1,115.7 million
  - Revenues 1/1/2000 – 12/31/2000: $1,125.7 million
  - Revenues 1/1/2001 – 12/31/2001: $1,105.2 million
  - Revenues 1/1/2002 – 12/31/2002: $1,068.9 million
  - Revenues 1/1/2003 – 12/31/2003: $1,024.4 million
  - Revenues 1/1/2004 – 12/31/2004: $1,030.2 million
  - Revenues 1/1/2005 – 12/31/2005: $1,036.2 million
  - Revenues 1/1/2006 – 12/31/2006: $1,031.3 million
  - Revenues 1/1/2007 – 12/31/2007: $984.6 million
  - Revenues 1/1/2008 – 12/31/2008: $952.3 million
  - Revenues 1/1/2009 – 12/31/2009: $870.1 million
  - Revenues 1/1/2010 – 12/31/2010: $849.4 million
  - Revenues 1/1/2011 – 12/31/2011: $829.4 million
  - Revenues 1/1/2012 – 12/31/2012: $813.1 million
  - Revenues 1/1/2013 – 12/31/2013: $768.6 million
  - Average annual revenues, 1/1999 – 12/2013: $973.7 million
- ❖ California – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 26.3%

- Connecticut – tax increases from 50 cents to 111 cents per pack, 4/3/2002, to 151 cents per pack, 3/15/2003, to 200 cents on 7/1/2007, to 300 cents on 10/1/2009, and to 340 cents on 7/1/2011:
  - Revenues 4/1/2001 – 3/31/2002: $115.8 million
  - Revenues 4/1/2002 – 3/31/2003: $234.7 million
  - Revenues 4/1/2003 – 3/31/2004: $280.9 million
  - Revenues 4/1/2004 – 3/31/2005: $269.4 million
  - Revenues 4/1/2005 – 3/31/2006: $268.6 million
  - Revenues 4/1/2006 – 3/31/2007: $269.5 million
  - Revenues 4/1/2007 – 3/31/2008: $301.2 million
  - Revenues 4/1/2008 – 3/31/2009: $299.3 million
  - Revenues 4/1/2009 – 3/31/2010: $349.1 million
  - Revenues 4/1/2010 – 3/31/2011: $394.0 million
  - Revenues 4/1/2011 – 3/31/2012: $412.7 million
  - Revenues 4/1/2012 – 3/31/2013: $384.2 million
  - Revenues 4/1/2013 – 3/31/2014: $370.9 million
  - Average annual revenues, 4/2002 - 3/2014: $319.6 million

❖ Connecticut – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 7.5%

- District of Columbia – tax increases from 100 cents to 200 cents per pack, 10/1/2008, and to 250 cents per pack on 10/1/2009:
  - Revenues 10/1/2007 – 9/30/2008: $23.1 million
  - Revenues 10/1/2008 – 9/30/2009: $34.2 million
  - Revenues 10/1/2009 – 9/30/2010: $33.3 million
  - Revenues 10/1/2010 – 9/30/2011: $33.5 million
  - Revenues 10/1/2011 – 9/30/2012: $37.7 million
  - Revenues 10/1/2012 – 9/30/2013: $32.1 million
  - Average annual revenues, 10/2008 – 9/2013: $34.2 million

❖ DC – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 13.1%

- Iowa – tax increase from 36 cents to 136 cents per pack, 3/15/2007:
  - Revenues 3/1/2006 – 2/28/2007: $91.3 million
  - Revenues 3/1/2007 – 2/29/2008: $219.3 million
  - Revenues 3/1/2008 – 2/28/2009: $230.8 million
  - Revenues 3/1/2009 – 2/28/2010: $206.1 million
  - Revenues 3/1/2010 – 2/28/2011: $207.6 million
  - Revenues 3/1/2011 – 2/29/2012: $200.6 million
  - Revenues 3/1/2012 – 2/28/2013: $202.3 million
  - Revenues 3/1/2013 – 2/28/2014: $205.2 million
  - Average annual revenues, 3/2007 – 2/2014: $210.3 million

❖ Iowa – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 25.4%

- Maryland – tax increase from 100 cents to 200 cents per pack, 1/1/2008:
  - Revenues 1/1/2007 – 12/31/2008: $276.7 million
  - Revenues 1/1/2008 – 12/31/2009: $403.6 million

- Revenues 1/1/2009 – 12/31/2010: $394.0 million
- Revenues 1/1/2010 – 12/31/2011: $401.3 million
- Revenues 1/1/2011 – 12/31/2012: $401.1 million
- Revenues 1/1/2012 – 12/31/2013: $380.9 million
- Average annual revenues, 1/2008 – 12/2013: $395.9 million

❖ Maryland – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 24.8%

- Massachusetts – tax increases from 76 cents to 151 cents per pack, 7/25/2002, to 251 cents per pack, 7/1/2008, and to 351 cents on 7/31/2013:
  - Revenues 8/1/2001 – 7/31/2002: $279.4 million
  - Revenues 8/1/2002 – 7/31/2003: $438.4 million
  - Revenues 8/1/2003 – 7/31/2004: $422.3 million
  - Revenues 8/1/2004 – 7/31/2005: $406.2 million
  - Revenues 8/1/2005 – 7/31/2006: $422.5 million
  - Revenues 8/1/2006 – 7/31/2007: $426.2 million
  - Revenues 8/1/2007 – 7/31/2008: $440.2 million
  - Revenues 8/1/2008 – 7/31/2009: $557.7 million
  - Revenues 8/1/2009 – 7/31/2010: $555.9 million
  - Revenues 8/1/2010 – 7/31/2011: $562.7 million
  - Revenues 8/1/2011 – 7/31/2012: $550.7 million
  - Revenues 8/1/2012 – 7/31/2013: $539.3 million
  - Average annual revenues, 8/2002 – 7/2013: $483.8 million

❖ Massachusetts – average tobacco control funding as a percent of the CDC recommendation, –2006 – 2015: 11.6%

- Michigan – tax increases from 75 cents to 125 cents per pack, 8/1/2002 and to 200 cents per pack, 7/1/2004:
  - Revenues 8/1/2001 – 7/31/2002: $556.9 million
  - Revenues 8/1/2002 – 7/31/2003: $815.6 million
  - Revenues 8/1/2003 – 7/31/2004: $1,124.4 million
  - Revenues 8/1/2004 – 7/31/2005: $1,138.2 million
  - Revenues 8/1/2005 – 7/31/2006: $1,092.8 million
  - Revenues 8/1/2006 – 7/31/2007: $1,043.9 million
  - Revenues 8/1/2007 – 7/31/2008: $1,028.6 million
  - Revenues 8/1/2008 – 7/31/2009: $957.5 million
  - Revenues 8/1/2009 – 7/31/2010: $916.0 million
  - Revenues 8/1/2010 – 7/31/2011: $918.3 million
  - Revenues 8/1/2011 – 7/31/2012: $896.1 million
  - Revenues 8/1/2012 – 7/31/2013: $896.1 million
  - Average annual revenues, 8/2002 – 7/2013: $982.6 million

❖ Michigan – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 2.0%

- Minnesota – tax increases from 48 cents to 123 cents per pack, 8/1/2005, to 283 cents per pack, 7/1/2013, and to 290 cents on 1/1/2015:
  - Revenues 8/1/2004 – 7/31/2005: $160.8 million
  - Revenues 8/1/2005 – 7/31/2006: $419.1 million

- Revenues 8/1/2006 – 7/31/2007: $401.5 million
- Revenues 8/1/2007 – 7/31/2008: $404.5 million
- Revenues 8/1/2008 – 7/31/2009: $390.4 million
- Revenues 8/1/2009 – 7/31/2010: $382.3 million
- Revenues 8/1/2010 – 7/31/2011: $383.6 million
- Revenues 8/1/2011 – 7/31/2012: $357.0 million
- Revenues 8/1/2012 – 7/31/2013: $377.2 million
- Average annual revenues, 8/2005 – 7/2013: $389.4 million

❖ Minnesota – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 48.3%

- Mississippi – tax increase from 18 cents to 68 cents per pack, 5/15/2009:
  - Revenues 5/1/2008 – 4/30/2009: $47.2 million
  - Revenues 5/1/2009 – 4/30/2010: $136.1 million
  - Revenues 5/1/2010 – 4/30/2011: $139.5 million
  - Revenues 5/1/2011 – 4/30/2012: $135.4 million
  - Revenues 5/1/2012 – 4/30/2013: $132.0 million
  - Revenues 5/1/2013 – 4/30/2014: $127.6 million
  - Average annual revenues, 5/2009 – 4/2014: $134.1 million

❖ Mississippi – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 33.7%

- New Jersey – tax increases from 80 cents to 150 cents per pack, 7/1/2002, to 205 cents per pack, 7/1/2003, to 240 cents on 7/1/2004, to 257.5 cents on 7/15/2006, and to 270 cents on 7/1/2009:
  - Revenues 7/1/2001 – 6/30/2002: $390.7 million
  - Revenues 7/1/2002 – 6/30/2003: $612.1 million
  - Revenues 7/1/2003 – 6/30/2004: $760.8 million
  - Revenues 7/1/2004 – 6/30/2005: $782.2 million
  - Revenues 7/1/2005 – 6/30/2006: $788.7 million
  - Revenues 7/1/2006 – 6/30/2007: $766.5 million
  - Revenues 7/1/2007 – 6/30/2008: $764.7 million
  - Revenues 7/1/2008 – 6/30/2009: $728.1 million
  - Revenues 7/1/2009 – 6/30/2010: $731.9 million
  - Revenues 7/1/2010 – 6/30/2011: $773.4 million
  - Revenues 7/1/2011 – 6/30/2012: $758.3 million
  - Revenues 7/1/2012 – 6/30/2013: $733.1 million
  - Revenues 7/1/2013 – 6/30/2014: $704.7 million
  - Average annual revenues, 7/2002 – 6/2014: $742.0 million

❖ New Jersey – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 9.0%

- New Mexico – tax increases from 21 cents to 91 cents per pack, 7/1/2003, and to 166 cents per pack on 7/1/2010:
  - Revenues 7/1/2002 – 6/30/2003: $21.0 million
  - Revenues 7/1/2003 – 6/30/2004: $61.8 million
  - Revenues 7/1/2004 – 6/30/2005: $61.3 million
  - Revenues 7/1/2005 – 6/30/2006: $62.9 million

- Revenues 7/1/2006 – 6/30/2007: $64.4 million
- Revenues 7/1/2007 – 6/30/2008: $61.7 million
- Revenues 7/1/2008 – 6/30/2009: $59.0 million
- Revenues 7/1/2009 – 6/30/2010: $55.5 million
- Revenues 7/1/2010 – 6/30/2011: $93.0 million
- Revenues 7/1/2011 – 6/30/2012: $92.4 million
- Revenues 7/1/2012 – 6/30/2013: $91.5 million
- Revenues 7/1/2013 – 6/30/2014: $85.2 million
- Average annual revenues, 7/2003 – 6/2014: $71.7 million

❖ New Mexico – average tobacco control funding as a percent of the CDC recommendation, –2006 – 2015: 38.4%

- New York – tax increases from 56 cents to 111 cents per pack, 3/1/2000, to 150 cents per pack, 4/3/2002, to 275 cents on 6/3/2008, and to 435 cents on 7/1/2010:
  - Revenues 3/1/1999 – 2/29/2000: $645.4 million
  - Revenues 3/1/2000 – 2/28/2001: $973.2 million
  - Revenues 3/1/2001 – 2/28/2002: $999.2 million
  - Revenues 3/1/2002 – 2/28/2003: $1,072.6 million
  - Revenues 3/1/2003 – 2/29/2004: $974.6 million
  - Revenues 3/1/2004 – 2/28/2005: $948.3 million
  - Revenues 3/1/2005 – 2/28/2006: $939.0 million
  - Revenues 3/1/2006 – 2/28/2007: $944.2 million
  - Revenues 3/1/2007 – 2/29/2008: $936.2 million
  - Revenues 3/1/2008 – 2/28/2009: $1,240.9 million
  - Revenues 3/1/2009 – 2/28/2010: $1,273.1 million
  - Revenues 3/1/2010 – 2/28/2011: $1,472.3 million
  - Revenues 3/1/2011 – 2/29/2012: $1,552.5 million
  - Revenues 3/1/2012 – 2/28/2013: $1,467.3 million
  - Revenues 3/1/2013 – 2/28/2014: $1,360.2 million
  - Average annual revenues, 3/2000 – 2/2014: $1,153.8 million

❖ New York – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 37.1%

- Ohio – tax increase from 55 cents to 125 cents per pack, 7/1/2005:
  - Revenues 7/1/2004 – 6/30/2005: $567.9 million
  - Revenues 7/1/2005 – 6/30/2006: $996.7 million
  - Revenues 7/1/2006 – 6/30/2007: $985.8 million
  - Revenues 7/1/2007 – 6/30/2008: $927.9 million
  - Revenues 7/1/2008 – 6/30/2009: $884.1 million
  - Revenues 7/1/2009 – 6/30/2010: $968.0 million
  - Revenues 7/1/2010 – 6/30/2011: $819.8 million
  - Revenues 7/1/2011 – 6/30/2012: $804.9 million
  - Revenues 7/1/2012 – 6/30/2013: $779.7 million
  - Revenues 7/1/2013 – 6/30/2014: $771.6 million
  - Average annual revenues, 7/2005 – 6/2014: $871.0 million

❖ Ohio – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 23.7%

- Oklahoma – tax increase from 23 cents to 103 cents per pack, 1/1/2005:
  - Revenues 1/1/2004 – 12/31/2004: $83.1 million
  - Revenues 1/1/2005 – 12/31/2005: $164.7 million
  - Revenues 1/1/2006 – 12/31/2006: $203.1 million
  - Revenues 1/1/2007 – 12/31/2007: $218.5 million
  - Revenues 1/1/2008 – 12/31/2008: $235.7 million
  - Revenues 1/1/2009 – 12/31/2009: $235.4 million
  - Revenues 1/1/2010 – 12/31/2010: $235.8 million
  - Revenues 1/1/2011 – 12/31/2011: $246.0 million
  - Revenues 1/1/2012 – 12/31/2012: $244.5 million
  - Revenues 1/1/2013 – 12/31/2013: $228.8 million
  - Average annual revenues, 1/2005 – 12/2013: $223.6 million

❖ Oklahoma – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 48.4%

- Oregon – tax increase from 68 cents to 128 cents per pack, 11/1/2002, tax reduced to 118 cents per pack, 1/1/04, and increased to 131 cents per pack on 1/1/2014:
  - Revenues 11/1/2001 – 10/31/2002: $162.1 million
  - Revenues 11/1/2002 – 10/31/2003: $259.6 million
  - Revenues 11/1/2003 – 10/31/2004: $231.7 million
  - Revenues 11/1/2004 – 10/31/2005: $229.2 million
  - Revenues 11/1/2005 – 10/31/2006: $236.7 million
  - Revenues 11/1/2006 – 10/31/2007: $238.1 million
  - Revenues 11/1/2007 – 10/31/2008: $225.9 million
  - Revenues 11/1/2008 – 10/31/2009: $210.9 million
  - Revenues 11/1/2009 – 10/31/2010: $204.0 million
  - Revenues 11/1/2010 – 10/31/2011: $208.0 million
  - Revenues 11/1/2011 – 10/31/2012: $199.7 million
  - Revenues 11/1/2012 – 10/31/2013: $198.1 million
  - Average annual revenues, 11/2002 – 10/2013: $222.0 million

❖ Oregon – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 21.0%

- Pennsylvania – tax increases from 31 cents to 100 cents per pack, 7/15/2002, and to 135 cents per pack, 1/7/2004, to 160 cents on 11/1/2009:
  - Revenues 7/1/2001 – 6/30/2002: $329.8 million
  - Revenues 7/1/2002 – 6/30/2003: $888.8 million
  - Revenues 7/1/2003 – 6/30/2004: $989.4 million
  - Revenues 7/1/2004 – 6/30/2005: $1,052.8 million
  - Revenues 7/1/2005 – 6/30/2006: $1,050.4 million
  - Revenues 7/1/2006 – 6/30/2007: $1,031.2 million
  - Revenues 7/1/2007 – 6/30/2008: $1,032.4 million
  - Revenues 7/1/2008 – 6/30/2009: $1,004.7 million
  - Revenues 7/1/2009 – 6/30/2010: $1,087.8 million
  - Revenues 7/1/2010 – 6/30/2011: $1,145.6 million
  - Revenues 7/1/2011 – 6/30/2012: $1,122.1 million
  - Revenues 7/1/2012 – 6/30/2013: $1,080.8 million
  - Revenues 7/1/2013 – 6/30/2014: $1,038.3 million

- Average annual revenues, 7/2002 – 6/2014: $1,043.7 million

❖ Pennsylvania – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 21.8%

- Rhode Island – tax increase from 171 cents to 246 cents per pack, 7/1/2004, to 346 cents per pack, 4/10/2009, and to 350 cents on 7/1/2012:
  - Revenues 7/1/2003 – 6/30/2004: $112.4 million
  - Revenues 7/1/2004 – 6/30/2005: $132.5 million
  - Revenues 7/1/2005 – 6/30/2006: $119.0 million
  - Revenues 7/1/2006 – 6/30/2007: $119.5 million
  - Revenues 7/1/2007 – 6/30/2008: $116.1 million
  - Revenues 7/1/2008 – 6/30/2009: $123.4 million
  - Revenues 7/1/2009 – 6/30/2010: $136.6 million
  - Revenues 7/1/2010 – 6/30/2011: $134.3 million
  - Revenues 7/1/2011 – 6/30/2012: $131.2 million
  - Revenues 7/1/2012 – 6/30/2013: $132.3 million
  - Revenues 7/1/2013 – 6/30/2014: $133.1 million
  - Average annual revenues, 7/2004 – 6/2014: $127.8 million

❖ Rhode Island – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 6.7%

- South Dakota – tax increase from 53 cents to 153 cents per pack, 1/1/2007:
  - Revenues 1/1/2006 – 12/31/2006: $27.5 million
  - Revenues 1/1/2007 – 12/31/2007: $59.3 million
  - Revenues 1/1/2008 – 12/31/2008: $64.1 million
  - Revenues 1/1/2009 – 12/31/2009: $58.6 million
  - Revenues 1/1/2010 – 12/31/2010: $57.7 million
  - Revenues 1/1/2011 – 12/31/2011: $56.4 million
  - Revenues 1/1/2012 – 12/31/2012: $54.2 million
  - Revenues 1/1/2013 – 12/31/2013: $55.0 million
  - Average annual revenues, 1/2007 – 12/2013: $57.9 million

❖ South Dakota – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 33.7%

- Texas – tax increase from 41 cents to 141 cents per pack, 1/1/2007:
  - Revenues 1/1/2006 – 12/31/2006: $523.4 million
  - Revenues 1/1/2007 – 12/31/2007: $1,527.1 million
  - Revenues 1/1/2008 – 12/31/2008: $1,348.8 million
  - Revenues 1/1/2009 – 12/31/2009: $1,246.0 million
  - Revenues 1/1/2010 – 12/31/2010: $1,342.4 million
  - Revenues 1/1/2011 – 12/31/2011: $1,339.8 million
  - Revenues 1/1/2012 – 12/31/2012: $1,363.5 million
  - Revenues 1/1/2013 – 12/31/2013: $1,312.0 million
  - Average annual revenues, 1/2007 – 12/2013: $1,354.2 million

❖ Texas – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 4.9%

- Vermont – tax increase from 119 cents to 179 cents per pack, 7/1/2006, to 199 cents per

pack, 7/1/2008, to 224 cents on 7/1/2009, to 262 cents on 7/1/2011, and to 275 cents on 7/1/2014:

- Revenues 7/1/2005 – 6/30/2006: $47.5 million
- Revenues 7/1/2006 – 6/30/2007: $60.8 million
- Revenues 7/1/2007 – 6/30/2008: $55.6 million
- Revenues 7/1/2008 – 6/30/2009: $61.8 million
- Revenues 7/1/2009 – 6/30/2010: $66.3 million
- Revenues 7/1/2010 – 6/30/2011: $67.9 million
- Revenues 7/1/2011 – 6/30/2012: $74.4 million
- Revenues 7/1/2012 – 6/30/2013: $68.5 million
- Revenues 7/1/2013 – 6/30/2014: $66.9 million
- Average annual revenues, 7/2006 – 6/2014: $65.3 million

❖ Vermont – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 49.5%

- Washington – tax increase from 82.5 cents to 142.5 cents per pack, 1/1/2002, to 202.5 cents per pack, 7/1/2005, and to 302.5 cents on 5/1/2010:
  - Revenues 1/1/2001 – 12/31/2001: $244.0 million
  - Revenues 1/1/2002 – 12/31/2002: $344.5 million
  - Revenues 1/1/2003 – 12/31/2003: $327.0 million
  - Revenues 1/1/2004 – 12/31/2004: $331.2 million
  - Revenues 1/1/2005 – 12/31/2005: $384.9 million
  - Revenues 1/1/2006 – 12/31/2006: $426.5 million
  - Revenues 1/1/2007 – 12/31/2007: $426.9 million
  - Revenues 1/1/2008 – 12/31/2008: $407.1 million
  - Revenues 1/1/2009 – 12/31/2009: $381.0 million
  - Revenues 1/1/2010 – 12/31/2010: $409.7 million
  - Revenues 1/1/2011 – 12/31/2011: $425.4 million
  - Revenues 1/1/2012 – 12/31/2012: $415.4 million
  - Revenues 1/1/2013 – 12/31/2013: $403.1 million
  - Average annual revenues, 1/2002 – 12/2013: $390.2 million

❖ Washington – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 33.7%

- Wisconsin – tax increase from 77 cents to 177 cents per pack, 1/1/2008, and to 252 cents per pack, 9/1/2009:
  - Revenues 1/1/2007 – 12/31/2007: $304.5 million
  - Revenues 1/1/2008 – 12/31/2008: $590.5 million
  - Revenues 1/1/2009 – 12/31/2009: $596.8 million
  - Revenues 1/1/2010 – 12/31/2010: $643.3 million
  - Revenues 1/1/2011 – 12/31/2011: $589.6 million
  - Revenues 1/1/2012 – 12/31/2012: $583.2 million
  - Revenues 1/1/2013 – 12/31/2013: $592.8 million
  - Average annual revenues, 1/2008 – 12/2013: $599.4 million

❖ Wisconsin – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 19.2%

**States With At Least 5 years of Post-Tax Increase Data Available, and the Average State Tobacco Control Funding as a Percent of the CDC Recommendation more than 50%:**

- Alaska – tax increase from 100 cents to 160 cents per pack, 1/1/2005, to 180 cents per pack,7/1/2006, and to 200 cents on 7/1/2007:
  - Revenues 1/1/2004 – 12/31/2004: $41.1 million
  - Revenues 1/1/2005 – 12/31/2005: $50.5 million
  - Revenues 1/1/2006 – 12/31/2006: $52.7 million
  - Revenues 1/1/2007 – 12/31/2007: $63.1 million
  - Revenues 1/1/2008 – 12/31/2008: $63.3 million
  - Revenues 1/1/2009 – 12/31/2009: $63.6 million
  - Revenues 1/1/2010 – 12/31/2010: $63.1 million
  - Revenues 1/1/2011 – 12/31/2011: $60.3 million
  - Revenues 1/1/2012 – 12/31/2012: $57.3 million
  - Revenues 1/1/2013 – 12/31/2013: $57.3 million
  - Average annual revenues, 1/2005 – 12/2013: $59.0 million
- ❖ Alaska – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 89.2%

- Arkansas – tax increase from 59 cents to 115 cents per pack, 3/1/2009:
  - Revenues 3/1/2008 – 2/29/2009: $138.8 million
  - Revenues 3/1/2009 – 2/28/2010: $185.3 million
  - Revenues 3/1/2010 – 2/28/2011: $196.3 million
  - Revenues 3/1/2011 – 2/29/2012: $196.6 million
  - Revenues 3/1/2012 – 2/28/2013: $188.4 million
  - Revenues 3/1/2013 – 2/28/2014: $183.4 million
  - Average annual revenues, 3/2009 – 2/2014: $190.0 million
- ❖ Arkansas – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 56.2%

- Colorado – tax increase from 20 cents to 84 cents per pack, 1/1/2005:
  - Revenues 1/1/2004 – 12/31/2004: $59.5 million
  - Revenues 1/1/2005 – 12/31/2005: $190.5 million
  - Revenues 1/1/2006 – 12/31/2006: $208.1 million
  - Revenues 1/1/2007 – 12/31/2007: $203.2 million
  - Revenues 1/1/2008 – 12/31/2008: $195.1 million
  - Revenues 1/1/2009 – 12/31/2009: $180.0 million
  - Revenues 1/1/2010 – 12/31/2010: $175.5 million
  - Revenues 1/1/2011 – 12/31/2011: $172.0 million
  - Revenues 1/1/2012 – 12/31/2012: $172.6 million
  - Revenues 1/1/2013 – 12/31/2013: $165.7 million
  - Average annual revenues, 1/2005 – 12/2013: $184.7 million
- ❖ Colorado – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 54.6%

- Delaware – tax increase from 55 cents to 115 cents per pack, 7/31/2007:
  - Revenues 8/1/2006 – 7/31/2007: $90.4 million
  - Revenues 8/1/2007 – 7/31/2008: $122.2 million

- Revenues 8/1/2008 – 7/31/2009: $125.5 million
- Revenues 8/1/2009 – 7/31/2010: $124.8 million
- Revenues 8/1/2010 – 7/31/2011: $126.8 million
- Revenues 8/1/2011 – 7/31/2012: $122.7 million
- Revenues 8/1/2012 – 7/31/2013: $113.0 million
- Average annual revenues, 8/2007 – 7/2013: $122.5 million

❖ Delaware – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 81.9%

- Maine – tax increase from 100 cents to 200 cents per pack, 9/19/2005:
  - Revenues 9/1/2004 – 8/31/2005: $93.5 million
  - Revenues 9/1/2005 – 8/31/2006: $165.1 million
  - Revenues 9/1/2006 – 8/31/2007: $153.8 million
  - Revenues 9/1/2007 – 8/31/2008: $147.9 million
  - Revenues 9/1/2008 – 8/31/2009: $137.5 million
  - Revenues 9/1/2009 – 8/31/2010: $136.9 million
  - Revenues 9/1/2010 – 8/31/2011: $137.9 million
  - Revenues 9/1/2011 – 8/31/2012: $135.9 million
  - Revenues 9/1/2012 – 8/31/2013: $130.7 million
  - Average annual revenues, 9/2005 – 8/2013: $143.2 million

❖ Maine – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 77.4%

- Montana – tax increase from 18 cents to 70 cents per pack, 5/1/2003 and to 170 cents per pack,1/1/2005:
  - Revenues 5/1/2002 – 4/30/2003: $12.0 million
  - Revenues 5/1/2003 – 4/30/2004: $43.1 million
  - Revenues 5/1/2004 – 4/30/2005: $51.8 million
  - Revenues 5/1/2005 – 4/30/2006: $79.6 million
  - Revenues 5/1/2006 – 4/30/2007: $84.7 million
  - Revenues 5/1/2007 – 4/30/2008: $87.2 million
  - Revenues 5/1/2008 – 4/30/2009: $80.8 million
  - Revenues 5/1/2009 – 4/30/2010: $81.0 million
  - Revenues 5/1/2010 – 4/30/2011: $78.1 million
  - Revenues 5/1/2011 – 4/30/2012: $77.2 million
  - Revenues 5/1/2012 – 4/30/2013: $76.2 million
  - Revenues 5/1/2013 – 4/30/2014: $74.9 million
  - Average annual revenues, 5/2003 – 4/2014: $74.1 million

❖ Montana – average tobacco control funding as a percent of the CDC recommendation, 2006 – 2015: 56.0%

***Conclusions:***

- Significant cigarette excise tax increases generate significant increases in cigarette tax revenues.
- Revenues several years after the tax increase remain significantly higher than revenues prior to the tax increase and changes over time after the increase are consistent with changes that would result from underlying downward trends in cigarette smoking.
- Revenues in states that dedicate some revenues for comprehensive tobacco control programs in the years following the implementation of these programs are still significantly higher than revenues prior to the tax increase and program implementation.

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

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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

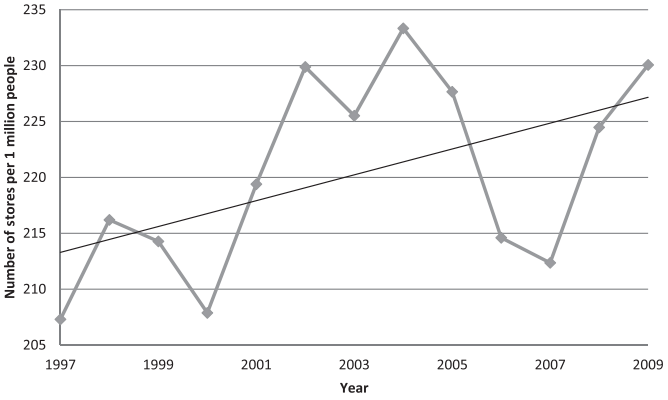


**Figure 1** Average number of convenience stores in a state.

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 |

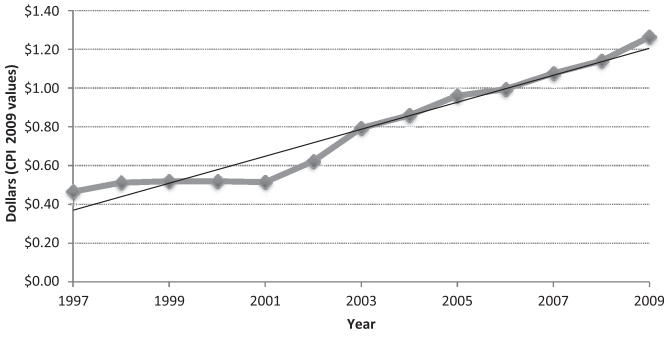


**Figure 2** Average state inflation adjusted cigarette tax rates. CPI, Consumer Price Index.

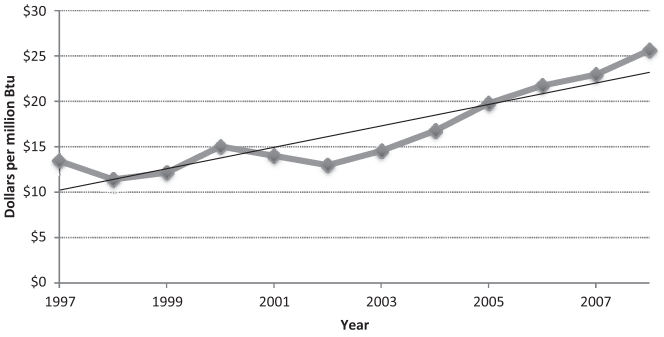


**Figure 4** Average state-level gasoline price, dollars per million Btu.

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).

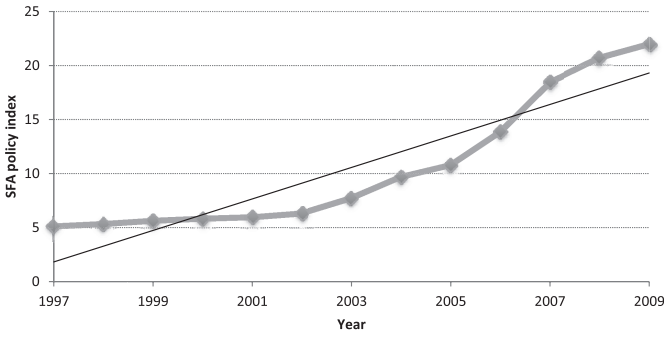


**Figure 3** Average state-level smoke-free air (SFA) policy index.

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.[23–27] 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 economic benefits of raising cigarette taxes and enacting SFA

## 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.

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.

**Contributors** This study was designed by FJC and JH; the analysis was done by JH; JH and FJC wrote the analysis and final draft.

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