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THE ROLE OF MARKETING PRACTICES AND TOBACCO CONTROL
INITIATIVES ON SMOKELESS TOBACCO SALES

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ABSTRACT OF THE DISSERTATION

The role of marketing practices and tobacco control initiatives on
smokeless tobacco sales

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Background: While much is known about the impact of tobacco control policies on the demand for cigarettes, there is relatively little known about how tobacco control interventions and tobacco industry activities may impact smokeless tobacco (SLT) demand. The purpose of this study was to examine how tobacco control policies and retail promotion may affect aggregate SLT sales, specifically moist snuff (MST) sales which makes up the vast majority of the SLT market.

Methods: Nielson market-level retail scanner data for moist snuff tobacco products in US convenience stores from 2005 to 2010 for 30 market areas, totaling 180 market-year observations, were used to examine the impact of tobacco control policies and retail promotion on sales. Tobacco control policy variables, including cigarette and MST excise taxes, state tobacco control program expenditures, and state clean indoor air laws, were merged to Nielsen market areas by state and year. Regression models were estimated for per capita sales volume and per capita dollar sales of MST products overall as well as stratified by pack size and brand.

Results: Higher cigarette tax was significantly associated with lower sales volume of single pack MST products. A higher level of per capita state level tobacco control program expenditures was found either to have no significant association with MST sales volume or be associated with increased MST sales volume. MST sales in markets with a weight-based MST excise tax structure appeared to be higher than in markets with an ad valorem tax structure. A higher MST product price was associated with a higher sales volume of premium single packs and had no significant effect on non-premium single packs sales volume. A higher MST price was also associated with high MST dollar sales for both premium and non-premium single packs.

Conclusions: This study observed that overall MST products were both complements and substitutes to combustible cigarettes. However, results vary depending on pack size and brand as well as region of the country. It is possible that MST are complements for some segments of the population and substitutes for others. A weight-based tax structure for MST products generally favors premium brand products.

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TABLE OF CONTENTS

| | |
|---|------|
| ABSTRACT OF THE DISSERTATION | ii |
| ACKNOWLEDGEMENT | iv |
| TABLE OF CONTENTS..... | v |
| LIST OF TABLES | viii |
| LIST OF FIGURES | x |
| CHAPTER 1: INTRODUCTION | 1 |
| Trends in prevalence and consumption of tobacco in the US | 2 |
| Policy interventions to reduce tobacco use | 5 |
| Impact of taxation on tobacco use..... | 7 |
| Impact of clean indoor air laws on tobacco use | 11 |
| Impact of comprehensive tobacco control programs on tobacco use..... | 12 |
| Industry developments and tobacco policy | 13 |
| <i>New SLT products and pricing</i> | 13 |
| <i>Tax policy for cigarettes and SLT products</i> | 15 |
| <i>Industry pricing practices</i> | 17 |
| A recent public policy intervention: The Family Smoking and Tobacco Control Act . | 19 |
| SLT and harm reduction..... | 20 |
| Summary | 20 |
| CHAPTER 2: DESCRIPTIVE ANALYSIS OF ENVIRONMENT | 22 |
| Tobacco control and industry practices..... | 22 |
| <i>Tobacco excise taxes</i> | 22 |
| <i>Cigarette excise tax</i> | 23 |
| <i>Moist snuff excise tax</i> | 25 |
| State tobacco control program expenditures | 29 |
| Clean indoor air laws..... | 32 |
| <i>State clean indoor air laws</i> | 33 |
| <i>Local clean indoor air laws</i> | 35 |
| Tobacco industry practices..... | 36 |
| <i>Types of SLT</i> | 37 |
| <i>Moist snuff</i> | 37 |

| | |
|--|----|
| <i>Moist snuff flavors</i> | 38 |
| <i>Moist snuff brands and price tiers</i> | 40 |
| Federal laws and policies | 41 |
| Summary | 42 |
| CHAPTER 3: METHODS | 44 |
| Data source | 44 |
| Measures | 46 |
| <i>Moist snuff (MST) sales</i> | 46 |
| <i>Tobacco industry practices</i> | 47 |
| <i>Tobacco control policies</i> | 48 |
| <i>Excise tax and price</i> | 48 |
| <i>State tobacco control program expenditures</i> | 49 |
| <i>State clean indoor air laws</i> | 49 |
| Linking policy level variables to market data | 49 |
| Sample size | 51 |
| Model specifications | 51 |
| Alternative model specifications | 53 |
| <i>Single and multiple packages</i> | 53 |
| <i>Premium and non-premium brands</i> | 54 |
| <i>Region</i> | 55 |
| CHAPTER 4: RESULTS | 56 |
| Descriptive analysis | 56 |
| Regression analysis | 60 |
| <i>Per capita MST unit sales: impact of tobacco control policies</i> | 60 |
| <i>Per capita MST unit sales: price and tax impact</i> | 61 |
| <i>Time trend, seasonality, and per capita sales volume</i> | 62 |
| <i>Per capita MST dollar sales results</i> | 64 |
| <i>Tax and price elasticities</i> | 67 |
| <i>Premium and non-premium brands</i> | 68 |
| <i>Per capita MST single pack unit sales by brand</i> | 68 |
| <i>Per capita MST single pack dollar sales by brand</i> | 72 |
| <i>Per capita MST unit sales by product features</i> | 75 |
| <i>Per capita MST sales dollars by product features</i> | 78 |
| <i>Per capita MST unit sales by region</i> | 79 |

| | |
|----------------------------------|----|
| CHAPTER 5: DISCUSSION..... | 82 |
| Summary of main findings..... | 83 |
| Strengths and limitations..... | 88 |
| Policy implications..... | 89 |
| Future research directions | 91 |
| APPENDICES | 99 |

LIST OF TABLES

- Table 2.1. State and federal cigarette excise taxes, United States – 2005-2010
- Table 2.2. State smokeless excise taxes, United States – 2005-2010
- Table 2.3. Total state and federal tobacco control appropriations (in millions of dollars) - United States, 2005–2010
- Table 2.4. 100% Smoke-free Definitions, American Nonsmokers’ Rights Foundation
- Table 2.5. Effective dates of state comprehensive clean indoor air laws – United States, 2002-2016
- Table 2.6. Percentage of state population with local comprehensive smoke-free laws for 24 states that do not have a statewide comprehensive smoke-free law — United States, December 31, 2015
- Table 2.7. Characteristics of smokeless tobacco sold in convenience stores in the US, 2005-2010
- Table 2.8. Promoted smokeless tobacco products sold in convenience stores in the US, 2005-2010
- Table 3.1. States and Census Regions included in the Nielsen Convenience Store Markets
- Table 4.1. Type of MST excise tax in Nielsen markets, 2005-2010
- Table 4.2. Policy characteristics of Nielsen markets, 2005-2010
- Table 4.3. MST sales and product characteristics in Nielsen markets, 2005-2010
- Table 4.4. Effect of tobacco control policies & retail promotions on per capita MST sales (Units) overall and by pack size
- Table 4.5. Effect of tobacco control policies & retail promotions on per capita MST sales (Dollars) overall and by pack size
- Table 4.6. Estimated elasticities of moist snuff and cigarettes
- Table 4.7. Effect of TC policies & retail promotions on per capita MST sales (Units) of single packs: results for brands
- Table 4.8. Effect of TC policies & retail promotions on per capita MST sales (Dollars) of single packs: results for brands
- Table 4.9. Effect of tobacco control policies & retail promotions on per capita MST sales (Units) by specific product characteristics
- Table 4.10. Effect of tobacco control policies & retail promotions on per capita MST sales (Dollars) by specific product characteristics
- Table 4.11. Effect of tobacco control policies & retail promotions on per capita MST sales (Units) of single packs by region
- Table 4.12. Summary of results for MST unit sales

Appendix A: Effect of tobacco policies & retail promotions on per capita MST sales
(Units) of two packs: results for brands

Appendix B: Effect of tobacco control policies & retail promotions on per capita MST
sales (Dollars) of two packs: results for brands

Appendix C: Effect of tobacco policies & retail promotions on per capita MST sales
(Units) of five packs: results for brands

Appendix D: Effect of tobacco control policies & retail promotions on per capita MST
sales (Dollars) of five packs: results for brands

LIST OF FIGURES

Figure 1.1. United States Consumption of Smokeless Tobacco: 1970-2008

Figure 3.1. Nielsen's 30 Convenience Store Markets

CHAPTER 1: INTRODUCTION

Tobacco products are consumed in a variety of forms including both combustible (cigarettes, pipe tobacco, cigars) and non-combustible products (smokeless tobacco). All tobacco products are dangerous and addictive. These various tobacco products have potentially different levels of addiction and toxicity, although it is generally agreed that products that are smoked and inhaled are the most hazardous.(1) Roughly a quarter of the US population uses *some* form of tobacco, although cigarettes remain the most prevalent type of tobacco consumed.(2) Cigarette smoking is the single most preventable cause of premature illness and death in the United States, with 444,000 deaths (3) and an estimated 8.6 million cases of serious illness attributed to smoking annually.(4)

Smokeless tobacco (SLT) in the US is usually consumed in two forms: chewing tobacco and moist snuff. Chewing tobacco is made up of long strands of tobacco, while snuff tobacco is a fine grain tobacco, which comes in a moist blend as well as dry or nasal varieties. Moist snuff is the most popular form of snuff,¹ leading all types of smokeless tobacco in revenues and marketing expenditures. (5) Swedish-style snus is a more recent entry in the US SLT market and is characterized as having a lower level of tobacco-specific nitrosamines. These types of smokeless tobacco as well as the different brands within each type vary widely in the amount of nicotine and nitrosamine.(6-8) SLT use increases the risk of multiple cancers, oral diseases, as well as cardiovascular disease.(9-11) The health risks associated with SLT are believed to be lower than the

¹ Most data systems (e.g., tobacco surveillance systems, tax revenue) do not distinguish between moist snuff and chew tobacco when collecting information on smokeless tobacco (SLT). For this reason and given that chew makes up a small and declining proportion of the SLT market, the research proposed for this dissertation will focus primarily on the regulatory policies that apply to moist snuff (e.g., excise tax).

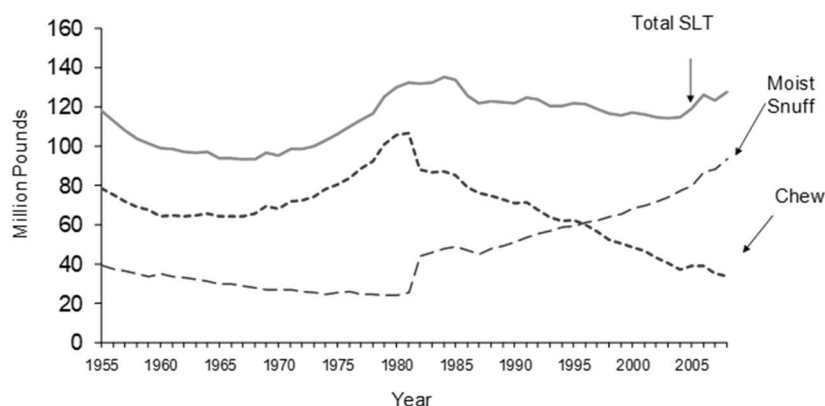
ones associated with conventional cigarettes (12) and experts estimate that low nitrosamine SLT products including snus are 90% less harmful than conventional cigarettes.(13) However, new research has found that the nicotine levels of moist snuff products have increased over time for several brands making them potentially more dangerous. Despite this potential to adversely affect health, market share has grown for these brands.(14)

Trends in prevalence and consumption of tobacco in the US

Tobacco use is a behavior substantially influenced by social and political factors and trends in tobacco use behavior must be interpreted in this context. In the United States, SLT use, most notably chewing tobacco or chew snuff, was common at the beginning of the 20th century, but then started a rapid decline in the 1920s, coinciding with the increasing popularity of cigarettes and decreasing social acceptability of spitting.(15) Meanwhile, consumption of cigarettes steadily increased from the early to mid-20th century following the growth of factory-made cigarettes and heavy cigarette advertising and promotion, peaking in about 1963.(16) At the time, about 40% of US adults were regular smokers, with about half of men and about one-third of women being regular smokers.(1) However, cigarette smoking began a steady decline after the 1964 release of the Surgeon General's Report on Smoking and Health, the first report issued on the damaging effects of smoking on health. In fact, since the report, the prevalence of smoking declined by nearly half, in large part because of policy interventions specifically targeted to reduce cigarette consumption including taxation, clean indoor air laws, and restricting the sales and promotion of cigarettes to youth.(1) In 2012, 18.1% of US adults

were current smokers, representing approximately 42.1 million adults.⁽¹⁷⁾ Cigarette smoking prevalence remains significantly higher among males (20.5%) than females (15.8%).⁽¹⁷⁾ However, most of the decline in prevalence from 1965 to 2012 reflects reductions in current smoking among males; the decline in females was steady but less dramatic.

Between 1970 and the mid-1980s, smokeless tobacco habits and consumption in the US rose dramatically but remained fairly stable during the 1990s.⁽¹⁸⁾ However, the steady level of SLT consumption over time masks the divergent patterns of chew and moist snuff consumption. Consumption of chew snuff precipitously declined while consumption of moist snuff steadily increased (see Figure 1). Indeed, chew tobacco sales represented less than 5% of the SLT market in 2011.⁽¹⁹⁾ Thus, despite the lack of growth in *overall* SLT consumption, there has been a sharp increase in sales of moist snuff because of a shift in consumer preferences for SLT products. There is no research specifically examining this shift but increased marketing and the growing diversity of products are suspected factors. For example, marketing expenditures for chew tobacco declined by 25% between 1986 and 2008 while expenditures for moist snuff increased by over 500% over the same time period.⁽⁵⁾ In addition, the increased availability of pouched portions of moist snuff products (e.g., moist snuff in a small, teabag-like pouch that is designed to be spit-free) may improve its appeal over chew tobacco.⁽¹⁹⁾ Innovation in industry marketing and product design can be a strong driver of use.

Figure 1.1. Consumption of Smokeless Tobacco: 1970-2008

Source: US Dept of Agriculture. *Tobacco Situation and Outlook Yearbook*; US Dept of Treasury TTB

The changes in moist snuff advertising and product formulation may also attract *different* SLT users. Not only has the pattern of various types of smokeless tobacco consumption changed but the demographic characteristics of SLT consumers have also shifted. Before the 1970s, SLT use was predominantly a behavior of older men but the industry's increased marketing and expansion of product brands and features likely reversed low rates of use among youth and young adults.(20) From 1970 to 1991, the regular use of moist snuff by 18-24 year old males increased from less than one percent to 6.2%. Conversely, SLT use among males ages 65 and older decreased by from 4% to 2.2%.(21)

Between the late 1980s and early 2000s, there were substantial reductions in SLT use among adolescent and adult males.(22, 23) In particular, the youngest and oldest male age groups showed the greatest decline while adults ages 25-44 showed the smallest declines. SLT use is still considered a predominantly male behavior, with certain demographic subgroups at higher risk for use including whites, rural residents, and persons with less education and lower income.(22, 23) Analyzing data from the 2003-

2005 National Survey on Drug Use and Health (NSDUH), Timberlake and colleagues found four distinct groups of SLT users including older chew users, younger poly-tobacco users, skilled laborers, and educated professionals, suggesting increased demographic heterogeneity among SLT users. (24) This could also be due, in part, to the increased diversity of SLT products.

The 2013 NSDUH provide some recent figures on prevalence of SLT use. In 2013, an estimated 8.8 million Americans (3.4%) used smokeless tobacco and rates of past month use of SLT (4.5%) were similar to rates in 2002.(25) Past month SLT use was substantially higher among males than females (6.5% vs. 0.4%). High rates of past month SLT use were found among adults ages 18-25 (5.8%), those in the Midwest (3.9%) and South (4.1%), and those in non-metropolitan areas (6.7%).

Policy interventions to reduce tobacco use

Public policy interventions to address tobacco use can be justified as a response to a market failure. Some of the most salient reasons as to why this market failure occurs include incomplete information about the health consequences of tobacco use and the presence of negative externalities that affect other members of society.(26) The long delay between tobacco use initiation and onset of disease as well as the tobacco industry's efforts to hide or distort the risks of tobacco use have contributed to the public being inadequately informed about the consequences of tobacco.(26) The externalities associated with tobacco use include the financial costs borne by others due to the physical consequences of smoking (disease or death). According to the 2010 Personal Health Care Expenditures report by the Centers for Medicare & Medicaid Services, smoking

contributed to \$170.6 billion in total health care expenditures and over 60% of these annual health care expenditures were reimbursed by public funds,² either Medicaid, Medicare, or other federal funds.(1) Of course, the damage that smokers do to themselves, or negative externalities, is also relevant, particularly in the case of SLT use where there is no secondhand smoke or risk of property damage from fires. Public policy interventions to reduce SLT use can correct for externalities such as a person's inability to properly discount future events (i.e., the costs of future damage to health from today's consumption of tobacco) and thus, their failure to exercise self-control.(27) For example, in taxing tobacco the government is providing a commitment device to the consumer that cannot be evaded and therefore, such taxation has the potential to address the externalities and make the consumer better off.

Policy interventions to reduce the harm from tobacco include clean indoor air laws, taxation, and state-level comprehensive tobacco control programs. These efforts have primarily focused on cigarettes. As such, it is possible that such policies with an emphasis on cigarette smoking may serve to cause substitution of SLT for smoked tobacco products, thereby indirectly promoting tobacco use. This may be especially pertinent for SLT use, particularly in the context of marketing messages for SLT which imply it can substitute for cigarettes. It follows that the body of evidence demonstrating the effectiveness of tobacco policy interventions is largely restricted to cigarettes. There are very few research studies that examine the overall impact of tobacco policy on youth or adult SLT prevalence.

² Private health care expenditures would constitute an externality only to the extent that others pay for such care or if premiums for a particular group were to rise and therefore, made other consumers worse off, perhaps by reducing their health care consumption.

Impact of taxation on tobacco use

Increasing the price of cigarettes through taxation has been highly effective in reducing cigarette use both in frequency and prevalence.(28) Most studies of cigarette demand produce price elasticity estimates in the range of -0.3 to -0.5, implying that a 10% increase in price reduces overall consumption by about 3 to 5% with higher estimates for youth and young adults.(29) The extensive evidence supporting the effectiveness of increased tobacco excise taxes and prices in reducing overall tobacco consumption and prevalence has almost certainly stimulated interest in raising taxes for reasons beyond simply generating revenue. Between 1990 and 2009, the federal excise tax on cigarettes rose from 16 cents to \$1.01 per pack and the average state cigarette excise tax more than quadrupled.(29) During this time period, the inflation-adjusted price of cigarettes increased by more than 125%.(29) Huang and Chaloupka (2012) suggested that the 2009 federal tobacco excise tax increase on cigarettes and SLT resulted in hundreds of thousands of fewer youth smokers and SLT users.(30) Based on data from the Monitoring the Future survey of 8th-, 10th-, and 12th-grade students, they estimated a price elasticity of -0.44 to -0.6 for cigarettes, implying that a 10% increase in cigarette price will reduce the smoking prevalence among youth by about 4.4% to 6% and a price elasticity for SLT of between -1.2 and -1.8, implying that that a 10% increase in the price of SLT will reduce the rate of SLT prevalence among youth by about 12% to 18%.

Oshfeldt and Boyle were the first to empirically study the effect of SLT excise taxes on adult SLT use in the US.(31) They obtained state-level prevalence estimates of SLT use from the September 1985 Current Population Survey (CPS). At the time, only 18 states imposed excise taxes on both chewing tobacco and snuff (plus two states taxed

chew only) and all of these tax rates were ad valorem (i.e., percentage of wholesale price).(32) As of July 2014, 49 states had an excise tax on snuff, of which 22 were weight-based.(33) The authors found that higher excise taxes on SLT did lower rates of use, holding other factors constant. A 10% increase in the SLT excise tax rate was associated with a reduction in snuff use prevalence of about 4 to 6% and a 10% increase in the *cigarette* excise tax rate was associated with a 4 to 6% *increase* in snuff use, suggesting cigarettes and snuff were substitutes. Expanding on their earlier study, Ohsfeldt, Boyle, and Capilouto used the same data from the September 1985 CPS to examine the impact of SLT excise tax rates and state laws restricting smoking.(34) They found that higher SLT excise taxes were associated with reduced likelihood of SLT use among males but no effect of restrictive smoking laws on SLT use. However, it should be noted that the smoke-free air movement was in its infancy at the time these data were collected; in fact, momentum for clean indoor air policies grew following the release of the 1986 Surgeon General's Report on the health consequences of secondhand smoke.(35)

Chaloupka, Tauras, and Grossman examined the price responsiveness of youth to SLT excise taxes based on 1992, 1993, and 1994 Monitoring the Future surveys of 8th, 10th, and 12-grade students.(36) The average *tax* elasticity of male youth SLT participation was -0.056. Without available price data for SLT, they converted tax elasticity of SLT to price elasticity of SLT by assuming that a 1% increase in SLT tobacco taxes would result in a 1% increase in SLT tobacco prices and that SLT tobacco taxes were approximately 14% of the retail price of SLT products. Given these assumptions, they estimated that a 10% increase in the *price* of SLT would reduce

consumption among young males by about 5.9%, with much of the reduction attributed to a lower number of young male SLT users (versus lower frequency of use). They also found that young men living in counties within 25 miles of a state with a lower SLT tax would be more likely to cross state borders to purchase SLT and eliminating these opportunities could reduce the likelihood of SLT use by about 1%. Other policies limiting youth access to tobacco also showed negative and significant impacts on SLT consumption.

Based on 1997 US data compiled by Goel and Nelson (37), SLT taxes only had a negative and significant impact on SLT participation in male youth and adult women but even the magnitude of these effects were low. Contrary to Ohsfeldt, Boyle, and Capilouto (34), Goel and Nelson found indoor smoking restrictions were effective in reducing SLT use.(37)

Most recently, Tauras and colleagues utilized data extracted from the 1995, 1997, 1999, and 2001 National Youth Risk Behavior Surveys (YRBS) to study determinants of SLT demand among male youth.(38) They reported -0.197 and -0.121 as the upper and lower bounds of the estimated tax elasticities of male youth SLT use prevalence, considerably larger than the -0.056 tax elasticity estimated by Chaloupka, et al. for male youth.(36) In addition, their examination of the cross-price elasticity of SLT demand and cigarettes indicated SLT products and cigarettes were economic complements in consumption for young males, unlike adults for whom previous evidence suggests that the SLT and cigarettes were economic substitutes.(34) They also found limited evidence that other tobacco control policies (i.e., purchase/possession/use laws, random inspection

requirements, smoking restrictions in high schools, vending machine restrictions) reduced SLT demand among male youth.

In sum, most research finds that higher SLT taxes lead to lower use among young people and adults, although at least one study suggests that both youth and adults may not be sensitive to SLT tax. In addition, there is inconsistent evidence as to whether SLT use is a substitute or a complement to cigarette smoking although research leans toward it being a substitute (e.g., as the price of cigarettes increase, the demand for SLT increases), particularly for adults. However, most of the existing SLT studies analyzed data collected prior to the adoption and implementation of major tobacco control initiatives, such as the 1998 Master Settlement Agreement (MSA) and subsequent funding for tobacco prevention programming, escalation of state cigarette tax rates since 2002, growth of clean indoor air laws, particularly after 2000 as well as the implementation of the 2009 Family Smoking Prevention and Tobacco Control Act (Tobacco Control Act). In the only recent study considering some of these factors, Dave and Saffer examined the simultaneous effects of SLT advertising, SLT tax rates, and cigarette taxes on SLT use while controlling for state spending on tobacco control.⁽³⁹⁾ Based on data from the 2003-2009 Simmons National Consumer Survey, their study suggested that SLT products are complements to cigarettes for the average male.⁽³⁹⁾ The impact of tobacco control interventions on tobacco use in what is now a vastly different policy environment must be further investigated. It is also worthwhile to assess the impact of health policy interventions on tobacco products like SLT that potentially serve as economic substitutes or complements for cigarettes. Combined with the broader appeal of SLT products and promotion of SLT products to cigarette smokers, there is the concern of increased dual

use, or contemporaneous use of SLT and cigarettes, if smokers turn to SLT when they are unable to smoke.

Impact of clean indoor air laws on tobacco use

Justifications for enacting smoke-free air policies are that such policies reduce exposure to secondhand smoke, limit opportunities to smoke, and may alter the social acceptability of smoking. Beginning in the 1970s, an increasing numbers of states and communities adopted and strengthened policies to limit smoking in public and private places. By 2010, every state had some type of policy to restrict smoking in at least some venues, with nearly three-quarters of the U.S. population residing in a jurisdiction that bans smoking in restaurants, bars and/or private worksites.(28) Extensive clean indoor laws have generally found to be associated with decreased smoking prevalence and reduced consumption among smokers.(40-42) Levy and Friend estimate that comprehensive smoke-free air policies can be expected to reduce smoking prevalence by roughly 10%.(41)

Research on the effect of indoor smoking restrictions on SLT use is also somewhat mixed but suggests the effect is limited if there is any. Ohsfeldt, et al. used data from September 1985 CPS to examine the impact of state laws restricting smoking (as well as SLT excise taxes discussed earlier) and found such laws had no effect on SLT use.(34) However, as mentioned previously, the smoke-free air movement was in its infancy at the time that these data were collected and the momentum for clean indoor air policies picked up after the release of the 1986 Surgeon General's Report on the health consequences of secondhand smoke.(35) Mumford and colleagues studied the influence of *self-reported* workplace smoking bans as well as SLT and cigarette excise taxes on the

concurrent use of cigarettes and SLT.(43) Using data from four waves of the CPS from 1992 to 2002, they found that workplace smoking bans decreased smoking among SLT users *and* SLT use among smokers.

A more recent study examined the association between state indoor smoking restrictions and prevalence of SLT.(44) Using data from the Behavioral Risk Factor Surveillance System (BRFSS) for a 10-year period from 1995-2004, Adams, Cotti, and Fhurmann studied whether SLT use among current smokers increases after a smoking ban was imposed in bars by a state or municipality compared with places without such a ban.(44) Their results strongly suggested that SLT and cigarettes were substitutes, finding that a smoking ban in bars increased SLT use by 2.93% for smokers, nearly double the rate of SLT use among this group.

Impact of comprehensive tobacco control programs on tobacco use

There is strong evidence that expenditures for state-level comprehensive tobacco control programs, which may also work to expand clean indoor air laws and increase tobacco prices through higher excise taxes³, are independently associated with declines in youth and adult smoking prevalence.(45-48) For example, Farrelly estimates that doubling the per capita cumulative funding for state tobacco control programs would lead to a 4% decrease in current and established smoking among youth and a 1% to 1.7% decrease in current smoking among adults.(47, 49) In a recently published study, Farrelly et al. were the first to *simultaneously* examine the influence of cigarette prices, clean indoor air laws, and state tobacco control program funding on young adult smoking

³ Comprehensive tobacco control programs have often been funded through increased cigarette excise taxes.

outcomes.(48) Their study is also unique in that it analyzes data from the 2002-2009 National Surveys on Drug Use and Health, a time of tremendous growth in all three measured outcomes. Similar to their previous work among youth and adults, they found that increased state tobacco control program funding was associated decreased current and established smoking among young adults. In addition, they found increased clean indoor air coverage was associated with decreased current and established smoking among young adults. In contrast to other studies, they found no effect of higher cigarette prices on young adult smoking.

Although limited to a sample of college students, Ciecierski and colleagues were the only study to explore the effect of state tobacco control expenditures on individual-level SLT use and did so using three different measures of state-level per capita expenditures on tobacco control programs.(50) The authors found that tobacco control program expenditures were not associated with SLT use with the exception of one case in which current expenditures appeared to *increase* smokeless tobacco use.

Industry developments and tobacco policy

New SLT products and pricing

More recent policy and industry developments have the potential to influence SLT consumption and prevalence. One concern is the introduction of new SLT products. In 2006, cigarette companies RJ Reynolds and Philip Morris as well as United States Smokeless Tobacco Company (USSTC) all launched new smokeless products to convert adult cigarette smokers to SLT use. (51) These new products are being positioned as products to which smokers can switch, particularly those in states with smoke-free air

laws. Indeed, USSTC's investor materials indicate that the company views this as a growth opportunity, as "adult smokers are looking for an alternative."⁽⁵¹⁾ The increasing popularity of pouch products with existing users and a likely preference among smokers encouraged USSTC to re-launch its starter pouch product Skoal Bandits in 2006. In 2009, pouch product line extensions have also been introduced by popular discount brands (e.g., Grizzly, Longhorn). Overall, sales of portion pouch moist snuff products increased by 333.8% between 2005 and 2011 and represented 14.5% of the moist snuff market share in 2011.⁽¹⁹⁾ In addition, flavors (still available in SLT products but not cigarettes) have also contributed to the growth in moist snuff. Sales of flavored moist snuff products increased by 72.1% between 2005 and 2011 and contributed to approximately 60% of the growth in the moist snuff category.⁽¹⁹⁾

The role of price and taxes in the context of the increased SLT sales is also important. The industry terms for the range in prices of moist snuff are not universally applied or accepted and new terms (e.g., "deep discount") were introduced when existing ones (e.g., "value") may not seem to apply. There is very little documentation on SLT pricing. However, a recent market analysis of SLT sales estimates in 2011 found that the average unit price was \$3.00 (range: \$1.88–\$3.66) for value/discount brands and \$4.26 (range: \$3.31–\$4.70) for premium brands.⁽¹⁹⁾ Overall, value or discount brands accounted for approximately 42% of moist snuff sales in 2011, largely driven by one value brand.⁽¹⁹⁾

The moist snuff category has traditionally been dominated by two major premium brands, Skoal and Copenhagen, but these premium brands have more recently lost market share to value/discount brands, led by the growth of Grizzly. In just the last decade, the

introduction of this value/discount brand has dramatically accelerated moist snuff growth. Grizzly which went from the third top selling brand in 2005 (with a 14.8% market share) to the number one selling brand in 2009, moving ahead of the premium brand market leaders, Copenhagen and Skoal.⁽¹⁹⁾ In 2011, Grizzly maintained its new status as the top selling brand with 26.4% of the market share.⁽¹⁹⁾ Moist snuff may be especially attractive to consumers in states or cities with particularly high cigarette excise taxes and strong clean indoor air smoking policies, such as New York and New Jersey.

Tax policy for cigarettes and SLT products

There were substantial increases in tax rates on cigarettes and other tobacco products, including SLT, by states and the federal government in recent years. Changes in taxation are often prompted by concerns for public health as well as a need for increased revenue. On April 1, 2009, the federal tax rates on cigarettes and moist snuff were both raised by 158%, from 39 cents to \$1.01 per pack of cigarettes and from 58.5 cents to \$1.51 per pound of moist snuff. As mentioned previously, SLT use among youth decreased in response to the last federal tax increase⁽³⁰⁾ and one can only speculate that adults have responded similarly, although probably to a lesser degree since youth are more price sensitive than adults.

Unlike cigarettes, excise taxes on SLT or moist snuff are a modern phenomenon in the US. As of 1969, all U.S. states had cigarette taxes but only 17 states taxed chew and/or snuff.⁽³²⁾ As of 1990, still a third of US states did not tax SLT.⁽³²⁾ In 2014, only Pennsylvania had no tax on SLT.⁽³²⁾ Moreover, moist snuff has been traditionally taxed in the US using an ad valorem tax (i.e., percentage of price). The large difference in

wholesale price between value and premium SLT brands is further compounded by the ad valorem tax. For example, if the wholesale price of a value brand is \$3.00, then a 40% ad valorem tax will add \$1.20 in taxes but for a premium brand with a wholesale price of \$4.00, the tax will add a \$1.60.

However, in the last few years, numerous states have changed their moist snuff taxation structure from ad valorem to a weight-based system. The SLT industry, in particular USSTC who is the dominant premium moist snuff manufacturer, has been a strong proponent of weight-based taxation in response to shifting market share of SLT products after 2004.⁽⁵²⁾ The threat that sub-premium, and in particular, deep discount brands, pose to premium brands' (e.g., Skoal) market share prompted USSTC to engage in widespread lobbying efforts to change moist snuff taxation to a weight-based system to reduce the price gap between premium and discount brands. A weight-based tax would tax premium brands the same as the discount brands, both of which are typically sold at 1.2 ounces. USSTC has been successful in lobbying at least 15 states to change their tax structure since July 2006. Only two states had taxed moist snuff by weight prior to the year 2000.⁽⁵²⁾ As of July 1, 2014, 22 of the 49 states with a tax on moist snuff imposed a weight-based tax as well as the District of Columbia.⁽³³⁾ There has not been the same shift in the taxation of chew tobacco; currently, only seven states tax chew tobacco by weight.

Thus, the ad valorem taxation system can be more advantageous for discount vs. premium brands while the weight-based system is more advantageous for premium brands than for discount brands. The growth of weight based-taxation puts pressure back on discount SLT brands whose increased sales are pinching the market share of premium

brands. However, studies examining the impact of taxation on SLT consumption have largely been conducted with data collected prior to the implementation of weight-based taxes for SLT products so very little is known about how weight-based taxation may influence SLT consumption.

There are potential pros and cons to both taxation approaches. First, with weight-based taxation, the real value of the tax will fall over time unless regularly increased to account for inflation, which benefits the industry. Alternatively, ad valorem taxation keeps up with increases in the price of the product over time. Second, USSTC's primary motivation is to counter the growth in discount brands that have now reduced their premium products' market share. In this case, if users switch to lower-priced brands, an ad valorem approach runs the risk of eroding the tax base. Third, some argue that ad valorem taxation is subject to manipulation that reduces its impact as with buy-one-get-one-free promotions, where tax is only paid on one can. However, weight-based taxation also raises concerns about whether moist snuff manufacturers will manipulate the weight of the SLT product to reduce excise taxes.(52)

Industry pricing practices

Warner (53) deftly points out that:

“price discounting and black and grey markets make ascertainment of actual prices paid, and actual consumption for that matter, far more difficult...Thus, a relatively new challenge, and an important one for the evolution of effective tobacco control, is to understand how smokers respond to tax increases in environments in which they have alternatives to simply paying the higher tax.”

There is very little research on price-based marketing strategies for tobacco products and in particular, how it may impact tobacco consumption, particularly for non-cigarette

products. Loomis, Farrelly, and Mann found the effective price of promoted cigarette products including buy-one-get-one-free, gift-with-purchase, and cents-off promotions, were on average 25% lower than non-promoted cigarette prices.(54) In addition, promoted cigarette sales were higher in markets with high cigarette taxes and high levels of funding for state tobacco control programs compared with market areas with weaker tobacco control policies.

The SLT industry has invested considerable resources towards promoting moist snuff.(5) In 2011, the total advertising and promotional expenditures by the major smokeless tobacco manufacturers was \$451.7 million. The companies reported spending \$168.8 million on price discounts (payments made to SLT retailers or wholesalers in order to reduce the price of SLT to consumers) in 2011, making it the single largest expenditure category as it has been for every year reported – this figure is up from \$95.0 million in 2010 and much closer to the \$160.3 million reported in 2009. In 2011, price discounting accounted for 37.4% of 2011 spending. Companies also spent \$44.1 million on retail-value-added expenditures involving free SLT products (e.g., buy one get one free) in 2010, a category of expenditures that has consistently increased since 2007 when companies spent only \$8.5 million. However, this category decreased quite dramatically in 2011 – to \$8.6 million, nearly the same amount spent back in 2007. Gifts with purchase that were something other than a SLT product accounted for \$4.1 million in 2010 but were no longer separately reported in 2011. Dave and Saffer(39) provide evidence that at least for magazine advertising, exposure to SLT advertising raises the probability of using SLT, especially among males and their results suggest that such advertising is effective in raising the overall demand for SLT, not just selective (or brand-

specific) demand. During the time period of Dave and Saffer's study (2003 to 2009), SLT advertising magazine expenditures averaged about \$18 million per year.⁽⁵⁾ However, spending on SLT magazine advertising has declined fairly consistently since then, to a low of \$4.86 million in 2011.⁽⁵⁾

A recent public policy intervention: The Family Smoking and Tobacco Control Act

The Family Smoking Prevention and Tobacco Control Act (Tobacco Control Act) became law on June 22, 2009, granting the Food and Drug Administration (FDA) the broad authority to regulate the manufacture, distribution, and marketing of tobacco products to protect public health. The intent of FDA regulation is to reduce the rate of tobacco initiation but of course, it is not known how FDA action, or inaction, may impact the prevalence and consumption of various tobacco products. A key provision of the law was a ban on flavoring in cigarettes, with the exception of tobacco and menthol flavors. However, the law does not prohibit flavoring in other tobacco products, including SLT. In addition, packaging for SLT products must now carry a warning label that covers 30% of the top half of the package, both front and back, and SLT product advertisements must carry a warning label that covers at least 20% of the area of the ad. FDA also has the authority to approve the marketing of a modified risk tobacco product if a company provides sufficient evidence for such product claims. Given the recent implementation of the Tobacco Control Act, there is still very little research evaluating the impact of FDA's regulatory actions.

SLT and harm reduction

In the last decade there has been a movement to consider the use of oral noncombustible tobacco products like SLT as harm reduction method for cigarette smokers who are unable or unwilling to quit using tobacco.⁽⁵⁵⁾ The scientific community generally agrees, at least at an individual level that, there are fewer health risks associated with the use of certain SLT products compared to cigarette use but at the population level, there are concerns about adoption of SLT products among novice youth and its potential as gateway to cigarette smoking as well as the dual use of cigarettes and SLT.⁽⁵⁶⁾ The combination of new product offerings like spit-free SLT pouches, product differentials in tobacco tax treatment, and the ability for FDA to formally evaluate modified risk tobacco product claims has the promise to draw users away from more harmful products like cigarettes. Given the recent acquisition of SLT manufacturers and the introduction of SLT products including line extensions of well-known cigarette brand names, many cigarette tobacco companies appear confident that at least some smokers will be attracted to SLT products.^(20, 57) Thus, the relationship between SLT and cigarette smoking will play a key part in the harm reduction debate.

Summary

The SLT industry in the United States has undergone major changes in the past decade in the way that it markets and manufactures moist snuff. In addition, the demographics of the SLT consumer are changing. In a complex marketplace, it is not entirely clear whether the consumer or the brand drives these changes but SLT pricing and product development strategies appear to be meeting consumer expectations. There

is concern about the potential for increased numbers of dual or poly-tobacco users given the increased restrictions on cigarettes combined with the marketing of an ever broadening SLT product category, both in styles and brands. In addition, the existing research on the impact of clean indoor air laws, taxation, and tobacco control program expenditures on SLT use, albeit limited, suggests that SLT and cigarettes are substitutes. However, the majority of the studies on SLT studies were conducted prior to the implementation of major tobacco control initiatives, including increased taxation, the Master Settlement Agreement, and the Tobacco Control Act, and prior to significant changes in the SLT marketplace. Thus, research is needed to study the effects of policy interventions that discourage cigarette use on SLT consumption. As such, the purpose of this dissertation is to comprehensively examine how public policy and tobacco industry practices have affected aggregate SLT sales. The two main questions that this dissertation intends to answer are:

- 1) How has the tobacco control and industry environment changed, specifically between 2005 and 2010?
- 2) What is the effect of retail promotion and tobacco control policies on SLT sales across various SLT markets?

CHAPTER 2: DESCRIPTIVE ANALYSIS OF ENVIRONMENT

The objective of Chapter 2 is to characterize the tobacco control and industry environment between the years of 2005 and 2010, the time period of interest, and identify how this environment has changed over time. There was substantial variation in federal and state tobacco policies during this time including changes to funding levels for tobacco control programs, federal and state excise tobacco taxes, and smoke-free air laws. To implement this analysis, federal and state-level policy variables relevant to SLT sales for the years and market areas under consideration were compiled, and trends and changes in such policy variables are discussed. These tobacco policy variables include taxes on cigarettes and SLT as well as clean indoor air laws and state-level tobacco control program expenditures. Relative to public policy data, tobacco industry practices are not as easily identified but these efforts are likely to influence tobacco policies and interventions as well as consumption and sales. A descriptive analysis of the tobacco industry environment is provided, in particular factors that may influence or be influenced by tobacco policy variables.

Tobacco control and industry practices

Tobacco excise taxes

Tobacco products are taxed by federal, state, and local governments in various ways, including excise taxes. Federal and state excise tax rates are set by legislation, are contained in federal and state statutes, and typically are collected before the point of sale (i.e., from manufacturers, wholesalers, or distributors), as denoted by a tax stamp.

Cigarette excise tax

In 2005, the federal cigarette excise tax (FET) was 39 cents per pack. As a funding mechanism for the State Children's Health Insurance Program (SCHIP), the FET on cigarettes increased from 39 cents per pack to \$1.01 cents per pack effective April 1, 2009, making it the largest FET increase in history. This represented a 156% increase in the FET.

The average state cigarette excise tax increased from 83 cents per pack to \$1.45 per pack during the same time period. From January 1, 2005 to December 31, 2010, there were a total of 55 separate cigarette excise tax increases in 33 states and DC (Table 2.1). In 17 states, the state cigarette excise tax did *not* change from 2005 to 2010. By the end of 2010, Missouri had the lowest state cigarette excise tax at 17 cents per pack, whereas New York had the highest state cigarette excise tax at \$4.35 per pack (see Table 2.1). The average state cigarette excise tax in 2010 was \$1.45 per pack, a 75% increase from the 2005 average state cigarette excise tax of 83 cents per pack.

Twenty-one states explicitly prohibit local governments from imposing an excise tax on tobacco products and seven states allow local governments to adopt such a tax. In the remaining 23 states, the laws regarding local authority to tax tobacco are unclear.⁽⁵⁸⁾ As a result, most counties and cities do not have their own cigarette tax rates because they are prohibited by state law, but there are major exceptions (New York City, Chicago, etc). More than 600 local jurisdictions nationwide have their own cigarette tax rates or fees, ranging from as high as \$3.00 per pack in Aspen, Colorado to 16 cents per pack in Cicero, Illinois.⁽⁵⁹⁾

Examining state-level data between 1981 and 2011, Golden, Ribisl, & Perreira found that state cigarette excise tax rates increased over time with stronger growth following the 1998 Master Settlement Agreement.(60) However, cigarette tax rates in tobacco-producing states and Southern states were lower than tax rates compared to non-tobacco producing states and states in other regions of the country, even after controlling for other state-level factors. A state's political leadership was also associated with state cigarette excise tax levels. After 2000, states with Republican Party control had lower cigarette excise tax rates compared with states with mixed-party control.(60)

Table 2.1. State and federal cigarette excise taxes, United States – 2005-2010

| | Jan 1, 2005 | | December 31, 2010 | | % increase 2005 to 2010 | | \$ increase 2005 to 2010 |
|---------------|--------------------|--------------------------------|--------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| State | State | State + FET¹ | State | State + FET¹ | State | State + FET¹ | |
| Alabama | \$0.43 | \$0.82 | \$0.43 | \$1.44 | 0% | 76% | \$0.62 |
| Alaska | \$1.60 | \$1.99 | \$2.00 | \$3.01 | 25% | 51% | \$1.02 |
| Arizona | \$1.18 | \$1.57 | \$2.00 | \$3.01 | 70% | 92% | \$1.44 |
| Arkansas | \$0.59 | \$0.98 | \$1.15 | \$2.16 | 95% | 120% | \$1.18 |
| California | \$0.87 | \$1.26 | \$0.87 | \$1.88 | 0% | 49% | \$0.62 |
| Colorado | \$0.84 | \$1.23 | \$0.84 | \$1.85 | 0% | 50% | \$0.62 |
| Connecticut | \$1.51 | \$1.90 | \$3.00 | \$4.01 | 99% | 111% | \$2.11 |
| Delaware | \$0.55 | \$0.94 | \$1.60 | \$2.61 | 191% | 178% | \$1.67 |
| DC | \$1.00 | \$1.39 | \$2.50 | \$3.51 | 150% | 153% | \$2.12 |
| Florida | \$0.34 | \$0.73 | \$1.34 | \$2.35 | 295% | 222% | \$1.62 |
| Georgia | \$0.37 | \$0.76 | \$0.37 | \$1.38 | 0% | 82% | \$0.62 |
| Hawaii | \$1.40 | \$1.79 | \$3.00 | \$4.01 | 114% | 124% | \$2.22 |
| Idaho | \$0.57 | \$0.96 | \$0.57 | \$1.58 | 0% | 65% | \$0.62 |
| Illinois | \$0.98 | \$1.37 | \$0.98 | \$1.99 | 0% | 45% | \$0.62 |
| Indiana | \$0.56 | \$0.95 | \$1.00 | \$2.01 | 79% | 112% | \$1.06 |
| Iowa | \$0.36 | \$0.75 | \$1.36 | \$2.37 | 278% | 216% | \$1.62 |
| Kansas | \$0.79 | \$1.18 | \$0.79 | \$1.80 | 0% | 53% | \$0.62 |
| Kentucky | \$0.05 | \$0.44 | \$0.60 | \$1.61 | 1100% | 266% | \$1.17 |
| Louisiana | \$0.36 | \$0.75 | \$0.36 | \$1.37 | 0% | 83% | \$0.62 |
| Maine | \$1.00 | \$1.39 | \$2.00 | \$3.01 | 100% | 117% | \$1.62 |
| Maryland | \$1.00 | \$1.39 | \$2.00 | \$3.01 | 100% | 117% | \$1.62 |
| Massachusetts | \$1.51 | \$1.90 | \$2.51 | \$3.52 | 66% | 85% | \$1.62 |

| | | | | | | | |
|----------------------|---------------|---------------|---------------|---------------|------------|-------------|---------------|
| | | | | | | | |
| Michigan | \$2.00 | \$2.39 | \$2.00 | \$3.01 | 0% | 26% | \$0.62 |
| Minnesota | \$0.48 | \$0.87 | \$1.49 | \$2.50 | 209% | 187% | \$1.63 |
| Mississippi | \$0.18 | \$0.57 | \$0.68 | \$1.69 | 278% | 196% | \$1.12 |
| Missouri | \$0.17 | \$0.56 | \$0.17 | \$1.18 | 0% | 111% | \$0.62 |
| Montana | \$1.70 | \$2.09 | \$1.70 | \$2.71 | 0% | 30% | \$0.62 |
| Nebraska | \$0.64 | \$1.03 | \$0.64 | \$1.65 | 0% | 60% | \$0.62 |
| Nevada | \$0.80 | \$1.19 | \$0.80 | \$1.81 | 0% | 52% | \$0.62 |
| New Hampshire | \$0.52 | \$0.91 | \$1.78 | \$2.79 | 242% | 207% | \$1.88 |
| New Jersey | \$2.40 | \$2.79 | \$2.70 | \$3.71 | 13% | 33% | \$0.92 |
| New Mexico | \$0.91 | \$1.30 | \$1.66 | \$2.67 | 82% | 105% | \$1.37 |
| New York | \$1.50 | \$1.89 | \$4.35 | \$5.36 | 190% | 184% | \$3.47 |
| North Carolina | \$0.05 | \$0.44 | \$0.45 | \$1.46 | 800% | 232% | \$1.02 |
| North Dakota | \$0.44 | \$0.83 | \$0.44 | \$1.45 | 0% | 75% | \$0.62 |
| Ohio | \$0.55 | \$0.94 | \$1.25 | \$2.26 | 127% | 140% | \$1.32 |
| Oklahoma | \$0.63 | \$1.02 | \$1.03 | \$2.04 | 64% | 100% | \$1.02 |
| Oregon | \$1.18 | \$1.57 | \$1.18 | \$2.19 | 0% | 39% | \$0.62 |
| Pennsylvania | \$1.35 | \$1.74 | \$1.60 | \$2.61 | 19% | 50% | \$0.87 |
| Rhode Island | \$2.46 | \$2.85 | \$3.46 | \$4.47 | 41% | 57% | \$1.62 |
| South Carolina | \$0.07 | \$0.46 | \$0.57 | \$1.58 | 714% | 243% | \$1.12 |
| South Dakota | \$0.53 | \$0.92 | \$1.53 | \$2.54 | 189% | 176% | \$1.62 |
| Tennessee | \$0.20 | \$0.59 | \$0.62 | \$1.63 | 210% | 176% | \$1.04 |
| Texas | \$0.41 | \$0.80 | \$1.41 | \$2.42 | 244% | 203% | \$1.62 |
| Utah | \$0.70 | \$1.09 | \$1.70 | \$2.71 | 145% | 149% | \$1.62 |
| Vermont | \$1.19 | \$1.58 | \$2.24 | \$3.25 | 88% | 106% | \$1.67 |
| Virginia | \$0.20 | \$0.59 | \$0.30 | \$1.31 | 50% | 122% | \$0.72 |
| Washington | \$1.43 | \$1.82 | \$3.03 | \$4.04 | 112% | 122% | \$2.22 |
| West Virginia | \$0.55 | \$0.94 | \$0.55 | \$1.56 | 0% | 66% | \$0.62 |
| Wisconsin | \$0.77 | \$1.16 | \$2.52 | \$3.53 | 227% | 204% | \$2.37 |
| Wyoming | \$0.60 | \$0.99 | \$0.60 | \$1.61 | 0% | 63% | \$0.62 |
| State Average | \$0.83 | \$1.22 | \$1.45 | \$2.46 | 75% | 102% | \$1.24 |

¹The federal excise tax (FET) was raised from 39 cents per pack to \$1.01 in April 2009, representing a 156% increase.
Source: Table adapted from CDC, 2009(RW.ERROR - Unable to find reference:doc:5c25452be4b0d2018f882994)

Moist snuff excise tax

The changes described in cigarette taxation were only changes to the rate of the excise tax as the tax on cigarettes is nearly always imposed on per cigarette/per pack of cigarette basis. For moist snuff, both the rate and type of excise tax changed during the time period of interest. As of 2005, all states except Pennsylvania (as well as DC) taxed

moist snuff. However, the types and rates of taxation on moist snuff vary from state to state. While some states apply a tax to smokeless products including moist snuff by weight, on a per ounce basis, most states tax smokeless products on an ad valorem basis, as a percentage of the wholesale or manufacturer's price. There is considerable variation among states in rates of moist snuff taxation. A few states have established a minimum tax on these products (e.g., Maine, Minnesota, New York, Oregon, Texas, and Wyoming).

Between 2005 and 2010, 24 states did not change their moist snuff excise tax rates nor did they increase the tax on moist snuff. However, 13 states shifted from an ad valorem to a weight-based specific tax for moist snuff (see Table 2.2). During this time period, Wisconsin approved a change from an ad valorem to a specific weight-based tax for moist snuff in 2007 but then reverted back to an ad valorem tax in 2009. Among those states with the same tax structure in 2005 and 2010, nine states increased their tax on moist snuff during this time period.

Timberlake, et. al studied the recent trend to legislate weight-based taxation of snuff and observed that between 2006 and 2012, 35 bills proposing weight-based taxation were introduced in state legislatures, 17 of which passed.⁽⁵²⁾ The predominant arguments around such legislation focused on fair taxation, state revenue, and public health.⁽⁵²⁾ The growing market share of discount brands was often acknowledged by tobacco industry representatives who were arguing for weight-based taxation.⁽⁵²⁾ At the beginning of 2005, only six states taxed moist snuff by weight and by the end of 2010, 19 states and DC taxed moist snuff by weight.

Since premium snuff brands are generally more expensive, an ad valorem or percentage of price tax system will result in a higher tax burden for these brands. Subsequently, a change in taxation from an ad valorem to a weight-based system will typically result in a reduced tax burden for premium snuff brands and an increased tax burden for discount snuff brands. For example, if the wholesale price for a can of moist snuff in New Jersey is \$3.00, then the tax based on a 30% ad valorem system is 90 cents for a total price of \$3.90 compared to \$3.75 with a specific weight-based tax of 75 cent per ounce. If the wholesale price for a can of moist snuff in New Jersey is \$1.00, then the tax based on 30% ad valorem system is 30 cents for a total price of \$1.30 compared to \$1.75, with a specific weight-based tax with 75 cents per ounce. Using a different example, if the wholesale price for a can of moist snuff in Rhode Island was \$1.00, then the product's excise tax based on its previous 40% ad valorem system would have been 40 cents for a total price of \$1.40 compared to \$3.00 with its new specific weight-based tax of \$2.00 per ounce. As such, the tax burden for lower-priced discount brands can potentially be much higher in states with a weight-based tax system while the tax burden for higher-priced premium brands would be lower.

The federal tax on moist snuff was \$0.585 per pound in 2005. As with all other tobacco products, the federal tax on moist snuff increased in 2009, to \$1.51 per pound. This represented a 158% increase in the federal excise tax on moist snuff.

Table 2.2. State smokeless excise taxes, United States – 2005-2010

| | 2005 | 2010 | Change in tax structure |
|---------|--|--|-------------------------|
| Alabama | 1.5 cents per ounce (chewing tobacco) 1 cent for up to 5/8 ounce (snuff) ¹ | 1.5 cents per ounce (chewing tobacco) 1 cent for up to 5/8 ounce (snuff) ¹ | |

| | | | |
|----------------|---|---|-----|
| Alaska | 75% of Wholesale Price | 75% of Wholesale Price | |
| Arizona | 13.25 cents per ounce | 22.25 cents per ounce | |
| Arkansas | 32% of Manufacturer's Selling Price | 68% of Manufacturer's Selling Price | |
| California | 48.89% of Wholesale Cost ² 46.76% of Wholesale Cost ² as of 7-1-05 | 45.13% of Wholesale Cost ² | |
| Colorado | 40% of Manufacturer's List Price | 40% of Manufacturer's List Price | |
| Connecticut | 20% of Wholesale Sales Price (chewing tobacco) 40 cents per ounce (snuff) | 27.5% of Wholesale Sales Price (chewing tobacco) 55 cents per ounce (snuff) | |
| Delaware | 15% of Wholesale Price | 15% of Wholesale Price (chewing tobacco/dry snuff) 54 cents per ounce (moist snuff) | Yes |
| DC | None | 75 cents per ounce | |
| Florida | 25% of Wholesale Sales Price | 85% of Wholesale Sales Price | |
| Georgia | 10% of Wholesale Cost Price | 10% of Wholesale Cost Price | |
| Hawaii | 40% of Wholesale Price | 70% of Wholesale Price | |
| Idaho | 40% of Wholesale Sales Price | 40% of Wholesale Sales Price | |
| Illinois | 18% of Wholesale Price | 18% of Wholesale Price | |
| Indiana | 18% of Wholesale Price | 24% of Wholesale Price | |
| Iowa | 22% of Wholesale Sales Price | 50% of Wholesale Sales Price (chewing tobacco) \$1.19 per ounce (snuff) | Yes |
| Kansas | 10% of Wholesale Sales Price | 10% of Wholesale Sales Price | |
| Kentucky | 7.5% of Wholesale Sales Price (chewing tobacco) 9.5 cents per 1.5 ounces (snuff) | 15% of Wholesale Sales Price (chewing tobacco/dry snuff) 19 cents per 1.5 ounces (moist snuff) | |
| Louisiana | 20% of Invoice Price | 20% of Invoice Price | |
| Maine | 78% of Wholesale Sales Price | \$2.02 per ounce (with min. tax) | Yes |
| Maryland | 15% of Wholesale Price | 15% of Wholesale Price | |
| Massachusetts | 90% of Price Paid | 90% of Price Paid | |
| Michigan | 32% of Wholesale Price | 32% of Wholesale Price | |
| Minnesota | 70% of Wholesale Sales Price | 70% of Wholesale Sales Price (with min tax) | |
| Mississippi | 15% of Manufacturer's List Price | 15% of Manufacturer's List Price | |
| Missouri | 10% of Manufacturer's Invoice Price | 10% of Manufacturer's Invoice Price | |
| Montana | 50% of Wholesale Price (chewing tobacco/dry snuff) 85 cents per ounce (moist snuff) | 50% of Wholesale Price (chewing tobacco/dry snuff) 85 cents per ounce (moist snuff) | |
| Nebraska | 20% of Purchase Price | 20% of Wholesale Price (chewing tobacco/dry snuff) 44 cents per ounce (moist snuff) | Yes |
| Nevada | 30% of Wholesale Price | 30% of Wholesale Price | |
| New Hampshire | 19% of Wholesale Sales Price | 65.03% of Wholesale Sales Price | |
| New Jersey | 30% of Wholesale Price | 30% of Wholesale Price (chewing tobacco/dry snuff) 75 cents per ounce (moist snuff) | Yes |
| New Mexico | 25% of Product Value | 25% of Product Value | |
| New York | 37% of Wholesale Price | 75% of Wholesale Price (chewing tobacco) \$2.00 per ounce (with min tax) (snuff) | Yes |
| North Carolina | 3% of Cost Price | 12.8% of Cost Price | |
| North Dakota | 16 cents per ounce (chewing tobacco) 60 cents per ounce (snuff) | 16 cents per ounce (chewing tobacco) 60 cents per ounce (snuff) | |

| | | | |
|----------------|---|---|------------------|
| Ohio | 17% of Wholesale Price | 17% of Wholesale Price | |
| Oklahoma | 60% of Factory List Price | 60% of Factory List Price | |
| Oregon | 65% of Wholesale Sales Price | 65% of Wholesale Sales Price (chewing tobacco) \$1.78 per ounce (with min tax) (snuff) | Yes |
| Pennsylvania | None | None | |
| Rhode Island | 40% of Wholesale Cost | 40% of Wholesale Cost (chewing tobacco) \$1.00 per ounce (snuff) | Yes |
| South Carolina | 5% of Manufacturer's Price | 5% of Manufacturer's Price | |
| South Dakota | 10% of Wholesale Purchase Price | 35% of Wholesale Purchase Price | |
| Tennessee | 6.6% of Wholesale Cost Price | 6.6% of Wholesale Cost Price | |
| Texas | 35.213% of Manufacturer's List Price | \$1.13 per ounce (with min tax) | Yes |
| Utah | 35% of Manufacturer's Sales Price | 86% of Manufacturer's Sales Price (chewing tobacco/dry snuff) \$1.83 per ounce (moist snuff) | Yes |
| Vermont | 41% of Wholesale Price | 92% of Wholesale Price (chewing tobacco) \$1.87 per ounce (snuff) | Yes |
| Virginia | 10% of Wholesale Sales Price as of 3-1-05 | 10% of Manufacturer's Sales Price | |
| Washington | 75% of Taxable Sales Price | 95% of Taxable Sales Price (chewing tobacco) \$2.105 per ounce (snuff) | Yes |
| West Virginia | 7% of Wholesale Price | 7% of Wholesale Price | |
| Wisconsin | 25% of Manufacturer's List Price | 100% of Manufacturer's List Price | Yes ⁴ |
| Wyoming | 20% of Wholesale Purchase Price | 20% of Wholesale Purchase Price (chewing tobacco) 60 cents per ounce (with min tax) (snuff) | Yes |

¹ This is the minimum taxable rate on a graduated scale.

² The excise tax on tobacco products is based on the wholesale cost of tobacco products at a rate to be determined by the State Board of Equalization.

³ The excise tax on tobacco products other than cigarettes is imposed at a rate proportional to the cigarette tax of 25 cents per pack.

⁴ Wisconsin adopted a weight-based moist snuff tax in January 2008 but then went back to an ad valorem tax in June 2009.

State tobacco control program expenditures

In 1999, CDC published *Best Practices for Comprehensive Tobacco Control*, which outlined the elements of an evidence-based state tobacco control program and provided a recommended state funding range to substantially reduce tobacco-related disease, disability, and death.⁽⁶¹⁾ *Best Practices* recommended that states invest a combined \$1.6–\$4.2 billion annually in such programs and subsequently updated that recommendation to \$3.7 billion annually in 2007.⁽⁶²⁾ CDC has tracked states’

investment in tobacco control over time and in 2012, published an analysis of state funding for tobacco control compared to *Best Practices* recommendations as well as state tobacco revenues from cigarette excise taxes and payments from the Master Settlement Agreement.(63) All 50 states and the District of Columbia (DC) have state tobacco control programs that are funded through various revenue streams, including tobacco industry settlement payments, cigarette excise tax revenues, state general funds, the federal government, and nonprofit organizations.(62, 64) There has been an increasing gap between state investments in tobacco control and *Best Practices* recommendations. As shown in Table 2.3, many states imposed cuts to tobacco control funding during the time period of interest (2005-2010) and some funding cuts were quite substantial (e.g., Ohio, Pennsylvania).

Table 2.3. Total state and federal tobacco control appropriations (in millions of dollars) - United States, 2005–2010*

| State [†] | 2007 <i>Best Practices</i> [§] funding recommendation | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 [†] | (2010 as % of 2007 <i>Best Practices</i>) | Total 2005– 2010 |
|--------------------|--|------|------|------|------|------|-------------------|---|---------------------|
| Alabama | 56.7 | 1.5 | 1.8 | 2.1 | 2.2 | 2.6 | 2.2 | (3.9) | 12.4 |
| Alaska | 10.7 | 5.2 | 7.1 | 7.5 | 8.8 | 9.4 | 8.6 | (80.4) | 46.6 |
| Arizona | 68.1 | 23.3 | 20.5 | 26.0 | 24.0 | 21.7 | 23.4 | (34.4) | 138.9 |
| Arkansas | 36.4 | 18.7 | 18.8 | 16.7 | 17.0 | 17.2 | 19.8 | (54.4) | 108.2 |
| California | 441.9 | 90.1 | 80.3 | 84.2 | 77.9 | 78.9 | 79.0 | (17.9) | 490.4 |
| Colorado | 54.4 | 5.6 | 28.6 | 26.4 | 27.5 | 27.8 | 12.4 | (22.8) | 128.3 |
| Connecticut | 43.9 | 1.0 | 1.2 | 3.2 | 1.2 | 8.6 | 7.2 | (16.4) | 22.4 |
| Delaware | 13.9 | 10.0 | 9.9 | 11.0 | 11.4 | 11.4 | 10.8 | (77.7) | 64.5 |
| DC | 10.5 | 0.4 | 0.8 | 1.0 | 3.4 | 4.2 | 2.1 | (20.0) | 11.9 |
| Florida | 210.9 | 1.7 | 2.0 | 6.7 | 58.9 | 60.8 | 67.7 | (32.1) | 197.8 |
| Georgia | 116.5 | 12.9 | 3.8 | 3.5 | 3.4 | 3.5 | 3.2 | (2.7) | 30.3 |

| | | | | | | | | | |
|----------------|-------|------|------|------|------|------|------|---------|-------|
| Hawaii | 15.2 | 9.7 | 6.8 | 10.4 | 11.4 | 11.5 | 8.8 | (57.9) | 58.6 |
| Idaho | 16.9 | 2.9 | 2.0 | 2.3 | 2.7 | 2.9 | 2.3 | (13.6) | 15.1 |
| Illinois | 157.0 | 12.7 | 12.4 | 9.8 | 9.8 | 9.9 | 9.7 | (6.2) | 64.3 |
| Indiana | 78.8 | 12.6 | 12.2 | 12.0 | 17.3 | 16.2 | 11.8 | (15.0) | 82.1 |
| Iowa | 36.7 | 5.9 | 6.7 | 7.6 | 13.4 | 11.5 | 11.1 | (30.2) | 56.2 |
| Kansas | 32.1 | 1.9 | 3.6 | 3.6 | 2.8 | 2.4 | 2.2 | (6.9) | 16.5 |
| Kentucky | 57.2 | 3.7 | 4.0 | 4.0 | 3.7 | 4.0 | 3.9 | (6.8) | 23.3 |
| Louisiana | 53.5 | 12.3 | 9.3 | 9.2 | 9.6 | 8.8 | 8.9 | (16.6) | 58.1 |
| Maine | 18.5 | 15.0 | 15.3 | 15.8 | 18.0 | 11.9 | 11.8 | (63.8) | 87.8 |
| Maryland | 63.3 | 10.7 | 10.7 | 20.1 | 19.9 | 20.9 | 6.7 | (10.6) | 89 |
| Massachusetts | 90.0 | 5.2 | 6.1 | 10.0 | 14.6 | 14.0 | 6.1 | (6.8) | 56 |
| Michigan | 121.2 | 6.7 | 5.8 | 5.5 | 5.4 | 5.5 | 4.5 | (3.7) | 33.4 |
| Minnesota | 58.4 | 19.8 | 23.5 | 23.0 | 23.4 | 21.8 | 21.5 | (36.8) | 133 |
| Mississippi | 39.2 | 20.3 | 20.6 | 0.7 | 8.6 | 11.1 | 11.7 | (29.8) | 73 |
| Missouri | 73.2 | 1.4 | 1.9 | 1.3 | 1.5 | 3.0 | 2.4 | (3.3) | 11.5 |
| Montana | 13.9 | 3.3 | 7.9 | 8.0 | 9.6 | 9.5 | 9.4 | (67.6) | 47.7 |
| Nebraska | 21.5 | 4.1 | 4.5 | 4.4 | 3.9 | 4.3 | 4.2 | (19.5) | 25.4 |
| Nevada | 32.5 | 5.1 | 5.4 | 4.8 | 2.9 | 4.5 | 3.8 | (11.7) | 26.5 |
| New Hampshire | 19.2 | 0.9 | 1.2 | 1.2 | 2.4 | 1.3 | 1.0 | (5.2) | 8 |
| New Jersey | 119.8 | 12.1 | 12.5 | 12.5 | 12.4 | 10.5 | 8.9 | (7.4) | 68.9 |
| New Mexico | 23.4 | 6.0 | 7.3 | 9.1 | 10.9 | 10.8 | 10.6 | (45.3) | 54.7 |
| New York | 254.3 | 42.3 | 56.0 | 87.6 | 86.3 | 79.5 | 67.5 | (26.5) | 419.2 |
| North Carolina | 106.8 | 27.7 | 23.9 | 19.0 | 18.9 | 18.9 | 20.0 | (18.7) | 128.4 |
| North Dakota | 9.3 | 4.1 | 4.4 | 4.4 | 4.4 | 4.4 | 9.4 | (101.1) | 31.1 |
| Ohio | 145.0 | 54.6 | 48.9 | 46.5 | 46.3 | 9.6 | 7.4 | (5.1) | 213.3 |
| Oklahoma | 45.0 | 6.0 | 10.0 | 11.5 | 15.7 | 19.5 | 21.1 | (46.9) | 83.8 |
| Oregon | 43.0 | 4.4 | 4.7 | 4.7 | 9.4 | 9.4 | 7.7 | (17.9) | 40.3 |
| Pennsylvania | 155.5 | 47.2 | 34.4 | 31.7 | 33.1 | 33.6 | 19.0 | (12.2) | 199 |
| Rhode Island | 15.2 | 3.5 | 3.5 | 2.4 | 2.3 | 2.2 | 1.9 | (12.5) | 15.8 |
| South Carolina | 62.2 | 1.1 | 1.3 | 3.3 | 3.3 | 1.4 | 3.2 | (5.1) | 13.6 |
| South Dakota | 11.3 | 2.3 | 1.8 | 1.8 | 6.1 | 6.0 | 6.0 | (53.1) | 24 |

| | | | | | | | | | |
|---------------|----------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|--------|
| Tennessee | 71.7 | 1.4 | 1.7 | 1.7 | 11.4 | 6.4 | 1.5 | (2.1) | 24.1 |
| Texas | 266.3 | 9.5 | 10.1 | 8.6 | 12.1 | 13.2 | 13.3 | (5.0) | 66.8 |
| Utah | 23.6 | 8.3 | 8.6 | 8.6 | 8.6 | 8.5 | 8.3 | (35.2) | 50.9 |
| Vermont | 10.4 | 5.7 | 6.2 | 6.4 | 6.5 | 6.4 | 5.9 | (56.7) | 37.1 |
| Virginia | 103.2 | 13.6 | 13.9 | 14.7 | 15.7 | 13.9 | 13.4 | (13.0) | 85.2 |
| Washington | 67.3 | 28.4 | 28.8 | 28.8 | 28.7 | 28.8 | 17.2 | (25.6) | 160.7 |
| West Virginia | 27.8 | 6.9 | 7.1 | 6.7 | 7.0 | 7.0 | 6.9 | (24.8) | 41.6 |
| Wisconsin | 64.3 | 11.0 | 11.4 | 11.4 | 16.3 | 16.6 | 8.1 | (12.6) | 74.8 |
| Wyoming | 9.0 | 4.7 | 7.1 | 7.0 | 7.0 | 7.1 | 5.8 | (64.4) | 38.7 |
| Total | 3,696.6 | 625.5 | 638.1 | 670.5 | 778.9 | 735.3 | 641.1 | (17.3) | 4089.4 |

(Adapted from MMWR, 2012)(63)

* Adjusted to fiscal year ending June 30.

† Includes the District of Columbia.

§ Available at http://www.cdc.gov/tobacco/stateandcommunity/best_practices/index.htm.

‡ Does not include time-limited funding (e.g., Communities Putting Prevention to Work).

Clean indoor air laws

State and local clean indoor air laws that protect workers and the public from exposure to secondhand smoke in work environments and public places are a critical component of public health efforts to reduce tobacco-related morbidity and mortality. Objectives for *Healthy People 2010* and *2020* included calling for comprehensive clean indoor air laws that eliminated smoking in public places and worksites (including restaurants and bars) in all 50 states.(65, 66) Table 2.4 indicates how comprehensive smoke-free areas were defined.

Table 2.4. 100% Smoke-free Definitions, American Nonsmokers' Rights Foundation

100% Smokefree Workplaces: Law requires no smoking in all workplaces (both public and private non-hospitality workplaces, including, but not limited to, offices, factories, and warehouses) within the state or municipality, even in separately ventilated rooms, with the following exemptions: workplaces with only one employee and family-owned businesses/businesses run by self-employed persons, in which all the employees are related to the owner or self-employed person and which are not open to the public.

100% Smokefree Restaurants: Law requires that all restaurants within the state or municipality do not allow smoking, including no smoking allowed in attached bars or separately ventilated rooms, and that restaurants do not have exemptions based on size, hours of operation, or age of admittance.

100% Smokefree Bars: Law requires that all bars within the state or municipality do not allow smoking, including no smoking allowed in separately ventilated rooms, and that bars do not have exemptions based on size, hours of operation, or age of admittance.

Source: American Nonsmokers' Rights Foundation.(67)

State clean indoor air laws

In 2002, Delaware became the first state to implement a comprehensive clean indoor air law that banned smoking in all indoor areas of private worksites, restaurants, and bars, followed by New York in 2003 and Massachusetts in 2004. The rate of adoption of statewide comprehensive clean indoor air laws has followed a typical diffusion pattern, doubling during a period of momentum and slowing to a gradual increase more recently.(68) The vast majority of statewide comprehensive clean indoor air law laws were enacted between 2005 and 2010 when 23 states passed such laws (see Table 2.5).

Between 2011 and 2015, North Dakota was the only state to pass a comprehensive clean indoor air law. In 2016, California eliminated exemptions from its statewide smoke free law that precluded it from being considered a comprehensive clean indoor air law.

Table 2.5. Effective dates of state comprehensive clean indoor air laws* --- United States, 2002—2016

| State | Effective date† |
|----------|-----------------|
| Delaware | 12/1/2002 |
| New York | 7/24/2003 |

| | |
|----------------------|------------|
| Massachusetts | 7/5/2004 |
| Rhode Island | 3/1/2005 |
| Washington | 12/8/2005 |
| New Jersey | 4/15/2006 |
| Colorado | 7/1/2006 |
| Hawaii | 11/16/2006 |
| Ohio | 12/7/2006 |
| District of Columbia | 1/1/2007 |
| Arizona | 5/1/2007 |
| New Mexico | 6/15/2007 |
| Minnesota | 10/1/2007 |
| Illinois | 1/1/2008 |
| Maryland | 2/1/2008 |
| Iowa | 7/1/2008 |
| Oregon | 1/1/2009 |
| Utah | 1/1/2009 |
| Nebraska | 6/1/2009 |
| Vermont | 7/1/2009 |
| Maine | 9/11/2009 |
| Montana | 10/1/2009 |
| Michigan | 5/1/2010 |
| Kansas | 7/1/2010 |
| Wisconsin | 7/5/2010 |
| South Dakota | 11/10/2010 |
| North Dakota | 12/6/2012 |
| California | 6/9/2016 |

(Adapted from MMWR, 2011)(69)

* States with comprehensive clean indoor laws are those requiring worksites, restaurants, and bars to be smoke-free

† Date when all 3 venues (worksites, restaurants, and bars) were required by state law to prohibit smoking indoors

‡ Although CDC considers CO & NM as having comprehensive smoke-free air laws, ANR does not.

Of the 25 states *without* comprehensive clean indoor air laws in 2010, 10 states had enacted laws that prohibited smoking in one or two, but not all three, of the venues (private worksites, restaurants, or bars), eight states passed less restrictive laws (e.g., laws allowing smoking in designated areas or areas with separate ventilation), and seven states had no statewide smoking restrictions in place for private worksites, restaurants, or bars.

Local clean indoor air laws

Overall, the initial growth of clean indoor air laws has been the result of local efforts rather than state or federal regulation/legislation. Beginning in the 1970s, an increasing number of communities, adopted smoke-free air policies primarily in workplaces and subsequently, strengthened clean indoor air laws to ban smoking in more areas including restaurants and bars. For example, the community of San Luis Obispo, California, adopted the first law in the U.S. eliminating smoking in bars but during the 1990s, smoke-free bar laws were largely limited to communities in California and Massachusetts.⁽⁶⁹⁾ Some states with no statewide comprehensive smoke-free air law have made substantial progress in adopting comprehensive smoke-free air laws at the local level. Although West Virginia has no statewide smoke-free air law, local laws that prohibit smoking in worksites, restaurants, and bars provide protection for more than half of West Virginia's population (see Table 2.6).

Table 2.6. Percentage of state population with local comprehensive smoke-free laws* for 24 states that do not have a statewide comprehensive smoke-free law — United States, December 31, 2015

| State | State population with local comprehensive smoke-free laws (%) |
|----------------|---|
| West Virginia | 60.1 |
| Alaska | 43.9 |
| Texas | 36.6 |
| South Carolina | 31.8 |
| Kentucky | 31.4 |
| California | 28.1 |
| Indiana | 26.8 |
| Mississippi | 24.2 |
| Missouri | 21.9 |
| Idaho | 13.6 |
| Alabama | 12.7 |
| Louisiana | 11.2 |
| Georgia | 2.4 |

| | |
|-----------------------------|-----|
| Arkansas | 0.5 |
| Wyoming | 0.3 |
| Connecticut [†] | 0 |
| Florida [†] | 0 |
| Nevada | 0 |
| New Hampshire [†] | 0 |
| North Carolina [†] | 0 |
| Oklahoma [†] | 0 |
| Pennsylvania [†] | 0 |
| Tennessee [†] | 0 |
| Virginia [†] | 0 |

(Adapted from MMWR, 2016)(70)

* States with comprehensive clean indoor laws are those requiring worksites, restaurants, and bars to be smoke-free

[†] State law preempts local communities from enacting smoke-free air laws.

Nine of 25 states without comprehensive statewide clean indoor air laws also lacked any local comprehensive clean indoor air laws; eight of the nine (Connecticut, Florida, New Hampshire, North Carolina, Oklahoma, Pennsylvania, Tennessee, and Virginia) have preemption statutes that prohibit adoption of local smoke-free laws.(69) Nevada is the only one of these nine states where local comprehensive smoke-free laws are allowed, yet none have been adopted. Although local smoke-free laws are permitted in Georgia, Arkansas, and Wyoming, relatively few local comprehensive laws exist in those states.

Tobacco industry practices

Nielsen market scanner data provides information on smokeless tobacco product sales and revenue including product attributes such as type, brand, flavoring, and form. The data also include promotion codes for these products such as bonus ounces, bonus unit, cents off, gift, and pre-priced.

Types of SLT

Based on national SLT convenience store sales data,(19) Table 2.7 presents the number of units sold and the respective market share for the smokeless tobacco (SLT) category overall and for each major type of SLT between 2005 and 2010. Overall, unit sales of SLT increased by 49.7% between 2005 and 2010, reaching over one billion units sold in 2010. With respect to various types of SLT, traditional moist snuff represented at least 90% of overall SLT market share each year and unit sales of moist snuff grew by 57% between 2005 and 2010. Sales of snus experienced notable growth, with unit sales doubling between 2009 and 2010 alone.⁴ In contrast, sales and market share for chew tobacco fell each year and by 2010 sales of chew represented less than 5% of the SLT market. Lastly, while dissolvable tobacco products also experienced overall growth during the time period, their SLT market share was negligible in 2010.

Moist snuff

Table 2.7 also describes unit sales and market share by and for select product attributes among moist snuff products only (inclusive of snus). Long cut styles represented at least 60% of the overall moist snuff market each year. Market share of fine cut products decreased slightly each year while portion pouch products increased annually. In fact, sales of portion pouch products increased substantially between 2005 and 2010 and by 2010, represented 13.4% of the moist snuff market share.

⁴ Camel Snus was launched nationally in 2009. Marlboro Snus was launched nationally in 2010.

Moist snuff flavors

Sales of flavored moist snuff products increased 72.1% between 2005 and 2010 and contributed to approximately 60% of the growth in the moist snuff category overall. In terms of market share, both flavored and unflavored products exhibited a relatively stable trend over the six year time period. Flavored products made up 54% of the moist snuff market share in 2005 and 55.9% of the market share in 2010, an increase of 3.6% while market share for unflavored products decreased by 4.78% from 46% in 2005 to 43.8% from 2010. However, there was more variation within the flavored product market.

Among flavored products, wintergreen was the most popular flavor (accounting for roughly two-thirds of all flavored snuff sold between 2005 and 2010), followed by spearmint/mint, fruit flavors (e.g., apple, berry, peach) and other characterizing flavors (e.g., vanilla, cinnamon). Sales of fruit flavored products across the seven years were largely attributed to Skoal, which accounted for 86.4% of all fruit flavored products sold (data not in table). However, the market share of fruit flavored products declined notably between 2005 (7.3%) and 2010 (6.0%), a decline of 17.8%. Also, portion pouch products were the style most frequently sold in flavors whereas fine cut were the least likely to be flavored. Between 2005 and 2010, roughly three quarters of portion pouch products, two-thirds of long cut styles and a quarter of fine cut styles were flavored (data not in table).

Table 2.7. Characteristics of smokeless tobacco sold in convenience stores in the US, 2005-2010

| | Market Share | | | | | |
|--|--------------|--------------|--------------|--------------|--------------|---------------|
| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| All Smokeless Tobacco (units in millions) | 675.2 | 750.8 | 815.8 | 862.3 | 905.9 | 1011.1 |
| Moist snuff | 90.4% | 91.2% | 91.8% | 92.3% | 92.0% | 91.8% |
| Chew | 9.0% | 8.3% | 7.6% | 6.9% | 5.9% | 4.7% |
| Snus | 0.0% | 0.0% | 0.1% | 0.4% | 1.7% | 3.2% |
| Dry snuff | 0.5% | 0.5% | 0.4% | 0.4% | 0.3% | 0.3% |
| Dissolvables/hard | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Moist Snuff Only* (units in millions) | 610.6 | 684.6 | 750.0 | 798.7 | 849.1 | 960.3 |
| Form | | | | | | |
| Long cut | 59.6% | 60.6% | 61.8% | 62.1% | 61.7% | 61.5% |
| Fine cut | 33.9% | 32.4% | 30.5% | 29.5% | 27.5% | 25.0% |
| Portion pouches | 5.5% | 6.1% | 7.0% | 8.1% | 10.6% | 13.4% |
| Other/unspecified | 1.0% | 0.9% | 0.7% | 0.3% | 0.2% | 0.1% |
| Flavor | | | | | | |
| Unflavored | 46.0% | 45.2% | 44.8% | 45.0% | 44.4% | 43.8% |
| Wintergreen | 37.6% | 38.0% | 38.0% | 38.0% | 37.7% | 38.3% |
| Spearmint/mint | 7.9% | 8.3% | 8.6% | 9.0% | 10.7% | 11.6% |
| Fruit | 7.3% | 7.6% | 7.7% | 7.1% | 6.6% | 6.0% |
| Other flavor | 1.2% | 0.9% | 0.8% | 0.9% | 0.6% | 0.3% |
| Brands | | | | | | |
| Grizzly ¹ (V) | 14.8% | 19.2% | 21.6% | 23.8% | 25.4% | 25.1% |
| Copenhagen ² (P) | 26.8% | 25.2% | 23.6% | 22.6% | 21.7% | 24.8% |
| Skoal ² (P) | 31.0% | 28.1% | 26.8% | 25.2% | 24.2% | 23.2% |
| Longhorn ³ (V) | 2.2% | 2.9% | 4.1% | 4.5% | 4.8% | 5.1% |
| Red Seal ² (V) | 7.0% | 6.5% | 6.2% | 5.6% | 5.4% | 5.0% |
| Timber Wolf ³ (V) | 6.8% | 6.8% | 6.7% | 6.4% | 5.8% | 4.9% |
| Kodiak ¹ (P) | 6.8% | 5.9% | 5.2% | 4.6% | 4.2% | 3.9% |
| Camel Snus ⁴ (P) | N/A | 0.0% | 0.1% | 0.3% | 1.7% | 2.2% |
| Husky ² (V) | 1.8% | 2.8% | 3.3% | 3.4% | 2.6% | 1.7% |
| Red Man ³ (P) | 0.0% | 0.0% | 0.2% | 1.4% | 1.7% | 1.3% |
| All others | 2.8% | 2.5% | 2.2% | 2.3% | 2.4% | 2.9% |
| Manufacturers | | | | | | |
| US Smokeless Tobacco Co. | 67.2% | 63.0% | 60.1% | 56.9% | 54.2% | 54.7% |
| American Snuff Co. | 22.5% | 25.9% | 27.3% | 28.8% | 29.9% | 29.1% |
| Pinkerton | 8.9% | 9.7% | 11.1% | 12.3% | 12.4% | 11.3% |
| Swisher International | 1.2% | 1.3% | 1.3% | 1.3% | 1.5% | 1.3% |
| RJ Reynolds | N/A | 0.0% | 0.1% | 0.3% | 1.7% | 2.3% |
| Philip Morris | N/A | 0.0% | 0.0% | 0.2% | 0.1% | 1.1% |
| Swedish Match | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% | 0.0% |
| Parent Company | | | | | | |
| US Smokeless Tobacco Co. | 67.2% | 63.0% | 60.1% | 56.9% | N/A | N/A |
| Altria | N/A | 0.0% | 0.0% | 0.2% | 54.3% | 55.9% |
| American Snuff Co. | 22.5% | 13.1% | N/A | N/A | N/A | N/A |
| Reynolds American | N/A | 12.8% | 27.4% | 29.1% | 31.6% | 31.4% |
| Swedish Match | 9.0% | 9.8% | 11.1% | 12.3% | 12.4% | 11.3% |
| Swisher International | 1.2% | 1.3% | 1.3% | 1.3% | 1.5% | 1.3% |
| Other | 0.0% | 0.0% | 0.0% | 0.1% | 0.2% | 0.1% |

(Adapted from Delnevo, et al., 2014)(19)

*In this section of the table, moist snuff sales include those for snus, a type of moist snuff.

(P) – denotes premium brand; (V) – denotes value brand

1 - Manufactured by American Snuff Company; Reynolds American parent group as of May 2006

2 - Manufactured by United States Smokeless Tobacco Company; Altria parent group as of 2009

3 - Manufactured by Pinkerton Tobacco Company; Swedish Match parent group

4 – Manufactured by RJ Reynolds; Reynolds American parent group

Moist snuff brands and price tiers

While historically two major premium brands (i.e., Skoal and Copenhagen) dominated the moist snuff market, in the late 1990s/early 2000s the introduction of several “value brands” (e.g., Timber Wolf, Red Seal, Grizzly, Longhorn) challenged this trend.⁵ Table 2.7 illustrates the rapid growth in the value brand Grizzly (made by American Snuff Company) which went from the third top selling brand in 2005 to the number one selling brand in 2009, moving ahead of the premium brand market leaders, Copenhagen and Skoal. Another value brand, Longhorn, also increased sales over the six year period to make it the 4th top selling brand in 2010, albeit with a considerably smaller market share (5.1%).

Promotions

Table 2.8 describes the total proportion of promoted SLT products and the type of promotions over time. The proportion of SLT products that were promoted remained relatively stable between 2005 and 2010 but promoted SLT products account for a very small portion of the overall SLT market. The vast majority of promotions were “cents off” the retail price and pre-priced. As mentioned previously, tobacco producers and marketers may offer cents-off wherein each can has a UPC code that is separate and distinct from a regular stock can and may be separately identified with distinguishable labeling of “Save \$X.XX.” In pre-priced sales, the tobacco producer offers consumers single cans of SLT at a pre-established retail price and may be separately identified with distinguishable labeling of “\$X.XX per can.” The proportion of cents off promotions

⁵ Brands are labeled as premium or value based on terms that the smokeless tobacco manufacturer as well as trade publications use to conventionally describe these products

decreased after 2007 while the proportion of pre-priced promotions increased during this time period.

Table 2.8. Promoted smokeless tobacco products sold in convenience stores in the US, 2005-2010

| | Year | | | | | |
|---------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| <i>Promoted Products, Total</i> | 2.2% | 2.1% | 1.9% | 2.8% | 2.1% | 2.2% |
| Bonus Ounces | 4.2% | 3.2% | 1.7% | 1.2% | 0.3% | 0.1% |
| Bonus Unit | 6.4% | 5.5% | 2.5% | 1.4% | 1.0% | 0.5% |
| Cents off | 88.7% | 87.6% | 85.1% | 78.9% | 61.4% | 80.5% |
| Gift | 0.5% | 0.1% | 0.0% | 3.8% | 1.7% | 0.5% |
| Prepriced | 0.3% | 3.6% | 10.7% | 14.7% | 35.6% | 18.3% |

Federal laws and policies

As mentioned previously, tobacco product excise taxes were increased at the federal level in April 2009. However, one of the most dramatic tobacco measures initiated at the federal level included the Family Smoking Prevention and Tobacco Control Act (commonly referred to as the Tobacco Control Act) signed into law on June 22, 2009. The Tobacco Control Act gives the Food and Drug Administration (FDA) the authority to regulate the manufacture, distribution, marketing, and sale of tobacco products to protect public health. Several parts of the Tobacco Control Act were in effect before the end of 2010 including bans on flavored cigarettes, misleading descriptors such as “light,” “mild,” and “low-tar” that imply that some cigarettes are less hazardous, free samples of cigarettes/other tobacco products, and brand-name sponsorship of sporting events and concerts by tobacco companies. In addition, by 2010, the law required larger, more specific warning labels covering 30% of the top half of the front and back of smokeless tobacco product packaging.

Summary

Tobacco-related laws and regulatory policies in the U.S. have included state and local laws prohibiting smoking in public places and workplaces, excise taxes that raise the price of tobacco products, funding for tobacco control programming, and federal legislation giving the FDA the authority to regulate tobacco. In particular, there was substantial variation in these policies between 2005 and 2010 including the adoption of comprehensive clean indoor air laws in 23 states, a 75% increase in the average state cigarette excise tax, and changes to moist snuff tax levels and structure in many states. Many states also experienced generous cuts to tobacco control funding during the time period of interest. Tobacco control policies have not been uniformly implemented across states leading to regional disparities in laws and regulations - few southern states have comprehensive clean indoor air laws and on average, southern states have lower cigarette excise taxes.

The moist snuff market is influenced to a certain extent by the success of these traditional tobacco control activities such as smoke-free environments and high cigarette taxes. Examination of the moist snuff market during the time period of interest reveals rapid growth in the sales of portioned pouches, flavorings, and discount brands such as Grizzly and Longhorn. Also, a large proportion of moist snuff products are promoted with price discounting at the point of sale including cents off and pre-priced promotions.

As discussed in Chapter 1, the SLT industry in the United States has transformed the way that it markets and manufactures moist snuff and the demographics of the consumer have changed. In addition, research on the impact of traditional tobacco control activities is scant and most studies were conducted prior to the implementation of

major tobacco control initiatives, including the growth of clean indoor air laws, increased taxation, and the Tobacco Control Act. This dissertation will be the first to examine how recent public policy and tobacco industry practices have affected individual SLT use and aggregate SLT sales. The objective of the dissertation is to examine the relationship between SLT sales and retail promotion activities and tobacco control policies.

CHAPTER 3: METHODS

The objective of this study was to estimate the effect of retail promotion and tobacco control policies on SLT sales across various SLT markets. It is unknown how tobacco control interventions and tobacco industry activities may impact aggregate SLT market activity and whether the impact may differ across markets. This study utilizes Nielsen retail market scanner data for SLT sales.

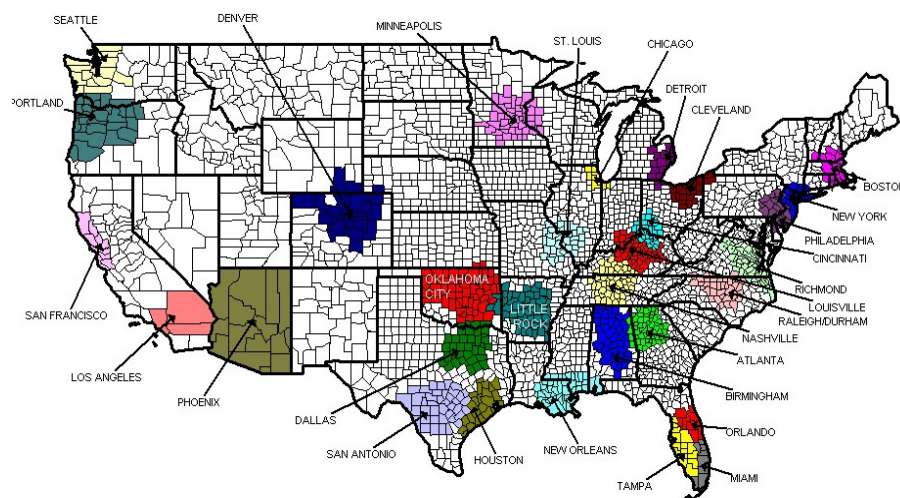
Data source

The primary data source for the outcome variable of SLT sales is biannual market scanner data from the Nielsen Research Company, an industry research company which gathers data on consumer packaged goods from convenience, drug, food and mass merchandise stores. Nielsen estimates that 93% of SLT sales are in convenience stores while 7% are in food, drug, or mass merchandise stores.⁽⁷¹⁾ Convenience store data are collected through Nielsen's *Convenience Track* system, which tracks sales data from a sample of convenience stores through a combination of in-store retail scanner equipment (i.e., barcode readers) as well as audits of sales in stores without scanner equipment. Nielsen's convenience store sample is representative of all convenience store types and includes chain stores, non-chain and independent convenience stores, as well as convenience stores found in gas stations. Using a proprietary mechanism, Nielsen applies sample weights to scanned retailer data before reporting.

The data for this analysis includes SLT sales in US convenience stores from 2005 to 2010 for 30 market areas, totaling 180 market year observations (see Figure 1). The

market areas are defined by Nielsen and are collections of counties that usually contain at least one large metropolitan area.

Figure 3.1. Nielsen's 30 Convenience Store Markets



Based on Nielsen data from 2008, the average number of counties in a market area is 32 (range 4 - 62). Market areas contain an average 5.9 million people (range 1.97 million - 20.1 million) and collectively cover approximately 58% of the U.S. population. The market areas do not generally conform to convenient geographic areas and often cross state borders. Nine markets are contained entirely within a single state and twenty-one markets include at least one county from more than one state (e.g., the New Orleans market includes the Southeastern portion of Louisiana, the lower Southern portion of Mississippi, and the lower Southwestern portion of Alabama). The combined market areas represent the total U.S. convenience store market. Table 3.1 lists the states and represented in each market as well as the census regions assigned to each market.

Table 3.1. States and Census Regions included in the Nielsen Convenience Store Markets

| Market | State(s) | Census Region |
|----------------|--|----------------------|
| Atlanta | Georgia, Alabama | South |
| Birmingham | Alabama | South |
| Boston | Connecticut, Massachusetts, New Hampshire, Rhode Island, Vermont | Northeast |
| Chicago | Illinois, Indiana | Midwest |
| Cincinnati | Indiana, Kentucky, Ohio | Midwest |
| Cleveland | Ohio, Pennsylvania | Midwest |
| Dallas | Oklahoma, Texas | South |
| Denver | Colorado, Nebraska, Wyoming | West |
| Detroit | Michigan, Ohio | Midwest |
| Houston | Texas | South |
| Little Rock | Arkansas, Oklahoma | South |
| Los Angeles | California | West |
| Louisville | Kentucky, Indiana | South |
| Miami | Florida | South |
| Minneapolis | Minnesota, Wisconsin | Midwest |
| Nashville | Tennessee, Kentucky | South |
| New Orleans | Alabama, Louisiana, Mississippi | South |
| New York | New York, New Jersey, Connecticut | Northeast |
| Oklahoma City | Oklahoma, Kansas | South |
| Orlando | Florida | South |
| Philadelphia | Pennsylvania, New Jersey, Delaware | Northeast |
| Phoenix | Arizona | West |
| Portland | Oregon, Washington | West |
| Raleigh Durham | North Carolina, Virginia | South |
| Richmond | Virginia, North Carolina | South |
| San Antonio | Texas | South |
| San Francisco | California | West |
| Seattle | Washington | West |
| St. Louis | Missouri, Illinois | Midwest |
| Tampa | Florida | South |

Measures

Moist snuff (MST) sales

The dependent or outcome variables in these analyses - per capita sales volume (measured in MST unit sales) and per capita MST sales revenue (measured in MST sales dollars) - were constructed by dividing the total MST sales volume and the total MST sales revenue in a market by the market population size for each year. These sales data were reported on a semi-annual basis. The Census Bureau county-level population data (2004-2010) was used to determine the total population within a Nielsen market. Unit sales for MST were also multiplied by the total ounces reported for the product package.

All dollar variables, including MST sales revenue were inflation adjusted using the Consumer Price Index (CPI) for 2010 as reported by the Bureau of Labor Statistics.

When the term ‘sales’ is used alone, it is referring to both sales volume and sales dollars unless otherwise specified.

Tobacco industry practices

To examine the potential influence of tobacco industry practices on the demand for MST across markets, I also included several tobacco product attributes or characteristics in the analysis. Tobacco marketing variables include MST product attributes that may tell us how the SLT market is shifting. For example, the Nielsen data provide information on attributes such as brand, flavoring, form (e.g., pouch), and packaging (e.g., multi-pack).

In terms of retail promotions, Nielsen data include promotion codes for bonus ounces, bonus unit, cents off, gift, and pre-priced. The vast majority of promotions includes cents off or pre-priced. Tobacco producers and marketers may offer cents-off wherein each can has a Universal Product Code (UPC) that is separate and distinct from a regular stock can and may be separately identified with distinguishable labeling of “Save \$X.XX.” In pre-priced sales, the tobacco producer offers consumers single cans of MST at a pre-established retail price and may be separately identified with distinguishable labeling of “\$X.XX per can.” Promoted MST products were coded as yes (or a value of 1) if designated as sold under any one of the aforementioned promotion codes. In addition, the proportion of dollar or unit sales by promoted product was derived by multiplying Nielsen dollar sales or unit sales by promoted MST sales.

Tobacco control policies

To examine the potential influence of tobacco control policies on the demand for MST across markets, the analyses included state-level contextual data compiled from several sources - inflation-adjusted state-level cigarette and moist snuff excise taxes and per capita tobacco control program funding obtained from CDC's State Tobacco Activities Tracking and Evaluation (STATE) system, and a smoke-free policy coverage measure obtained from the American Nonsmokers' Rights Foundation U.S. Tobacco Control Laws Database, which takes into account both state and local smoke-free policies.

Excise tax and price

State level cigarette and moist snuff excise taxes from 2005 through 2010 were obtained from CDC's STATE System. State level cigarette and moist snuff excise taxes were reported for the second and fourth quarter of each year reported except for 2005 where fourth quarter tax rates was substituted as second quarter data were not available for this year. So for all years other than 2005, second quarter taxes were linked to the January-June sales period for Nielsen scanner data and fourth quarter taxes to the July-December sales period, except for 2005 where fourth quarter taxes were utilized. Average market-level smokeless tobacco price was included in the Nielsen market scanner data which reported the average retail price for each product in each market, including excise tax but not sales tax. The MST product price in Nielsen market scanner data also reflects any retail promotion or discount applied at the point of sale. Tax and price were continuous variables.

State tobacco control program expenditures

The variable for state tobacco control program expenditures was obtained from a published analysis by CDC of state funding for tobacco control which included annual state tobacco control investments for the period 1998–2010 obtained from the ImpacTeen Project, and included state and federal appropriations to each state for tobacco control program efforts.(63) These state and federal appropriations were adjusted to a fiscal year ending June 30 and were presented as annual dollar amounts. The tobacco control program expenditure variable was a continuous variable.

State clean indoor air laws

Following previous approaches,(47-49) the variable for clean indoor air was represented by the annual percentage of the state population covered by state or local smoke-free air laws that banned smoking in all workplaces, restaurants, or bars. These data, for 2005 to 2010, were obtained from the American Non-Smokers' Rights Foundation. A value of 1 indicated that 100% of the population was covered by state or local smoke-free air laws that included all workplaces, restaurants, or bars. A value of less than 1 indicated the proportion of the population covered by state or local smoke-free air laws.

Linking policy level variables to market data

The tobacco policy variables – excise tax, price, state tobacco control program expenditures, and smoke-free air policy coverage – were merged to the market areas by state and year. That is, state-level variables were matched to Nielsen market areas (e.g.,

data on clean indoor air laws in Georgia were linked to the Atlanta Nielsen market). This strategy is most transparent when a market area contains only one state. However, Nielsen markets do not consistently contain an entire state, and some market areas may cover multiple states. For example, the New York market includes portions of New York as well as New Jersey and Connecticut. For markets that include more than one state, a weighted average of these regulatory measures was calculated using the proportion of the market population residing in each state. Thus, for the New York Nielsen market area, state-level policy variables for the state of New York were weighted by the state's proportion of the market area - about 63% of this Nielsen market area is in the state of New York. Similarly, state-level policy variables for New Jersey and Connecticut were weighted by the states' proportion of the New York Nielsen market area - about 32% and 5%, respectively. These weighted averages more appropriately reflect the potential impact of a particular state-level tobacco control policy on MST sales in a particular Nielsen market area. To derive the proportions of the market population residing in each state, I used county population estimates from 2005 to 2010 for the counties included in each market.

Per capita tobacco control program expenditures were derived by dividing these expenditures by the Nielsen market population size for each year. Tobacco policy variables (i.e., state level cigarette excise taxes, state level weight-based moist snuff excise taxes, average smokeless tobacco prices reported by Nielsen, tobacco control program expenditures) were also inflation adjusted using the Consumer Price Index (CPI) for 2010 as reported by the Bureau of Labor Statistics.

Sample size

I imposed several sample restrictions on the data. I used Nielsen sales data in six-month periods from January 2005 through December 2010. The initial sample size include 71424 product-year observations. First, the sample was restricted to moist snuff products (MST) only (including snus). This resulted in a total of 60845 product-year observations across all 30 markets over the 2005-2010 time period. Second, I stratified the sample by pack size (i.e., single, 2 pack, 5 pack) for some model estimations. Thus, depending on pack size, the sample sizes in these regression analyses varied between 4104 and 49288 product-year observations.

Model specifications

The objective was to devise an empirical model to estimate the effect of retail promotion and tobacco control policies on MST sales across various Nielsen markets.

The null hypothesis was expressed as: H₀: Retail promotions and tobacco control policies had no impact on market level MST sales in the US

A per capita unweighted ordinary least squares estimator was applied to the following model: $MSTsales_{its} = \alpha_0 + \alpha_1 Spending_{it} + \alpha_2 V_{it} + \alpha_3 CIA_{it} + \alpha_4 Promotion_{it} + \alpha_5 Time_t + \alpha_6 Season_{it} + u_{it}$

The model examined how MST sales per capita (per total population) in market i in the time period t for season s ($MSTsales_{its}$) depends on per capita tobacco control program expenditures ($Spending_{its}$) in the state where market i was located; state-level policies related to tobacco which affect price (V_{its}) where V was a vector of such

elements; clean indoor air (CLA_{its}); MST retail promotions ascertained from Nielsen data ($Promotion_{its}$); year effects ($Time_{ts}$), seasonal effects ($Season_{it}$) and an error term (u_{its}). Seasonal effects ($season$) reflected whether sales occurred in the first (January to June) or second half (July to December) of year t .

The outcome variable of MST sales was estimated both in units (adjusted by package size or total ounces) and dollars. The price vector V_{its} included the moist snuff excise tax, cigarette tax, and average MST product price. I used several model specifications to test the use of alternative variables for average MST price (median price, unit price, etc). Because of the high correlation between moist snuff excise tax and MST price, the variable reflecting the *size* of moist snuff excise tax was removed from the final model to minimize multicollinearity. As discussed below, the variables depicting MST excise tax *structure* was retained in the final model. In addition, I re-estimated models based on annual and biannual periods of Nielsen market scanner data.

In markets with higher MST excise taxes and/or prices, I anticipated a lower overall demand for MST. However, an increase in *cigarette* tax or price may increase MST sales if, as suspected, MST use replaced or supplemented cigarette use. Given that tobacco control efforts have historically focused on cigarette use, a higher level of expenditures for tobacco control programming may increase sales of MST. Similarly, the demand for MST was hypothesized to increase in states with strong protection of clean indoor air, particularly since MST product advertising has often suggested using MST in places where smoking is not allowed. Retail promotions are intended to reduce the price of MST; thus, MST sales are likely to be higher in those markets with greater retail promotion (e.g, bonus ounces, bonus unit, cents off, gift, and pre-priced).

Additionally, markets were coded for mixed or single MST tax status. If states in a particular Nielsen market consisted exclusively of states that taxed MST on an ad valorem basis, the market was coded as ad valorem MST tax market only in that year. If states in a particular Nielsen market consisted exclusively of states that taxed MST based on weight, the market was coded as a weight-based MST tax market only; and finally, if the Nielsen market contained states that taxed on an ad valorem basis and by weight, the market was coded as a mixed MST tax market.

Alternative model specifications

Single and multiple packages

The package quantity of MST products varies in that these products are available in single and multiple package quantities (e.g., two, three, five, or 10 pack products). While the vast majority of MST products in the Nielsen scanner data were offered as a single pack (81%), nearly 7% of MST products were sold as two packs and 11% were sold in five packs. Less than 2% of MST products were sold in three or 10 pack quantities. Evidence suggests that the key reason for varying tobacco package quantities is to influence consumer behavior through effects on price (e.g., large packages lower the per-package or per-unit price).(72) Tobacco companies tailor package quantities to specific brands and consumer demographics (e.g, long-term heavy users value larger package quantity).(72) Given the role that package quantity may play on consumer behavior, I also reestimated the models described above for pooled data (all MST products) by pack size including the most popular package quantities of MST products

(i.e., single two, and five packs); I did not estimate results for three and 10 packs due to smaller sample sizes.

Premium and non-premium brands

Premium MST brands are typically perceived as higher quality and sold at a higher price relative to non-premium or value brands; hence, such brands may target a different segment of consumers. As described in Chapter 2, two major premium brands, Skoal and Copenhagen, have historically dominated the moist snuff market. Value or non-premium MST brands may also target a different consumer segment such as committed or experienced users who are more price sensitive. As described in Chapter 2, despite its non-premium price, Grizzly gained considerable market share over the time period of interest and became a market leader in overall SLT sales. Given the potential for brand to effect the relationship between MST sales and tobacco control policies, I conducted an analysis separately for premium and non-premium MST products to examine how this effect may vary by brand. For this analysis, Copenhagen, Skoal, Kodiak, Camel, and Red Man were categorized as premium brands and Grizzly, Longhorn, Red Seal, Timber Wolf, and Husky were categorized as non-premium brands;(19) together, these brands account for 97-98% of SLT sales during the time period of interest. I also repeated the analysis above separately for the top three selling MST products (Skoal, Copenhagen, and Grizzly); together, these brands account for roughly three-quarters of SLT sales during the time period of interest.

Region

Given that tobacco use and tobacco control policies vary by geographic region within the U.S., I also re-estimated the models for the four regions defined by the Census Bureau. The four Census regions include the Northeast, Midwest, South, and West. Table 3.1 indicates the Census region assigned to each Nielsen market. Given that this study examined retail sales, the data could not be separated to analyze results by certain subgroups of the population. Therefore, this regional analysis provides another measure, however blunt, by which to identify potential variation within the overall population.

CHAPTER 4: RESULTS

As described in Chapter 2, there were substantial changes in state tobacco policies between 2005 and 2010 including changes to funding levels for tobacco control programs, increases in state excise taxes for tobacco products, and proliferation of smoke-free air laws. This chapter aimed to examine the effect of retail promotion and tobacco control policies on moist snuff (MST) sales across various SLT markets.

Descriptive analysis

Of the 30 market areas defined by Nielsen, nine markets are contained entirely within a single state and 21 markets include at least one county from more than one state. Therefore, the *size* of state-level cigarette and moist snuff excise taxes varies within and across markets. During the time period of interest, state level MST excise taxes also changed in structure and thus, the *type* of excise tax also varied within and across markets. Some states applied a tax to MST by weight, on a fixed per ounce basis while other states taxed MST on an ad valorem basis, as a percentage of the wholesale or manufacturer's price. Table 4.1 depicts the changes in the type of MST excise tax in Nielsen markets between 2005 and 2010 and illustrates the gradual shift from ad valorem-based taxation toward weight-based taxation during this time period. In 2005, a total of 19 Nielsen markets consisted exclusively of states which taxed MST on an ad valorem basis only, representing nearly 60% of the market population compared to 13 such markets in 2010, reflecting 42% of the market population. Markets consisting exclusively of states that taxed MST based on weight increased to 7 markets in 2010 (or

| Table 4.1. Type of MST excise tax in Nielsen markets, 2005-2010 | | | | | | | | | | | | |
|---|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|
| | 2005 | | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | |
| | Total Markets | Population Share | Total Markets | Population Share | Total Markets | Population Share | Total Markets | Population Share | Total Markets | Population Share | Total Markets | Population Share |
| Ad valorem MST tax only | 19 | 59.4% | 19 | 59.7% | 19 | 59.7% | 18 | 57.3% | 15 | 57.4% | 13 | 42.4% |
| Weight-based MST tax only | 2 | 5.3% | 2 | 5.4% | 2 | 5.5% | 3 | 5.5% | 5 | 16.8% | 7 | 22.8% |
| Mixed MST tax structure | 9 | 35.2% | 9 | 34.9% | 9 | 34.8% | 9 | 37.2% | 10 | 25.8% | 10 | 33.3% |
| MST=Moist snuff | | | | | | | | | | | | |
| Population share reflects the share of the Nielsen market population with each type of MST excise tax structure | | | | | | | | | | | | |

| Table 4.2. Policy characteristics of Nielsen markets, 2005-2010 | | | | | | | | | | | | |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 2005 | | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | |
| | mean | sd | mean | sd | mean | sd | mean | sd | mean | sd | mean | sd |
| MST excise tax, ad valorem (% of price) ^a | 27.84 | 21.32 | 27.52 | 20.96 | 26.99 | 21.07 | 26.56 | 20.88 | 28.84 | 26.62 | 25.81 | 28.81 |
| MST excise tax, weight (cents) ^b | \$0.01 | \$0.02 | \$0.02 | \$0.05 | \$0.03 | \$0.07 | \$0.04 | \$0.10 | \$0.10 | \$0.28 | \$0.27 | \$0.55 |
| Population covered by 100% smoke-free air laws (%) | 9.75% | 22.03% | 17.86% | 30.80% | 27.85% | 35.63% | 32.34% | 37.23% | 35.07% | 38.37% | 39.30% | 40.11% |
| Cigarette excise tax (dollars) | \$0.90 | \$0.58 | \$0.88 | \$0.58 | \$0.99 | \$0.58 | \$0.98 | \$0.61 | \$1.10 | \$0.61 | \$1.19 | \$0.70 |
| Per capita TC program expenditures (dollars) ^c | 2.21 | 1.86 | 2.27 | 2.00 | 2.12 | 1.79 | 2.47 | 1.61 | 2.25 | 1.67 | 1.98 | 1.60 |
| MST=Moist Snuff; TC=tobacco control | | | | | | | | | | | | |
| Note: Values reflect the mean across all product-market observations; dollars indexed to 2010 to adjust for inflation | | | | | | | | | | | | |
| ^a Averages calculated only for markets with an ad valorem MST excise tax | | | | | | | | | | | | |
| ^b Averages calculated only for markets with a weight-based MST excise tax | | | | | | | | | | | | |
| ^c Per population capita calculated at the market population level | | | | | | | | | | | | |

22.8% of the market population) from 2 in 2005 (or just 5.2% of the market population.)

The number of markets that included both types of MST excise tax structures remained relatively consistent across years.

Table 4.2 reflects the tobacco control policy characteristics of the combined Nielsen markets between 2005 and 2010. In markets where smokeless products were taxed on an ad valorem basis (% of price), the mean value of moist snuff excise tax rates remained relatively stable, at 27.18% over the time period of interest (range: 0 - 75%). In markets where MST products were taxed based on weight (cents), moist snuff excise tax rates increased in mean value incrementally from 2005 to 2009 (from 1 to 10 cents) but then increased considerably in 2010 (27 cents per ounce). The proportion of the population in an average market that was covered by comprehensive clean indoor air policies grew substantially during this time period, from nearly 10% in 2005 to almost 40% of the population in 2010. The mean value of the cigarette excise tax in these markets also increased from 2005 to 2010, from \$0.90 cents to \$1.19. However, there was also considerable variation in the cigarette excise tax across markets (range= \$0.23 to \$3.76). Per capita tobacco control program expenditures fluctuated somewhat during this period, with a mean value of \$2.21 dollars across the time period, with the lowest level of funding in 2010 (range= \$0.11 to \$7.21).

Table 4.3 reports the overall MST sales in the combined Nielsen markets between 2005 and 2010 as well as other market characteristics for MST. Total unit and dollar sales of MST increased over this time period while both the average and weighted average unit prices declined over time. Per capita unit consumption increased by about 44% while per

| Table 4.3. MST sales and product characteristics in Nielsen markets, 2005-2010 | | | | | | | |
|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | % Change |
| Total MST sales, units | 280,267,499 | 313,391,993 | 344,145,225 | 360,057,323 | 382,279,066 | 424,687,624 | 51.5% |
| Total MST sales, dollars | \$1,236,287,214 | \$1,315,555,514 | \$1,387,192,985 | \$1,376,272,342 | \$1,402,009,310 | \$1,573,517,135 | 27.3% |
| Average MST unit price | \$3.95 | \$3.88 | \$3.83 | \$3.77 | \$3.61 | \$3.71 | -6.1% |
| Average weighted MST unit price ^a | \$4.41 | \$4.20 | \$4.03 | \$3.82 | \$3.67 | \$3.71 | -15.9% |
| Per capita MST consumption, units ^b | 1.65 | 1.82 | 1.98 | 2.05 | 2.16 | 2.38 | 44.2% |
| Per capita MST consumption, dollars ^b | \$6.50 | \$7.08 | \$7.60 | \$7.76 | \$7.80 | \$8.82 | 35.7% |
| % of MST unit sales with a retail promotion | 2.2% | 2.1% | 1.9% | 2.8% | 2.1% | 2.2% | 0.0% |
| % of MST unit sales that were multipack | 1.5% | 2.5% | 3.5% | 3.9% | 1.3% | 0.7% | -53.3% |
| % of MST unit sales that were 1.2 oz | 88.8% | 88.4% | 88.3% | 87.8% | 86.4% | 85.1% | -4.2% |
| % of MST unit sales that were pouches | 5.4% | 6.0% | 6.9% | 7.9% | 10.4% | 13.1% | 142.6% |
| % of MST unit sales that were premium brand | 68.3% | 63.1% | 59.7% | 57.0% | 56.0% | 57.6% | -15.7% |
| MST= Moist Snuff | | | | | | | |
| <i>Note:</i> Averages reflect the mean across all product-market observations; dollars indexed to 2010 to adjust for inflation | | | | | | | |
| ^a Weighted price by product market share | | | | | | | |
| ^b Per population capita calculated at the market population level | | | | | | | |

capita consumption measured in dollars increased by nearly 36% over this time period. In addition, the percent of MST sales occurring under a retail promotion and those that were multipack decreased, although in both cases made up a small percent of the overall market. Pouches and non-premium brands, however, increased as a percent of overall MST unit sales over this time period.

Regression analysis

The primary objective of this chapter was to examine the effect of retail promotion and tobacco control policies on MST sales across various SLT markets. Using the specification described in Chapter 3, we estimated the regression models for per capita sales volume and revenue of MST products.

Per capita MST unit sales: impact of tobacco control policies

Table 4.4 reports the estimation results that examined how tobacco control policies and retail promotions were associated with per capita MST sales volume (or unit sales). As described in Chapter 3, I conducted the analysis for the pooled sample of all MST products (includes all pack sizes) as well as a subsample analysis stratified by pack size (single, two, and five pack MST products).

The table shows that in the analysis of both the pooled and stratified samples a higher percent of a market population covered by smoke-free air policies was significantly associated with lower per capita MST unit sales, suggesting *complementarity* between cigarettes and MST. In addition, a higher cigarette tax was

significantly associated with lower per capita unit sales of MST, also suggesting *complementarity* between MST and cigarettes.

Per capita state level tobacco control program expenditures had a positive and significant impact on per capita MST unit sales; that is, higher tobacco control expenditures were associated with increased MST unit sales. Thus, higher spending on tobacco control was likely to decrease cigarette smoking but increased MST sales which suggests *substitution*. Consistent with the mixed findings of previous studies, *both complementarity and substitution* were observed in the results.(31, 34, 36-39, 44, 50, 73)

Per capita MST unit sales: price and tax impact

Results indicated that a higher average product price for MST was associated with lower MST unit sales. However, the stratified analysis showed that this relationship was not uniform across single and multi-pack products. A higher average price for five-pack MST products also resulted in lower unit sales. In contrast, a higher average price was related to *higher* unit sales among single pack and two-pack products. It appears that a negative relationship between MST price and sales volume is primarily driven by larger product quantities of MST. If the price for five pack MST products increases, the quantity demanded decreases, which could suggest that consumers may not have an adequate substitutes for their preferred product. However, the vast majority of MST products were sold in single packs, ranging from 96% to 99% of the market depending on year. Therefore, the relationship between MST price and sales volume is positive for the overwhelming proportion of the MST market.

As a reminder, the MST product price in Nielsen market scanner data includes excise tax and reflects any retail promotion or discount applied at the point of sale. The model specification includes other components of price including the type of MST excise tax in the market during the time period of interest (ad valorem, weight-based, or both) and whether the product was sold with a retail promotion.

Table 4.4 also shows that sales volume was higher in markets with mixed and weight based-only tax structure than in markets with ad valorem tax structure. This relationship was statistically significant for the pooled sample as well as the single and two pack product subsamples. This relationship was also positive in the five pack product subsample but the coefficient was small and not statistically significant. This may suggest that large volume consumers were simply less sensitive to differences in the MST tax structure.

Sales volume of products sold with the retail promotion, which implies a price discount (most frequently cents-off), was significantly lower than sales volume of products sold without retail promotion, except for five-pack MST products where the relationship was negative but not statistically significant. Thus in most cases, the increased likelihood of a retail promotion resulted in decreased per capita MST unit sales.

Time trend, seasonality, and per capita sales volume

For per capita MST unit sales overall, there were no significant differences by year. In some cases, later years were positively associated with per capita MST unit sales, most consistently among two pack unit sales of MST. Among five pack MST products, only per capita unit sales in 2009 and 2010 were significantly different from 2005.

Table 4.4. Effect of tobacco control policies & retail promotions on per capita MST sales (Units) overall and by pack size

| | Overall Unit sales | Single Pack Unit sales | 2 pack Unit sales | 5 pack Unit sales |
|---|------------------------------------|----------------------------------|-----------------------------------|--------------------------------------|
| Smoke-free air policy | -0.00276*** (0.000378) | -0.00344*** (0.000466) | -0.00208*** (0.000314) | -0.000114*** (0.0000300) |
| Cigarette tax | -0.00218*** (0.000220) | -0.00354*** (0.000269) | -0.000715*** (0.000182) | -0.0000469* (0.0000202) |
| Per capita state TC spending | 0.000234*** (0.0000625) | 0.000195* (0.0000768) | 0.000110* (0.0000447) | 0.0000336*** (0.00000560) |
| Average MST price | -0.000310*** (0.0000152) | 0.00161*** (0.0000796) | 0.000458*** (0.0000437) | -0.0000137*** (0.00000143) |
| <i>Ad valorem MST tax only (referent)</i> | | | | |
| Mixed MST tax | 0.00147*** (0.000235) | 0.00294*** (0.000289) | 0.000959*** (0.000189) | 0.0000110 (0.0000207) |
| Weight-based MST tax only | 0.00381*** (0.000373) | 0.00522*** (0.000450) | 0.00221*** (0.000292) | 0.0000599 (0.0000361) |
| Retail promotion | -0.00910*** (0.000271) | -0.00996*** (0.000314) | -0.00109*** (0.000208) | -0.000171 (0.0000892) |
| <i>2005 (referent)</i> | | | | |
| 2006 | 0.000303 (0.000409) | 0.00102* (0.000493) | 0.00122*** (0.000250) | 0.0000154 (0.0000550) |
| 2007 | 0.0000255 (0.000394) | 0.00117* (0.000476) | 0.00234*** (0.000254) | 0.0000577 (0.0000518) |
| 2008 | -0.000614 (0.000386) | 0.000606 (0.000468) | 0.00293*** (0.000259) | 0.0000302 (0.0000502) |
| 2009 | -0.000577 (0.000384) | 0.00103* (0.000468) | 0.00103*** (0.000289) | 0.000112* (0.0000474) |
| 2010 | -0.000647 (0.000379) | 0.000928* (0.000463) | 0.00103* (0.000498) | 0.000206*** (0.0000459) |
| January – July | 0.000914*** (0.000207) | 0.00111*** (0.000252) | -0.000388* (0.000159) | 0.0000158 (0.0000187) |
| Constant | 0.0124*** (0.000396) | 0.00716*** (0.000542) | -0.000810* (0.000387) | 0.000283*** (0.0000521) |
| r ² | 0.0297 | 0.0385 | 0.0965 | 0.0321 |
| N | 60845 | 49288 | 4104 | 6507 |

MST= Moist Snuff; TC= tobacco control

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The relationship between MST unit sales and some important variables, such as MST price and tax structure, varied by pack size so bias may be introduced in the pooled analysis where price and tax are not differentiated between various product offerings (i.e., pack size).

Except for five-pack MST unit sales, the first half of the year, January-July, was significantly different from the second half of the year, July-December. Overall and among single pack MST products, the first half of the year resulted in increased per capita MST unit sales; the first half of the year resulted in decreased per capita MST unit sales among two pack MST products.

Per capita MST dollar sales results

Table 4.5 reports the effect of tobacco control policies and retail promotions on the demand for per capita MST dollar sales. These results were substantively similar to those reported for per capita MST unit sales. Namely, similarly to the unit sales results, the results here found that a higher percent of the market population covered by clean indoor air policies and higher cigarette taxes were negatively associated with per capita MST sales in dollars while higher state tobacco control program expenditures were positively associated with per capita MST sales in dollars. Similarly to sales volume results, we found that a negative association between MST price and MST dollar sales was primarily driven by products sold in multipacks with five or more products per pack. A higher average MST product price resulted in reduced per capita MST sales dollars overall and for five pack products while a higher average MST product price increased per capita MST sales dollars for single and two pack MST products.

Table 4.5. Effect of tobacco control policies & retail promotions on per capita MST sales (Dollars) overall and by pack size

| | Overall Dollar Sales | Single Pack Dollar Sales | 2 pack Dollar Sales | 5 pack Dollar Sales |
|--|---|--|--|--|
| Smoke-free air policy | -0.00942^{***} (0.00148) | -0.0118^{***} (0.00180) | -0.0120^{***} (0.00189) | -0.00147^{***} (0.000429) |
| Cigarette tax | -0.00421^{***} (0.000862) | -0.0106^{***} (0.00104) | -0.00307^{**} (0.00110) | -0.000710[*] (0.000289) |
| Per capita state TC spending | 0.00105^{***} (0.000245) | 0.000642[*] (0.000297) | 0.000565[*] (0.000270) | 0.000432^{***} (0.0000800) |
| Average MST price | -0.000821^{***} (0.0000598) | 0.0120^{***} (0.000308) | 0.00390^{***} (0.000263) | -0.0000711^{***} (0.0000205) |
| <i>Ad valorem MST tax only</i> (referent) | | | | |
| Mixed MST tax | 0.00115 (0.000920) | 0.00773^{***} (0.00112) | 0.00432^{***} (0.00114) | 0.000111 (0.000296) |
| Weight-based MST tax only | 0.00926^{***} (0.00146) | 0.0155^{***} (0.00174) | 0.0110^{***} (0.00176) | 0.000448 (0.000515) |
| Retail promotion | -0.0346^{***} (0.00106) | -0.0364^{***} (0.00121) | -0.00541^{***} (0.00125) | -0.00194 (0.00127) |
| <i>2005 (referent)</i> | | | | |
| 2006 | -0.000589 (0.00160) | 0.00305 (0.00191) | 0.00755^{***} (0.00151) | 0.000136 (0.000786) |
| 2007 | -0.00359[*] (0.00154) | 0.00234 (0.00184) | 0.0139^{***} (0.00153) | 0.000522 (0.000740) |
| 2008 | -0.00736^{***} (0.00151) | -0.000775 (0.00181) | 0.0172^{***} (0.00156) | 0.000276 (0.000717) |
| 2009 | -0.00868^{***} (0.00151) | -0.0000332 (0.00181) | 0.00625^{***} (0.00174) | 0.00154[*] (0.000678) |
| 2010 | -0.00859^{***} (0.00149) | -0.000333 (0.00179) | 0.00422 (0.00300) | 0.00312^{***} (0.000656) |
| January – July | 0.00367^{***} (0.000811) | 0.00423^{***} (0.000974) | -0.00224[*] (0.000959) | 0.000118 (0.000267) |
| Constant | 0.0466^{***} (0.00155) | 0.00781^{***} (0.00210) | -0.0118^{***} (0.00233) | 0.00200^{**} (0.000745) |
| r ² | 0.0232 | 0.0545 | 0.108 | 0.0213 |
| N | 60845 | 49288 | 4104 | 6507 |

MST= Moist Snuff; TC= tobacco control

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Recall that the results in Table 4.4 suggested that mixed MST tax markets had a significant and positive impact on overall per capita MST unit sales compared to markets with an ad valorem tax structure. This effect becomes insignificant in the model for overall per capita MST dollar sales, as shown in Table 4.5. A weight-based only MST tax structure was associated with increased per capita MST dollar sales overall as well in single and two pack product sales. Presence of retail promotions had a significant and negative impact on per capita MST dollar sales.

Unlike in the model for per capita MST unit sales, there were significant differences by year in overall per capita MST dollar sales and in two pack dollar sales. Over time, there was an increase in MST sales volume but not in MST sales dollars among single pack MST products; however, this trend flattens out over time. In other words, the increase in sales volume can be attributed to the first few years of the time period of interest and any gap between single pack MST sales volume and MST dollar sales was minimized in later years. However, per capita MST dollar sales among single pack products did not significantly differ by year. Among five pack products, 2009 and 2010 were significantly positively associated with per capita MST dollar sales, perhaps reflecting a consumer shift to volume discounts or stockpiling as a result of the large increase in the federal excise tax on MST in 2009.

Similarly to the model for per capita MST unit sales, the first half of the year was significantly different from the second half of the year. Overall and among single pack MST products, there was a positive association between the first half of the year and per capita MST dollar sales while there was a negative association between the first half of the year and per capita MST dollar sales among two pack MST products.

Tax and price elasticities

As shown previously in Tables 4.4 and 4.5, the average price of MST products overall and five packs was negatively and significantly associated with MST sales while significantly and positively associated with single and two pack MST product sales. In all cases, there was a negative association between cigarette tax and MST sales volume (units) and revenue (dollars). Based on the estimated parameters and elasticity formula for the linear model, I also calculated the own price elasticities for moist snuff and the cross-tax elasticities with respect to cigarette tax and described them below (see Table 4.6). The own price elasticity of demand for moist snuff overall and five pack products was negative and ranged from -0.155 to -1.258. The own price elasticity of demand for MST single and two pack products was positive and ranged from 0.582 to 1.510.

| Table 4.6. Estimated elasticities of moist snuff and cigarettes | | | |
|--|----------|---------------------------------|---|
| MST Sales Revenue (Dollars) | N | MST own price elasticity | Cross-tax elasticity (cigarette taxes) |
| Total | 60845 | -0.155 | -0.150 |
| Single pack | 49288 | 1.163 | -0.319 |
| 2 pack | 4104 | 1.510 | -0.207 |
| 5 pack | 6507 | -0.499 | -0.324 |
| MST Sales Volume (Units) | N | MST own price elasticity | Cross-tax elasticity (cigarette taxes) |
| Total | 60845 | -0.222 | -0.294 |
| Single pack | 49288 | 0.582 | -0.397 |
| 2 pack | 4104 | 1.038 | -0.283 |
| 5 pack | 6507 | -1.258 | -0.281 |
| MST=Moist snuff | | | |

The cross-tax elasticities, positive for substitutes and negative for complements, measure the change in the demand for moist snuff with respect to a change in the cigarette tax. In all cases, the demand for MST products, measured by both dollar and unit sales, decreased in response to higher cigarette tax. Overall, the demand for MST declined in response to a higher cigarette tax (cross tax elasticity [with respect to cigarette

tax] = -0.150 for MST dollar sales and =-0.294 for MST unit sales]. That is, a 10% increase in the cigarette tax resulted in roughly a 1.5% decline in MST demand as measured by sales dollars and a nearly 3% decline in MST demand as measured in unit sales. Similarly for single, two, and five pack products, MST dollar and unit sales declined in response to a higher cigarette tax; that is, a 10% increase in the cigarette tax resulted in declines ranging from 2.1% to 3.2% reductions in MST sales dollars and 2.8% to 3.97% reductions in MST unit sales. These results suggest that cigarettes act as a complement for consumers of MST products.

Premium and non-premium brands

As described in earlier chapters, tobacco manufacturers may target brands toward specific types of consumers. In addition, consumer brand preferences may be a function of price and taxation which differ between premium and non-premium, or value, brands. Thus, this subanalysis assessed the effect of tobacco control policies and retail promotions on MST sales stratified by premium and non-premium brands. By definition, a premium (or name-brand) product (e.g., Copenhagen, Skoal) is perceived to have a higher value than one that is marketed as a non-premium (or value/generic/economy) brand product (e.g., Grizzly, Longhorn).

Per capita MST single pack unit sales by brand

Table 4.7 presents the models examining the relationship between tobacco control policies and retail promotions and per capita MST sales volume of single packs of premium and non-premium brands overall as well as the top selling brands of

Table 4.7. Effect of tobacco control policies & retail promotions on per capita MST sales (Units) of single packs: results for brands

| | Non-premium Brand Per Capita Unit Sales | Premium Brand Per Capita Unit Sales | Skoal Per Capita Unit Sales | Copenhagen Per Capita Unit Sales | Grizzly Per Capita Unit Sales |
|---|--|--|----------------------------------|-------------------------------------|----------------------------------|
| Smoke-free air policy | -0.00295*** (0.000549) | -0.00445*** (0.000815) | -0.00381*** (0.000580) | -0.0164*** (0.00356) | -0.000147 (0.00297) |
| Cigarette tax | -0.00272*** (0.000318) | -0.00443*** (0.000473) | -0.00249*** (0.000334) | -0.0117*** (0.00210) | -0.00888*** (0.00188) |
| Per capita TC spending | 0.000440*** (0.0000898) | -0.000131 (0.000137) | -0.0000939 (0.0000929) | 0.000164 (0.000582) | 0.000560 (0.000555) |
| Average MST price | -0.0000736 (0.000108) | 0.00222*** (0.000206) | 0.000458** (0.000152) | 0.00854*** (0.00124) | -0.00425* (0.00185) |
| <i>Ad valorem tax only (referent)</i> | | | | | |
| Mixed MST tax | 0.00213*** (0.000339) | 0.00407*** (0.000516) | 0.00357*** (0.000358) | 0.00867*** (0.00231) | 0.0108*** (0.00201) |
| Weight-based MST tax | 0.00291*** (0.000532) | 0.00862*** (0.000791) | 0.00635*** (0.000562) | 0.0235*** (0.00340) | 0.00580* (0.00294) |
| Retail promotion | -0.00734*** (0.000397) | -0.0140*** (0.000533) | -0.0120*** (0.000370) | -0.0291*** (0.00240) | -0.0315*** (0.00214) |
| <i>2005 (referent)</i> | | | | | |
| 2006 | 0.00116* (0.000581) | 0.000638 (0.000866) | 0.000680 (0.000534) | -0.00415 (0.00384) | 0.00878 (0.00460) |
| 2007 | 0.00173** (0.000564) | -0.000235 (0.000827) | 0.00134* (0.000521) | -0.00955** (0.00361) | 0.0126** (0.00446) |
| 2008 | 0.00185*** (0.000558) | -0.00177* (0.000815) | 0.000583 (0.000533) | -0.0125*** (0.00354) | 0.00271 (0.00399) |

| | | | | | |
|----------------|---|---|---|--|---|
| 2009 | 0.00220^{***} (0.000551) | -0.000810 (0.000851) | 0.000935 (0.000563) | -0.000496 (0.00398) | 0.00000815 (0.00392) |
| 2010 | 0.00223^{***} (0.000546) | -0.000425 (0.000853) | 0.000383 (0.000571) | 0.00230 (0.00389) | -0.00488 (0.00388) |
| January-July | 0.000627[*] (0.000298) | 0.00177^{***} (0.000439) | 0.00122^{***} (0.000302) | 0.00451[*] (0.00189) | 0.00236 (0.00173) |
| Constant | 0.00816^{***} (0.000619) | 0.00978^{***} (0.00130) | 0.0112^{***} (0.000915) | 0.00866 (0.00706) | 0.0467^{***} (0.00544) |
| r ² | 0.0201 | 0.0661 | 0.123 | 0.101 | 0.0922 |
| N | 29592 | 19696 | 11289 | 3779 | 4363 |

MST= Moist Snuff; TC= tobacco control

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Copenhagen, Skoal, and Grizzly. Models for two and five pack MST single pack sales by brand are provided in the Appendix.

As shown in Table 4.7, there appeared to be a pattern in that the coefficients for smoke-free air policies, cigarette tax, type of MST tax, and retail promotion were nearly all greater in size for premium brand relative to non-premium brand single pack MST products. Among premium brands, smoke-free air policies were significantly negatively associated with per capita single pack MST unit sales. Higher cigarette tax also had a negative and significant impact on per capita unit sales across all single pack MST products, both premium and non-premium brands.

The impact of clean indoor air policies and cigarette taxes on MST unit sales indicate complementarity between MST and cigarettes while the results of the impact of state-level tobacco control expenditures on overall MST unit sales indicate substitutability. Tables 4.7 and 4.8 suggest that among single pack MST products the positive effect of tobacco control expenditures on MST sales (volume and revenue) was primarily driven by non-premium brands rather than premium brands.

Consistent with differences observed between premium and non-premium brands in relation to other tobacco policies, a positive relationship between MST *price* and unit sales was driven primarily by premium brands. The relationship between MST price and sales volume was not statistically significant for non-premium brand MST products and even negative for Grizzly brand. So in addition to differences in consumers of varying MST package quantities, it appears that consumers of premium and non-premium products are also different.

Overall, a mixed tax market resulted in significantly higher per capita single pack unit sales across all brands relative to markets with only an ad valorem tax. There was a statistically significant and positive association between a weight-based only tax market and single pack Grizzly products, albeit the strength of this association was much weaker than that found for Skoal and Copenhagen products. Retail promotions were negatively related to per capita unit sales of premium and non-premium products as well as the three leading brands.

Thus, the impact of tobacco control policies varies across brands and Grizzly, though priced as a non-premium/value brand, often responds like a premium brand in the marketplace. Tobacco companies conduct extensive consumer research to effectively position their products to consumers (20) and by some measures, it appears that the manufacturers of Grizzly have been fairly successful at positioning a lower priced brand as a premium product.

Per capita MST single pack dollar sales by brand

As tobacco control expenditures increased, both MST sales volume in units and revenue in dollars for premium brands were largely unaffected while sales volume and revenue for non-premium brands increased (see Table 4.8). On the other hand, as the average MST price increased, the sales volume of premium single packs increased and remained basically unchanged for non-premium single packs and significantly decreased for Grizzly only. However, when sales dollars were considered, the MST price increase was associated with increased sales dollars among both premium and non-premium

Table 4.8. Effect of tobacco control policies & retail promotions on per capita MST sales (USD) of single packs: results for brands

| | Non-Premium Brand Per Capita \$ Sales | Premium Brand Per Capita \$ Sales | Skoal Per Capita \$ Sales | Copenhagen Per Capita \$ Sales | Grizzly Per Capita \$ Sales |
|---------------------------------------|--|--------------------------------------|---------------------------------|-----------------------------------|--------------------------------|
| Smoke-free air policy | -0.00750*** (0.00141) | -0.0199*** (0.00391) | -0.0180*** (0.00270) | -0.0754*** (0.0171) | 0.00509 (0.00750) |
| Cigarette tax | -0.00496*** (0.000819) | -0.0157*** (0.00227) | -0.00777*** (0.00155) | -0.0470*** (0.0101) | -0.0192*** (0.00475) |
| Per capita TC spending | 0.00140*** (0.000231) | -0.0000176 (0.000655) | -0.00000429 (0.000432) | 0.00159 (0.00280) | 0.00224 (0.00140) |
| Average MST price | 0.00138*** (0.000278) | 0.0137*** (0.000989) | 0.00412*** (0.000708) | 0.0534*** (0.00594) | 0.00164 (0.00468) |
| <i>Ad valorem tax only (referent)</i> | | | | | |
| Mixed tax market | 0.00300*** (0.000872) | 0.0132*** (0.00248) | 0.0131*** (0.00166) | 0.0294** (0.0111) | 0.0192*** (0.00509) |
| Weight-based tax only | 0.00458*** (0.00137) | 0.0303*** (0.00380) | 0.0221*** (0.00261) | 0.0909*** (0.0164) | 0.00496 (0.00743) |
| Retail promotion | -0.0186*** (0.00102) | -0.0657*** (0.00255) | -0.0571*** (0.00172) | -0.135*** (0.0115) | -0.0784*** (0.00542) |
| <i>2005 (referent)</i> | | | | | |
| 2006 | 0.00237 (0.00149) | 0.00266 (0.00415) | 0.00318 (0.00248) | -0.0249 (0.0185) | 0.0195 (0.0116) |
| 2007 | 0.00355* (0.00145) | -0.00386 (0.00397) | 0.00491* (0.00242) | -0.0547** (0.0173) | 0.0291** (0.0113) |
| 2008 | 0.00370** (0.00144) | -0.0129*** (0.00391) | 0.000188 (0.00248) | -0.0713*** (0.0170) | 0.0102 (0.0101) |
| 2009 | 0.00579*** (0.00142) | -0.0123** (0.00408) | -0.00200 (0.00262) | -0.0242 (0.0191) | 0.00476 (0.00992) |

| | | | | | |
|----------------|---|---|---|--|---|
| 2010 | 0.00706^{***} (0.00140) | -0.0110^{**} (0.00409) | -0.00485 (0.00265) | -0.00803 (0.0187) | -0.00561 (0.00983) |
| January-July | 0.00125 (0.000766) | 0.00846^{***} (0.00211) | 0.00592^{***} (0.00140) | 0.0219[*] (0.00909) | 0.00422 (0.00437) |
| Constant | 0.0154^{***} (0.00159) | 0.0329^{***} (0.00623) | 0.0440^{***} (0.00425) | -0.0106 (0.0340) | 0.0785^{***} (0.0138) |
| r ² | 0.0179 | 0.0683 | 0.123 | 0.105 | 0.0739 |
| N | 29592 | 19696 | 11289 | 3779 | 4363 |

MST= Moist Snuff; TC= tobacco control; USD= United States Dollars

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

single packs, except for the Grizzly brand specifically, where the direction of the relationship was also positive but did not reach statistical significance.

As with sales volume, a weight-based only MST tax market had the most favorable impact on revenue in dollars for premium brands overall and the brand leaders, particularly for Copenhagen where the effect size was largest. Having retail promotions had a significant and negative impact of per capita MST dollar sales for all single pack products, both premium and non-premium.

Per capita MST unit sales by product features

Given that tobacco product design and marketing features can influence consumer choice and subsequent product sales and consumption, I also examined the effect of tobacco control policies and retail promotion on specific MST product forms and characteristics such as snus, pouch, and flavored. As shown in Table 4.9, the impact of smoke-free air policies resulted in higher per capita unit sales for snus but lower sales for flavored MST products. This was consistent with expectations given that snus was often marketed as a product that could be used in places where other tobacco products could not be smoked. Cigarette tax was negatively associated with snus, pouch, and flavored MST unit sales. Higher per capita tobacco control spending resulted in higher per capita unit sales of both snus and flavored products but there was no significant relationship for pouch products. Average product price was negatively associated with unit sales of pouch and flavored MST but not significantly related to snus products. As a premium specialty MST product, snus consumers may be less sensitive to product price. Relative to a market with an ad valorem tax only, both mixed and weight-based only tax markets

Table 4.9. Effect of tobacco control policies & retail promotions on per capita MST sales (Units) by specific product characteristics

| | Snus Unit Sales | Pouch Unit Sales | Flavored Unit Sales |
|---|-----------------------------------|------------------------------------|------------------------------------|
| Smoke-free air policy | 0.000941* (0.000416) | -0.000319 (0.000211) | -0.00104* (0.000448) |
| Cigarette tax | -0.000906*** (0.000249) | -0.000976*** (0.000127) | -0.00217*** (0.000259) |
| Per capita TC spending | 0.000176* (0.0000892) | -0.0000143 (0.0000387) | 0.000178* (0.0000740) |
| Average MST price | -0.0000181 (0.0000606) | -0.000165*** (0.0000104) | -0.000321*** (0.0000181) |
| <i>Ad valorem MST tax only (referent)</i> | | | |
| Mixed MST tax market | 0.000326 (0.000296) | 0.000927*** (0.000139) | 0.00177*** (0.000277) |
| Weight-based MST tax only | -0.000250 (0.000404) | 0.00120*** (0.000212) | 0.00254*** (0.000445) |
| Retail promotion | 0 (.) | -0.00394*** (0.000164) | -0.00813*** (0.000316) |
| <i>2005 (referent)</i> | | | |
| 2006 | 0 (.) | -0.000423 (0.000316) | 0.000481 (0.000474) |
| 2007 | 0 (.) | -0.000315 (0.000300) | 0.000226 (0.000456) |
| 2008 | -0.00184 (0.00114) | -0.00111*** (0.000288) | -0.000358 (0.000450) |
| 2009 | -0.000630 (0.00111) | -0.00144*** (0.000275) | -0.000170 (0.000450) |
| 2010 | 0.000601 (0.00111) | -0.00128*** (0.000269) | 0.000113 (0.000447) |
| January – January | -0.000405 (0.000257) | 0.000369** (0.000123) | 0.000726** (0.000245) |
| Constant | 0.00356** (0.00113) | 0.00663*** (0.000286) | 0.0110*** (0.000461) |
| r ² | 0.0353 | 0.0834 | 0.0284 |
| N | 1593 | 10816 | 37040 |

MST= Moist Snuff; TC= tobacco control

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.10. Effect of tobacco control policies & retail promotions on per capita MST sales (Dollars) by specific product characteristics

| | Snus Dollar Sales | Pouch Dollar Sales | Flavored Dollar Sales |
|---|--------------------------------|------------------------------------|------------------------------------|
| Smoke-free air policy | 0.00273 (0.00147) | -0.00201* (0.000911) | -0.00331* (0.00142) |
| Cigarette tax | -0.00222* (0.000882) | -0.00205*** (0.000547) | -0.00402*** (0.000819) |
| Per capita TC spending | 0.00102** (0.000315) | 0.000263 (0.000167) | 0.000805*** (0.000234) |
| Average MST price | 0.000504* (0.000214) | -0.000553*** (0.0000451) | -0.000875*** (0.0000574) |
| <i>Ad valorem MST tax only (referent)</i> | | | |
| Mixed MST tax | 0.000179 (0.00105) | 0.00182** (0.000602) | 0.00299*** (0.000878) |
| Weight-based MST tax only | -0.00155 (0.00143) | 0.00265** (0.000918) | 0.00510*** (0.00141) |
| Retail promotion | 0 (.) | -0.0172*** (0.000707) | -0.0299*** (0.00100) |
| <i>2005 (referent)</i> | | | |
| 2006 | 0 (.) | -0.00274* (0.00136) | 0.000236 (0.00150) |
| 2007 | 0 (.) | -0.00333* (0.00130) | -0.00230 (0.00144) |
| 2008 | -0.00859* (0.00404) | -0.00834*** (0.00125) | -0.00554*** (0.00143) |
| 2009 | -0.00518 (0.00392) | -0.0116*** (0.00119) | -0.00600*** (0.00143) |
| 2010 | -0.00300 (0.00392) | -0.0119*** (0.00116) | -0.00486*** (0.00142) |
| January – July | -0.000895 (0.000908) | 0.00193*** (0.000530) | 0.00282*** (0.000776) |
| Constant | 0.0120** (0.00401) | 0.0295*** (0.00123) | 0.0392*** (0.00146) |
| r ² | 0.0220 | 0.0812 | 0.0300 |
| N | 1593 | 10816 | 37040 |

MST= Moist Snuff; TC= tobacco control

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

resulted in higher per capita unit sales of pouch and flavored MST products. For snus products, there was no significant association with type of tax market.

Retail promotion was negatively associated with pouch and flavored MST unit sales; there were no reported unit sales of snus with retail promotions. Relative to 2005, there was a significant and negative impact on per capita unit sales of pouch products in 2008, 2009, and 2010; year was not a significant predictor for per capita unit sales of snus or flavored MST products. The first half of the year (Jan-Jun) was a significant predictor of per capita unit sales of snus or flavored MST products but not snus products.

Per capita MST sales dollars by product features

Table 4.10 reflects the impact of tobacco control policies on retail promotions on per capita dollar sales by the specific characteristics of MST products. The impact of smoke-free air policies resulted in higher per capita dollar sales for both pouch and flavored products but no difference in sales of snus products. As with per capita unit sales, cigarette tax was negatively associated with snus, pouch, and flavored MST dollar sales and higher per capita tobacco control spending resulted in higher per capita dollar sales for both snus and flavored products but there was no significant relationship for pouch products. While average product price was negatively associated with dollar sales of pouch and flavored MST, it was positively associated with dollar sales of snus products. Also, both mixed and weight-based only tax markets resulted in higher per capita dollar sales of pouch and flavored MST products. Retail promotions were negatively associated with pouch and flavored MST dollar sales. Relative to 2005, there was a significant and negative impact per capita unit sales of pouch products in all subsequent years while only

2008 was significant predictor for per capita dollar sales of snus products. Among flavored MST products, year was a significant predictor of per capita dollar sales in 2008 and beyond. The first half of the year (Jan-Jun) was a significant predictor of per capita dollar sales of snus or flavored MST products but not snus products.

Per capita MST unit sales by region

Given the geographic differences in use of MST, I also re-estimated the model from Table 4.3 for single pack unit sales by the four Census regions – Northeast, Midwest, South, and West. Although previously negative and statistically significant, the impact of smoke-free air policies on MST unit sales weakened and lost significance in the South while maintaining a negative and significant association on MST unit sales in the other regions of the U.S (see Table 4.11) The direction of the relationship between MST unit sales and cigarette tax changed in the Northeast and West regions (from negative to positive but not statistically significant) which would indicate that MST and cigarettes may be substitutes rather than complements like in the Midwest and South. The results are perhaps consistent with the overall climate for tobacco control policies in the Southeast in that states in this region have been slower to adopt comprehensive clean indoor laws or high cigarette excise taxes. The direction of the relationship also changed, from positive to negative, for MST unit sales and per capita tobacco control expenditures in the Northeast and lost statistical significance in the Midwest.

Table 4.11. Effect of tobacco control policies & retail promotions on per capita MST sales (Units) of single packs by region

| | Northeast Unit Sales | Midwest Unit Sales | South Unit Sales | West Unit Sales |
|---|---|---|---|---|
| Smoke-free air policy | -0.00609^{***} (0.00113) | -0.00304^{**} (0.00112) | -0.00475 (0.00316) | -0.00386^{**} (0.00119) |
| Cigarette tax | 0.000825 (0.000735) | -0.00182^{***} (0.000548) | -0.00120 (0.000725) | 0.000967 (0.000805) |
| Per capita TC spending | -0.000954^{**} (0.000345) | 0.000377 (0.000218) | 0.000718^{***} (0.000144) | 0.000625^{***} (0.000185) |
| Average MST price | 0.00175^{***} (0.000101) | 0.00181^{***} (0.000171) | 0.00186^{***} (0.000132) | 0.00137^{***} (0.000129) |
| <i>Ad valorem MST tax only (referent)</i> | | | | |
| Mixed MST tax | 0.00161[*] (0.000657) | 0.00257^{***} (0.000665) | 0.00437^{***} (0.000522) | 0.00393^{***} (0.000986) |
| Weight-based MST tax only | 0 (.) | 0 (.) | 0.00738^{***} (0.000740) | 0.00398^{***} (0.000720) |
| Retail promotion | -0.00428^{***} (0.000395) | -0.00780^{***} (0.000615) | -0.0128^{***} (0.000486) | -0.00654^{***} (0.000621) |
| <i>2005 (referent)</i> | | | | |
| 2006 | 0.00208^{**} (0.000646) | 0.00165 (0.00102) | 0.000884 (0.000773) | 0.000330 (0.000942) |
| 2007 | 0.00236^{***} (0.000653) | 0.00210 (0.00108) | 0.000393 (0.000751) | 0.000938 (0.000921) |
| 2008 | 0.00264^{***} (0.000593) | 0.00241[*] (0.00117) | -0.00105 (0.000741) | 0.000662 (0.000898) |
| 2009 | 0.00324^{***} (0.000594) | 0.00377^{**} (0.00129) | -0.00147 (0.000762) | 0.000821 (0.000949) |
| 2010 | 0.00187^{**} (0.000724) | 0.00483^{***} (0.00143) | -0.00226^{**} (0.000768) | -0.000464 (0.000993) |
| January - July | 0.000442 (0.000326) | 0.000699 (0.000500) | 0.00172^{***} (0.000397) | 0.000829 (0.000471) |
| Constant | -0.000103 (0.00179) | 0.00265[*] (0.00124) | 0.00597^{***} (0.000875) | -0.00172 (0.00129) |
| r ² | 0.121 | 0.0291 | 0.0400 | 0.0327 |
| N | 3886 | 10904 | 25938 | 8560 |

MST= Moist Snuff; TC= tobacco control

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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Table 4.12 summarizes relationships between the primary outcome of interest - per capita MST unit sales - and the predictor variables including smoke-free air policy coverage cigarette excise tax, state tobacco control program expenditures, average MST price, MST excise tax structure, and retail promotions if present.

| Table 4.12. Summary of results for MST unit sales | | | | |
|---|--------------------------|--------------------|------------------------------|--------------------|
| | Premium brand MST | | Non-premium brand MST | |
| | 5 pack | Single pack | 5 pack | Single pack |
| Smoke-free air policy | - | - | - or NS | - or NS |
| Cigarette tax | NS | - | - or NS | - |
| TC spending | + | NS | NS or + | NS or + |
| Average MST price | - | + | - | - or NS or + |
| Mixed tax market | NS | + | + or NS | + |
| Weight-based tax market only | NS | + | + or NS | + or NS |
| Retail promotion | (none) | - | (none) | - |
| MST= Moist Snuff; TC= tobacco control | | | | |
| Note : - = negative association; + = positive association; NS = nonsignificant result | | | | |

The results above predicting MST sales volume paint a fairly consistent picture and recall that results for MST sales revenue were comparable. For the most part, stronger protections for clean indoor air and higher cigarette excise taxes were associated with lower per capita MST unit sales which indicates complementarity with MST. Conversely, higher state-level per capita tobacco control expenditures were associated with higher per capita MST unit sales. The impact of higher average MST price varied by pack size in that higher price increased sales volume among five pack MST products but decreased sales volume among single pack products. Relative to a market with an ad valorem MST tax only, consumers in both mixed and weight-based MST tax markets responded with increased purchasing of single pack MST products. Retail promotions were negatively associated with per capita MST unit sales of single pack products.

CHAPTER 5: DISCUSSION

Between 2002 and 2012, cigarette sales declined while sales of non-cigarette tobacco products including moist snuff (MST) increased.⁽⁷⁴⁾ Self-reported tobacco use data also showed declines in current cigarette smoking prevalence, but increases in current use of roll your own and smokeless tobacco (SLT) products. In addition, a significant increase in SLT use was observed among males, the predominate users of SLT products, as well as 18–25-year-olds and 35–49-year-olds, whites, Hispanics, persons with incomes above \$50,000 and persons at or above a high school education.⁽⁷⁴⁾ Differences in state and federal tobacco control policy and regulation between cigarettes and non-cigarette tobacco products may contribute to the growing prevalence of other tobacco products including MST. In addition, the industry may target consumers of MST in specific ways in terms of both product and promotional offerings.

The premise of this investigation was that a restrictive policy climate for cigarettes may have unintended consequences on the market for non-cigarette tobacco products such as MST. Thus, the aim of this dissertation was to examine how industry promotion and tobacco control policy changed between 2005 and 2010 and whether such changes affected MST sales across various Nielsen markets. The first part of this chapter summarizes the key findings of the analyses and how they related to the published literature. This is followed by a brief discussion of the study's strengths and limitations. It concludes with the public health and tobacco control policy implications and broader recommendations for future areas of research.

Summary of main findings

One of the questions posed by this analysis was how did the tobacco control and industry environment change, specifically between 2005 and 2010? Despite many public health efforts to discourage tobacco use during the time period of interest, the tobacco *industry continued to effectively market SLT products* resulting in increased MST sales volume and revenue. Between 2005 and 2010, many local, state, and federal-level tobacco control policies were enacted including expansion of clean indoor air laws, higher excise taxes for combustible and SLT products, and investment in tobacco control programming. The percentage of the population in Nielsen market areas covered by state-level comprehensive clean indoor air laws grew from less than 10% to over 40% of the population and the mean state-level cigarette excise tax in these areas was raised from \$0.90 to \$1.19, both representing a 30% increase. However, the average and weighted unit prices for MST in these market areas actually declined over this period while total unit and dollar sales and per capita consumption of MST increased substantially. In addition, the percent of MST unit sales that were non-premium brands or sold in pouches grew over this time period.

In addition, policy and regulation at the federal level have increased restrictions on the sales, marketing, distribution, and taxation of cigarettes. Specifically, under two tobacco control laws that became effective in 2009 - the Children's Health Insurance Program Reauthorization Act (CHIPRA) and the Family Smoking Prevention and Tobacco Control Act (Tobacco Control Act) - cigarettes are subject to stricter tax and other regulations than some other tobacco products. For example, the Tobacco Control Act prohibited characterizing flavors in cigarettes but these flavors are still available in

SLT products. Much larger increases in federal excise tax rates were implemented by CHIPRA on cigarettes in comparison to MST. In addition, many states shifted from an ad valorem MST excise tax to a weight-based system which in some cases reduced the tax burden for MST products.

The other question posed by this analysis was what was the effect of retail promotion and tobacco control policies on MST sales across various markets? Lower demand for MST was anticipated in markets with high MST price while growth in MST demand was expected in markets with high cigarette taxes, higher levels of expenditures for tobacco control programming, broader protection of clean indoor air, and more retail promotions.

Overall, a higher average MST price was associated with a decline in MST unit and dollar sales but there were differences by package quantity and brand. Single and two pack MST product unit and dollar sales actually increased while five pack products decreased in response to a higher average MST price. For premium brands, however, a higher MST price was associated with increased MST dollar and unit sales. The type of tax structure was also significantly associated with MST sales volume and revenue in that markets with a mixed or weight-based only MST excise tax significantly increased MST sales relative to a market with an ad valorem MST excise tax only. There were larger effect sizes for premium brand MST sales volume and revenue in markets with a weight-based MST excise tax only.

Overall, a higher cigarette tax was significantly associated with lower per capita MST unit and dollar sales, suggesting complementarity between MST and cigarettes. Whereas older evidence (as discussed in Chapter 1) found mixed results on whether SLT

use was a substitute or a complement to cigarette smoking, recent research seems to more consistently point to SLT and cigarettes as complements, particularly among studies reporting sales elasticities.(75, 76) Previously reported cross-price elasticities for SLT and cigarettes were -0.045,(75) -0.0434 (although not significant),(76) and -0.77.(39) *Overall*, the cross-tax elasticities for cigarettes and MST found in this study were lower (-0.10 for dollar sales, -0.22 for unit sales) but also varied by package quantity. Moist snuff has generally found to be less elastic relative to combustible products.(75, 76)

In terms of other policy interventions, both complimentary and substitution were observed, similar to previous literature which found varying consumers' responses to tobacco control policies. A higher percent of a market population covered by smoke-free air policies was, in most cases, associated with lower per capita MST unit and dollar sales which suggests complementarity. Overall, higher tobacco control expenditures were associated with increased MST unit and dollar sales which suggests substitution, although such expenditures had no impact on premium MST brands.

Overall, there was no time trend in MST sales volume while there is a trend over time for MST sales dollars; however, this finding was reversed for single pack products where there was an increasing trend in sales volume but not in sales dollars. In addition, it appeared that any relationship to year was occurring in the first few years of the study period (before 2009). The results also indicate that there are brand differences in that the effect sizes found for premium brands were larger relative to non-premium brands for many tobacco policy interventions including the percent of population covered by smoke-free air policies, cigarette tax, the type of MST tax structure, and retail promotion.

Could tobacco control spending nudge cigarette smokers to non-premium brands of smoke-free products? Tobacco control programs have undoubtedly focused on reducing cigarette smoking with few efforts targeting non-cigarette tobacco products. The only other study to specifically examine the impact of per capita state-level tobacco control program expenditures did so on individual SLT use among college students and found that current spending was associated with increased SLT use but two other measures of spending (lagged, and sum of current and lagged) revealed no relationship.⁽⁵⁰⁾ Previous research has recognized that new SLT products were developed to target cigarette smokers to promote switching or dual use.⁽⁵⁷⁾ In a recent analysis of two longitudinal cohorts of the TUS-CPS, male recent former smokers in the 2010–2011 cohort were more likely to become SLT users than those in the 2002–2003 cohort but overall, smokers were unlikely to switch to other forms of tobacco compared to SLT users.⁽⁷⁷⁾ Tobacco control programs encompass a variety of activities and interventions and so it is difficult to pinpoint why program expenditures may have a differential impact on MST products.

Not surprisingly, markets with a mixed MST excise tax structure (which would include weight-based MST taxes) or a weight-based only tax structure favored premium brands to a greater degree than other MST brands. A weight-based only MST excise tax, which is essentially a tax on quantity or a per unit tax, ignores the price of the product and reduces the tax on premium (i.e., higher priced) products whereas a tax based on the percentage of the sale price imposes a higher tax on premium products for obvious reasons. As described in Chapter 2, the growing market share of discount MST brands was often acknowledged by tobacco industry representatives who were arguing for

weight-based taxation. In particular, U.S. Smokeless Tobacco Company (UST), the manufacturer of two leading premium MST brands, Copenhagen and Skoal, strongly advocated that states move to a weight-based MST tax in order to compete more effectively with low-priced brands.(78)

Despite the advantage for premium brands under a weight-based MST tax structure, the value brand of Grizzly has challenged popular premium brands for market share including, the well-established market leaders of Copenhagen and Skoal, both premium brands. These data suggest that in some ways Grizzly responds more like a premium brand. For example, state spending on tobacco control initiatives had no effect on the sales volume of premium brand MST products or Grizzly while it had a positive effect on non-premium brands overall. Previous research suggests that Grizzly's popularity, particularly among youth, may be due to low price, advertising and added flavorings as well as faster nicotine dependence because of high nicotine content.(14)

In line with the work of Zheng, et al., I conducted an additional analysis by U.S census region and found differential impact on MST demand.(75) Zheng, et al. found the South to be the most elastic region for SLT.(75) Interestingly, this study found that cigarette taxes and clean indoor air laws did not significantly change demand for MST in South. Also, markets with weight-based MST tax only did not exist in the Northeast and West regions but MST unit sales in the South and West regions increased under a weight-based MST tax system. While not precise, the results give us some indication that there are cultural and demographic differences that can influence the success or effectiveness of tobacco policy interventions.

Strengths and limitations

This study examined the effect of retail promotion and tobacco control policies on MST sales. Most studies on the impact of tobacco control policies focus on cigarettes, so the research presented here fills important gaps in the tobacco control literature. Perhaps most importantly, the series of analyses incorporated specific brands and package size into the nature of consumer substitution between tobacco products. This project demonstrated that such measures are needed to more accurately describe the demand for MST, and potentially other non-cigarette tobacco products, more fully.

Despite the importance and unique contribution of this work, it is not without methodological limitations. The market-level scanner data for MST sales was limited to convenience stores. While the vast majority of MST products are sold in convenience stores, evidence suggests that the elasticity of demand is different according to the outlet in which it is sold.(76, 79) In addition, retailer scanner data may be more elastic given that sales elasticities may be more responsive to price than consumption elasticities (e.g., stockpiling for price discounts). In addition, this analysis did not include data on advertising expenditures which previous research shows can influence demand for tobacco products. For example, Zheng et al. (2017) found that elasticity of SLT magazine advertising on its own demand was 0.002 while Dave & Saffer (2013) reported that magazine advertising elasticity on SLT demand was 0.06.(39, 75) In addition, Zheng et al. (2017) also found that such advertising increased SLT demand in the Midwest and North but not the South or West regions of the U.S.(75) Finally, because the data reflect sales in aggregate, I could not examine differences by important individual characteristics such as gender, race, ethnicity, age, education and income

Policy implications

At this point in time, it appears that the evidence base leans more heavily toward MST and cigarettes acting as complements (e.g., as the price of cigarettes increase, the demand for MST increases). However, we observed that MST can act as both compliments and substitutes to cigarettes. And it appears that non-premium brand MST products are more likely to exhibit the properties of substitution relative to premium brand MST products.

A better understanding of the relationship between cigarettes and non-cigarette tobacco products has important policy implications. For the most part, policy interventions aimed at reducing cigarette smoking such as cigarette taxation and clean indoor air policies appear to decrease MST sales and so should work effectively to reduce the use of MST products. However, results may vary based on specific program components as well as by consumer segments and region.

There is substantial product differentiation by package quantity, presence of flavors, and branding in the tobacco marketplace. These results provide further evidence that tobacco companies target consumers in rather sophisticated ways and different products are aimed at different segments of the consumer market. Tobacco companies appear to be well aware of differences in the population of consumers for these products and target them accordingly. For example, sales of five pack MST products decreased when MST price increased while sales of single pack MST products increased. Sales of snus products were not sensitive to MST price while flavored MST sales decreased in response to increased MST price. The presence of retail promotion appeared to uniformly decrease MST sales.

Policy restrictions could target any further attempts to reinforce quality differences between various tobacco brands and consumer segments. For instance, pricing or the display of pricing at the point of sale give prominence to particular brands and can be effective promotional strategies. Limiting the display of price at retail or standardizing the unit price may also limit perceived differences between consumer market segments. State-level tobacco policies can have an immediate impact on leveling the playing field for all MST products with regard to taxation, particularly considering that tax rates vary both in size and structure at the state level. Some recommend setting a minimum tax on MST products equivalent to the per pack tax on cigarettes along with a high ad valorem tax rate when possible as an effective way to increase the price of these products.(80, 81)

One of the important policy implications here is the recognition that blanket recommendations for tobacco policy may not be as effective as a tailored policy approach. Tobacco companies are clearly using tailored marketing strategies to target different consumer segments. Population-based tobacco control efforts, such as policy change, are effective, have made an enormous difference in tobacco consumption and must be continued, but should also be designed to influence behavior change for maximum impact. The variation in consumer response to tobacco policy and marketing variables is in stark contrast to the blanket approaches often used by tobacco control policymakers. In the context of an increasingly diverse tobacco marketplace, policies and regulations that target a single product or consumer segment may have various benefits and consequences for the use of different MST products (e.g., brand, size, etc.) as well as use of *other* tobacco products dependent on within and cross product substitutions.

The use of two or more tobacco products has increased over time, especially among young adults.(82-85) A recent estimate suggests that approximately 40% of tobacco users in the U.S, both adults and youth, used at least two types of products.(86) Dynamic complementarity may explain why users of multiple tobacco products tend to use tobacco products more frequently and exhibit greater tobacco dependence than single tobacco product users.(87) Federal, state, and local policy makers must consider how policy action may affect the use of other tobacco products by altering cross substitution.

Future research directions

These research can be extended by examining how MST use including current use and frequency of use, varies among individuals and could specifically examine individuals that are of a particular policy interest, including age, race/ethnicity, education, and income. In particular, further examination of adults and adolescents transitioning between tobacco use categories (e.g, former, current, dual, and poly) and various tobacco products such as cigarettes and SLT is warranted given the dynamic tobacco marketplace. The industry is historically very responsive to potential regulatory changes, regularly modifying existing products and adding new products to the marketplace. These data can be used to track tobacco use behaviors and evaluate their effect on public health, particularly in response to regulatory action. In addition to behavioral surveillance, researchers should continue to follow trends in MST retail sales, such as product characteristics driving sales growth. Additional analyses can attempt to better understand the impact of tax and price and other factors that affect the price of tobacco products.

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APPENDICES

Appendix A: Effect of tobacco policies & retail promotions on per capita MST sales (Units) of two packs: results for brands

| | Non-premium Brand Per Capita Unit Sales | Premium Brand Per capita Unit Sales | Skoal Per Capita Unit Sales | Copenhagen Per Capita Unit Sales | Grizzly Per Capita Unit Sales |
|---|--|--|----------------------------------|-------------------------------------|----------------------------------|
| Smoke-free air policy | -0.000476* (0.000197) | -0.00285*** (0.000483) | -0.00197*** (0.000362) | -0.00429*** (0.00114) | -0.000366 (0.000280) |
| Cigarette tax | -0.000232* (0.000108) | -0.000832** (0.000289) | -0.000619** (0.000216) | -0.000999 (0.000686) | 0.000283 (0.000189) |
| Per capita TC spending | 0.000112*** (0.0000260) | 0.000104 (0.0000711) | 0.0000507 (0.0000538) | 0.000248 (0.000164) | 0.0000938 (0.0000658) |
| Average MST price | 0.000263*** (0.0000545) | 0.0000300 (0.0000946) | -0.0000499 (0.0000725) | -0.0000734 (0.000219) | 0.0000599 (0.000165) |
| <i>Ad vlaorem MST tax only (referent)</i> | | | | | |
| Mixed MST tax | 0.000166 (0.000107) | 0.00128*** (0.000312) | 0.00115*** (0.000232) | 0.00170* (0.000747) | 0.0000338 (0.000192) |
| Weight-based MST tax | 0.000886*** (0.000171) | 0.00304*** (0.000478) | 0.00245*** (0.000354) | 0.00440*** (0.00115) | 0 (.) |
| Retail promotion | -0.000185 (0.000105) | -0.00201*** (0.000443) | -0.00146*** (0.000340) | -0.00274** (0.00106) | 0 (.) |
| <i>2005 (referent)</i> | | | | | |
| 2006 | 0.000186 (0.000142) | 0.00178*** (0.000405) | 0.00117*** (0.000309) | 0.00274** (0.000922) | 0 (.) |
| 2007 | 0.000764*** (0.000150) | 0.00329*** (0.000410) | 0.00226*** (0.000318) | 0.00482*** (0.000914) | -0.000275 (0.000218) |
| 2008 | 0.000918*** (0.000160) | 0.00402*** (0.000415) | 0.00238*** (0.000322) | 0.00671*** (0.000933) | 0 (.) |

| | | | | | |
|----------------|---|---|---|---|-------------------------|
| 2009 | 0.000801^{***} (0.000182) | 0.00131^{**} (0.000458) | 0.000842[*] (0.000350) | 0.00205 (0.00106) | 0 (.) |
| 2010 | 0.00117^{***} (0.000246) | 0.000802 (0.000967) | 0.000648 (0.000895) | 0.000542 (0.00186) | 0 (.) |
| January-July | -0.000206[*] (0.0000912) | -0.000481 (0.000257) | -0.000277 (0.000193) | -0.000882 (0.000598) | 0 (.) |
| Constant | -0.000450 (0.000262) | 0.00212^{**} (0.000808) | 0.00187^{**} (0.000623) | 0.00400[*] (0.00185) | -0.000202 (0.000775) |
| r ² | 0.0809 | 0.101 | 0.135 | 0.131 | 0.579 |
| N | 1663 | 2441 | 1551 | 881 | 12 |

MST= Moist Snuff; TC= tobacco control

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix B: Effect of tobacco control policies & retail promotions on per capita MST sales (USD) of two packs: results for brands

| | Non-Premium Brand Per Capita \$ Sales | Premium Brand Per Capita \$ Sales | Skoal Per Capita \$ Sales | Copenhagen Per Capita \$ Sales | Grizzly Per Capita \$ Sales |
|---|--|--------------------------------------|---------------------------------|-----------------------------------|--------------------------------|
| Smoke-free air policy | -0.00229** (0.000755) | -0.0177*** (0.00298) | -0.0119*** (0.00212) | -0.0279*** (0.00708) | -0.00184 (0.00118) |
| Cigarette tax | -0.000465 (0.000413) | -0.00360* (0.00178) | -0.00296* (0.00126) | -0.00313 (0.00428) | 0.00148 (0.000797) |
| Per capita TC spending | 0.000385*** (0.0000994) | 0.000662 (0.000438) | 0.000468 (0.000314) | 0.00122 (0.00102) | 0.000462 (0.000278) |
| Average MST price | 0.00181*** (0.000209) | 0.00201*** (0.000583) | 0.000502 (0.000424) | 0.00309* (0.00136) | 0.000695 (0.000694) |
| <i>Ad valorem MST tax only (referent)</i> | | | | | |
| Mixed MST tax | 0.000418 (0.000411) | 0.00583** (0.00192) | 0.00560*** (0.00136) | 0.00775 (0.00466) | 0.000331 (0.000809) |
| Weight-based MST tax | 0.00233*** (0.000653) | 0.0167*** (0.00294) | 0.0134*** (0.00207) | 0.0246*** (0.00716) | 0 (.) |
| Retail promotion | -0.000822* (0.000400) | -0.0116*** (0.00273) | -0.00881*** (0.00199) | -0.0148* (0.00660) | 0 (.) |
| <i>2005 (referent)</i> | | | | | |
| 2006 | 0.000730 (0.000545) | 0.0115*** (0.00249) | 0.00683*** (0.00181) | 0.0187** (0.00575) | 0 (.) |
| 2007 | 0.00321*** (0.000573) | 0.0206*** (0.00252) | 0.0136*** (0.00186) | 0.0307*** (0.00570) | -0.00125 (0.000919) |
| 2008 | 0.00367*** (0.000613) | 0.0251*** (0.00256) | 0.0141*** (0.00188) | 0.0427*** (0.00582) | 0 (.) |
| 2009 | 0.00327*** (0.000698) | 0.00950*** (0.00282) | 0.00573** (0.00204) | 0.0154* (0.00659) | 0 (.) |

| | | | | | |
|----------------|---|---|-----------------------|-----------------------|-----------------------|
| 2010 | 0.00355^{***} (0.000941) | 0.00523 (0.00596) | 0.00400 (0.00523) | 0.00499 (0.0116) | 0 (.) |
| January-July | -0.000583 (0.000349) | -0.00314[*] (0.00158) | -0.00180 (0.00113) | -0.00574 (0.00373) | 0 (.) |
| Constant | -0.00485^{***} (0.00100) | 0.000144 (0.00498) | 0.00559 (0.00364) | -0.000176 (0.0115) | -0.00308 (0.00327) |
| r ² | 0.0977 | 0.0819 | 0.113 | 0.109 | 0.672 |
| N | 1663 | 2441 | 1551 | 881 | 12 |

MST= Moist Snuff; TC= tobacco control; USD= United States Dollars

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix C: Effect of tobacco policies & retail promotions on per capita MST sales (Units) of five packs: results for brands

| | Non-premium Brand Per Capita Unit Sales | Premium Brand Per Capita Unit Sales | Skoal Per Capita Unit Sales | Copenhagen Per Capita Unit Sales | Grizzly Per Capita Unit Sales |
|---|---|---|---|---|---|
| Smoke-free air policy | -0.000106* (0.0000431) | -0.000124** (0.0000419) | -0.0000356** (0.0000123) | -0.000371* (0.000146) | 0.0000333 (0.0000862) |
| Cigarette tax | -0.0000450 (0.0000295) | -0.0000305 (0.0000283) | -0.00000695 (0.00000847) | -0.0000573 (0.0000958) | -0.000123* (0.0000584) |
| Per capita TC spending | 0.0000316*** (0.00000780) | 0.0000386*** (0.00000813) | 0.00000866*** (0.00000239) | 0.0000916*** (0.0000268) | -0.00000168 (0.0000173) |
| Average MST price | -0.0000223*** (0.00000333) | -0.0000102*** (0.00000265) | -0.00000539*** (0.000000827) | -0.0000207* (0.00000976) | -0.0000330** (0.0000105) |
| <i>Ad valorem MST tax only (referent)</i> | | | | | |
| Mixed MST tax | 0.0000351 (0.0000288) | -0.0000277 (0.0000304) | 0.000000896 (0.00000890) | -0.000133 (0.000106) | 0.000133* (0.0000604) |
| Weight-based MST tax | 0.000158** (0.0000573) | -0.0000239 (0.0000478) | -0.0000161 (0.0000139) | -0.000110 (0.000155) | 0.000161 (0.000115) |
| Retail promotion | -0.000166 (0.0000918) | 0 (.) | 0 (.) | 0 (.) | 0 (.) |
| <i>2005 (referent)</i> | | | | | |
| 2006 | 0.0000252 (0.0000729) | 0.000000900 (0.0000842) | 0.00000128 (0.0000300) | -0.00000355 (0.000247) | 0.0000367 (0.000156) |
| 2007 | 0.0000879 (0.0000689) | 0.00000347 (0.0000793) | -0.0000131 (0.0000272) | 0.0000250 (0.000241) | 0.000122 (0.000147) |
| 2008 | 0.0000661 (0.0000659) | -0.0000192 (0.0000784) | -0.0000256 (0.0000269) | 0.0000532 (0.000248) | 0.000185 (0.000143) |
| 2009 | 0.000182** (0.0000634) | 0.0000353 (0.0000729) | -0.0000204 (0.0000254) | 0.000179 (0.000223) | 0.000367** (0.000142) |

| | | | | | |
|----------------|---|--|---|----------------------------|---|
| 2010 | 0.000265^{***} (0.0000621) | 0.000157[*] (0.0000703) | 0.0000451 (0.0000247) | 0.000423 (0.000217) | 0.000425^{**} (0.000140) |
| January-July | 0.0000243 (0.0000260) | -0.00000231 (0.0000269) | -0.00000864 (0.00000790) | -0.00000919 (0.0000903) | 0.0000302 (0.0000537) |
| Constant | 0.000319^{***} (0.0000717) | 0.000267^{**} (0.0000958) | 0.000161^{***} (0.0000325) | 0.000528 (0.000319) | 0.000487^{**} (0.000167) |
| r ² | 0.0330 | 0.0277 | 0.0745 | 0.0539 | 0.0420 |
| N | 3468 | 3039 | 1753 | 860 | 1392 |

MST= Moist Snuff; TC= tobacco control

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix D: Effect of tobacco control policies & retail promotions on per capita MST sales (USD) of five packs: results for brands

| | Non-Premium Brand Per Capita \$ Sales | Premium Brand Per Capita \$ Sales | Skool Per Capita \$ Sales | Copenhagen Per Capita \$ Sales | Grizzly Per Capita \$ Sales |
|---|--|--|--|---------------------------------------|--|
| Smoke-free air policy | -0.000731 (0.000496) | -0.00228** (0.000721) | -0.000695** (0.000228) | -0.00682** (0.00248) | 0.00109 (0.000984) |
| Cigarette tax | -0.000753* (0.000340) | -0.000515 (0.000486) | -0.000101 (0.000158) | -0.000859 (0.00163) | -0.00149* (0.000668) |
| Per capita TC spending | 0.000289** (0.0000897) | 0.000633*** (0.000140) | 0.000141** (0.0000446) | 0.00144** (0.000456) | 0.0000337 (0.000198) |
| Average MST price | -0.0000789* (0.0000383) | -0.000119** (0.0000456) | -0.0000749*** (0.0000154) | -0.000220 (0.000166) | -0.000269* (0.000120) |
| <i>Ad valorem MST tax only</i> <i>(referent)</i> | | | | | |
| Mixed MST tax | 0.000315 (0.000332) | -0.000249 (0.000522) | 0.0000472 (0.000166) | -0.00173 (0.00180) | 0.00123 (0.000690) |
| Weight-based MST tax only | 0.00119 (0.000659) | -0.000206 (0.000823) | -0.000341 (0.000258) | -0.00113 (0.00263) | 0.000848 (0.00131) |
| Retail promotion | -0.00187 (0.00106) | 0 (.) | 0 (.) | 0 (.) | 0 (.) |
| <i>2005 (referent)</i> | | | | | |
| 2006 | 0.0000823 (0.000839) | 0.000165 (0.00145) | 0.0000844 (0.000559) | 0.000205 (0.00420) | 0.000310 (0.00178) |
| 2007 | 0.000662 (0.000793) | 0.000144 (0.00136) | -0.000246 (0.000507) | 0.000700 (0.00410) | 0.00107 (0.00168) |
| 2008 | 0.000499 (0.000758) | -0.000262 (0.00135) | -0.000487 (0.000500) | 0.00136 (0.00421) | 0.00168 (0.00164) |
| 2009 | 0.00185* (0.000730) | 0.000867 (0.00125) | -0.000384 (0.000474) | 0.00397 (0.00380) | 0.00387* (0.00162) |

| | | | | | |
|----------------|---|--|---|---|--|
| 2010 | 0.00301^{***} (0.000715) | 0.00288[*] (0.00121) | 0.000818 (0.000459) | 0.00815[*] (0.00368) | 0.00497^{**} (0.00160) |
| January-July | 0.000224 (0.000300) | -0.0000331 (0.000463) | -0.000172 (0.000147) | -0.000208 (0.00154) | 0.000171 (0.000613) |
| Constant | 0.00184[*] (0.000825) | 0.00342 [*] (0.00165) | 0.00251^{***} (0.000606) | 0.00593 (0.00543) | 0.00430[*] (0.00190) |
| r ² | 0.0222 | 0.0247 | 0.0631 | 0.0500 | 0.0359 |
| N | 3468 | 3039 | 1753 | 860 | 1392 |

MST= Moist Snuff; TC= tobacco control; USD= United States Dollars

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$