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Evaluating the Impact of Changing Mississippi's Tobacco Tax

By

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Introduction

Governor Haley Barbour of Mississippi is expected to ask for an increase in the state's tobacco (currently \$.18 per pack¹) during the opening session of the state Legislature in 2009. The proposal would tax name brand cigarettes at \$.24 per pack and off brand cigarettes at \$.43 per pack. At minimum, 41 states plus the District of Columbia (D.C) would still have tax rates higher than Mississippi's based on data for 2007. If the higher tax rates go into effect, the new tobacco taxes would comprise between 11.41 and 15.76 percent of the final cost of a typical pack of cigarettes in Mississippi. In 2007, the average cost of cigarettes was \$3.44 per pack² in the state.

During the past two years, Governor Haley Barbour has blocked efforts to raise the tobacco tax as a way of raising state revenues. His proposal calls for paying for part of the state's budget in 2009 with a two-tiered increase in the cigarette tax (Pettus, 2008). This proposal is lower than the \$1.00 per pack tax (an increase of 82 cents to put the tax at \$1 per pack) that many lawmakers and health advocates supported in 2006 and 2007.

Mississippi is one of the most heavily taxed states, but when it comes to tobacco, the state has one of the lowest tobacco taxes in the country. In 2007, Mississippi had the third lowest cigarette excise tax in the United States – 18 cents per pack - and has not increased since 1985 (Stennis Institute of Government, 2007). Only Missouri and Montana had lower tax rates (\$.17 per pack respectively) than Mississippi in 2007.

Although Mississippi's current tobacco tax is among the lowest in the nation, "Barbour says he's not trying to help build up the state coffers. He said his aim is to reduce consumption." Research shows that tobacco use has declined in states that have raised the price of cigarettes. Critics question whether Barbour's proposed increase is significant enough to make a big difference in how many people light up (Byrd, 2008). McMillen in a 2005 study of tobacco tax impacts concluded that a one dollar increase in the Mississippi's cigarette tax could reduce overall cigarette consumption by approximately 12 percent. This would reduce the number of adults who smoke by 31,000 and reduce the number of future adolescent smokers by 51,000 in the state. These estimates would support critic's argument that a \$.24 per pack increase is not large enough to significantly impact smoking in Mississippi. Further, there is consensus in the research literature that price (that is, higher prices caused by higher tobacco taxes) can provide a strong incentive to people to quit smoking.

Despite the size of the tax increase, a potential problem in empirically analyzing Barbour's proposals is that most available data do not specify sales as name brand or off brand cigarettes in many states. The Center for Disease Control (CDC, 2007), one of the best sources of tobacco-related information, does not breakout cigarette sales into name brand and off brand sales. Several studies referenced in this paper have used information on cigarette prices and sales reported by the CDC to perform their analysis of tobacco impact in host communities and states.

¹ Obtained from the Center for Disease Control's STATE Tobacco Activities Tracking and Evaluation (STATE) System, 2007

² Ibid

Given the problems with delineating cigarette sales into name brand and off brand sales in Mississippi, the paper follows previous studies and evaluates the impact of changes in tobacco policy on cigarette sales in general. Specifically, the paper evaluates the impact of a \$.24 per pack increase on total cigarettes sales in Mississippi. The policy has created considerable discussions about the need for raising the tax on tobacco products to reduce consumption and improve the health of Mississippi residents.

Cigarette Tax Revenues and Sales

Tobacco taxes have become a popular source of revenue for many states. However, since 1997, the total quantity (or # of packs sold) of cigarettes sold in Mississippi has declined (Appendix, Figure 1 and Table 1). This was caused by rising prices and increasing consumer awareness about the dangers of smoking. The average (nominal) retail price of a pack of cigarettes in Mississippi was \$1.76 in 1997 (Appendix, Table 2). The estimated (gross tax revenues from cigarettes divided by the tobacco tax) number of taxable packs sold was about 288.64 million in 2007. During this period, the average retail price per pack of cigarette rose from \$1.68 to \$3.44, while the number of taxable packs sold decreased to 258.33 million. This represented a 95.45 percent increase in the average retail price per pack of cigarette and a 10.59 percent decline in the number of taxable packs of cigarettes sold in 2007.

Currently, all states levy some type of tax on cigarettes, and most states are increasing their reliance on tobacco taxes as a source of revenue. Since 1970, every state including the District of Columbia has increased their cigarette tax rates. Four states increased their tobacco taxes more than 10 times between 1970 and 2007. Those states were: Hawaii (23³), Rhode Island (11), New Jersey (10), and Maine (10). Given the current state of the national economy, this trend of rising cigarette taxes will likely continue in the immediate future.

Seven states have raised their rates less than three times since 1970. These were major producers of tobacco in the United States and included: Georgia, Kentucky, South Carolina, Tennessee, Virginia, and West Virginia. North Carolina.

Objectives

The primary objective of this paper is to evaluate the fiscal and economic impacts of raising the cigarette tax by \$.24 per pack in Mississippi. Specific objectives include:

- 1) Determining the impact of raising the cigarette tax by \$.24 per pack on state revenues in Mississippi,
- 2) Determining the impact of raising the tobacco tax by \$.24 on cigarette sales in Mississippi,

³ Figures in parentheses indicate the number of times the tax was increased between 1970 and 2007.

- 3) Determining the impact of raising the cigarette tax by \$.24 on retail employment in Mississippi,
- 4) Determining the border/spatial effects of these policies on neighboring states in the region, and
- 5) Determining the Internet effects of these policies on Mississippi tobacco revenues

Methodology

A regression model was used to estimate the effects of the tobacco tax on cigarette sales in Mississippi. Regression analysis was performed on 37 years of data that included cigarette sales, retail employment personal income, cigarette taxes, and cigarette prices. These data were used to develop a demand model for cigarettes in Mississippi that accurately explains how the demand for cigarettes might respond to price changes.

Results from the demand model were used to forecast cigarette sales both with and without a \$.24 tax increase. The difference, between sales with and without the tax increase, provided an estimate of the increased revenue from raising the tax.

Data

Data used in the study consisted of secondary-time series data taken from multiple sources for the period 1970 -2007. Total retail employment and unemployment rates were obtained from the Mississippi Employment Security Commission Covered Wages and Employment Report for selected years. Information on mean household income and population were obtained from Woods and Poole Population Profiles for Mississippi, with projections to 2030.

Data for interstate and time series (years 1970 to 2007) comparisons of selected tobacco statistics came from the *Center for Disease Control's STATE Tobacco Activities Tracking and Evaluation (STATE) System* in 2007. The study was statewide since data on these statistics are readily available and more complete at this level.

Model

The general form of the demand model is presented in the equation below. Using ln to note the natural logarithm⁴, the general model estimated is

$\ln Q = \beta_0 + \beta_1 \ln MsCig + \beta_2 \ln MsPop + \beta_3 \ln RetE + \beta_4 \ln T + \mu$

Where:

Q	= Cigarette sales (number of packs) in Mississippi
RetE	= Total retail employment
MsCig	= Mississippi cigarette price
MsPop	= Mississippi total population
Т	= Trend variable (Time)
U	= error term

Results

The demand model with three variables and a time trend to capture the impacts of prior year sales produced the highest degree of accuracy in predicting future cigarette sales in Mississippi. Combined, these four variables explain almost 91 percent of the variation in cigarette sales in Mississippi (Table 1) during the study period.

Table 1 provides some details on the relationship between each of the independent or "predictor" variables and cigarette sales in Mississippi. The "coefficients" are the "elasticities," and measure the degree to which cigarette sales in Mississippi would change in response to changes in the independent variables. Results of this model suggest that prior year cigarette sales have a positive impact on current sales and that as the price per pack in Mississippi increases (6.98%) relative to the price per pack in Alabama, Arkansas, Louisiana, and Tennessee cigarette sales in Mississippi would decline.

Table 1. Cigarette Demanu Wouel Results				
Descriptor	Coefficients	Standard Error	T-Values	P- Values
Constant	-15.32	3.023	-5.066	0
RetE	-0.2804	0.1126	-2.491	0.020
MsPop	2.659	0.2518	10.56	0.000
MsCig	-0.3582	4.23	-8.48	0.000
Trend	132,190	356800	3.705	0.001
	$R^2 = .913$			

Table 1. Cigarette Demand Model Results

Using the demand model and altering the average retail price in Mississippi by adding \$.24 to the tobacco excise tax, produced several key findings:

- While cigarette sales would decline by almost 6.5 million packs, gross tobacco revenues would equal \$110.81 million as the increase in state revenue per pack exceeds the percentage decline in sales.
- With revenue adjustments (\$1.59 million) for things such as increased tax avoidance (by internet sales, cross-border shopping, etc.); the study estimated net cigarette revenues of \$109.51 million for the state.
- The elasticity estimates suggests that cigarette sales in Mississippi would decline by 1.8 percent for every 5 percent change in the price of cigarettes in Mississippi, assuming prices remain constant in Alabama, Arkansas, Louisiana, and Tennessee.

⁴ The model is a double-log liner form, which allowed the author s to estimate the elasticity of one variable with respect to another variable

A \$.24 per-pack tobacco tax increase would move Mississippi's cigarette prices from 92.16 percent to 98.59 percent of the 4-state average price per pack in Alabama, Arkansas, Louisiana, and Tennessee. This change would represent a 6.98 percent average decrease in the price differentials between Mississippi and the other four states. On a state basis, a \$.24 per-pack tax increase would narrow the price differentials between Mississippi, Alabama, Arkansas, and Louisiana by 8%, 14%, and 6%, respectively. The tax increase would widen the cigarette price differential between Mississippi and Tennessee by 7 percent.

Border Effects

The differential between cigarette prices in Mississippi and those in Alabama, Arkansas, Louisiana, and Tennessee may influence some border sales. Given the price differentials between Mississippi and these states, it is possible that individual smoking consumers would be willing to travel long distances to buy cigarettes outside of Mississippi. Given the small price differentials between Mississippi and Tennessee and the cost of gasoline, it is unlikely that Mississippi smokers would be willing to travel long distances to purchase cigarettes (since most cigarettes sold in the U.S. are sold by the pack) in Tennessee. It is more likely that most of the cross border shopping will occur when smokers are already in these neighboring states for various reasons (Stennis Institute, 2007).

Prior research⁵ on border effects in California found that in a short time after the state's 50-cent cigarette-tax increase went into effect in 1999 no more than five percent of continuing smokers were purchasing cigarettes in nearby states, from Indian reservations, military bases, or by the Internet, to avoid the state's cigarette tax increase (Ibid, 139). Other research⁶ on tax avoidance found that a relatively small percentage of tax revenues are lost because of individual cross border cigarette purchases to avoid taxes. For example Yurelki and Zhang (2000) found that approximately 1.5 percent of state cigarette tax revenues are lost due to individual cross border cigarette purchases. Stehr (2004) found border crossing effects to be small, accounting for 2 percent of total sales in 1985 and only 7 percent of total sales in 2001(Stennis Institute, 2007).

Based on these findings, this study assumed the volume of cross-border sales would be small (1.2%) in comparison to total sales in Mississippi. Further, we believed that these purchases (\$795,824) would not exert a significant impact on the total volume of cigarette sales in Mississippi in future years.

⁵ 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

Internet Effects

Apart from the border effects associated with the tax increase on cigarettes in Mississippi is increased tax avoidance by Internet sales and other means. A 2003 New Hampshire study estimated that about 2 percent of cigarette sales would occur via the Internet. This figure would rise to about 5 percent (in response to a \$1.00 per pack cigarette tax increase in the state) by 2005 (Gottlob, 2003). This study estimated internet purchases (\$795,824) as 1.2⁷ percent of cigarette sales in 2007 times \$.24.

<u>Results</u>

Using the most recent data (2007) as the base, our model predicted a \$110.81 million gross revenue gain from a \$.24 increase in the tobacco tax. With adjustments⁸ for things such as cross-border shopping and increased tax avoidance (via internet sales etc.), the study estimated the net revenue yield at \$109.21 million.

Elasticities

Estimating the regression coefficients in logarithms provided direct estimates of the prices elasticites for Mississippi. Elasticities measure the degree to which cigarette sales might change in response to changes in the cigarette price (caused by changes in the tobacco taxes) in Mississippi, holding constant other independent variables in the model.

Cigarettes are considered an inelastic good (the absolute value of the price elasticity of demand is less than one.) Thus, consumers highly value this product. If the product is price inelastic, the decrease in sales of the product will be more than compensated for by the increase in price. The result is that revenue will rise (Stennis Institute, 2007).

Elasticity estimates nationally vary widely, according to some estimates ranging from -0.3 to -0.5 (McMillen and Valentine (2006) to -0.348 to -0.615. These are consistent with other studies using aggregate annual time-series and some state specific variables such as those found in Farrelly, Pachacek, Chaloupka's (2003) estimate of -0.32 (Ibid., 82-83).

The price elasticity of demand, specific to Mississippi (-.03582), was estimated for cigarette consumption, based on data (for 1970 through 2007) from the Center for Disease Control's *STATE Tobacco Activities Tracking and Evaluation (STATE) System*. Changes in the elasticities with and without the \$.24 cigarette tax increase were small when the tax was imposed in the model.

⁶ Merriman, David; Cigarette Smuggling does not Reduce the Public Health Benefits of Cigarette Taxes," Applied Economic Letters, 2002, 9, 493 – 496.

⁷ Internet purchases reflect loss cigarette sales in Mississippi.

⁸ The study used a cross-border and internet sales factor of 1.2 percent. That is, about 1.2 percent of cigarette purchases made by Mississippians would occur in surrounding states and over the internet.

The overall income elasticity for retail employment was estimated to be .1580(Table 2). This meant that a 10 percent increase in mean household income would cause total retail employment to rise by 1.58 percent.

Employment Impacts

Concerns about the economic impacts of declines in cigarette sales and revenues are what promoted this study. The results in this study are consistent with studies on the employment impacts of declines in cigarette sales in non-tobacco producing states. Studies conducted independent of the tobacco industry found that declines in tobacco sales would be offset by compensating expenditures which have a greater impact on local economies (Warner and Fulton 1994, Warner et.al 1996). As noted by Chaloupka and Warner and 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 (Gottlob, 2003).

The retail employment regression model is presented below. Using ln to note the natural logarithm, the general model estimated is

InRetE= $\beta_0 + \beta_1 \ln Qt + \beta_2 \ln MsHdllnc + \beta_3 \ln MsPop + \beta_4 \ln T + \mu$

Where:

RetE	= Total retail employment in Mississippi
Qt	= Cigarette sales (number of packs) in Mississippi
MsHdlInc	= Mississippi mean household income
MsPop	= Mississippi total population
Т	= Trend variable (Time)
U	= error term

Using this model, we predicted specific impacts that changes in cigarette sales (caused by the cigarette tax increase) would have on employment in Mississippi. The model included other explanatory variables such as household income, cigarette sales, population, and a trend variable to capture the effects of past cigarette sales on retail employment in the state.

Results from the employment model (Table 2) show a small (negative) but significant relationship between cigarette sales and retail employment in Mississippi.

Descriptor	Coefficients	Standard Error	T-Values	P- Values
Constant	-23.58	7.83	-3.01	0.0060
Qt	-0.5476	0.134	-4.079	0.0000
MsHdlInc	0.1579	7.158	2.207	0.0370
MsPop	3.014	0.6867	4.39	0.0000
Trend	128,610	482,000	2.688	0.0130
	R^2 = .985			

 Table 2. Cigarette Employment Model Results

The model shows that a 2.5 percent decline in cigarette sales in Mississippi would result in .0075076 percent decrease in retail employment in the state. If the 2.5 percent decline in cigarette sales forecast were to occur because of the \$.24 tax increase, results imply a loss of about 1,064 retail jobs in the state. This differs with some studies that show a small positive impact on employment⁹, in non-tobacco producing states, in response to declines in cigarette sales. However, this finding is consistent with a state like Mississippi that relies heavily on a statewide sales tax as one of its major sources of revenue. Any marginal increase in taxes will have a negative impact on consumers in the state.

Summary and Conclusion

A multiple regression was performed on 37 years of data to determine the impact of raising the tobacco tax on cigarettes by \$.24 per pack on cigarette sales in Mississippi. The t-statistic for the slope was significant at the .05 critical alpha level, t(29) = 1.69 and p=.05. Thus, we conclude that there is a positive significant relationship between taxes and sales volume. Further, about 91 of the variability in sales volume could be explained by the demand model.

The evidence from this analysis supports the conclusion that raising the cigarette tax would not have a dramatic impact on cigarette sales and cigarette revenues in Mississippi. Results from this model further suggest that prior year cigarette sales have a positive impact on current sales in Mississippi. Therefore, as the price per pack in Mississippi increases relative to the price per pack in Alabama, Arkansas, Louisiana, and Tennessee, cigarette sales in Mississippi would decline.

At an aggregated level, the estimated reductions in packs sold, resulting from a \$.24 increase in state excise taxes, are estimated to be 6.6 million packs, producing aggregate state tax revenues of \$109.21 million. Including the increase in sales tax and the additional 7 percent of the increased excise tax revenues, would produce another \$7.562 million in state revenues. This would bring the total fiscal impact to \$116.77 million in revenue using consumptions estimates for 2007.

⁹ This is because money not spent on cigarettes (because some residents who quit smoking) is spent on other goods and services that have a great multiplier impact on the local economy (Ibid, 25-26).

Potential Use of Research

The information in this study can be used to estimate changes in cigarette consumption caused by border effects from neighboring states and the Internet, state retail employment, and changes in tax revenues that would likely occur with the tax change.

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Appendix, Figure 1. Total Number of Tobacco Tax Increases: 1970 – 2007

Year	State Tax	Price Per- Pack	Packs Per- Capita	Quantity Sold	Gross Revenue
1970	0.09	0.38	93.4	207,904,104	19,844,033
1971	0.09	0.37	105.4	238,739,537	21,021,142
1972	0.09	0.37	112.1	258,527,598	22,467,168
1973	0.09	0.41	115	270,062,550	23,431,124
1974	0.11	0.43	117.1	278,321,758	29,390,709
1975	0.11	0.46	116.8	280,039,797	29,870,336
1976	0.11	0.49	120.9	293,497,565	31,194,721
1977	0.11	0.54	122.1	299,957,331	31,606,577
1978	0.11	0.57	124.9	310,304,558	32,819,570
1979	0.11	0.6	123.9	310,227,511	32,770,862
1980	0.11	0.63	127	320,551,302	33,608,855
1981	0.11	0.69	125.3	318,138,955	34,741,994
1982	0.11	0.79	125.8	321,646,698	35,020,184
1983	0.11	0.89	122.3	314,033,624	34,308,215
1984	0.11	0.98	116.4	300,082,110	33,262,141
1985	0.18	1.06	115.3	298,410,236	35,093,776
1986	0.18	1.16	113.2	293,596,652	54,070,578
1987	0.18	1.23	110	284,742,370	52,452,861
1988	0.18	1.26	109	281,261,747	52,497,860
1989	0.18	1.4	108.3	278,797,881	51,984,251
1990	0.18	1.43	101.8	262,531,715	48,814,561
1991	0.18	1.61	105.6	274,426,205	48,919,737
1992	0.18	1.78	103.9	272,605,963	48,170,870
1993	0.18	1.57	105.4	279,847,540	48,875,348
1994	0.18	1.54	106	285,033,152	49,446,765
1995	0.18	1.61	107.5	292,685,843	51,134,101
1996	0.18	1.69	106.9	293,770,287	51,646,631
1997	0.18	1.76	106.3	295,195,525	51,954,563
1998	0.18	2.00	107	300,117,238	52,319,643
1999	0.18	2.72	103.9	293,871,591	51,089,722
2000	0.18	2.8	97.2	276,868,368	49,247,468
2001	0.18	3.09	93.9	268,339,532	48,067,271
2002	0.18	3.19	91.5	262,306,070	47,071,164
2003	0.18	3.22	91.2	262,773,010	46,899,340
2004	0.18	3.2	88.4	256,578,171	45,850,002
2005	0.18	3.18	88.8	259,794,168	46,344,020
2006	0.18	3.22	92.2	271,750,557	48,477,899
2007	0.18	3.44	88.8	263.827.642	46,499,885

Appendix, Table 1. Selected Tobacco Statistics for Mississippi, 1970 – 2007

State	Frequency of Tax Increase	State	Frequency of Tax Increase
Alabama	3	Montana	6
Alaska	5	Nebraska	6
Arizona	6	Nevada	4
Arkansas	6	New Hampshire	9
California	3	New Jersey	10
Colorado	5	New Mexico	3
Connecticut	8	New York	7
Delaware	3	North Carolina	3
District of			
Columbia	7	North Dakota	5
Florida	4	Ohio	5
Georgia	2	Oklahoma	3
Hawaii	23	Oregon	7
Idaho	4	Pennsylvania	3
Illinois	5	Rhode Island	11
Indiana	3	South Carolina	1
Iowa	6	South Dakota	6
Kansas	4	Tennessee	1
Kentucky	1	Texas	6
Louisiana	5	Utah	6
Maine	10	Vermont	7
Maryland	6	Virginia	1
Massachusetts	6	Washington	10
Michigan	5	West Virginia	3
Minnesota	6	Wisconsin	7
Mississippi	2	Wyoming	3
Missouri	2		

Appendix, Table 2. Frequency of Tobacco Tax Increase in the United States, 1970 – 2007