Tobacco Use as Response to Economic Insecurity: Evidence from the National Longitudinal Survey of Youth

Michael G. Barnes*
Washington State University

Trenton G. Smith
Washington State University

Christiana Stoddard
Montana State University

Abstract: This paper analyzes the relationship between economic insecurity and smoking behavior. We apply individual-level data from the 1979 National Longitudinal Survey of Youth survey (NLSY79) and instrumental variable techniques to isolate the causal effect of economic insecurity on smoking behavior. We find that indicators of economic insecurity increase the probability that individuals smoke, while factors that serve as a financial "safety net" for the individual decrease the probability of smoking. Instrumental variable estimates indicate that a 1 percent increase in the percent of time unemployed in 1998 will cause an individual to be 1.2 percent more likely to smoke, while an increase of wealth in 1998 by $10,000 causes a decrease in the probability of smoking by 6 percent.

JEL Codes: I12, D91, D87, D12

* Corresponding Author: School of Economic Sciences, Washington State University, P.O. Box 646210, Hulbert Hall 101, Pullman, WA 99164-6210. email: michael_barnes_30@hotmail.com

Introduction

Low socioeconomic status (SES) and smoking behavior are highly correlated. Many potential mechanisms have been proposed to explain this relationship, including stress, time preferences, and pure income effects. In this paper, we test a novel hypothesis inspired by new findings in neuroscience: that a particular type of stress—*economic insecurity*, defined roughly as the probability of catastrophic income loss—jointly impacts both time preference and smoking decisions.

Neuroscience suggests that economic insecurity can induce a neuroendocrine state characterized by low levels of serotonin (see Smith 2007). At the same time, neuroscience suggests that nicotine stimulates serotinergic neurons in the brain in a manner that appears to reflect an *increased* sense of economic security (Tompkins 1968 and Spielberger 1986)[1]. These findings suggest that tobacco might, in effect, be viewed as a form of "self-medication" in response to economic insecurity, in which the consumer chooses to use tobacco in order to (perhaps unconsciously) alter his subjective beliefs about catastrophic income loss. An important implication of this view is that individuals who experience a greater degree of economic insecurity should be more likely to smoke. This is the central hypothesis we aim to test in the pages that follow.

Background and Theory

A substantial amount of literature in psychology, neuroscience, medicine, and economics addresses the smoking-insecurity link. The following pages present findings from each field as they pertain to this relationship. The three main strands of evidence

[1] For a review, see Smith (2007).

include: the relationship between SES and cigarette smoking, the stress-cigarette smoking connection, and the use of nicotine as self-medication as motivated by neuroscience.

Although it is widely accepted that low SES and smoking are highly correlated[2] (Ashton and Stepney 1982, Ross and Wu 1995, Mulatu and Schooler 2002, Kirsch 1999), it has yet to be established whether (i) something about having low SES causes individuals to take up smoking (Gilbert 1995, Levine *et al.* 1997, Hersch 2000), (ii) expenditures on tobacco cause or exacerbate low SES, in other words: smokers are poor because they smoke (Zagorsky 2004), or (iii) unobservable individual characteristics (e.g., a personal disregard for long-term consequences) cause both smoking and low SES; in other words, an individual would choose—as revealed by his time-preferences—to smoke, regardless of his socioeconomic environment (Fuchs 1980).

Although an association between smoking and SES appears evident, current literature has failed to demonstrate what aspects of SES are correlated with smoking behavior, or whether some other unobservable characteristic altogether leads to smoking. Furthermore, direction of causation between smoking and SES has yet to be established.

Smoking behavior is often associated with stress. Siahpush *et al*. (2005) find the probability of experiencing any form of financial stress to be 1.5 times higher and the probability of experiencing severe financial stress to be 2 times higher for smoking households than for non-smoking homes. Ashton and Stepney (1982; 110) present a number of findings in the psychology literature detailing smoking behavior and stressful-

[2] However, Ruhm (2000 & 2005) shows that high levels of SES are positively correlated with smoking behavior. Ruhm's use of state-level explanatory variables on individual smoking data is a possible explanation for the pro-cyclical smoking relationship. In contrast, those who demonstrate a negative relationship between income and smoking use individual level data.

or anxiety-causing events[3]. Among them are the findings of Schachter *et al*. (1977) and Mangan and Golding (1978) whose experiments demonstrate that stressful- and tension-raising events induce smoking. In addition to distress (Lawton 1962), anxiety and depression may also cause both smoking initiation and heavy smoking (e.g. Tyas and Pederson 1998 and Baker *et al*. 2004). Tompkins (1968) notes that an individual's choice to smoke is based on an anticipated affect. In other words, an individual's perceived future expectations, based on past experiences, are enough to induce smoking.

Dominitz and Manski (1997) show that "expectations and realizations of job-loss match up closely" in most cases; furthermore, past experiences play a strong role in forming future expectations (Feather 1982; 63). Although these studies don't focus on smoking behavior they do suggest that individuals with an unstable economic history perceive their future differently than those with a relatively stable economic history, and rightly so. It follows directly that these ideas may be applied to the smoker. Perceptions therefore change through time, based on individual experiences. A perceived uncertain economic future is likely to influence a shift to a higher time preference.

Several suggest that this relationship between cigarette smoking and stress is likely based on a reaction induced by the nicotine found in tobacco. In a review of medical literature, Smith (2007) explains that as nicotine enters the bloodstream it binds to receptors in the brain that enhance the release of serotonin and other neurotransmitters. The neurobiological effects of nicotine may be understood as increasing the smoker's perception of economic security—it does so by increasing serotonin levels. Thus, nicotine

[3] The economics literature also offers insight into the smoking-stress association. In a seminal paper, "A Theory of Rational Addiction", Becker and Murphy (1988) present several theories fundamental to the economics field related to addictive related substances. They suggest that "tension-raising events affect the demand for addictive goods", furthermore they propose that temporary events or shocks can 'hook' an individual to addictive goods.

may be taken as a sort of self-medication to regulate the insecurity and stress an individual feels (Smith 2006 and Tomkins 1968), varying the levels of nicotine intake depending on their circumstances (Ashton *et al.* 1979) and ultimately achieving the 'optimum' nicotine dose for a given activity (Ashton and Watson 1970). Baker *et al.* (2004) propose that individuals may develop a dependence on nicotine based on the anxiety relief the biological effects of nicotine offer. In fact, Gilbert (1997) reports that smoking has been described as a tranquilizer that relaxes the body and helps the smoker feel calm (Spielberger 1986 and McNeill *et al*. 1987). By enhancing reactions that reduce and terminate stressors (Dunn 1973) individuals may become dependent on even small doses of nicotine. This literature suggests that tobacco consumption plays a significant role in helping individuals cope with stress and insecurity through self-medication.

It is fairly evident that stress is highly correlated with smoking, less convincing however is the current theory that SES affects smoking behavior, for both the poor and rich smoke. This paper is innovative because it proposes that economic insecurity, *regardless* the level of SES, increases the probability of smoking. Negative deviations from perceived expectations and the probability of catastrophic income loss are hypothesized as the economic causes of smoking. In other words, factors that lead an individual to feel less secure economically add to one's distress and influence them to smoke. While factors that lead to one's added economic security lessen financial stress and decrease the likelihood an individual will smoke, these variables serve as "safety nets" and strengthen perceived wellbeing. Jacob Hacker (2004) argues that economic insecurity is a bigger problem in America than is the disparity between SES, saying: "It's not where you are on the ladder that counts but how far you fall when you slip and what's there to catch you".

Empirical Model

This section presents the model used to estimate the hypothesis that economic insecurity causes smoking behavior. The specification for the model is of the following form:

$$S_{1998,ij} = ES_{ij}\alpha + BMI_{1982,ij}\phi + X_{1998ij}\delta + \rho_{1998,j} + \varepsilon_{ij}$$

where $S_{1998,ij}$ is a binary variable indicating whether or not an individual smokes daily in 1998, ES_{ij} is a vector of individual *i*'s measures of past and current economic security which serves as a proxy for perceived economic security[4], $BMI_{1982,ij}$ is individual *i*'s BMI in 1982[5], $X_{1998,ij}$ is a vector of demographic variables for individual *i* in 1998, $\rho_{1998,j}$ is a regional fixed effect representing the region of the country where the individual lives in 1998[6], and finally, ε_{ij} represents the disturbance term. A detailed explanation of the variables follows in the data section. Robust standard errors are adjusted for within-state correlation because many of the instruments are state level measures[7].

The model is estimated using a linear probability model. The linear probability model is chosen over the probit model for several reasons. First, like the probit model it gives unbiased and consistent estimates of the coefficients (Wooldridge 2002). Although predicted values may lie outside the limits of probability, [0,1] (Maddala 1983), predicted values at the center of the distribution should not have this problem. Consequently, estimates of the partial effects at the center of the distribution should be fine (Wooldridge

[4] These historical economic measurements measure changes in perceived economic insecurity. A long-term specification is needed because one's perceived economic insecurity presumably stems from a lifelong history of events.
[5] 1982 BMI is used because 1983 weight and height is not reported.
[6] It is assumed that regional attitudes towards smoking play a large role in individual smoking behavior.
[7] This is implemented using the cluster command in Stata. It estimates the Huber-White Sandwich estimator of the standard errors.

2002). In our model, about 90 percent of the predicted values fall within the limits of probability [0,1], while most of the values outside the interval are found at the extreme values of the sample. This suggests that we shouldn't have problems interpreting the results at the mean.

The instrumental variable (IV) technique is also used to estimate the model. Econometric theory has yet to establish a generally accepted manner of estimating an IV-probit approach. The two most widely accepted IV-probit approaches, proposed by Maddala (1983) and Rivers and Voung (1988), fail to generate efficient standard errors (Chen 2003 and Bollen *et al.* 1995). Furthermore, Wooldridge (2002) suggests the traditional IV method as acceptable in most cases when estimating binary dependent variables. For these reasons both the linear probability and IV models are used.

The traditional linear probability specification is likely to produce biased results due to reverse causality and unobservable personal characteristics. For example, an individual's employment history can be used as a substitute for their expectations about the future probability of job loss or insecurity. However, if people who smoke are more likely to have lower wages or become unemployed—which they are (Levine *et al.* 1997)—regardless of their perceptions of risk, then the linear probability estimates of α will be biased. There may be one of many reasons an individual loses a job: he may, for example, experience job loss because of unobservable personal characteristics (i.e., the lack of dedication to his job or the lack of ability to concentrate and work for long periods of time), another reason for experiencing job loss may be due to employment discrimination (an employer may refuse to employ individuals who smoke), or maybe he is no longer able to work effectively due to negative health consequences stemming from smoking. Finally,

he could experience job loss due to a worsening local economic market. The area of interest in this paper is that of the last example—to see if personal job loss, as a result of downturns in the economy, causes daily cigarette smoking. We are interested in downturns (or upturns) in the economic market (individual or local) because they effectively measure the insecurity or security an individual feels. Ultimately we are concerned with the relationship between economic insecurity (as measured by the economic market) and smoking behavior.

An IV approach is implemented in order to draw out the causal relationship between one's perceived economic insecurity and smoking behavior. The IV approach is a two-step estimation procedure. This approach corrects for potential endogeneity bias due to reverse causality (e.g., smokers suffering discrimination in the workplace and any insecurity that comes as a byproduct of discrimination) and/or unobservable personal characteristics (such as disregard for future economic and health outcomes) that may jointly affect smoking behavior and different measures of economic security. In particular, endogenous right hand side (RHS) variables (e.g. employment, family income, etc.) are regressed in the first stage on known, observed personal characteristics (exogenous RHS and predetermined variables) and state-, MSA- level instruments (including the instruments for other endogenous variables specified in the model), and other variables exogenous to the individual. This stage generates predicted values for the endogenous proxy variables. Finally, the dependent variable is regressed on all exogenous RHS variables and the predicted values. A generalized method of moments estimator is used in

the IV analysis for two reasons: first, the equations are over-identified and second, the covariance matrix is of an unknown specification[8].

Instruments for variables measuring insecurity

The series of annual BLS unemployment rates from 1983-1998 in the geographical area where the individual resides are used to instrument for different measures of unemployment used in various regressions. The entire series is used as opposed to simply using the unemployment rate for 1998 in order to represent an individual's subjective belief regarding his economic security formed from unemployment experience over the past 16 years. To identify the probability of being below the poverty level, state-level averages for the probability of being below the probability level are used. Stat-level averages are constructed from the NLSY79 dataset with men and women pooled together. The state-level average for number of drops in real income over 50 percent is used as an instrument for the number of real drops in family income over 50 percent over the 16-year period. Because the past two instruments are formed directly from the dataset they are arguably not as exogenous as other state level instruments used. In other words, if many of the respondents have an unobserved personal characteristic that is similar to respondent *i* then the identification problem cannot be solved and the estimates remain biased. However, inasmuch as this is not a problem the IV approach will produce unbiased estimates. Therefore caution must be used when interpreting these estimates. The series of local unemployment rates as well as the history of median household incomes for the entire period are also used as instruments for the probability of being below the poverty

[8] The optimal weighing matrix is obtained using the Stata gmm command.

level in 1998 and the number of real income drops faced. Series of data were used in this instance because the variables measure changes over the entire period.

Instruments for variables measuring security

The instrument for family income is state median household income[9] in 1998, obtained from the U.S. Census Bureau. A vector of dummy variables measuring state-level regulations for the individual and small-group markets for health insurance are used as instruments for the dummy variable that measures whether or not an individual has health insurance in 1998. Because health insurance is usually purchased in the private market or offered through employment, health insurance is endogenously related to smoking in at least three ways[9]: i) healthy individuals are less likely to purchase health insurance at any given price than will be non-healthy individuals, ii) employment discrimination[10] and iii) that of personal time-preferences or unobservable characteristics. The issue of moral hazard is also troublesome because insured individuals are more likely to pursue risky behavior. Finally, the series of state median home prices over the time period is used to identify wealth in 1998.

In order to avoid having the instruments correlated with unobserved personal characteristics yet highly correlated with the variable of interest state level variables are used whenever possible. Specific examples highlighting the validity of instruments for two endogenous variables follow: first, state median home prices are highly correlated with individual wealth, however extremely uncorrelated with unobservable characteristics of the individual. Second, the dummy variables measuring state-level regulations for the individual and small-group markets for health insurance have a strong positive relationship

[9] All variables measured in dollars are generated in real terms with 1998 being the base year.
[10] Employment plays a major role in whether or not an individual has health insurance.

with individual health insurance but have no association with individual unobservable characteristics. The instruments are valid in all cases, i.e., highly correlated with the endogenous variable of interest and orthogonal to the errors[11], first stage results are available on request.

Data

The data come from the *National Longitudinal Survey of Youth, 1979 Cohort* (NLSY79). This longitudinal survey follows 12,686 individuals born between 1957 and 1964. Although, the primary year of concern is 1998, the model specification covers a time period of sixteen years from 1983 to 1998. In 1983 all respondents are at least eighteen years old. This age is significant because it is the age when many begin taking upon themselves a certain level of independence, it is also the legal smoking age in most states. The nature of the dataset allows a comprehensive study of one's personal experience with economic insecurity over the period, and the beliefs they form from these experiences.

Women are excluded from the analysis for a number of reasons. First, labor supply decisions are less uniform for women than for men, particularly because the women in our samples are ages 18-40, peak child bearing years. Accordingly, the economic security faced by women may be more dependent on spousal earnings and security; and spouse-level measures of economic security are not reported in much detail. Finally, because this age group for women represents the prime childbearing years women are less likely to smoke for reasons other than that of economic security.

[11] See the discussion on validity of instruments by Baum *et al*. (2003).

There are several demographic variables used in the regression, they include: age in 1998, race, BMI in 1982, whether or not the respondent lives in a city in 1998, marital status in 1998, years of schooling completed in 1998, and the years of schooling their mother completed. BMI in 1982 is used to control for weight and height of the individual. 1982 BMI is used instead of 1998 BMI because of strong endogeneity problems with 1998 BMI and smoking in 1998[12]. Mother's education is used instead of father's education because mother's education is presumably more exogenous to a child's schooling than is the father's. The means and standard deviations for all variables used in the regression are reported in Tables 1a-1d.

State-level variables include cigarette prices in 1998 (in cents), clean indoor-air laws[13] in 1998, real median home incomes, real median home prices, MSA unemployment rates and unemployment rates associated with the rural part of a state, and state regulations for health insurance.

We construct several measures of economic insecurity. Two measures of unemployment are used. They are percent of time unemployed in 1998 and an individual's Bayesian posterior probability of unemployment. The posterior probability is calculated using weekly data on employment status available in NLSY79, based on a five year history (1994-1998) with the prior distributions being generated from the full sample of NLSY79 men (see Data Appendix for details)[14]. This variable represents an individual's perceived

[12] It is very likely that smoking and weight gain are correlated through a similar unobservable personal characteristic like personal time preferences.

[13] A point system ranking states clean-indoor air laws similar to one discussed by Frank Chaloupka (1996) is implemented. Higher points indicate greater restrictions in a state.

[14] The sample median tenure with a given employer for the NLSY sample is four years, with the mean being six. Therefore, the hazard rate associated with employment over the five year window is presumed to remain fairly constant.

economic security based on past experiences. The average posterior probability of unemployment is 0.035 (3.5 percent), with the average being 0.057 for smokers and 0.027 for nonsmokers.

The second variable that serves as a proxy for economic insecurity measures the probability that an individual's family is below the poverty level. This variable is formed through a series of steps briefly described here (see Data Appendix for details). First, family income is regressed on a time trend separately for each individual over 16 years. Family income in 1998 is then predicted and using standard statistical theory associated with confidence intervals, the probability of being below the poverty level is calculated. Predicted family income is used as opposed to actual family income because it measures what an individual expects to earn based on their income history, accordingly it incorporates average annual income changes. In essence, this variable incorporates an individual's employment history, possible changes in hourly wages, and other aspects of economic volatility[15] faced in the home otherwise not measured or discussed. The average probability of being below the poverty level for smokers is 0.207 while the average for non-smokers is 0.106.

The number of real income drops greater than 50 percent compared to the previous year's income over the 16-year period is also used. A drop indicates that income in year *k* is at least 50 percent less than income in year *k-1*. This measure captures significant income drops and is likely a sign of great insecurity over the last 16 years (i.e., individuals with more drops in real income are assumed to face greater perceived levels of economic

[15] Volatility is incorporated in the variable through the standard deviations. Larger standard deviations of actual income from expected income represent greater volatility. These standard deviations are used when generating confidence limits.

insecurity, and accordingly will likely face greater probabilities of smoking). The insecurity measures are estimated individually due to problems of multicollinearity.

There are three measures of safety nets that serve the purpose of minimizing economic insecurity. The first measure is the amount of inheritances received from deceased relatives or friends in 1998. It is assumed that this variable is exogenous. The second proxy variable is a dummy variable indicating whether or not an individual has health insurance. About 78 percent of the sample has some sort of health plan[16] in 1998. This variable is endogenous to the model because of the adverse selection and moral hazard aspects of insurance[17]. The final safety net measure is wealth in 1998. Wealth is defined as total assets minus total debts. A complete description of this variable and all others that were either created or obtained from a source other than NLSY79 are in the data appendix. In 1998 non-smokers have an average wealth of $111,729 as compared to their smoker counterparts whose average is $61,847. Family income in 1998 is used in all the regressions, both those measuring economic insecurity as well as those measuring safety nets. Once again, the measures of security are not included in the model simultaneously due to problems of multicollinearity.

Results

Estimation results are tabulated at the conclusion of the text. Table 2 presents the results for the models that measure the effects of economic insecurity on daily cigarette smoking for men in 1998, and Table 3 presents the results for the models measuring the effects of financial safety nets on daily cigarette smoking for men in 1998. Each table

[16] This includes both private and public health plans.
[17] Individuals are more likely to buy health care if they are more prone to face health problems and are risk-averse. Also, once they have health insurance the cost of smoking decreases, thus increasing the likelihood an individual will smoke.

contains several pairs of columns. In each case the first column presents the findings from the linear probability model labeled *LP*, the second column reports the results from the IV regression and is respectively titled *IV*. Because the LP models produce biased results, those discussed in this section focus on the IV estimates.

Before proceeding to analyze the variables of interest general results such as education, mom's education, and 1982 weight are discussed. In each case, the number of years of education has a significant negative effect on cigarette smoking. Each additional year of education decreases the probability of smoking by between 3 and 5 percent, depending on the specification of the model. It is also found that mother's education has a negative effect (and in some cases significant) on the probability of smoking. Because education is treated as an exogenous variable (and it may very likely be endogenous) the results must be interpreted with caution. BMI in 1982, in every specification, has a small, but statistically significant negative affect on the probability of daily cigarette smoking in 1998. This is consistent with literature that suggests the relationship between smoking and weight to be negative (Wee *et al*. 2001, Chou *et al*. 2004, Honjo and Siegel 2003, Cawley *et al.* 2004).

Family income in 1998 is included in each regression. In each case, the sign is negative and never significant for the LP regressions, however the coefficient is positive and significant in the IV regressions. Therefore, after correcting for endogeneity and reverse causality these results indicate that individuals of higher income levels, *not* lower levels are more likely to smoke[18]. Although these results aren't very sensible a possible explanation is that cigarettes are a normal good, accordingly people with higher incomes

[18] These findings are similar in sign to Ruhm's, who finds that a $1000 increase in median family income increases the number of predicted smokers by four percent. Ruhm uses aggregate data for his explanatory variables in contrast to the individual-level data used here.

are more likely to smoke. Column two in Table 2 indicates that a $1,000 increase in family income increases the probability that males smoke daily in 1998 by 0.28 percent.

Economic Insecurity

There are four measures of economic insecurity in Table 2. The first two measure unemployment. The first measure of unemployment, percent of time unemployed in 1998, has a statistically significant, positive effect on current smoking behavior. A one percent (0.01) increase in unemployment in 1998 leads to a 1.2 percent increase in the probability of smoking in 1998. The next measure of unemployment, posterior probability of unemployment, represents an individual's current perception of future employment risk. The IV results suggest that an increase of one percent (0.01) in perceived future unemployment increases the probability of smoking by 1.37 percent indicating that an increase of ten percent in the posterior probability of unemployment causes an individual to be 14 percent more likely to smoke. Other measures of unemployment covering larger time spans (not reported here) appear to have statistically significant positive effects on the probability of smoking; however, with smaller magnitudes as the time horizon increases. These results suggest that unemployment plays an important role in causing smoking behavior. Furthermore, more recent spells of unemployment cause a higher probability of smoking

The next insecurity measure is the probability that an individual's predicted family income is below the poverty level. An increase of one percent in the probability of being below the poverty level increases the probability of smoking by 0.82 percent. This indicates a substantial increase in the probability of smoking given that the average probability of being below the poverty level is thirteen percent.

Finally, the last measure of economic insecurity is the number of real income drops greater than 50 percent that an individual faces over the 16-year time span. This variable is valuable because it measures the number of dramatic drops in income over 16 years. Although the average number of drops over this time for the sample is only 0.98 the causal effect is still quite large. Column eight indicates that an increase in one 50% drop of real income (nearly the sample mean) increases the probability of smoking by ten percent. This dramatic effect is justified by the likely catastrophic loss in the security it measures.

Safety Nets

The first measure, inheritance received in 1998 due to either the death of a family member or a friend, has a small and insignificant negative effect on smoking behavior. Inheritance received is arguably an exogenous variable, however it is possible that the variable is insignificant because of confounding effects that may occur due to the emotions an individual feels because of the death of a friend or family member. Inheritance received is also regressed including a dummy variable indicating whether or not the respondent inherits money from the death of a family member or friend in 1998[19]. In this specification (not reported) the estimate for inheritance received is of greater magnitude and more significant, however still not statistically significant. The dummy variable 'mourn' has a positive, and nearly significant affect on smoking behavior. Although not statistically significant it appears that inheritance received plays a small role in decreasing the probability of smoking.

The effect of the second safety net, health insurance, has a large and statistically significant causal effect on the probability of smoking. As noted earlier, the health

[19] The death of a friend or family is indicated by whether or not an individual received inheritance in 1998. In other words, the dummy variable indicating whether or not an individual lost a friend or family members only indicates deaths where a transfer of inheritance occurs.

insurance estimate is plagued by endogeneity issues stemming from asymmetric information (i.e., adverse selection and moral hazard). The IV estimation technique eliminates the adverse selection problem and therefore estimates the causal effect of health insurance on the probability of smoking. This estimate can be interpreted as the effects of two forces acting in opposite directions: that of an added safety net decreasing the probability of smoking, and that of moral hazard increasing the probability of smoking. The estimate indicates that the safety net effect of health insurance far outweighs the moral hazard effect. Switching from having no health insurance to having health insurance in 1998 decreases the probability of smoking daily by 35 percent. There is a difference of nearly 32 percent between the LP and IV estimates, highlighting the magnitude of the adverse selection problem in health insurance.

Finally, the last economic safety net measure is that of individual wealth in 1998. An increase in wealth of $10,000 dollars causes an individual to be 0.6 percent less likely to smoke. As expected, wealth serves as an important safety net that cushions the blow and offsets the negative effects of economic insecurity.

Conclusion

The results presented in the preceding pages support the hypothesis that economic insecurity causes smoking behavior. Although the change in probability of smoking due to economic insecurity and safety net measures may be small, in some cases a causal effect appears to exist. In fact, increasing the number of real drops in income by only one drop over the 16-year span will cause an individual to be 10 percent more likely to smoke, while increasing the posterior probability of unemployment by 0.01 will increase the probability of smoking by 1.37 percent.

Furthermore, these results suggest that an increase in individual security causes an individual to be less likely to smoke. Switching from having no health insurance to having health insurance causes a decrease in the probability of smoking by 35.4 percent while an increase of $10,000 in wealth in causes an individual to be 0.6 percent less likely to smoke. Certainly, under the conditions tested in this paper, the safety net theory presented earlier holds true to the situation faced by the potential smoker. Economic safety net measures effectively cushion the blow felt by economic insecurity and cause an individual to feel less susceptible to economic stress.

This paper suggests that smoking is both a private and public health problem. In other words, smoking is a choice that individuals make, not solely based on individual preferences—it is also a function of various factors including an individual's perceived insecurity which is greatly affected by both his personal economic wellbeing and the economic wellbeing of his surroundings. In this sense, health and public welfare organizations can work together to form programs that may increase the safety net offered to the individual. Current tobacco preventative and rehabilitative programs pay little attention to bolstering the economic situation of those at risk of nicotine addiction[20]. This paper offers vital insights that can be implemented in anti-smoking campaigns. Such programs may include better access to health insurance, education in the areas of financial planning and job seeking, or social support groups of micro-financing, etc.

[20] Current anti-tobacco campaigns in most states focus on anti-smoking advertising clean indoor air laws to encourage decreased tobacco consumption (first- and second-hand).

Tables and Figures

Table 1a: Means and Standard Deviations of Individual and State Characteristics NLSY79 Men

Characteristic	Mean	Standard Deviation
Smoke daily in 1998	0.2502	0.4332
Family income (in $1000) in 1998	56.0317	47.0368
Percent of time unemployed in 1998	0.0270	0.1132
Posterior probability of unemployment	0.0346	0.0888
Probability of being below the poverty level	0.1321	0.2794
Number of Drops greater than 50% in Real Family Income, 1983-1998	0.7362	0.9628
Mourn death of relative or friend in 1998	0.0649	0.2465
Total value of inheritance (in $1000) in 1998	1.5578	21.0343
Covered by Health Insurance, 2000	0.8183	0.3857
Total wealth (in $1000) in 1998	102.7666	317.7024
State clean air regulations in 1998	3.2450	2.3280
Avg. state price of cigarettes (in cents) in 1998	233.5400	28.2951
Years of education completed in 1998	12.8681	2.6616
Years of education respondent's mother completed	10.1107	4.4832
Age in 1998	36.7824	2.2866
BMI in 1982	23.5927	3.4124
Black	0.2907	0.4542
Hispanic	0.1738	0.3790
White	0.5355	0.4988
Married	0.5954	0.4909
Never Married	0.2395	0.4268
Divorce or separated	0.1610	0.3676
Widowed	0.0041	0.0641
Live within a city	0.7014	0.4578

N=2422
Sources: See Data Appendix.

Table 1b: Means and Standard Deviations of Individual and State Characteristics
NLSY79 Men Smokers

Characteristic	Mean	Standard Deviation
Family income (in $1000) in 1998	44.7220	42.3849
Percent of time unemployed in 1998	0.0443	0.1420
Posterior probability of unemployment	0.057	0.1111
Probability of being below the poverty level	0.2074	0.3365
Number of Drops greater than 50% in Real Family Income, 1983-1998	0.9868	1.1074
Mourn death of relative or friend in 1998	0.0561	0.2303
Total value of inheritance (in $1000) in 1998	2.2869	29.0810
Covered by Health Insurance, 2000	0.7231	0.4479
Total wealth (in $1000) in 1998	65.1710	292.1582
State clean air regulations in 1998	3.1705	2.2597
Avg. state price of cigarettes (in cents) in 1998	232.9779	28.8659
Years of education completed in 1998	11.6329	2.0759
Years of education respondent's mother completed	9.3234	4.8209
Age in 1998	36.8201	2.3473
BMI in 1982	23.3038	3.4103
Black	0.3317	0.4712
Hispanic	0.1337	0.3406
White	0.5347	0.4992
Married	0.4571	0.4986
Never Married	0.3152	0.4650
Divorce or separated	0.2211	0.4153
Widowed	0.0066	0.0810
Live within a city	0.7063	0.4558

N=606
Sources: See Data Appendix.

Table 1c: Means and Standard Deviations of Individual and State Characteristics
NLSY79 Men Non-Smokers

Characteristic	Mean	Standard Deviation
Family income (in $1000) in 1998	59.5868	47.8706
Percent of time unemployed in 1998	0.0212	0.1011
Posterior probability of unemployment	0.0271	0.0787
Probability of being below the poverty level	0.1069	0.2526
Number of Drops greater than 50% in Real Family Income, 1983-1998	0.6525	0.8944
Mourn death of relative or friend in 1998	0.0679	0.2516
Total value of inheritance (in $1000) in 1998	1.3140	17.5372
Covered by Health Insurance, 2000	0.8500	0.3572
Total wealth (in $1000) in 1998	115.3123	324.8905
State clean air regulations in 1998	3.2698	2.3504
Avg. state price of cigarettes (in cents) in 1998	233.7240	28.1117
Years of education completed in 1998	13.2793	2.7081
Years of education respondent's mother completed	10.3734	4.3344
Age in 1998	36.7698	2.2665
BMI in 1982	23.6891	3.4086
Black	0.2770	0.4476
Hispanic	0.1872	0.3902
White	0.5358	0.4989
Married	0.6415	0.4797
Never Married	0.2142	0.4104
Divorce or separated	0.1410	0.3481
Widowed	0.0033	0.0574
Live within a city	0.6997	0.4585

N=1816
Sources: See Data Appendix.

Table 1d: Means and Standard Deviations of State Characteristics, various years

Characteristic	Mean	Standard Deviation
Unemployment rate in local labor market, 1983	11.74624	3.915444
Unemployment rate in local labor market, 1984	8.742775	3.193848
Unemployment rate in local labor market, 1985	8.19104	3.035633
Unemployment rate in local labor market, 1986	7.836251	2.895117
Unemployment rate in local labor market, 1987	7.192403	2.59502
Unemployment rate in local labor market, 1988	6.30033	2.498123
Unemployment rate in local labor market, 1989	5.489802	1.989173
Unemployment rate in local labor market, 1990	5.654253	1.839056
Unemployment rate in local labor market, 1991	7.342527	2.639832
Unemployment rate in local labor market, 1992	7.943105	2.404476
Unemployment rate in local labor market, 1993	7.534434	2.548091
Unemployment rate in local labor market, 1994	7.119405	2.601589
Unemployment rate in local labor market, 1996	6.841123	3.042642
Unemployment rate in local labor market, 1998	5.109331	2.716493
State median household income (in $1000), 1984	35.31794	4.793593
State median household income (in $1000), 1985	36.08346	5.103464
State median household income (in $1000), 1986	37.38756	5.305254
State median household income (in $1000), 1987	37.77985	5.240861
State median household income (in $1000), 1988	38.01796	5.611795
State median household income (in $1000), 1989	38.38651	5.899113
State median household income (in $1000), 1990	37.44516	5.008324
State median household income (in $1000), 1991	36.43414	4.93408
State median household income (in $1000), 1992	35.9406	4.791666
State median household income (in $1000), 1993	35.42062	4.463673
State median household income (in $1000), 1994	35.99188	4.350395
State median household income (in $1000), 1996	37.19073	4.804754
State median household income (in $1000), 1998	39.30574	4.853246
State median home prices (in $1000), 1983	98.7280	30.9563
State median home prices (in $1000), 1984	99.5955	32.1378
State median home prices (in $1000), 1985	102.2579	35.5508
State median home prices (in $1000), 1986	108.7238	41.9378
State median home prices (in $1000), 1987	113.4127	49.7578
State median home prices (in $1000), 1988	117.3979	56.1790
State median home prices (in $1000), 1989	119.4589	61.0381
State median home prices (in $1000), 1990	116.9812	60.6509
State median home prices (in $1000), 1991	112.7154	56.0575
State median home prices (in $1000), 1992	111.3031	52.6743
State median home prices (in $1000), 1993	108.3965	47.7268
State median home prices (in $1000), 1994	106.5964	42.8552
State median home prices (in $1000), 1996	105.2819	37.6556
State median home prices (in $1000), 1998	110.0454	39.4514

Table 1d: Means and Standard Deviations of State Characteristics, various years

Characteristic	Mean	Standard Deviation
Mean State Probability of being below the poverty level	0.1464	0.0467
Mean State Number of Drops greater than 50% in Real Family Income, 1983-1998	0.6313	0.1089
State Small Group Health Insurance Regulation: No. of Mandates, 1998	21.1870	5.8718
State Small Group Health Insurance Regulation: NAIC Rating Bands, 1998	0.6214	0.4851
State Small Group Health Insurance Regulation: Tight Rating Bands, 1998	0.1581	0.3649
State Small Group Health Insurance Regulation: Community Rating, 1998	0.2622	0.4399
State Individual Health Insurance Regulation: Any Market Reform, 1998	0.1953	0.3965
State Individual Health Insurance Regulation: Guaranteed Issue, 1998	0.1982	0.3987

N=2422
Sources: See Data Appendix

Table 2: Effect of Economic Insecurity on Daily Cigarette Smoking in Men, 1998

Variables	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Family income (in $1000)	-0.0003	0.0028*	-0.0003	0.0025**	-0.0002	0.0033**	-0.0002	0.0027***
	(0.0003)	(0.0015)	(0.0002)	(0.0012)	(0.0003)	(0.0013)	(0.0002)	(0.0008)
Percent of time unemployed in 1998	0.2805***	1.2155***	--	--	--	--	--	--
	(0.0819)	(0.4279)						
Posterior probability of unemployment	--	--	0.5775***	1.371**	--	--	--	--
			(0.1115)	(0.5646)				
Probability of being below the poverty level	--	--	--	--	0.0849**	0.8235***	--	--
					(0.0421)	(0.2835)		
Number of drops in real family income, 1988-2000	--	--	--	--	--	--	0.0342**	0.1013***
							(0.0128)	(0.0291)
State clean air regulations	0.0062	0.0052	0.0064	0.0031	0.0064	0.004	0.0058	0.0035
	(0.0051)	(0.0041)	(0.0049)	(0.0041)	(0.0049)	(0.0033)	(0.0049)	(0.0028)
State cigarette price (in cents)	0.0002	0.0003	0.0001	0.0002	0.0002	0.0001	0.0001	-0.0003
	(0.0005)	(0.0004)	(0.0004)	(0.0003)	(0.0005)	(0.0004)	(0.0004)	(0.0002)
Years of education	-0.0371***	-0.044***	-0.0356***	-0.0421***	-0.0385***	-0.0422***	-0.0379***	-0.0484***
	(0.0035)	(0.0052)	(0.0034)	(0.0052)	(0.0034)	(0.0067)	(0.0034)	(0.0038)
Mom's education	-0.0007	-0.0049	-0.0008	-0.0045*	-0.0001	-0.0028	-0.0005	-0.0034***
	(0.0027)	(0.0031)	(0.0027)	(0.0026)	(0.0028)	(0.0023)	(0.0026)	(0.0010)
Age	0.0057	0.0051	0.0048	0.0025	0.0062*	0.005**	0.0071*	0.007***
	(0.0035)	(0.0039)	(0.0034)	(0.0039)	(0.0035)	(0.0025)	(0.0036)	(0.0025)
BMI in 1982	-0.0059*	-0.008***	-0.0054*	-0.0057**	-0.0058*	-0.0081**	-0.0058*	-0.0075***
	(0.0032)	(0.0030)	(0.0032)	(0.0028)	(0.0032)	(0.0031)	(0.0031)	(0.0020)
Black	-0.057**	-0.0562**	-0.0664***	-0.0716**	-0.0517**	-0.0878***	-0.0562**	-0.0545***
	(0.0245)	(0.0246)	(0.0246)	(0.0306)	(0.0245)	(0.0329)	(0.0250)	(0.0190)
Hispanic	-0.0902**	-0.0975***	-0.0908**	-0.0903***	-0.0898**	-0.0995***	-0.0848**	-0.0782***
	(0.0402)	(0.0342)	(0.0394)	(0.0330)	(0.0391)	(0.0245)	(0.0398)	(0.0206)
Married	0.0492	0.1147	0.0658	0.1116	0.078	0.3312*	0.0612	-0.0388
	(0.1808)	(0.1733)	(0.1917)	(0.1579)	(0.1914)	(0.1846)	(0.1873)	(0.0716)
Never Married	0.1606	0.2807*	0.1682	0.2431	0.1829	0.3949**	0.1526	0.0634
	(0.1834)	(0.1588)	(0.1940)	(0.1500)	(0.1926)	(0.1682)	(0.1868)	(0.0726)
Divorced or Separated	0.1528	0.2562	0.164	0.2471	0.1835	0.453**	0.1549	0.0755
	(0.1850)	(0.1631)	(0.1955)	(0.1518)	(0.1944)	(0.1772)	(0.1894)	(0.0677)
Live within a city	-0.0041	-0.013	-0.0043	-0.0111	-0.0009	-0.0008	-0.0028	-0.0036
	(0.0223)	(0.0140)	(0.0217)	(0.0144)	(0.0224)	(0.0128)	(0.0221)	(0.0107)
N	1905	1905	1904	1904	1891	1891	1905	1905
R^2	0.1		0.11		0.1		0.1	

Sources: See Data Appendix
Variables are for the year 1998, unless otherwise specified
Robust standard errors (adjusted for within-state clustering) in parentheses.
* significant at 10%, ** significant at 5%, *** significant at 1%

Instruments used in IV regressions:

Variable: Family Income	Instrument: State median household income
Variable: Percent of time unemployed	Instrument: Local unemployment history from 1983-1998
Variable: Posterior probability of unemployment	Instrument: Local unemployment history from 1983-1998
Variable: Probability of being below the poverty level	Instrument: State average probability of being below the poverty level, Local unemployment rates, 1983-1998, State med. household income
Variable: Number of drops in real income	Instrument: State average number of drops in real income, Local unemployment history from 1983-1998, State med. household income

Table 3: Effect of Financial Safety Nets on Daily Cigarette Smoking in Men, 1998

Variables	OLS	IV	OLS	IV	OLS	IV
Family income	-0.0003	0.0026**	-0.0002	0.0033***	-0.0002	0.0061***
(in $1000)	(0.0002)	(0.0012)	(0.0002)	(0.0011)	(0.0003)	(0.0009)
Inheritance received	0.0006	-0.0003	--	--	--	--
(in $1000)	(0.0005)	(0.0004)				
Health insurance	--	--	-0.0337	-0.3506***	--	--
			(0.0282)	(0.0949)		
Wealth (in $1000)	--	--	--	--	0	-0.0006***
					(0)	(0.0002)
Posterior probability of	0.5781***	1.3499**	0.5389***	0.5526	0.5775***	0.7066**
unemployment	(0.1107)	(0.5706)	(0.1269)	(0.5723)	(0.1115)	(0.3316)
State clean air regulations	0.0065	0.0029	0.0064	0.0049	0.0064	0.0005
	(0.0049)	(0.0042)	(0.0049)	(0.003)	(0.0049)	(0.0029)
State cigarette price (in cents)	0.0001	0.0002	0.0001	-0.0002	0.0001	0.0003
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0002)
Years of education	-0.0355***	-0.0425***	-0.0349***	-0.0394***	-0.0355***	-0.0506***
	(0.0034)	(0.0054)	(0.0035)	(0.0049)	(0.0034)	(0.0034)
Mom's education	-0.0008	-0.0044*	-0.0004	-0.0041	-0.0008	-0.0029*
	(0.0027)	(0.0026)	(0.0028)	(0.0028)	(0.0027)	(0.0015)
Age	0.0048	0.0029	0.0049	-0.0004	0.0049	0.0033
	(0.0035)	(0.0041)	(0.0034)	(0.0032)	(0.0035)	(0.0029)
BMI in 1982	-0.0054*	-0.0058**	-0.0052	-0.0032	-0.0054*	-0.005**
	(0.0032)	(0.0029)	(0.0032)	(0.0025)	(0.0032)	(0.0021)
Black	-0.0653**	-0.0708**	-0.0667***	-0.0526*	-0.0666**	-0.065***
	(0.0251)	(0.0307)	(0.0247)	(0.0282)	(0.0252)	(0.0231)
Hispanic	-0.0893**	-0.0909***	-0.0893**	-0.0895***	-0.0911**	-0.1061***
	(0.0393)	(0.033)	(0.0392)	(0.0306)	(0.0389)	(0.0216)
Married	0.0679	0.1061	0.065	-0.0544	0.0657	-0.0801
	(0.1922)	(0.1577)	(0.1922)	(0.1091)	(0.1915)	(0.0904)
Never married	0.1686	0.2412	0.1645	0.0569	0.1681	0.1322
	(0.1944)	(0.1499)	(0.1936)	(0.1123)	(0.1938)	(0.0897)
Divorced or separated	0.1647	0.2433	0.1601	0.0675	0.1638	0.093
	(0.196)	(0.1516)	(0.1951)	(0.1119)	(0.1953)	(0.0909)
Live within a city	-0.0045	-0.0121	-0.0056	-0.0136	-0.0043	-0.0141
	(0.0214)	(0.0145)	(0.0219)	(0.016)	(0.0217)	(0.0113)
N	1902	1902	1902	1902	1904	1904
R^2	0.11		0.11		0.11	

Sources: See Data Appendix
Variables are for the year 1998, unless otherwise specified
Robust standard errors (adjusted for within-state clustering) in parentheses.
* significant at 10%, ** significant at 5%, *** significant at 1%

Instruments used in the IV regressions:

Variable: Family income	Instrument: State median household income
Variable: Posterior probability of unemployment	Instrument: Local unemployment rates, 1983-1998
Variable: Health Insurance	Instrument: Series of state health care regulations for 1998
Variable: Wealth	Instrument: History of median state home prices from 1983-1998

Data Appendix

Description of Constructed and non-NLSY Variables

Percent of Time Unemployed in 1998. Number of weeks a respondent was unemployed in 1998, divided by 52.

Posterior Probability of Unemployment. NLSY79 includes weekly data on employment status (working, unemployed, out of labor force, etc.) for each subject. From this information we derive an approximation of each respondent's subjective beliefs about the probability of experiencing involuntary job loss at the time of the 1998 survey. If one is willing to posit that this probability is fixed but unknown (to the worker) at the beginning of the worker's current career, and that workers adjust their beliefs in a Bayesian manner as time goes on, it is possible to calculate the worker's belief (i.e., his posterior probability) directly. We calculate posterior probability as follows:

We assume the worker has a fixed, but unknown probability π of being unemployed in any given week. He knows that there are k possible values of π, denoted π_i for i = 1, 2, …, k and prior probabilities $P(\pi = \pi_i)$. After n weeks the worker observes that he has been unemployed for $x \leq n$ weeks. The probability that he will be unemployed in week n + 1 is given by

$$\sum_{i=1}^{k} \pi_i P(\pi = \pi_i | x) \tag{1}$$

where

$$P(\pi = \pi_i | x) = \frac{P(x | \pi = \pi_i) P(\pi = \pi_i)}{\sum_{j=1}^{k} P(x | \pi = \pi_j) P(\pi = \pi_j)} \tag{2}$$

and because for any given value π_i, x is realized from a binomially distributed random variable,

$$P(x \mid \pi = \pi_i) = \frac{n!}{x!(n-x)!} (\pi_i)^x (1-\pi_i)^{n-x} \tag{3}$$

(1) is computed by generating values for π_i (job-loss hazard) and $P(\pi = \pi_i)$ (prior probability of a given hazard level) from the sample of 4625 male NLSY79 respondents for whom we have comprehensive weekly employment data from 1994-1998. Observations were sorted into 30 bins, with approximately 49 observations per bin, with the exception of the first bin, which represents the 3200 observations with prior probability of 0. π_i is then calculated as the mean hazard (number of weeks unemployed divided by total number of weeks) for the each individuals in the same bin, and the prior probability $P(\pi = \pi_i)$ is given by the number of observations in bin i divided by the total number of observations.

Probability of Being Below the Poverty Level. This variable is formed by finding the probability that individual i's predicted family income in 1998 is below the poverty level. Poverty levels are obtained from the Department of Health and Human Services website, the poverty levels are specified by the *HHS Poverty Guidelines* on the website. They are dependent on the number of family members living in the home, family income, and state. Individual. In order to find the probability of being below the poverty level, we first apply separate regressions for each individual who has at least three annual income levels reported from 1983-1998. We regress annual family income (as reported in NLSY79 each year) on year for each individual, by applying ordinary least squares regression formulas. These formulas yield estimated coefficients for the slope, or rate of change and intercept for the linear time trend in family income. The slope is calculated by:

$$\frac{n\sum_{t=83}^{98} ty_t - \sum_{t=83}^{98} t \sum_{t=83}^{98} y_t}{n\sum_{t=83}^{98} t^2 - \left(\sum_{t=83}^{98} t\right)^2}$$

where t = two-digit year (t = 83, 84, 85, …, 98), y = income in year t, n = number of years when income is reported (i.e., data is not missing), and in years where data is missing (i.e., no income reported in year t) neither t nor y_t exist.

The intercept is calculated by:

$$\frac{\sum_{t=83}^{98} y_t}{n} - (slope)\frac{\sum_{t=83}^{98} t}{n}$$

Then, the predicted value of family income in 1998 is computed:

$$\hat{Y}_{98}=(intercept) + (slope)(98)$$

Finally, a confidence interval is calculated, with the poverty level as the lower confidence limit:

$$\hat{Y}_{98} - t(1-\alpha/2;n-2)\sqrt{\frac{\sum_{i=1}^{n}(Y_i-\hat{Y}_i)^2}{n-2}\left(\frac{1}{n}+\frac{(x_h-\bar{x})^2}{\sum_{i=1}^{n}(x_i-\bar{x})^2}\right)} = poverty\ level$$

We then solve for t and using the *ttail* command in Stata compute the probability of having a value below the poverty level.

Health Insurance Policies. Seven state-level measures of health insurance-related regulation were obtained from the December 1997 *State Legislative Health Care and Insurance Issues* published by BlueCross BlueShield Association. *No. of Mandates* is a count of the number of specific plan mandates (benefits, providers, or persons covered) written into state law; *NAIC Rating Bands*, *Tight Rating Bands*, and *Community Rating* are various measures of the extent to which plans can use experience, health status, and/or duration of coverage in setting small group rates; *Any Market Reform* is a composite of these three variables, applied to the market for individual plans; and *Guaranteed Issue* states require health plans to offer coverage to all individuals regardless of their health status or claims experience.

Median Household Income. This variable represents the median household income in respondent's state of residence in 1998; this data comes from the U.S. Statistical Abstract.

Median Home Prices. This variables is obtained from the BLS. The series of data is used from 1984-1998.

Number of Drops in Real Family Income greater than 50 percent, 1983-1998. Family annual income in each survey year is reported in NLSY79. This variable is a count of the number of times family income (adjusted for inflation) was less than 50 percent of the pervious year's income than the most recently reported previous income.

Self Reported Weight and Height Corrections. Self-reported weight and was corrected for reporting bias using the method described in Cawley (2000). Matched data on reported and actual heights and weights from the NHANES III survey were used for this purpose. Separate OLS regressions were performed for each sex and race/ethnic group.

To estimate the actual weight in pounds of an individual, actual weight of the subset of NHANES III respondents between the ages of 26 and 45 was regressed on reported weight (in lbs.), reported weight squared, and the respondent's age in years. Estimated coefficients were then used to correct for the bias.

State Cigarette Tax Data. Data on cigarette taxes for each state in 1998 is from *The Tax Burden on Tobacco*, by Orzechowski and Walker.

References

Ashton, H., V. Marsh, J. Millman, M. Rawlins, R. Stepney, R. Telford, J. Thompson (1979): "Pattern of Behavioural, Autonomic and Electro-physiological Response to Cigarette Smoking and Nicotine in Man" In A. Remond and C. Izard (eds) *Electrophysiological Effects of Nicotine*. Amsterdam: Elsevier/N. Holland Biomedical Press.

Ashton, H. and R. Stepney (1982; 110): *Smoking: Psychology and Pharmacology*, New York: Tavistock Publications.

Ashton, H. and D. Watson (1970): "Puffing Frequency and Nicotine Intake in Cigarette Smokers," *British Medical Journal* 3: 679-681.

Baker, T., T. Brandon, L. Chassin (2004): "Motivational Influences on Cigarette Smoking," *Annual Review of Psychology*, 55, 463-491.

Baum, C., M. Schaffer, and S. Stillman (2003): "Instrumental Variables and GMM: Estimation and Testing," *Boston College Working Paper 545*.

Becker, G. and K. Murphy (1988): "A Theory of Rational Addiction," *The Journal of Political Economy*, 96(4), 675-700.

Bollen, K., D. Guilkey, T. Mroz (1995): "Binary Outcomes and Endogenous Explanatory Variables: Tests and Solutions with an Application to the Demand for Contraceptive Use in Tunisia," *Demography*, 31(1), 111-131.

Cawley, J. (2000): "Body Weight and Women's Labor Market Outcomes," *NBER Working Paper 7841*.

Cawley, J., S. Markowitz, and J. Tauras (2004): "Lighting up and slimming down: the effects of body weight and cigarette prices on adolescent smoking initiation," *Journal of Health Economics*, 23, 293-311.

Chaloupka, F. and M. Grossman (1996): "Price, Tobacco Control Policies and Youth Smoking," *NBER Working Paper W5740*.

Chen, S. D. Guilkey (2003): "Determinants of Contraceptive Method Choice in Rural Tanzania between 1991 and 1999," *Studies in Family Planning*, 34(4), 263-276.

Chou, S.-Y., M. Grossman, H. Saffer (2004): "An economic analysis of adult obesity: results from the behavioral risk factor surveillance system," *Journal of Health Economics*, 23, 565-598.

Chou, S.-Y., M. Grossman, H. Saffer (2006): "Reply to Jonathan Gruber and Michael Frakes," *Journal of Health Economics*, 25, 389-393.

Dominitz, J. and C. F. Manski (1997): "Perceptions of Economic Insecurity: Evidence From the Survey of Economic Expectations," *The Public Opinion Quarterly*, 61(2), Summer, 261-287

Dunn, W. (1973): *Smoking Behavior: Motives and Incentives*, Washington DC: V. H. Winston & Sons.

Feather, N. (1982; 63): *Expectations and Actions: Expectancy-Value Models in Psychology*, New Jersey: Lawrence Erlbaum Associates, Publishers.

Fehily, A.M., K. M. Phillips, W.G. Yarnell (1984): "Diet, smoking, social class and body mass index in the Caerphilly Heart Disease Study," *American Journal of Clinical Nutrition*, 40, 827-833.

Frith, C. (1971): "The Effect of Varying the Nicotine Content of Cigarettes on Human Behavior," *Psychopharmacologia*, 19, 188-192.

Froom, P., E. Kristal-Boneh, S. Melamed, D. Gofer, J. Benbassat, J. Ribak (1999): "Smoking cessation and body mass index of occupationally active men: the Israeli CORDIS Study," *American Journal of Public Health, American Public Health Association*, 89 (5), 718-722.

Fuchs, V. (1980): "Time Preference and Health: An Exploratory Study," *NBER Working Paper 539.*

Gilbert, D. (1995; 31): *Smoking: Individual Differences, Psychopathology, and Emotion*, Washington DC: Taylor & Francis.

Gordon, T., W. Kannel, T. Dawber, D. McGee (1975): "Changes associated with quitting cigarette smoking: the Framingham study," *American Heart Journal*, 90, 322-328.

Gruber, J., M. Frakes (2006): "Does falling smoking lead to rising obesity?" *Journal of Health Economics*, 25, 183-197.

Hacker, J. (1/22/2004): "The New Economic Insecurity", *On Point*, http://www.onpointradio.org/shows/2004/01/20040122_b_main.asp.

Hersch, J. (2000): "Gender, Income Levels, and the Demand for Cigarettes," *Journal of Risk and Uncertainty*, November, 21: 2/3, 263-282.

Honjo, K. and M. Siegel (2003): "Perceived importance of being thin and smoking initiaitn among young girls," *Tobacco Control*, September, 12(3), 289-294.

Kirsch, I. (1999), *How Expectancies Shape Experience*, Washington DC: American Psychological Association.

Lawton, M. P. (1962): "Psychosocial Aspects of Cigarette Smoking," *Journal of Health and Human Behavior*, 3(3), Autumn, 163-170.

Levine, P., T. Gustafson, A. Velenchik (1997): "More Bad News For Smokers? The Effects of Cigarette Smoking on Wages," *Industrial & Labor Relations Review*, 50(3), 493-509.

McNeill, A., M. Jarvis, R. West (1987): "Subjective effects of cigarette smoking in adolescents," *Psychopharmacology*, 92, 115-117.

Madalla, G. (1983): *Limited Dependent and Qualitative Variables in Econometrics*, Cambridge, UK: Cambridge University Press.

Mangan, G. and J. Golding (1978): "An enhancement model of smoking maintenance," In R. E. Thorton (Ed.), *Smoking behaviour: Physiological and psychological influences*, Edinburgh, Scotland: Churchill Livingstone, 87-114.

Mulatu, M., and C. Schooler (2002): "Causal Connections between Socio-Economic Status Health: Reciprocal Effects and Mediating Mechanisms," *Journal of Health and Social Behavior*, 43(1), 22-41.

Nemery, B., N. Moavero, L. Brasseur, D. Stanescu (1983): "Smoking, lung function and body weight," *British Medical Journal (Clinical Research Edition)*, 286, 249-251.

Rivers, D., Q. Vuong (1988): "Limited Information Estimators and Exogeneity Tests for Simultaneous Probit Models," *Journal of Econometrics*, 39: 347-366.

Ross, C. and C. Wu (1995): "The Links Between Education and Health," *American Sociological Review*, 60(5), 719-745.

Ruhm, C. J. (2000): "Are Recessions Good For Your Health?" *The Quarterly Journal of Economics*, May, 617-650.

Ruhm, C. J. (2005): "Healthy living in hard times," *Journal of Health Economics*, 24, 341-363.

Schachter, S., B. Silverstein, L. Kozlowski, C. Herman, B. Liebling (1977): "Effects of Stress on Cigarette Smoking and Urinary pH," *Journal of Experimental Psychology: General*, 106: 5-12.

Siahpush, M., R. Borland, M. Scollo (2005): "Smoking and financial stress," *Tobacco Control*, 12, 60-66.

Smith, T. G. “Reconciling Psychology with Economics: Obesity, Behavioral Biology, and Rational Overeating,” forthcoming in *Journal of Bioeconomics*.

Smith, T. G., C. Stoddard, M. Barnes: “Why the Poor Get Fat: Weight Gain and Economic Insecurity,” Working Paper, *Washington State University Working Paper 2007-16*.

Spielberger, C. (1986): “Psychological determinants of smoking behavior,” In R. D. Tollison (Ed.), *Smoking and society: Toward a more balanced assessment*, Lexington, MA: D. C. Health.

Tompkins, S. (1968): “A modified model of smoking behavior,” In E. F. Borgatta & R. Evans (Ed.), *Smoking, health and behavior*, Chicago: Aldine.

Tyas, L. T. and L. L. Pederson (1998): “Psychosocial factors related to adolescent smoking: a critical review of the literature,” *Tobacco Control*, 7, 409-420.

Wee, C. C., N. A. Rigotti, R. B. Davis, R. S. Phillips (2001): “Relationship Between Smoking and Weight Control Efforts Among Adults in the United States,” *Archives of Internal Medicine*, vol. 161, 546-550.

Wooldridge, J. (2002): *Econometric Analysis of Cross Section and Panel Data*, Cambridge, MA: The MIT Press.

Zagorsky, J. (2004): “The Wealth Effects of Smoking,” *Tobacco Control*, 13, 370-374.