
The Fiscal and Economic Impacts
of Increasing the Cigarette Tax
in Virginia

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Preface By James J. Regimbal, Jr.

Fiscal Analytics, Ltd. of Richmond, Virginia has reviewed the findings of the PolEcon Research study concerning the fiscal and economic impacts of increasing the cigarette tax in Virginia. *FA* believes the findings of the study are conservative estimates, using accepted economic theory, of the changes in Virginia cigarette sales, tax revenues, and jobs resulting from an increase in tobacco tax rates. The \$260 million in annual revenues from a 50 cent cigarette tax increase are comparable to the net revenues resulting from a 0.4 cent sales tax increase (without food).

In fact, this analysis understates the positive fiscal and economic impacts of increasing Virginia tobacco taxes due to the well-documented employee health and productivity benefits of higher cigarette taxes and recent General Assembly proposals to use this increased revenue for the Medicaid health care program in Virginia. Any additional Medicaid spending in Virginia would be matched dollar-for-dollar from the federal government. Therefore, new 50 cent tobacco tax revenues used for Medicaid could bring up to \$260 million of federal funding into Virginia for hospital and nursing facility reimbursements, health care provider payments, and prescription drug subsidies.

This additional federal funding would have a beneficial wage and job effect on the health care industry in Virginia not included in the PolEcon analysis. The health care industry already employs 9 percent of Virginia's labor force and is one its fastest growing job sectors. Fiscal Analytics estimates that an additional \$250 million of federal funding injected into the health care economy of Virginia would increase business activity by at least \$426 million and 10,000 jobs. Ironically, given the design of the Medicaid program, much of the additional state-federal Medicaid benefit would accrue to those regions of the state -- such as Richmond, Southside and Southwest Virginia -- that are most dependent on the tobacco industry.

Virginia has traditionally been reluctant to do anything that would upset the tobacco industry's "long and significant role in the history of VA." However as PolEcon points out, the tobacco industry and agriculture in Virginia has been declining in importance over time (less than 1 percent of employment). Even in the Richmond metropolitan area, tobacco manufacturing now accounts for less than 2 percent of employment and less than 3 percent of wages. PolEcon argues that a cigarette tax increase would have little impact on the tobacco industry in Virginia and only a small retail impact on the borders of Virginia.

Fiscal Analytics also believes it is highly unlikely that a 50 cent tobacco tax increase would cause a significant industry re-evaluation of Virginia's long-standing relationship with the tobacco industry. Virginia would continue to be one of the most tobacco friendly states and with a tax rate well below the average state rate of 73 cents per pack. Any significant industry changes to this Virginia relationship would likely have greater long-term repercussions on the tobacco industry than on the Virginia or Richmond regional economies.

In the midst of Virginia's difficult budget deliberations, PolEcon Research has produced a timely report that should help the Governor and Members of the General Assembly properly assess the fiscal and economic impact of a cigarette tax increase.

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PolEcon Research was commissioned by the Campaign for Tobacco-Free Kids to examine the fiscal and economic impacts of a 50-cent increase to Virginia's cigarette tax. Although commissioned by the Campaign, this report was prepared independently. PolEcon chose the economic methods, models, and data used in the analysis. PolEcon presented this report to the Campaign for Tobacco-Free Kids without advance notice of the results. PolEcon agreed to make editorial changes in the report but did not make any changes to the results of the analysis unless an error in model inputs or calculations could be clearly demonstrated. All analyses in this study employ standard methods and models widely used by economists and extensively reviewed in academic journals. All data used in the construction of models and in calculating impacts is publicly available from federal and state government agencies, or from readily available private sources.

Executive Summary

Virginia's cigarette excise tax is currently set at 2.5 cents per pack, the lowest state cigarette tax rate in the United States. Since the beginning of 2002, there have been 37 separate new cigarette tax increases in other states. The average state tax is now 73.5 cents per pack, with New Jersey having the highest rate at \$2.05 per pack and 15 other states having cigarette excise tax rates of \$1.00 per pack or more. Virginia last adjusted its cigarette tax rate in 1966, when it reduced the rate from three to 2.5 cents per pack.

Because the state has not raised its low excise tax rate for decades, both the total and real (inflation-adjusted) value of Virginia's cigarette tax revenues have declined substantially. In addition, the percentage of the total retail price of a pack sold within its borders that is attributable to the state's excise tax is smaller than in any other state in the country. Since 1966, the average price of a pack of cigarettes in Virginia has increased by more than 1000 percent while the state's cigarette tax rate has stayed the same.

The experiences of other states demonstrate that cigarette tax increases always yield significant new state revenue at the same time that they work both to reduce smoking levels, especially among youth and low-income persons, and to reduce smoking-caused harms and costs.

This study examines the fiscal and economic impacts from increasing Virginia's cigarette excise tax by 50 cents, to 52.5 cents per pack but does not examine the public health effects of a cigarette tax increase in Virginia.

The Key Findings Include:

INCREASED REVENUES: Following a 50-cent cigarette tax increase, cigarette tax revenue to the Virginia state government will increase by about \$260 million, while taxed pack sales decline by about 19 percent. The increased state revenue per pack sold will be significantly greater than any revenue impacts associated with fewer packs being sold and taxed in Virginia.

- The 19 percent decline in cigarette sales following the 50-cent increase will come primarily from reduced smoking among Virginia residents (6.8%) and from fewer purchases of Virginia cigarettes by out-of-state buyers (8%). Only about 2.5 percent of continuing Virginia smokers will engage in new efforts to evade the excise tax.
- Even with a higher cigarette tax rate, Virginia's cigarette price advantage will mean that out-of-state residents will continue to purchase cigarettes in Virginia (although in smaller numbers).
- Taxed cigarette sales in Virginia would have to decline by 95 percent after the 50-cent increase for the state not to realize any additional new revenue.

- Although each additional 5-cent increase in the cigarette tax yields slightly less new additional state revenue, raising the increase from 45 to 50 cents per pack will still bring Virginia an additional \$23 million in new excise tax revenues. Raising the 50-cent increase to a 75-cent increase would bring the state an additional \$100 million, for a net total of \$360 million in new excise tax revenue.

Revenue and Sales Impacts From Different State Cigarette Tax Increase Amounts

Tax Increase Amount	Revenue Increase (millions)	Cigarette Sales Decline (percent)
\$0.25	\$139.7	-13.8%
\$0.30	\$165.7	-14.9%
\$0.35	\$191.0	-15.9%
\$0.40	\$215.7	-16.9%
\$0.45	\$239.5	-18.0%
\$0.50	\$262.7	-19.0%
\$0.55	\$285.1	-20.0%
\$0.60	\$306.8	-21.0%
\$0.65	\$327.8	-22.1%
\$0.70	\$348.1	-23.1%
\$0.75	\$367.6	-24.2%
\$0.80	\$386.4	-25.1%
\$0.85	\$404.5	-26.2%
\$0.90	\$421.9	-27.2%
\$0.95	\$438.5	-28.2%
\$1.00	\$454.5	-29.2%

Sales declines and revenues include ongoing trend effects (smoking declines) that will reduce state cigarette sales and related revenues whether the cigarette tax is increased or not.

INCREASING STATE CIGARETTE TAXES AND REVENUES COULD CREATE NEW JOBS IN VIRGINIA. A 50-cent increase in the Virginia cigarette excise tax will create as many as 2,400 new jobs in the state.

- There are three separate elements to the net employment gain from the 50-cent increase, and the impacts will vary by region. The state will receive \$260 million in new cigarette tax revenues and the results of economic modeling show that related state expenditures will create up to 2,750 new jobs. At the same time, lost cigarette sales and related reductions in store revenues, along with reductions in smoker households’ non-tax disposable income, will prompt a decline of approximately 1,400 jobs (including about 40 fewer jobs in the non-agricultural cigarette industry and employment declines among retailers that sell to out-of-state cigarette buyers). Offsetting employment gains would occur, however, as smokers who quit or cutback in response to the 50-cent increase will spend their cigarette savings on other products and services, creating more than 1,000 additional new jobs. Together these effects produce a net gain of as many as

2,400 jobs. If state spending of the cigarette tax revenues is used to avoid spending cuts, rather than for new expenditures, fewer new jobs will be created but job losses from expenditure cuts, totaling as many as 5,000, will be averted.

ECONOMIC IMPACTS ON SMOKING HOUSEHOLDS: More than sixty percent (63%) of the excise tax increase will be paid by smokers in households with incomes of \$30,000 or more – with more than a third paid by smokers in households with incomes of \$50,000 or more.

- Virginia pack-a-day smokers who continue smoking and do not cutback, despite the 50-cent increase, will pay an additional \$182.50 in state excise taxes per year.
- Pack-a-day smokers who quit after the 50-cent increase will not only avoid the excise tax increase but will also increase their available household income by more than \$1,000 per year by eliminating their other direct expenditures on cigarettes.
- A pack-a-day smoker who cuts back to half a pack per day after the 50-cent increase will increase his or her available household income by more than \$440 per year.

DECLINING SIGNIFICANCE OF TOBACCO INDUSTRY TO STATE'S ECONOMY. Since the early 1980s, the tobacco industry's role in the Virginia economy has declined significantly.

- Cigarette manufacturing jobs account for fewer than two-tenths of one percent of all non-agricultural jobs in Virginia.
- Tobacco stemming and drying jobs account for fewer than two-hundredths of one percent of all non-agricultural jobs in Virginia, and cigarette and tobacco wholesaling accounts for less than four-hundredths of a percent.
- From 1992 to 1997, the number of tobacco farms in Virginia declined by 39 percent (from 3,135 to 1,920), and the next Agricultural Census will likely show that even more state tobacco farms have disappeared.
- Cigarette sales account for only about 2.5 percent of all retail sales in Virginia.

HISTORICAL RELATIONSHIP BETWEEN STATE CIGARETTE SALES & STATE EMPLOYMENT. Over the past 30 years, there has been no significant relationship between the level of state cigarette sales and overall employment in Virginia.

- Changes in the number of cigarettes sold in Virginia are not associated with increases or decreases total employment in the state.

- Contrary to common belief, increases in sales of cigarettes in Virginia are associated with small negative impacts on overall retail employment in the state, but the association is not statistically significant.
- Total cigarette sales in the United States has had a stronger relationship to overall Virginia employment than cigarette sales in the state, itself – and changes in cigarette sales in Virginia have only a small impact on nationwide cigarette sales. This finding is key to understanding why a loss of cigarette sales in Virginia will not have a significantly greater impact on the Virginia economy than on a state with little or no tobacco farming or cigarette production.
- The total amount of cigarettes sold in Virginia equals less than seven percent of all cigarette production in the state.
- Virginia cigarette sales account for only a very small fraction of the total demand for Virginia-grown tobacco (less than two percent).

RELATED FINDINGS FROM OTHER RESEARCH RELATING TO STATE CIGARETTE TAX RATES, TAX INCREASES, AND REVENUES:

- States that do not increase their cigarette and other tobacco product tax rates lose excise tax revenue over time because of inflation and ongoing smoking and other tobacco use declines.
- States that significantly increase their cigarette and other tobacco product tax rates gain excise tax revenue, despite related consumption declines, tax avoidance, and smuggling.
- Although cigarette tax avoidance and smuggling increase somewhat after cigarette tax increases, they do not cause state revenues to decline but only reduce the size of the states' revenue gains from the tax increases.
- Cigarette sales typically decline sharply immediately after a cigarette tax increase and then rise again to settle on a new sales level lower than the sales level before the increase. This pattern likely reflects a surge in tax avoidance efforts around the date of the tax increase, which subsequently subsides.
- Implementing measures to curtail cigarette tax evasion offers states an opportunity to increase the additional revenues they receive from cigarette excise tax increases.
- State smoking declines – including those prompted by state cigarette tax increases -- will reduce a state's public and private smoking-related costs and improve public health, including potential improvements to the productivity of many workforce members who currently smoke.

I. Introduction and Overview

The tobacco industry has a long and significant role in the history of Virginia and the special status accorded it is best evidenced by Virginia's 2.5 cent excise tax on cigarettes, the lowest in the nation, and a rate which has not been increased since Virginia first enacted its state cigarette tax (at 3 cents per pack) in 1961. Virginia last changed its cigarette tax rate in 1966 when the state reduced the cigarette tax from 3 to 2 ½ cents per pack. Because of the special status accorded the tobacco industry in Virginia, discussions of cigarette taxation generate strong emotions and heated debate. Little empirical evidence has been publicly presented to support claims on either side of the issue. This lack of Virginia specific data exists despite the fact that a substantial body of research exists nationally on the economic, fiscal, and cigarette consumption effects that result from changes in cigarette prices and taxes.

The purpose of the report is to provide an independent analysis of data that will inform elected and appointed officials and members of the public interested in the economic and fiscal impacts of raising Virginia's cigarette tax. Like other tobacco producing states, issues of cigarette taxation in Virginia are more complex and must consider impacts on both the production and consumption side of the tobacco industry.

This study examines historical cigarette sales, tax, and price data in Virginia, in other states, and the US (going back to 1955), along with employment, income, and demographic data to determine the relationship between cigarette prices in Virginia, prices in other states, cigarette tax rates, cigarette sales, and cigarette tax revenue. We estimate the portion of changes in cigarette sales that will result from changes in sales to Virginia residents, as well as changes related to "border sales.

We examine the historical and current role that cigarettes and tobacco plays in the Virginia economy and use historical data on employment and cigarette sales to determine the impact that changes in the volume of cigarette sales in Virginia, and the US, have on Virginia's employment. A well known economic model of the State of Virginia² is used to estimate the overall impact that changes in cigarette sales, and cigarette tax revenue will have on the Virginia economy. Finally, we estimate the impact that changes in cigarette taxes will have on households, by income category, in Virginia.

² Implan model of the State of Virginia, MIG, Inc., www.Implan.com.

II. Methodology

Estimating the revenue impacts of a 50-cent increase in Virginia's cigarette tax requires an understanding of the historical relationship between cigarette prices, cigarette taxes and cigarette sales in Virginia. Estimating the employment impacts of a cigarette tax increase requires an understanding of the structure of the tobacco industry in Virginia and its role in the larger Virginia economy, as well as the historical relationship between cigarette sales and employment in Virginia,. Estimating the distributional impacts of the tax increase requires knowledge of the patterns of cigarette consumption among demographic and, especially, different income groups, as well as how consumption among the different groups is affected by changes in the price that result from the tax increase. In addition, all of these require some understanding of the percentage of cigarette sales in Virginia that are to Virginia residents, and what percentage of cigarette sales are to residents from outside of Virginia.

The results reported here were developed using the following methods:

- Regression analysis on 43 years of data on cigarette sales, taxes and prices was used to develop a model of cigarette sales in Virginia that accurately demonstrates how cigarette sales respond to price changes in Virginia and neighboring states. These “elasticity”³ estimates are a significant improvement over estimates derived by simply applying estimates from national or other regional studies. The model was used to forecast cigarette sales both with and without a 50-cent tax increase. The difference between sales with and without the tax increase yields an estimate of the increased revenue from raising the tax.
- Historical cigarette sales in Virginia along with other economic data were analyzed to determine the sensitivity of Virginia's employment to changes in the volume of cigarettes sold in the state, and the volume of cigarettes sold in the US.
- The Implan economic modeling system was used to determine employment impacts resulting from changes in cigarette price, sales, and taxes in Virginia.
- Consumer expenditure patterns (by income) from the Bureau of Labor Statistic's “Consumer Expenditure Survey, 2001” along with data on the distribution of households by income in Virginia from the 2000 Census, and actual cigarette sales data, were used to develop an estimate of the volume of cigarette sales in Virginia by income group. This estimate of cigarette sales by income was then adjusted to reflect consumption with a 50-cent tax increase using national studies on the price elasticity of demand for cigarettes by income. The result yields an estimate of how much of the tax increase will be paid by various income groups in Virginia. No estimate was made of the distributional impact of the tax increase on sales to out-of-state residents.

³ “Elasticity” here refers to ” price elasticity” or how cigarette sales in Virginia change on a percentage basis for any percentage change in the price of cigarettes in the state.

III. Tax Increases and Cigarette Sales in Virginia

A large body of research indicates that changes in the retail price of cigarettes influence cigarette consumption (see Chaloupka & Warner – 1999, for an extensive review of this literature). Some of these studies examine the impact on cigarette sales of total changes in retail price and others explicitly examine changes in excise taxes. Retail price and/or cigarette excise tax differentials between states also influences cigarette sales.

We used regression analysis to test a number of models, using various tax and price variables for their ability to predict cigarette sales in Virginia. In modeling cigarette sales in Virginia we found that:

- As studies nationwide have shown, cigarette sales in Virginia are responsive to changes in the retail price per pack, although we found a smaller elasticity (about 2% decline in sales for every 10% increase in price) in Virginia than researchers in other states have found (4-5% declines in cigarette sales for every 10% increase in price.)
- Although Virginia cigarette sales to smokers from nearby higher-tax states account for only a relatively small portion of all Virginia cigarette sales, the influence of cigarette price differentials between Virginia and some neighboring states (the so called “border sales effects”) on total state sales is still significant. Elasticities for price differentials with neighboring states were similar to the retail price elasticity. This suggests that although border sales are a minority of total cigarette sales in Virginia, they will be responsible for a larger proportion of any sales declines that result from price increases.
- Price differences between cigarettes in Virginia, Maryland and Washington, D.C., have a significant impact on cigarette sales in Virginia. Although the differential between prices in Virginia and prices in North Carolina, Kentucky, and West Virginia influence some border sales, the volume of sales along these borders is so small that changes in these price differentials do not exert a significant impact on the overall volume of cigarette sales in Virginia. This finding is similar to a recent study by Farrelly and Nimsch (2003) that estimated border sales impacts of tax increases in Southern states.
- Cigarette tax evasion via the Internet or cross-border purchases by Virginia smokers, and from sales to customers from non-neighboring states (i.e., long distance “exports” through interstate cigarette smugglers) will also influence cigarette sales in Virginia in response to a 50-cent tax increase.
- Ongoing declines in cigarette consumption nationwide will also reduce cigarette sales in Virginia, whether or not a state cigarette tax increase is implemented. Because of this trend, state cigarette tax revenues will likely decline unless a tax increase is implemented.

- The percentage of the total retail price of cigarettes in Virginia that is attributable to the state excise tax is lower than any state in the nation. Cigarette prices have risen dramatically during the 1990's and our findings indicate that the State of Virginia currently receives a smaller portion of the total dollar value of cigarette sales in the state than at any previous time.

Using time series data dating back to 1961 (the first year Virginia placed an excise tax on cigarettes), we tested several models designed to predict cigarette sales in Virginia and found that sales can be accurately predicted using just a few key variables: (1) the average retail price per pack in Virginia, (2) the price differential between Virginia and the weighted average retail price of cigarettes in Maryland and Washington, D.C., (3) a variable that captures other influences on sales over time. Trend variables are important to include for accurate predictions because cigarette sales in Virginia during any year are greatly influenced by the volume of sales in previous years and longer term influences on sales (Internet, consumption declines etc.) can be captured by these trends. There are a number of other variables that exhibit a small and not statistically significant relationship to cigarette sales in Virginia (unemployment rates for instance) but which do not contribute to our ability to predict sales nor help us isolate the impact that prices, price differentials, other public policies, or cigarette company decisions have on sales.

The generic form of the models is presented in the equation below. Models are in log-linear form (a standard econometric practice that converts the values of all variables to their natural logarithm, allowing the estimation of the elasticity of one variable with respect to another variable).

$$\ln(VASales) = \alpha + \beta \ln(VAprice) + \beta \ln(VA PricePctDC_MD) + \beta \ln(Trend) + \varepsilon$$

Where: *VASales* = Cigarette sales (packs) in Virginia.

VA Price = Average retail price per pack of cigarettes in Virginia.

VAPricePctDC_MD = The average retail price per pack of cigarettes in Virginia as a percentage of the weighted average retail price per pack in Washington, D.C. and Maryland.

Trend = Lagged value of prior year cigarette sales in Virginia.

Combined, these three variables explain about 96 percent of the annual variation in cigarette sales in Virginia. The table below provides detail on the relationship between each of the independent or “predictor” variables and cigarette sales in Virginia. The “standardized coefficients” are the “elasticities,” and measure the degree to which cigarette sales in Virginia change in response to changes in the independent variables. Results of this model suggest that prior year cigarette sales have the strongest relationship to sales, that as the price of cigarettes increases, per pack sales in Virginia decline, and that as the price per pack in Virginia increases relative to the price per pack in Maryland and DC, cigarette sales in Virginia also decline.

Table 1. Cigarette Sales Model Details						
		Unstandardized Coefficients	Std. Error	Standardized Coefficients	T	Significance
Model		B		Beta		
1	(Constant)	3.09	.838		3.76	.001
	LNVAPrice	-6.18E-02	.015	-.198	-4.14	.000
	LNTrend	.824	.042	.927	20.28	.000
	LNPctDC MD	-.388	.131	-.170	-3.15	.005
$R^2 = .968$						

The standardized coefficient for the Virginia price variable is negative and implies that a 10 percent increase in the retail price of cigarettes in Virginia will result in a 2 percent decline in sales⁴. Results also suggest that a 10 percent increase in the average retail price of cigarettes in Virginia as a percentage of prices in Maryland and DC will result in a 1.7 percent decline in sales in Virginia. These results imply that the any tax increases in Maryland and DC will reduce the impact of a 50-cent tax increase in Virginia will have on Virginia cigarette sales. As one state raises it cigarette tax, it presents an opportunity for neighboring states to “shadow price”(raise their tax rates but by a lesser amount), to gain additional revenue without dramatically affecting sales. States that do not “shadow price” with their tax rates present cigarette manufacturers with the opportunity to gain additional revenues and cigarette company price increases may be higher in those states as a result.

The accuracy of our predictive cigarette sales model in Virginia can be tested by applying it to the actual sales figures in prior years. Figure 1, below on next page, shows actual cigarette sales in Virginia for prior years and the corresponding model-generated predictions. The close match demonstrates the ability of the model employed in this report to accurately predict cigarette sales using limited available information about prior sales and prices in Virginia and neighboring states.

⁴ This is a relatively low price elasticity and in estimating revenue and sales impacts of a 50-cent tax increase we use a higher elasticity because of concerns that a 50-cent increase result in changes that are out of the range of historical price and sales data.

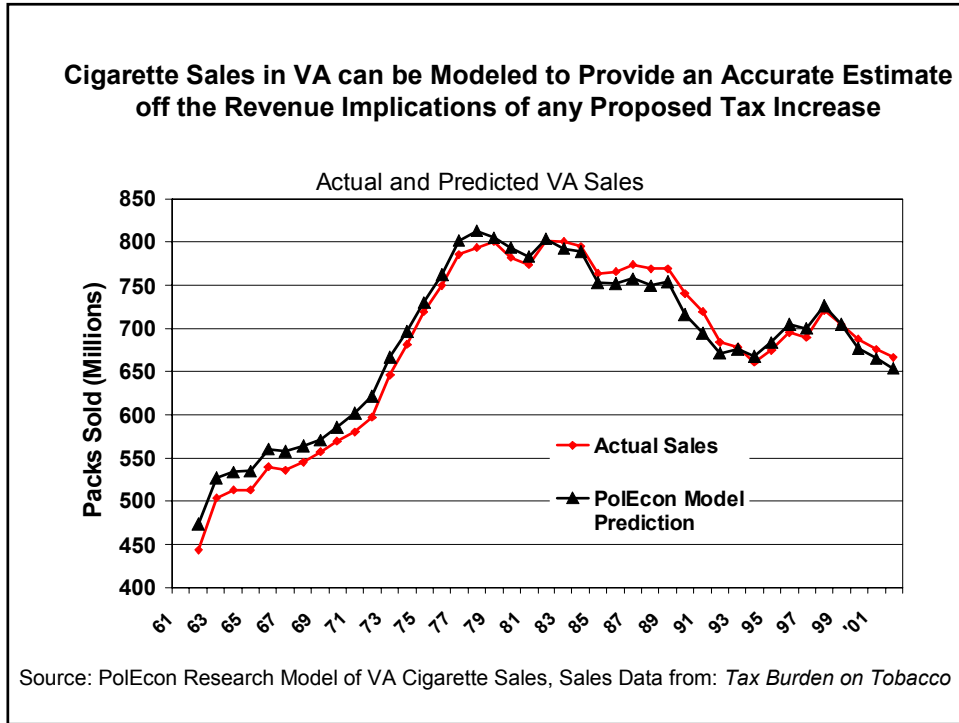


Figure 1

IV. Revenue Impacts

The model of cigarette sales in Virginia presented here can be used to estimate the revenue implications of increasing the cigarette tax in Virginia by 50 cents. Using our cigarette sales model and altering the average retail price in Virginia by adding 50 cents to the cigarette excise tax results in several key findings:

- If nothing changes (other than the 50-cent increase in Virginia's tax rate) to alter the price differential between Virginia and Maryland and DC, then sales in Virginia can be expected to fall by about 19 percent or about 125 million packs. If Maryland or DC raises its excise tax, or if the non-tax portion of cigarette prices in Virginia are adjusted to offset some of the price rise due to a higher Virginia excise tax, sales will not decline by 19 percent and the increase will yield additional revenue.
- We estimate that about one-half of the total decline in cigarette sales will come from decreased sales to Virginia residents. Of the 125 million pack decline, about 45 million (or 36% of the decline) will result from reductions in cigarette purchases by Virginia residents. Another 16.8 million decline (or 13% of the total decline in sales) will result from evasion of the tax by Virginia residents who increase purchases outside of the state.
- We estimate that about 42 percent of the decline (or about 53 million packs) will result from a loss of interstate sales to Maryland and DC (about 21 million packs) and from long distance loss sales to smugglers etc.
- About 11 million packs will be lost due to other factors such as the long term decline in cigarette sales, Internet purchases, etc. Although these are not directly attributable to a cigarette tax increase, we include them in model calculations because price hikes may impact them and because it is necessary to estimate total revenue impacts of any tax increase.
- While sales will decline, revenues will increase dramatically as the increase in state revenue per pack greatly exceeds the percentage decline in sales. At a new Virginia cigarette excise tax rate of \$.525, cigarette sales in Virginia would have to decline by over 95 percent before the state would lose revenue from the tax hike.⁵
- Using the most recent data available, our model indicates that a 50-cent increase in Virginia's cigarette excise tax will yield about \$260 million in additional revenue for the state.

⁵ State tobacco tax revenue currently equals approximately \$15 million dollars. At a new tax rate of \$.525, total packs sold would have to be less than 30 million packs to yield less than \$15 million in revenue. Current total packs sold exceeds 600 million and a decline to below 30 million packs would be greater than 95 percent ($30/600=.95$)

Our Models Suggest Cigarette Sales Declines Could Be Smaller Than Forecast

Our “best” model of cigarette sales in Virginia indicates that cigarette sales decline by 2 percent for every 10 percent change in the price of cigarettes in VA. In developing our revenue estimate, however, we used a higher elasticity (4 percent change for every 10 percent change in the price). Although our model is extremely accurate (see figure 1), most studies of the price elasticity of demand for cigarettes place the elasticity between 4 and 5 percent, with 4 percent the most commonly used elasticity.

Many states have enacted large tax increases that have resulted in concomitant price increases. Virginia has little experience with large price hikes, with the exception of the 2000 increase that resulted from a \$.45per pack increase to cover the cost of the Master Settlement Agreement, and a \$.10 increase in the federal tax rate. These increases applied to all states, however. We used a larger price elasticity because lacking historical experience (and data) with a similar price increase we believe it is better to use a figure supported by extensive research. Note that the effect of this modification is to increase our estimate of the decline in cigarette sales and to reduce our estimate of the revenue gains from a 50-cent tax increase.

State And Federal Taxes As A Percentage Of The Average Retail Price Of A Pack Of Cigarettes Continues To Decline In Virginia

Figure 2 shows that the Virginia cigarette tax as a percentage of the average retail price of cigarettes in Virginia continues to decline and is now the lowest in the nation.

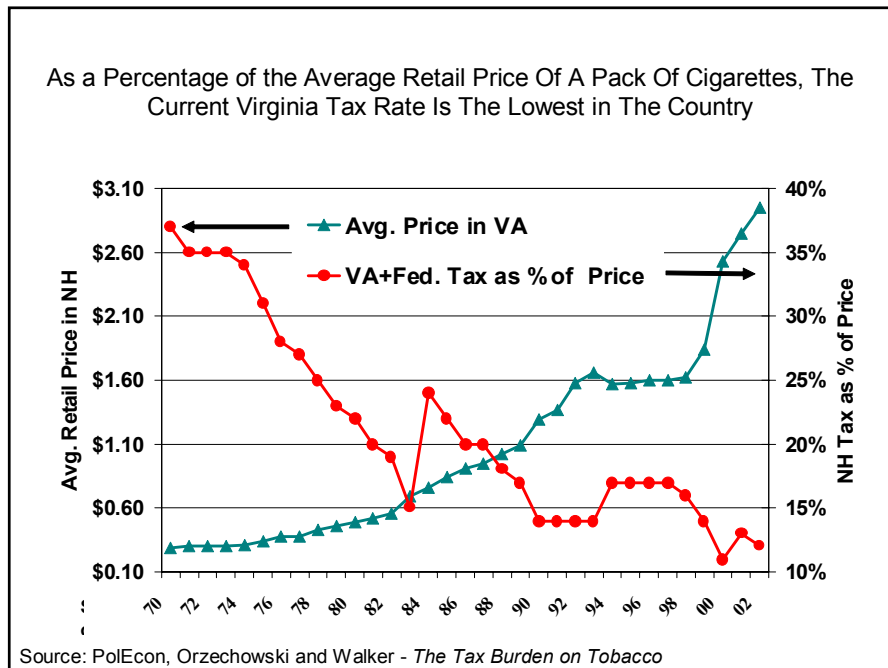


Figure 2

Virginia first instituted an excise tax on cigarettes in 1960 at three cents per pack -- and the last time Virginia changed its cigarette tax was in 1966, when it reduced the rate from three to 2.5 cents per pack. Since 1966, the consumer price index has increased by more than 470 percent (474.7% as of February, 2004), and the price index for cigarettes has increased by more than 1,280 percent (1281.9% as of February, 2004).⁶ According to the *Tax Burden on Tobacco* (a tobacco industry publication), the average retail price of a pack of cigarettes in Virginia increased by 1096.7 percent from 1966 to 2002 (from 30.5 to \$3.65 per pack). Since 1966, the average state tax on cigarettes has increased by more than 8,000 percent (from 8 to 73 cents per pack); but Virginia's excise tax has stayed the same.⁷

Virginia's cigarette tax is currently the lowest state cigarette tax in the nation and as a percentage of the total average retail price of cigarettes, Virginia's cigarette tax is lower than the state tax percentage of the average retail price in any other state. In New Jersey, the state cigarette tax accounts for approximately 40 percent of the average retail price of a pack of cigarettes in the state. In Georgia, it is 11 percent; in West Virginia it is 16 percent; in Maryland it is 25 percent, while in Virginia it is less than one percent.

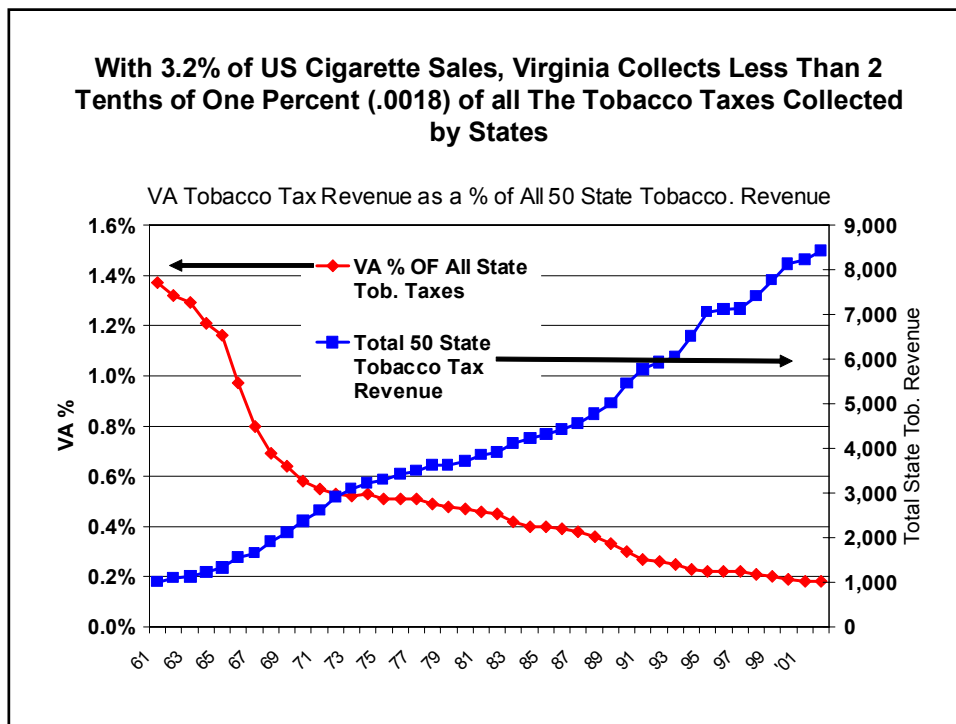


Figure 3

⁶ U.S. Department of Labor, Bureau of Labor Statistics, Consumer Price Index data, <http://data.bls.gov/cgi-bin/surveymost?cu>, and the CPI for tobacco products data (the CPI did not start tracking cigarettes and other tobacco products separately until well after 1966), <http://data.bls.gov/labjava/outside.jsp?survey=cu>

⁷ Orzechowski and Walker, (2003). *The Tax Burden on Tobacco*, Arlington, VA. (17).

A 50-Cent Increase In The Cigarette Tax Would Not Raise Cigarette Prices In Virginia Compared To Prices In Maryland And DC To A Level Higher Than They Have Been In The Past

A 50-cent increase in the Virginia cigarette tax would increase the price per pack in Virginia to about 90% of the weighted average price of cigarettes in Maryland and Virginia. As Figure 4 shows, Virginia prices have been near or above 90 percent of the price in Maryland and DC in the 1960's and from the mid 1980's through the early 1990's. The graph in Figure 4 also shows that Virginia cigarette sales rise when the price of cigarettes in Virginia is low relative to neighboring states.

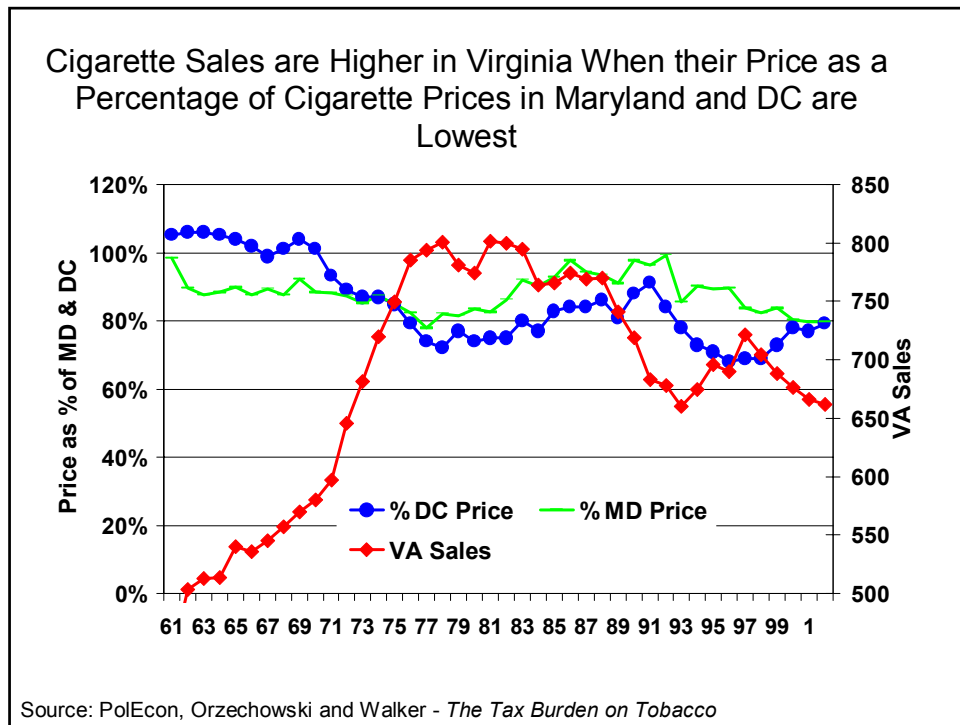


Figure 4

Virginia's Low Cigarette Tax Functions Like An Incentive Or Indirect Subsidy To Cigarette Manufacturers

Virginia has not raised its excise tax on cigarettes since its inception in 1961. The lone change in the tax rate occurred in 1966, when the rate was lowered from \$.03 to \$.025 per pack. Kentucky and North Carolina both have raised their taxes once, and several other states in the Southeast have both very low tax rates and have raised them only twice. As a result, state cigarette taxes collected in Virginia, as a percentage of cigarette taxes collected by all states, continues to decline (Figure 3). This low tax policy is, in effect, an incentive or tax subsidy to the cigarette companies equal to the annual revenue forgone from a higher tax rate. Even a tax rate of \$.25, still well below the nationwide

state tax average of about 73 cents per pack, this subsidy would amount to about \$140 million annually. With a changing Virginia economy, and the role of tobacco farming and cigarette manufacturing in the economy declining for two decades (discussed later), policymakers must consider whether Virginia receives sufficient benefits from cigarette manufacturers to justify the large amounts of forgone revenue.

Cigarette Sales In Virginia Will Decline By About 19 Percent As A Result Of A 50-Cent Increase In The Cigarette Tax

A 50-cent cigarette tax increase would move Virginia’s cigarette prices from about 80% to about 93% of the weighted average price per pack in Maryland and DC. This change represents a 17% decrease in the price differential between Virginia and Maryland/DC prices. Our model of cigarette sales shows that for every 10 percent increase in the price of cigarettes in Virginia relative to prices in these states, there will be a 1.7 percent decrease in cigarette sales in Virginia, which translates to a “cross-border” sales decline of about three percent from a 50-cent cigarette tax increase. Losses to other neighboring states and a loss of longer distance sales (e.g., through reduced sales to interstate cigarette smugglers) will contribute to another eight percent decline in sales in Virginia. Reduced smoking by Virginia residents, at a price elasticity of demand of four percent for every 10 percent change in price, can be expected to decrease sales by another seven percent. Tax evasion (purchases by Virginians in other states or over the Internet to avoid the higher taxes) will contribute to an additional two percent decline in sales; and ongoing smoking declines will decrease sales by another two percent (as they would even if the tax increase were not implemented).

Table 2. Components of Cigarette Sales Declines

	Decline in Sales (Packs)	Percent Decline in Total Sales	Percent of Total Decline
Reduced VA Smoking	44,964,346	6.8%	35.8%
VA Smoker Tax Evasion	16,817,233	2.5%	13.4%
Trend	11,255,700	1.7%	9.0%
Lost Interstate Sales	52,662,780	8.0%	41.9%

These findings are consistent with other research and state experiences regarding the effects of cigarette tax or other price increases on smoker consumption patterns and related cigarette smuggline and tax evasion. For example, a survey in California after that state increased its cigarette tax by 50 cents per pack found that only five percent of all continuing smokers were making any effort to avoid the increased state tax (the survey did not note what percentage had been taking such steps to avoid the state’s 37-cent tax prior to the tax increase).⁸ Other research has found that cigarette tax evasion and interstate cigarette reduce total state cigarette tax revenues by approximately ten percent or less and (because these activities occur primarily in the highest tax states) account for

⁸ Emery, S et al., “Was There Significant Tax Evasion After the 1999 50 Cent Per Pack Cigarette Tax Increase in California?,” *Tobacco Control* 11: 130-34, June 2002, (<http://tc.bmjournals.com/cgi/reprint/11/2/130.pdf>).

an even smaller portion of total state cigarette sales.⁹ There is also considerable research showing that cigarette tax and price increases reduce smoking rates.¹⁰

Increased Revenues In The First Year From A 50-Cent Tax Increase Are Estimated At About \$260 Million. A Tax Increase Of 75 Cents Would Yield About \$360 In Additional Revenue

Despite a 19 percent decline (about 125 million packs) in sales, Virginia will see a dramatic increase in cigarette tax revenues from a 50-cent tax increase. We estimated first year revenues from a 50-cent tax increase using our model of cigarette sales in Virginia. We use actual data from 2002 to avoid concerns about any assumptions in the estimate.

Actual sales in Virginia during 2002 were 662.1 million packs according to *The Tax Burden on Tobacco*. Introducing a 50-cent tax increase into our model reduces sales by about 125 million packs. Applying the existing tax rate of \$.025 to actual 2002 sales, results in gross state revenues of about \$16.5 million. Applying a higher tax rate of \$.525 to our new forecast of revenues after sales declines results in gross revenues of about \$282 million. Subtracting actual gross revenues from our forecast of revenues results in new revenues of about \$265.5 million, and net revenues of about \$260 million.

Employing the same procedure using a cigarette tax increase of 75 cents, indicates that cigarettes tax revenues would increase by about \$360 million, while tax paid cigarette sales would decline by about 25 percent.

As The Amount Of The Cigarette Tax Increase Becomes Larger, Each Additional Increase Yields Slightly Less New Revenue, But Revenues Continue To Increase

Our estimates indicate that a five-cent increase in Virginia's cigarette tax would yield approximately \$29 million in additional revenue. One objection to significant increases in the cigarette tax is that as the size of the increase gets larger, the revenue gained from each additional incremental increase becomes smaller, to the point where no additional revenue is gained. Some have even suggested negative revenue gains from tax hikes. Our findings clearly demonstrate that substantial cigarette tax hikes result in substantial

⁹ Yurekli, A. & P. Zhang, "The Impact of Clean Indoor-Air Laws and Cigarette Smuggling on Demand for Cigarettes: An Empirical Model," *Health Economics* 9:159-170, 2000. Farrelly, M. et al., *State Cigarette Excise Taxes: Implications for Revenue and Tax Evasion*, RTI International, 2003, http://www.rti.org/pubs/8742_Excise_Taxes_FR_5-03.pdf. See, also, Farrelly, M., et al., *State Cigarette Excise Taxes: Implications for Revenue and Tax Evasion*, RTI International Report, 2003, http://www.rti.org/pubs/8742_Southern_Neighbors_FR_9-18-03.pdf [even low-tax tobacco states would gain substantial revenue from cigarette tax increases, despite no longer serving as suppliers for smugglers, internet sellers, and customers from other higher-tax states].

¹⁰ See, e.g., Chaloupka, F., "Macro-Social Influences: The Effects of Prices and Tobacco Control Policies on the Demand for Tobacco Products," *Nicotine and Tobacco Research*, 1999, and other price studies at <http://tigger.uic.edu/~fjc> and <http://www.impactteen.org/researchproducts.htm>; U.S. Centers for Disease Control and Prevention (CDC), "Responses to Cigarette Prices By Race/Ethnicity, Income, and Age Groups – United States 1976-1993," *Morbidity and Mortality Weekly Report (MMWR)* 47(29): 605-609 July 31, 1998, www.cdc.gov/mmwr.

revenue gains even with large declines in sales. As tax increases become larger, however, their impact on the price difference between cigarettes in Virginia and neighboring states becomes greater. In addition, price elasticities have a greater impact on declining cigarette purchases of Virginians, and the incentives for long distance purchasers are diminished. We use our model and elasticities to estimate the sensitivity of revenue gains to the magnitude of the tax increase.

Our Models Suggest That As The Size Of The Cigarette Tax Increase Goes From \$.05 To \$.50, The Revenue From Each Additional \$.05 Increase Declines From \$29.8 Million To \$23.1 Million, A Drop Of 23 Percent

Figure 5 shows how the size of the each additional increase in the size of the tax increase results in less additional revenue (because it narrows the price differential with other

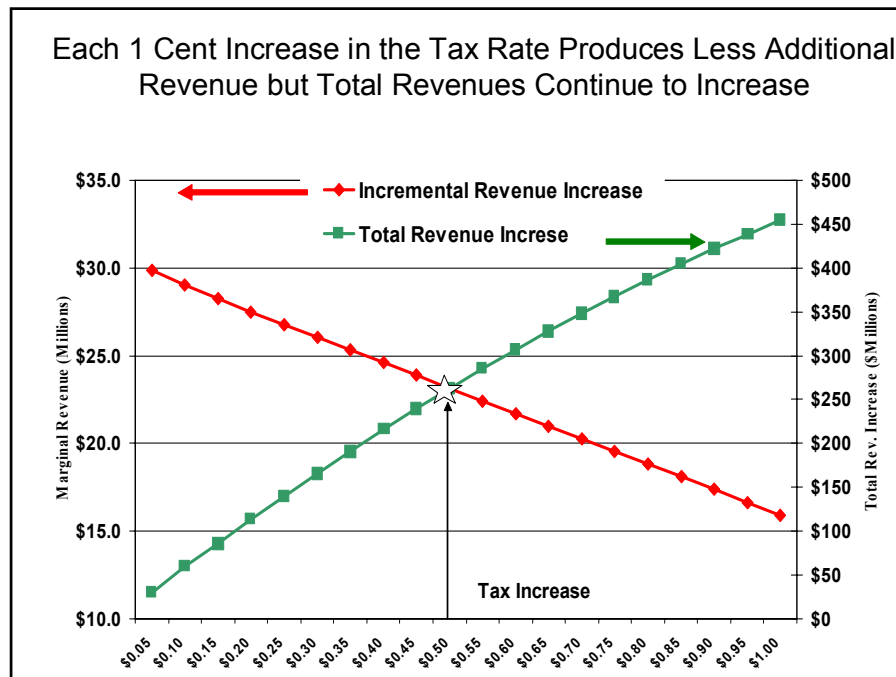


Figure 5

states, increases tax evasion among Virginians, and reduces cigarette consumption) while total revenue gains continue to increase (albeit at a smaller rate with each incremental increase in the tax).

This analysis indicates that while sales will decline in response to a cigarette tax increase, revenues will increase dramatically as the increase in state revenue per pack greatly exceeds the percentage decline in sales. At a new Virginia cigarette excise tax rate of \$.525, cigarette sales in Virginia would have to decline by over 95 percent before the state would lose revenue from the tax hike. Table 3 presents model forecasts of the increases in gross cigarette tax revenue and cigarette sales declines associated with cigarette tax increases from \$.25 to \$1.00.

Table 3. Projected New Revenue and Sales Impacts From Different State Cigarette Tax Increase Amounts

Tax Increase Amount	Revenue Increase (millions)	Cigarette Sales Decline (percent)
\$0.25	\$139.7	-13.8%
\$0.30	\$165.7	-14.9%
\$0.35	\$191.0	-15.9%
\$0.40	\$215.7	-16.9%
\$0.45	\$239.5	-18.0%
\$0.50	\$262.7	-19.0%
\$0.55	\$285.1	-20.0%
\$0.60	\$306.8	-21.0%
\$0.65	\$327.8	-22.1%
\$0.70	\$348.1	-23.1%
\$0.75	\$367.6	-24.2%
\$0.80	\$386.4	-25.1%
\$0.85	\$404.5	-26.2%
\$0.90	\$421.9	-27.2%
\$0.95	\$438.5	-28.2%
\$1.00	\$454.5	-29.2%

Sales declines and revenues include ongoing trend effects (smoking declines) that will reduce state cigarette sales and related revenues whether the cigarette tax is increased or not.

The Experience Of Other States Supports Our Findings That A 50-Cent Cigarette Tax Increase Will Yield Substantial New Revenue Even As Cigarette Sales Decline

The experience of other states indicate that cigarette tax increases always yield significant new state revenue at the same time that they work both to reduce smoking levels. For example, on July 1, 2003 Georgia increased its cigarette tax from 12 to 37 cents per pack and more than doubled its cigarette tax revenue in the first eight months after the tax increase compared to the same time period the year before.¹¹ On July 15, 2002, Tennessee increased its cigarette tax from 12 to 20 cents per pack and increased its cigarette tax revenue by 52.9 percent with a corresponding pack sales decline of 8.3 percent in the year after the tax increase,¹² and on July 1, 2002, Ohio increased its cigarette tax from 24 to 55 cents per pack and increased its cigarette tax revenue by 115.2 percent, with a corresponding pack sales decline of 6.1 percent.¹³

Despite the direct evidence from states which have significantly increased their cigarette tax rates, there appears to be a common myth that increasing the cigarette tax will not produce substantial new revenue, and may even decrease revenue, because of cigarette

¹¹ Georgia Department of Revenue. *Press Release: Governor Perdue Announces February Revenue Collections*. March 3, 2004, <http://www.gov.state.ga.us/document.asp?doc=press/press388>

¹² Orzechowski & Walker, *Tax Burden on Tobacco*; Tennessee Department of Revenue.

¹³ Orzechowski & Walker, *Tax Burden on Tobacco*; Ohio Department of Taxation.

smuggling, counterfeit sales, and smoker tax evasion through cross-border and Internet purchases. A careful analysis of actual tax-increase experiences throughout the country, however, does not support this argument. Most notably, in New York City -- which is the prime target for cigarette smugglers and has a range of unique characteristics that make it especially prone to black market sales and various other forms of smoker tax evasion -- the city's increase of its local cigarette tax from eight cents to \$1.50 per pack (on top of a state cigarette tax of \$1.50 per pack) has increased cigarette tax revenues by more than a quarter of a billion dollars per year despite substantial declines in taxable pack sales.¹⁴ Experience clearly shows that in each jurisdiction that has increased its cigarette tax rates, the additional revenue received per taxed pack sold brings in more revenue than any revenue reductions from fewer taxable packs being sold.

Related Findings From Other Research Regarding State Cigarette Tax Increases And Increased State Revenues

In a careful review of available research and data, researchers from RTI International¹⁵ made the following findings relating to state cigarette tax increases and their effects on revenues, tax evasion and smuggling, and state smoking-caused costs.

- States that do not increase their cigarette and other tobacco product tax rates lose excise tax revenue over time because of inflation and ongoing smoking and other tobacco use declines.
- States that significantly increase their cigarette and other tobacco product tax rates gain excise tax revenue, despite related consumption declines, tax avoidance, and smuggling.
- Although cigarette tax avoidance and smuggling increase somewhat after cigarette tax increases, they do not cause state revenues to decline but only reduce the size of the states' revenue gains from the tax increases.
- Cigarette sales typically decline sharply immediately after a cigarette tax increase and then rise again to settle on a new sales level lower than the sales level before the increase. This pattern likely reflects a surge in tax avoidance efforts around the date of the tax increase, which subsequently subsides.
- Implementing measures to curtail cigarette tax evasion offers states an opportunity to increase the additional revenues they receive from cigarette excise tax increases.
- State smoking declines -- including those prompted by state cigarette tax increases -- will reduce a state's public and private smoking-related costs and improve public health, including potential improvements to the productivity of many workforce members who currently smoke.

¹⁴ New York City Department of Revenue.

¹⁵ Farrelly, M., Nimsch, C., James, J. (2003), *State Cigarette Excise Taxes: Implications for Revenue and Tax Evasion*, Tobacco Technical Assistance Consortium, RTI International Report. (http://www.rti.org/pubs/8742_Excise_Taxes_FR_5-03.pdf)

V. Economic Impacts

Concerns over the economic impacts of declines in cigarette sales have been a primary argument against cigarette tax increases. The arguments are especially strong in tobacco producing and cigarette manufacturing states, such as Virginia, where tobacco and cigarette manufacturing play a larger role in the state's economy than they do in states where retailers and wholesalers are the primary industries affected economically by changes in cigarette consumption.

Our analysis of economic impacts begins with a brief discussion the structure of cigarette manufacturing and sales and tobacco farming in Virginia and examines the historical and current role they play in the Virginia economy. We use two methods to estimate the economic impacts that will occur in response to a 50-cent increase in Virginia's cigarette tax and the resulting declines in cigarette sales that will occur.

- We use econometric methods to determine the relationship between cigarette sales and total employment and retail employment levels in Virginia.
- We employ a widely used economic model to assess the economic changes that would occur in Virginia in response to declines in cigarette sales, increased taxes, and changes in disposable income associated with a 50-cent tax increase.
- This model does not directly examine potential impacts on tobacco farmers because of the limits of agricultural data available, and because the presence of federal programs and subsidies to the industry confound the analysis of relationships between cigarette sales and impacts on growers. As discussed more fully below, however, eliminating all cigarette sales in Virginia would reduce the overall demand for tobacco grown in Virginia by less than two percent – and a 50-cent cigarette tax increase would reduce Virginia cigarette sales by only 19 percent, with a significant portion of those sales recouped in other state

Results from these analyses fails to find evidence of large, negative economic impacts on in Virginia associated with changes in cigarette sales. In addition:

- Because cigarettes sold in Virginia represent less than seven percent of cigarette production in the state (and any sales declines will represent only a small fraction of one percent of their overall production), and most of the losses in Virginia sales will simply be shifted to sales in other states, the impact of a 50-cent tax increase on producers and manufactures will be very small (42 jobs among growers, stemmers and dryers, and cigarette manufacturers).
- Impacts will be regionalized, with areas with the highest concentrations of cigarette manufacturing and related employment experiencing small negative impacts and regions that border larger population centers in other states will see some small declines in retail employment.

- Overall, employment in Virginia will increase by a small amount (about 1/20th of one percent, or about 2,400 jobs) as a result of the decline in cigarette sales attributable to a 50-cent tax increase, alternative consumption, and additional state revenues spent on goods and services.
- Total employment impacts will, in large part, be determined by what the State of Virginia does with the revenue raised from the tax increase. If the state uses more than half of the \$260 in new revenue to provide additional services, the overall impact of the tax increase is to increase total employment in the State. As more than 50 percent of new revenue is used to provide additional services, positive employment impacts become greater.
- If the state uses the \$260 million in new cigarette tax revenues to avoid making cuts in state expenditures, the 50-cent increase will work to save the jobs that would have been lost from those budget cuts. State government expenditures of \$260 million support approximately 5,000 jobs in Virginia.
- An cigarette tax of 50 cents in Virginia that yields \$260 million will reduce the disposable income of Virginia residents by only \$208 as a result of the higher tax rate because a significant portion of cigarette sales are to non-residents. This means a significant portion of the cigarette tax is “exported”. Compared to a broad-based sales or income tax, the cigarette tax will thus have a smaller impact on Virginia residents, and if new revenues are spent on goods and services, a greater simulative effect on the Virginia economy.

These findings are consistent with previous studies of the the impact cigarette sales declines on state employment impacts of declines in cigarette sales in non-tobacco producing states (Warner and Fulton 1994, Warner et.al 1996), and with other studies conducted independent of the tobacco industry, which find that declines in cigarette sales would be offset by compensating expenditures which have a greater impact on local economies. As noted by Chaloupka and Warner in *The Economics of Smoking (1999)*, even studies commissioned by the tobacco industry (American Economics Group, 1996a, Chase Econometrics, 1985) and cited by industry representatives in testimony before state legislatures, note in their reports to their clients that reductions in cigarette sales would produce alternative spending patterns that would generate compensating employment that would offset the declines in tobacco industry employment

Richmond Is The Largest The Largest Center For Cigarette Manufacturing In The Country But Cigarette Manufacturing Has A Declining Impact On The Overall Virginia Economy

The tobacco industry is hour glass shaped, with many growers, very few manufacturers, and many wholesalers and retailers. In 2001, there was about 6,500 employees in cigarette manufacturing in Virginia, including stemming and drying. Another 1,000 were

employed in tobacco wholesaling. Together, these industries comprise about one-quarter of one percent (.0025) of total Virginia employment.

Richmond is one of only five counties in the country where cigarette manufacturing accounts for between 5 and 10 percent of all personal income in the county. Pittsylvania and Chesterfield Counties are centers for tobacco stemming and drying employment and several counties in the Piedmont region along the North Carolina border are large producers of flue cured tobacco.

Cigarettes sold in Virginia, however, represent less than 7 percent of cigarette production in the state¹⁶. Thus even a substantial decline in sales in Virginia will have a very small effect on cigarette manufacturing. More importantly, as we demonstrated in our analysis of revenue impacts, most of the decline in cigarette sales in Virginia will only result in a shift in purchases to other states and thus is not a decline in overall demand for cigarettes. In addition, decline in actual demand for cigarettes (not simply a shift in cigarette purchases from one state to another in response to price changes) of about 44 million in Virginia represents a minute portion of the cigarette manufacturers output in Virginia and will have little impact on overall cigarette production in the State..

A Cigarette Tax Increase Will Have Little Impact On Virginia Tobacco Farming

From 1992 to 1997, the number of tobacco farms in Virginia declined by 39 percent (from 3,135 to 1,920), and the next Census of Agriculture will likely show that, since 1997, even more state tobacco farms have disappeared.¹⁷ These declines have occurred primarily because the size of tobacco farms has been increasing and because of reduced demand for U.S. tobacco leaf caused by reduced domestic consumption, reduced exports of U.S. cigarettes, and especially, increased U.S. cigarette company reliance on overseas manufacturing and foreign-grown leaf.¹⁸

Virginia cigarette sales account for only about 3.5 percent of all cigarette sales in the United States, and for a much smaller portion of the total demand for tobacco leaf grown in the United States, which includes U.S. leaf purchased for cigarettes made and sold in other countries.¹⁹ Accordingly, the consumption declines (not the declines resulting from a shift in purchases from Virginia to other states) from a cigarette tax increase in Virginia of about 45 million packs will have no significant impact on the overall declining demand for flue-cured and burley tobacco leaf (the main types of tobacco in American-blend cigarettes) grown by farmers in Virginia and other U.S. states. Even if all cigarette sales

¹⁶ PolEcon calculations using US Bureau of Economic Analysis figures on cigarette production and cigarette sales data from "The Tax Burden on Tobacco".

¹⁷ US Department of Agriculture (1999), *1997 Census of Agriculture* [done every five years, the full 2002 Census is not yet available], (<http://www.nass.usda.gov/census>).

¹⁸ See, e.g., Lindblom, E., *False Friends: The U.S. Cigarette Companies' Betrayal of American Tobacco Farmers*, American Heart Assoc. et al., <http://tobaccofreekids.org/reports/falsefriends/campaign.pdf>, December 1999.

¹⁹ US Department of Agriculture, Economic Research Service, *Tobacco Situation & Outlook*, December 2003; and other data on the demand for U.S. tobacco leaf available at the USDA ERS *Briefing Room: Tobacco*, website, <http://www.ers.usda.gov/Briefing/tobacco>.

were eliminated in Virginia (with no corresponding increase in cigarette sales elsewhere in the United States), the total demand for U.S. flue-cured and burley tobacco would decline by less than two percent.

Cigarette Manufacturing And Cigarette Sales Account For A Very Small Percentage Of Employment In Virginia

Table 4 presents employment and income data for cigarette-related industries, along with the portion of total Virginia employment they represent. The table shows that cigarette-related employment is less than 1 percent of Virginia’s total employment. It also shows that cigarette-related industries have higher average annual wages than most industries in Virginia.

	Emp.2001	% of VA Emp.	Avg. Annual Wage
Cigarette Manufacturing	5,478	0.19%	\$75,371
Stemming and Drying	700	0.02%	\$37,144
Tobacco Wholesaling	1,052	0.04%	\$34,600
Total	7,230	0.25%	

Figure 6 shows that as a percentage of total personal income in the state, the percentage of total income in the state that comes from cigarette manufacturing has been declining since the early 1980’s

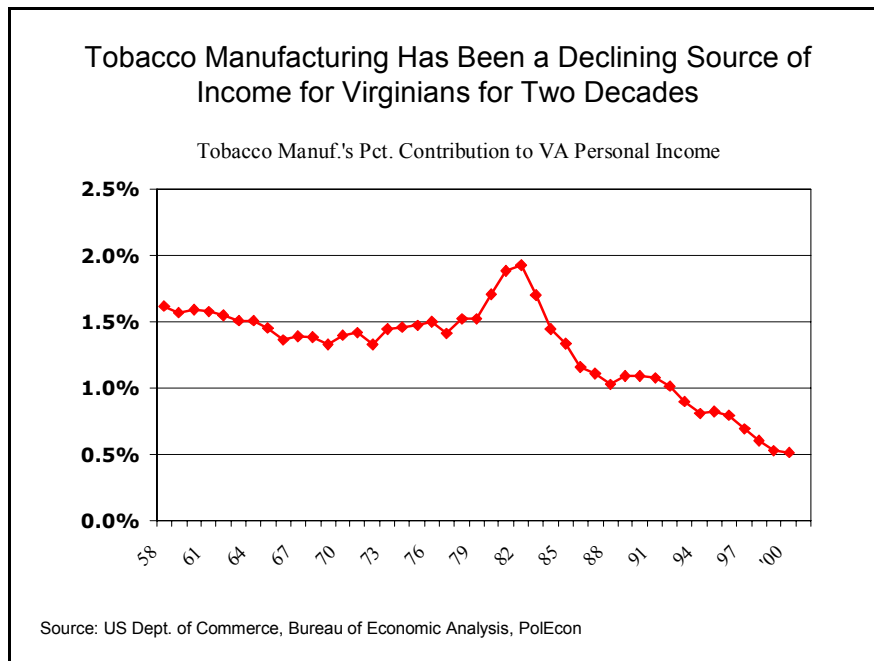


Figure 6

²⁰ US Department of Commerce, Bureau of the Census, *County Business Patterns*. 2001

Cigarette Sales Account For About 2.5 Percent Of Total Retail Sales In Virginia

In 2002 there was over \$67 billion of retail sales in VA. Cigarette sales in Virginia were 662.1 million packs in 2002. At an average price of \$2.54 (net of state and federal taxes - retail sales figures do not include taxes in their totals) for an estimated total dollar volume of cigarette sales of \$1.67 billion. This amount represents about 2.5 percent of total retail sales in Virginia. A 19 percent reduction in the volume of cigarette sales in Virginia in 2002 would have reduced cigarette sales as a percentage of total retail sales to just over 2 percent.

A large number of retail establishments sell tobacco products and declines in cigarette sales prompted by a tax increase may have an affect on the retail employment of those retailers that substantially depend on cigarette sales. Table 3 presents the retail industries with the largest share of cigarette sales and the percentage of their sales from tobacco products. Convenience stores have the largest share of total sales from tobacco products at about 21 percent of the dollar volume of their sales. Assuming that almost all of these sales are for cigarettes, a 19 percent decline attributable to a 50-cent tax increase on tobacco would result in about a four percent decline in their total dollar volume of sales. While this is significant, it is not enough to result in a large decline in overall convenience store employment. Because a large percentage of sales declines resulting from a 50-cent tax increase will occur as a result of loss of interstate sales, however, the impact on retailers along areas bordering states will be more significant.

Table 5. Stores With Largest Volume of Cigarette Sales

Type of Retailer	% Dollar Value of Tobacco Sales
Supermarkets	3.4%
Convenience Stores	20.8%
Convenience Stores With Gas	13.1%
Gas/Convenience Stores	9.7%
Gas Service Stations	4.8%
Drug Stores	3.7%

Source: Gale, H.F. , *Tobacco and The Economy*

Figure 7 shows that the two industries that are thought to be most affected by a decline in cigarette sales, convenience stores and convenience stores that sell gasoline, account for about one percent of total private sector employment in Virginia, but because most of these jobs are part-time and low wage, the industries account for only about 4/10th of one percent of total private sector payroll in Virginia. The average annual wages in the convenience store and convenience stores with gasoline industries were \$12,478 and \$13,312 respectively in Virginia in 2001.²¹

²¹ US Dept. of Commerce, Bureau of the Census, *County Business Patterns in Virginia, 2001*.

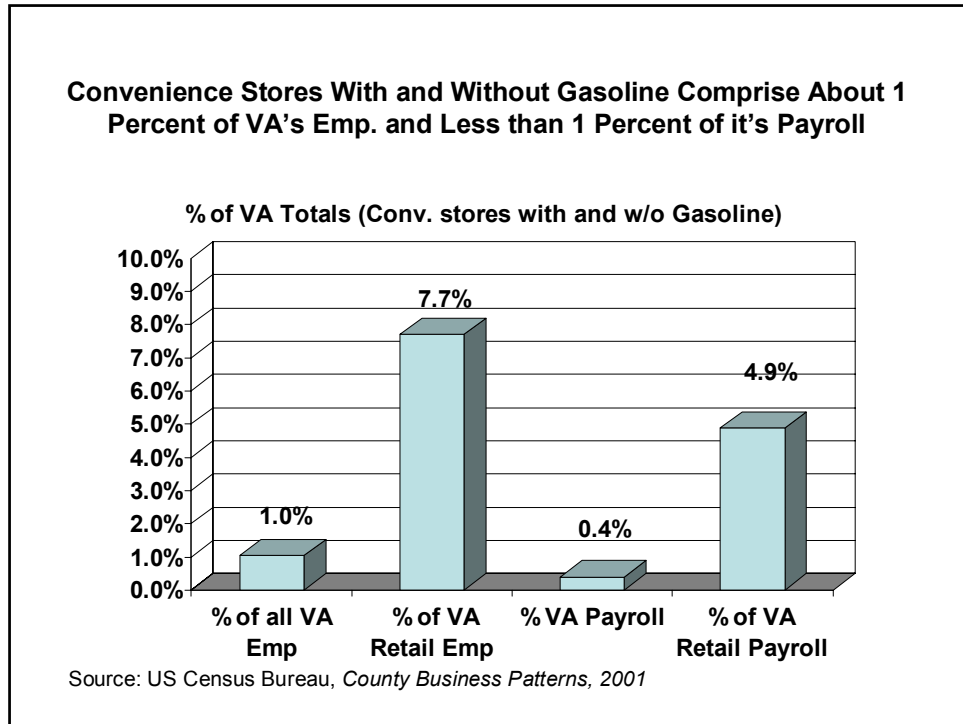


Figure 7

Historically, Increased Cigarette Sales In Virginia Have Been Associated With Very Small Declines In Retail Employment, And No Significant Relationship To Total Employment in Virginia

As noted above, cigarette sales comprise a small percentage of retail sales in Virginia, and cigarette manufacturing comprises a very small percentage of total state employment. In addition, changes in the volume of cigarette sales in Virginia have little impact on the cigarette manufacturing industry. Changes in the volume of cigarettes sold in Virginia are thus unlikely to have a significant effect on employment in Virginia.

We examined the impact that cigarette sales have on total and retail employment in Virginia by constructing simple regression models in log-linear form, using employment, cigarette sale, and other economic data over the past 30 years.. Results indicate that the total number of packs of cigarettes sold in Virginia has no significant relationship to total employment, and higher cigarette sales in Virginia are associated with very small declines in total retail employment.

Looking beyond Virginia, the total volume of cigarettes sold in the United States has a small, positive, but not statistically significant relationship to total employment in Virginia. By far the best predictor of changes in total Virginia employment is US economic conditions and changes in total United States employment. Figure 8 visually presents the relationship between cigarette sales in Virginia and the US, and changes in total employment in Virginia, in Richmond, and in the Richmond/Petersburg Metropolitan Statistical Area.

The graph shows that total employment in Virginia has little relationship to cigarette sales in Virginia. Figure 8 does show that Richmond, although not the larger Richmond/Petersburg metropolitan area, is affected by US sales of cigarettes, and less affected by cigarette sales in Virginia.

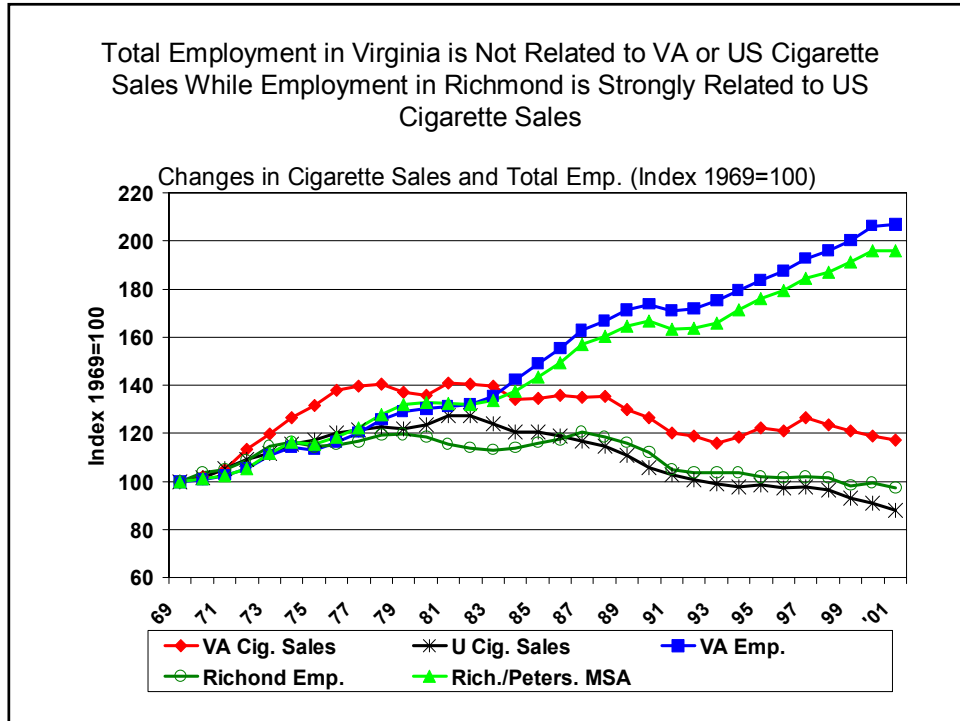


Figure 8

Total Retail Employment In Virginia Is Not Significantly Related To Cigarette Sales

Because of the number of retail establishments that sell cigarettes in Virginia, and their employment levels, we would expect that any impacts of declines in cigarette sales in Virginia would be most evident in the retail sector of Virginia’s economy. We constructed a simple model to test the relationship between cigarette sales in Virginia and total retail employment in the state. The model predicts Virginia retail employment based on real (inflation adjusted) income in the state, economic conditions in the state (unemployment rate), and total cigarette sales in the state.

Retail employment model equation:

$$\ln(VAretailEmp) = \alpha + \beta \ln(VACigSales) + \beta \ln(VAIncome) + \beta \ln(NHUnempRate) + \varepsilon$$

Where: $VARetailEmp$ = Retail employment in Virginia

$VAIncome$ = Real personal income in Virginia

$VACigSales$ = Cigarette sales (packs) in Virginia

$VAUnempRate$ = The unemployment rate in Virginia

The model allows us to determine the unique impact that changes in cigarette sales in Virginia have on employment in the state after factoring-out other explanatory variables such as the income and economic conditions that exist in the state such as the unemployment rate.

Table 6: Employment Model Details					
Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Significance
1 (Constant)	-1.98	.359			.000
LnVAUNEMP	7.191E-03	.014	.023	.793	.440
LnVAINCOME	1.016	.007	.997	26.05	.000
LnVACIGSALE	-1.673E-02	.054	-.014	-.282	-.782
$R^2 = .99$					

Results from our employment model show a small, negative, but not statistically significant relationship between cigarette sales and retail employment in Virginia. The model indicates that a 10 percent decline in cigarette sales in Virginia would result in just over a 1/10th of one percent increase in retail employment in the state. Although total Virginia employment and retail employment will not be significantly affected by a decline in cigarette sales, impacts will be felt in regions with a high concentration of stores that sell cigarettes to non-residents.

These results are consistent with other studies that show a small positive impact on retail employment in response to declines in cigarette sales (see Chaloupka and Warner, 1999, for a extensive listing of these studies). The primary reason for this result is that money not spent on cigarettes is spent on other goods and services that have a great multiplier impact on the local economy than do cigarette sales.

Importantly, these results also challenge the belief that cigarette sales generate significant “collateral” retail sales to out-of-state residents. If collateral sales were a substantial part of the impact that cigarette sales have on Virginia employment, we would not expect a net gain in retail employment in the state from declines in cigarette sales.

Analyses Of The Employment Impacts Of A 50-Cent Cigarette Tax Increase Using Economic Models Of Virginia Suggest Employment Declines From A Loss Of Cigarette Sales But Slight Gains When “Compensating Expenditures” And Government Purchases Of Goods And Services Are Considered

The “IMPLAN” input-output modeling system developed by the U.S. Government and the University of Minnesota (available from the Minnesota IMPLAN Group, Inc.) was used in this analysis to calculate economic impacts of raising the cigarette tax by 50 cents per pack in Virginia.²² Along with the U.S. Department of Commerce’s RIMSII model, IMPLAN is the most widely used input-output model used in the U.S. for calculating economic impacts of economic events, projects and policies.

We modeled the overall economic impact in Virginia using a comprehensive analysis that considered:

- Loss of cigarette sales.
- Decreases in household disposable income resulting from cigarette tax increase (allocated by income group according to estimated percentage of Virginia cigarettes they purchase).
- An increase in disposable income (and expenditures as a result of reduced smoking – allocated according to income group) as a result of a decline in consumption of cigarettes by Virginia residents of about 45 million packs.
- Increased government revenues and expenditures (or reductions/foregoing taxes from other revenue sources) from a 50-cent tax increase of which 20 percent is estimated to come from out-of-state residents²³ and thus is available without a concomitant reduction in disposable income among Virginia households.

We modeled the 50-cent tax increase in a stepwise fashion (adding the elements listed above individually). We also modeled impacts using several different assumptions about what state government would do with the increased revenue it receives from the tax increase.

- Our first step modeled reduced cigarette manufacturing receipts by the portion of sales decline that is attributable to reduced consumption (and not just a shift in the location of sales), and a decline in disposable income for Virginia residents attributable to the tax increase. Tax increases (reductions in household income available for purchasing goods and services) were allocated by income group according to estimated tobacco purchases (from Consumer Expenditure Survey and Virginia Census Data on the number of households in each group). This captures the impact on cigarette producers and the impact on households. In addition, we reduced expenditures at food and convenience stores to reflect the

²² A description of the IMPLAN model and technical references are available to readers via the World Wide Web at ftp://www.Implan.com/documents/implan_io_system_description.pdf.

²³ We used two methods to estimate the percentage of Virginia sales to residents. We compared per capita sales in Virginia to US per capita sales (14% higher) and we used Bureau of Labor Statistic’s Consumer Expenditure Survey to estimate the percentage of tobacco sales expected to by Virginia residents and compared it to actual sales. This method suggested a 28 percent higher consumption by Virginia residents. Adjusting for rates of adult smoking (5 percent higher) we settled on a 20 percent “middle road” estimate of the percentage of sales to non-residents.

loss of cigarette sales in Virginia at the average retail price net of taxes. Results of this basic analysis suggest a decline of 1,405 jobs in Virginia.

- The second step accounts for the more than \$60 million increase in disposable income that occurs as a result of households in Virginia that include smokers who quit or cut back because of the cigarette tax increase. By reducing expenditures on cigarettes, these households increase funds available for other purchases by over \$60 million. This \$60 million was allocated among income groups according to their estimated cigarette purchases in Virginia and their difference responses to price increases. No additions to income were made for out-of-state smoking reductions and quits (since that income would likely be spent outside of Virginia.). The \$60 million freed up by smoking quits and reductions will result in Virginia households spending on alternative goods and services (so called “compensating expenditures”), which will produce more than 1,000 jobs. The net effect of declines in cigarette sales in Virginia and “compensating expenditures” is a decline of 362 jobs in Virginia.
- The third step in the analysis includes all of the factors in steps one and two, while also modeling different scenarios for how the state could use the additional \$260 million in new revenues from the cigarette tax increase. If the state uses one-half of the new revenue to provide new services it will increase government employment as well as private sector employment (by purchasing goods and services from the private sector) the net job impact continue to be a very small job loss. If three-quarters of the new revenue is used to new or expanded services, the net impact of the tax increase is a gain of 1,029 jobs. Finally, if all \$260 million in new revenue is spent on new goods and services (as opposed to simply reducing the need for other taxes), then job gains would be a gain of 2,419 jobs in Virginia. There is a big jump in job gains as expenditures get closer to the full amount of the tax increase. This occurs because at high levels of expenditures state government is “stimulating” the economy by providing services that are paid for by taxes from out-of-state residents. We reduced household income in VA by over \$208 million to account for the impact of the 50 cent tax increase, as state government spends more than that amount, up to the total \$260 million in new revenue, it is paying for the services with revenues that did not come at the expense of declines in Virginia household income (via taxes).

Another possibility, however, is that an increase in cigarette tax revenue of \$260 million could be used as a way to avoid reductions in government expenditures that themselves will have employment impacts. We modeled a cut in state, non-education expenditures of \$260 million to better understand the potential consequences of a reduction in state expenditures without a concomitant increase in disposable income (state expenditures cut without any other changes such as a decrease in taxes). Our results indicate a loss of about 5,000 jobs throughout the Virginia economy, with just over half of those being state and local government jobs. The remaining jobs losses would occur in other industries as a result of the multiplier effects of the loss of expenditures by state government, and individual expenditures as a result of the job losses. If increased

cigarette tax revenue is used to replace \$260 million in state expenditure reductions, then the impact of the tax increase can be seen as preventing the loss of 5,000 jobs, in addition to any of the other impacts noted above.

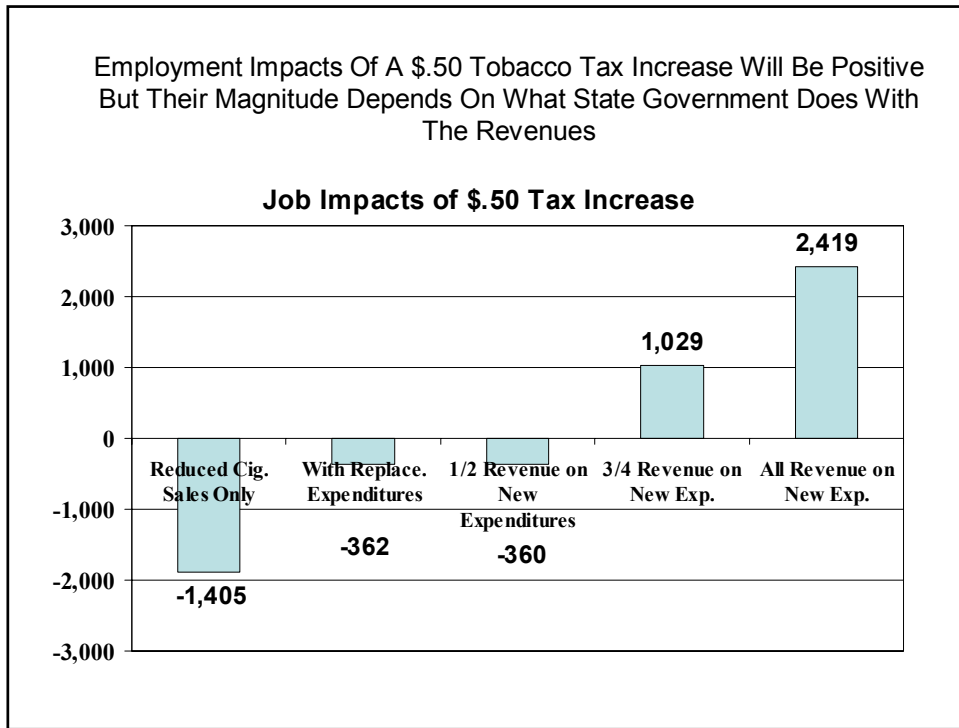


Figure 9

Model results also suggest that:

- Under all scenarios, cigarette manufacturers and tobacco stemming and drying operations will lose a total of 42 jobs as a result of the 50-cent cigarette tax increase
- Net private sector employment will decline in all scenarios, but some industries will experience gains while retail, wholesale and cigarette manufacturers experience a loss in all scenarios.
- There will be a gain in state and local government employment as a result of the increased revenue from a cigarette tax hike. If more than one-half of the increased revenues are spent on additional government goods and services, Virginia will experience a net gain in employment from the tax increase.

Both Public And Private Sector Jobs Will Be Affected

The exact nature of employment impacts, and the industries affected, will also be determined within the context of other of budget choices made by Virginia’s state

government. As an example, if the \$260 million in additional cigarette tax revenue from a 50-cent cigarette tax increase were used to avoid cuts in education aid, fewer school staff would lose their job (or staff increases might be possible) thus local government educational employment would be affected. If Medicaid cuts that reduce payments to private providers of health services are avoided (or if expenditures are increased), then private sector jobs in the health care industry would be saved or created. Private sector jobs will be affected regardless of the budgetary choices made, however, because the effect on personal income related to either cuts in state expenditures, or increases, will affect the private sector via multiplier impacts regardless of whether the private or public sector jobs are directly impacted.

Because A Large Percentage Of Cigarette Sales In Virginia Are To Non-Residents, A Substantial Portion Of Any Cigarette Tax Will Be “Exported” And Will Have Less Of An Impact On Virginia Residents Than Either A Sales Or Income Tax Increase

Even with a 50-cent cigarette tax increase, Virginia will maintain a strong competitive advantage with neighboring states (Maryland, DC), from which it draws a large volume of cigarette purchasers. Interstate sales will decline, but the substantial increase in revenues from the higher tax rate will mean that the state receives a substantial increase in revenue (\$260 million), at a “tax price” (\$208 million) to Virginia residents that is well below a comparable increase in revenue via an increase in sales, income, or corporate taxes.

VI. Distributional Impacts of A 50-cent Cigarette Tax Increase

Because of concerns that cigarette tax increases may be disproportionately paid by lower income households, we estimated how much of the cigarette tax increase will be paid by households according to income category. To produce our estimates we:

- Used data from the US Bureau of Labor Statistics' *Consumer Expenditure Survey* for estimates of the average household expenditure on cigarettes by households according to income.
- Applied average household expenditure data to the distribution of Virginia households by income from the 2000 Census to develop an estimate of the share of cigarette sales in Virginia by income group. We then applied actual sales data to the share distribution by income to develop an aggregate dollar estimate of the amount of cigarette taxes paid by Virginia residents according to income group.
- Developed an estimate, based on a review of literature, of the impact that price increases have on cigarette sales by income category. The literature generally concludes that while lower income households have higher rates of smoking, they also are more responsive to price increases with reductions in consumption.²⁴
- Applied the proposed 50-cent tax increase to the distribution of cigarette sales by income category, using the elasticity estimates for each income group to produce a new distribution of cigarette sales by income group. Comparing the distributions of cigarette sales by income both with and without the 50-cent tax increase provides an estimate of the amount of the tax increase that will be paid by each income group in Virginia.

Two-Thirds Of The Cigarette Tax Increase Will Be Paid By Households With Annual Incomes In Excess Of \$30,000.

Because Virginia is a relatively wealthy state, with more higher income households, and because lower income groups are more likely to reduce cigarette consumption in response to price increases, lower income groups will pay a relatively smaller share of the tax increase. Note also that the lowest income groups include students and other young people who, although they currently have low incomes, should not be considered as belonging to a low socioeconomic status group because most will see their incomes rise dramatically as they enter the workforce on a full-time basis.

Figure 10 presents our estimates of the decline in cigarette sales by income category in Virginia in response to a 50-cent increase in the cigarette tax. Figure 11 depicts the aggregate share of the tax increase that will be paid by households in different income groups in Virginia.

²⁴ See, CDC (1998) and Farrelly (2001) and others.

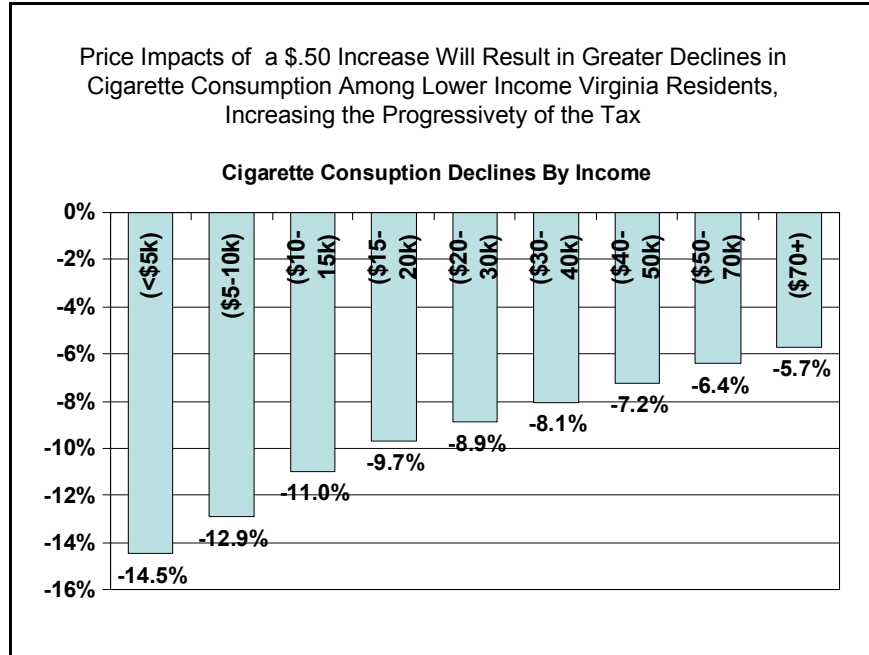


Figure 10

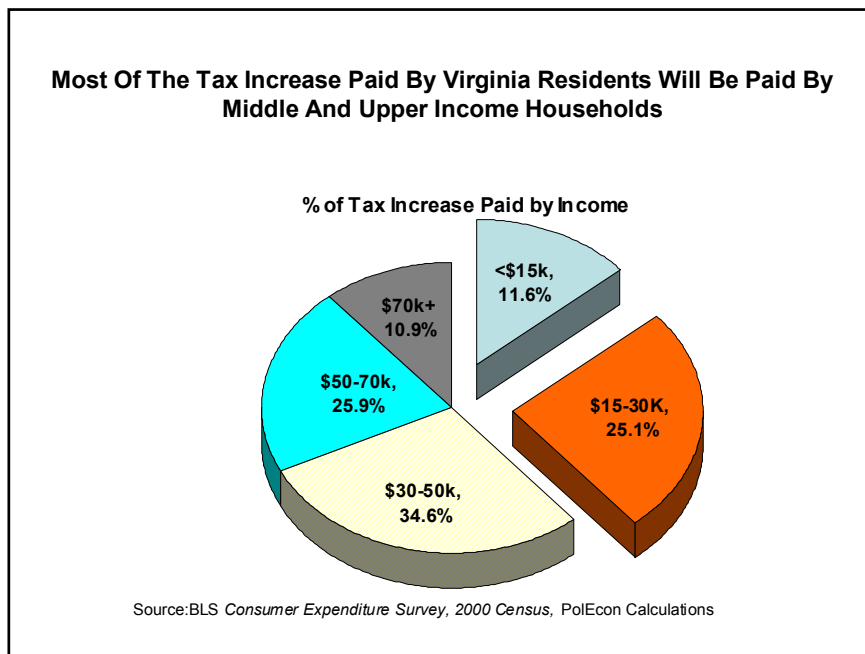


Figure 11

The 50-Cent Cigarette Tax Increase Will Increase The Average Smoker’s Annual Cigarette Tax Payments By About \$180, But Smokers That Quit Will Get A “Tax Cut” Of \$1,000 Per Year.

Our distributional analysis highlights the impacts of a 50-cent cigarette tax increase on Virginia residents by aggregated income groups. The economic impact on specific smokers, or households with smokers, will depend on how the smokers react to the cigarette tax increase. For example, pack-a-day smokers in Virginia who continue smoking and do not cutback, despite the 50-cent increase, will pay an additional \$182.50 in state excise taxes per year. Pack-a-day smokers who quit after the 50-cent increase will not only avoid the excise tax increase but will also increase their available household income by more than \$1,000 per year by eliminating their other direct expenditures on cigarettes. And pack-a-day smokers who cut back to half a pack per day after the 50-cent increase will increase their available household income by more than \$440 per year.²⁵

²⁵ Smokers currently pay 2.5 cents in state excise tax for each pack they smoke, as part of the approximately, \$2.95 per pack they pay, on average, as the total retail price. A pack-a-day smoker buys and smokes 365 packs per year. The 50-cent tax increase times 365 packs per year equals \$182.50 in additional excise taxes for a pack-a-day smoker who continues smoking despite the 50-cent increase. But a pack-a-day smoker who quits saves 365 times \$2.95, which equals \$1,076.75 per year. A pack-a-day smoker who cuts back to a half-pack per day will save \$2.95 times 182.5 packs by smoking fewer packs, which equals \$538.37 per year – but will pay additional taxes on the 182.5 packs per year he or she still smokes, which equals \$91.25, for net savings of \$538.37 minus \$91.25, which equals \$447.12.

VII. Conclusions

The cigarette industry has a prominent role in the history of Virginia and any policy proposals that may affect it are subject to heated debates. Rhetoric, anecdote and sometimes hyperbole have dominated the policy debates surrounding the economic impacts of increasing cigarette taxes in Virginia as they have in many states. This study adds empirical evidence to the debate employing analytical methods derived from the extensive national research on the economics of cigarette taxation.

Our study quantifies the degree to which cigarette sales to Virginia residents and non-residents are affected by key price variables, demonstrates how cigarette tax revenues respond to changing levels of taxation, and perhaps most importantly, we clarify the impact that cigarette sales in Virginia have on employment in the state.

Results from our analyses indicate that a 50-cent increase in Virginia's cigarette tax will result in a significant (19 percent) decline in cigarette sales in Virginia but that over \$260 million in new revenue will be generated. The bulk of the additional taxes paid by Virginia residents will fall on households in the middle and upper income range and 20 percent of the new tax will be paid by out-of-state buyers of Virginia cigarettes.

Finally, we conclude, as studies in other states have found, that declines in cigarette sales are likely to produce a very small employment gain in Virginia. Aggregate employment impacts will largely be determined by the choices the Commonwealth of Virginia makes in the use of the additional revenue from the tax increase. If the state uses the additional revenue to avoid cuts in expenditures that would have otherwise occurred, the impact will be to save several thousand public and private sector jobs. If all of the additional revenue from a 50-cent increase in the cigarette tax were used to fund additional state government expenditures, the impact would be to create about 2,400 additional jobs. At the same time, we note that the impacts of the increase will be localized and the City of Richmond, with considerable cigarette manufacturing, and those Virginia counties with substantial cigarette sales to neighboring states, will experience the greatest net negative impacts associated with a decline in cigarette sales prompted by the 50-cent tax increase.

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