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Cigarette Taxes and Consumption: An Economic and Policy Analysis

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The impact of excise taxes on cigarette consumption

An estimated 45.3 million, or 19.3% of American adults smoke cigarettes according to the Center for Disease Control and Prevention. The deleterious health effects of smoking have been extensively researched and documented by scientists and doctors worldwide. Due to the passage of the Federal Cigarette Labeling and Advertising Act of 1965 and the Public Health Cigarette Smoking Act of 1969, the U.S. Surgeon General's health warning is stamped on every pack of cigarettes (Centers for Disease Control and Prevention). Yet, despite the flood of information on the dangers of smoking cigarettes, approximately 3,800 youths under the age of 18 start smoking every day. This is more than enough to replace the approximately 1,200 people that die in the United States each day due to smoking related causes (US Department of Health and Human Services). The rates in decline for first times smokers have become stagnant. Public Health experts, physicians, and legislators routinely propose various methods of decreasing cigarette consumption. Cigarette smoking is a grave public health concern from a health and economic perspective, and although numerous public policy initiatives have been directed at reducing cigarette consumption, one of the most widely used methods has been the taxation of cigarette smoking at both the federal and the state levels.

Methodology:

This paper seeks to examine the effectiveness of state excise taxes on packs of cigarettes as a way to inhibit their consumption. Through literature review, demand elasticity analysis, and by use of multivariable regression, the efficiency and

effectiveness of higher excise taxes as a public health measure are analyzed. The paper is organized as follows: the next section briefly traces the history in the U.S. of cigarette consumption, associated health issues and its taxation. The third and fourth sections of the paper discuss the previous research on the efficiency and incidence effects of cigarette taxation, and the data used in the empirical analysis. The final sections of the paper discuss the empirical model of the determinants of cigarette smoking, the results of the estimation, and conclude with a public policy recommendation on tax rates and public health expenditures based on regression results. Consumption rates and excise tax rates will be analyzed on a state- by-state basis.

History:

Tobacco use in the United States is older than the country itself. Primarily used by Native Americans for medicinal and ceremonial purposes, most Europeans did not begin using tobacco products until the mid 1500s. It was not until 1612, that the first successful commercial crop was grown in the Virginia colony (CNN). By the mid 18th century, Virginia was producing thousands of tons of tobacco per year. In England, tobacco imports increased from 38 million pounds to 100 million pounds per year between 1700 and 1770 (Mukherjee 240).

The apocryphal origin of the cigarette was in 1855 during the Crimean War, when a soldier in Turkey used a piece of newspaper to smoke tobacco after exhausting his supply of pipes. Although using paper to pack tobacco was not a novel idea, Siddhartha Mukherjee notes, “The context was pivotal: the war had squeezed soldiers from three continents into a narrow, blasted peninsula, and habits and mannerisms were destined to

spread quickly through its trenches like viruses (240).” The use of paper to smoke tobacco spread through Europe, and finally to the United States. After the Civil War, the use of cigarettes gained in popularity due to decreased production costs. In 1876, Allen and Ginter, a tobacco company in Virginia offered a prize to an innovator who could make a machine that would increase the production of cigarettes. Prior to 1876, cigarettes were hand-rolled and consequently expensive due to high labor costs. James Albert Bonsack developed a machine that created 70,000 cigarettes in 10 hours. Allen and Ginter rejected his design, weary that market demand was not great enough, and there would be a surplus of cigarettes. However, James “Buck” Duke eventually bought the machine, and later became the president of the American Tobacco Company in 1889 (Witschi 5). Tobacco consumption skyrocketed. In 1870, the per capita consumption was less than one cigarette per year; by 1953 the average American consumed 3,500 cigarettes per year (Mukherjee 241).

Little was known about the health effects of tobacco use until the early 1900s. The primary problem, notes Siddhartha Mukherjee in his book *The Emperor of all Maladies* is that as cigarette usage became nearly ubiquitous in the United States, it became difficult to discern the association between cancer and tobacco use. As a risk factor becomes so prevalent in the population, it no longer presents itself as a risk factor (Mukherjee 241). Published in 1930, *The Springer Handbook of Special Pathology* noted the increase in malignant lung cancer, predominately in men. Experts proposed multiple explanations for the rise in incidence such as the asphalting of roads, gas exposure from World War I, urban living, and the Spanish Influenza pandemic of 1918. But, no explanation could be made as to why lung cancer rates increased the same amount in

countries that had not been exposed to these factors. Smoking was suggested as a potential factor, with the caveat that many studies prior could find no plausible link (Witschi 4).

The first comprehensive study that strongly indicated a link between smoking and lung cancer was performed in the United Kingdom in 1951. Austin Bradford Hill, a biostatistician and Richard Doll, a medical researcher utilized the physician records from the National Health Service database. From October 1951-March 1954, 789 deaths occurred in the cohort, of those 789 deaths, 36 of the deaths were attributable to lung cancer, and all 36 people who had died were smokers (Mukherjee 249). The link between lung cancer and smoking was no longer deniable, although this did not deter many from smoking. In 1963, at the peak of consumption, the average American smoked 4,345 cigarettes per year, approximately 12 cigarettes per day (Tauras 361).

Today, lung cancer is the leading cause of cancer death in the United States, and smoking causes approximately 90% of lung cancer deaths in men, and 80% of lung cancer deaths in women (National Cancer Institute). There are many proposals on how to decrease the prevalence of cigarette consumption in the United States; among them is a tax on cigarettes as a financial disincentive.

Taxation on cigarettes did not begin as a corrective tax, but rather as a federal measure to increase revenue for the Civil War in 1864 (The Tax Foundation). The current federal excise tax is $1.01 per pack of cigarettes. The average pack of cigarettes in the United States contains 20 individual cigarettes and costs $5.98 including the federal sales tax. The highest combined state and local tax rate for a pack of cigarettes is in New York City, with a combined total of $5.85 per pack. New York State also has the highest excise

tax rate at $4.35 per pack. The lowest excise tax rate is in Missouri, at $0.17 tax per pack. The Centers for Disease Control & Prevention estimate that smoking- caused health morbidity is $10.47 per pack sold and consumed in the United States (Boonn). This means that the cost of disease and disability due to smoking is equal to $10.47 per pack.

The following chart, from the Campaign for Tobacco Free Kids (Figure 1.1) shows respective excise tax rates per state as of 2012, and ranks them highest to lowest; it does not include local tax rates, which some municipalities (eg. New York City, Chicago) also impose.

(Figure 1.1)

Overall All States' Average: $1.49 per pack
Major Tobacco States' Average: 48.5 cents per pack
Other States' Average: $1.63 per pack

State	Tax	Rank
Alabama	$0.425	47th
Alaska	$2.00	11th
Arizona	$2.00	11th
Arkansas	$1.15	30th
California	**$0.87**	33rd
Colorado	$0.84	34th
Connecticut	$3.40	3rd
Delaware	$1.60	21st
DC*	$2.86	6th
Florida	$1.339	27th
Georgia	$0.37	48th
Hawaii	$3.20	4th
Idaho	$0.57	42nd
Illinois	$1.98	16th
Indiana	$0.995	32nd
Iowa	$1.36	26th
Kansas	$0.79	36th
Kentucky	$0.60	40th

* Tax stamp includes 36¢ cigarette surtax, which replaces the sales tax (surtax rate is adjusted each October)

State	Tax	Rank
Louisiana	$0.36	49th
Maine	$2.00	11th
Maryland	$2.00	11th
Massachusetts	$2.51	10th
Michigan	$2.00	11th
Minnesota**	$1.60	21st
Mississippi	$0.68	37th
Missouri	**$0.17**	51st
Montana	$1.70	17th
Nebraska	$0.64	38th
Nevada	$0.80	35th
New Hampshire	$1.68	19th
New Jersey	$2.70	7th
New Mexico	$1.66	20th
New York	$4.35	1st
North Carolina	$0.45	45th
North Dakota	**$0.44**	46th
Ohio	$1.25	28th

** Tax stamp includes 75¢ health impact fee & 37¢ cigarette sales tax (Commissioner of Revenue sets sales tax rate each January)

State	Tax	Rank
Oklahoma	$1.03	31st
Oregon	$1.18	29th
Pennsylvania	$1.60	21st
Rhode Island	$3.50	2nd
South Carolina	$0.57	42nd
South Dakota	$1.53	24th
Tennessee	$0.62	39th
Texas	$1.41	25th
Utah	$1.70	17th
Vermont	$2.62	8th
Virginia	$0.30	50th
Washington	$3.025	5th
West Virginia	$0.55	44th
Wisconsin	$2.52	9th
Wyoming	$0.60	40th
Puerto Rico	$2.23	NA
Guam	$3.00	NA
Northern Marianas	$1.75	NA

Elasticity Analysis:

Whether or not the taxation of cigarettes is ultimately successful at reducing consumption is a function of the elasticity of demand for cigarettes. Moreover, elasticity is also used to assess economic incidence, the measure of who bears the burden of a tax. Elasticity provides the measure of the ability to escape a particular tax. The elasticity of demand measures the sensitivity of demand of a product to a change in the price level. It is measured as:

$$E_d = \frac{\%\Delta Q_d}{\%\Delta P} \qquad \begin{array}{l} E_d > 1\text{: elastic} \\ E_{d<1}\text{: inelastic} \end{array}$$

The more elastic the demand, the easier it is for consumers to escape the burden of the tax, because as the prices increase, consumers will turn to other product substitutes, thus the burden of the tax is borne by suppliers. Conversely, greater inelasticity of demand places the burden on the consumers because they cannot easily substitute for other products (Rosen 282-283). Previous studies have placed the elasticity of demand for cigarettes between –0.14 to –1.23; with the majority of the studies estimating that elasticity was between –0.20 to –0.50 (Tauras 361). There are variations in elasticity, including sex, age, income, etc. The highly addictive nature of cigarettes leads to low price elasticity, and nearly the entire burden of a tax is borne by smokers (Tauras 361).

Changes in cigarette consumption are difficult to measure from a national standpoint, because some cigarette taxes are under the jurisdiction of states. Additionally, states increased their taxes at different times. For example, the most recent increase in New York occurred in 2010, while the most recent tax change in Louisiana occurred in 2002. The amount of a tax also impacts consumption, for example, a tax increase of $1 per pack may have more of a burden than a tax increase of $.05. This analysis measures

the change in percent of adults who reported smoking in the year pre-tax and post-tax increase. Data is extracted from the State Tobacco Activities Tracking and Evaluation (STATE) System, run by the Centers for Disease Control and Prevention utilizing data from the Behavioral Risk Factor Surveillance System (BRFSS). The measurement of quantity demanded is the percent of adults aged 18-64 who reported smoking. The percent change indicated in the demand elasticity equation could be related to a variety of factors in addition to the change in tax rate, such as social, political or economic pressures. For the purpose of this paper, the model will analyze demand elasticity in three states during a period of changing tax rates: New York, Ohio, and Louisiana. These three states represent the highest, median, and one of the lowest excise tax rates. The years measured will be 2009-2010 in New York, 2004-2005 in Ohio, and 2001-2002 in Louisiana. The elasticity will predictably be similar for each of the states as it is a measure subject to change in price within the state, not relative to other areas. These calculations will be extrapolated to estimate a general measure of elasticity that will be used throughout this paper. The data was derived from tax changes, and the rate was measured the year before the change and year after the increase in price.

Calculations:

New York (2010) tax increase $1.60:

$$E_d = \frac{(15.5-18.0/15.5)}{(\$4.35-\$2.75/\$2.75)} \qquad E_d = -.28$$

Ohio (2005) tax increase $.70:

$$E_d = \frac{(22.3-25.9/22.3)}{(\$1.25-\$.55/\$.55)} \qquad E_d = -.13$$

Louisiana (2002) tax increase $.12:

$$E_d = \frac{(23.9-24.6/23.9)}{(\$.36-\$.24/\$.24)} \qquad E_d = -.06$$

The above calculations demonstrate the price insensitivity of cigarettes. These measures are consistent with prior research that placed the elasticity of demand for cigarettes between -.14 and -1.23, with the majority falling between -.20 and -.50 (Tauras 361). This makes cigarettes ideal for both a corrective tax as well as an important source of revenue. As predicted, consumption decreased slightly, but not significantly.

Review of Literature:

Given the inelastic nature of cigarettes, they have been subject to the "sin tax," which is a corrective tax on goods that are considered undesirable or harmful. Since cigarettes have historically been taxed, there is a great deal of literature on how taxation impacts cigarette consumption. However, much of the literature does not use recent data and focuses on the economic impact of the tax, not on the behavioral impact of the tax. Economic impact refers to how the tax impacts federal and state budgets, on the receiving end of the tax, as opposed to the payment end of the tax impacting behavior of smokers. For example, the Congressional Budget Office estimates that a cigarette tax will improve the federal budget by increasing revenue and decreasing medical costs due to smoking related causes. The CBO used a flat tax of .50 cents in its analysis (Congressional Budget Office).

Due to the addictive properties of cigarettes, the demand for them is not sensitive to price, and although there is some reduction in consumption because of increased taxes, smokers often find other ways to avoid the tax. A great deal of the literature focuses on the behavioral changes in smokers caused by taxation. One study by Jérôme Adda and Francesca Cornaglia examines the true homogeneity of cigarettes as a uniform product, and also questions the rational addiction model. This Rational Addiction model was proposed by Gary Becker and Kevin Murphy in 1988, it states that an addict knows the manner in which the good affects him or her, and consumes more because that maximizes the addict's discounted utility. Becker and Murphy claim that, "addictions, even strong ones, are rational in the sense of involving forward-thinking maximization with stable-preferences (1)." Basically, a person who smokes a cigarette, under this model, understands that it will lead him or her to smoke again tomorrow, and the following day, etc. and does so because present gains are greater than future costs. A rational addict compares the benefit of smoking to the total discounted costs, including monetary and health costs in the future. Therefore, in this model, if taxes go up, an addict will smoke less because future costs increase relative to present benefits. The rational addiction model has been a major focus of economic literature, but Adda and Cornaglia's evidence shows that people do not act "rationally."

Cigarettes are not a consistent product. Brands differ in content, the amount of additives, and size, and this is often reflected in price differences. Smokers can also moderate the amount of consumption per cigarette. By altering the number of puffs, length of puffs, or reducing ventilation. This compensatory behavior is not caught in a statistical analysis, but could reduce the efficacy of the tax, if the tax is for public health

purposes. The conclusion of the study is "that a one percent increase in taxes increases the smoking intensity by about 0.4%." This behavior is more prevalent among low-income individuals. Adda and Cornaglia note "Individuals with higher education extract less nicotine from a given cigarette. An additional year of education leads to a two percent decrease in smoking intensity." Therefore, taxes may not reduce the number of smokers, but rather shift consumption patterns to more "intense" smoking and to cheaper cigarettes. (Adda, Cornaglia 1013-1028).

Consumption patterns changed in response to tax increases. One study highlights COMMIT (Community Intervention Trial for Smoking Cessation), a survey by the National Cancer Institute. The cohort was originally interviewed in 1993, and again in 2001. The study indicated that rather than reducing smoking, a majority of smokers simply bought less expensive cigarettes as taxes increased. Methods of obtaining cheaper cigarettes include traveling to adjacent states, buying generic cigarettes instead of premium cigarettes, and traveling to Native American reservations. For example, "a survey of western New York adult smokers in 2002-2003 found that 67% of smokers reported that they usually purchase their cigarettes from an Indian reservation, where the average cigarette price was 40% that of an off- reservation convenience store." (Hyland, Bauer, Li, Abrams, Higbee, Peppone, Cummings 91).

Critics of taxes often cite the inherently regressive nature of consumption taxes as an argument against raising tax rates. Moreover, theoretically, a cigarette tax violates both horizontal and vertical equity. Lower-income individuals must pay a greater proportion of their income on cigarettes, violating vertical equity. Second, individuals of the same income strata are taxed differently if one person smokes, and the other does not,

a violation of horizontal equity (Wilson and Thomson). Critics also argue that the tax would be justifiable if money went back into tobacco cessation or prevention programs, but tax revenue most often goes into a general government fund (Wilson and Thomson). Proponents of the tax who argue that the cigarette tax is progressive say that low-income individuals are more sensitive to price changes, and therefore more likely to quit smoking. However, low-income individuals will compensate by buying less expensive cigarettes, or altering consumption behavior-such as smoking past the filter, and increasing the length of "puffs" (Adda and Cornaglia). In 2008, one study estimated that smokers in the lowest 33% of the population spent 7.7% of their income on cigarettes, while the middle income spent 3.1%, and highest income spent 1.4% (Farrelly, Nonnemaker and Watson).

Model and Data:

In this regression, the dependent (Y) variable is the number of adults in each state who are current smokers. This is a useful measurement because it accounts for the number of people within the state who are considered smokers. The data in this regression is taken from the BRFSS Survey in 2011. The model will seek to analyze the impact of independent variables on the dependent variable. The first independent variable is state excise tax rates, since the main focus of this paper is to examine the relationship between taxes and consumption. The second variable is public health expenditures, using this data is important because policy solutions to counter taxation are often based in increased spending. Tracking public health spending per capita by state will be not only indicative of health promotion and disease prevention in that state, but it also shows how

effective the funding is relative to the rate. Also, the greater amount of revenue spent on public health relative to tax rates, the stronger the argument for the progressivity of cigarette taxes (Wilson and Thomson). The other variable is the percentage of adults below the poverty level. The cigarette tax is commonly cited inherently regressive because low-income people smoke more, logically, states with higher levels of poverty will have higher smoking rates.

A study by the Mackinac Center, a policy think tank in Michigan found that 60.9% of cigarettes consumed in New York State had been smuggled into the state. Using the percentage of cigarettes smuggled into and out of states is an important variable to show the unintended consequences of a tax, and it is an individual behavioral change that has economic implications, such as a loss of tax revenues to other states (LaFaive and Nesbit).

The last variable is alcohol consumption. The data is taken from the Centers for Disease Control and Prevention through the BRFSS Survey. This paper predicts that cigarettes and alcohol are complements rather than substitutes, meaning as the demand for alcohol increases, the demand for cigarettes will also increase.

The variables chosen were done so to reduce multicollinearity. For example, an interesting variable would be Medicaid spending per state, however that would likely be confounded with the poverty variable skewing the results of the study.

Et ceteris peribus, there will be a negative correlation between cigarette consumption and the percentage of public health expenditures; as expenditures increase it should decrease consumption. Public Health expenditures are not, however, a measure of efficacy and so there is not a metric to demonstrate how effective public health

interventions are in decreasing cigarette consumption. There will also be an inverse relationship between tax rates and smoking rates, as taxes increase, smoking should decrease slightly.

Et ceteris peribus there will be a positive relationship between poverty and smoking rates. There will also be a correlation between percentage of cigarettes that have been smuggled and taxes. Predictably, taxes will distort behavior and cause residents in states with high taxes to seek cheaper alternatives. According to the LaFaive and Nesbit, 60% of cigarettes consumed in New York State, where taxes are the highest in the nation are smuggled into the state. New Hampshire had the highest percent of cigarettes smuggled out of state. The geographic proximity to states with lower tax rates relative to higher tax rates will drive people to seek cigarettes elsewhere. The data table on the appendix shows the positive percentages, which represent an inflow of cigarettes. The negative numbers represent and outflow of cigarettes.

The following regression (page 15) will analyze the relationship between these variables. From the regression results, an efficacy analysis and public policy recommendation will be made regarding expenditures on public health and taxes on cigarettes. The recommendation will use literature reviewed above as well the regression results in this paper.

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.6647452					
R Square	0.4418862					
Adjusted R Square	0.3798736					
Standard Error	2.7089644					
Observations	51					
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	5	261.4609697	52.29219	7.12574	5.54005E-05	
Residual	45	330.2319714	7.338488			
Total	50	591.6929412				
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	18.283716	4.041884761	4.523562	4.4E-05	10.14294213	26.42449
Excise Tax	-1.124608	0.46025216	-2.44346	0.01853	-2.05160318	-0.1976123
PH Spending	-2.45E-09	1.04575E-09	-2.33945	0.02381	-4.5527E-09	-3.402E-10
Smuggling as % of Consumption	0.0537591	0.130286409	0.412622	0.68184	-0.2086512	0.3161694
Poverty Rate	0.3488356	0.140336576	2.485707	0.01671	0.066183208	0.631488
Alcohol Consumption	-5.610795	5.451971744	-1.02913	0.30892	-16.5916297	5.3700399

Analysis:

The regression was a standard Ordinary Lease Squares (OLS) model. All variables were tested at the 95% confidence level. Significance is therefore measured by p-values less than or equal to .05. The entire model is highly significant given the significant F of .0000554, meaning that the explanatory variables account for a significant amount of the variation in the dependent variable. Therefore, much of the change in smoking rates can be attributed to public health spending, taxes, and poverty. Alcohol consumption and smuggling were both insignificant variables in the model. A possible explanation for the insignificance is that the alcohol data was extracted from the most recent BRFSS, and many states have laws that ban smoking in public places, including bars, casinos, and restaurants. Currently 25 states and Washington D.C. have

enacted smoking bans. In 2000, there were zero states with bans. Several states currently have partial smoke-free laws (Cevallos). Since the data was taken from the 2011 survey, after some of the states had implemented smoke-free laws, there may be less of a correlation between the rates of smoking and alcohol consumption, resulting in insignificance.

In a regression between only excise tax rates and smoking rates, the adjusted R squared was .246, meaning that taxes account for approximately 25% of the difference in smoking rates between states. It is also negatively correlated and significant with a p-value of .01853. Another significant variable was public health spending. The p-value was significant at the .05 level with .024323, and negatively correlated with smoking rates. There is some weakness in this variable because the public health spending by state accounts for the total amount of spending on all issues, not limited only to tobacco cessation and smoking prevention. However, the correlation is still relevant, and the amount a state spends on public health is related to the smoking rate in that state. The policy recommendation in the next section will elaborate on the efficacy of public health spending.

There is also a significant and positive correlation between the percentage of citizens in each state in poverty and consumption of cigarettes. The p-value is .01671, significant at the 5% confidence level. This has implications in policy the model shows that lower income individuals not only spend more of their relative income on cigarettes but that they also smoke more. This has several implications in terms of the equity of the cigarette excise tax, and also on future medical costs for low-income populations.

The final variable, smuggling as a percent of consumption in the state was insignificant at the 5% confidence level, although the sign was positive, as predicted. There are a number of reasons that the smuggling data in this model could not fully explain the relevance of the variable. First, it is more likely that smuggling is related to the tax than it is the smoking rate, so there is a degree of multicollinearity. Running a regression with only the excise tax rates and smuggling data, the variable was still insignificant and the sign was positive. One potential problem with this is that smuggling is part of the "underground economy" and so true figures may not be fully representative. The second is that the range of data in the smuggling set is very wide, ranging from -60.94% in New York State (meaning approximately 61% of cigarettes in New York State are smuggled into the state), to 26.84% in New Hampshire, (meaning approximately 27% of cigarettes in New Hampshire are smuggled out of the state) (LaFaive and Nesbit). The wide range of these variables puts stains on the standard OLS model, particularly when measured as a percent, which technically only ranges from 0%-100%. This causes the problem of "truncated errors," which occurs when an infinite sum is measured within finite bounds. The wide range of data for smuggling could have put strain on the percentage bounds, which only range from 0%-100%. Given the analysis of the data, and significant correlation of certain variables with the dependent smoking rates, the following policy analysis will focus on three areas; public health spending, taxes, and poverty.

Policy Recommendation:

One of the main reasons for government intervention in the market is to correct market failures, or control externalities. Cigarette smoking causes a negative spillover cost to society, through higher medical costs not borne by the patient, secondhand smoke, adverse selection in the health insurance pool, and fire and safety hazards (Ross, and Chaloupka 6). The marginal social costs of cigarette consumption outweigh the marginal social benefits (e.g., personal utility), and so the government taxes cigarettes.

Ross and Chaloupka also argue that the government intervenes because there is information asymmetry in the market for cigarettes. For example, less educated people tend to be less health literate and often do not personalize the risks associated with smoking. According to the constrained maximization model, under which the rational addict model also applies, a consumer cannot maximize utility without sufficient information on a good (Ross and Chaloupka 6).

There are three primary methods of intervention, the first is taxation, the second is public health spending and education, and the final is by smoking restrictions. Smoke-free policies have lead to a 5-15% reduction in population smoking rates, and smoke-free workplace laws reduced prevalence up to 20%, these movements were particularly strong in changing social norms around smoking, especially the youth population (Ross and Chaloupka). Currently, 25 states and the District of Columbia have smoke-free laws in place, the Centers for Disease Control and Prevention estimates that by 2020, the entire country will have smoke-free laws (Cevallos).

Tobacco tax revenues were $17,267,568 in 2010 according to the Tax Policy Center at the Urban Institute and Brookings Institute. The Centers for Disease Control estimated that only 2.4% of the total tax revenue from cigarette excise taxes was spent on smoking related public health prevention. This further exacerbates the regressivity of the tax, as low-income individuals are now paying more essentially into general funds. Wilson and Thompson argue that the regressive nature of the tax could be offset by using revenues to fund programs that have greater benefit to low income populations, such as inner city school funding, health literacy campaigns, or public health campaigns.

A perverse disincentive arises when one policy action creates not only an unintended consequence, but actually can exacerbate the problem that the policy originally set out to alleviate. Medicaid is a social program meant to help low income populations, primarily women and children to obtain medical care. If prescribing to the rational addiction model (an addict weighs costs and benefits, choosing to consume if benefits outweigh costs), then increased spending on tobacco cessation and on programs such as Medicaid will discount future costs to a present-day smoker. Thus, spending on reactionary medicine and reducing the future cost to the smoker could entice one to consume more. According to the CDC in 2010, "Medicaid enrollees have nearly twice the smoking rates (37%) of the general adult population (21%), and smoking-related medical costs are responsible for 11% of Medicaid expenditures." Thus, a distinction must be made between public health and medical spending. Public Health has the primary purpose of prevention of a disease at a population level, and this approach reduces the perverse disincentive in health spending.

The most effective policy will aim to reduce the excess burden of the tax by making the tax difficult to avoid, or evade. One way to do this is by raising the federal excise tax rate in addition to the state tax rate. The policy should reduce the negative spillover effects of smoking, one of the most effective methods of reducing secondhand smoke is by instituting smoke-free laws in public places. Lastly, the tax revenue from cigarettes should be redistributed more equitably across incomes, and a greater percent of spending should go towards preventative health and public health services. It should be noted that there are positives to cigarette consumption aside from personal utility. The first is employment and the second is tax revenue. Therefore, excise tax policy cannot outlaw cigarettes or make them too expensive because according to the World Lung Foundation, the tobacco industry has revenues of approximately $35 billion annually.

Conclusion:

Cigarette taxes account for a statistically significant variation in the smoking rates, showing that taxes are effective in reducing smoking to a certain amount. However, if government seeks to correct the market failures related to cigarette consumption a comprehensive approach must be enacted. The most effective policy will combine a tax increase with public health expenditures and smoking bans that will change behavior. One aspect of smoking prevention that this paper does not elaborate a great deal on is stopping youth smoking rates.

More research should be dedicated to the impact of taxes on smuggling, as the model in this report did not elucidate a clear relationship. In conclusion, taxes are the most effective way to reduce consumption at the present time, yet that does mean it is an effective measure.

Appendix A

Data						
State	Smoking Rate	Excise Tax	PH Spending	Smuggling as % of C	Poverty Rate	Alcohol (Any) Consumption (BR
Alabama	21.9	$0.43	$335,488,409.00	7.70%	16.4	41.30%
Alaska	20.4	$2.00	$55,550,000.00	0.00%	12	58.20%
Arizona	15	$2.00	$54,120,500.00	-54.39%	19.1	56.20%
Arkansas	22.9	$1.15	$149,800,388.00	-9.60%	17.6	42.10%
California	12.1	$0.87	$2,415,831,000.00	-36.08%	16.2	57.10%
Colorado	16	$0.84	$183,551,436.00	-16.22%	12.6	64.30%
Connecticut	13.2	$3.40	$79,551,713.00	-22.25%	9	64.30%
Delware	17.3	$1.60	$28,791,300.00	22.95%	12.7	59.50%
DC*	15.6	$2.50	$55,676,000.00	0.00%	19.1	67.40%
Florida	17.1	$1.40	$441,688,341.00	-19.10%	15.1	56.90%
Georgia	17.6	$0.37	$162,837,455.00	4.10%	18.5	50.80%
Hawaii	14.5	$3.20	$210,580,163.00	0.00%	12.3	53.10%
Idaho	15.7	$0.57	$122,845,700.00	19.88%	14.4	48.90%
Illinois	16.9	$1.98	$297,742,900.00	-2.31%	13.8	60.70%
Indiana	21.2	$1.00	$83,710,931.00	3.07%	16	51.60%
Iowa	16.1	$1.36	$51,790,348.00	-21.32	10.5	60.60%
Kansas	17	$0.79	$43,092,255.00	-18.37%	14.2	51.60%
Kentucky	24.8	$0.60	$192,860,700.00	7.18%	16.9	43.10%
Louisiana	22.1	$0.36	$225,294,657.00	-5.12%	18.9	49.60%
Maine	18.2	$2.00	$31,434,509.00	-13.65%	12.5	60.50%
Maryland	15.2	$2.00	$173,747,000.00	-25.76%	9.9	57.80%
Massachusetts	14.1	$2.51	$350,186,952.00	-18.11%	10.8	64.50%
Michigan	18.9	$2.00	$205,877,200.00	-29.34%	14.9	57.60%
Minnesota	14.9	$1.23	$64,815,000.00	-19.48%	10.6	63.60%
Mississippi	22.9	$0.68	$25,875,597.00	-10.13%	21	42.10%
Missouri	21.1	$0.17	$35,311,567.00	12.32%	15.3	52.50%
Montana	18.8	$1.70	$24,180,994.00	-23.52%	14.8	58.70%
Nebraska	17.2	$0.64	$72,785,962.00	-5.40%	10.1	61.80%
Nevada	21.3	$0.80	$9,307,757.00	20.02%	15	57.00%
New Hampshire	16.9	$1.68	$21,026,483.00	26.83%	7.3	65.80%
New Jersey	14.1	$2.70	$236,625,000.00	-18.07%	10.6	61.40%
New Mexico	18.5	$1.66	$105,036,600.00	-52.95%	19.9	51.00%
New York	15.5	$4.35	$1,361,874,065.00	-60.94%	15.9	60.10%
North Carolina	19.8	$0.45	$132,055,198.00	0.00%	16.6	48.00%
North Dakota	17.4	$0.44	$16,939,076.00	1.55%	11.2	62.40%
Ohio	22.5	$1.25	$175,566,137.00	-8.98%	14.8	55.90%
Oklahoma	23.7	$1.03	$135,791,000.00	-4.55%	14.4	45.60%
Oregon	15.1	$1.18	$52,141,850.00	-15.66%	14	59.40%
Pennsylvania	18.4	$1.60	$190,456,000.00	-3.35%	12	57.20%
Rhode Island	15.7	$3.50	$50,815,757.00	-39.75%	13.5	62.50%
South Carolina	21	$0.57	$81,225,679.00	2.47%	16.6	47.00%
South Dakota	15.4	$1.53	$24,558,841.00	-28.61%	14.4	58.80%
Tennessee	20.1	$0.62	$278,401,400.00	2.40%	16.5	37.50%
Texas	15.8	$1.41	$521,636,021.00	-33.76%	17.7	54.30%
Utah	9.1	$1.70	$84,410,000.00	-31.95%	10.2	29.50%
Vermont	15.4	$2.62	$43,951,667.00	16.87%	10.6	65.10%
Virginia	18.5	$0.30	$295,499,639.00	24.73%	10.9	56.00%
Washington	15.2	$3.03	$265,838,500.00	-48.47%	11.9	57.90%
West Virginia	26.8	$0.55	$132,295,059.00	20.79%	16.7	31.80%
Wisconsin	19.1	$2.52	$52,826,100.00	-36.39%	11.3	67.10%
Wyoming	19.5	$0.60	$33,852,718.00	20.35%	9.8	54.00%

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