ORIGINAL CONTRIBUTION

Youth Are More Sensitive to Price Changes in Cigarettes than Adults

Alexander Ding

Department of Economics, University of California, Berkeley, California

Virtually all smoking begins in our population's youth and remains as a habit into those smokers' elder years. If we desire to halt smoking in its infancy, we should seek to deter and induce cessation in the youth years. It has been cited that taxation is an effective means to deter smoking at all ages, particularly efficacious in the youth population. This paper explores the merits of this method of preventative medicine, and intends to investigate differences between the price elasticity of cigarette demand between various cohorts, particularly the adult versus the youth population. We use a two-variable log-log, ordinary least-squares econometric regression to determine the extent that price alterations have on participation rates and quantity smoked. Our results show that youth are quite responsive to price increases showing a decrease of 14 percent prevalence in smoking for a 10 percent increase in price; whereas, the adult population is relatively less responsive to such price changes, exhibiting nearly a 2 percent decrease in prevalence for a 10 percent increase in price. We conclude that taxation is an effective means of socially-enacted preventative medicine in deterring youth smoking.

INTRODUCTION

"Smoking remains the largest single preventable cause of premature death and disability in the United States" [1]. Since the publication of the Surgeon General's first report on smoking, the United States government has intervened and implemented policy and programs intended toward cessation of smoking in the interest of her people. An effective method to decreasing the prevalence of smoking in the population is through the prevention of initiation, most often cited as a habit picked up in adolescence. The Center for Disease Control states that "[s]moking begins primarily during childhood and adolescence" [1], and, in fact, "Nearly all first use of tobacco occurs before high school graduation; this finding suggests that if adolescents can be kept tobacco-free, most will never start using tobacco" [2]. Therefore, tobacco control policies directed at the youth population could provide an effective method of preventative medicine by accomplishing and sustaining long-term reductions in smoking in all segments of the population.
This paper investigates the success that taxation and price increases could have on limiting cigarette consumption. We hypothesize that smokers are price elastic in their demand for cigarettes and that the youth population is even more price elastic in cigarette demand. Therefore, a likely to be effective method to decreasing smoking would be to increase the price of a pack of cigarettes. How price-responsive a group is ultimately determines how effective such policies are. Price elasticity of demand is an economic term that represents the responsiveness of demand to changes in price. This is described mathematically as a percent change in quantity demanded over the percent change in price. That is price elasticity of demand = (ΔQ/Q)/(ΔP/P), where Q = quantity demanded and P = price.

The price elasticity of demand is a ratio and can be read as a "1 percent change in price will cause a ___ percent change in demand." This elasticity is most easily described as the reciprocal slope of the demand curve: the steeper the slope, the lower the elasticity ratio, the more inelastic and the more unresponsive the consumer is to a change in price. Figures 1 and 2 show price elasticity of demand graphically [3]. The demand curve, generally, is downward sloping exhibiting the notion that as price decreases for a given good, consumers will purchase and consume more of that product. Taxation provides for a popular method of price alteration; this is a demand-side technique by which to increase the price of cigarettes. This is by far the most often used method to affect changes in price (Figures 1 and 2).

When estimating the effectiveness of certain price increases in cigarettes we must ensure that at the very least price elasticity of cigarette demand is less than zero. A positive elasticity would suggest that if we increased price that quantity demanded of cigarettes would also increase. This is an opposite result of the intent of such policies. We will not limit ourselves, however, to only accepting elastic figures (i.e., PED < -1) because an inelastic amount can still reduce the quantity of cigarette consumption. Our purpose is to investigate just how much cigarette consumption can be cut with a price increase, not to speculate whether a certain percent in cutback is worth the effort.

There is good reason to believe that the price elasticity of cigarette demand in youth is relatively elastic. Grossman and Chaloupka [4] sum up the various reasons cited. First, the youth population's disposable income is much smaller than that of the adult population. As a result, a greater percentage of their wealth is spent on purchasing cigarettes. Teens, in theory, are

Figure 1. Elastic demand curve.

Figure 2. Inelastic demand curve.
less addicted to cigarettes and thus find it a more realistic option to stop smoking as a response to costlier smokes. Youngsters are also inclined to have a greater discounting of the future and do not fully realize the long-term consequences of smoking. Becker and Mulligan [5] cite that children have a tendency to overweight present satisfaction and only become more future oriented through the investment process as they mature. As a result, they smoke more than is optimal unless that cost is made explicit to them in cash. Lastly, the most optimistic result of increased taxes is that peer pressure declines. Many teenagers start smoking because of peer pressure in attempts to emulate a certain image or to draw association between themselves and an "in-crowd." When the price of cigarettes increase, the amount their peers smoke decreases and the opportunity to lasso another youth into smoking diminishes. A possible multiplying effect seems plausible under this model, and provides great ammunition for the importance and effectiveness of taxation to the decrease of youth smoking.

Many studies have been conducted investigating the general population price elasticity of cigarette demand. According to a review article conducted by Chaloupka and Warner [6] there were a variety of elasticities reported in various papers over the years. However, generally speaking, the elasticity figures were between −0.3 and −0.5. This represents a 3 to 5 percent decrease in cigarette consumption for a 10 percent increase in the price of cigarettes.

In the youth population, empirical data provides strong evidence of greater elastic price sensitivity. Lewit et al. [7] provides numbers nearly three times that of the adult population. Using data from the 1960s and 1970s, the team declared that teen price sensitivity was −1.44. Their findings conclude that the prices affect youths' decision to smoke rather than the conditional demand for cigarettes, that is, how many cigarettes to smoke. Chaloupka and Grossman [8], with more recent data, find a figure not far from Lewit et al. They state that the average overall youth price elasticity of cigarette demand is −1.313. The reductions of smoking come about equally from a decline in participation and a cut-back on the quantity smoked per smoker. These authors agree that because almost no smokers begin smoking after the age of 20, large sustained increases in taxes are very effective in achieving long-run improvements in health.

While taxation works to stop those youth who actually purchase the cigarettes, price changes might not have as large of an effect on those who are only experimenting. The economic incentives are not as solid without actual purchases or very small volumes thereof. Gruber [13] shows in surveying younger youth the effectiveness of taxation seem inept. In the youth-at-large, they estimate a price elasticity of −3.0, but in younger youth a price elasticity of only −0.31, with conditional demand of −0.03. Perhaps these children bum cigarettes off older friends or only smoke when offered for free and, thusly, are price inelastic. Emery et al. [9] conducted research on differences between these sub-cohorts of youth smokers. Their results show that for regular smokers the price elasticity is estimated between −1.70 and −2.24. However, price was not a factor for experimenters in any age group. We can infer that as intensity of smoking increases and as a greater percentage of their allowances and spending money is allocated toward tobacco, the more effective taxation is on creating incentives to cease such behavior.

From the literature on price elasticities of cigarette demand, it is quite reasonable to conclude that increases in price affect teen smoking to a great degree. One problem area that needs to be addressed, however, is the experimentation phase. At
this early stage of smoking, teens are not aware of the risks of addiction and cannot be effectively prevented from doing so with simple taxation. Nevertheless, the benefits of using a simple, virtually costless tool such as taxation proves to be quite large; the rates of returns are unmatched. Our study contributes to the literature with an analysis using more recent data and delves deeper into the nuances of price increases by investigating differences in sub-cohorts of youth and types of decreased demand.

DATA AND METHODS

Our primary empirical model is a simple, two-variable double log regression, estimated by the ordinary least squares method. The log-log model is a very popularly used model in measuring elasticities of demand. The log function is used to convert the data numbers into percentage figures, by which elasticities are evaluated. Therefore, data that were retrieved as percentage figures were not logged. The regression model is to be estimated as the equation: \( \ln Y = \alpha + \beta_2 (\ln X) + \nu \). It is attractive for such use because the slope coefficient \( \beta_2 \) is equal to the elasticity we are attempting to estimate. The dependent variable, \( Y \), will represent the various measures of smoking consumption, and our only independent variable, \( X \), will represent the real price of a pack of cigarettes. This model measures elasticity of demand for cigarettes with respect to the real price. With the following data sets, we will estimate four sets of regressions.

Every set of regression will utilize the real price of cigarettes as the independent variable and the remaining four data sets will be independently regressed thereto as the dependent variable.

\( X = \text{Real Price of a Pack of Cigarettes} \)

The consumer price index (CPI)\(^a\), the standard measure of price inflation, was used as our indicator of inflation adjustment [10]. The nominal price, also known as the sticker price, of a pack of cigarettes was extracted from the former Tobacco Institute’s fact book on tobacco [11].

The price used represents the average retail price of a pack of cigarettes throughout the United States, both brand name and generic substitute brands. These nominal prices per pack of cigarettes were then adjusted to general CPI inflation figures. The real price represents the true price of a pack of cigarettes. This adjusts for the effects of inflation, and takes into account only the actual change in the price.

**Regression 1:**

\( Y = \text{Adult Consumption of Cigarettes} \)

Two data sources for the time-series consumption of cigarettes were gathered. The first set was obtained from the most recent 2001 The Tax Burden of Tobacco [13]. We took the data for federal cigarette consumption per capita for the years 1970 through 2000. The second set of data was published by the U.S. Department of Agriculture and obtained from the Center for Disease Control: the April 1996 USDA report included figures from 1970 through 1995, and the subsequent 1996 to 2001 figures were extracted from the Mann Library website at Cornell University [14]. This set of data differs from the first set in that it includes overseas military forces’ cigarette consumption, but was also similarly presented as per capita figures.

**Regression 2:**

\( Y = \text{Youth Prevalence for Cigarette Use} \)

The youth prevalence for cigarette use looks at the amount of United States high-school seniors that have smoked over the last 30 days. These data were obtained from the Center for Disease Control, whose original source was from a survey entitled the Monitoring the Future Project [15]. These data provide figures for the year 1976 through 1998. Data are provid-
RESULTS AND DISCUSSION

The results of our regressions present an optimistic picture for the effectiveness of taxation on the youth population of smokers, assuming that the historic time series data used in this analysis remain reflective of current consumption choices of today’s youth. Estimates show that in youth, taxation is effective in cutting down the number of cigarettes smoked, leading to the cessation and quitting of smoking, and deterring others from beginning this habit altogether. While our study investigated price changes, it is assumed that taxation can be accurately used to produce these price changes because the incidence of tax has been elucidated [18]. Therefore, our study in generic price changes can be translated into taxation policy.

The first set of regressions provides elasticities of –0.15 and –0.19, respectively, for the price sensitivity of the general adult population to cigarettes. Both figures are statistically significant. These numbers are comparable, but are roughly less than, figures previously published. It can be argued that such taxation policies are fairly ineffective in decreasing the consumption of cigarettes because of its inelastic figure. However, re-examining this figure in absolute terms could present different statistics in better perspective. In the year 2000, a price change of 10 percent, which would have been approximately $0.33, would have hypothetically decreased the number of total cigarettes consumed by the population by over 8.5 billion and a pack and a half less consumed per capita for the given year, assuming no quits (Table 1).

A comparison between the elasticity estimates of the adult population versus the youth population shows a substantial difference. The youth population tends to be much more responsive to price changes as we have hypothesized. A price elasticity of cigarette demand of –1.4 was obtained for the youth-at-large. This elasti-
ty is statistically insignificant from zero at our conventional 95 percent confidence interval, but is significant at the 90 percent confidence interval. If considered significant, such an elastic coefficient suggests a very effective policy in taxation for the deterrence of youth to smoking and, ultimately, that of the population. The obtained coefficient states that for a 10 percent increase in price, there will be a 14 percent decrease in the prevalence of youth that smoke. This amounts to incredibly significant numbers of youth who will stop smoking or will be deterred from smoking. With this estimate, it is plausible that we can stop or prevent smoking at its major source: youth. One question that we must examine though is whether or not they would pick up the smoking habit after their initial youth period. For example, if the price of cigarettes for a high-school student was too high and deterred them from smoking then, would they decide to smoke later in life such as when they become college students or new members of the workforce? This question must be clarified before concluding on the effectiveness that taxation has on keeping youth-turned adults and later people of all ages from smoking cigarettes.

When examining the elasticity of prevalence in smoking within various cohorts of the youth population, significant differences arose. These variations unfortunately state that for some groups of youth taxation is virtually ineffective. The different reactions that the different cohorts exhibit to price changes imply different perceptions of cigarettes as a product to differing groups. Differences in gender showed that females were much more responsive to price changes; almost an astonishing 30 percent decrease for a 10 percent increase in price. This figure is statistically significant. Whereas, males showed a counterintuitive 2.9 percent increase in smoking for a 10 percent increase in price. The latter figure, however, is statistically insignificant.

Within ethnic and racial constraints, the black and Hispanic youth population provides substantial evidence of the effectiveness of price changes on the use of cigarettes: -9.1 and -2.0, respectively. Both figures are statistically significant and suggest taxation to be quite effective in decreasing prevalence of smoking. Unfortunately for the white youth population, figures are positive at 0.9. This coefficient is statistically insignificant. This may be suggestive that the lowest socioeconomic echelon of society tends to be the most responsive to the tax on cigarettes.

These results from our regression emulate those results of Gruber [13], who also cites a strong correlation between price sensitivity and lower socioeconomic status. Therefore, taxation on cigarettes could be most hurtful, in terms of economic welfare, to the poorest. With sensitivity greatest for the lowest socioeconomic class, however, taxation does not seem to hurt the poorest the most. Generally, we deem regressive taxes to be unfair in that the poorest should be paying the least as a percentage of income because they can afford the least. However, it may be in the case of cigarettes that a regressive tax could be also beneficial in the long run. The poor who smoke are generally those

| Data            | Elasticity coefficient | Standard error | T-statistic | P-value |
|-----------------|------------------------|----------------|-------------|---------|
| Tobacco institute | -0.15                  | 0.01           | -10.58      | <.05    |
| U.S.D.A.        | -0.19                  | 0.01           | -19.13      | <.05    |

Table 1. Adult consumption response to price changes (1970-2001).
Ding: Cigarette price and youth smoking

Table 2. Youth prevalence response to price changes (1976-1998).

| Cohort            | Elasticity coefficient | Standard error | T-statistic | P-value |
|-------------------|------------------------|----------------|-------------|---------|
| Youth-at-large    | -1.41                  | 0.83           | -1.69       | .10     |
| Male youth        | 0.29                   | 1.03           | 0.28        | .78     |
| Female youth      | -2.98                  | 0.69           | -4.33       | <.05    |
| White youth       | 0.89                   | 0.93           | 0.95        | .35     |
| Black youth       | -9.11                  | 0.88           | -10.39      | <.05    |
| Hispanic youth    | -2.01                  | 0.85           | -2.36       | <.05    |

who cannot afford to pay for the side-effects thereof such as medical costs. By deterring these groups from smoking, the money they save from such auxiliary costs may benefit both them and society in the long run.

This set of regressions implies that taxation is most effective for black girls and practically ineffective for white boys. The unfortunate fact is that the majority of youth smokers in the United States are Caucasian and boys. Of those who smoke, our data show greatest prevalence in whites and males. In 1998, 42 percent of whites smoked versus 15 percent in blacks and 27 percent in Hispanic; also, 36 percent of boys smoked, while 33 percent of girls smoked [15]. Therefore, while as a group the youth is quite responsive to price and taxation should be useful in decreasing prevalence of smoking, some groups within the youth population will cut back on smoking more than others (Table 2).

The results of the quantity demanded in response to price hikes demonstrates the response of price increases to not only prevalence but also number of cigarettes smoked per smoker. Of those who smoked, for a 10 percent increase in price, there would be a 42 percent increase in the group that would smoke less than 15 cigarettes per day, a 9.4 percent decrease in those who smoked between 15 and 24 cigarettes per day, and a 33 percent decrease in those who smoked over 24 cigarettes per day. All of these estimates are statistically significant. This exhibits the likelihood of a substantial number of smokers to cut back in the number of cigarettes smoked due to tax hikes. The stated figures imply a drop in conditional demand of the number of cigarettes. The large increase in the group of least cigarettes smoked suggests that those who would otherwise smoke greater than 15 cigarettes per day would cut back on the number they smoked so that they fell into the cohort of fewer than 15 per day. Most of those who dropped into the low level of smoking were those who used to be in the mid-level. The heaviest of smokers signif-

Table 3. Population quantity demand response to price (1974-1995).*

| Cohort            | Elasticity coefficient | Standard error | T-statistic | P-value |
|-------------------|------------------------|----------------|-------------|---------|
| <15 Cigarettes    | 4.17                   | 0.88           | 4.74        | <.05    |
| 15-24 Cigarettes  | -0.94                  | 0.37           | -2.53       | <.05    |
| >24 Cigarettes    | -3.28                  | 0.71           | -4.57       | <.05    |

*Data contain years 1974 through 1995 non-continuously: 1974, 78-80, 83, 85, 87-88, 90-95 (14 observations).
icantly dropped in percentage proposing that this group of smoker would have cut back the number of cigarettes smoked to a lesser amount. The mid-level group of smokers changes the least because those formerly in the mid-level group cut back smoking to the low level of smoking, but their numbers are replaced by those who were formerly in the heavy level cutting back to a mid-level of smoking. Thus the influx and the efflux of the middle group is comparable except for an approximately 1 percent difference.

While this data set encompasses the entire population of smokers, it may be reasonable to conclude that this flow of smokers toward less smoking is also very likely for our youth. Certainly, it is not possible to make this claim from our data without a doubt. However, this speculation falls in line with previous studies showing the youth’s decrease in conditional demand in addition to a decrease in prevalence and participation rates with price increases (Table 3).

The results of our final regression provide evidence that taxation can not only cause youth to cut back or quit smoking but also leads to the deterrence of acquiring such habits. Results state those who are considered current smokers would decrease, with an elasticity of $-4.6$. Those youths who are considered former smokers would decrease, exhibiting a slightly negative elasticity of $-0.8$. The number deterred from smoking and those who would consider themselves as have never smoked would increase, showing an elasticity of $5.5$. All of the figures obtained in this set of regressions are statistically significant.

An examination into the current smokers and never-smoked cohorts provides evidence of both quitting and deterrence. With an increase in price there would be a large drop in those who currently smoked. This indicates that a substantial amount of people quit in response to higher taxes. The large increase in the number of those who never smoked points to strong evidence that increased prices increases those who never smoke cigarettes in their youth. Such figures point to increased levels of deterrence. The cohort of former smokers tends to present somewhat of a cloudy picture as to the meaning of such results. Despite the possibility to analyze this estimate, it could also be deemed to be a useless figure. It is insignificant because it provides ambiguous information. A decrease in former smokers could point to higher taxes causing more to be deterred and having less people ever be former smokers. Alternatively, it could be read as an increase in smoking by that group and moving them from the former smokers to the current smokers category; though all other regression estimates point to the former rather than the latter explanation. More importantly, is the graduation of those who are in the youth cohort. The possibility to move out of the cohort as a function of time in a time series makes the ability to be a former smoker less plausible. For example, if I were a 17-year-old who used to smoke, but quit due to the expensiveness of cigarettes, I would be a former smoker. Price would have caused me to quit. However, the next year I could not be counted as a former smoker because I am now 18 years old and considered to be an adult. The result of this graduation phenomenon out of the youth cohort proves to be a substantial problem in correctly counting former smokers. Nevertheless, our estimates with current and never smokers are much clearer coefficients and provide optimistic figures on the efficacy of increased taxation on cigarettes (Table 4).

The results of our research evince the effectiveness of taxation policies within the confines of the youth population. Emphasis on the use of taxation as an effective policy for youth smoking deterrence should be strongly advocated for by those who value a smokeless culture and
society. Our study shows that with price increases both quantity consumed and prevalence fall; also, individuals both quit smoking and are deterred from ever picking up a cigarette. Because cigarette smoking has been linked to an ever-growing list of health problems, the cessation thereof via financial incentives could provide for an effective non-traditional method of preventative medicine.

From our studies, several specific recommendations can be made about taxation policy as preventative medicine. Because of the influence of price on the consumption, it is important that taxation effects sustain themselves by indexing them to inflation. By keeping the real price of the tax the same, despite fluctuations in price levels, the effects of the tax cannot be eroded and will remain stable. Levy et al. [14] use a computer simulation model to compare taxation policies with and without indexing to inflation. Their results confirm the ability of indexed taxes to sustain decreases in smoking due to taxes to a greater extent than non-indexed taxes. Indexing should follow that of general government protocol via the CPI.

Another specification suggests that taxation be enacted on a Federal rather than a state or local level. Evidence from Meier and Licari [15] state that Federal taxes tend to be more effective because of the increased difficulty in bootlegging among countries rather than between states. Barnett et al. [16] further provide fuel for Federal taxation in that evidence shows Federally-enacted excise taxes cause a greater increase in price because of a greater incidence of tax due to the decreased possibilities of bootlegging. Fortunately, for the youth population, due to their limited methods of transportation, bootlegging tends to be rather difficult.

Despite the allure of taxation as a tool to decrease cigarette consumption in youth, it is by no means without flaws or the panacea to smoking cessation. Unfortunately, taxation is limited in its effectiveness. As noted from our studies, taxes and price increases may be ineffective in decreasing tobacco consumption for certain groups of the population. For groups such as experimenters and those in the upper socioeconomic cohorts, price elasticity of demand for cigarettes tends to be relatively steep. Additionally, evidence from new data in California by Hu et al. [17] suggest that an assault of continued taxation exhibits a diminishing effectiveness of smoking cessation over time. Another study including Hu, by Sheu et al [18] cites that as taxes are enacted, the more price-sensitive smokers quit. New policies of taxation become less effective for those remaining hard-core smokers who are much less sensitive to price and will continue to smoke regardless of cost. Therefore, while taxation provides a significant method for deterring smoking in youth, other types of policies should be enacted to reach those smokers who are unaffected by price. These alternate policies should act to reach deeper within so-

| Youth smoking status | Elasticity coefficient | Standard error | T-statistic | P-value |
|----------------------|------------------------|----------------|-------------|---------|
| Current smokers      | -4.74                  | 0.49           | -9.76       | <.05    |
| Former smokers       | -0.80                  | 0.28           | -2.89       | <.05    |
| Never smoked         | 5.53                   | 0.52           | 10.64       | <.05    |

*Data contain years 1974 through 1995 non-continuously: 1974, 78-80, 83, 85, 87-88, 90-95 (14 observations).
ciety to enact changes in public opinion and cultural views on smoking, and attend to the psychological defumation of desires to smoke.

Acknowledgements: The author would like to thank Professor Theodore Keeler, from the University of California, Berkeley, Department of Economics, for his guidance and support on this paper.

REFERENCES

1. Department of Health and Human Services, Public Health Service, Office on Smoking and Health (US). Reducing the Health Consequences of Smoking: A Report of the Surgeon General. Washington, D.C.: Government Printing Office; 1989.

2. Department of Health and Human Services, Public Health Service, Office on Smoking and Health (US). Preventing Tobacco Use Among Young People: A Report of the Surgeon General. Washington, D.C.: Government Printing Office; 1994.

3. Chien A. SparkNotes on Elasticity [book online]. Available from: http://www.sparknotes.com/economics/micro/supplydemand/equilibrium/section2.rhtml. Accessed February 26, 2002.

4. Grossman M and Chaloupka FJ. Cigarette taxes: the straw to break the camel's back. Public Health Rep. 1997;112:291-7.

5. Becker GS and Mulligan CB. On the endogenous determination of time preference. Chicago: Economics Research Center/National Opinion Research Center. 1994; Discussion Paper 94-2.

6. Chaloupka FJ and Warner KE. The economics of smoking. In: Culver A Jr and Newhouse JP, eds. Handbook of Health Economics. Amsterdam: Elsevier; 2000:1539-627.

7. Lewit EM, Coate D and Grossman M. The effects of government regulations on teenage smoking. J Law Econ 1981;24:545-69.

8. Chaloupka FJ and Grossman M. Price, tobacco control policies and smoking among young adults. J Health Econ 1997;3:359-73.

9. Emery S, White MM, and Pierce JP. Does cigarette price influence adolescent experimentation? J Health Econ 2001;20:261-70.

10. Consumer Price Indices [database online]. Washington D.C.: Bureau of Labor Statistics, U.S. Department of Labor. Available from http://www.bls.gov/data/. Accessed February 8, 2002.

11. The Tobacco Institute. The Tax Burden on Tobacco, Vol. 35. Arlington, Virginia: Orzechowski and Walker; 2000.

12. National Health Interview Surveys [database online]. Atlanta, Georgia: Center for Disease Control, National Center for Chronic Disease Prevention and Health Promotion, Tobacco Information and Prevention Source (US); 2000. Available from http://www.cdc.gov/tobacco/research_data/adults_prev/adstat3.htm; Accessed February 8, 2002.

13. Gruber J. Youth Smoking in the U.S.: Prices and Policies. Working Paper No. 7506. National Bureau of Economic Research; January 2000.

14. Department of Agriculture (US). Tobacco Situation and Outlook Report [database online]. Washington (DC); April 1996-2001, accessed on February 8, 2002. Available from http://www.cdc.gov/tobacco/research_data/economics/consump1.htm for April 1996 report and subsequent reports at http://usda.mannlib.cornell.edu/reports/ers/specialty/tbs-bb. Internet.

15. Center for Disease Control, National Center for Chronic Disease Prevention and Health Promotion, Tobacco Information and Prevention Source (S). Monitoring the Future Project [database online]. Atlanta, Georgia; 2000, accessed February 8 2002; accessed from http://www.cdc.gov/tobacco/research_data/youth/hssdata.htm. Internet.

16. Levy DT, Cummings KM, and Hyland A. Increasing taxes as a strategy to reduce cigarette use and deaths: results of a simulation model. Prev Med. 2000;31:279-86.

17. Meier KJ and Licari MJ. The effect of cigarette taxes on cigarette consumption, 1955 through 1994. Am J Pub Health 1997;7:1126-30.

18. Barnett PG, Keeler TE, and Hu TW. Oligopoly structure and the incidence of cigarette excise taxes. J Public Econ 1995;57:457-70.

19. Hu TW, Bai J, Keeler TE, and Barnett PG. The impact of 1989 California major anti-smoking legislation on cigarette consumption: three years later. J Public Health Policy 1994;15:26-36.

20. Sheu ML, Hu TW, Keeler TE, Ong M, and Sung HY. The effect of a major price change on cigarette consumption in California: a zero-inflated negative binomial model. [Forthcoming.]