# The Fiscal and Economic Impacts of Increasing the Tobacco Tax In New Hampshire

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# I. Introduction and Overview

The New Hampshire legislature is considering a proposal to increase the state excise tax on tobacco by one dollar, from $0.52 to $1.52. PolEcon Research was commissioned by the New Hampshire Healthy Families Campaign (NHHFC) to examine the fiscal and economic impacts of this proposed increase. Although commissioned by NHHFC, this report was prepared independently. PolEcon Research chose the economic methods, models and data used in the analysis and presented the report to NHHFC.

Considerable rhetoric surrounds the debate over the economics of increasing the tobacco tax in NH, yet little empirical evidence has been presented to support claims on either side of the issue. This lack of New Hampshire 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 tobacco prices and taxes.

This study examines historical cigarette sales, tax, and price data for NH and other states (going back to 1955), along with employment, income, and demographic data at the state and county level, to determine the relationship between cigarette prices in NH, tobacco tax rates, cigarette sales, and tobacco tax revenue. The study uses sophisticated econometric methods to develop price elasticity estimates (the impact that price increases have on cigarette sales) for NH that explicitly consider prices in NH relative to other states (so called border effects). In addition, employment (by industry) data for every county in NH is used to determine the impact that changes in the volume of cigarette sales have on retail employment throughout the state. A nationally recognized economic model of the State of NH[1] is used to estimate the impact that changes in cigarette sales in NH will have on the NH economy as a result of multiplier impacts. Key findings of the study include:

**Cigarette sales will decline by about 11 percent, but revenue to NH state government will increase by $134 million.**

- Recent history provides an example of the impact that a substantial increase in the price of cigarettes can have on NH revenues and the NH economy**.** A 91 cent increase in the price of cigarettes in FY 2000 (of which 15 cents was a state tax hike and 10 cents was a federal tax increase) resulted in a loss in sales of about 20 million packs but was offset by a large gain in revenue for NH. Most of the increased revenue from the price hike went to tobacco companies, not the state.

- For every 10 percent increase in the price of NH cigarettes in relation to their price in Massachusetts, there is a reduction in cigarette sales in New Hampshire of between 3.2 and 4.0 percent.

- Increasing the tobacco excise tax in NH by $1 will result in an 11% (or about a 19 million pack) decline in cigarette sales in NH**.** The decline in sales will be

[1] Implan model of the State of NH, MIG, Inc.,www.Implan.Com.

greatest among lower income and younger smokers.

- Because sales decline in NH as the price of cigarettes in the state rise in relation to prices in Massachusetts, the marginal increase in revenue from each additional 5 cent increase in the tobacco tax rate decreases as it rises. There is about a 23 percent reduction in the marginal tax yield between a $.05 and $1.00 increase. That is, the first $.05 increase yields approximately $7.58 million, while the last $.05 (going from $.95 to $1.00) yields about $5.84 million.

- Although each additional $.05 increase in the tobacco tax yields slightly less additional revenue, the overall increase in revenues continues with each additional $.05 increase in the tobacco tax rate.

- A $1 tax increase will yield over $134 million in additional revenue. Revenue estimates fall within a range of $128 to $144 million with a "best" estimate of $134.2 million.

- Based on the US Bureau of Labor Statistics' *Consumer Expenditure Survey* and detailed Census data on household income in NH (adjusted for the different rates at which lower and higher income households reduce smoking in response to price changes), about two-thirds (64%) of the tax increase will be paid by households making $30,000 or more.

**Loss of cigarette sales will not result in a net loss of jobs in NH**

- Despite a loss in cigarette sales of 20 million packs between 1998 and 2000, employment in convenience stores and convenience stores that sell gasoline increased in New Hampshire[2]. This finding is significant because our modeling suggests a loss in sales of just under 20 million packs in response to the $1 increase in the excise tax, mirroring prior experience with a significant tobacco tax increase in NH.

- Over the past 30 years there is a small negative relationship between cigarette sales and retail employment in NH (higher cigarette sales are associated with lower levels of employment). The relationship is not statistically significant but does indicate that cigarette sales are not an important factor in NH employment levels. Most counties show the same negative relationship between cigarette sales and employment but the counties with the highest concentrations of retail employment (Rockingham, Belknap and Carroll), and one border county (Strafford) show a small and not statistically significant positive relationship between retail employment and cigarette sales.

- The elasticity of retail employment in NH with respect to cigarette sales suggests that an 11 percent decline in cigarette sales will result in an increase of about 184

[2] US Bureau of the Census, *County Business Patterns 1998-2000*

retail jobs, and 857 jobs in all industries, as money not spent on cigarettes is spent on goods and services with a greater multiplier impact on the local economy.

- Retail employment impacts vary by county, with Belknap seeing the largest decrease (78 jobs) and Cheshire and Coos the greatest gains (81).

- Employing a widely used economic model (IMPLAN) to estimate economic impacts, results indicate that increasing the cigarette excise tax will result in a small positive impact on employment in NH. This finding is consistent with independent studies in other states not affiliated with the tobacco industry or tobacco prevention organizations**.** Money not spent on tobacco is spent on other goods and services with a greater impact on NH's economy and the increased revenue from out-of-state residents are the primary reasons for this result. We modeled the overall economic impact in NH using a comprehensive analysis that considered:

    - Loss of cigarette sales.
    - Decreases in household disposable income resulting from tax hike (allocated by income group).
    - Some increase in disposable income and expenditures as a result of reduced tobacco use (allocated according to income group).
    - Increases in government revenue that would reduce tax revenue from NH residents or which result in additional purchases of goods and services by government.

## II. Methodology

Estimating the revenue impacts of a $1 increase in New Hampshire's tobacco tax requires an understanding of the historical relationship between tobacco prices, tobacco taxes and cigarette sales in New Hampshire. Estimating the employment impacts of a tobacco tax increase requires an understanding of the historical relationship between cigarette sales and employment in New Hampshire. Estimating the distributional impacts of the tax increase (who will bear the increased tax) requires knowledge of the patterns of tobacco consumption among demographic (income) groups as well as how consumption among the different groups is affected by changes in the price that result from the tax increase.

Results reported here were developed using the following methods:

- Regression analysis on 48 years of data on cigarette sales, taxes and prices was used to develop a model of cigarette sales in NH that accurately demonstrates how cigarette sales in NH respond to price changes in NH and Massachusetts. These elasticity 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 $1 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 NH along with other economic data were analyzed with regression analysis to determine the sensitivity of NH's retail employment and total employment to changes in the volume of cigarettes sold in the state. The elasticity of retail employment with respect to cigarette sales in NH was calculated for each of NH's 10 counties.

- Actual employment data for convenience stores in NH as well as Maine, Massachusetts and Vermont and border counties was examined for the time period of 1998-2000 that included a drop in cigarette sales of 20 million packs in New Hampshire during a rise in the price of a pack of cigarettes of 91 cents. This analysis was performed to evaluate claims that a significant drop in cigarette sales in NH would have a dramatic impact on convenience store employment.

- 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 NH from the 2000 Census, and actual cigarette sales data, were used to develop an estimate of the volume of cigarette sales in NH by income group. This estimate of cigarette sales by income was then adjusted to reflect consumption with a $1 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 NH. No estimate was made of the distributional impact of the tax increase on sales to out-of-state residents.

## III. The Impact of Tax Increases on Cigarette Sales in NH

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 tax. 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 NH. In modeling cigarette sales in NH we found that:

- Cigarette sales in NH are more responsive to changes in the average retail price per pack of cigarettes in NH, as a percentage of the average price in Massachusetts, than they are to simple changes in the average retail price per pack.

- Although the differential between cigarette prices in NH and those in Vermont and Maine may influence some border sales, the volume of sales along these borders is so small in comparison to the sales between the Massachusetts and NH borders that changes in these price differentials do not exert a significant impact on the volume of cigarette sales in NH. This finding may also simply reflect the fact that changes in the model's price differential variable between NH and Massachusetts are strongly correlated with changes in the price differential between NH and the other states as well, indicating that the price differential with Massachusetts effectively captures all border effects.

- The percentage of the total retail price of cigarettes in NH that is attributable to the state excise tax is at historical lows. Cigarette prices have risen dramatically during the 1990's and our finding indicates that today, the State of NH receives a smaller portion of the total private (profits) and public (tax) revenue produced by the sales of cigarettes than has at any time since 1955.

- Neither the tax rate per pack of cigarettes in NH, nor the percentage of the price of cigarettes that is comprised of state excise taxes have a significant impact on sales in NH, above or beyond the impact that the tax has on the average retail price, and price differential of cigarettes between NH and Massachusetts. That is, the tax rate itself does not appear to have any special psychological or economic influence, but rather, its influence acts through its impact on prices. This is an important finding because, as noted, most of the rise in cigarette prices in NH are the result of tobacco industry decisions rather than changes in the rate of NH's excise tax. Thus the "burden" that rising tobacco prices may have on lower socioeconomic groups is primarily a function of industry pricing decisions and not the actions of the NH legislature.

- Irrespective of the difference in price between cigarettes in Massachusetts and NH, the long term downward trend in cigarette sales in Massachusetts is influencing sales in NH. Sales to Massachusetts residents can be expected to erode even if no changes are made to the price differential between NH and Massachusetts cigarettes, because of the continuing, long-term decline in cigarette consumption in Massachusetts.

Using time series data dating back to 1955, we tested several models designed to predict cigarette sales in NH and found that sales can be accurately predicted using just a few key variables: (1) the average retail price per pack in NH as a percentage of the average price per pack in Massachusetts, (2) total sales of cigarettes in Massachusetts, and (3) a variable that captures the time trend of cigarette sales in NH. Trend variables were constructed as either a function of time or as lagged values of prior year sales of cigarettes in NH. Trend variables are important to include for accurate predictions because sales of cigarettes in NH during any year are greatly influenced by the volume of sales in previous years.

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).

$$\ln(NHSales) = a + \ln(NHPricePct) + b\ln(MAsales) + b\ln(Trend) + e$$

where:

*NHSales* = Cigarette sales (packs) in NH,

*NHPricePct* = The average retail price per pack of cigarettes un NH compared to the average retail price per pack in Massachusetts,

*MASales* = Cigarette sales in Massachusetts

*Trend* = Lagged value of prior year cigarette sales in NH and/or time trend

Using this model with a lagged value of cigarette sales as the trend variable yields the highest degree of accuracy in predicting cigarette sales. Combined, these 3 variables explain about 90 percent of the variation in cigarette sales in NH. Variables such as the cigarette tax rate and the average retail price per pack were not as strongly related to cigarette sales in NH (and thus were not as useful in explaining the variation in sales).

The table below provides detail on the relationship between each of the independent or "predictor" variables and cigarette sales in NH. The "standardized coefficients" are the "elasticities," and measure the degree to which cigarette sales in NH 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, and that as the price per pack in NH increases relative to the price per pack in Massachusetts, cigarette sales in NH decline.

The standardized coefficient for the NH price as a percentage of Massachusetts price is negative and implies that a 10 percent increase in the average retail price of cigarettes in NH as a percentage of the price in Massachusetts will result in a 3.3 percent decline in sales in NH. A 10 percent decrease in the relative price would increase sales by 3.3 percent. The results also imply that as total cigarette sales in Massachusetts increase or decrease by 10 percent, cigarette sales in NH will increase or decrease by 1.6 percent. Because sales in Massachusetts are on a long-term downward trend, this result also implies that NH sales to NH residents will erode by a small percentage regardless of the price differentials between the states.

**Table 1: Cigarette Sales Model Details**

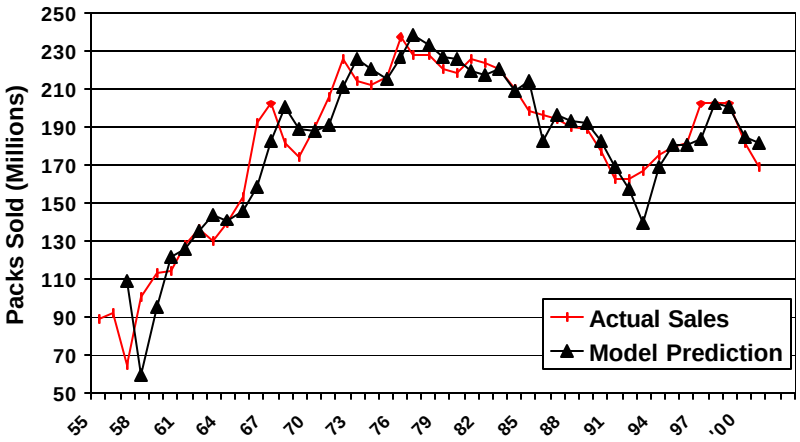
| Model | | Unstandardized Coefficients B | Std. Error | Standardized Coefficients Beta | T | Significance |
|---|---|---|---|---|---|---|
| 1 | (Constant) | 1.18 | .371 | | 3.240 | .003 |
| | LnNHTREND | .654 | .096 | .673 | 6.820 | .000 |
| | LnPRIPCT | -.533 | .130 | -.333 | -4.093 | .000 |
| | LnMASLS | 8.423E-02 | .048 | .160 | 1.760 | .090 |
| | | | | | | |
| $R^2$ = .883 | | | | | | |

a Dependent Variable: LNNHSALE

Figure 1 below shows actual cigarette sales in NH and model generated predictions and demonstrates the ability of the model employed in this report to accurately predict cigarette sales with limited information about prior sales and prices, in NH and Massachusetts.

Figure 1

Cigarette Sales In NH Can Be Modeled To Provide An Accurate Estimate Of The Revenue Implications Of Any Proposed Tax Increase




Source: PolEcon Research Model of NH Cigarette Sales, *The Tax Burden on Tobacco* 17

# IV. Revenue Impacts

The model of cigarette sales in NH presented here can be used to estimate the revenue implications of increasing the tobacco tax in NH by $1 per pack of cigarettes. Using our cigarette sales model and altering the average retail price in NH by adding $1 to the tobacco excise tax results in four key findings:

- Cigarette prices have risen dramatically over the last decade, but the percentage of the total price of a pack of cigarettes in NH that is comprised of the state tobacco excise tax is currently as low as it has ever been.

- If nothing else changes to alter the price differential between NH and Massachusetts, then sales in NH can be expected to fall by about 11 percent. If Massachusetts raises its excise tax or if prices in NH were discounted to compensate for the higher excise tax sales will not drop as much.

- While sales will decline, revenues increase dramatically as the increase in state revenue per pack greatly exceeds the percentage decline in sales.

- Using the most recent data available, our model predicts a $143 million revenue gain from a $1 increase in the tobacco tax. With adjustments for things such as increased tax avoidance (via internet sales etc.), our best estimate of the revenue yield is $134 million.

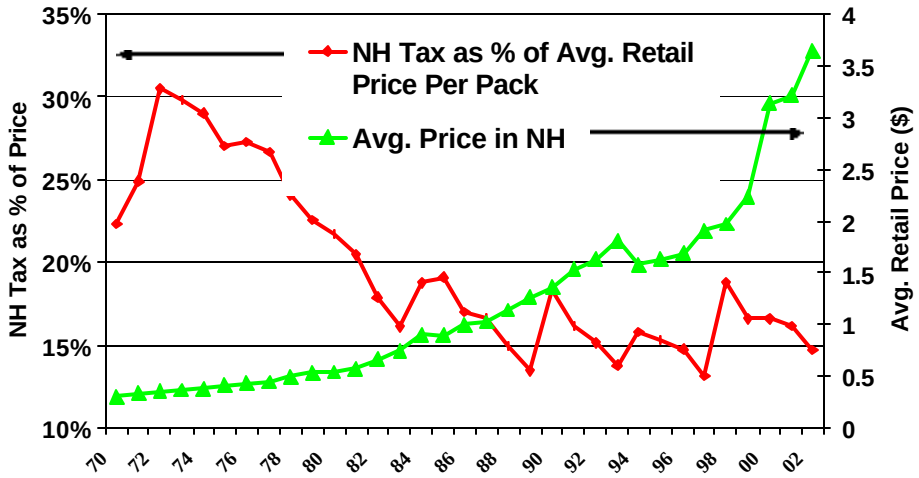
Our "best" model of cigarette sales in NH indicates that cigarette sales decline/increase by 3.3 percent for every 10 percent change in the price of cigarettes in NH as a percentage of the Massachusetts price. In developing our revenue estimate, however, we used a higher elasticity (4 percent change for every 10 percent change in the price differential) because some model variations had elasticities as high as 4.0. Increasing the elasticity estimate used in the model's calculations from 3.3 percent to 4.0 percent has the effect of reducing our forecast of cigarette sales. This 21% increase in the elasticity and this adjustment can substitute for not including Maine and Vermont price differential variables (border effects from these states are quite small compared to Massachusetts) and do not appear to have a statistically significant impact on NH sales.

**Cigarette Prices Rose Dramatically During The 1990's, But NH's Tobacco Tax As A Percentage Of Retail Price Is Near Historic Lows**

Figure 2 shows that the NH tobacco tax as a percentage of the average retail price of cigarettes in NH is quite low by historical standards.

Figure 2

As A Percentage Of Average Retail Price Of A Pack Of Cigarettes, The Current NH Tax Rate Is About As Low As It Has Ever Been




Source: NH Dept. of Revenue, Orzechowski and Walker - *The Tax Burden on Tobacco*

To better understand the impact of a $1 increase in the tobacco tax we used historical data on sales and prices and applied an additional $1 to the NH tobacco tax for each year beginning in 1991. We then used the model of cigarette sales discussed earlier to determine the change in sales and revenues that would have occurred had the tax been increased by $1 in each year since 1991. Our results show that:

- Sales would have decreased by 40 million packs or 25 percent in the first year of the tax increase, but because of prices rising in Massachusetts relative to NH prices, by 2002, cigarette sales lost because of the tax increase would have been only about 18 million packs, or about an 11% decrease (Figure 3).

- Despite the loss of cigarette sales in NH, the increased tax rate would have dramatically increased tobacco tax revenues (Figure 4).

Figure 3

A $1 Increase Enacted In 1991 Would Have Grown Tobacco Tax Revenue Dramatically, Despite A Decrease In Sales

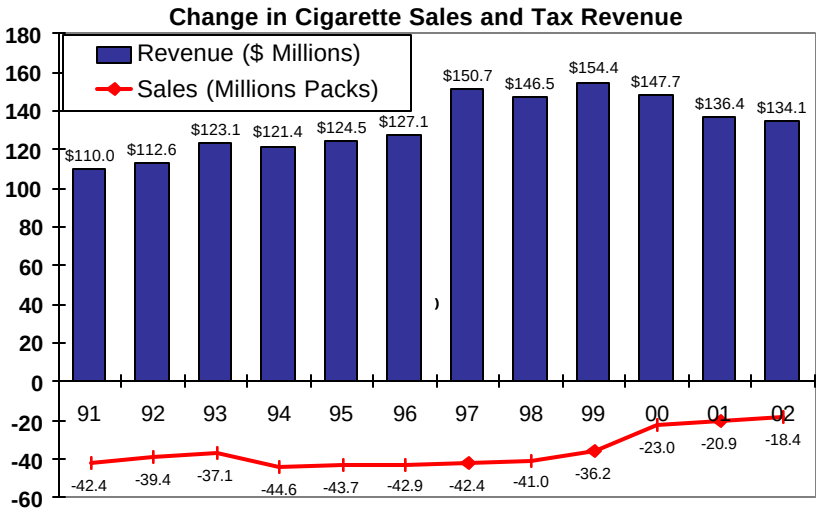
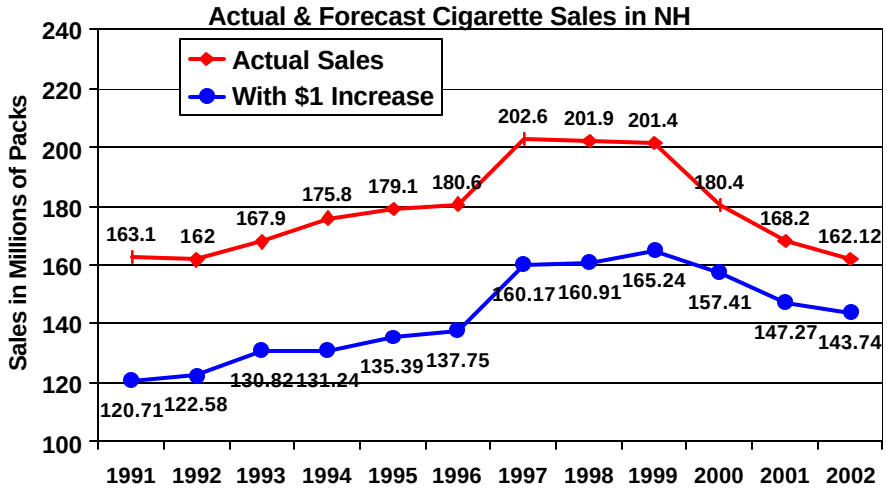



Figure 4

By 2002 The Sales Impacts Of A $1 Increase In The Tax Rate In 1991 Would Have Been Cut In Half Because Of MA Price Hikes




Source: NH Dept. of Revenue, *The Tax Burden on Tobacco,* PolEcon

**After A $1 Increase In The Tobacco Tax, Cigarettes Will Remain Less Expensive In NH Than In Massachusetts, But NH's Average Retail Price Per Pack Will Go From 71% Of The Average Price In Massachusetts To 91% Of The Average Massachusetts Price Per Pack**

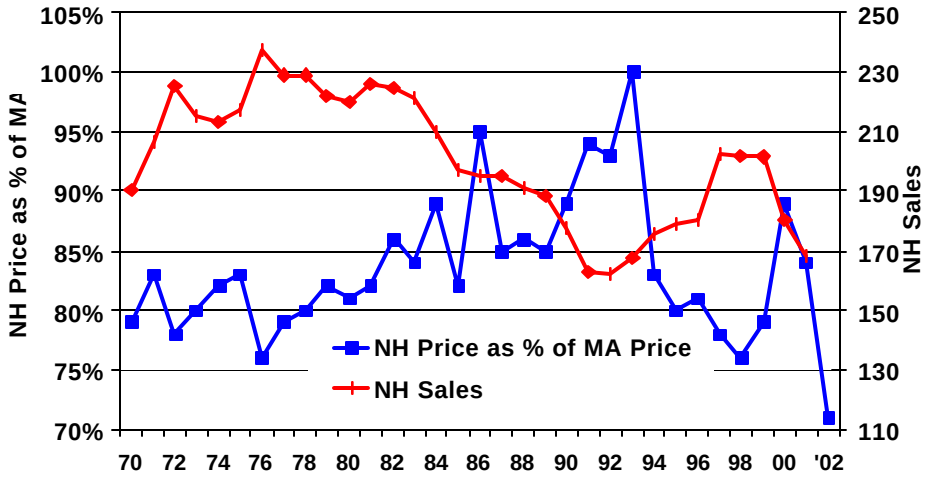
The most recent price data (from 2002) available shows that, including all applicable sales and excise taxes, the average per pack price of cigarettes in NH was $3.65 or 71% of Massachusetts average price per pack of $5.11. Adding $1 to NH's tobacco excise tax would thus (all other things equal) increase the NH price per pack from 71% to 91% of the average Massachusetts price per pack.

**A $1 Increase In The Tobacco Tax Would Not Raise Cigarette Prices In NH Compared To Prices In Massachusetts To A Level Higher Than They Have Been In The Past**

In the early 1990's cigarette prices in NH were about equal to prices in Massachusetts. In 2000 NH cigarette prices increased to a about 90% of the average price per pack in Massachusetts (Figure 5). The result was a loss of sales in NH. Since that time, prices have risen sharply in Massachusetts and as a result, tobacco sales have increased in NH in the first six months of FY 2003 by about 10 percent over FY 2002.

Figure 5

In NH, Price In Relation To MA Is Important - Sales Are Highest In NH When The NH Price Is Lowest Relative To MA




Source: NH Dept. of Revenue, *The Tax Burden on Tobacco,* PolEcon

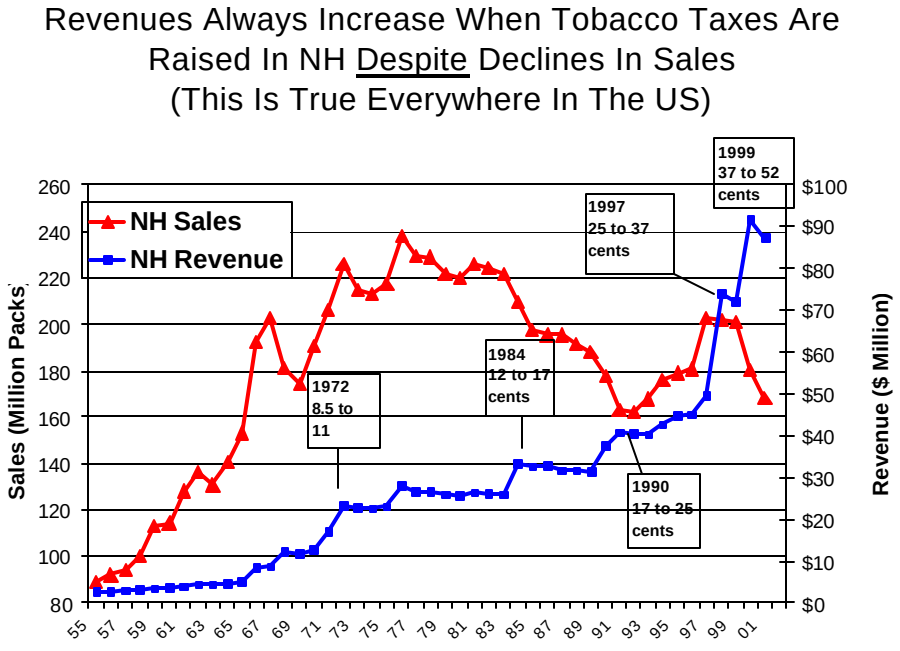
**Cigarette Sales Can Be Expected to Decrease Between 9 and 11 Percent As a Result of an Increase in the Tobacco Tax of $1 Per Pack**

A $1 tobacco tax increase would move NH's cigarette prices from 71.4% to 91% of the average price per pack in Massachusetts. This change represents a 27.4% (19.6/71.4 = 27.4) decrease in the price differntial between NH and Massachusetts. Our model of cigarette sales shows that for every 10 percent increase in the price of cigarettes in NH relative to prices in Massachusetts, there will be a 3.3 percent decrease in cigarette sales in NH. A $1 tax increase that moves NH prices closer to Massachusetts by 27.4% would thus be expected to decrease NH sales by about 9 percent. In modeling the impacts of a $1 tax increase on prior year sales and revenue, we chose to use a higher (4.0 percent) elasticity estimate to conservatively estimate revenues, and to account for border impacts not directly included in the model. This higher elasticity implies cigarette sales decrease in NH will decrease by about 11 percent from a $1 tax increase.

**Revenues Always Increase In NH With An Increase In The Tobacco Tax**

Some have suggested that tax increases result in declines in cigarette tax revenue. As Figure 6 shows, however, each increase in the cigarette tax in NH has resulted in more revenue to the state. Figure 6 also shows that the year following the tax increase generally sees a small decline in revenue. This decline is the result of the long term trend toward declining consumption of cigarettes. That is, at any tax rate, revenues can be expected to gradually decline, unless there is some change in the relative price of cigarettes between NH and Massachusetts, because a smaller percentage of the population is smoking each year or smoking less.

Figure 6




Source: NH Dept. of Revenue, Orzechowski and Walker - *The Tax Burden on Tobacco*

**Increased Revenues In The First Year From A $1 Tax Increase Are Estimated At $134 Million**

We estimated first year revenues from a $1 tax increase using our model of cigarette sales in NH. We first modeled tobacco revenues for a "no tax increase" scenario using the following assumptions:

- That no changes occur that would alter NH's price in relation to Massachusetts cigarette prices. We assume that NH's price per pack is 71% of the price of cigarettes (including all applicable sales taxes).
- We used the elasticity from our analysis that indicates a 10 percent change in the relative price of NH cigarettes compare to the price in Massachusetts will result in a 3.3 percent change in NH sales.
- We apply a lag (trend) variable that assumes 162.12 million packs will be sold in the year prior to the tax increase. This is a conservative figure given that revenues are running roughly 10 percent above FY 2002 revenues in the first six months of FY 2003.
- We assume Massachusetts sales continue their long-term downward trend and will be 310 million (down from 348 million in 2001)

Applying this scenario to our model of cigarette sales results in forecast cigarette sales in NH of 176 million packs. At the existing tax rate of $.52, sales of 176 million packs would produce revenues of $91.5 million. This is a reasonable forecast given that FY 2003 appear to be over 10 percent ahead of FY 2002 revenues of $84.3 million.

Adding the $1 dollar tax increase and adjusting the forecast to reflect a change in NH's price advantage over Massachusetts (going from 71% to 91% of the average price in Massachusetts), produces estimated sales in NH of approximately 155 million packs. At a new tax rate of $1.52, total tobacco tax revenues would be $235 million.

Comparing the two forecasts suggests:

- Sales in NH will decline by about 20 million packs.

- Revenue will increase by about $143.5 million ($235-$91.5 million).

**The PolEcon Model Produced Revenue Forecasts That Were Adjusted Downward To A Final Estimate Of $134 Million To Account For The Following:**

- The fact that some variations of the model had higher (4.0) elasticities for sales in NH with respect to NH cigarette prices comparison to Massachusetts cigarette prices.

- The increase in tax avoidance via internet sales and other means. Estimates are that about 2 percent of cigarette sales occur via the internet and that the figure is expected to rise to about 5 percent by 2005.

- The possibility that we overestimate the number of cigarettes sold in NH in the year prior to the tax increase (an unlikely occurrence because our estimate is below the level of sales suggested by the first 6 months of FY 2003 tobacco tax revenue.)

**As The Amount Of The Tobacco Tax Increase Gets Larger, Each Additional Increase Yields Slightly Less New Revenue, But Revenues Continues To Increase**

Our estimates indicate that a $.05 increase in NH's tobacco tax would yield approximately $7.58 million in additional revenue. One objection to significant increases in the tobacco 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 tobacco tax hikes result in substantial revenue gains even with declines in sales.

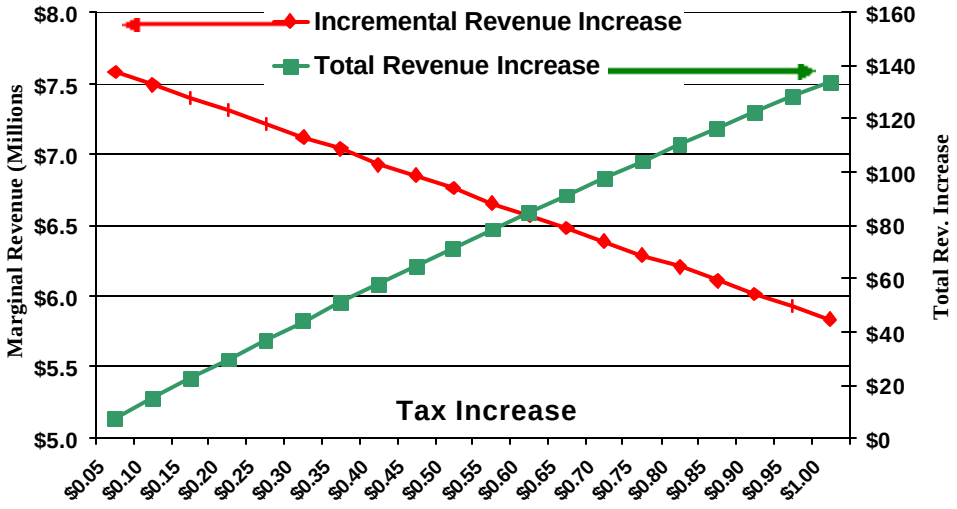
It is apparent, however, that as tax increases become larger, their impact of the price difference between cigarettes in NH and Massachusetts becomes greater. We use our model and elasticities to estimate the sensitivity of revenue gains to the magnitude of the tax increase.

**Our models suggest that as the size of the tobacco tax increase goes from $.05 to $1.00, the revenue from each additional 5 cent increase declines from $7.58 million to $5.84 million, a drop of 23 percent**

Figure 7 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 Massachusetts), while total revenue gains continue to increase (albeit at a smaller rate with each incremental increase in the tax).

Figure 7

Each Increase in The Tax Rate Produces Marginally Less Revenue Because it Reduces The Price Differential Between NH & MA (All Else Held Equal), But Total Revenues Continue to Increase




## V. Distributional Impacts of A $1 Tobacco Tax Increase

Because of concerns that tobacco tax increases may be disproportionately paid by lower income households, we estimated how much of the tobacco 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 tobacco by households according to income.

- Applied average household expenditure data to the distribution of NH households by income from the 2000 Census to develop an estimate of the share of cigarette sales in NH 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 tobacco tax paid by NH residents according to income group.

- Based on a review of the literature we developed an estimate 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 (see, CDC (1998) and Farrelly (2001) and others).

- We then applied the proposed $1 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 $1 tax increase provides an estimate of the amount of the tax increase that will be paid by each income group in NH.

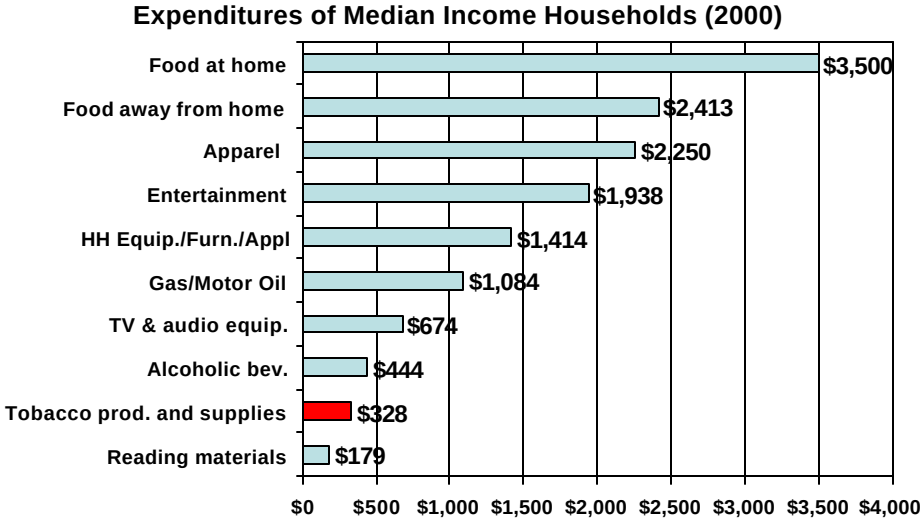
Our results indicate that two-thirds of the tax increase will be born by households making more than $30,000. Because NH has a relatively low percentage of households in the lowest income categories, and because lower income groups are more likely to reduce tobacco consumption in response to price increases, lower income groups 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.

Figure 8 presents data from the US Bureau of Labor Statistics' *Consumer Expenditure Survey*. It shows average annual household expenditures and several categories of consumer expenditures (the full survey includes many more categories). Although individual household expenditures will vary greatly from these averages depending on whether households contains smokers or not, the survey is commonly used by economists to estimate the aggregate distribution of expenditures and tax impacts by income group.

It is important to note that Figure 8 indicates one reason why aggregate employment does not fall in NH as a result of declines in cigarette sales (discussed in the following section). The absence of a general retail sales tax means that NH has a considerable price advantage on consumer goods that comprise a far greater portion of consumer expenditures than do tobacco products. The price advantage NH enjoys, particularly on consumer durables such as furniture, appliances, electronics etc., is not affected by a tobacco tax increase.

Figure 8

NH's Retail Tax Advantage Applies To A Much Higher Portion Of Household Budgets. Cigarettes May Be A "Collateral Sale" As Much As Producing Them




Source: Bureau of Labor Statistics, *Annual Survey of Consumer Expenditures*

Figure 9 presents our estimates of the decline in cigarette sales by income category in NH in response to a $1 increase in the tobacco tax. Figure 10 depicts the aggregate share of the tax increase that will be paid by households in different income groups in NH. Our analysis assumes that much of the tax increase ($108 million of the $134 million total) will be paid by NH residents because much of the drop in sales will occur among residents from outside NH, as NH's price advantage with surrounding states is diminished. This is probably too high a percentage to allocate to NH residents. The result of this allocation is that in our economic impact analysis, NH residents are assumed to have a greater reduction in disposable income, maximizing any negative impacts of the tax increase in the economic models used.

Figure 9

Price Impact Of $1 Tobacco Tax Increase Will Result In Lower Income Smokers Quitting At Higher Rates Than Smokers In Other Income Groups

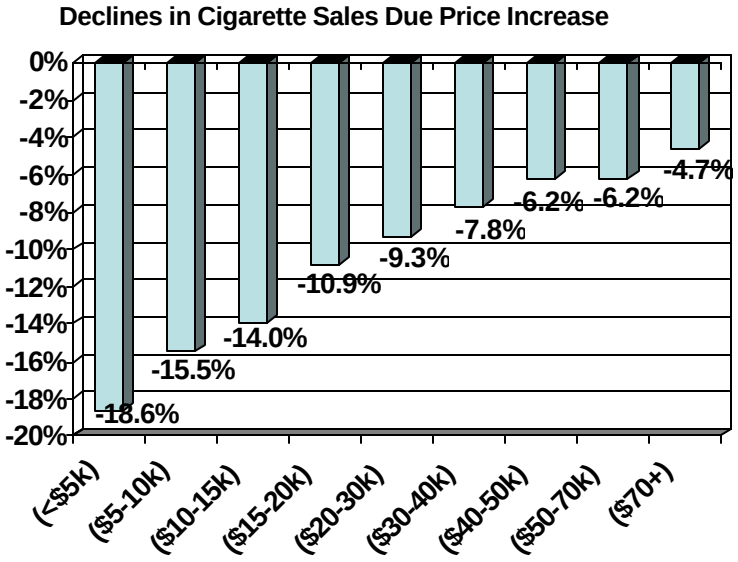
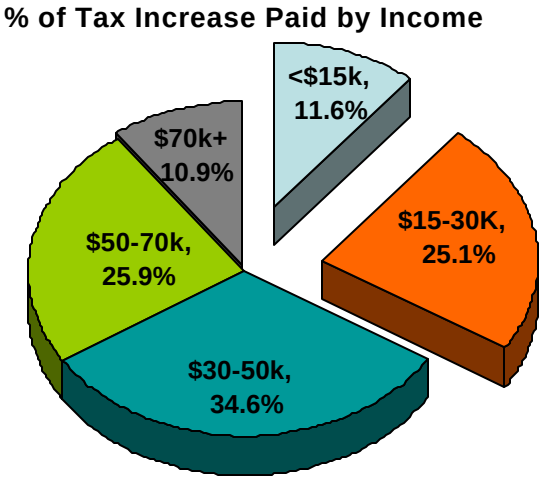



Figure 10

Most Of The Tax Increase Paid By NH Residents Will Be Paid By Middle And Upper Income Households – But Most Of The Program Benefits Are Directed Towards Lower Income Households




Source:BLS *Consumer Expenditure Survey,* PolEcon Calculations

# VI. Employment Impacts

Concerns over the economic impacts of declines in cigarette sales have been a primary argument against increases in the tobacco tax. Despite the important role economic considerations play in the debate over cigarette taxes, there has been remarkably little solid empircal evidence relating to New Hampshire introduced into the policy debate. This study used several methods to estimate the economic impacts that will occur in response to a $1 increase in NH's tobacco tax and the resulting declines in cigarette sales that will occur.

- We looked for evidence of economic impacts associated with a 20 million pack decline in cigarette sales in NH in 2000 because this decline is similar to that which is forecast to occur as a result of the $1 tax increase.

- We used econometric methods to determine the relationship between cigarette sales and retail employment levels in NH and all 10 counities in the state.

- We employed a widely used economic model to asses the economic changes that would occur in NH in response to declines in cigarette sales, increased taxes, and changes in disposable income associated with a $1 tax increase.

Results from each of these analyses fails to find evidence of significant economic impacts associated with decreases or increases in cigarette sales. Individual businesses will be affected, and regions with the highest concentrations of retail employment or border or border regions (Rockingham, Belknap, Carroll and Stafford) will see very small declines in retail employment. Overall, however, our models indicate that employment in NH will increase by a small amount (about $1/10^{th}$ of one percent) as a result of the decline in cigarette sales attributable to a $1 tax increase.

Our results are consistent with studies of the employment impacts of declines in cigarette sales in non-tobacco producing states (Warner and Fulton 1994, Warner et.al 1996), and studies conducted independent of the tobacco industry, which find that declines in tobacco 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, 1996, 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. Industry representative generally fail to mention these results when discussing the employment impacts of cigarette sales, however.

**Cigarette Sales Account For About 1.6 Percent Of Total Retail Sales In NH - Convenience Stores And Convenience Stores That Sell Gasoline Account For Less Than One Percent Of Private Sector Employment In NH**

Understanding the economic impacts of a decline in cigarette sales in NH requires some insight into the role that cigarettes play in the context of total retail sales in NH. In 2001 there was an estimated $24 billion in retail sales in NH[3] Cigarette sales in NH were 168.2 million packs in 2001 at an average price of $2.36 (net of state and local taxes because retail sales figures do not include taxes in their totals) for an estimated total dollar volume of cigarette sales of $398.4 million. This amount represents about 1.6 percent of total retail sales in NH.

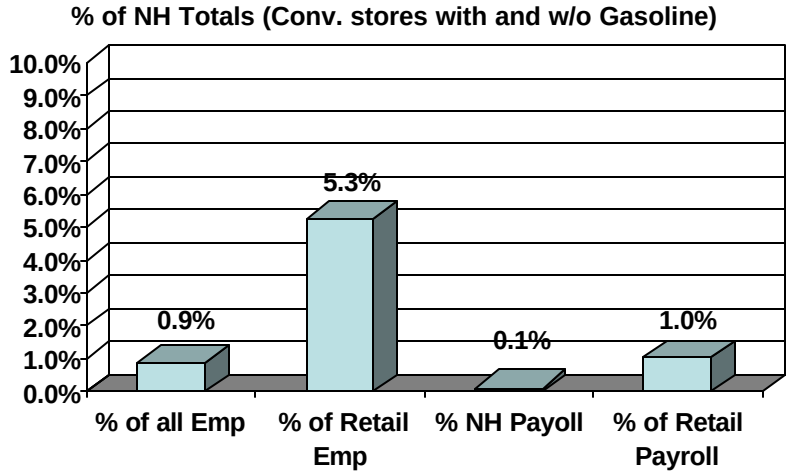
An 11 percent reduction in the volume of cigarette sales in NH in 2001 (the forecast decline associated with a $1 dollar tax increase) would reduce cigarette sales as a percentage of total retail sales to about 1.5 percent. Although empirical evidence of "collateral sales" associated with cigarette sales is lacking, adding impacts associated with their loss due to an 11 percent decline still would exert a minimal impact on retail sales. If collateral sales double the impact that cigarette sales have on retail sales (increasing total impacts to 3 percent), an 11 percent reduction in cigarette sales would only reduce the impact of cigarette sales from 3.0 percent to 2.7 percent of total retail sales.

Figure 11 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 less than one percent of total private sector employment in NH, and because most of the jobs are part-time and low wage, the industries account for about $1/10^{th}$ of 1 percent of total private sector payroll in NH.

[3] NH Economic and Labor Market Information Bureau, *Vital Signs 2003*

Figure 11

The Convenience Store Industry (Including Those That Sell Gasoline) Accounts For Less Than 1/10th Of One Percent Of Wages And Less Than One Percent Of Total Private Sector Employment In NH




Source: US Census Bureau, *County Business Patterns, 2000*

**A Decline In Cigarette Sales Of 20 Million Packs In 2000 Had No Significant Employment Impact On The Convenience Store Industry In NH**

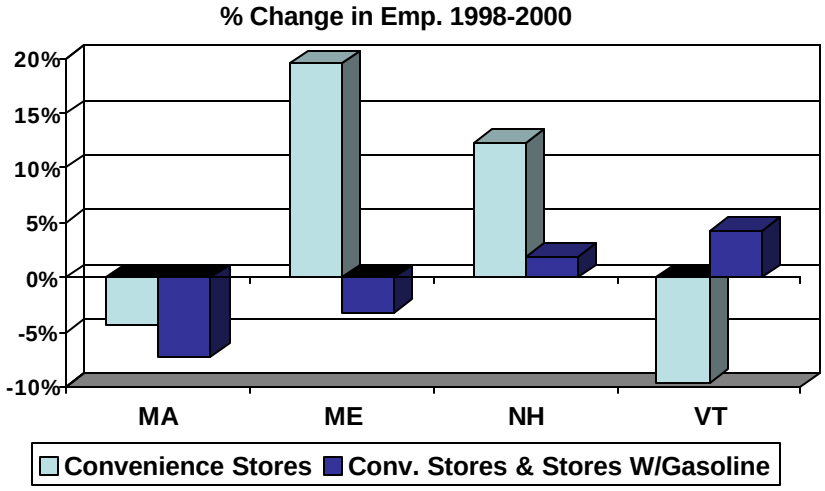
We looked for direct evidence of employment impacts of changes in cigarette sales in NH by examining employment in convenience stores in NH as well as convenience stores that sell gasoline during a time period when cigarette sales declined in NH by 20 million packs. We also compared changes in employment in these industries in neighboring states.

Because of a change in the federal government's industry classification system, from the Standard Industrial Classification (SIC) to the North American Industry Classification System (NAICS), historical employment data for the convenience store industry is only available since 1998. Examining the US Census Bureau's "*County Business Patterns*" for 1998 to 2000 (the most recent year available) allows us to examine changes in convenience store employment before and after a significant decline in cigarette sales in NH.

Figure 12 presents the percentage change in convenience store employment between 1998 and 2000 and demonstrates that aggregate convenience store employment grew in NH, and grew more rapidly in NH than it did in other neighboring states, during a time period that when cigarette sales fell by 20 million packs.

Figure 12

Over The Time Period When Cigarette Sales Dropped By 20 Million Packs In NH, Convenience Store Employment Increased In NH




Source: US Census Bureau, *County Business Patterns 1998-2000*

Figure 13 shows the changes in convenience store employment before and after NH increased its cigarette tax by 15 cents (July 1, 1999) and the overall price increased by 91 cents, resulting in a sales loss of about 20 million packs. Data for some smaller NH counties is withheld by the government because of the small number of business in those areas would violate the federal confidentiality provisions. As the chart shows, convenience store employment increased in nearly every NH county between 1998 and 2000. For comparison purpose, convenience store employment in two Massachusetts border counties is presented.

Figure 13

## Convenience Store Employment Increased in Almost Every County in NH Even as Cigarette Sales Declined in the State

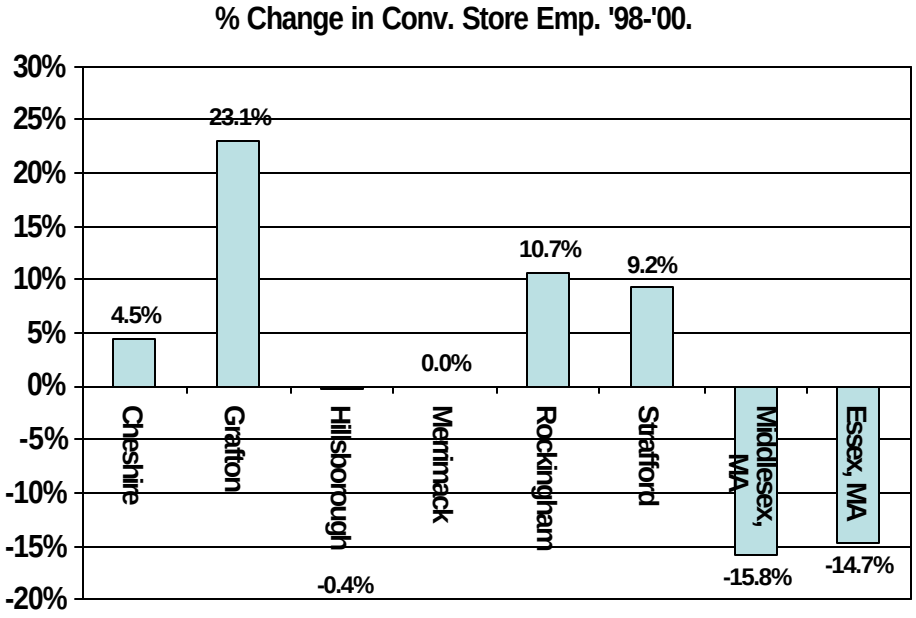
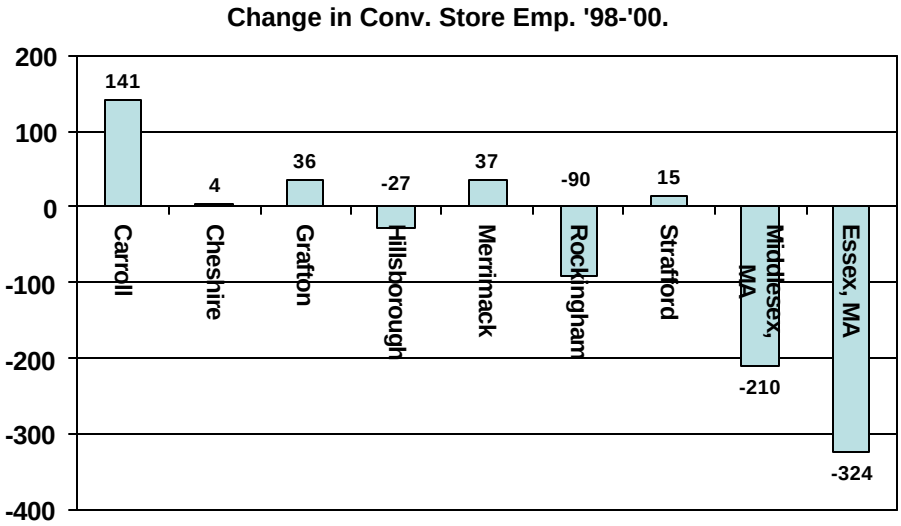



Figure 14 shows that combined employment in convenience stores and convenience stores that sell gasoline fell by 90 jobs in Rockingham County during the time period when cigarette sales fell by 20 million packs. With the largest border population, it is likely that any negative impacts of cigarette sales losses will be greatest in Rockingham County. The fact that border counties in Massachusetts also experienced declines, however, suggests the decline in Rockingham County was not simply a result of a loss of "border sales". The employment decline was among convenience stores that sell gasoline and it is possible that consolidation in that industry (as large chains of have come to dominate the market and small independents have been lost) accounts for some of this result.

Figure 14

Only In Rockingham County Did Combined Convenience Stores And Convenience Stores With Gasoline See Much Decline In Employment (But MA Border Counties Experienced Bigger Declines)




Source: US Census Bureau, *County Business Patterns, 1998-2000*

**Over The Past 30 Years, There Has Been A Small, Negative Relationship Between Total Employment In NH And Cigarette Sales And Between Retail Employment and Cigarette Sales, But The Relationship Is Not Statistically Significant**

With cigarette sales comprising such a small percentage of retail sales in NH**,** it should not be surprising that changes in the number of cigarettes sold in the state would have a limited impact on employment in the state.

We examined the impact that cigarette sales have on retail employment in the state and each of its counties by constructing a simple regression model, in log-linear form, that predicts retail employment based on total personal income in the state (a critical determinant of consumer expenditures and thus retail sales and employment), the state unemployment rate (a measure of economic conditions that might influence retail expenditures), and the volume of cigarette sales in NH.

The form of the equation was:

$$\ln(Retailemp) = a + b\ln(NHSales) + b\ln(NHIncome) + b\ln(NHUnempRate) + e$$

Where:

*RetailEmp* = Retail employment in the state (or county)

*NHSales* = Cigarette sales (packs) in NH

*NHUnempRate* = The unemployment rate in NH

*NHIncome* = Total personal income in NH

The model allows us to determine the unique impact that changes in cigarette sales in NH 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 2: Employment Model Details**

| | | Unstandardized Coefficients | Std. Error | Standardized Coefficients | t | Significance |
|---|---|---|---|---|---|---|
| Model | | B | | Beta | | |
| 1 | (Constant) | 5.202 | .359 | | 14.492 | .000 |
| | LnNHUNEMP | -5.514E-02 | .014 | -.056 | -3.862 | .001 |
| | LnNHINC | .400 | .007 | .987 | 58.251 | .000 |
| | LnNHSALE | -3.623E-02 | .054 | -.011 | -.668 | .510 |
| | | | | | | |
| $R^2$ = .986 | | | | | | |

Results from our employment model show a small, negative, and not statistically significant relationship between cigarette sales and employment in NH. The model indicates that a 10 percent decline in cigarette sales in NH would result in just over a $1/10^{th}$ of one percent increase in retail employment in the state. In the case of the 11 percent decline in cigarette sales forecast to occur as a result a $1 tax increase, results imply a gain of about 184 retail jobs in the state.

These New Hampshire results are consistent with other studies that show a small positive impact on employment, in non-tobacco producing states, in response to declines in cigarette sales. 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 challenge the belief that cigarette sales generate significant "collateral" retail sales. If collateral sales were a substantial part of the impact that cigarette sales have on NH employment, we would not expect a net gain in retail employment in the state from declines in cigarette sales.

**The Relationship Between Cigarette Sales And Retail Employment Varies By County**

We used the same employment model to estimate the impact that cigarette sales have on retail employment in each of NH's counties. As with our examination of convenience store employment by county, we found variation in the impact across counties. Counties with a high percentage of retail employment and/or significant cross border sales (Belknap, Carroll, Rockingham and Strafford), experience small retail employment losses.

Figure 15

Some Counties Would See An Increase In Retail Emp. As Tobacco Expenditures Are Reallocated, While Those With High Retail Concentrations And Border Sales See a Decline

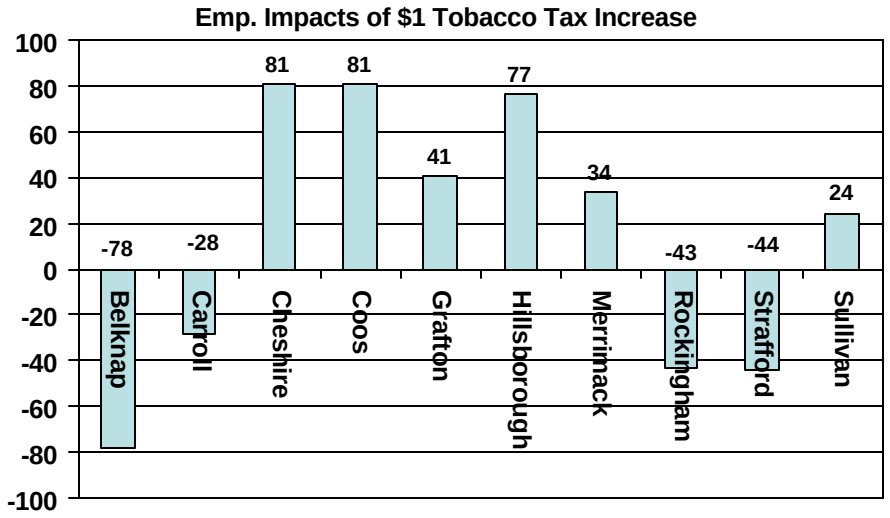



Figure 15 shows model predicted retail employment impacts for each of NH's counties. Our state model predicts an increase in retail employment of 183 jobs in response to a decline in cigarette sales of about 19 million packs. The net impact on retail employment of modeling impacts individually in each county is a gain of 146 jobs.

Analysis Of The Employment Impacts Of A $1 Tobacco Tax Increase Using The IMPLAN Economic Modeling System Also Suggests Gains In Employment From The Tax Increase And Resulting Decline In Cigarette Sales

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 tobacco tax by $1 per pack in New Hampshire.[4] 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 various scenarios and economic proposals.

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

- Loss of cigarette sales ($32.5 million in 1997 prices).
- Decreases in household disposable income resulting from tax hike of $108 (allocated by income group according to estimated percentage of NH cigarettes purchased by).
- An increase in disposable income (and expenditures as a result of reduced tobacco use – allocated according to income group) of about $10 million.
- Increased government revenues and expenditures (or reductions/foregoing taxes from other revenue sources) of $132 million of which $24 million is estimated to come from out-of-state residents and thus is available without a concomitant reduction in disposable income among NH households.

We modeled the $1 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 modeling approach simply reduced expenditures at food and convenience stores to reflect a sales loss of 19 million packs at the average retail price net of taxes. Results suggest a decline of 407 jobs in NH.

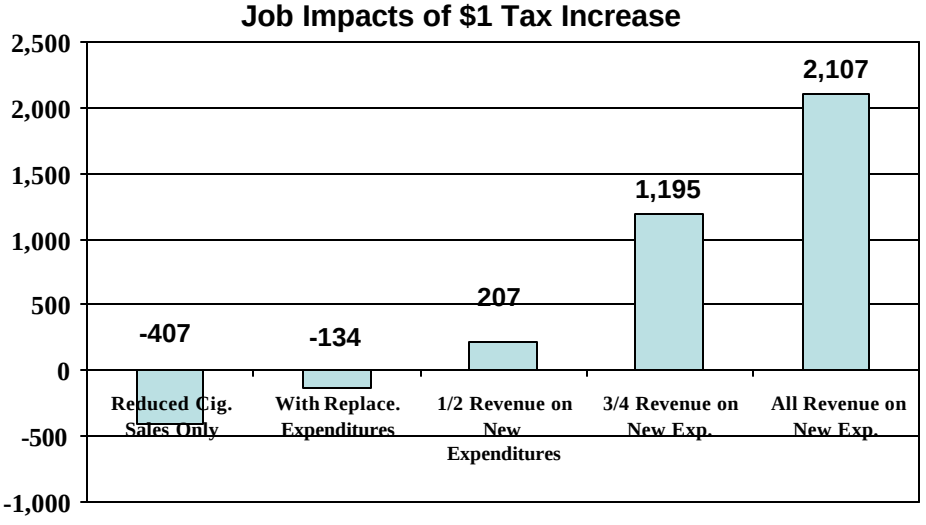
- We followed the same procedure in our second approach, but we increased disposable income of households in NH by over $20 million (and allocated among income groups according to their difference responses to price increases) to reflect the fact that smoking reductions and quits (among NH residents, no additions to income were made for out-of-state smoking reductions and quits. Smoking quits and reductions will leave some consumers with income which will be spent on alternative goods and services (so called "compensating expenditures"). This scenario resulted in a decline in of 147 jobs in NH

[4]. 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.

- Our third approach (Figure 16) considered all of the sales losses and compensating expenditures, as well as tax implications. Tax increases (reductions in household income available for purchasing goods and services) were allocated by income group according to tobacco purchases (from Consumer Expenditure Survey and NH Census Data on the number of households in each group). We then made different model runs based on how much of the increased revenue would be used by state government to fund additional services. 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) for a total gain of 207 jobs. If the state spends ¾ of the revenue on new services then employment will increase by 1,195 jobs. Finally, if all $134 million is spent (as opposed to simply reducing the need for other taxes), then job gains would be 2,107. 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 NH by $108 million to account for the impact of the $1 tax increase, as state government spends more than that amount, up to the total $134 million in new revenue, it is paying for the services with revenues that did not come at the expense of declines in NH household income (via taxes).

Figure 16

Employment Impacts Of A $1 Tobacco Tax Increase Will Be Positive But Their Magnitude Depends On What State Government Does With The Revenues



# VII. Conclusions

Rhetoric, anecdote and hyperbole have dominated the policy debates surrounding the economic impacts of increasing tobacco taxes in NH. This study adds empirical evidence to the debate employing analytical methods derived from the extensive national research on the economics of tobacco taxation.

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

Results from our analyses indicate that a $1 increase in NH's tobacco tax will result in a significant decline in cigarette sales in NH but that over $134 million in new revenue will be generated. The bulk of the additional taxes paid by NH residents will fall on households in the middle and upper income range. Finally, we conclude, as studies in other states have found, that declines in cigarette sales will actually produce a very small employment gain in NH. At the same time, the employment impacts vary by county, so that some regions (those with high retail employment concentrations) will experience very small declines in retail employment.

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