Tobacco Consumption Patterns: Implications For Consumer Education

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Tobacco spending was investigated, using the 1990 BLS Consumer Expenditure Interview data. The mean tobacco budget share was 1.2%, but only 43% had tobacco spending. For those, mean budget share was 2.8%. Based on tobit there was a positive relationship between tobacco expenditures and total expenditures for over age 40, but a negative relationship for those under 40. Tobacco expenditure was negatively related to education. Higher taxes may be more effective than consumer education in reducing tobacco consumption.

Tobacco use is an obvious example of a dangerous health practice that has been the subject of substantial public education and labeling warnings. Over 23 years ago in the Journal of Consumer Affairs, Gellhorn stated:

> "Cigarette smoking is dangerous to one's health. The label on each cigarette pack constantly reminds us of this, yet almost half the adult population in the United States continues to smoke. How to discourage a habit which contributes to over 75,000 deaths each year -- twice the total Vietnam toll -- continues to perplex a nation which has landed men on the moon." (Gellhorn, 1969, 145).

Since that time, there has been much success in reducing tobacco use in many segments of the U.S. population, but this success has been uneven. The patterns of use of tobacco may provide insights into challenges of other health and safety education issues. This paper analyzes spending on tobacco products. Expenditure patterns provide additional evidence on tobacco use to supplement self-reported usage. Evidence on tobacco spending is important because one important anti-smoking strategy is to increase the price of tobacco products. Taxes on tobacco are very regressive, but may be very effective in reducing the number of teenagers who become addicted to tobacco (Wartzman, 1993). The combined evidence from self-reported usage and from spending can be used to design better education programs on health risks such as tobacco use. Understanding of tobacco consumption patterns may also help in consideration of regulatory efforts to deal with marketing efforts targeted at special groups such as Blacks or teenagers (Mintz, 1991).

Understanding of tobacco consumption patterns in the United States may also be helpful in addressing concerns about the rapid increase in tobacco consumption in some developing nations such as the People's Republic of China (Yu, et al., 1990).

Literature

The consumption of cigarettes in the United States reached a maximum in 1981, at 640 billion cigarettes, then declined to 510 billion by 1991 (Grise, 1992, p. 35). The number of cigarettes consumed per U.S. adult has fallen from 4,287 in 1966 to about 3,200 in 1987 (USHHS, 1989, p. 268). The effects of past and present smoking will be with the United States for years to come. The U.S. Surgeon General's report attributed 390,000 deaths in 1985 to smoking (USHHS, 1989, p.22).

Other forms of tobacco also cause health problems, but cigarette expenditures amounted to 95 percent of tobacco expenditures in 1990. (Grise, 1992, p. 36). Therefore, the primary focus of this literature review is on research related to cigarette consumption.

Estimates of smoking from self-reported data may only account for about 70% of actual cigarette smoking, but trends from self-reported data follow trends from aggregate estimates very closely (USHHS, 1989, p. 266). The percentage of adults with post-BS education who smoked was less than half the rate among adults who were not high school graduates (USHHS, 1988, p. 571). The prevalence of smoking among Blacks in 1987 was 34 percent, compared to 29 percent among Whites (USHHS, 1989, p. 269). A multivariate analysis of smoking found that, controlling for age, education, marital status, employment status and poverty status, blacks were no more likely to smoke than whites (USHHS, 1988, p. 572). "Although black smokers smoke fewer cigarettes per day than white smokers, they smoke brands with higher tar/nicotine yields.." (USHHS, 1988, p. 510)

Lee and Kidane (1988) used the 1973 U.S.

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Consumer Expenditure Interview Survey involving 10,105 consumer units to analyze tobacco spending. About half of the consumer units had tobacco expenditures. Multiple regression analysis using tobacco consumption expenditure as the dependent variable and about 60 other economic and demographic attributes as independent variables. Except for the dependent variable, income, and family size, the rest of the variables are treated as dummy variables for specific groups of interest. The results show that several socioeconomic factors affect significantly consumption of tobacco products. Other things being equal heads of a consumer unit with college education, Blacks, and married couples spend less on tobacco consumption.

Browning (1987), in an analysis of United Kingdom data, found that tobacco expenditures increased until age 50, then decreased. The presence of children did not significantly affect tobacco spending.

Sharp increases in taxes may be effective in decreasing smoking. Canada instituted tax increases that changed the average price of a pack of cigarettes from $1.74(U.S.) to $4.43 during the past decade, and now Canadians smoke 40% fewer cigarettes (Wartzman, 1993).

Methods

This paper uses the U.S. Bureau of Labor Statistics Survey of Consumer Expenditures for its analysis of tobacco expenditures. Tobacco expenditure includes chewing tobacco, smoking related products, and accessories. The 1990 BLS public use tape, EXPN, was used to construct a sample of consumer units with four quarters of 1990 interviews for some simple statistics, and a multivariate tobit analysis of tobacco spending. Details of the methods and assumptions used are in Bae (1992). The number of consuming units (hereafter referred to as households) in the four quarter sample was 1,109. For comparison, overall means for tobacco spending and tobacco budget shares were obtained from spreadsheet files available from the Bureau of Labor Statistics. These files have integrated estimates of consumer unit characteristics and expenditures from the 1990 Quarterly Interview Survey and the Diary Survey.

In the Consumer Expenditure Survey spreadsheet files, mean tobacco expenditures equal 1.0% of personal expenditures. In the U.S. Department of Commerce National Income Accounts, based on aggregate data sources, tobacco expenditures amount to 1.2% of personal consumption expenditures. It is probable that the results presented in this paper underestimate expenditures by approximately 20%. In this study, a sample of consumer units with four quarters of interviews was used in order to obtain a good estimate of total spending during the year. By having a good estimate of total spending during the year, a more accurate estimate of the tobacco budget share may be obtained. Total spending during the year may also give the most complete single measure of the resources (past and present) available to a household. This is particularly evident based on the finding that 39% of the households spent more than their income after taxes and Social Security and pension contributions. This study adjusts the BLS definition of total spending in two ways: Social Security and pension contributions are subtracted; and net vehicle purchases are replaced by vehicle loan payments to make the total spending estimate correspond to actual spending.

The mean tobacco spending in the four quarter sample is $262, which is slightly lower than the mean of $274 in the Integrated Spreadsheet sample.

Results

Distribution of Tobacco Spending

In the four quarter sample, the maximum tobacco budget share was 18%. Only 43% of the consumer units reported spending on tobacco during the year. Of those who spent some money on tobacco during the year, the mean expenditure was about $614, and 10% spent $1209 or more during the year. The median percent of income after taxes and pension deductions devoted to tobacco among those who spent some money on tobacco was 2.6%, although 10% of that group spent 15% or more of income on tobacco. The mean budget share of those who spent money on tobacco was 2.8% and the median budget share was 2.0%, but 10% devoted 6.2% or more of their spending to tobacco. Table 1 shows other aspects of the distribution of tobacco spending and budget shares.

Table 1
Distribution of Tobacco Spending and Budget Share, for Households with Some Spending on Tobacco, 1990 BLS EXPN, Households in Survey Four Quarters of 1990. (n=373)

	Spending	Budget Share
Maximum	$3,939	18.1%
95th percentile	$1,482	8.2%
90th percentile	$1,235	6.2%
75th percentile	$845	3.6%
Median	$572	2.0%
25th percentile	$312	1.1%
10th percentile	$130	0.4%
5th percentile	$52	0.2%

Tobit Analysis

Tobit was used for a multivariate analysis, because tobacco spending is a limited dependent variable. The independent variables used included a set of household characteristics: total expenditure as a proxy for permanent income, household size, age and race of reference person, race of reference person, education, occupation, family type, region, and city size. The set of independent variables explained 14.4 percent of the variation of tobacco expenditure.

Figure 1.
Predicted Annual Tobacco Expenditures
Based on Tobit, for couples, by Age

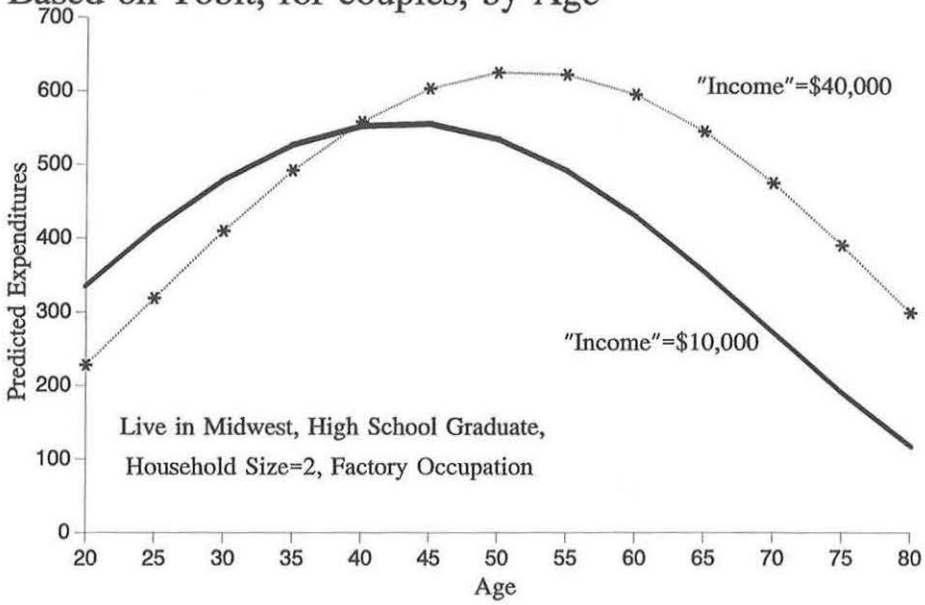

Figure 2.
Predicted Annual Tobacco Expenditures
Based on Tobit, for couples

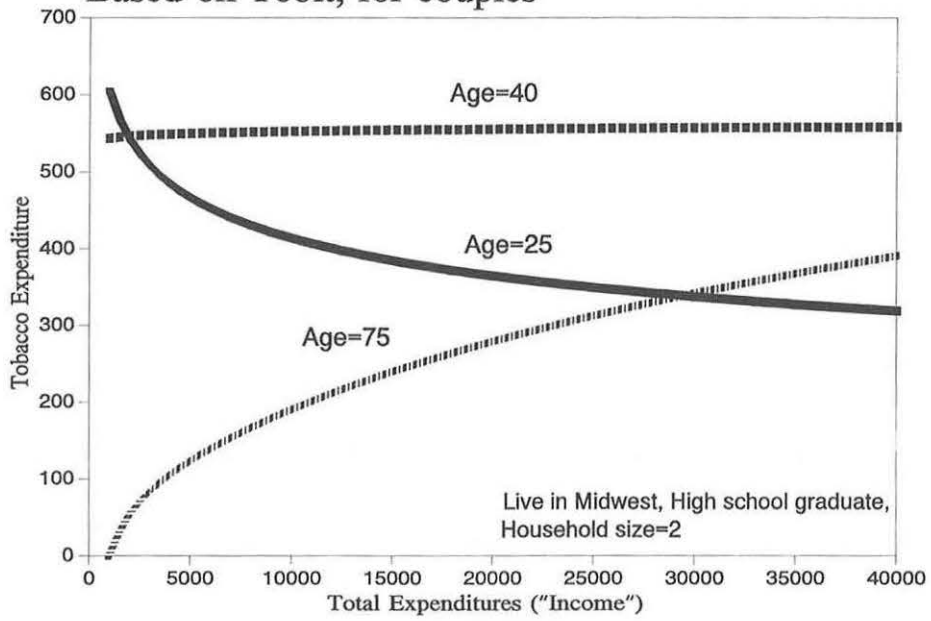

Figure 3.
Predicted Annual Tobacco Expenditures
Based on Tobit, couples with child < 18

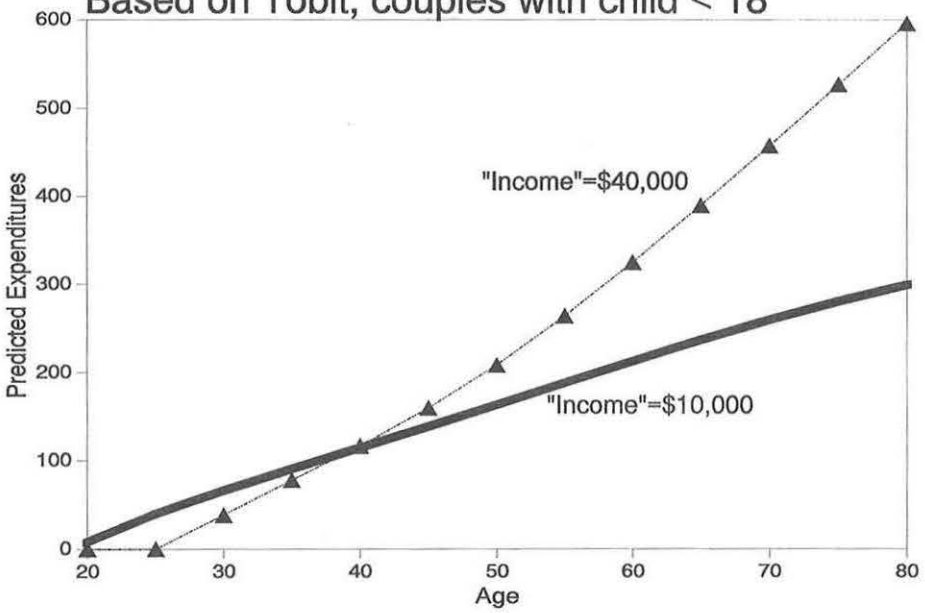

Figure 4
Predicted Annual Tobacco Expenditures
Based on Tobit, couples without children

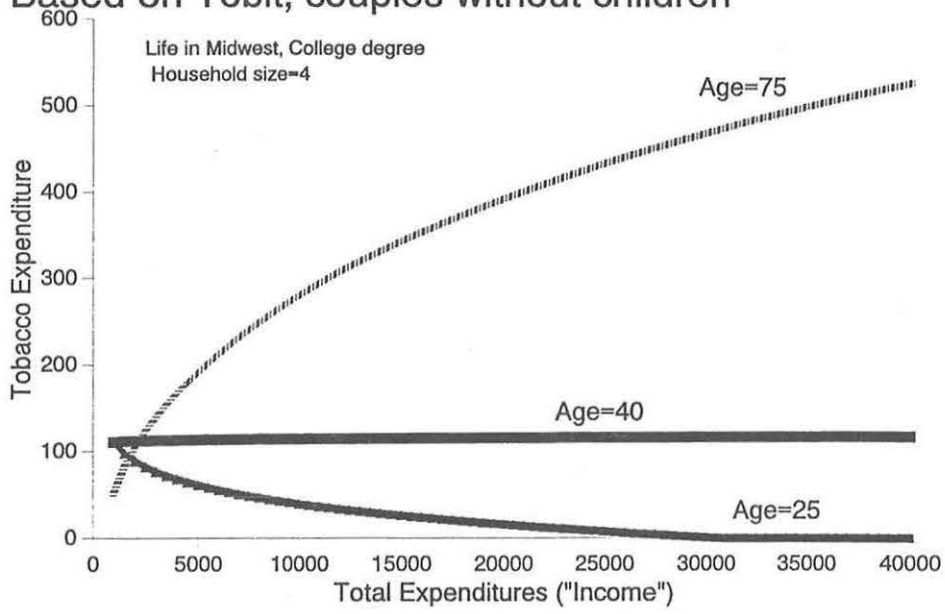

Table 2
Tobacco Tobit Estimates. Consuming Units with 4 quarters of interviews in 1990 BLS EXPN tape. (n=872)

Variables	Normalized Coef
Ln(Total Spending)	-0.44434*
Number of earners	-0.11556
Household size	0.77290
Age of reference person	-0.41989E-01
Age squared	-0.15082E-02**
Black (0=non-Black)	-0.67077E-01
Hispanic	-0.44150**
Homeowner with mortgage	-0.29815**
Homeowner without mortgage	-0.41114**
Less than high school degree	0.71347**
Highest ed. H.S. degree	0.59828**
Some college but not degree	0.63426**
Married couple w/o children	0.66444
Married couple, child<18	-0.55432
Other married couple	1.3307
Single parent unit	-2.0785
Factory,Service & Misc. Occ.	0.10244
Self-employed	-0.24314
Retired	-0.11316
Not working	0.55597E-01
City size > = 4 million	0.37775E-01
City size 1.3-3.9 million	-0.14052
City size .33-1.29 million	0.76654E-01
City size 75,000-330,000	0.70000E-02
City size missing(West)	0.59571E-01
Region Northeast	-0.11648
Region Midwest	0.60014E-01
Region West	-0.36737**
Age*couple without children	-0.11041E-01
Age*couple with child<18	0.94677E-02
Age*Other married couple	-0.37771E-01
Age*Single parent unit	0.59362E-01
Age^2*Married couple w/o children	0.59121E-04
Age^2*Married couple with child<18	0.19714E-03
Age^2*Other married couple	0.42739E-03
Age^2*Single parent unit	-0.33179E-03
Age*Household Size	-0.29505E-01
Age^2*Household Size	0.28388E-03
Ln(Total Spending)*Age	0.11292E-01**
Intercept	0.39043
Tobin's a	0.13382E-02
R^2 = .145	

Note. * Significant at the .10 level
** Significant at the .05 level (2-tail test)

Predicted Effects of Age and Total Spending.

Table 2 shows the results of the tobit analysis. At mean values of the independent variables, the combined effect of the log of total spending and the interaction term between age and the log of total spending results in an "income" elasticity (elasticity of total spending with respect to tobacco spending) of only 0.13. At age 25, the "income" elasticity is -0.27. At age 75, the "income" elasticity is 0.35.

The interaction terms in the tobit make interpretation difficult. Figures 1 and 2 illustrate the relationship between the tobacco expenditure, total spending and the age of reference person based on the tobit results in Table 2. The example is a household with the following characteristics: a married couple with no children living in a mid-size city in the Midwest; with one wage earner. They own a house which is mortgaged. The reference person is a high school graduate and has a factory job. In the example illustrated in Figure 1, the predicted levels of tobacco expenditure for six levels of total spending are presented. Below age 40, households with lower total spending levels spend more on tobacco than do households with higher total spending levels. The pattern is reversed for households older than 40.

In Figure 2, the relationship between tobacco expenditures and total spending is negative for households with 25 year old heads and positive for consumers older than 40. Consumers aged 40 had predicted tobacco spending that was virtually constant with total expenditure. The predicted levels of tobacco spending amounted to over 10 percent of total spending for young consumers with low total spending.

Figures 3 and 4 show another example based on predictions from the tobit results in Table 2. The household has the following characteristics: married couple with two children under 18, living in a mid-sized city in the West, with one wage earner. The reference person is a college graduate in a managerial or professional occupation. In Figure 3, such households with total spending ("income") of $40,000 would spend nothing on tobacco if the reference person were age 25 or under. Tobacco spending would be somewhat higher for households with lower "incomes" up to age 40. Predicted tobacco spending would increase with age for both low and high "income" households. In Figure 4, the relationship between tobacco spending and "income" is negative for those age 25, with zero predicted levels of tobacco spending above $15,000 per year. The relationship between tobacco spending and "income" is positive for those older than 40, as with the example for age 75.

Predicted Effects of Other Variables.

Households headed by a college graduate had predicted tobacco spending at less than half the amount of otherwise similar households with less than a college degree. High school dropouts had predicted tobacco spending 2.4 times as high as college graduates. Homeowners with mortgages had predicted tobacco spending 28 percent less than otherwise similar renters, and homeowners without mortgages had predicted tobacco spending 38 percent less than otherwise similar renters. Households in the West had predicted tobacco spending 41 percent less than otherwise similar households in the Midwest. At the mean values of the other variables, predicted tobacco spending by Hispanic households was 19 percent less than non-Hispanics.

Conclusions

Most of the results presented in this paper are consistent with patterns previously reported in the literature. The most interesting result was obtained by including interaction terms for age and other variables, especially total spending. It has long been known that tobacco taxes were regressive, but the results presented in this paper suggest that they may be extremely regressive for young consumers. Given the possibility that many young smoker households are less educated, they may not be very responsive to traditional consumer education efforts. Further large increases in taxes on tobacco may be unfair in the traditional evaluation of tax fairness, but they may have significant impacts on smoking habits of young consumers, as the budgets of some of these households may stretched very tightly. The results also suggest that the impact of tobacco taxes on older, more addicted smokers is likely to be less than on the younger consumers, as the more affluent consumers are more likely to spend more on tobacco, at any particular level of education. Consumer education efforts should be targeted on the groups more likely to smoke, but a policy of drastic increases in tobacco taxes may provide the most behavior change for young consumers.

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