Distribution Agreement

In presenting this thesis or dissertation as a partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis or dissertation in whole or in part in all forms of media, now or hereafter known, including display on the world wide web. I understand that I may select some access restrictions as part of the online submission of this thesis or dissertation. I retain all ownership rights to the copyright of the thesis or dissertation. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

Signature:

_____ _____

Alex C. Liber Date

The Smoker's Premium: The Effect of Higher Health Insurance Premiums on Tobacco Cessation
By

Alex C. Liber
MSPH

Health Policy and Management

David H. Howard
Committee Chair

Laura M. Gaydos
MSPH Director

Joseph Lipscomb
Committee Member

Hana Ross
Committee Member

The Smoker's Premium: The Effect of Higher Health Insurance Premiums on Tobacco Cessation

By

Alex C. Liber

Bachelor of Science
The Ohio State University
2010

Thesis Committee Chair: David H. Howard, PhD

An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Science in Public Health
in Health Policy and Health Services Research
2012

Abstract

The Smoker's Premium: The Effect of Higher Health Insurance Premiums on Tobacco Cessation

By Alex C. Liber

This study attempted to determine if charging tobacco users more for their health insurance premiums increases tobacco cessation above predicted levels. A comparison of proportions test examined the differences in tobacco cessation rates between a cohort who were charged a tobacco surcharge and the predicted population cessation rate. The Georgia State Health Benefit Plan (SHBP) began charging a tobacco surcharge on monthly health insurance premiums in July 2005. The surcharge was applied to each enrolled employee who reported tobacco use during the past 12 months by the employee or by any of the employee's covered dependents (spouse, dependent children). A cohort of 43,034 SHBP members, who were state employees, teachers, and school support staff, were followed for 70 months (July 2005 to April 2011). The Department of Community Health (DCH) provided the raw data (non-identifiable to specific individuals) used in this research. We found that over the 70 months observation period, 46.3% of the enrollees in the SHBP cohort reported that all covered family members had quit using tobacco, a figure that was significantly different than the 13.9% that would have quit at the predicted national cessation rate. Sensitivity analysis confirmed this finding when SHBP enrollees quit in greater numbers when compared to a range of population cessation rates. We concluded that charging tobacco users a higher health insurance premium appears to significantly increase tobacco cessation rates. This study measures self-reported cessation and most likely overestimates the impact of the tobacco surcharge on cessation, but sensitivity analysis indicates that the central findings of this study hold true. This is the first study to employ empirical data to examine the effect of charging higher health insurance premiums to tobacco users and provides evidence that this rapidly spreading practice may improve the public health by increasing tobacco cessation.

Acknowledgement

To my Family: Thank you for supporting me on my journey into research and for encouraging me to do what I love. Mom and Dad, you have served as nothing but the greatest role models for me. Chad, Max, and Julian, I can ask nothing more from you all than to see my brothers so enthused with the learning process as you have been. Your energy gives me my momentum. Papa Ernie and Grandma Audrey, I sincerely agree with you that, "If you love what you do, you will never work a day in your life". Since I began working in tobacco control research that has been the absolute truth. Grandma Elsie, your love and gentle encouragement has provided bedrock on which I have grown. To all my cousins, aunts, and uncles this journey has only been made richer and more fulfilling through your presence and your help.

To my mentors, Penny Cobau and Amy Ferketich: I would not be where I am today without you. Ms. Cobau, you taught me in high school to bring a sense of energy and professionalism to research that I have not and will not forget. Amy, I owe you the world for bringing me into your work at Ohio State and for fostering my growth into a tobacco control researcher. You taught me to be open-minded, diligent, principled, and passionate about this field and I hope to be your colleague in it for years to come.

To my faculty at Emory and colleagues at the American Cancer Society: Thank you to Drs. Howard and Lipscomb for serving on my thesis committee and for providing timely and sagely advice. Dr. Gaydos, you have guided me through these two years at Emory with nothing but my best interests in mind. Dr. Hockenberry, you may be new to Emory, but I am deeply grateful for your tough critical stance on my work. Kathy Wollenzein, I would not have been so enthused to come to Emory without you, and I have trusted you as a guide and friend since I met you in Philadelphia. Hana, Evan, Michal, and Rijo, I am so lucky to have been welcomed so openly into your International Tobacco Control Research group. Your assistance and moral support lent to my thesis effort has made the process infinitely easier to bear.

To the Georgia Department of Community Health: This thesis would not have been possible without your cooperation. If more health insurance administrators acted like you did and actively tried to

determine the effects of their policies on their enrollees then our national health insurance system would be in much better shape.

Finally to my MSPHers past and present: Your support, keen critiques, and smiling faces have been an absolute joy to learn and grow with over the past two years. I wish nothing but the best for you and hope we can remain close friends and colleagues as the years roll by.

Disclaimer

The Georgia Department of Community Health (DCH) provided the raw data (non-identifiable to specific individuals) used in this research.

DCH is not responsible for the research validity, findings or conclusions expressed.

Contents

Table of Figures

List of Tables

Introduction

The prevalence of tobacco use among Americans has begun to plateau in recent years and renewed efforts and strategies are required to get more Americans to quit using tobacco. The private health insurance industry has rapidly adopted the tobacco surcharge on health insurance premiums in an effort to (1) introduce a measure of risk-rating into group health insurance plans and (2) incentivize tobacco users to quit their costly habit. No published research employing empirical data has tested whether charging a tobacco surcharge on health insurance increases cessation rates among tobacco users beyond a baseline population cessation rate.

This study seeks to answer whether the tobacco surcharge works to promote public health by promoting tobacco cessation. Additionally, the study seeks to determine if different subpopulations are affected by the tobacco surcharge in ways that are relevant to creating an informed, effective, and equitable tobacco surcharge policy.

Literature Review

Tobacco use prematurely ends the lives of 1200 Americans every day (1). It is the largest preventable risk factor for death, disease, and disability in the United States (2). Not only does individual health suffer as a result of using tobacco products, but tobacco use also imposes sizeable medical and social costs on our economy. The main private sector payor for health care in the United States, the health insurance industry, is expanding its use of wellness incentives to lower the incidence of preventable disease, including those caused by using tobacco. This study examines the interaction between two nearly ubiquitous products, tobacco and health insurance.

Public health policies promoting tobacco control have already saved the lives of approximately three million Americans who would have otherwise died from tobacco-related illnesses over the past four decades(3). The prevalence of Americans using tobacco has been cut in half since its peak in the 1960s (4).Since the mid-1990s, however, the steady decline in tobacco use has stalled. Approximately twenty percent of Americans still used tobacco products in 2010, a figure that has not changed very much in the last fifteen years (5). New and creative tobacco control policies are needed to decrease tobacco use even further.

From an epidemiologic perspective, there are two main reasons for the stalled decline in tobacco use prevalence. First,the declining tobacco initiation rate, or the number of young people who begin to use tobacco in each birth year cohort, has leveled off, and according to some reports, is increasing among certain subsets of Americans (6). Second, the tobacco cessation rate, or the number of Americans who quit using tobacco each year, has also declined(5). These two forces in combination, flat or rising initiation and declining cessation, have stalled the decline in prevalence rates (7). However, these observations also suggest two pathways toward achieving future reductions in tobacco use; first, to prevent young people from starting to use tobacco and second, to convince current tobacco users to quit their habit (8). This study examines a strategy that focuses on cessation.

The nominal prices of health insurance premiums and cigarette excise taxes (colloquially known as "sin taxes") have both quadrupled since 1990 (9,10). Excise taxes increase the price of consuming a particular good, and in the process make that good less affordable when compared to other goods consumers may buy.

Excise taxes on cigarettes have long been leveraged as the most effective tobacco control measure available to policy makers, and are the classic example of an economic disincentive used to promote the public health. Health economists widely agree that when cigarette prices increase by 10 percent, either due to a manufacturer's price increase or a tax increase, cigarette demand or consumption falls between 2.5 and 5 percent (11). Cigarette price increases, in parallel, increase the number and success rate of smoking cessation attempts (12). While other tobacco control policies such as indoor smoking bans or youth access restrictions are also considered to increase the social cost of consuming tobacco, no other policy beyond taxation is proven to be a pure economic disincentive to tobacco consumption.

The Tobacco Surcharge on Health Insurance

For at least thirty years, significant numbers of American health insurers have charged higher health insurance premiums to their customers who smoked than to their nonsmoking customers (13,14). This policy, called a "tobacco surcharge," adds a fixed additional cost to the health insurance premiums of persons who use tobacco products. Typically, the tobacco surcharge is removed once all persons on a health insurance

policy enroll in a tobacco cessation course, or report that they have successfully ceased using tobacco. Enforcement mechanisms to keep tobacco users vary, but most operate on an honor system, wherein both tobacco use status and cessation are self-reported by enrollee to their employers or insurance companies.

The tobacco surcharge on health insurance is often presented as a potential economic disincentive to smoking, a policy that is in part, inspired by the logic of cigarette excise taxes (15). However, the effect of a tobacco surcharge on health insurance has been less studied. When a tobacco surcharge on health insurance is added to the monthly premium of a tobacco user, the lump cost of the surcharge is added to the total price of tobacco consumption. While this additional cost may be large, the marginal cost of the surcharge on consuming each additional cigarette is smaller than the previous cigarette smoked. The per-pack cost of the surcharge is smaller for smokers who smoke more cigarettes.

For example, if a smoker consumed sixty packs of cigarettes per month and was assessed a sixty dollar per month tobacco surcharge on their health insurance, the additional cost of the surcharge per pack would be one dollar. If a smoker consumed only four packs per month and was charged the same tobacco surcharge as the heavy smoker, the surcharge adds fifteen dollars to the cost of each pack consumed. This pattern indicates that moderate tobacco users should be most affected by the surcharge, rather than the heavy tobacco users who are most affected by tobacco excise taxes.

The tobacco surcharge forces a tobacco user to choose whether their consumption of tobacco is preferable to the consumption of other goods. The operative microeconomic principle behind the hypothesis that instituting a tobacco surcharge leads to cessation is that when the budgets of consumers are fixed, and the price of one good increases, the consumption of other goods must decrease in turn. Tobacco users who are assessed a surcharge must determine if they are willing to trade the amount of health insurance they could have bought without the tobacco surcharge for the utility they derive from consuming tobacco. A tobacco user who is assessed the tobacco surcharge has the choice to cease using tobacco and reclaim their forgone income. In order for that to happen, the tobacco user must decide to value the utility gained from reclaiming the lost income from paying the tobacco surcharge is greater than the utility gained from consuming tobacco.

Many large employers have already begun charging their smoking employees more for their health insurance premiums. Mercer, a market research firm, reported that between 2009 and 2010, the fraction of companies with more than 20,000 employees nationwide who charged higher health insurance premiums to smokers increased from 23% to 28% (16). Mercer also reported that the fraction of firms with 500 employees or less who have the same sort of policy increased from 5% to 10% over the same time period. Most lay media stories indicate that charging tobacco users more for their health insurance is a growing practice across the country (17–19).

In 2008, PepsiCo started charging its smoking employees an annual $600 health insurance premium. An internal analysis found that there was a 10-fold increase in enrollment in its internal tobacco cessation course and a 14% increase in the quit rate among its smoking employees (20). This experience is the only available evidence of whether a tobacco surcharge works, but the lack of transparency or rigorous analysis done in the PepsiCo case makes it an un-authoritative source on the effectiveness of the policy.

Ten state governments have implemented this practice of charging a higher premium to their employees who smoke (21). The largest of these states by population is Georgia, the source of the data used in this study. All of these states, including Georgia, have implemented these higher premiums under the rationale that they are promoting workplace wellness through the use of economic disincentives (22–24). However, no empirical study has yet confirmed whether charging smokers more for their health insurance can change their smoking behavior (14,25,26).

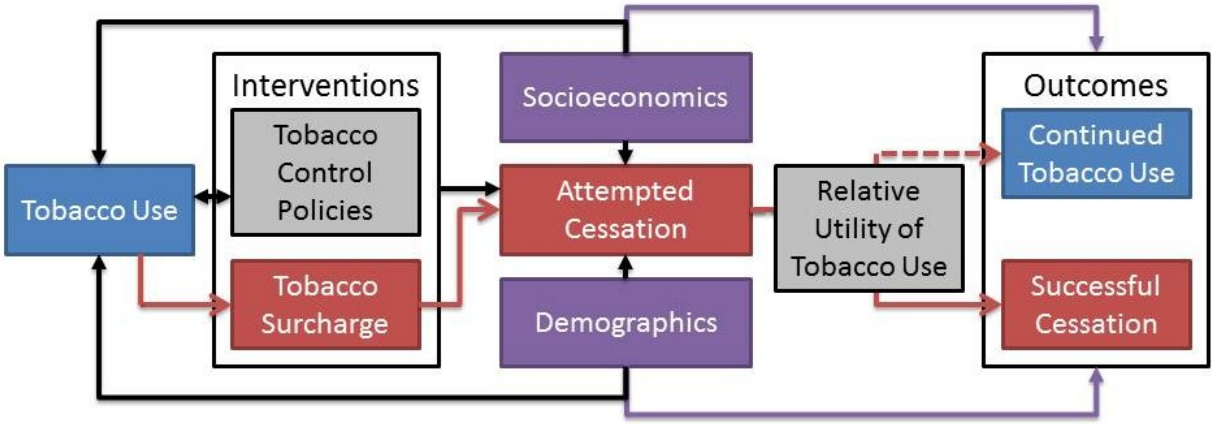
An evaluation of the tobacco surcharge needs to take place in order to determine if this policy is actually promoting public health, or just shifting cost increases in health insurance from non-smokers to smokers.

Methods

Theoretical Model

Figure 1 illustrates the theoretical model that underpins this study. The purple, blue, and red colored boxes represent directly observable variables and events in the SHBP dataset provided by DCH. We do not directly observe most tobacco control policies and interventions and we do not directly observe the mental decision mechanism to determine the relative utility compared to the lost income from the tobacco surcharge. Therefore, those unobservable boxes are colored gray. The red arrows indicate the course of behavior change we observe in the study subjects; from tobacco use, to successful cessation or continued tobacco use via the imposition of the tobacco surcharge and an attempted cessation event. The purple boxes contain important characteristics that are known to drive tobacco use and determine a person's receptivity to tobacco use interventions. Variables including age, gender, marital status, employee type, and region are thought to act as direct representations of, or proxies to, the socioeconomic status and demographic characteristics of individual enrollees (25).

Figure 1: Theoretical Model



Age is particularly relevant, given that as people age, they are more likely to quit using tobacco, but they also become less sensitive to the changes in the price of tobacco (7,11). Males are known to quit using tobacco at a more rapid rate than their female counterparts (27). With respect to marital status, we know that tobacco users tend to marry other tobacco users, and we also expect married tobacco users to have a more

difficult time to quit using tobacco than their unmarried counterparts, a simple reflection of mathematical odds (28).Persons employed as schoolteachers and librarians are thought to serve as role models for youth and have been targeted as potentially important persons for targeted smoking cessation intervention programs (29). Additionally, teachers more often work in a smoke-free environment than other employees. The other employee groups (school support staff, state government employees and county government employees) were combined into a comparison group. Those persons living in the Atlanta area may have quit using tobacco at a greater rate than the rest of the state because several of the counties in the city adopted comprehensive smoking ban ordinances, a policy known to increase tobacco cessation rates(30,31).

The black arrows connecting the purple boxes to the initial tobacco use box indicated that those characteristics are known to predispose someone to be being more or less likely to use tobacco. These black arrows are not accounted for in the statistical analyses in the study. The purple arrows that connect the purple boxes to the outcomes box represent the control variables for the statistical analysis used in Research Question 2.

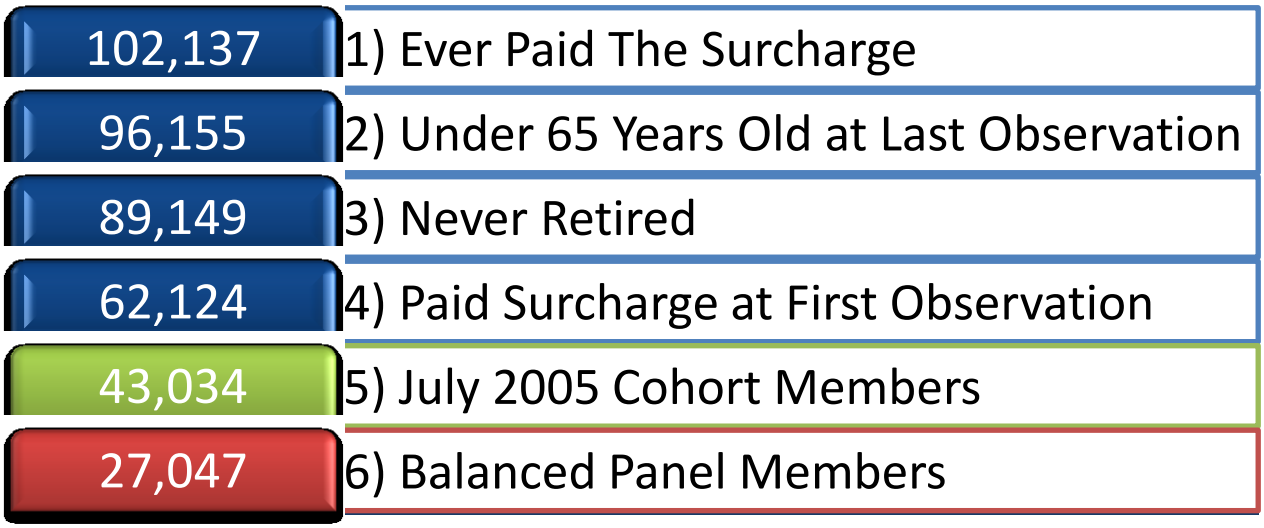
The theoretical model illustrated in Figure 1 visualizes the intervention studied here, the changed caused by the tobacco surcharge policy, as well as the factors that mediate those effects of the tobacco surcharge on the outcomes at hand.

Data

The data for this study are the monthly health insurance enrollment data from July 2005 to April 2011 for enrollees in the Georgia State Health Benefit Plan (SHBP). The SHBP is managed by the Georgia Department of Community Health (DCH) and provides insurance for 700,000 Georgians who are employees of the state of Georgia, school teachers, school support staff, their spouses and their children. The DCH provided the raw data (non-identifiable to specific individuals) used in this study. Starting in July 2005, a monthly tobacco surcharge was added to the health insurance premium of every tobacco user who was an active employee in the SHBP. The original dataset provided by the DCH contained monthly observations for every enrollee who ever paid the tobacco surcharge during the study period.

In order for an SHBP enrollee to have the tobacco surcharge removed, they could complete a smoking cessation class (either in person, or by telephone) and sign an affidavit declaring that (1) nobody covered by the SHBP policy had used any tobacco products in the past 60 days and (2) if anyone in their family was found to be using tobacco for the remainder of the plan year, they would face significant financial and/or legal penalties. Additionally, the tobacco surcharge could be removed at the beginning of a new plan year if the enrollee declared that (1) all persons covered under their SHBP policy had not used tobacco products in the past 90 days, and (2) all covered persons would not use tobacco products over the plan year or face significant financial and/or legal penalties. The tobacco surcharge was valued at $40 per month in 2005, was raised to $60 per month in 2010 and again to $80 per month in 2011. In 2011, the surcharge was extended to cover retirees in the SHBP.

Figure 2: Inclusion Criterion with Numbered Samples and Subsamples



For this analysis, we excluded some of the observations for various reasons. Figure 2documents the inclusion criterion used to create the final sample, it numbers corresponding subsamples of the data and shows the number of individuals that comprise those groups. First, all SHBP enrollees, those family members who were not employees of the State of Georgia, its counties, or its schools, were removed from the original dataset, leaving 102,137 individuals who ever paid the tobacco surcharge (Sample 1).

Next, because enrollment in Medicare may have influenced quit decisions, all persons who entered Medicare age during the period of observation were excluded from the sample (Subsample 2). In addition,

anyone who was not of Medicare age but retired during the period was excluded, because retired employees were not charged the tobacco surcharge until January 2011 and the anticipation of retirement may have moderated the disincentive effects of the surcharge on quitting (Subsample 3).

In order to eliminate the influence of tobacco use initiation from the analysis, all individuals who were not tobacco users when they first enrolled in the SHBP during the study period were eliminated from the sample. This step of cleaning out tobacco use initiation would also remove those who accidentally enrolled in the tobacco surcharge, those whose dependents began using tobacco, and those persons whose tobacco using spouses joined their health insurance plan during the course of the study (Subsample 4). Then, in order to create a longitudinal study cohort, all individuals who were not enrolled in the SHBP in July 2005 were dropped from the previous group (Subsample 5). From those persons, a subsample was drawn of enrollees who were still enrolled in the SHBP in April 2011 (n=27,047) wherein each enrollee recorded exactly 70 observations (Subsample 6). That smallest group, we call the "balanced panel" because each has an equal number of observations that all occur on same chronological dates.

Enrollees who were a part of the July 2005 cohort but were not included in the balanced panel could have left for a number of reasons including death, changing employers, or switching the source of their insurance to a spouse's employer. An alternate dataset was created that carried the last observation of tobacco use status forward to April 2011 for all persons in the July 2005 cohort. This alternate dataset was constructed to compensate for biases created by removing the enrollees who dropped out of the July 2005 cohort.

The SHBP data is not publicly available. A data release contract was drafted to securely release the de-identified dataset to the study team. The dataset contained personal health information, such as health insurance information and geographic identifiers, which necessitated a request for a complete HIPAA waiver. The study was reviewed and received expedited approval and a complete HIPAA waiver by the Emory Institutional Review Board, #IRB00050727 on 9/16/2011.

Measure

The primary measure used in this study is the payment of a monthly tobacco surcharge, a variable that, ideally, is a close proxy to tobacco cessation. That variable was derived from the monthly health insurance enrollment data provided by DCH. The tobacco surcharge could be removed by signing affidavits declaring all covered persons on a policy were tobacco-free (further detail in the Data section below). Once the tobacco surcharge was removed for the final time in the study period, the enrollee was considered to have quit using tobacco. As this is a self-reported measure of cessation and no biometric confirmation was required, it is likely that reported cessation rates are greater than actual cessation rates. Additionally, because each observed enrollee can represent more than one person (including spouses or adult dependent children), a reported cessation event in this data could represent multiple cessation events, and would then lead to an underreporting of the actual cessation rate. There is no available method to determine which of these effects is more important; but,the conservative conclusion is to conclude the reported cessation rate is an overestimate of the effect size.

Independent Variables

Age [Continuous] -Age is measured as a continuous variable with a range in our data from 18to64 years old.

Female [Binary] -This is a binary variable for gender based on what the enrollee indicated on their annual enrollment forms.

Base Insurance Premium [Continuous] - This variable indicates the base rate (the cost, in dollars, without including a spousal or tobacco surcharge) of the nominal monthly health insurance premium paid by enrollees. The base insurance premiums are reported in real dollars inflation-adjusted to July 2005 dollars using the national Consumer Price Index (new base), as reported by the United States Bureau of Labor Statistics (32).

Teacher [Binary] - This variable indicates if the enrollee in the SHBP worked as a teacher or librarian, as opposed to their SHBP counterparts who worked as school support staff and as employees for the state and county governments.

Atlanta [Binary] -SHBP enrollees were assigned to a metropolitan region by the SHBP administrators based on where they resided. This variable is a geographic indicator of whether an enrollee lived inside or outside of the Atlanta Metropolitan Area.

Married [Binary]- This variable indicates whether the enrollee also has a spouse enrolled on their health insurance policy, and, therefore is only a proxy indicator of being married because spouses may have separate health insurance plans. For the purpose of this study, entire families are represented by the primary SHBP enrollee on their plan (the person who is has an SHBP-associated employer). In order for a married enrollee to be counted as having quit using tobacco, both spouses must quit.

Research Questions

The research questions in this study will examine whether the tobacco surcharge policy (1) works and (2) what demographic, socioeconomic, and financial factors are associated with an increasing or decreasing effect of the tobacco surcharge.

Research Question 1: Does a tobacco surcharge on health insurance premiums increase cessation rates beyond the general adult population?

Hypothesis 1: A tobacco surcharge on health insurance premiums increases cessation rates beyond the general adult population.

Research Question 2: Did the tobacco surcharge cause different subpopulations to quit using tobacco at different rates?

Hypothesis 2a: Older enrollees will quit using tobacco less rapidly than younger employees.

Hypothesis 2b: Females will quit using tobacco less rapidly than males.

Hypothesis 2c: Enrollees in less expensive health insurance plans will quit using tobacco less rapidly than those in more expensive plans.

Hypothesis 2d: Teachers will quit using tobacco more rapidly than other employees.

Hypothesis 2e: Enrollees living in the Atlanta area will quit using tobacco more rapidly than others.

Hypothesis 2f: Married enrollees will quit at a lower rate than unmarried enrollees.

Statistical Analysis

To answer the question of whether a tobacco surcharge increases quit rates, a comparison of proportions was employed to determine if the observed prevalence of tobacco use was significantly different than what would be predicted if cessation rates in the SHBP were equal to the national average. For this analysis, we used the July 2005 Cohort subsample (N= 43,034). The last observations on the tobacco use status of persons who were not included in the balanced panel (because they left the SHBP) but were a part of the July 2005 Cohort were carried forward to the end of the study period. A series of comparison-of-proportions tests were employed to determine if observed tobacco cessation was significantly different in the SHBP study sample when compared to the national cessation rate (2.6% of tobacco using adults per year). This method compared two fixed panels of adults (SHBP, National Population At Large), who at first observation, all used tobacco. Due to cessation, over time, tobacco use dropped in both groups. This method determines whether the cessation rates in the two groups are different.

In order to further confirm that the cessation rate in the SHBP study sample was different than in the national population at large, we performed a sensitivity analysis. We compared the tobacco use rates that would result from four different predicted annual cessation rates ((2.6% (Predicted national cessation rate), 5.2% (Double), 7.8% (Triple), and 10.4% (Quadruple)) to the observed prevalence in the SHBP cohort at the indicated dates. The highest tested rate, 10.4%, is four times higher than the national average and, after 70 months, tobacco cessation in the SHBP cohort was greater than in that most unlikely tested cessation scenario.

To answer Research Question 2 concerning which populations are most responsive to the tobacco surcharge and to test Hypotheses 2a-2f, logistic regressions were performed on cross-sections of the balanced

panel subsample (N=27,047). The logistic regression was chosen because the dependent variable, tobacco use status, is a binary outcome with a non-normal distribution. The independent variables chosen were used to predict probabilities for tobacco use and the results are presented in the next section.

Results

Descriptive Statistics

The balanced panel sample is comprised of 27,047 individuals for whom descriptive data is shown in Table 1, which contains the independent variables used in the regression analysis models. The sample is largely middle-aged, (mean age in years = 42.80) married, (over 70%) and female (nearly, three-quarters of the enrollees). They are nearly evenly divided in their types of jobs between teachers, government workers, and service workers. Thirty nine percent of the enrollees in the cohort live in the Atlanta metropolitan area. These demographics appear largely comparable to the state demographics, with the only differing variable being the proportion of males in the SHBP cohort. The average base health insurance premium is $208.90 per month in July of 2005.

Table 1: Descriptive Statistics for Independent Variables

In July 2005	N	Percent
Teacher	10,637	39.33
Government	7,412	27.40
School Support	8,948	33.08
Female	20,021	74.02
Atlanta	11,150	41.22
Married	19,081	70.55
In July 2005	**Mean**	**Median**
Age (Years)	42.80	44.00
Real Premium ($)	208.90	224.40

Table 2 shows the results of T-tests that measure relevant differences between study populations at four cross-sections of the data. First, tobacco users (enrollees, spouses, and/or dependents who used tobacco at their first observation in the dataset, and continued to use tobacco for at least 3 months) stay in the SHBP for a significantly longer period of time (measured in months) than non-tobacco users (as enrollees, spouses, and/or dependents who did not use tobacco at their first observation in the dataset, and only paid a surcharge

for less than 3 months)[1]. This finding indicates that the presence of the tobacco surcharge did not cause tobacco users to leave the SHBP in greater numbers than non-users.

Table 2: T-Test Results Comparing Tobacco Users and Non Users; "Dropouts" and Balanced Panel

Tobacco Users v. Non-Users	Jan-06	Jan-07	Jan-09	Jan-10
Months in SHBP	2.394***	2.028***	1.240***	0.735***
N	68345	59909	53247	47197
"Dropouts" v. Balanced Panel	Jul-05	Jan-07	Jan-09	Jan-10
Age	-3.653***	-2.746***	-2.347***	-2.701***
Married	-0.167***	-0.139***	-0.145***	-0.131***
Teacher	-0.112***	-0.104***	-0.0619***	-0.0448***
Atlanta	0.00985*	0.0151*	0.0274***	0.0407***
Real Premium	-23.29***	-21.74***	-18.31***	-16.29***
Real Tobacco Surcharge	0	-62.40***	-144.0***	-171.9***
N	43034	36623	32103	30141
p<0.05 ** p<0.01 *** p<0.001				

There are relevant differences between the July 2005 Cohort "Dropouts" (persons who were included in the July 2005 Cohort but not in the balanced panel (N=15,987)) and the Balanced Panel that are also shown. All results are statistically significant at the 99.9% confidence level, except for two of the measures concerning those who live in the Atlanta metropolitan area. On the whole the dropouts were more likely to be younger in age, unmarried, and male, to not work as teachers, to live in the Atlanta area, to pay less for their health insurance, and pay fewer tobacco surcharges. None of these results would combine to dramatically bias the effect size of the primary outcome variable (tobacco cessation) away from the null hypothesis.

[1] These persons are assumed to be non-users who failed to opt-out of the surcharge by mistake.

Research Question 1

The most basic analysis performed intended to answer Research Question 1 -- did the tobacco surcharge increase tobacco cessation rates? Figure 3 answers this question, by illustrating the observed quit rates versus the predicted quit rates.

Figure 3: Statistical Comparison of Observed and Predicted Tobacco Use Rates for the July 2005 SHBP Cohort

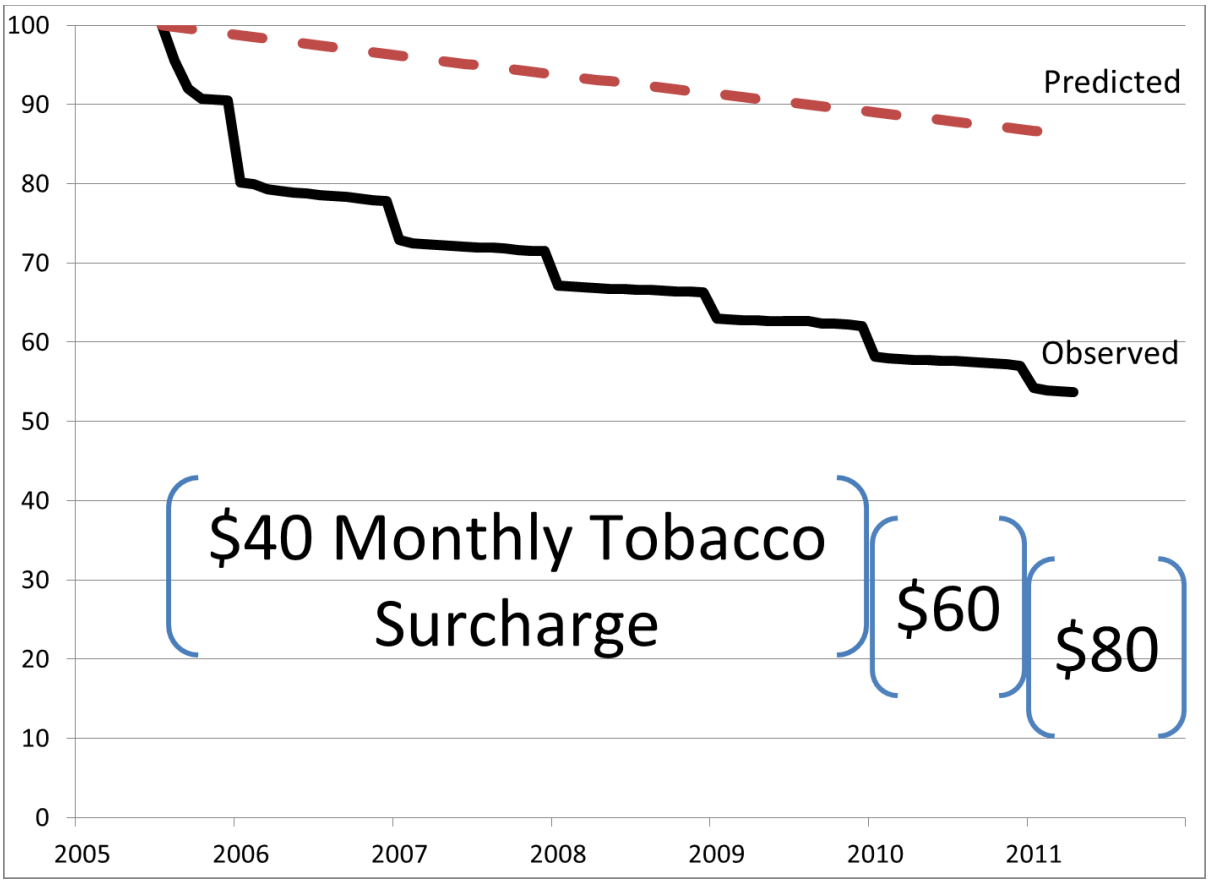


Figure 3displays the proportion of the July 2005 SHBP cohort that paid a tobacco surcharge in each month of the study period. The brackets indicate the nominal values of the tobacco surcharge over specified periods of time. The $40 nominal monthly tobacco surcharge was elevated to $60 in 2010 and again to $80 in 2011. The entire cohort paid the ($40) tobacco surcharge in July 2005; therefore, every data point after that date represents the fraction of that cohort that was still paying the tobacco surcharge in each month of the analysis. By January 2006, only 5 months after the tobacco surcharge was implemented, over one-fifth of enrollees had quit paying the surcharge and, theoretically, quit using tobacco. By April 2011, 46.3% of

tobacco users in the balanced panel had quit. The imposition of the tobacco surcharge on health insurance appears to have cut the tobacco using population in the sample by half over a 70 month period.

The first column of Table 3examines whether tobacco use rates for the balanced panel were significantly different than what would be predicted if the cohort quit using tobacco at rates equivalent to the national tobacco cessation rate. Roughly, 2.6% of tobacco using adults in the United States will permanently end their habit every year, either by quitting or dying (6). A predicted tobacco use rate for the SHBP was constructed using this information and was plotted in Figure 3as the red line. A one sample comparison of proportions test was performed to determine if observed proportion of tobacco users in the July 2005 Cohort in each January of the study period (and April 2011) was significantly different than the predicted proportion of tobacco users. The critical value for rejecting the null hypothesis (Predicted=Observed) at the 99.9% confidence level is Z ~ 3.50. Therefore, we are more than 99.9% confident that the Predicted values are not equal to the Observed values. The Observed values are significantly lower than the Predicted values, indicating that the SHBP cohort quit using tobacco significantly faster than the population at large. The sensitivity analysis results reported in the remaining columns of Table 3, strengthen the findings of the baseline comparison of proportions test. The highest tested rate is four times higher than the national average and, after 70 months, tobacco use in the SHBP cohort is significantly smaller than in that improbable national cessation scenario.

Table 3: Z-Scores for Comparison of Proportions Tests for Sensitivity Analysis

Date	2.6%	5.2%	7.8%	10.4%
Jul-05	0.00	0.00	0.00	0.00
Jan-06	-340.00	-230.00	-170.00	-140.00
Jan-07	-250.00	-150.00	-110.00	-74.73
Jan-08	-230.00	-130.00	-82.15	-48.96
Jan-09	-210.00	-110.00	-63.72	-29.06
Jan-10	-200.00	-110.00	-55.43	-18.84
Jan-11	-200.00	-100.00	-47.30	-9.03
Apr-11	-190.00	-97.09	-43.89	-5.26

Research Question 2

We developed a series of seven repeated logistic regressions to determine if the tobacco surcharge impacted different subpopulations at different rates over the course of the study period. The results of these regressions are displayed in Notably, all of the independent variables were statistically significant across the years of data.

Table 4 below. The dependent variable in each regression is tobacco cessation. For this variable, the enrollee was assigned a value of zero for each observation until they quit for the final time in the study period, wherein their value changed to one for every subsequent observation. These regressions were run on the balanced panel during the same months (except July 2005) used in the analysis of Table 3above.

In Notably, all of the independent variables were statistically significant across the years of data.

Table 4, a positive coefficient indicates that an individual possessing that particular trait had an increased probability of having ceased their tobacco use by that month. Notably, all of the independent variables were statistically significant across the years of data.

Table 4: Logistic Regressions Results for Research Question 2

	Jan-06	Jan-07	Jan-08	Jan-09	Jan-10	Jan-11	Apr-11
Base Monthly Premium	0.000126	0.000191*	0.0000860	0.000328***	0.000319***	0.000354***	0.000353***
	[0.0000706]	[0.0000938]	[0.000103]	[0.0000673]	[0.0000628]	[0.0000598]	[0.0000599]
Married	-0.129***	-0.152***	-0.163***	-0.248***	-0.267***	-0.272***	-0.273***
	[0.00968]	[0.0125]	[0.0147]	[0.00903]	[0.00900]	[0.00911]	[0.00911]
Age	-0.00353***	-0.00449***	-0.00503***	-0.00470***	-0.00499***	-0.00502***	-0.00506***
	[0.000253]	[0.000298]	[0.000323]	[0.000333]	[0.000342]	[0.000353]	[0.000353]
Female	-0.00291	-0.00503	-0.00727	-0.0206**	-0.0258***	-0.0299***	-0.0327***
	[0.00525]	[0.00605]	[0.00649]	[0.00667]	[0.00685]	[0.00694]	[0.00695]
Teacher	0.0595***	0.0638***	0.0675***	0.0749***	0.0608***	0.0443***	0.0404***
	[0.00461]	[0.00536]	[0.00579]	[0.00587]	[0.00607]	[0.00618]	[0.00619]
Atlantan	0.0561***	0.0642***	0.0669***	0.0612***	0.0638***	0.0513***	0.0506***
	[0.00441]	[0.00514]	[0.00554]	[0.00568]	[0.00585]	[0.00597]	[0.00598]
Observations	27045	27046	27047	27047	27047	27047	27047
Pseudo R-squared	0.053	0.039	0.037	0.055	0.055	0.051	0.051
Standard errors in brackets * p<0.05 ** p<0.01 *** p<0.001							

Age: Holding all other variables at the mean, each year increase in age was consistently associated with between a 0.4 and 0.5 percent decrease in the probability of having quit using tobacco. Therefore, we fail to reject Hypothesis 2a; older enrollees will quit using tobacco less rapidly than younger employees.

Gender: Females were between 2.1 and 3.2 percent less probable to have quit using tobacco over by the end of the study period. Therefore, we fail to reject Hypothesis 2b; females will quit using tobacco less rapidly than males.

Cost of Insurance Plan: Those persons who pay a lower base monthly premium are less likely to quit using tobacco than those persons paying a lower insurance premium. Each one dollar increase in the monthly premium was associated with roughly a 0.04 percent increase in the probability of having quit using tobacco. Therefore, we fail to reject Hypothesis 2c; enrollees in less expensive health insurance plans will quit using tobacco less rapidly than those in more expensive plans.

Job Type: Teachers appear to quit using tobacco in greater numbers than other SHBP enrollees. Teachers were 6.0 percent more probable to have quit using tobacco than other employees in January 2006, a figure than declined to a still-significant 4.0 percent increase in probability in April 2011. Therefore, we fail to reject Hypothesis 2d; teachers will quit using tobacco more rapidly than other employees.

Geography: Those persons living in the Atlanta area quit using tobacco in a similar pattern to teachers in the study sample. In January 2006, Atlantans were between 5.1 and 6.7 percent more likely to have quit using tobacco, a figure that declined to 21.7 percent increase in probability of being a non-user in April 2011. Therefore we fail to reject Hypothesis 2e; enrollees living in the Atlanta area will quit using tobacco more rapidly than others.

Marital Status: Married enrollees are found to be much less likely to quit using tobacco than their unmarried counterparts over the study. Those persons and their spouses were between 12.9 and 27.3 percent less probable to have ceased using tobacco during the study period. This finding allows us to fail to reject Hypothesis 2f; Married enrollees will quit at a lower rate than unmarried enrollees.

Discussion

Summary

Research Question 1

We observed substantially higher tobacco cessation rates over the first six years of the SHBP's tobacco surcharge than what was expected at the outset of this study. The tobacco cessation rates in the study group are least four times greater than the national average. However, this figure most likely overestimates the size of the effect of the surcharge because cessation is self-reported. Nonetheless, this finding supports the first hypothesis: cessation rates of persons charged a tobacco surcharge are higher than in the general population.

Research Question 2

The differing rates of cessation seen among subpopulations in the study sample reflect previously observed patterns of cessation. Older persons quit at greater rates than younger persons. This could be due to the fact that increasing age is associated with earning a higher income, a factor that would protect a tobacco user's budget from being significantly negatively impacted by the tobacco surcharge. In other words, they may have a less constrained budget.

Females quit at greater rates than males, a phenomenon that has been seen in other studies where women tended to be more resistant to quitting smoking than their male counterparts. This happens despite the lower incomes that are paid to women.

Persons with less expensive (pre-surcharge) premiums were less likely to quit, a finding which conforms to the microeconomic theory of constrained budgets that underpins the basic rationale of this study.

Teachers quit at greater rates than other employees, a result that was expected because teachers work in schools, a relatively smoke-free environment, and are surrounded by children, a population for whom teachers act as role models.

Those persons living in the Atlanta metropolitan area were more likely to quit than others living elsewhere in the state and married persons were less likely to quit than unmarried persons. This finding on marital status speaks to the veracity of the self-reported cessation measure used in this study, as a real cessation event in a multi person family is known to be rarer than for a single person. When juxtaposed against the observation that reporting a tobacco cessation event is no more difficult for married persons, these findings indicate that this study is measuring real cessation events.

Policy Implications

From a policymaker's perspective, the most important finding in this study is that the tobacco surcharge appears to have worked to increase tobacco cessation rates in the SHBP. The regressions performed in this study indicate that persons who continued using tobacco purchased slightly less expensive health insurance plans than persons who quit using tobacco, bringing concern that tobacco users would cut back on the quality of their health insurance in the face of the being charged a tobacco surcharge. The size of this effect seems small and exploring the health insurance purchasing behaviors of tobacco users should be undertaken in future study. The finding in the study that tobacco users stayed in the SHBP as long as or longer than non-users of tobacco should also allay concerns that the tobacco surcharge would encourage tobacco users to drop health insurance, switch insurance providers, or change employers at a greater rate than non-users. The findings in this study indicate that there appear only small detectable negative side-effects that have resulted from the imposition of the tobacco surcharge.

Limitations

There are four main limitations to the findings in this study.

(1) Because tobacco cessation is self-reported in the SHBP, and no biological confirmation of cessation was recorded, there is an incentive for enrollees to misreport their tobacco use. This would lead to an overestimation of the observed effect size. However, because the observed effect size is very large, this would not make the results statistically insignificant, as the sensitivity analysis suggests. Future work ought to attempt to confirm if observed tobacco cessation reports reflect reality. If cessation truly is over-reported,

insurers will not reap expected cost-savings from their allegedly tobacco-free enrollees, and dishonest enrollees will suffer ill health via their continued tobacco use.

(2) This study does not control for the presence of other tobacco control policies that were introduced during the study period. The real price of cigarettes in Georgia increased by 12.9% over the study period, while real wages for teachers and state government employees in the state rose by 8.7% and 1.1%, respectively(33,34). Additionally, the federal excise tax rose for all tobacco products in January 2010, and prices increased again in January 2011, most likely due to an increase charged by manufacturers(33,35). We can assume that the tobacco surcharge was a significant additional marginal cost to tobacco consumers because the majority of cessation occurred in the study sample while cigarettes became cheaper in real (inflation-adjusted) terms. Georgia also instituted a weak statewide smoking ban in January 2006(36). Two of the largest counties had passed stronger laws in the years prior to the statewide law as well as to the imposition of the tobacco surcharge(36). Those counties, Gwinnett and DeKalb, were separated to determine if their residents quit using tobacco at a faster pace than the rest of the state during the first 7 months of the study period and the cessation rates in those counties were equal to the rest of the state. The SHBP also did not cover tobacco cessation therapy, medication, or counseling during the study period, a policy that would have led to a lower baseline rate of cessation among its covered population when compared to the general national population.

(3) Generalizability to the entire US population is limited because the study sample was drawn from a single Southeastern state. Certain subpopulations, particularly females, are overrepresented in the sample. Georgia has weak tobacco control programs (ALA GPA[2], 0.5(37)), as do most governments who impose tobacco surcharges (Median ALA GPA, 0.0; Mean ALA GPA, 0.36(37)). Intuitively, this program would work even better in an environment that was less conducive to tobacco use (i.e., a state with a higher ALA GPA). If, in theory, the environment in Georgia became less hospitable over time to tobacco use, we could

[2] The American Lung Association Grade Point Average (ALA GPA) is an author's calculation that equally weights the four grades given to each state for their tobacco control policies by the ALA in 2011 into a single number based on the traditional academic 4-point scale.

expect that would cause the study to over-estimate the effect of the tobacco surcharge on cessation rates. This is an issue that could be addressed in future studies through the use of a traditional control group.

(4) This conclusions drawn in this study are constrained by the type of statistical analyses that was performed. The ideal statistical analysis should have incorporated a survival analysis that used a Cox-Proportional Hazard Model to determine the precise cessation rate of the study population. This and other econometric techniques will be applied to the SHBP data in future research on the tobacco surcharge., but were beyond the scope of this analysis.

Shifting the Paradigm

The rationale for health insurers to charge tobacco users more for their monthly premiums ought to be subjected to scrutiny. Traditional risk factors for chronic disease, including tobacco use have little short-term impact on the health care expenses of insurance policy holders (38). Furthermore, the employer-sponsored health insurance market is highly unstable. Health insurers do not expect new enrollees to stay on their plan for more than a few years since health insurance is tightly linked with employment and Americans change jobs at a rapid pace (39). These issues have complicated efforts to persuade health insurance companies to invest in workplace wellness, health promotion, and disease prevention. Health insurance companies understand that the rewards of an investment in wellness or prevention will most likely be reaped by another insurance company or by Medicare.

The tobacco surcharge changes that paradigm. The insurance company that institutes this policy could prevent disease and reaps short-term economic rewards of the extra fees paid by tobacco users in their plan. Long-term economic rewards in the form of decreased expenditures should also accrue to the insurer with a tobacco surcharge, albeit only from the fraction of ex-tobacco users who stay enrolled with that insurer. Therefore, the business case for instituting a tobacco surcharge is very strong: boost short-term revenues and potentially decrease long-term expenditures. No research needs to be performed to determine if health insurance company revenues increase after the institution of a tobacco surcharge. This evaluation of the tobacco surcharge also indicates the policy appears to promote public health, and does not merely shift the cost increases in health insurance from non-smokers to smokers. The Patient Protection and Affordable

Care Act of 2010 established tight restrictions on the health insurance marketplace, and serves to perpetuate the spread of tobacco surcharge policies. Four basic provisions of the law inform our research. If its constitutionality is resolved, the mandate requiring all individuals carry health insurance by 2014 will bring millions of previously uninsured Americans into the health insurance market. Next, each state must set up an exchange through which individuals and small groups can purchase federally subsidized health insurance by 2014. Then, each insurance policy sold in the exchange can only be priced or "rated" on four factors : geography, age, family composition, and tobacco use(40). [1] Geography and [2] family composition will adjust for regional differences and the number of people enrolled on any plan. [3] Age can be factored into the rating and a person may not be charged more than 3 times the market average premium for being old. [4] Tobacco use status can be factored into the rating and a person may not be charged more than 1.5 times the average market premium for using tobacco. A tobacco user in a market where the average premium is one hundred dollars per month could be charged up to a fifty dollar penalty for using tobacco, a penalty that is already greater in size than their monthly tobacco excise tax burden. This penalty quickly begins to constrain the budget of the tobacco user and appears to act as an economic disincentive to tobacco use. Finally, the Affordable Care Act enables employers to expand their workplace wellness programs by providing larger incentives to employees to live healthy lifestyles than was allowed under prior law(41). These factors will drive the expansion of tobacco surcharge policies, and other similar wellness policies, to expand across the country.

Policymakers need to ensure that these policies do not become a "backdoor" to discriminating against those persons with previously existing medical conditions or physical disabilities(42). This study is the first to demonstrate that a financial disincentive in the form of a higher health insurance premium can promote tobacco cessation. But, this result should not be immediately extrapolated towards the creation of a program that would charge a premium based on a person's blood glucose levels, BMI, or blood pressure. Those measures, unlike smoking status, have significant genetic components, and can never be completely controlled by a person's behavior. While certain persons are genetically predisposed to start smoking, and others to continue smoking, no one is born a tobacco user(43). People can radically and fundamentally change their disease course through tobacco cessation. Policymakers and relevant stakeholders need to have

clear, honest, and candid conversation about the design of future tobacco surcharge policies in order to encourage honest compliance by enrollees and employees as well as the use non-discriminatory policy designs by insurers and employers.

Future Study

The SHBP has yet to biometrically confirm a single enrollee's tobacco use status and it has not taken legal action against a single enrollee for violating the terms of the affidavit signed by all enrollees who declared they had given up using tobacco. This inaction is most likely not due to the flawless record of tobacco cessation among SHBP enrollees who have never relapsed their tobacco use, but is a product of the complicated legal and political environment surrounding the enforcement of a tobacco surcharge policy. Such policies require (possibly) invasive searches, drug tests, or first-hand testimony to determine the veracity of claims of the tobacco use status of enrollees. However, this study's findings provide an impetus for instituting confirmatory tests.

Concerns about preserving the individual's right to privacy and personal liberty need to be addressed in the design of future tobacco surcharge policies. These policies could institute rebate programs where portions of the tobacco surcharge would be refunded when enrollees pass biomarker tests (nicotine cheek swabs, urine cotinine, etc.) that confirm tobacco cessation status to the insurer. Insurers should offer all tobacco cessation tools and therapies that have been proven to aid the tobacco cessation process. Additionally, insurers should re-examine the "option-out" design of most tobacco surcharge programs. Because the tobacco surcharge, along with the rest of a health insurance premium, is taken out of an pre-tax employee's salary, an employee could be accidentally assessed a tobacco surcharge and currently, there is little recourse to recover that lost income. Health insurers should allow persons who claim to have been accidentally assessed a tobacco surcharge to recuperate those costs through a formal testing mechanism, if only to increase consumer trust.

This study is the first to examine the tobacco surcharge on health insurance premiums and must not be the last. The limitations inherent in the outcome measures and in the available data invite the use of more data to explore other important aspects of the tobacco surcharge policy.

Basic work should attempt to confirm employee cessation through alternative methods (surveys, nicotine/cotinine tests, health risk assessment audits, or insurance claims) in order to determine the veracity of the cessation claims in the current study. A traditional control group who was not assessed a tobacco surcharge should be found with which to compare cessation rates. Econometric studies need to take place to precisely measure cessation patterns as they correspond to changes in the size of the tobacco surcharge. Other work must examine if the tobacco surcharge adversely changes the health insurance purchasing habits of tobacco users. Namely, those studies should determine if tobacco users are purchasing policies with higher cost-sharing, higher out-of-pocket payments, or if they are forgoing purchasing insurance entirely.

Additional research should seek to quantify the costs and benefits accrued by tobacco users, insurance companies, and society from the institution of the tobacco surcharge policy. Finally, studies should attempt to design the optimal tobacco surcharge policy design that would reap the greatest health benefits for the tobacco user while causing minimal adverse effects. In order to justify the continuation and expansion of these policies, an evidence base that details the costs, benefits, and side-effects of these policies must be constructed.

Conclusion

Health insurance companies have eagerly started charging tobacco users more for their health insurance. Until now, there has been no empirical study if a tobacco surcharge on health insurance would promote tobacco cessation. This study provides new evidence that the tobacco surcharge could be a novel, effective tobacco cessation intervention. The tobacco surcharge appears to be a true economic disincentive to tobacco use, as it raises the total cost of tobacco consumption similar to a tobacco excise tax.

The findings of this study should serve to invite further study of the design of tobacco surcharge policy. The costs, benefits, and efficacy of the surcharge should be established to quantify the improved health outcomes or decreased health expenditures that tobacco users and health insurance companies gain from the tobacco surcharge. Concerns about implementation of the tobacco surcharge should not be dispelled through this study and further research must seek to clarify the legal, econometric, and ethical

questions that still surround the policy. But, the central conclusion here is that the tobacco surcharge in the SHBP increased tobacco cessation rates above the general population. Policymakers and stakeholders in this discussion should carefully consider these findings when moving forward in the rollout of more tobacco surcharge polices across the United States.

References

1. Ibrahim JK, Glantz SA. Tobacco industry litigation strategies to oppose tobacco control media campaigns. Tobacco Control. 2006 Feb 1;15(1):50 –58.

2. Danaei G, Ding EL, Mozaffarian D, Taylor B, Rehm J, Murray CJL, et al. The Preventable Causes of Death in the United States: Comparative Risk Assessment of Dietary, Lifestyle, and Metabolic Risk Factors. PLoS Med. 2009 Apr 28;6(4):e1000058.

3. Warner KE, Murt HA. Premature deaths avoided by the antismoking campaign. Am J Public Health. 1983 Jun;73(6):672–7.

4. Brandt A. The cigarette century: the rise, fall, and deadly persistence of the product that defined America. New York: Basic Books; 2007.

5. CDC's Office on Smoking and Health. Vital signs: current cigarette smoking among adults aged ≥18 years --- United States, 2005--2010. MMWR Morb. Mortal. Wkly. Rep. 2011 Sep 9;60:1207–12.

6. Mendez D, Warner KE. Setting a Challenging Yet Realistic Smoking Prevalence Target for Healthy People 2020: Learning From the California Experience. Am J Public Health. 2008 Mar 1;98(3):556–9.

7. Mendez D, Warner KE, Courant PN. Has smoking cessation ceased? Expected trends in the prevalence of smoking in the United States. Am. J. Epidemiol. 1998 Aug 1;148(3):249–58.

8. Warner KE, Mendez D. Tobacco control policy in developed countries: yesterday, today, and tomorrow. Nicotine Tob. Res. 2010 Sep;12(9):876–87.

9. CDC's Office on Smoking and Health. Federal and state cigarette excise taxes - United States, 1995-2009. MMWR Morb. Mortal. Wkly. Rep. 2009 May 22;58(19):524–7.

10. KFF. Trends in Health Care Costs and Spending [Internet]. Kaiser Family Foundation; 2007 Sep p. 2. Available from: http://www.kff.org/insurance/upload/7692.pdf

11. Chaloupka FJ, Straif K, Leon ME. Effectiveness of tax and price policies in tobacco control. Tobacco Control. 2011 May 1;20(3):235 –238.

12. Franz GA. Price effects on the smoking behaviour of adult age groups. Public Health. 2008 Dec;122(12):1343–8.

13. Penner M. Economic Incentives to Reduce Employee Smoking: A Health Insurance Surcharge for Tobacco Using State of Kansas Employees. American Journal of Health Promotion. 1989 Sep;4(1):5–11.

14. United States. Public Health Service. Office of the Surgeon General. Reducing the Health Consequences of Smoking: 25 Years of Progress: A Report of the Surgeon General: 1989 Executive Summary [Internet]. 1989 [cited 2011 Apr 30]. Available from: http://profiles.nlm.nih.gov/NN/B/B/X/S/

15. Ignani K. U.S. Health Policy: What's Next. Emory University, Atlanta, GA; 2011.

16. Sinclair J. Mercer's National Survey of Employer Sponsored Health Plans 2010 Columbus [Internet]. Columbus, OH; 2011 [cited 2011 Aug 26]. Available from: http://www.ehpco.com/documents/MercerNationalSurveyResults2010CentralOH.pdf

17. Balko R. Health riskers ought to pay. The Atlanta Journal-Constitution. Home ed. Washington, DC; 2005 May 16;11A.

18. AJC. OUR OPINIONS: Coverage too costly; Raising smokers' health insurance premiums the wrong way for state to address shortfall. The Atlanta Journal-Constitution. Home ed. Atlanta, GA; 2005 May 16;10A.

19. UPI. Smoking, weight as hiring factors opposed. UPI.com [Internet]. Princeton, NJ; 2011 Jul 22 [cited 2011 Jul 25]; Available from: http://www.upi.com/Top_News/US/2011/07/22/Smoking-weight-as-hiring-factors-opposed/UPI-66001311376398/

20. Towers Watson. Raising the Bar on Health Care, in Employer Survey on Purchasing Value in Health Care [Internet]. National Business Group on Health; 2010 [cited 2010 Nov 12]. Available from: http://www.towerswatson.com/assets/pdf/1345/TW_15565_NBGH.pdf

21. Cauchi R, Marsh T. State Employee Health Benefits [Internet]. National Conference of State Legislatures; 2011 [cited 2011 Apr 30]. Available from: http://www.ncsl.org/default.aspx?tabid=14345

22. Badertscher N, Salzer J. Smokers gasp at insurance; State workers who puff socked $40 a month. The Atlanta Journal-Constitution. Home ed. Atlanta, GA; 2005 May 12;1A.

23. Miller A. Smoking surcharge takes effect; 54,000 pay extra fee for state insurance. The Atlanta Journal-Constitution. Home ed. Atlanta, GA; 2005 Jul 15;1E.

24. Powell K. Workers' wellness rewarded; Metro cities, counties among employers that impose insurance surcharges for unhealthy habits. The Atlanta Journal-Constitution. Main ed. Atlanta, GA; 2009 Feb 20;1C.

25. Warner KE, Foundation RWJ. Tobacco control policy. John Wiley and Sons; 2006.

26. Warner KE, Liber A. A Potential Masters Thesis Topic. 2010.

27. Wetter DW, Kenford SL, Smith SS, Fiore MC, Jorenby DE, Baker TB. Gender differences in smoking cessation. Journal of Consulting and Clinical Psychology. 1999;67(4):555–62.

28. Franks MM, Pienta AM, Wray LA. It Takes Two. J Aging Health. 2002 Aug 1;14(3):336–54.

29. Maziak W, Mzayek F, al-Moushareff M. Smoking behaviour among schoolteachers in the north of the Syrian Arab Republic. East. Mediterr. Health J. 2000 May;6(2-3):352–8.

30. Tauras JA. The Transition to Smoking Cessation: Evidence from Multiple Failure Duration Analysis. National Bureau of Economic Research Working Paper Series [Internet]. 1999;No. 7412. Available from: http://www.nber.org/papers/w7412

31. ANR. Municipalities with Local 100% Smokefree Laws (currently in effect as of April 1, 2012) [Internet]. American Nonsmoker's Rights Foundation; 2012 [cited 2012 Apr 1]. Available from: http://no-smoke.org/pdf/100ordlisttabs.pdf

32. BLS. Consumer Price Index - All Urban Consumers: Databases, Tables & Calculators by Subject [Internet]. United States Bureau of Labor Statistics. 2011 [cited 2011 Nov 30]. Available from: http://bls.gov/data/

33. Economist Intelligence Unit. MARLBORO BRAND OR EQUIVALENT CIGARETTE PRICES IN LOCAL CURRENCY AND US$ June 2011. The Economist; 2011.

34. United States Bureau of Labor Statistics. Quarterly Census of Employment and Wages [Internet]. Washington DC: Bureau of Labor Statistics; 2011. Report No.: ENU130005029211. Available from: http://data.bls.gov/cgi-bin/surveymost?en+13

35. Ayers JW, Ribisl K, Brownstein JS. Using search query surveillance to monitor tax avoidance and smoking cessation following the United States' 2009 "SCHIP" cigarette tax increase. PLoS ONE. 2011;6(3):e16777.

36. Ferketich AK, Liber A, Pennell M, Nealy D, Hammer J, Berman M. Clean indoor air ordinance coverage in the Appalachian region of the United States. Am J Public Health. 2010 Jul;100(7):1313–8.

37. American Lung Association. State of Tobacco Control 2012 [Internet]. Washington, DC: American Lung Association National Office; 2012 Jan. Available from: http://www.stateoftobaccocontrol.org/SOTC_2012.pdf

38. Terry PE, Fowler EJ, Fowles JB. Are health risks related to medical care charges in the short-term? Challenging traditional assumptions. Am J Health Promot. 1998 Jun;12(5):340–7.

39. Tchernis R, Normand S-LT, Pakes J, Gaccione P, Newhouse JP. Selection and plan switching behavior. Inquiry. 2006;43(1):10–22.

40. GPO. H.R.3590 - Patient Protection and Affordable Care Act [Internet]. US Code. Sect. Sec. 2701. Fair health insurance premiums, 111-148 Mar 23, 2010. Available from: http://www.opencongress.org/bill/111-h3590/text

41. Schmidt H. Wellness Incentives, Equity, and the 5 Groups Problem. American Journal of Public Health. 2012 Jan;102(1):49–54.

42. American Cancer Society Cancer Action Network, American Heart Association, AFLCIO, AFSCME, UAW, American Diabetes Association, et al. Re: Proposed changes to 71 FR 75014: Nondiscrimination Based on a Health Factor and Wellness Programs [Internet]. 2011 [cited 2012 Feb 10]. Available from: http://www.heart.org/idc/groups/heart-public/@wcm/@adv/documents/downloadable/ucm_434107.pdf

43. Kaprio J. Genetic epidemiology of smoking behavior and nicotine dependence. COPD. 2009 Aug;6(4):304–6.