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A Growing Sin-dustry: The History and Effects of Cigarette Excise Taxation and
Regulation in the United States

by

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Class of 2015

A thesis submitted to the faculty of the University of New Hampshire
In fulfillment of the requirements for the
Degree of Bachelor of Science
With University and Departmental Honors in
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INTRODUCTION:

Originating with the gabelle taxes of France during the close of the Albigensian Crusades, excise taxes and regulations on consumer products have historically been used by local and federal governments to generate revenue during periods of war. Following the enactment of the Internal Revenue Act on June 30, 1864, the United States extended their definition of consumer products to include cigarettes and other tobacco products. The United States Federal government justifies cigarette taxes as a method not only to discourage the habit of smoking but also to recover the costs of the negative externalities associated with the “sinful” behavior. Through an analysis of price elasticities as well as individual state taxation and cigarette consumption data, this thesis attempts to explain why increased prices of cigarettes due to excise taxes are not effective deterrents for smokers without additional enforcement of tax-avoidant behaviors.

The first section of this study defines excise taxation through historical and contemporary theories. In addition, the analysis chronologically reviews the history of excise taxation and regulation, including those imposed on cigarette and tobacco, in the United States. This chronological review also highlights the evolution of government policy and the acceptability of cigarette consumption in the United States.

The second section analyzes tobacco taxation in the United States during the year 2015. The section begins with an overview of the federal governments’ tobacco taxation policies in the nation. The section concludes with a review of differing taxation rates in individual states. The conclusion introduces factors that affect smoking behavior, which will be used in the proceeding econometric analyses.

The third section uses an econometric analysis, conducted by John Lovell Jarvis at Wesleyan University, to explain the price elasticity of cigarettes and the impact of tax-induced prices on annual per capita cigarette consumption. The fourth section also illustrates a differing explanation of price elasticity from the perspective of tobacco companies.

The final section studies the impact of cigarette taxation in the state of New York as well as the advantages and disadvantages of cigarette excise taxes. The section explores the increases in tax-avoidant behaviors and additional legislation that affect cigarette consumption in New York and the United States as a whole. Using the results from these studies, the conclusion section discusses the effects of cigarette taxation and regulation on consumer smoking behavior in the United States.

DEFINITIONS RELATING TO EXCISE TAXATION IN THE UNITED STATES:

Although it is not considered a technical term in economics, a “sin” tax is a form of state or local-sponsored excise tax with statutory meaning. According to the Internal Revenue Service (IRS), excise taxes are inland taxes on the “sale, or production for sale, of specific goods” (IRS, 2015). Furthermore, in the United States, excise taxes are indirect-event taxes, which are paid by the producer or seller at the time of sale. In order to recover the taxable amount, sellers shift the tax by raising commodity prices to consumers. Federal statutory excise taxes in the United States are imposed under Subtitle D – “Miscellaneous Excise Taxes” and Subtitle E – “Alcohol, Tobacco, and Certain Other Excise Taxes” of the Internal Revenue Code. 26 U.S.C § 4001 through 26 U.S.C. § 5891 describe the excise taxes imposed on commodities in the United States, including luxury passenger automobiles, tires, petroleum products, coal, vaccines, recreational equipment, indoor tanning services, firearms, air transportation, water transportation, policies issued by foreign insurance companies, chemicals, non-deductible contributions to certain employer plans, alcohol and cigarettes. In addition, the three main targets of global excise taxation are gasoline, alcohol and cigarettes. Excise taxes on the latter commodities are considered sin taxes.

Representing a sub-classification of excise taxes, sin taxes impose additional costs on products or services that are not only viewed as vices and affect individual’s health, such as alcohol and tobacco, but also those determined to be morally objectionable. This form of taxation, levied by the local governments, discourages individuals from participating in activities without making their use illegal. Unlike other forms of taxation,

sin taxes only affect those who use the aforementioned products. Therefore, sin taxes are often accepted by the general public and favored by governments for generating income.

HISTORICAL AND CONTEMPORARY THEORIES OF EXCISE TAXATION:

The first western philosopher to indirectly discuss economic policies involving sin taxes on luxury goods, including tobacco, rum, and sugar, was Adam Smith. In *An Inquiry into the Nature and Causes of the Wealth of Nations*, Smith suggests that such items are “extremely proper subjects of taxation” due to their widespread use and consumption (Smith 1818, 341). Although he does not explicitly advocate taxing morally objectionable goods and services, Smith supports tax legislation that deters negative externalities, such as alcoholism, that affect unrelated third parties. Furthermore, according to Smith, taxes that deter negative behaviors lead to a more productive society. With more productive members, a society is better able to reach its full potential by generating more economic output and, in turn, become more prosperous (Smith 1818, 288-289).

In his *Principles of Political Economy and Taxation* (1817), English political economist, David Ricardo, elaborates on Smith’s theories regarding excise taxation. Ricardo states that “taxes on luxuries have some advantage over taxes on necessities” as taxes on luxuries reduce profits for industrialists by increasing wage rates (Ricardo 1817, 167-168). Ricardo also hypothesizes that consumers have “taxation limits” where, once the limit is reached, the consumer will decrease or cease purchases of the goods. For the consumer, the higher price does not equate to the products’ perceived worth (Ricardo

1817, 167-168). Ricardo explains that this limit differs between products and the deciding factor depends on the relative satisfaction derived from the product by the consumer.

Expanding upon Smith's idea of negative externalities, British economist Arthur C. Pigou discusses the benefits of sin taxes (Pigouvian taxes) for alcohol and tobacco products on health and public safety. In *The Economics of Welfare* (1920), Pigou argues that industrialists seek their own marginal private interests without regard for social interests. First, when social interests diverge from marginal private interests, the industrialists have no incentive to internalize the cost affecting third-party members of society. Much like Adam Smith, Pigou declares that companies selling alcohol affect social interests. In particular, crime associated with alcohol consumption necessitates higher costs for policemen and detention facilities. Second, when marginal social costs exceed the private benefit of industrialists, the cost-creator over-produces the product. In order to manage over-production, Pigou recommends a tax, like sin tax, to equalize the marginal private cost and the social cost. Under the imposition of taxation, industrialists pay for the externalities they create thereby decreasing the supply and creating equilibrium in the market.

In accordance with Pigouvian Theory, sin taxes impact producers of taxable commodities through decreases in long-term commodity supplies due to price changes. Assuming that consumers had been willing to pay the original price plus the taxable portion, the producers could successfully have charged that amount in the absence of tax. With the imposition of sin taxes, however, firms are unable to increase the base prices of their commodities without affecting demand and therefore do not receive compensation for the increased costs of conducting business due to the tax. As a result, these firms will

decrease their supplies. In addition, the exiting of marginal firms from the industry as a result of higher taxes also reduces the supply. The decrease in supply coupled with a constant demand increases the price of commodity supplies.

HISTORICAL REVIEW OF EXCISE TAXATION:

The first instance of sin taxation influencing the price of commodity supplies occurred in the form of the gabelle, or salt tax, in France. Following the close of the Albigensian Crusades by Louis IX in 1229, the Rhône estuary was ceded to the French Crown. The marsh terrain, including the Camargue swamp, was an ideal location for salt mining. In 1246, Louis established the first French Mediterranean port, Aigues-Mortes, which referred to the “dead waters” of the salt evaporation ponds in the area. Louis, with ambitions of invading the Middle East, not only recognized the profitability of salt and its production but also originated the French salt gabelle tax as means of generating revenue for war. Originally established during the mid-fourteenth century, the gabelle was an indirect tax applied to agricultural and industrial commodities including wheat, spices, and wine. From the fourteenth century onward, however, the gabelle was limited and solely referred to the monarchy’s taxation of salt.

Regarded as the leading source of state revenues, the gabelle exploited the inelastic demand for salt in France. Comte Charles de Provence, the brother of Louis IX, initiated the first attempt at comprehensive salt administration in 1259. In the following century, the administration, labeled the Pays de Petite Gabelle, extended to Aigues-Mortes, Camargue, and Peccais. The Pays de Grande Gabelle followed in 1341 under the rule of Philip VI. Each administration uniformly levied a 1.66 percent sales tax on salt

across France. Much like other taxes of the time, however, these rates varied for the greater part of France's history and resulted in large disparities between regions. In addition, unlike proceeding sin taxes of today, the gabelle imposed the *sel du devoir*, a salt duty. Every citizen over the age of eight living in the Grande Gabelle was required to purchase 15.4 pounds of salt each year at a fixed government rate. Further restrictions stated that using the *sel du devoir* to create salted products was considered *faux saunage*, salt fraud.

Although the salt tax was not the sole cause of the French Revolution, the gabelle not only symbolized unfair distributions of power and wealth but also the represented the injustices of the government against the citizens of France. By the late eighteenth century, more than three thousand French men, women and children were sentenced to prison or death yearly for crimes against the gabelle or the *gabelous*, the collectors and enforcers of the salt tax. Religious figures, nobility, and high-ranking officials were exempt from the gabelle, however. Following the ascension of the National Assembly in 1789, the gabelle was abolished throughout France and all persons imprisoned for laws pertaining to the gabelle were freed. After being reinstated by Napoleon Bonaparte in 1804, the gabelle would remain part of France's legislation until its final abolishment in 1946.

Smith's early discourse on excise taxation influenced the development of tax legislation in the United States. Maintaining legal traditions of France other Western European countries, the United States drafted the U.S. Constitution with provisions for excise taxes and therefore sin taxes. Prior to the ratification of the United States Constitution by the ninth state in 1788, the previous central government under the

Articles of Confederation was unable to levy taxes. Under Article I, Section VIII, Clause I of the U.S. Constitution, however, the newly formed Congress developed the power “to lay and collect taxes, duties, imposts and exercises, to pay the debts and provide for the common defense and general welfare of the United States; but all duties” (U.S. Constitution, 1788). The clause continues to state that all “duties, imposts and excises shall be uniform throughout the United States.” Responding to the need for government revenue following the end of the American Revolutionary War, the United States Congress and President George Washington signed the Tariff Act of July 4, 1789. The purpose of the Tariff Act, recommended by the first U.S. Secretary of the Treasury, Alexander Hamilton, was to decrease the \$54 million state and federal debt incurred during the American Revolutionary War. In addition to unobtrusive tariffs on foreign imports, low excise taxes were imposed on whiskey, rum, tobacco, snuff, and refined sugar.

Following the historical trends of the French Revolution, excise tax protests, beginning in 1791, led to the Whiskey Insurrection in the United States. During the presidency of George Washington, the tax on distilled spirits was the first tax imposed by the newly formed federal government on domestic products through the Whiskey Act. Based on Smith’s theories outlined in the *Wealth of Nations*, the tax was coined the “whiskey tax” due to the high levels of whiskey consumption during the eighteenth century. Prior to the ratification of the United States Constitution, the previous central government under the Articles of Confederation was unable to levy taxes and therefore borrowed \$54 million to fund the Revolution. Large amounts of investments from bondholders required a source of revenue to offset the debt. Hamilton believed that the

whiskey excise, amounting to seven cents per gallon of whiskey and ten cents per gallon of rum, was a form of luxury tax and the least objectionable tax the government could levy (Shughart 1998, 33). In contrast, social reformers believed that the “sin tax” would raise public awareness about the harmful effects of alcohol.

Much like the opinions of the gabelle of France, citizens of the United States argued that the tax not only unfairly targeted westerners but also was imposed without local representation, which resulted in resistance. Given the popularity of spirits during the eighteenth century, farmers west of the Appalachians supplemented their incomes by distilling their excess grain into whiskey. The whiskey, being less cumbersome than grain, was transported and used as a medium of exchange during cash shortages. With the imposition of whiskey taxes, western farmers believed that eastern farmers had a competitive advantage through tax breaks. Under Hamilton’s plan, the whiskey excise was imposed either by paying a flat fee or by the gallon. Large distilleries, primarily located in the east, produced whiskey in volume and therefore paid less tax per gallon. In addition, given the use of whiskey for exchange, farmers argued that the excise was an additional income tax. In opposition to the tax, members of the rebellion, including farmers of Western and Southern states, tarred and feathered revenue collectors as well as civilians who complied with the tax. Hamilton believed that the United States government could not claim to be established until “some signal display manifested its power of military coercion” and convinced President George Washington to combat the rebellion (Shughart 1998, 34). In 1794, thirteen thousand militiamen confronted the rebels, who dispersed before violence action ensued. Although the Whiskey Insurrection

did not result in changes to the tax structure, the incident established and demonstrated the United States power to levy excise taxes.

Despite Smith's argument that the taxation of luxury goods generates sizeable government revenues, excise and sin taxes remained unfavorable in the United States throughout the 1800s. Focusing his campaign on the abolishment of internal taxation, Thomas Jefferson repealed excise taxes on whiskey, rum, snuff, and sugar in 1801. Following Jefferson's election into office, excise taxes in the United States were only levied to provide government revenue during wartime periods, with the exception of the Great Depression era. Although excise taxes continued to face opposition during these periods, American society embraced the patriotic reasoning for the taxation until they were repealed following each period of war.

The effects of wartime excise taxation are present in today's markets for alcohol and tobacco products. In an effort to raise revenue for the Civil War, Congress passed the Internal Revenue Act of July 1, 1862, which established the first excise tax on cigars. This was also the first legislation in the United States to tax rolled tobacco products. Seeking to earn additional revenue for the war, Congress increased these excise taxes and established the first tax on cigarettes with the Internal Revenue Act of June 30, 1864 (Werner 1922, 358). Most excise taxes were repealed after the end of the Civil War in 1867 and 1870, with the exception of taxes on alcohol and tobacco products. In 1951, the federal cigarette excise tax increased from seven cents to eight cents per pack in order to finance the Korean War. The federal cigarette tax doubled in 1983 to sixteen cents per pack. In 1985, the federal government levied a tax of twenty-four cents per pound on snuff, eight cents per pound on chewing tobacco, and forty-five cents per pound on

pipe tobacco (Centers for Disease Control and Prevention, 1994). Changes in federal and state taxes on tobacco products continue to fund government revenues today.

In addition to alcohol and tobacco products, the Federal Margarine Act of 1886, imposed a sin tax on oleomargarine with the intent of creating a safer world for consumers and to protect dairy producers. Oleomargarine, invented by French chemist, Hippolyte Mège-Mouriès, was introduced to United States markets in 1874 by the U.S. Dairy Company. Over a seven-year period, the U.S. Dairy Company and its subsidiary, the Commercial Manufacturing Company, opened fifteen factories and controlled ten percent of the market for margarine oil and margarine butter products. By 1882, the U.S. Dairy Company produced fifty thousand pounds of margarine daily and twenty million pounds annually. As prices decreased, consumers purchased more margarine compared to other dairy butter products. As a result of the change in consumer preferences, the vice president of the New York State Dairy Association, Professor L.B. Arnold, determined that “the availability of margarine caused producers of creamery butters to increase their quality in order to maintain their comparative advantage” (Young, 2002). In turn, small family-operated producers of lower-grade butters, unable to compete with larger and more efficient industrial producers, lost their market share and sought sales in foreign markets. In order to stimulate international sales, smaller producers marketed margarine as American butter. In 1880, margarine exports, in the form of oil, increased to sixteen million pounds annually. In response to increased sales, the dairy lobby waged a campaign regarding health concerns and margarine consumption. Margarine was described as containing “many kinds of living organisms, with masses of dead mould [sic], bits of cellulose, various colored particles, shreds of hair, bristles, etc., while other

samples teemed with life; doubtful portions of worms were also noticed...corpuscles from cockroach, small bits of claws, corpuscles of sheep, the egg of a tape-worm...a dead hydraviridis” (Young, 2002). Fearing international bans on American butter products due to fraud and health concerns, the Dairy Association lobbied heavily for legislative controls on domestic margarine producers. In 1886, the Federal Margarine Act imposed a ten-cent tax on margarine resembling the color of butter, mandated annual license fees, and required margarine producers to label their products. The public viewed the additional tax as a deterrent to protect the health of consumers, however, the true intent was to ensure the profitability of dairy butter producers in the United States.

CIGARETTE TAXATION AND REGULATION IN THE UNITED STATES

(2015):

According to the Tobacco Institute, as of January 1, 2015, all fifty states, the District of Columbia, and 600 towns, cities, and counties levy taxes on cigarettes. Today, local jurisdictions generate approximately \$430 million in annual revenue from cigarette tax rates or additional fees (Tobacco Free Kids, 2015). In 1921, Iowa became the first state to tax cigarettes; in 1969, North Carolina was the last state to enact a cigarette excise tax. Much like federal excises, the imposition of and the increases in state tobacco taxes, with a few exceptions, are used to generate revenue. The level of the tax imposed, however, directly correlates to the state’s dependency on tobacco production. For example, in 1992, “the average cigarette tax in non-tobacco producing states was nineteen cents higher than in large tobacco-producing states” (Center for Disease Control and Prevention, 1994). Since 1988, states have used additional ballot initiatives to

increase tobacco taxes not only for revenue but also for anti-smoking campaigns. In November 1988, California ratified Proposition 99, which increased the state cigarette excise tax from ten cents to thirty-five cents per pack. Similarly, in November 1992, Massachusetts' voters passed a state tax increase by twenty-five cents per pack.

Furthermore, problems with enforcement of tax laws occurred due these differences among state and local cigarette excise tax rates. During the late 1960s, as the difference between state and local tax rates increased, "organized smuggling and illegal diversion of cigarettes from the legal distribution system also increased" (Advisory Commission on Intergovernmental Relations, 1977). According to the 1977 report by the Advisory Commission on Intergovernmental Relations, tax evasion strategies included "casual smuggling, or buying cigarettes in neighboring states with lower taxes; purchase of cigarettes through tax-free outlets such as military stores and American-Indian reservations, commercial smuggling for resale, and illegal diversion of cigarettes within the traditional distribution system by forging tax stamps and underreporting" (Advisory Commission on Intergovernmental Relations, 1977). In response to the increasing levels of tax evasion, Congress enacted the Federal Cigarette Contraband Act, which prohibited the "transportation, receipt, shipment, possession, distribution, or purchase of more than sixty thousand cigarettes not bearing the indicia of the state in which the cigarettes were found" (Lewit, 1982). Although the Federal Cigarette Contraband Act significantly reduced the organized interstate smuggling of cigarettes, the casual smuggling and purchase of cigarettes from neighboring states continues to affect states with high cigarette taxes.

The increasing discrepancy between cigarette pack prices and federal and state excise taxes is apparent between 1955 and 1993 in the United States. During these years, the average state excise tax on cigarettes increased more than federal taxes since 1955. In 1955, the total average price per pack of cigarettes was approximately twenty-three cents. The selling price included eleven cents for taxes, which equates to 48% of the total price. On November 1, 1993, the average price of a pack of cigarettes was \$1.79, with approximately 30% due to taxes (fifty-three cents).

The current tax rates for each state as of January 1, 2015 are listed on Table 1 entitled *State Tax Rates on Cigarettes* on page 16. Currently, the median excise tax amount per state in the United States is \$1.36. The state of New York imposes the highest excise tax rate on cigarettes with an additional \$4.35 due per pack. In contrast, Missouri levies the lowest tax at a rate of seventeen cents per pack. The chart provides further evidence of the correlation between the level of taxes imposed and the dependency of the state on tobacco production. Tobacco producing states, such as North Carolina, Kentucky, Georgia, and Virginia, levy lower cigarette excise taxes than those that depend on tobacco imports, for example Hawaii, Rhode Island, New York, and Massachusetts.

Today, lawmakers continue to use sin taxes on alcohol, gambling, and tobacco products to recover state budget deficits. In the fiscal year 2014, as described in *Figure 1*,

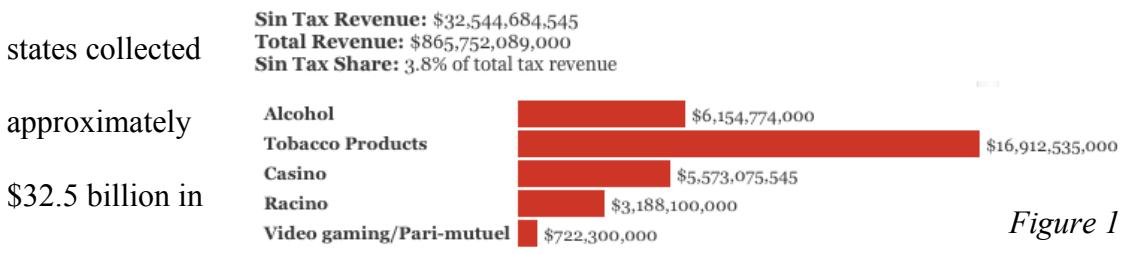


Figure 1

SOURCES: U.S. Census Bureau 2014 Annual Survey of State Government Tax Collections, Rockefeller Institute

alcohol, gambling, and tobacco (Maciag, 2015). According to the National Association of

State Budget Officers, state legislatures have shown that they are most apt to increase excise taxes on tobacco products. From fiscal years 2000 to 2015, states enacted a total of “111 tax increases on tobacco products and another 23 on alcohol” (Maciag, 2015).

Nationally, however, sin taxes accounted for 3.76 percent of total state tax revenues in 2014. The extent to which individual states rely on sin taxes varies based on the size of the state as well as the population’s dependence on gambling, tobacco, and alcoholic products.

STATE EXCISE TAX RATES ON CIGARETTES

(January 1, 2015)

STATE	TAX RATE (¢ per pack)	RANK	STATE	TAX RATE (¢ per pack)	RANK
Alabama (a)	42.5	47	Nebraska	64	38
Alaska	200	12	Nevada	80	35
Arizona	200	12	New Hampshire	178	18
Arkansas	115	30	New Jersey	270	9
California	87	33	New Mexico	166	21
Colorado	84	34	New York (a)	435	1
Connecticut	340	4	North Carolina	45	45
Delaware	160	22	North Dakota	44	46
Florida (b)	133.9	27	Ohio	125	29
Georgia	37	48	Oklahoma	103	31
Hawaii	320	5	Oregon (e)	131	28
Idaho	57	42	Pennsylvania	160	22
Illinois (a)	198	17	Rhode Island	350	3
Indiana	99.5	32	South Carolina	57	42
Iowa	136	26	South Dakota	153	24
Kansas	79	36	Tennessee (a)	62	39
Kentucky (c)	60	40	Texas	141	25
Louisiana	36	49	Utah	170	19
Maine	200	12	Vermont	275	8
Maryland	200	12	Virginia (a)	30	50
Massachusetts	351	2	Washington	302.5	6
Michigan	200	12	West Virginia	55	44
Minnesota (d)	290	7	Wisconsin	252	10
Mississippi	68	37	Wyoming	60	40
Missouri (a)	17	51			
Montana	170	19	Dist. of Columbia (f)	250	11
			U. S. Median	136.0	

Source: Compiled by FTA from state sources.

(a) Counties and cities may impose an additional tax on a pack of cigarettes: in Alabama, 1¢ to 25¢; Illinois, 10¢ to \$4.18; Missouri, 4¢ to 7¢; New York City, \$1.50; Tennessee, 1¢; and Virginia, 2¢ to 15¢.

(b) Florida's rate includes a surcharge of \$1 per pack.

(c) Dealers pay an additional enforcement and administrative fee of 0.1¢ per pack in Kentucky and 0.05¢ in Tennessee.

(d) In addition, Minnesota imposes an in lieu cigarette sales tax determined annually by the Department.

The current rate is 52.6¢ through December 31, 2015.

(e) Tax rate in Oregon is scheduled to increase to \$1.32 per pack January 1, 2016

(f) In addition, District of Columbia imposes an in lieu cigarette sales tax calculated every March 31. The current rate is 40¢.

INDIVIDUAL STATE ANALYSIS OF CIGARETTE EXCISE TAXATION:

Lucy Dadayan, a policy analyst at the Rockefeller Institute of Government, states that a select group of states, including Nevada, Rhode Island, and New Hampshire, rely more heavily on sin taxes than other states. Known for its sizable collection of gambling revenue, Nevada reported casino tax collection exceeding \$900 million, approximately thirteen percent of total tax revenues in 2014. The state's heavy reliance on sin taxes explains its lack of income tax (Maciag, 2015). Although more casinos continue to open in different parts of the country, gambling does not represent a fast-growing revenue source. Dadayan explains that, "gambling collections grow at a much slower pace than expenditures and other sources of revenue" (Maciag, 2015). Following the recession, Nevada casinos experienced steep declines until gaming revenues increased for four consecutive fiscal years beginning in 2011. Unlike other states where gambling-related revenues shift across state borders, Nevada, according to the Nevada Control Board, does not experience fluctuations in revenue due to the competition for international tourism in Las Vegas.

Rhode Island, the smallest state geographically in the United States, is the most dependent on sin taxes on gambling and tobacco products for tax revenue. In contrast to Nevada, Rhode Island faces competition from bordering states, including Connecticut and Massachusetts, for gambling revenues. Two casinos, including Twin River Casino, generate the majority of state gambling revenue, which account for a tenth of total state tax collections. Twin River also routes sixty-one percent of video lottery terminal revenues to state coffers, a higher share than most other revenue sharing agreements, which also contributes to the large amounts of tax revenue. The Rhode Island Public

Expenditure Council anticipates that gambling revenues will decrease between thirty-six and forty-one percent between 2015 and 2020. The Expenditure Council fears that this heavy reliance on taxes of gambling revenue will worsen the structural deficit of Rhode Island. In order to offset the anticipated loss, Rhode Island imposes one of the highest taxes on tobacco sales in any state (Maciag, 2015). In fiscal year 2014, the state collected approximately five percent of its total tax revenue from excise taxes on tobacco products.

Much like Rhode Island, New Hampshire relies heavily on the taxation of tobacco products to generate state income. During fiscal year 2014, New Hampshire collected

\$225,357,000 in sin tax revenue, which accounts for 9.9% of the state's total tax

New Hampshire FY 2014 Sin Tax Data

Sin Tax Revenue: \$225,357,000
Total Revenue: \$2,282,507,000
Sin Tax Share: 9.9% of total tax revenue

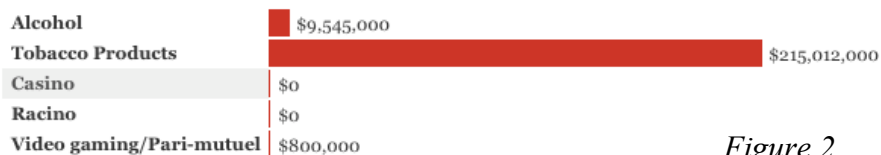


Figure 2

SOURCES: U.S. Census Bureau 2014 Annual Survey of State Government Tax Collections, Rockefeller Institute

revenue (Maciag, 2015). New Hampshire's lack of sales tax not only creates a heavy reliance on tobacco taxation but also generates cross-border cigarette sales due to lower sales prices, according to the New Hampshire Department of Revenue Administration.

PRICE ELASTICITY OF DEMAND FOR CIGARETTES:

A regression model, calculated by John Lovell Jarvis at Wesleyan University (Jarvis 2010, 45), can be used to describe the effects of taxation and regulation on the demand for cigarettes. The primary assumption for the model is that the final price per pack of cigarettes is the deciding factor in purchases for consumers. As previously described, the sin tax on cigarette sales composes a large percentage of the overall price per pack of cigarettes. Evans, Ringel, and Stech (1999) reaffirm this fact by stating “the full amount of a cigarette excise tax is passed on to consumers as a price increase, and that any increase in the excise tax rate of cigarettes in a given state direct increase price per pack in that state” (Evan,1999). In order for prices to influence consumption behaviors of cigarettes, the price elasticity for a pack of cigarettes must be elastic. The assumption that cigarette supply is perfectly elastic is consistent with the findings of Barzel (1976), Harris (1987), Sumner (1981) and Keeler (1996).

Despite price increase due to regulation and taxation, economists argue that other factors discourage cigarette consumption. In addition to price increases, Licari and Meier (2000) suggest that “signaling effects” also deter behavior. According to Licari and Meier, a signaling effect occurs when governments communicate negative characteristics of consuming a good through tax increase. For example, when government-sponsored anti-smoking campaigns publicize the negative health consequences and externalities associated with cigarettes to consumers, economists believe the information dissuades behavior.

Given the separate explanations for changes in cigarette consumption, Jarvis states that both explanatory variables need to be included in the regression. Jarvis

believes that “one problem with including price as an independent variable in the demand equation for cigarettes is that price is expected to be a function of cigarette demand and [therefore] there will be endogeneity in the equation” (Jarvis 2010, 45). The endogeneity will cause bias in the estimates produced by the regression. Therefore, Jarvis develops a model where the effects of the price increase on the per capita consumption of cigarettes is determined without directly including price as an explanatory variable. In order to resolve the endogeneity, a Two Stage Least Squares (2SLS) model is used.

The purpose of the developing the model is to determine the elasticity of demand for cigarettes. In an analysis of eighty-six publications focused on cigarette consumption and demand, Gallet and List (2003) determine that the mean price elasticity of cigarette demand is -0.48. Similar studies, conducted by Evans, Ringel, and Stech (1999), calculate the elasticity to be in the range of -0.3 to -.05. In addition, Chaloupka and Warner (2000) report that the price elasticity of cigarette demand is approximately -.04.

Using the findings of Baltagi and Levin (1986); and Baltagi, Griffin, and Xiong (2000), the regression model is expressed by the following equation:

$$Q_{it} = \beta_0 + \beta_1 P_{it} + \beta_2 Y_{it} + \beta_3 B_{it} + \beta_4 L_{it} + \beta_5 A_{it} + \beta_6 Q_{i,t-1} + \beta_7 Q_{i,t-1} + \beta_8 W_{it} + \beta_8 BL_{it} + a_t + a_i + e_{it}$$

According to Baltagi and Levin (1986), the variables represent the following information:

The dependent variable, Q_{it} , represents the state per capita cigarette consumption for state (i) and period (t). The independent variables are “the real average price per pack of cigarettes in state (i) in time (t), P_{it} , real disposable per capita income, Y_{it} , an index which measures the incentive for residents to purchase cigarettes in a neighboring state, B_{it} , an index representing the level of anti-smoking legislation, L_{it} , the average age of residents over the age of sixteen, A_{it} , per capita packs of cigarettes sold lagged by one year, $Q_{i,t-1}$, per capita packs of cigarettes sold in the following year, $Q_{i,t+1}$, the percentage of White residents in the population, W_{it} , and the percentage of Black residents in the population, BL_{it} . The

variable a_i represents any time-invariant state factors that might affect cigarette consumption, a_t denotes time-varying factors on a national level that might affect cigarette consumption, and e_{it} represents the error-term in a given state and year. (Jarvis 2010, 54)

The aforementioned variables of the model can be described further to illustrate their effects on cigarette consumption. Denoted by a_i , individual time-invariant state factors refer to constant, inherent qualities of a state, such as geography, that affect cigarette consumption trends. In contrast, time-varying national factors, denoted by a_t , are factors that change cigarette consumption levels in the United States. For example, the release of Surgeon General's Warnings and additional information regarding the health concerns and consequences of cigarette consumption on purchase and consumption rates.

The legislation variable incorporated in the model (L_{it}) is a measure of the "the level of restrictive smoking legislation in state (i) during time (t)" (Jarvis 2010, 45). In response to the Surgeon General's Warnings in 1972 and 1986, which demonstrated a connection between smoking and lung cancer, many laws were enacted to restrict smoking in private and public domains, including the Minnesota Clean Indoor Air Act of 1975. Anti-smoking legislation not only alerts consumers to health effects and negative externalities of smoking but also increases the inconvenience of smoking through restrictions. In regards to the model, these restrictions relate to smoking locations. The government can restrict smoking locations in three ways: "the location must have designated smoking areas, the building must have separate ventilated areas, or smoking is banned completely" (Jarvis 2010, 48). Designating smoking and non-smoking areas is the least restrictive policy, quantified with a restrictive level of one, while banning smoking is the most restrictive form of legislation, denoted with a value of 3 in the formula. A value of zero denotes no restrictive legislation in a given location.

States use legislation to influence smoking behavior in public settings. The legislation variable also describes four locations where smoking restrictions are enacted in most states to influence behavior: public transportation, private workplaces, restaurants and bars. Similar to the legislation vector used by Tauras and Liang (2003), which measured the statistical significance of clean air laws on smoking behavior, the legislation variable equally weights the sum of restrictive measures enacted in each of the aforementioned locations in state (i) for the period (t). Therefore, Jarvis defines the legislation variables as:

$$L_{it} = PT_{it} + PW_{it} + R_{it} + BAR_{it}$$

“where PT_{it} represents smoking legislation concerning public transportation in state (i) and time (t), PW_{it} denotes legislation in the private workplace, R_{it} , represents smoking legislation in restaurants, and BAR_{it} denotes legislation targeted in bars” (Jarvis 2010, 49). Because the individual variables can be quantified with the numbers zero through three, the maximum value of legislation index, L_{it} , equals twelve.

Although their results were inconclusive, Baltagi and Levin (1986) and Stehr (2005) hypothesize that the bootlegging effect, due to lower selling prices and differing tax rates in nearby states, is also statistically significant in the model results. The economists believe that three factors influence a consumer’s decision to purchase cigarettes across state borders. The first factor is the price differential between packs of cigarettes in different states. The second factor relates to the length of the border between neighboring states. It is assumed that states in contact with more bordering states have increased opportunities for cross-state purchases. The final factor influencing out of state purchases is the total area of the consumers’ home state. The smaller the total area of the

state, the less opportunities the consumer has to purchase cigarettes and will, therefore, make purchases elsewhere if the perceived benefit is higher. In order to quantify these factors, however, the cross-border cigarette purchase index must become more “positive as the incentive for purchasing cigarettes in a bordering state increases, and likewise become more negative when there is increased incentive for consumers in neighboring states to purchase cigarettes in their own state” (Jarvis 2010, 50). Thus, the variable should increase in absolute magnitude as the price differential and border lengths increase. Following these constructions, Jarvis represents the bootlegging variable as follows:

$$B_{it} = \sum_{n=1}^k \frac{(T_{it}-T_{nt})(X_{in})}{(AREA_i)}$$

where $(T_{it}-T_{nt})$ denotes the price differential between cigarette excise tax rates in state (i) and its neighboring state (n) for a period of time (t). In addition, “ X_{in} represents the border length between state (i) and its neighboring state (n) in miles [while] $AREA_i$ denotes the area of state (i) in square miles” (Jarvis 2010, 51).

The combination of these equations in the cigarette consumption model offers several advantages for concluding on the demand for cigarettes as well as for determining the price elasticity of demand. Through the variable Y_{it} , which denotes the real per capita disposable income of consumers, the model is able to determine whether cigarettes are inferior or normal goods. For normal goods, higher consumer incomes indicate that an individual will purchase a greater number of products in a given year. The inverse of this statement reflects the purchasing patterns for inferior goods. A negative estimated

coefficient for Y_{it} signifies that cigarettes are inferior goods while a positive coefficient classifies cigarettes as normal goods. According to Jarvis, a negative coefficient also signifies that government revenues collected through increased cigarette taxes are borne disproportionately by lower income consumers who are least able to pay them.

Furthermore, the cigarette consumption model indicates the effectiveness of anti-smoking legislation on consumer smoking behavior by analyzing the coefficient of the variable L_{it} , the legislation index. A negative coefficient indicates that legislative measures are effective in preventing smoking and may be “more equitable than taxation if the intentions of state governments are to reduce cigarette consumption in their state” (Jarvis 2010, 54). Conversely, if the estimated coefficient is statistically insignificant or positive, one can conclude that legislative measures are not effective in reducing cigarette consumption or deterring behavior.

Penultimately, the model also tests the cigarette addiction theories proposed by Becker and Murphy (1988) and Gruber and Köszegi (2002). The addiction theories assert that consumers are “not only influenced by past consumption of addictive goods but also adjust their current consumption of these goods based on their future consumption and preferences for addictive substances” (Jarvis 2010, 55). Under this assertion, the current demand for cigarettes is a function of both past and future demand for cigarettes. The model incorporates this concept through the variables $Q_{i,t-1}$ and $Q_{i,t+1}$. The works of Baltagi and Griffin (2001) and Becker, Grossman, and Murphy (1994) support the inclusion of past and present per capita sales for packs of cigarettes.

The final benefit of the cigarette consumption model is its ability to quantify the effects of the bootlegging variable (B_{it}) on the demand for cigarettes. A statistically

significant coefficient of the bootlegging variable suggests that the difference between cigarette excise tax rates of neighboring states influences the demand for cigarettes. Therefore, states attempting to earn revenue through cigarette excise tax changes should be aware of changes in other jurisdictions.

Despite the perceived advantages of the cigarette consumption model, the lack of available data for other variables regarding cigarette consumptions hinders the accuracy of the model's results. The first variable that is not incorporated in the model is the level of education attained by consumers of smoking age in each state. Due to more awareness in regards to the health consequences of smoking, it is believed that the more education one attains, the less likely he or she consumes cigarettes. The time frame of this variable, for which yearly data was not available from the United States Census Bureau prior to 1993, does not align with the research of the other model variables. In order to determine the statistical significance of education on the effects of cigarette consumption, however, Jarvis uses information from 1998 to 2008 in a second set of regressions where the dependent variable is smoking prevalence.

In addition, the percentage of individuals in each state that do not identify themselves as Black or White, such as Asian and Native American, are not included in the regression due to lack of information. Although these other races are "intrinsically accounted for in the model as being neither white nor black," the races are not incorporated as separate variables in the regressions due to unavailable data between 1970 and 2008.

According to Jarvis, because the model analyzes data that spans over thirty-eight years, heteroskedasticity may exist. Although it does not generate biased or inconsistent

results, heteroskedasticity underestimates the variance and standard errors of the coefficients in the model (Woolridge 2009, 264-265). The variance of the variables differs in each time period and, therefore, the regressions may “give too much significance to some variables and falsely conclude that they are statistically significant determinants of cigarette demand (Jarvis 2010, 67). In his model, Jarvis attempts to control the possibility of heteroskedasticity by using Huber-White standard errors, which increases the certainty that estimated coefficients are correct values.

Information from the Center for Disease and Control Prevention (CDC), the Bureau of Labor Statistics, and the United States Census are used to calculate the variable Q_{it} and Y_{it} . In its program State Tobacco Activities Tracking and Evaluation (STATE), the CDC collects annual data for state per capita packs of cigarettes sold as early as the 1970s. The CDC’s STATE program also provides information regarding annual state cigarette excise tax rates and annual state average retail price per pack of cigarettes for use in the model. Furthermore, to convert the nominal dollar values into real dollar values for the per capita real disposable income variable (Y_{it}), Jarvis uses the Consumer Price Index (CPI) from the Bureau of Labor Statistics. With 2007 as a base year, the study also converts average price per pack of cigarettes and state excise tax rates into real dollar values (Jarvis 2010, 70).

The Center for Disease and Control Prevention also provides information for the variables B_{it} and W_{it} , which relate to the racial differences in cigarette consumption trends in the United States. The CDC’s WONDER system, which compiles population data from the United States Census Bureau, provides state population data, populations

by race and age groupings from all fifty states between 1970 and 2008 which are used in the study.

Furthermore, The CDC STATE system provides data for legislation restricting the consumption of tobacco products in public and private locations. Using similar categories for anti-smoking legislation, such as none, designated areas, separate ventilated areas and incorporate data from the State Cancer Legislative Database Program.

In order to assess the bootlegging variable, B_{it} , Jarvis uses information on state border lengths and state areas. In a dataset created by Thomas Holmes, an economics professor at the University of Minnesota, border lengths for each state, excluding Alaska and Hawaii, are denoted in miles. The model incorporates information regarding state areas in square miles from the United States Census of Population and Housing in 2000.

Table 2 – Variable Summary on page 28, compiled by Jarvis, summarizes the data used in the cigarette consumption model and provides the means and standard deviations of the variables.

Variable	Definition (mean, SD)
Q_{it}	Per capita consumption in packs of cigarettes in fiscal year t , represented by tax-paid sales in state i (mean = 106.994, SD = 36.395)
P_{it}	Average real retail price per pack of cigarettes in fiscal year t and state i in 2007 dollars (mean = 2.647, SD = 1.024)
B_{it}	Index which measures the incentive to smuggle cigarettes from neighboring states in year t for residents of state i . The index is a weighted summation of differences between the excise tax in state i and the excise taxes in all neighboring states, weighted by the length of border shared between each neighboring state and the area of state i (mean = 0.329, SD = 0.139)
Y_{it}	Real per capita disposable income in state i during fiscal year t . Measured in 2007 dollars (mean = 29,194.45, SD = 6,911.648)
A_{it}	The average age of residents in state i over the age of 16 in year t (mean = 42.365, SD = 1.891)
L_{it}	Index which measures the level of non-price smoking restrictions in effect for state i in year t . The index is a sum of smoking legislation in private workplaces, restaurants, bars, and public transportation. For each of these four locations, the following values were used to represent a different type of restriction: 0 represents no smoking restrictions, 1 indicates designated smoking areas must be established, 2 indicates separate ventilated smoking areas must be present, and 3 denotes that smoking is banned completely (mean = 1.960, SD = 2.413)
W_{it}	The percentage of White citizens that make up the population of state i during year t (mean = 0.847, SD = 0.138)
BL_{it}	The percentage of Black citizens that make up the population of state i during year t (mean = 0.108, SD = 0.120)
T_{it}	The real excise rate per pack of cigarettes in state i during fiscal year t denoted in 2007 dollars (mean = 0.486, SD = 0.360)

The results of the regression are listed in *Table 3 – Regression Results* on page 30. Both column (i) and column (ii) give estimates for P_{it} , $Q_{i,t-1}$, and $Q_{i,t+1}$, which are treated as endogenous variables. Furthermore, column (i) “consists of the current tax rate, T_{it} , the tax rate in the lagged period, $T_{i,t-1}$, the tax rate one year in the future, $T_{i,t+1}$, a two-year lag of the price variable, $P_{i,t-2}$, plus the other explanatory variables of the model” (Jarvis 2010, 73). In addition to these variables, column (ii) includes a three-year lag for the price variable, $P_{i,t-3}$.

The R-square value of 0.9739 signifies that the model adequately describes 97.39% of the variation in the demand for cigarettes. Most importantly, the model calculates a statistically significant coefficient of -0.1748 for the price variable, P_{it} . Because the absolute magnitude of price elasticity is less than one, the coefficient indicates that cigarettes are price inelastic. Furthermore, the value implies that “a 10% increase in the price of cigarettes will result in a decrease of 1.748% in the number of cigarettes consumed per capita (Jarvis 2010, 73). This value is less negative and smaller in absolute value than in the aforementioned studies. The price elasticity of cigarettes differs from the studies of Evans, Ringel, and Stech (1999) due to the availability of more timely and relevant information and the inclusion of the bootlegging variable, a tax-avoidant behavior. As previously mentioned, Goel and Nelson (2006), Baltagi and Goel (1987), and Huang, Yang and Hwang (2004) develop similar conclusions regarding the price elasticity of demand for cigarettes. The economists further their findings by suggesting the price elasticity decreases over time. The results of Jarvis’ study act in accordance with this idea. Jarvis believes that his findings reflect the possibility “that smokers who were more sensitive to price changes in cigarettes have decided to stop

Table 3 – Regression Results

Independent Variable	(i)	(ii)
P_{it}	-0.159** (0.071)	-0.178** (0.075)
$Q_{i,t-1}$	0.584** (0.045)	0.598** (0.045)
$Q_{i,t+1}$	0.298** (0.066)	0.276** (0.067)
Y_{it}	0.025 (0.021)	0.024 (0.022)
B_{it}	-0.210** (0.090)	-0.210** (0.092)
L_{it}	-0.001 (.0008)	-0.001 (0.0008)
A_{it}	0.244 (0.151)	0.304* (0.158)
BL_{it}	0.591** (0.285)	0.609** (0.300)
W_{it}	0.346* (0.182)	0.379** (0.188)
R^2 :	0.9745	0.9739
N:	1,836	1,785

(*)Significant at 10%; (**) Significant at 5%.

smoking in recent years, leaving only those individuals who are more addicted to smoking and less sensitive to price changes per pack “ (Jarvis 2010, 76). The remaining smoker population is less likely to adjust their smoking behavior due to price increases or more information regarding the health consequences of smoking. Instead, consumers are participating in tax-avoidant behavior to feed their addiction. Despite the fact that the price elasticity of demand in Jarvis’ study is highly inelastic, it is important to note that cigarettes are not completely inelastic. Although it is to a lesser degree than the studies of the 1980s, there are still consumers in Jarvis’ study who remain sensitive to price changes of cigarettes.

Based on the results of this study, Jarvis determines that cigarette price changes have a significantly lesser effect on cigarette demand than suggested in previous studies. The price does not influence smoking behavior but instead changes consumer purchasing habits through tax evasion channels. The model also indicates that price is the only statistically significant variable that governments can control to influence cigarette demand. First, this implies that governments seeking to increase revenues can rely more heavily on cigarette excise taxation. Second, if governments use sin taxes to deter behavior, excise taxes on cigarettes must be significantly higher than those outlined in previous studies to be effective.

PRICE ELASTICITY OF CIGARETTES FORMULATED BY TOBACCO COMPANIES:

Since the rise of the American Tobacco Company and the increasing cost advantages achieved from the mass production of hand rolled cigarettes by James Duke, tobacco companies have employed pricing as one of their most important marketing strategies. With the invention of the Bonsack cigarette machine, invented in 1880, Duke managed to cut prices for his brand of cigarettes to less than half the cost of his hand-rolled competitors. Duke used the additional savings to invest in an aggressive advertising and promotion campaign, which would be considered illegal under the emerging U.S. antitrust laws, and forced his competitors to join his business. The consolidation of the cigarette industry in the United States led to the creation of the American Tobacco Company which controlled more than 90% of the market. Due to the aggressive marketing campaigns employed by Duke, per capita cigarette consumption in the United States “rose from less than one half cigarette per year in 1870 to 35 cigarettes per year in 1890” (Chaloupka 2002, 1).

The significant profits resulting from the monopoly in the cigarette market motivated the American Tobacco Company to expand into markets for other tobacco products. The company used a “fighting brands” strategy to price cigarettes and other tobacco products lower than manufacturing costs thereby driving competitors in the market (Kluger, 1996). Despite the financial success of the American Tobacco Company, anti-competitive practices under the Sherman Antitrust Act disbanded the monopoly in 1911. The separation created four entities: American Tobacco Company (ATC), RJ Reynolds Tobacco Company (RJR), Liggett & Myers Tobacco Company (L&M), and P

Lorillard Company. In the following decades, the companies primarily competed through new product development and advertising, including advertisements targeting women and other target markets.

In his study *Tax, Price, and Cigarette Smoking: Evidence from the Tobacco Documents and Implications for Tobacco Company Marketing Strategies*, F.J. Chaloupka analyzes the pricing and price-related marketing strategies of tobacco companies to understand the impact of cigarette prices on smoking among youth, young adults, and adults. Using tobacco industry documents procured from the Roswell Park Cancer Institute, Chaloupka examines pricing strategies of the four largest tobacco companies, which included discount brands and Marlboro Friday.

As described above, for much of its history, the cigarette industry employed price leadership of dominant firms to initiate price increases and decreases of competitors in the market. A 1976 report from the business planning and analysis division of Philip Morris regarding pricing policy reveals “the general price level is determined by a small number of firms (price leaders); that no economic advantage can be obtained by any one firm pricing below the general price level; and that major disadvantages accrue to a firm which attempts a price above the general level. In short, the general price level results from some sparring among the potential price leaders, after which the rest of industry accepts the resulting price structure” (Morris, 1976). Furthermore, the report recognizes the uneasy relationship among firms in the industry. Although prices are well below the profit maximization level, attempting a sharp increase in prices would not produce equilibrium at the higher price but “would instead destroy the resiliency of the system” (Morris, 1976). According to Chaloupka, this reflects the awareness of growing price

sensitivity among young smokers, the market responsible for sustaining the long run profitability of the industry. Chaloupka states that increases in prices to generate short-run profits ultimately reduces the long-term number of youth smokers in the United States and therefore profits in the long-run. In addition, the report also reveals several other strategies including: “a straight pass through of the higher costs resulting from inflation; a pricing policy that would maintain the relatively high profit margins that had been earned historically; one which would provide earnings growth; one that would sustain the rate of return on assets; and a full inflation price relief strategy” (Morris, 1976).

During the late 1970s and 1980s, price increases per pack of cigarettes reflected the full inflation price relief strategy. As of December of 1975, premium brand manufacturers’ list cigarette prices were \$12.75 per thousand cigarettes for all major manufacturers. By September of 1981, prices rose to \$20.20 per thousand to maintain profits with rising inflation rates (Tobacco Reporter, 2000). At the end of period, the industry diverged from this strategy when Myron Johnston of Philip Morris anticipated federal excise tax increases in the early 1980s. Prices were no longer adjusted to reflect changing inflation rates but instead to cover the expected federal cigarette tax increase. Between February of 1982 and January of 1983, prices increased from \$20.20 to \$26.90 per thousand, approximately \$2.70 more than the imposed excise taxes. In order to maintain their young smoker consumer base, Johnston passed “on the increases in one fell swoop and [made] clear to smokers that the government [was] solely responsible for the price increases and [advertised] to that effect” (Johnston, 1987). Furthermore, Johnston suggested that consumers purchase more packs of cigarettes at lower prices.

According to Johnston, when consumers exhaust their supply and purchase more, they will be less likely to remember what they last paid and will be less likely to suffer “sticker shock.” As a result, Johnston suggests that price increases are not an incentive to stop smoking or reduce consumption (Johnston, 1987).

Due to the economic downturn of the early 1980s, coupled with the increase in cigarette prices by inflation and excise taxes of 1983, smokers changed their preference towards generic, discount brand cigarettes thereby increasing the market share. A 1983 report by RJ Reynolds Tobacco Company (RJR) emphasizes the company’s concerns with the price-sensitive environment. The company feared that “price wars” would result from the inclusion of generic brands in the market. RJ Reynolds Tobacco Company states that “there would be heavy competitive activity and differing margins associated with a new, multi-tier structure” (Hall, 1983). In addition, the company’s 1984 Strategic Research Report describes pricing as the main issue in the cigarette industry. RJ Reynolds Tobacco Company believed that younger adult smokers would need more than an inexpensive product to adapt a new brand. The report also states that value brands “would need a conspicuous second ‘hook’ to reduce possible conflict between younger adults’ value wants and imagery wants” (Hall, 1983). The most saleable “hooks” were based on product quality. As a result, RJ Reynolds Tobacco Company released “Project VB Assessor,” one of its first efforts in entering the discount market (RJ Reynolds, 1983). By early 1993, discount brands captured nearly 40% of the total cigarette market at a selling price of approximately \$48.98 per thousand. By comparison, regular sized premium brands sold for \$71.10 per thousand (Tobacco Reporter, 2000).

Philip Morris also used price discounts and advertising in the form of Marlboro Friday to impact the number of smokers in the United States. As discount brands captured larger shares of the market, the position of Marlboro brand decreased in the United States. By 1994, the company projected that Marlboro's share of sales would decrease from 22% to 18%. In an effort to prevent the market share decrease, Philip Morris "announced a major shift in business strategy designed to increase market share and grow long-term profitability in a highly price sensitive market" (Philip Morris Companies Inc., 1993). Through a series of promotional efforts beginning on April 2, 1993, the price per pack of Marlboro brand cigarettes decreased by forty cents. Consequently, due to the price leadership and dominant position of Marlboro in the market, the price of premium brands also reduced. The reduction in prices stimulated a sharp increase in youth smokers (Grossman, 1997). By the end of 1994, Marlboro's market share rose to 30% and the strategy increased the overall market share of the Philip Morris Company to 46.9%.

The influence of tobacco company price adjustments and marketing strategies not only disaffirm Jarvis' findings regarding the overall price elasticity of cigarettes but also suggest differing price elasticity between youth and young adult smokers. In its first quarter interim report to stockholders in 1969, Liggett & Myers Tobacco Company (L&M) describes the impact of state cigarette tax increases on cigarette sales (Liggett & Myers Inc., 1969). Noting the nine cent tax on cigarettes during this time, the report states: "There is strong evidence to indicate that the consumer demand for cigarettes is elastic, as it is for most other products, and that the state cigarette excise taxes do affect sales wherever they are imposed. According to the US Department of Agriculture, in 28

states where cigarette prices have increased 12% in the last two years, sales have declined by 6%; whereas in 21 other states where the price has increased 1%, sales have increased almost 1%" (Liggett & Myers Inc., 1969). The findings documented in the 1969 shareholders report mirror the short-run estimates of price elasticity derived from econometric studies of cigarette demand. Similarly, in "Economic Forecast: 1975-1980" Myron Johnston, financial analyst for Philip Morris Company, reveals that "the price elasticity of cigarettes [is] -0.43. This shows that a 10% increase in the retail price of cigarettes leads to a 4.3% decrease in unit sales" (Johnston, 1975). The report also notes, in a study conducted by the United States Department of Agriculture, an estimated price elasticity of -0.42. Additional reports, written by Philip Morris management associates and KPMG Policy Economics Groups, estimate the elasticity of cigarettes between -0.50 and -0.60.

Economic theory suggests several factors that describe young adult smokers sensitivity to price increases in comparison to adult smokers. These factors include: "the fact that young smokers who have been smoking for a shorter time are likely to be less addicted than older smokers and, as a result, will more quickly adjust to price changes; that youth have lower incomes, making them relatively more responsive to changes in prices; that peer effects are more important among youth, multiplying the effects of a price induced change in youth smoking; and that youth are more present-oriented and therefore, more responsive to changes in immediate smoking costs" (F.J. Chaloupka 2002, 2). In a 1981 memorandum, Johnston states "price elasticities are different for various demographic or socioeconomic groups" (Johnston, 1981). During the 1980s, Johnston contributes the declining growth rate of Marlboro Red to the price elasticity of

young adult smokers. Marlboro smokers, representing a younger age demographic, earn lower incomes and therefore are more responsive to price changes than older segments of the population who consume premium brands. Other reports and studies discuss the influence of cross-elasticities and substitution effects. In regard to the substitution effect, Johnston states that the price of gasoline is a contributing factor to decreasing cigarette sales. The sharpest declines in smoking prevalence among teenage males occurred in 1970 and 1980 when gasoline prices increased exponentially. Johnston also asserts the following:

With regard to the substitution effects, or cross-elasticities, I think the most important substitution effect is with gasoline. When it comes to a choice between smoking cigarettes or cruising around in his car, the average teenage male would probably choose the latter” (Johnston, 1981).

Given Johnston’s hypothesis, young smokers forgo cigarettes to purchase gasoline. This relates the price of cigarettes to the price of other services and income.

The variance between the price elasticity of cigarettes in Chaloupka’s analysis in comparison to Jarvis’ is due to the timing of relevant information and the number of external variables included in each calculation. Unlike Jarvis’ study, which analyzes smoking data through 2010, Chaloupka’s report analyzes marketing strategies and pricing information of tobacco companies during the 1960s through the 1980s. Furthermore, Chaloupka does not include the influence of bootlegging, differing tax rates between states, government legislation, and negative externalities in his analysis. Therefore, although Chaloupka’s research introduces the effects of cross-elasticities and substitution, his report implies that price is the most influential determinant of cigarette sales.

EFFECTS OF EXCISE TAXATION ON CIGARETTE PURCHASES IN NEW YORK STATE:

According to Chaloupka, increasing taxation on cigarettes is the most effective way to deter cigarette sales while reducing smoking rates. As suggested by Jarvis, however, high cigarette prices lead to increased tax-avoidant behaviors among smokers. In response to tax increases, the Center for Public Health and Tobacco Policy states, “smokers seek untaxed sources of cigarettes in other jurisdictions, the Internet, or from Native American Reservations” (*Cigarette Tax Evasion in New York*, 2011). The availability of cigarettes from untaxed sources provides opportunities for tax evasion and trafficking of cigarettes across state borders where excise taxes are low.

In “The Impact of Cigarette Excise Tax Increases on Purchasing Behaviors Among New York City Smokers,” Micaela H. Coady analyzes cigarette purchases in New York, where state and federal excise tax increases result in the highest cigarette pack price in the United States (See Page 16 – *State Excise Tax Rates on Cigarettes*). The study not only examines trends in tax-avoidant, adult smokers and their characteristics between 2003 and 2010 but also uses a multivariable logistic regression analysis to identify a correlation between a 2008 tax increase and the trafficking of cigarettes on the black market.

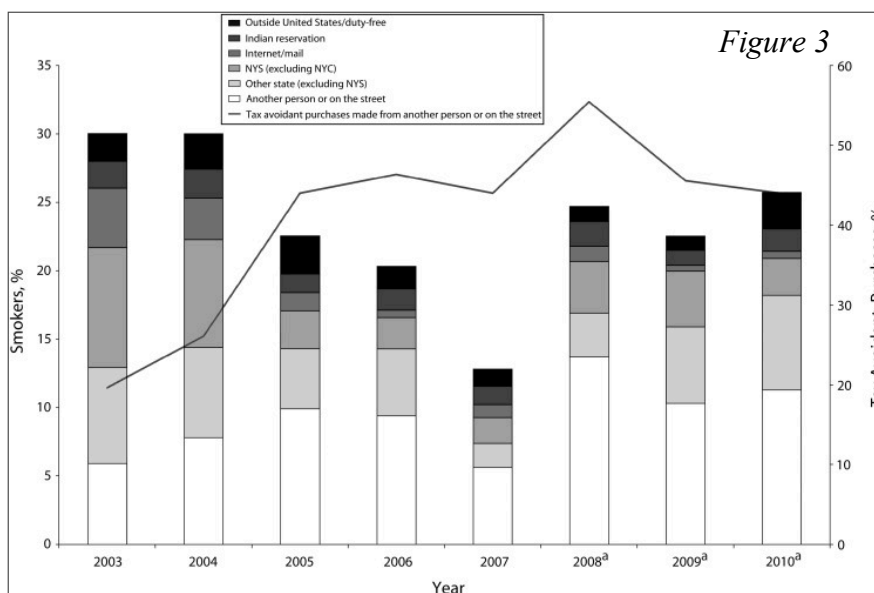
In the study, Coady uses data from the New York City Community Health Survey (CHS), a population-based, random-digit-dialed telephone survey of approximately ten thousand adults over the age of eighteen. The CHS adapted survey questions based on the Centers for Disease Control and Prevention’s Behavioral Risk Factor Surveillance System and incorporated questions on “current smoking, secondhand smoke exposure,

response to increases in cigarette taxes, and smoking cessation” (Coady 2013, 2). The survey was conducted in English, Spanish, Russian, and Chinese.

From 2003 to 2010, the CHS asked one question in order to document cigarette purchasing and tax avoidance behaviors: “Where did you get the last cigarette that you smoked?” Responses for tax-avoidant purchases included “outside New York State, internet/mail, another person, Indian reservation, duty-free, and outside the United States.” Approximately 3% of respondents were not included in the study due to the undisclosed nature of their cigarette purchase or if the participant rolled their own cigarette. Other questions prompted demographic responses such as age, gender, race/ethnicity, education, and employment status.

In order to assess trends in cigarette tax avoidance in New York, the study calculated percentages of responses and developed 95% confidence intervals for each

year. Based on the results in *Figure 3*, the prevalence of tax-avoidant cigarette purchases ranges from 30% in 2003 to 13% in 2007.



Although tax avoidance decreased by 53% between 2006 and 2007, the rate of avoidance increased to 25% in 2008 after the cigarette tax increase in the state. The results show

that most respondents who participated in tax-avoidant behavior received their cigarettes from “another person on the street.”

In addition, *Table 4 - Characteristics of Adult Smokers and Prevalence of Tax-Avoidant Cigarette Purchases by Select Characteristics* on pages 43 and 44 illustrates the characteristics of survey participants in New York and their relation to tax-avoidant purchases. In 2008, approximately 50% of smokers were between the ages of 25 and 44. Furthermore, more than 40% were Caucasian. Of the smokers surveyed, about 42% were low-income individuals and one quarter made tax-avoidant purchases in 2008. The table shows that tax avoidance is highest among those who bought their most recent cigarette from a carton versus a pack. Coady attributes this result to smokers seeking to stockpile cigarettes in other jurisdictions or purchasing more cartons in bulk to minimize the number of illegal transactions. The model also demonstrates that smokers aged 18 to 44 were more likely than other age groups to purchase cigarettes from people on the street. Furthermore, in comparison to Whites, Black smokers were nine times more likely to purchase cigarettes on the street. In 2008, the mean price per pack for street or other tax-avoidant forms of cigarette purchases was \$5.48 compared to the state price per pack of \$7.40. Coady affirms that the price differential is an incentive for price-sensitive smokers to participate in tax-avoidant behaviors.

In addition, the 2008 excise tax increase on tobacco products in New York influenced consumer purchasing habits. Approximately one fifth (21%) of adult smokers reported buying cigarettes from street vendors while an additional 21% admitted to purchasing cigarettes outside New York state lines through the Internet, the mail, at an Indian Reservations, and at duty free shops. The study underscores the importance of

street vendors in the black market for untaxed cigarettes, especially among the aforementioned price-sensitive smokers.

Table 4

Characteristics of Adult Smokers and Prevalence of Tax-Avoidant Cigarette Purchases by Select Characteristics: New York City Community Health Survey, 2008

Variable	% (95% CI) or Mean (SE)	Prevalence, % (95% CI) or Mean (SE)	<i>P</i> ^c
Total sample	100	24.7 (21.0, 28.9)	
Demographics			
Age, y			.27
18–24	12.9 (9.5, 17.2)	29.7 ^a (16.0, 48.4)	
25–44	47.5 (43.2, 51.8)	20.2 (15.3, 26.1)	
45–64	30.7 (27.4, 34.3)	24.4 (19.6, 29.9)	
≥ 65	8.9 (7.1, 11.0)	32.5 (22.2, 44.8)	
Gender			.5
Male	55.5 (51.3, 59.6)	25.5 (20.0, 32.0)	
Female	44.5 (40.4, 48.7)	25.2 (20.3, 30.8)	
Race/ethnicity			.73
Non-Hispanic White	40.4 (36.5, 44.5)	24.2 (18.7, 30.7)	
Non-Hispanic Black	24.2 (20.8, 27.9)	29.2 (21.5, 38.4)	
Hispanic	24.2 (20.4, 28.3)	21.3 (14.7, 29.9)	
Asian	9.2 (6.8, 12.3)	23.9 (14.0, 37.7)	
Other	2.1 (1.3, 3.4)	20.7 ^a (10.5, 36.7)	
Borough			.77
Bronx	16.4 (13.8, 19.5)	21.8 (15.2, 30.3)	
Brooklyn	30.6 (27.0, 34.3)	23.1 (16.6, 31.2)	
Manhattan	18.1 (15.1, 21.4)	27.7 (20.0, 37.0)	
Queens	27.6 (23.8, 31.8)	25.9 (18.8, 34.5)	
Staten Island	7.3 (5.7, 9.2)	23.1 (15.0, 33.9)	
Education			.28
≤ high school	20.0 (19.9, 27.4)	29.1 (19.7, 40.7)	
High school graduate	23.9 (20.8, 27.7)	24.3 (18.0, 32.0)	
Some college	20.2 (17.7, 24.6)	25.2 (17.7, 34.6)	
≥ college	35.9 (28, 35.3)	23.7 (18.2, 30.3)	
Employment status			.05
Employed	64.6 (60.6, 68.5)	23.3 (17.9, 29.8)	
Unemployed	9.9 (7.5, 12.9)	25.2 (15.2, 38.7)	
Not in labor force	25.5 (22.2, 29.1)	32.5 (24.6, 41.6)	
Household poverty, % FPL			.52
< 200	42.4 (38.1, 46.8)	26.6 (20.9, 33.3)	
200–399	17.9 (15.0, 21.2)	21.7 (14.4, 31.3)	
≥ 400	30.4 (26.7, 34.4)	23.4 (17.4, 30.8)	
Don't know	9.3 (6.9, 12.5)	29.9 (17.4, 46.4)	

Current smoking characteristics			
Consumption, cigarettes/d			.16
Light (< 11)	70.5 (66.9, 73.9)	26.3 (21.8, 31.1)	
Heavy (\geq 11)	29.5 (26.1, 33.1)	20.6 (14.6, 28.2)	
Total	9.5 (0.3)	9.80 (0.9)	.74
Smoking frequency			.07
Nondaily	35.4 (31.4, 39.7)	30.9 (24.1, 38.7)	
Daily	64.6 (60.3, 68.6)	21.7 (17.9, 26.2)	
Quit attempt in the past y			.02
Yes	61.5 (57.3, 65.5)	21.1 (16.5, 26.5)	
No	38.5 (34.5, 42.7)	30.2 (24.2, 36.9)	
Cigarette pack price, \$	7.40 (0.1)	5.48 (0.3)	<.001
Source of most recent cigarette			<.001
Pack	76.0 (72.2, 79.3)	17.5 ^b (13.6, 22.2)	
Single	6.6 (4.7, 9.2)	44.7 ^b (31.6, 58.5)	
Carton	10.3 (8.3, 12.8)	67.5 (56.3, 77.0)	

Note. CI = confidence interval; FPL = federal poverty level (according to 2000 US Census). Characteristics of current smokers and mean pack price are not age-standardized to the US 2000 standard population.

^aEstimate should be interpreted with caution: relative SE (a measure of estimate precision) is > 30% or the sample size is < 50, making the estimate potentially unreliable.

^bSignificant difference within source of most recent cigarette (reference level = pack), among tax-avoidant smokers, derived from pairwise *t* test ($P < .05$).

Due to the correlation between increased excise tax rates and cigarette trafficking, local, state, and national efforts have attempted to limit and to prevent tax-avoidance among smokers. In 2005, the United States Bureau of Alcohol, Tobacco, Firearms, and Explosives required all major credit card companies and PayPal to ban payment processing for all tax-free, Internet cigarette sales for vendors. Similarly, the United States Postal Service and FedEx developed policies restricting mail orders for black market cigarette sales (Ribisl, 2011). In addition, under federal jurisdiction, in 2010, Congress enacted the Prevent All Cigarette Trafficking Act, which imposed additional requirements on Internet and mail order sellers of tobacco products. Furthermore, at the state level, during 2011, New York State regulated cigarette wholesalers by imposing a state tax on tobacco products before selling them to Native American Reservations. The state of New York also sued retailers located on Native American Reservations for tax evasion resulting from the sale of cigarettes to nontribal customers. Lastly, in 2013, New York City filed a Citizen Petition with the Food and Drug Administration in order to develop a track-and-trace system that would prevent untaxed cigarettes from “compromising the public health benefit of excise taxes” (Citizen Petition, 2013).

Unlike the analysis performed by Chaloupka, Coady’s study reaffirms Jarvis’ position regarding the inelastic demand for cigarettes in the United States. As made evident by the data in New York State, excise taxes and other changes to the price per pack of cigarettes are not deterrents for consumer purchases. The price differential between taxed and non-taxed cigarettes creates incentive for price-sensitive smokers to participate in tax-avoidant behaviors. The availability of less expensive alternatives, as suggested by both Coady and Jarvis, not only creates a disincentive for smokers to quit

the behavior but also contributes to increased youth smoking rates. According to Coady, in order to decrease tax-avoidance in New York, “tax increases should be paired with enforcement strategies that limit the flow of untaxed, cheap cigarettes into jurisdictions with high cigarette prices” (Coady 2013, 9).

ADVANTAGES AND DISADVANTAGES OF EXCISE TAXES ON CIGARETTES:

As suggested by Smith and Pigou, excise or sin taxes are advantageous in comparison to other forms of taxation due to their predictability and easiness to administer. Unlike ad valorem excise taxes, the tax is not connected to the product’s price and therefore does not automatically adjust with inflation. As a result, government revenue is protected against the aforementioned price wars and manipulations outlined in the section entitled “Price Elasticity of Cigarettes Formulated by Tobacco Companies”. In regards to cigarettes, because the tax is not sensitive to price changes, the government can more easily budget and predict tobacco tax revenue.

In contrast, excise taxes on specific items are less effective than ad valorem excise taxes and other forms of taxation because inflation erodes their value and changing the product can reduce collectable amount. Because there is not automatic adjustment for inflation on excise taxes, the government must implement additional tax rate increases. Without enforcement, as Coady suggests in the section entitled “Effects of Excise Taxation on Cigarette Consumption in New York State,” however, smokers will participate in tax-avoidant behavior to evade the additional imposed tax. Therefore, local, state, and federal revenues decrease and governments are unable to afford the costs of

negative externalities associated with smoking and other “sinful” behaviors. In addition, in order to reduce the impact of specific taxes on consumption, companies can change the size and composition of their product. By changing the size of the cigarette or increasing the size of the pack or carton, cigarette manufacturers can increase the selling price of their product while achieving economies of scale and lessening the burden of the imposed tax. In turn, due to product enhancements, consumers will purchase the product less often and government revenue will decrease.

CONCLUSION:

The combination of the studies conducted by Jarvis and Coady not only emphasize the inelastic properties of tobacco product sales in the United States but also the negative effects of cigarette taxation. Although Jarvis’ analysis does not examine consumers’ ability to purchase cigarettes at tax-free Indian reservations, online, or through wholesale smuggling and the black market, the survey completed by Coady illustrates the implications of these sales in the state of New York. Although excise taxes imposed by local, state, and federal governments attempt to deter smoking behavior, price increases are not an effective deterrent for cigarette sales. In fact, higher prices incentivize consumers to participate in tax-avoidance, due to the addictive nature of tobacco products. If the United States federal government intends to use cigarette tax revenue to pay for negative externalities, such as increased health care costs, additional enforcement and regulation of non-taxable sales channels are required. The effects of cigarette taxation and regulation, as well as excise taxes in general, are relevant topics for

contemporary government and policy decisions and will continue to be important for the 2016 presidential election and preceding years.

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