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8

Environment and Persistence in Youthful Drinking Patterns

Philip J. Cook and Michael J. Moore

Excess drinking is associated with lost productivity, traumatic injury, early death, crime and violence, and neglect of family responsibilities. These and related concerns have long engendered public support for government regulation of the production, sale, and use of alcoholic beverages. Drinking by youths is a particular concern. Every state bans the sale of alcohol to those under age twenty-one.

Despite this age-based prohibition, drinking is widespread among teenagers. According to a national survey of high school students, Monitoring the Future (MTF), the thirty-day prevalence of drinking in 1998 among twelfth graders was 52 percent, and over half those (33 percent of the total) said that they had gotten drunk in the previous month; the thirty-day drinking prevalence for tenth graders was 39 percent, for eighth graders 23 percent. These alcohol-use rates are higher than use rates for other abused substances, including tobacco and marijuana (www.isr.umich.edu/src/mtf/data). Indeed, alcohol is the illicit drug most widely used by teenagers.

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The concern with this widespread use and misuse stems primarily from the dangers of youthful inebriation, including an increased chance of motor-vehicle accident or other type of injury, unwanted sex, criminal victimization, and other problems stemming from clumsiness, distorted perception, and cognitive deficit. But there is another type of concern as well: a teenage drinker who escapes the immediate hazards may still be burdened with longer-term deleterious effects and, in particular, a taste for alcohol that may lead to heavy drinking in later years as well as a deficit in human-capital acquisition (Mullahy and Sindelar 1989, 1991).

The public response to youthful drinking includes efforts directed at both the demand for alcohol among and the supply of alcohol to young people. For the most part, the relevant economics literature has focused on supply-side interventions, especially the minimum purchase age (MPA) and alcohol excise taxes (Cook and Moore, in press; Grossman et al. 1994; Sloan, Stout, and Whetten-Goldstein 1999). These evaluations have provided evidence that alcohol-control policies reduce the prevalence of drinking and bingeing (having a large number of drinks on a single occasion), and the immediate consequences thereof, for youths and, in the case of excise taxes, adults as well. But the scholarly consensus on the public-health benefits of alcohol excise taxes appears to have broken down in recent years. Two notable papers (Dee 1999; Mast, Benson, and Rasmussen 1999) conclude that estimates of the influence of beer excise taxes on drinking, heavy drinking, and motor-vehicle fatality rates are not robust against alternative specifications or time periods and that the true effects may be considerably smaller than suggested in the previous literature.

In this paper, we provide further evidence on the influence of the MPA and the beer excise tax on youthful drinking, using data from the National Longitudinal Survey of Youth (NLSY) for 1982–85 and 1988–89. While we, too, find that the estimated effects of excise taxes are sensitive to specification, our results are compatible with the view that increasing these taxes would reduce the prevalence of binge drinking.

Given the habitual nature of alcohol use and abuse, it is also important to understand the dynamic effects of control policies. Here, we utilize the NLSY data to assess the extent to which alcohol-control measures at age fourteen influence how much people drink later in life. Our results suggest that adolescents growing up in states with a low MPA were relatively likely to binge in later years. These results are relevant, not only to evaluating alcohol-control measures, but also (and more fundamentally) to providing evidence on the extent to which youthful drinking is habit-forming.

Government taxes and regulations are not the only features of the drinking "environment" that influence youthful consumption patterns. Sociological research, not to mention personal experience, suggests that drinking is a social activity (Skog 1980, 1985). In a "wet" environment, where most adults drink and alcohol is included in a wide variety of social occa-

sions, adults will tend to drink more than they otherwise would, and adolescents may be initiated into drinking relatively early. In what follows, we attempt to capture the influence of social context by introducing per capita ethanol consumption as a covariate.[1] It is strongly positively associated with youthful drinking, but the proper interpretation of this result is ambiguous.

Our presentation is organized as follows. Section 8.1 presents some descriptive statistics on how much American adolescents drink and how their use of alcohol compares with that of their counterparts in other countries. Section 8.2 analyzes the twenty-five-year trend in drinking and bingeing prevalence by high school seniors in America. The similarity between this teen-drinking time profile and the time profile of adult per capita alcohol consumption suggests that the drinking decisions of teens are influenced by adult drinking behavior or, in any event, that they share a common set of determinants. Section 8.3 presents our results on the determinants of drinking by young adults, with a particular focus on the conflicts in the literature concerning the influence of the alcohol excise tax on alcohol abuse. Results on the persistence of youthful drinking are described in section 8.4, together with findings that suggest that alcohol availability at age fourteen influences the likelihood of bingeing as an adult. Section 8.5 summarizes.

8.1 Adolescent Drinking in an International Context

While American adolescents drink far more than their elders would like, they are less likely to drink or drink heavily than adolescents in some other prosperous countries. The primary source of data for such international comparisons is a series of surveys conducted under the auspices of the World Health Organization (WHO) Regional Office for Europe, known as the Health Behaviour in School-Aged Children Study (HBSC). Since 1985, surveys have been conducted at four-year intervals in a growing number of countries. In the 1997–98 survey, twenty-six European countries or regions, Canada, and, for the first time, the United States participated (Currie et al. 2000, 8). The target population in this survey was youths aged eleven, thirteen, and fifteen. The surveys were administered in school to nationally representative samples of classrooms; with a few exceptions, fifteen hundred or more students from each age group participated in each of the countries.

Table 8.1 summarizes the results for young Americans and indicates how they rank in comparison to youths in the other twenty-seven nations/regions included in the survey. A majority of Americans have had at least

1. For a general introduction to the influence of social context, see Coleman (1990) and Becker (1996).

Table 8.1 **Drinking by American Adolescents: Findings for the United States from the HBSC**

Indicator of Drinking	Age 11	Age 13	Age 15
Ever had a drink:			
Boys (%)	62	74	88
Girls (%)	58	78	87
Rank among 28 countries	12	6	5
Drink at least weekly:			
Boys (%)	8	10	23
Girls (%)	7	11	15
Rank among 28 countries	22	18	11
Drunk twice or more in life:			
Boys (%)	3	12	34
Girls (%)	3	11	28
Rank among 28 countries	13	18	10

Source: HBSC (Currie et al. 2000).

Note: The rankings are from the lowest (rank = 1) to the highest (rank = 28) among the countries and regions included in the survey.

one drink by age eleven, and almost everyone has been "initiated" by age fifteen; in this respect, Americans are no different than youths in other countries. (The country with the largest number of lifetime abstainers at age fifteen is Israel, but, even there, 70 percent have had at least one drink.)

With respect to two other measures—*drinks at least weekly* and *reported being drunk at least twice in lifetime*—the prevalence for Americans and youths from other countries is quite low at ages eleven and thirteen, increasing somewhat at age fifteen. By that age, 19 percent of Americans say that they drink weekly, and almost one-third indicate that they have been drunk a couple of times or more. Fifteen-year-olds from most other countries have higher prevalence rates on both measures. In particular, youths from Denmark, Britain, Ireland, Greece, and much of Central Europe are more likely to be regular drinkers; the prevalence of such frequent drinking in the Nordic and Baltic countries is somewhat less than that in the United States.[2]

Thus, we see that there is nothing unusual about the amount of drinking done by American adolescents when it is compared to that done in other countries.

2. It is interesting to note in this context that the minimum age for purchasing alcoholic beverages is lower elsewhere than it is in the United States. In Europe, the MPA differs among countries and, in some cases, differs with the type of beverage and whether the purchase is on premise or off. Youths as young as sixteen or eighteen may legally purchase beer or wine in most countries (Rossi 1992). We do not attempt here to relate international differences in MPA to youth drinking.

8.2 Trends in Teenage Drinking

It is also somewhat reassuring to place recent drinking by American teenagers in historical context; as prevalent as it is now, it was still more so a generation ago. A widely used source of information on trends in drug use by American teenagers is Monitoring the Future (MTF), conducted at the University of Michigan's Institute for Social Research. Data have been collected from fifteen to twenty thousand seniors at 130-or-so high schools by a survey administered every spring since 1975. The questionnaire includes items on the respondents' use of a variety of drugs. In particular, respondents are asked whether they have ever used alcohol and, if so, whether they have used it in the last year and the last thirty days. They are then asked whether they have consumed five or more drinks in a row any time in the last two weeks (the MTF definition of *bingeing*) and whether they have been drunk in the last month.

The accuracy of responses to such questions is difficult to calibrate. One effort to do so compared the responses of the MTF seniors in 1982 with seniors included in the National Longitudinal Survey of Youth (NLSY) in that year (Cook, Moore, and Pacula 1993). The thirty-day prevalence from MTF respondents was substantially higher than the corresponding figure from the NLSY. One possible explanation is that the NLSY survey is conducted at home while the MTF is conducted in school. The latter may be a setting more conducive to confession (or even bragging) about drinking.

Figure 8.1 depicts the thirty-day prevalence of drinking and the prevalence of bingeing during the previous two weeks since 1976 for twelfth graders aged seventeen to nineteen.[3] Both series peak in the early 1980s and then decline, first gradually, then rapidly, until 1992 or so. The thirty-day prevalence dropped 22 percentage points (from 72 percent), the binge prevalence by 15 percentage points (from 42 percent), during this time. Both series have a slight upward trend in recent years.

What explains the sharp reduction in drinking during the 1980s? The obvious answer does not apply. The price of alcoholic beverages (relative to the overall consumer price index) was essentially flat during the period 1980–90, as shown by the bars in figure 8.1. (The upward blip in 1991 was the result of an increase in federal excise taxes.) If prices had not been declining so rapidly before 1981, the reduction in drinking would presumably have started sooner. It is true that the effective price for high school seniors probably increased during the early 1980s since over half the states raised their MPA during this period. But the observed reductions in prevalence are much larger than could plausibly be associated with a change in the MPA (cf. the estimates presented in sec. 8.3 below).

3. The results presented here are based on our calculations from the micro data.

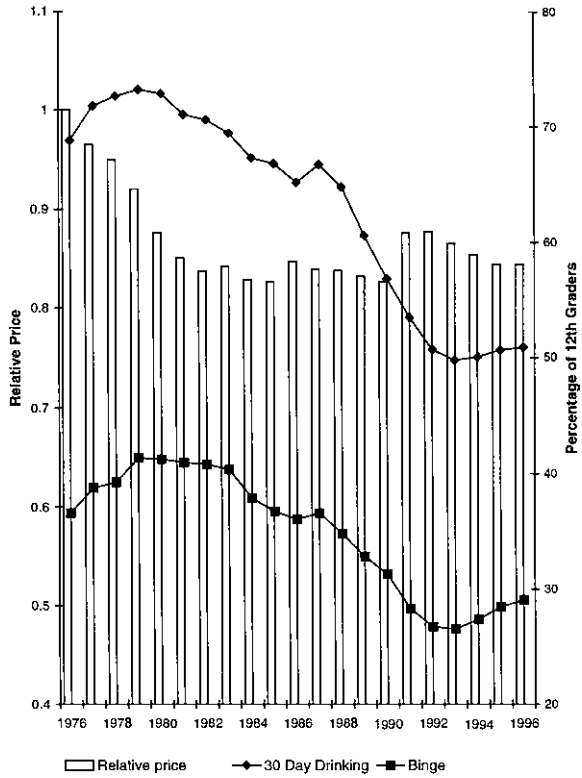

Fig. 8.1 Trend in youth drinking, twelfth graders, MTF 1976–96

Since price movement and MPA shifts cannot account for the downward shift in youth drinking during the 1980s, we consider other possibilities. One is the changing composition of the twelfth-grade population. For example, we know that minority youths are less likely to report drinking than are whites and that minorities are an increasing proportion of the high school population during this period. To check whether these and other changes in population composition can account for the observed trend, we estimated 1986 cross-sectional linear-probability models of drinking and bingeing. The independent variables are the indicators of socioeconomic characteristics of the respondent included in the public-use MTF data files. (The results are reported in app. tables 8A.2 and 8A.4.) We used the resulting equation to simulate the prevalence of drinking and bingeing, substituting into the equation mean values for the covariates for each of the other years in turn. We repeated this exercise using a fuller set of covariates that included a number of variables reflecting choices made by the respondent: smoking, drug use, school attendance, work, marriage, and so forth (tables 8A.3 and 8A.5). The results of these simulations are

shown in figures 8.2 and 8.3. As it turns out, the values from the simulations do not track the trend in drinking prevalence; for bingeing prevalence, the "long-form" values predict a portion of the decline but still leave much of it unexplained.

Since the estimated model for the 1986 cross section yields biased predictions for other years, it must be true that the OLS weights on these independent variables have changed over time. We follow Gruber and Zinman (chap. 2 in this volume) in estimating the same model for other years and testing for changes in the magnitudes of corresponding coefficients (reported in the appendix). The results from the long form of the bingeing equations are perhaps most interesting: they suggest that, between 1976 and 1996, binge drinking has become less closely associated with gender, race, grades in school, and marijuana use (although all these variables remain important); at the same time, binge drinking has become much more strongly associated with smoking. The underlying causal mechanism is not revealed by this exercise.

Figure 8.4 depicts the drinking and bingeing series after converting them to indexes, with the means for the entire period set to 100. We add a third

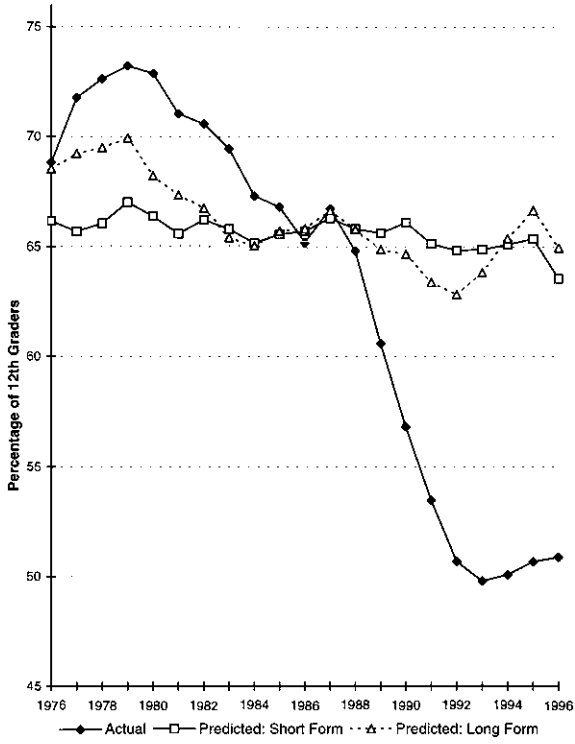

Fig. 8.2 30-day drinking prevalence, twelfth graders, actual vs. predicted

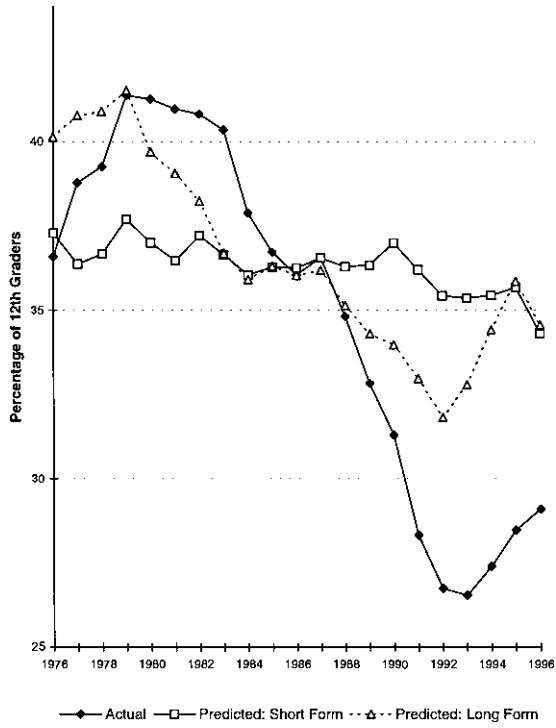

Fig. 8.3 Binge drinking, twelfth graders, actual vs. predicted

line to this chart representing an index for adult per capita consumption of ethanol, a series calculated from tax-paid sales data. (At its peak, per capita consumption was 2.8 gallons of pure alcohol per adult age fifteen and over.)[4] It is interesting that all three series follow roughly the same pattern, with perhaps the main difference being that the prevalence series turns up a bit in 1992 while the per capita consumption series continues to decline.

While the similar patterns for these series may be coincidence, Occam's razor suggests that we seek a common explanation. Having ruled out price and changes in population composition, it seems reasonable to consider changes in other alcohol-control measures next. The 1980s were a time of increased public concern about drinking, especially in connection with driving under the influence (DUI). Mothers Against Drunk Driving (MADD), an organization that was particularly effective during this pe-

4. This series is taken from the Beer Institute's *Brewer's Almanac* for various years. The method for estimating per capita consumption starts with data on the volumes of tax-paid wholesale shipments of wine, beer, and liquor. The volume of ethanol that these shipments contained is estimated by using standard estimates of the average ethanol content of each type of beverage.

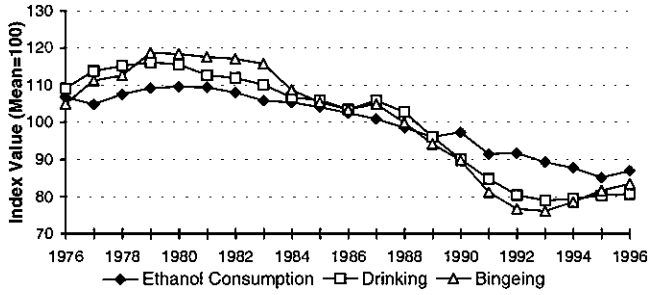

Fig. 8.4 Trend in adult (*ethanol*) consumption and twelfth-grade drinking and bingeing prevalence, MTF 1976–96

riod, opened its first chapter in 1981 and by 1986 had 395 chapters nationwide (Evans, Neville, and Graham 1991). A variety of legislation designed to increase the likelihood and severity of punishment for DUI was enacted during the 1980s (Evans, Neville, and Graham 1991). These changes may have had some influence on the prevalence of heavy drinking by initiating the era of the designated driver and making barhopping a less attractive activity. It may also be true that this legislation and the downward trend in alcohol consumption both reflect a shift in the public or private value placed on safety and health. That such a shift occurred is suggested by the fact that smoking and marijuana use were declining at the same time.

The close link between adult per capita consumption and youthful drinking provides further clues about drinking trends. The downward trend in both youthful and adult drinking may be due to a common cause (such as an increased value placed on health by adults and eighteen-year-olds alike), but it is also plausible that youthful drinking decisions are influenced by adult drinking practices. We return to that subject in section 8.4 below.

8.3 The Importance of the MPA, the Excise Tax, and the Drinking Environment

Alcoholic beverages have long been subject to government regulation and special taxes, beginning with the first domestic revenue measure of the U.S. Congress, an excise tax on liquor enacted in 1791 (Cook and Moore 1993b), and reaching the most extreme form with Prohibition. Since repeal in 1933, prohibition has (with a few local exceptions) been limited to youths; the MPA was set between eighteen and twenty-one in every state. During the 1980s, the states with lower MPAs all raised them to twenty-one, many in response to federal pressure authorized in the Uniform Drinking Age Act of 1984. No such uniformity has emerged with alcohol excise taxes. In addition to the large federal excise taxes on beer, wine, and liquor, the states have enacted widely differing rates and changed

them from time to time in response to revenue needs. For example, the federal beer tax is set at $18 per barrel ($0.581 per gallon), increased from $9 per barrel in 1991, while the state rates ranged from $0.02 to $0.77 per gallon in 1999.[5]

Table 8.2 lists the changes in MPA and the beer excise tax between 1982 and 1989. As can be seen, few states enacted tax changes over this period, and the changes that did occur were rather small. That fact makes the task of identifying the effects of beer taxes on consumption difficult. Changes in the MPA, on the other hand, are more frequent, especially during the early 1980s.

An extensive literature has documented the effects of the MPA on drinking and some of its consequences (Cook and Tauchen 1984; Males 1986; Ruhm 1995, 1996; Chesson, Harrison, and Kassler 2000). The published findings are consistent in establishing the effectiveness of the MPA in reducing heavy drinking by and vehicle fatalities involving youths as well as some other alcohol-related problems. The beneficial influence of the excise tax in reducing alcohol abuse and its consequences has also been well established (Cook 1981; Cook and Tauchen 1982; Grossman et al. 1994; Grossman, Coate, and Arluck 1987; Saffer and Grossman 1987a, 1987b; Coate and Grossman 1988; Kenkel 1993; Cook and Moore 1994; Ruhm 1996; Markowitz and Grossman 1998).

This consensus on the potent effect of the excise tax has been challenged of late by two articles (Mast, Benson, and Rasmussen 1999; Dee 1999), both of which concluded from their regression analyses that, while the MPA effects on drinking are robust to different specifications, the estimated effects of the alcohol excise tax are not.

The Mast, Benson, and Rasmussen article does not focus on youth drinking but rather uses state beer sales as the dependent variable. The authors utilized a nine-year panel of forty-eight states, finding that the beer tax has a significant negative effect on beer sales per capita (in gallons) when they control for fixed state and year effects as well as income, the percentage of eighteen- to twenty-year-olds for whom drinking is legal, and several other variables; however, this tax effect disappears when they also control for the percentages of the state population who are Mormon, Southern Baptist, Protestant, and Roman Catholic. Since data for these religious-affiliation variables were available for only two years out of their nine-year series, the authors were forced to assume linear time trends in affiliation to create a complete series. The fact that the excise tax did not

5. Our source for the federal tax rate is the Bureau of Alcohol, Tobacco, and Firearms (BATF) downloaded from www.atf.treas.gov/alcohol/info/faq/subpages/atftaxes.htm on 21 March 2000. Historical tax rates are from BATF historical tax rates spreadsheet 94A1_1&2.WK1 downloaded from www.atf.treas.gov/alcohol/stats/historical.htm on 21 March 2000. State tax rates are from Federation of Tax Administrators, State Tax Rates on Beer, February 2000, downloaded from www.taxadmin.org/fta/rate/tax_stru.html on 21 March 2000.

Table 8.2 **Change in Nominal Beer Tax, MPA, and Per Capita Consumption, 1982–85, 1988–89, by State**

State	Δ Tax 1982–85 (cents/can)	Δ Tax 1985–89 (cents/can)	Δ MPA 1982–85 (years)	Δ PC Ethanol 1982–85 (gallons)	Δ PC Ethanol 1985–89 (gallons)
Alabama	−2.3	0	1	.02	−.02
Alaska	22.5	0	2	−.19	−.37
Arizona	18.0	0	3	−.05	−1.03
Arkansas	0	17.6	0	.01	.02
California	0	0	0	−.08	−.27
Colorado	0	0	0	−.14	−.34
Connecticut	3.8	9.4	2	.10	−.26
Delaware	0	0	1	−.01	−.23
DC	0	0	0	−.33	−.68
Florida	18.0	0	1	−.05	−.16
Georgia	0	0	0	.09	−.08
Hawaii	. . .	0	0	−.40	−.08
Idaho	0	0	0	−.11	−.13
Illinois	0	0	0	−.08	−.12
Indiana	0	0	0	−.01	−.11
Iowa	0	11.3	0	−.06	−.10
Kansas	0	0	1	−.07	−.13
Kentucky	0	0	0	−.12	−.07
Louisiana	0	0	0	−.21	−.07
Maine	0	11.3	1	−.07	−.08
Maryland	0	0	2	−.11	−.21
Massachusetts	0	0	1	−.18	−.11
Michigan	0	0	0	−.00	−.16
Minnesota	0	4.4	0	−.04	−.19
Mississippi	5.6	−5.6	0	−.03	.01
Missouri	0	0	0	.04	−.07
Montana	1.1	1.1	0	−.26	−.17
Nebraska	3.4	16.9	1	−.13	−.14
Nevada	6.8	0	0	−.12	−.17
New Hampshire	27	0	1	−.04	−.28
New Jersey	0	0	2	−.03	−.19
New Mexico	20.3	0	0	−.03	−.19
New York	2.4	8.2	1	−.16	−.24
North Carolina	0	0	1	.02	−.06
North Dakota	0	0	0	−.25	−.05
Ohio	0	0	1	−.03	−.12
Oklahoma	0	9.1	3	−.22	−.12
Oregon	0	0	0	−.10	−.11
Pennsylvania	0	0	0	−.09	−.11
Rhode Island	0	3.6	1	.01	−.23
South Carolina	0	0	2	.08	−.02
South Dakota	0	0	1	−.08	−.17
Tennessee	0	0	2	.01	−.03
Texas	0	0	0	−.14	−.21
Utah	49.9	0	0	−.09	−.09
Vermont	0	0	0	−.04	−.23
Virginia	0	0	1	−.04	−.04
Washington	.8	8.5	0	−.03	−.22
West Virginia	0	0	1	−.08	−.03
Wisconsin	0	0	1	−.15	−.23
Wyoming	0	0	0	−.28	−.30

Source: Tax rates and per capita consumption from the Beer Institute's *Brewer's Almanac* (various years).

survive this addition to the list of covariates does not, to our mind, constitute a serious challenge to the importance of taxes in influencing consumption.

The second article (Dee 1999) does focus on youth drinking, utilizing MTF data for the period 1977–92. Dee constructed 3,941 observations from the micro data, one for each group of high school seniors in the MTF sample defined by state, year, sex, and race. His dependent variables are drinkers (percentage of the group that had taken a drink in the preceding month), moderate drinkers (percentage who reported having ten or more drinks in the preceding month), and heavy drinkers (percentage who reported drinking five or more drinks on a single occasion within the preceding two weeks). Using weighted least squares, Dee estimates a model that includes indicators of race, gender, age, and year, together with two alcohol-policy variables: the state excise tax on beer and an indicator of whether the MPA was eighteen. Each equation was estimated with and without state fixed effects. The results for all three dependent variables (prevalence of drinkers, moderate drinkers, and heavy drinkers) follow the same pattern. The MPA variable remains positive and significant and of a magnitude to suggest that an MPA of eighteen increased the prevalence of each of the three drinking categories by at least 2 or 3 percentage points. On the other hand, the beer-tax coefficients, which are negative and significant when state fixed effects are left out, become negligible when they are included. On this basis, Dee concludes that "beer taxes have relatively small and statistically insignificant effects on teen drinking" (p. 289). It should be noted that, owing to the limitations of the MTF data, this conclusion is based on a very sparse specification, something that we are able to remedy using NLSY data in what follows.

Both papers also analyze the effect of excise taxes on vehicle fatalities, which is beyond the scope of our paper (see Dee and Evans, chap. 3 in this volume). But there is a logical relation: if excise taxes reduce vehicle-fatality rates, it is most likely through the mechanism of reducing the frequency of heavy drinking.

8.3.1 The Data

The NLSY was initiated in 1979 and has interviewed the sample of 12,686 youths (aged fourteen to twenty-two in 1979) annually since then, albeit with some attrition. In addition to extensive information on the sample youths' labor market experiences, education, family composition, and personal characteristics, the NLSY asked a series of questions about drinking behavior in the years 1982–85 and 1988–89. Among other items, NLSY respondents were asked whether they had consumed alcohol in the thirty-day period before the interview and, if so, were asked a series of questions concerning the quantities that they had consumed on drinking occasions during that period. From these items, we define two binary variables, *drinks* and *binges. Drinks* equals 1 if the respondent reports having

consumed at least one drink in the previous thirty days. *Binges* equals 1 if the respondent reports having consumed at least six drinks on four or more occasions in the previous month.[6] For the six years of the NLSY survey that included these items, the overall prevalence of *drinks* is 70 percent and of *binges* is 14 percent.

We estimated a series of probit regressions on these two variables to determine the influence of alcohol-control measures and drinking environment on individual drinking decisions. In line with our earlier research on drinking (Cook and Moore 1993a, 1994), we use two specifications throughout this exercise. The "short form" includes predetermined covariates: indicators of sex, race, primary ethnic identification, birth cohort, age, cognitive ability (as measured by the Armed Forces Qualifying Test [AFQT] percentile score), parents' education, and several descriptors of the respondent's family when he or she was fourteen (family composition, whether the parents worked, religion, and size of place). The "long form" adds to this list a number of variables that reflect choices made by the respondent (and hence are quite possibly endogenous in the sense of being influenced by drinking history): weight, years of school completed, marital status, number of children in the household, school and employment status, income, and education aspirations. The long form also includes indicators of whether the respondent's parents had a drinking problem, based on items included in the 1988 survey. Table 8.3 provides definitions and means.

Before discussing the estimates for the alcohol-control variables, we first review some of the interesting findings on the association between socioeconomic (SES) characteristics and self-reported drinking.

8.3.2 Results for SES Variables

Table 8.4 presents complete results for the short and long forms on both the *drinks* and the *binges* variables. The coefficients reported here are the marginal effects on the probability, calculated from the estimated coefficients in probit regressions and evaluated at the sample means. Thus, the prevalence of bingeing is 14 percentage points higher for males than for females (or, in the long form, 12 percentage points), other things equal. The estimated standard errors are cluster corrected to take account of the fact that there are up to six observations on each respondent[7] and corrected for general heteroskedasticity using the Huber/White/Sandwich estimator.

6. This definition is more stringent than that of the binge variable from the MTF, which required only one occasion of five or more drinks in the preceding two weeks. Unfortunately, that item cannot be estimated from the NLSY.

7. We estimated versions of each model that imposed an AR(1) structure on the within-person correlations. The results suggested that the unstructured clustering correction performed better; the pattern of correlations across years was more consistent with a permanent effect than an AR(1). As a separate matter, we tested for bias in the estimated standard errors due to clustering at the state level and found it to be inconsequential—approximately 5 percent.

Table 8.3 **Variable Means and Definitions from NLSY, 1982–85, 1988–89 (N = 68,377)**

Variable	Mean (S.D.)	Definition
Drinks	.703	Dummy variable (d.v.): 1 if respondent drank any alcohol in the past 30 days, 0 otherwise
Binges	.143	D.v.: 1 if respondent drank 6 or more drinks containing alcohol at least 4 times in the past month
Beer tax	59.62 (63.19)	State excise tax on beer per case of 24 12-ounce cans in constant cents (1993)
MPA binding	.097	D.v.: 1 if respondent's age is currently less than his or her state's MPA
Per capita ethanol	2.06 (.39)	Average state per capita consumption of ethanol matched to respondent by state and year (computed from *Brewers Almanac* data on consumption of beer, wine, and spirits)
Age less than 21	.185	D.v.: 1 if respondent age younger than 21
Male	.509	D.v.: 1 if respondent is male
Black	.140	D.v.: 1 if respondent is black non-Hispanic
Hispanic	.064	D.v.: 1 if respondent is Hispanic
Year dummies (each)	.167	D.v.: indicators for each year, 1983, 1984, 1985, 1988, 1989
Cohort indicators:		D.v.s: 1 for each age (15–22) in 1979
Age 15	.128	
Age 16	.121	
Age 17	.124	
Age 18	.126	
Age 19	.129	
Age 20	.124	
Age 21	.128	
Age 22	.031	
Parents' education:		
Mother's education	10.99 (3.76)	Highest grade completed
Missing data, mother's education	.053	D.v.
Father's education	10.63 (4.96)	Highest grade completed
Missing data, father's education	.102	D.v.
Family history:		
Lived with mother at age 14	.942	D.v.
Lived with father at age 14	.776	D.v.
Mother worked when respondent was 14	.526	D.v.
Father worked when respondent was 14	.814	D.v.
Lived with both biological parents until age 18	.657	D.v.
AFQT percentile score	45.89 (29.93)	
Missing data, AFQT percentile score	.046	D.v.

Table 8.3 (continued)

Variable	Mean (S.D.)	Definition
Primary ethnic identification (excludes black, Hispanic, "American"):		
Asian	.010	D.v.
United Kingdom	.272	D.v.
French	.066	D.v.
German	.198	D.v.
Other European	.014	D.v.
American Indian	.042	D.v.
Irish	.062	D.v.
Italian	.030	D.v.
Polish	.016	D.v.
Other ethnic group	.046	D.v.
Religion in which respondent was raised:		
None	.040	D.v.
Protestant	.272	D.v.: excludes Baptist
Baptist	.239	D.v.
Jewish	.013	D.v.
Roman Catholic	.326	D.v.
Other Religion	.108	D.v.
Location of respondent's residence:		
Not in SMSA	.211	D.v.
In SMSA, not central city	.564	D.v.
Central city	.137	D.v.
Highest grade that respondent completed by survey year:[a]		
Less than 12	.207	D.v.
12 (high school degree)	.401	D.v.
1–3 years of college	.243	D.v.
At least 4 years of college	.149	D.v.
Employment status at time of survey:		
Out of labor force	.184	D.v.
Employed	.701	D.v.
Unemployed	.084	D.v.
Armed forces	.031	D.v.
Current school status:		
In school	.184	D.v.
Any relatives been alcoholics or problem drinkers? (asked in 1988):		
Mother	.044	D.v.: biological only
Father	.178	D.v.: biological only
Children in household under 18:		
One	.160	D.v.
Two	.114	D.v.
Three or more	.046	D.v.

(*continued*)

Table 8.3 (continued)

Variable	Mean (S.D.)	Definition
Current living arrangements:		
Lives by self	.650	D.v.
Lives in military barracks	.015	D.v.
Lives in dormitory	.030	D.v. includes living in fraternity or sorority
Lives with others	.013	D.v.
Wage and salary income	9,761.58 (15,248.80)	Past calendar year
Weight	154.93 (47.92)	Pounds
Marital status:		
Married	.382	D.v.
Single	.539	D.v.
Separated/divorced/widowed	.079	D.v.
Education aspirations	14.50 (2.23)	Highest grade respondent would like to complete (asked in 1982)

[a]Variables reported below this point are included in long-form regressions only. SMSA = standard metropolitan statistical area.

Race and ethnicity effects are remarkably strong. Blacks and Hispanics are less likely to drink or binge than are non-Hispanic whites. Among whites, those who identify themselves as being from Irish, Polish, German, or French stock are disproportionately represented among the drinkers and bingers. Relatedly, childhood religion is important; compared with Roman Catholics (the omitted category), all other groups are less likely to binge drink, and all but Jews are less likely to drink at all.

The AFQT results are particularly interesting. The percentile score is strongly *positively* associated with drinking but *negatively* related to bingeing participation. Most of that negative effect is dissipated in the long form, perhaps because in the short form the AFQT acts as a proxy for schooling (which is not included in the short form).

In the long form, we see that the prevalence of drinking and the prevalence of bingeing are inversely related to years of school completed at the time of the survey and to education aspirations (in 1982) and are lower for those in school than for those who are not. Different living arrangements are associated with dramatically different participation rates: compared with those who live with their parents (the omitted category), those who live in a dormitory or a fraternity/sorority house are far more likely to binge (9 percentage points). Marriage and children both reduce drinking and bingeing.

The likelihood of bingeing (but not drinking) increases with body weight. This may be an artifact of our definition of *bingeing,* which we define as weekly bouts of six or more drinks; ideally, we would tailor the definition so that the drink count was proportional to body weight. Six drinks

Table 8.4 **Probit Regression Results, NLSY, 1982–85, 1988–89, Drinking and Bingeing (× 100)**

Variable (omitted category in brackets)	Drink in Last 30 Days		Binge	
	(1)	(2)	(3)	(4)
Beer tax	−2.137***	−2.404***	−.254	−.153
	(.532)	(.542)	(.324)	(.316)
MPA binding	−5.516***	−5.477***	−2.536***	−2.610***
	(1.100)	(1.141)	(.573)	(.551)
Under 21	−4.826***	−4.146***	−.436	−.733
	(.829)	(.866)	(.517)	(.500)
Male	17.323***	15.517***	14.278***	11.859***
	(.677)	(.835)	(.434)	(5.051)
Race [other]:				
Black	−.379	−1.594	−4.043***	−4.040***
	(1.475)	(1.560)	(.792)	(.780)
Hispanic	−2.651*	−2.121	−2.348***	−1.438*
	(1.550)	(1.580)	(.808)	(.812)
Year [1982]:				
1983	−.331	−.406	−.782**	−.664*
	(.537)	(.577)	(.333)	(.337)
1984	2.184***	2.193***	−.971**	−.584
	(.688)	(.644)	(.370)	(.381)
1985	−1.622**	−3.682***	−6.137***	−3.184***
	(.651)	(1.244)	(.327)	(.606)
1988	−1.663**	−.628	−2.526***	−.941*
	(.701)	(.883)	(.405)	(.499)
1989	−6.092***	−5.051***	−3.821***	−2.061***
	(.724)	(.949)	(.380)	(.483)

(*continued*)

Table 8.4 (continued)

Variable (omitted category in brackets)	Drink in Last 30 Days		Binge	
	(1)	(2)	(3)	(4)
Cohort indicators [age 14]:				
Age 15	.836	.479	.434	.200
	(1.386)	(1.397)	(.867)	(.822)
Age 16	1.987	1.851	.700	.631
	(1.404)	(1.423)	(.898)	(.872)
Age 17	1.064	.736	.004	−.093
	(1.479)	(1.514)	(.888)	(.865)
Age 18	1.929	2.181	.624	8.202
	(1.500)	(1.545)	(.939)	(.934)
Age 19	.758	.579	.486	1.194
	(1.543)	(1.621)	(.964)	(.994)
Age 20	.535	1.094	−1.021	−.145
	(1.615)	(1.686)	(.904)	(.949)
Age 21	−.761	.016	−.679	.935
	(1.607)	(1.679)	(.935)	(1.022)
Age 22	−3.350	−2.829	−2.804**	−1.495
	(2.587)	(2.704)	(1.195)	(1.334)
Parent's education:				
Mother's education	.308**	.325**	.030	.137
	(.151)	(.156)	(.085)	(.084)
Missing data, mother's education	4.051*	4.679**	2.294*	3.216**
	(2.024)	(2.093)	(1.361)	(1.454)
Father's education	.833***	.842***	.113	.198***
	(.125)	(.130)	(.073)	(.073)
Missing data, father's education	6.172***	5.690***	−.078	.393
	(1.511)	(1.578)	(.945)	(.971)

Family history:				
Lived with mother at age 14	2.916*	2.958*	.058	−.780
	(1.605)	(1.643)	(.886)	(.914)
Lived with father at age 14	−1.232	−.626	−1.435**	−1.059
	(1.172)	(1.208)	(.706)	(.687)
Mother worked when respondent was 14	1.646**	1.357*	.532	.505
	(.711)	(.730)	(.411)	(.402)
Father worked when respondent was 14	2.302**	2.158**	−.021	.007
	(1.038)	(1.066)	(.604)	(.587)
Lived with both biological parents until 18	−1.983**	−2.032**	−.350	.469
	(.930)	(.969)	(.532)	(.525)
AFQT percentile score	.180***	.160***	−.081***	−.022**
	(.016)	(.019)	(.009)	(.010)
Missing data, AFQT score	−1.143	−.954	−4.856***	−2.436**
	(1.896)	(2.347)	(.725)	(1.018)
Primary ethnic identification [black, Hispanic, or "American"]:				
Asian	−5.098	−3.649	−4.904**	−4.469**
	(3.562)	(3.468)	(1.596)	(1.490)
United Kingdom	4.088***	3.688**	2.295**	1.583*
	(1.417)	(1.448)	(.991)	(.943)
French	7.604***	6.985***	3.358***	2.806**
	(1.760)	(1.795)	(1.405)	(1.339)
German	7.615***	7.661***	3.475***	3.047***
	(1.466)	(1.490)	(1.109)	(1.075)
Other European	−.589	−.877	−1.121	−1.287
	(2.811)	(3.000)	(1.597)	(1.522)
American Indian	−1.704	−2.663	1.971	1.008
	(2.101)	(2.200)	(1.370)	(1.280)

(*continued*)

Table 8.4 (continued)

Variable (omitted category in brackets)	Drink in Last 30 Days		Binge	
	(1)	(2)	(3)	(4)
Irish	8.389***	8.193***	5.047***	4.992***
	(1.826)	(1.879)	(1.454)	(1.433)
Italian	9.324***	8.671***	.288	.273
	(2.332)	(2.374)	(1.569)	(1.492)
Polish	6.224*	6.527*	4.700**	4.248**
	(3.496)	(3.453)	(2.493)	(2.342)
Other ethnic group	5.021**	3.982*	.866	.388
	(2.205)	(2.303)	(1.377)	(1.324)
Religion in which respondent was raised [Roman Catholic]:				
None	−9.333***	−9.267***	−2.366**	−2.497***
	(2.010)	(2.088)	(.844)	(.799)
Protestant	−5.978***	−6.132***	−1.951***	−1.878***
	(1.157)	(1.184)	(.570)	(.550)
Baptist	−10.951***	−10.624***	−3.781***	−3.305***
	(1.196)	(1.226)	(.581)	(.571)
Jewish	6.903*	8.719**	−3.094	−2.864
	(3.744)	(3.830)	(1.659)	(1.572)
Other religion	−18.526***	−18.560***	−5.890***	−5.384***
	(1.479)	(1.531)	(.537)	(.525)
Location of respondent's residence [not in SMSA]:				
In SMSA, not in central city	6.271***	5.157***	.665	.590
	(.742)	(1.026)	(.437)	(.426)
In central city	4.568***	2.577**	.006	−.258
	(.966)	(1.026)	(.593)	(.569)

Highest grade that respondent completed in survey year [12 years]:		
Less than 12	2.199**	2.743***
	(.913)	(.569)
1–3 years of college	.274	−1.221**
	(.985)	(.527)
At least 4 years of college	−.618	−4.886***
	(1.423)	(.578)
Current employment status [employed]:		
Outside labor force	−10.066***	−1.289***
	(.775)	(.432)
Unemployed	.930	1.451***
	(.802)	(.504)
Current school status:		
In school	−5.939***	−3.221***
	(.867)	(.425)
Any relatives been problem drinkers?		
Mother	1.775	.597
	(1.827)	(1.018)
Father	3.684***	2.324***
	(.898)	(.548)
Number of children under 18 in household [none]:		
One	−3.173***	−1.451***
	(.886)	(.504)
Two	−3.738***	−1.601***
	(1.079)	(.582)
Three or more	−4.574***	−1.384
	(1.547)	(.823)

(*continued*)

Table 8.4 (continued)

Variable (omitted category in brackets)	Drink in Last 30 Days		Binge	
	(1)	(2)	(3)	(4)
Living arrangements [lives with parents]:				
By self		7.724***		1.703***
		(.744)		(.390)
Military barracks		1.749		2.565
		(9.916)		(5.969)
Dormitory		6.735***		9.132***
		(1.658)		(1.465)
With others		−34.386***		−5.739***
		(2.156)		(.689)
Wage and salary income		.0000738**		.0000122
		(.0000336)		(.0000149)
Weight		−.025**		.0300***
		(.012)		(.0063)
Marital status [single]:				
Married		−14.981***		−7.511***
		(.903)		(.436)
Separated/divorced/widowed		1.059		.602
		(1.198)		(.675)
Education aspirations		−.055		−.454***
		(.219)		(.122)

Note: Estimated using 1982–85 and 1988–89 NLSY data: $N \geq 49{,}674$. Marginal effects are computed at full sample means. Cluster-corrected robust standard errors are given in parentheses.

***Statistically significant at the 1 percent level.

**Statistically significant at the 5 percent level.

*Statistically significant at the 10 percent level.

typically have a less intoxicating effect on a man weighing two hundred pounds than three drinks do on a woman weighing one hundred pounds.

Tables 8.5 and 8.6 present the results of estimating the same specification for males and females separately. The patterns that are evident in the results from the combined sample survive this decomposition. One interesting exception is that, while women are decidedly less likely to binge drink when they have children, that is not true for men. Both men and women binge less when married, but divorced men end up bingeing *more* than their single brethren.

In summary, it appears that binge drinking is most prevalent among those who are non-Hispanic white, left school early or are in school but live in a dormitory, are currently unmarried, have low cognitive ability, grew up in a Roman Catholic home, and have roots in Ireland or Poland.

8.3.3 Tax and MPA Effects

At the top of tables 8.4–8.6 are the estimates of the effects of the beer excise tax and MPA variable, for both the short and the long form, for both *drinks* and *binges.* Beginning with the combined-sample results in table 8.4, we see that a binding MPA is associated with a reduction of the prevalence of drinking (which is 70 percent overall) by about 5.5 percentage points and a reduction of the prevalence of bingeing (14 percent overall) by 2.5 percentage points. These results are highly significant and little affected by the addition of the long-form covariates. The estimated effect of the beer excise tax on drinking prevalence is statistically significant and quite important: a dollar increase per case reduces prevalence by over 2 percentage points. On the other hand, the effect of the tax on the prevalence of bingeing is much smaller and insignificantly different from 0. From tables 8.5 and 8.6, we see that the results for males and females are similar, the main difference being that MPA binding reduces male bingeing prevalence by 4 percentage points and female bingeing prevalence by just 1.5 percentage points, in line with the sexes' very different baseline rates.

The excise tax has negligible effects on bingeing in these specifications; if correct, then it is logical to suppose that it will have little effect on motor-vehicle-injury rates either. That conclusion is in line with the revisionists, including Dee (1999), Mast, Benson, and Rasmussen (1999), and Dee and Evans (chap. 3 in this volume). In our view, there remains the possibility that the excise tax does reduce bingeing prevalence among youths but that the effect is masked by other state-level policies or characteristics. We experiment with two approaches to exploring this possibility: controlling for state fixed effects and including a measure of how wet the state drinking environment is, namely, per capita ethanol consumption.[8]

8. This variable is calculated from data on wholesale shipments of wine, beer, and liquor. The ethanol content of each type of beverage is estimated using standard percentages. The total ethanol is then divided by the state's population aged fourteen and older to get the annual state per capita ethanol consumption.

Table 8.5 **Probit Regression Results, NLSY, 1982–85, 1988–89, Drinking and Bingeing (× 100)—Males**

Variable (omitted category in brackets)	Drink in Last 30 Days		Binge	
	(1)	(2)	(3)	(4)
Beer tax	−1.859***	−2.306***	−.410	−.373
	(.681)	(.701)	(.608)	(.620)
MPA binding	−4.911***	−4.711***	−3.980***	−4.069***
	(1.446)	(1.493)	(1.116)	(1.133)
Age less than 21	−5.239***	−4.619***	−.582	−.925
	(1.091)	(1.129)	(.976)	(.989)
Race [other]:				
Black	−.119	.349	−6.945***	−6.622***
	(1.900)	(2.020)	(1.511)	(1.591)
Hispanic	−1.994	−1.660	−3.213*	−1.889
	(2.099)	(2.159)	(1.612)	(1.692)
Year [1982]:				
1983	.583	.283	−.470	−.743
	(.667)	(.715)	(.643)	(.667)
1984	3.036***	2.076**	−.510	−.392
	(.727)	(.801)	(.714)	(.756)
1985	−.346	1.780	−8.868***	−3.421**
	(.841)	(1.800)	(.677)	(1.485)
1988	−.678	−1.954*	−3.258***	−2.170**
	(.911)	(1.176)	(.788)	(.975)
1989	−4.015***	−5.309***	−5.137***	−3.614***
	(.950)	(1.280)	(.753)	(.970)

Cohort indicators [age 14]:				
Age 15	1.167	.259	−.546	−1.223
	(1.721)	(1.760)	(1.558)	(1.543)
Age 16	2.904	1.318	2.035	1.118
	(1.735)	(1.821)	(1.700)	(1.696)
Age 17	.660	−1.493	−.424	−1.601
	(1.879)	(2.001)	(1.661)	(1.654)
Age 18	1.850	−.594	.990	.333
	(1.890)	(2.068)	(1.741)	(1.781)
Age 19	.266	−2.281	1.180	1.236
	(2.009)	(2.240)	(1.830)	(1.901)
Age 20	1.906	−.777	−.786	−1.012
	(2.055)	(2.275)	(1.786)	(1.871)
Age 21	−.431	−2.703	−.606	.444
	(2.156)	(2.381)	(1.824)	(1.965)
Age 22	−.672	−4.454	−2.753	−2.462
	(3.365)	(3.788)	(2.503)	(2.639)
Parent's education:				
Mother's education	−.138	−.035	.042	.203
	(.197)	(.206)	(.163)	(.168)
Missing data, mother's education	1.327	1.787	3.279	3.561
	(2.629)	(2.740)	(2.485)	(2.639)
Father's education	.626***	.722***	.018	2.175
	(.169)	(.176)	(.142)	(.147)
Missing data, father's education	2.272	2.791	−.843	.619
	(2.065)	(2.141)	(1.807)	(1.950)

(*continued*)

Table 8.5 (continued)

Variable (omitted category in brackets)	Drink in Last 30 Days		Binge	
	(1)	(2)	(3)	(4)
Family history:				
Lived with mother at age 14	2.377	2.187	1.025	−.347
	(2.100)	(2.186)	(1.718)	(1.812)
Lived with father at age 14	−3.012**	−3.256**	−2.889**	−2.600*
	(1.508)	(1.555)	(1.381)	(1.408)
Mother worked when respondent was 14	−.075	−.496	1.224	1.063
	(.946)	(.975)	(.798)	(.814)
Father worked when respondent was 14	3.608***	3.677**	1.312	1.462
	(1.398)	(1.453)	(1.157)	(1.175)
Lived with both biological parents until 18	−.105	−.495	−1.278	−.412
	(1.231)	(1.297)	(1.034)	(1.068)
AFQT percentile score	.129***	.131***	−.116***	−.029
	(.021)	(.026)	(.017)	(.021)
Missing data, AFQT score	−2.749	−.725	−8.111***	−4.415**
	(2.363)	(2.832)	(1.420)	(1.986)
Primary ethnic identification [black, Hispanic, or "American"]:				
Asian	−6.296	−3.521	−11.341***	−11.367***
	(4.623)	(4.449)	(2.361)	(2.103)
United Kingdom	2.080	1.122	2.503	1.770
	(1.874)	(1.963)	(1.789)	(1.820)
French	4.318*	3.824	3.444	3.501
	(2.424)	(2.507)	(2.502)	(2.553)
German	5.712***	5.813***	4.821**	4.372**
	(1.941)	(1.988)	(2.010)	(2.058)

Other European	5.023	4.006	1.745	.869
	(3.730)	(4.003)	(3.675)	(3.656)
American Indian	−.200	−1.258	1.346	.377
	(2.830)	(3.058)	(2.354)	(2.350)
Irish	4.910**	4.900*	5.676**	5.997**
	(2.319)	(2.371)	(2.403)	(2.481)
Italian	7.431**	6.516**	−1.660	−.683
	(2.736)	(2.823)	(2.655)	(2.752)
Polish	1.943	2.102	6.414	6.149
	(4.502)	(4.471)	(4.243)	(4.184)
Other ethnic group	1.308	.473	−.422	−.887
	(3.042)	(3.256)	(2.469)	(2.531)
Religion in which respondent was raised [Roman Catholic]:				
None	−9.044***	−9.072***	−4.043**	−4.582**
	(2.631)	(2.745)	(1.652)	(1.632)
Protestant	−5.291***	−5.614***	−3.218***	−3.193***
	(1.602)	(1.668)	(1.136)	(1.149)
Baptist	−9.391***	−8.993***	−6.494***	−5.764***
	(1.666)	(1.729)	(1.170)	(1.199)
Jewish	5.113	7.269*	−6.582*	−5.513
	(4.335)	(3.847)	(3.300)	(3.474)
Other religion	−19.826***	−19.809***	−10.403***	−10.000***
	(2.229)	(2.340)	(1.103)	(1.132)
Location of respondent's residence [not in SMSA]:				
In SMSA, not in central city	4.842***	3.834***	1.479*	1.425*
	(.991)	(1.033)	(.831)	(.851)
In central city	.712	−.798	−.669	−.626
	(1.298)	(1.389)	(1.090)	(1.114)

(*continued*)

Table 8.5 (continued)

Variable (omitted category in brackets)	Drink in Last 30 Days		Binge	
	(1)	(2)	(3)	(4)
Highest grade that respondent completed in survey year [12 years]:				
Less than 12		2.156*		2.976***
		(1.167)		(1.059)
1–3 years of college		.719		−1.426
		(1.352)		(1.119)
At least 4 years of college		.001		−7.888***
		(1.961)		(1.279)
Current employment status [employed]:				
Outside labor force		−9.228***		−.800
		(1.270)		(1.037)
Unemployed		.041		2.168**
		(.991)		(.955)
Current school status:				
In school		−7.811***		−5.981***
		(1.202)		(.875)
Any relatives been problem drinkers?				
Mother		−.266		−2.068
		(2.678)		(2.114)
Father		1.943		3.723***
		(1.277)		(1.159)
Number of children under 18 in household [none]:				
One		.099		.493
		(1.260)		(1.223)

Two	−.789	1.791
	(1.619)	(1.533)
Three or more	−1.591	.775
	(2.360)	(2.059)
Living arrangements [lives with parents]:		
By self	5.880***	2.587***
	(.929)	(.789)
Military barracks	1.757	5.474
	(9.500)	(9.805)
Dormitory	7.880***	10.914***
	(1.783)	(2.321)
With others	−40.468***	−10.542***
	(2.511)	(1.335)
Wage and salary income	.000023	−.000021
	(.000030)	(.000029)
Weight	.031*	.058***
	(.017)	(.014)
Marital status [single]:		
Married	−10.336***	−11.314***
	(1.337)	(.926)
Separated/divorced/widowed	1.751	2.486*
	(1.660)	(1.468)
Education aspirations	−.127	−.750***
	(.286)	(.239)

Note: Estimated using 1982–85 and 1988–89 NLSY data: $N \geq 49{,}674$. Marginal effects are computed at full sample means. Cluster-corrected robust standard errors are given in parentheses.

***Statistically significant at the 1 percent level.

**Statistically significant at the 5 percent level.

*Statistically significant at the 10 percent level.

Table 8.6 **Probit Regression Results, NLSY, 1982–85, 1988–89, Drinking and Bingeing (× 100)—Females**

Variable (omitted category in brackets)	Drink in Last 30 Days		Binge	
	(1)	(2)	(3)	(4)
Beer tax	−2.375***	−2.337***	−.133	.095
	(.787)	(.793)	(.321)	(.280)
MPA binding	−5.933***	−6.122***	−1.523***	−1.541***
	(1.559)	(1.633)	(.536)	(.452)
Age younger than 21	−4.047***	−3.552***	−.333	−.692
	(1.196)	(1.257)	(.504)	(.434)
Race [other]:				
Black	.040	−2.433	−1.722**	−1.813**
	(2.162)	(2.253)	(.819)	(.686)
Hispanic	−2.329	−1.911	−1.546*	−.978
	(2.176)	(2.205)	(.766)	(.676)
Year [1982]:				
1983	−1.266	−1.100	−.924***	−.487
	(.802)	(.869)	(.311)	(.300)
1984	1.231	2.272**	−1.189***	−.521
	(.883)	(.971)	(.341)	(.341)
1985	−2.804***	−7.198***	−4.006***	−2.464***
	(.943)	(1.645)	(.288)	(.392)
1988	−2.517**	.758*	−1.871***	.299
	(1.016)	(1.271)	(.380)	(.512)
1989	−7.799***	−4.458***	−2.695***	−.580
	(1.033)	(1.344)	(.353)	(.476)

Cohort indicators [age 14]:				
Age 15	.997	1.123	1.239	1.300*
	(2.070)	(2.071)	(.960)	(.851)
Age 16	1.844	2.719	−.145	.428
	(2.086)	(2.097)	(.861)	(.811)
Age 17	2.034	3.417	.261	.995
	(2.172)	(2.187)	(.902)	(.873)
Age 18	2.350	5.104**	.261	1.139
	(2.213)	(2.230)	(.935)	(.923)
Age 19	1.922	3.775	−.003	1.205
	(2.220)	(2.280)	(.930)	(.970)
Age 20	−.303	3.066	−1.216	.569
	(2.347)	(2.419)	(.808)	(.902)
Age 21	−.388	2.705	−.691	1.446
	(2.273)	(2.348)	(.876)	(1.020)
Age 22	−5.019	−.719	−2.839**	−.981
	(3.625)	(3.745)	(.899)	(1.226)
Parent's education:				
Mother's education	.777***	.676***	.040	.092
	(.219)	(.225)	(.081)	(.073)
Missing data, mother's education	6.224**	7.007**	1.671	3.153**
	(3.078)	(3.157)	(1.427)	(1.567)
Father's education	1.010***	.910***	.172**	.158**
	(.175)	(.182)	(.069)	(.064)
Missing data, father's education	9.589***	8.013***	.300	.069
	(2.168)	(2.270)	(.928)	(.830)

(*continued*)

Table 8.6 (continued)

Variable (omitted category in brackets)	Drink in Last 30 Days		Binge	
	(1)	(2)	(3)	(4)
Family history:				
Lived with mother at age 14	3.030	3.297	−.700	−1.039
	(2.350)	(2.371)	(.859)	(.836)
Lived with father at age 14	1.084	2.378	−.383	−.136
	(1.702)	(1.741)	(.636)	(.561)
Mother worked when respondent was 14	3.277***	3.101***	−.012	.154
	(1.009)	(1.033)	(.384)	(.340)
Father worked when respondent was 14	.588	.445	−1.064*	−.942*
	(1.483)	(1.504)	(.590)	(.511)
Lived with both biological parents until 18	−4.111***	−3.975***	.380	1.025**
	(1.332)	(1.376)	(.496)	(.438)
AFQT percentile score	.227***	.194***	−.056***	−.016
	(.024)	(.027)	(.009)	(.010)
Missing data, AFQT score	.413	−1.265	−2.638***	−.848
	(2.922)	(3.617)	(.738)	(1.034)
Primary ethnic identification [black, Hispanic, or "American"]:				
Asian	−3.311	−2.808	.222	.526
	(5.135)	(4.892)	(2.390)	(2.033)
United Kingdom	6.216***	6.351***	2.357**	1.589*
	(2.044)	(2.053)	(1.091)	(.906)
French	10.301***	9.819***	3.484***	2.479**
	(2.517)	(2.628)	(1.577)	(1.324)
German	9.239***	9.305***	2.709***	2.150**
	(2.128)	(2.150)	(1.190)	(1.026)

Other European	−1.970	−3.759	−2.415*	−1.744
	(3.969)	(4.215)	(1.003)	(.933)
American Indian	−2.999	−3.473	2.863**	1.947
	(2.955)	(3.038)	(1.661)	(1.430)
Irish	11.798***	11.392***	5.156***	4.529***
	(2.758)	(2.868)	(1.854)	(1.671)
Italian	11.691***	11.636***	2.676	1.275
	(3.652)	(3.711)	(2.140)	(1.601)
Polish	11.534**	11.167**	3.444	2.940
	(5.020)	(4.964)	(2.910)	(2.311)
Other ethnic group	10.006***	8.836***	2.566*	1.678
	(2.946)	(3.015)	(1.648)	(1.402)
Religion in which respondent was raised [Roman Catholic]:				
None	−9.159***	−8.569***	−.943	−.833
	(2.946)	(3.053)	(.851)	(.726)
Protestant	−6.012***	−6.055***	−.888	−.813*
	(1.582)	(1.607)	(.530)	(.456)
Baptist	−11.677***	−11.572***	−1.696***	−1.469***
	(1.637)	(1.670)	(.530)	(.467)
Jewish	8.167	10.378	−.500	−1.038
	(5.781)	(6.857)	(1.610)	(1.203)
Other religion	−16.451***	−16.564	−2.691***	−2.282***
	(1.909)	(1.956)	(.503)	(.435)
Location of respondent's residence:				
In SMSA, not in central city	7.272***	6.278***	.065	.084
	(1.056)	(1.089)	(.423)	(.368)
In central city	8.391***	5.959***	.625	.221
	(1.387)	(1.459)	(.619)	(.523)

(*continued*)

Table 8.6 (continued)

Variable (omitted category in brackets)	Drink in Last 30 Days		Binge	
	(1)	(2)	(3)	(4)
Highest grade that respondent completed in survey year [12 years]:				
Less than 12		1.543		2.243***
		(1.371)		(.561)
1–3 years of college		.491		−.956**
		(1.387)		(.418)
At least 4 years of college		−1.904		−2.485***
		(1.971)		(.457)
Current employment status [employed]:				
Outside labor force		−7.969***		−.602*
		(.986)		(.346)
Unemployed		2.430**		.870**
		(1.220)		(.470)
Current school status:				
In school		−4.392***		−1.604***
		(1.201)		(.359)
Any relatives been problem drinkers?				
Mother		2.802		1.433*
		(2.479)		(.852)
Father		4.767***		1.418***
		(1.255)		(.443)
Number of children under 18 in household [none]:				
One		−5.491***		−1.992***
		(1.223)		(.363)

Two	−5.690***	−2.454***
	(1.477)	(.374)
Three or more	−6.286***	−2.084***
	(2.098)	(.512)
Living arrangements [lives with parents]:		
By self	9.301***	.995***
	(1.085)	(.331)
Military barracks	1.865	(Dropped)
	(21.641)	
Dormitory	3.482	6.126***
	(2.734)	(1.565)
With others	−6.247	−1.220
	(5.182)	(1.476)
Wage and salary income	.0000715	−.0000796***
	(.0000462)	(.0000255)
Weight	−.0767***	.0084
	(.0183)	(.0052)
Marital status [single]:		
Married	−19.450***	−5.121***
	(1.204)	(.383)
Separated/divorced/widowed	.242	.0004
	(1.667)	(.5262)
Educational aspirations	.122	−.246*
	(.318)	(.109)

Note: Estimated using 1982–85 and 1988–89 NLSY data: $N \geq 49{,}674$. Marginal effects are computed at full sample means. Cluster-corrected standard errors are given in parentheses.

***Statistically significant at the 1 percent level.

**Statistically significant at the 5 percent level.

*Statistically significant at the 10 percent level.

The inclusion of state fixed effects ensures that all permanent characteristics of the state relevant to youthful drinking are accounted for, a virtue that comes at the cost of reducing the relevant variation in the tax variable. The state ethanol-consumption variable arguably provides an efficient control for all state-level factors that might influence drinking, including state licensing and liability rules that may influence alcohol availability, as well as the local drinking culture.

Table 8.7 summarizes the results of these experiments. *Drinking* results are in panel A and *bingeing* results in panel B. The top row of both panels of this table repeats the results with respect to tax and MPA from table 8.4 above. The next row reports the result of adding per capita ethanol consumption: this has a large effect on youthful drinking in its own right, but its inclusion does not undermine the estimated effects of MPA and tax. In the binge equations, the ethanol variable is not influential either directly or indirectly.

The results of including state fixed effects is another story. While there is little change in the MPA results, the estimated tax effects are increased dramatically, to levels that in some cases strain credulity. For example, it is difficult to believe that a dollar increase in the beer tax (the equivalent of $0.25 per six-pack) would reduce the prevalence of drinking by 15 percentage points. This strange result may argue for inclusion of the per capita ethanol variable since the beer tax retains a more modest (and somewhat more credible) effect in fixed-effects specifications that include that variable. Turning to the results on binge prevalence, we see that the fixed-effects specification inflates the estimated influence of tax to such an extent as to make it statistically significant in several specifications. Again, the most reasonable tax effects are found when per capita ethanol is included: a dollar increase (1993 dollars) in the tax reduces the prevalence of bingeing by 3.9 percentage points (short form) or 2.5 percentage points (long form). Our corresponding estimates for the effect of a binding MPA are 2.2 or 2.4 percentage points.

So what is to be concluded about the influence of the beer excise tax on youthful drinking? The picture remains cloudy, in part, no doubt, because the changes in excise taxes between 1981 and 1988 were too few and too small to provide the basis for precise estimates of their effects (see table 8.2 above).[9] It would surely be inappropriate to rule out a role for excise taxes as a control on alcohol abuse since our favored specification, which controls for state fixed effects and overall drinking, suggests that even modest changes in the state beer taxes have had a discernible influence on the prevalence of youthful bingeing.

9. To test whether our results reflect the coincidence of a tax increase with an unusual change in drinking in some state, we reestimated our models a number of times, excluding in each case data from one of the states that experienced a tax increase. None of these exclusions had much effect on our estimates.

Table 8.7 **Probit Regression Results, NLSY 1982–85, 1988–89, Estimated Coefficients (S.E.s), Policy Variables Only**

	Beer Tax	MPA Binding	State per Capita Ethanol Use
	A. Drink in Last 30 Days (× 100)		
No state fixed effects:			
Short form	−2.137***	−5.516***	
	(.532)	(1.100)	
Long form	−2.404***	−5.477***	
	(.542)	(1.141)	
Short form	−1.566***	−5.432***	5.658***
	(.542)	(1.098)	(.952)
Long form	−1.882***	−5.419***	4.941***
	(.553)	(1.141)	(.976)
With state fixed effects:			
Short form	−16.867***	−6.412***	
	(3.021)	(1.112)	
Long form	−13.970***	−6.303***	
	(3.159)	(1.166)	
Short form	−5.210*	−6.017***	12.011***
	(3.054)	(1.109)	(2.566)
Long form	−2.265	−5.907***	11.862***
	(3.233)	(1.162)	(2.636)
	B. Binge (× 100)		
No state fixed effects:			
Short form	−.254	−2.536***	
	(.324)	(.573)	
Long form	−.153	−2.610***	
	(.316)	(.551)	
Short form	−.154	−2.529***	.811
	(.329)	(.573)	(.510)
Long form	−.111	−2.605***	.355
	(.321)	(.551)	(.511)
With state fixed effects:			
Short form	−9.244***	−2.369***	
	(1.841)	(.573)	
Long form	−7.167***	−2.490***	
	(1.836)	(.553)	
Short form	−3.878*	−2.213***	5.474***
	(1.987)	(.578)	(1.523)
Long form	−2.465	−2.352***	4.707***
	(1.995)	(.559)	(1.474)

Note: Estimated using 1982–85, 1988–89 NLSY data: $N \geq 50{,}000$. Marginal effects are computed at full sample means. Cluster-corrected robust standard errors are given in parentheses. All equations included indicators for sex, race, ethnicity, age in 1979, residence in SMSA, parents' education, family structure at age 14, AFQT percentile, and family religion. The long-form equations also include schooling, employment status, income, current school enrollment, weight, marital status, whether either parent was a problem drinker, number of children under 18 in household, living arrangements, and education aspirations in 1982.

***Statistically significant at the 1 percent level.

**Statistically significant at the 5 percent level.

*Statistically significant at the 10 percent level.

Our results in this respect are in accord with much of the literature but contrast with those reported in Dee (1999). His analysis of panel data on bingeing by high school seniors finds that the estimated effect of the beer excise tax switches from statistically significant and negative to insignificant and positive when he enters state fixed effects into the regression specification. His data and specification are different than ours in several potentially important respects, and we will not speculate on why his results appear to contradict ours. We do note, however, that Dee's estimate for the effect of the beer excise tax on bingeing (with state fixed effects included) is not significantly different from ours at the 5 percent level.

8.3.4 Social Influence

The proper interpretation of the strong results on per capita ethanol consumption deserves further discussion. Drinking is a social activity, in the sense that the utility of taking a drink at a particular time and place depends in part on the social setting. For many people, drinking with others is more enjoyable than drinking alone; if one associates with those who are not drinking or who disapprove of drinking, the natural inclination would be to substitute another type of beverage. Of course, the social setting may also influence drinking decisions directly, by determining the availability of drinks. Given these mechanisms of social influence, it seems reasonable to presume that individual drinking is influenced by how wet the social environment is.

If individual drinking decisions are positively linked to the drinking practices of others, then there will be a social multiplier in the response of aggregate alcohol consumption to prices, income, and other external influences; social influence will amplify the direct effects of such variables. This mechanism may be particularly important for initiation into drinking. Indeed, the assumption that peers are central to adolescent alcohol and drug use is reflected in the social-influence paradigm underlying many prevention programs (Bauman and Ennett 1996).

One type of evidence supporting this view is that adolescents whose friends drink are far more likely to drink themselves. For example, Norton, Lindrooth, and Ennett (1998) studied drinking in thirty-six schools, finding that adolescents in schools with a high prevalence of drinking were more likely to drink themselves. This result holds after controlling for various individual, household, and neighborhood characteristics. Indeed, the estimated effect is very large, suggesting that an increase of 10 percentage points in group drinking is associated with a equal increase in the likelihood of individual drinking.

But this result is compatible with several other mechanisms besides social influence (Manski 1995). First, it may be the result of an endogenous selection process, where some parents consider the behavior of the local

adolescents in deciding where to live. Second, it may reflect a "contextual" effect, where the individual's drinking behavior is influenced by other characteristics of the group (commitment to getting a good education) but not by the group's drinking per se. Third, it may be true that youths within the same group share some important but unobserved aspect of the environment, such as whether local merchants are willing sell alcohol to youths.

Of these three mechanisms, we are inclined to rule out the first in interpreting our results since the choice of state in which to live (as opposed to neighborhood) is not likely to be much affected by a concern for drinking practices. That leaves several possible interpretations for the estimated effect of the per capita consumption variable: it could be a proxy for unobserved dimensions of alcohol regulation and availability; it could be a proxy for local cultural values that are relevant to drinking, such as the value of higher education or starting a family; and it could be directly relevant to youth drinking through a process of social contagion. This variable arguably belongs in the equation regardless of the correct interpretation, but the interpretation matters in evaluating the policy implications of our results. In particular, if social contagion is the right explanation, then the excise tax will have an indirect effect on youth drinking through its effect on per capita consumption; if, on the other hand, the per capita–consumption variable is only a proxy for other factors, then there will be no indirect effect.

8.4 Drinking Persistence and Habit

Alcohol-control measures that promote moderation or abstinence will produce contemporaneous public-health benefits, such as reduced injury rates. To the extent that drinking is habit-forming, there will also be delayed benefits. The belief that teenage drinking is habit-forming is plausible but perhaps not so well established as the notion that tobacco, heroin, and some other drugs are habit-forming. In what follows, we document the high degree of autocorrelation in youth drinking and provide evidence that the autocorrelation may in part reflect habit formation.

The NLSY provides four consecutive years of data on drinking, 1982–85. The intertemporal pattern for *drinks* and *binges* is displayed in probability-tree diagrams in figures 8.5 and 8.6. The patterns of response suggest a heterogeneous population, including the full range of possibilities from persistent abstainers to persistent drinkers. The probability of drinking in 1985, given three successive years of drinking, equals 0.90 and that of abstaining, given three previous years of abstinence, equals 0.84.

Such heterogeneous patterns presumably reflect an underlying heterogeneity, both in individuals' tastes for alcohol and in the contexts in which they make drinking decisions. But these patterns also suggest habit forma-

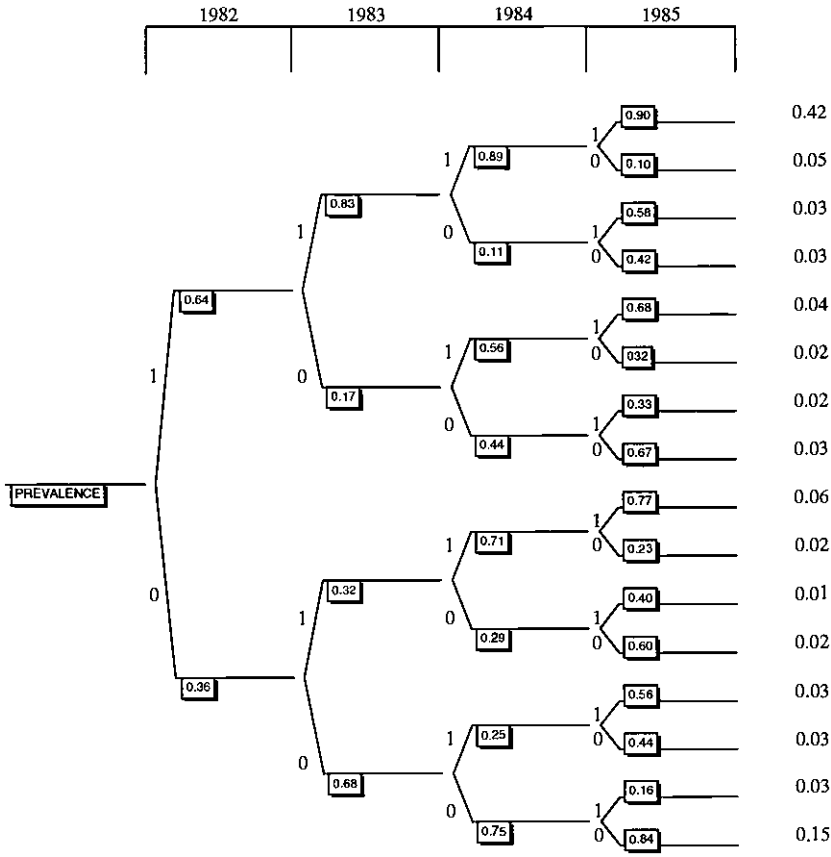

Fig. 8.5 Probability tree for drinking prevalence, 1982–85
Note: 1 = consumed alcohol in past 30 days; 0 = did not consume any alcohol in past 30 days.

tion, where persistence results from a process whereby experience with alcohol strengthens subsequent taste for alcohol.[10]

The economics literature offers a number of analogous inquiries where the econometric challenge is to distinguish between state dependence and heterogeneity (Heckman 1981). An individual who was unemployed last period is relatively likely to be unemployed this period. Does past unemployment therefore cause future unemployment, or does unemployment in each period simply act as a proxy for some unobserved traits that render the individual more prone to unemployment (Ellwood 1982)? Labor force

10. On the dynamics of habitual consumption in general, see Becker (1992, 1996) and Becker and Murphy (1988). Empirical studies of habituation and addiction include Becker, Grossman, and Murphy (1991), Chaloupka and Wechsler (1996), Grossman, Chaloupka, and Sirtalan (1998), and Moore and Cook (1995).

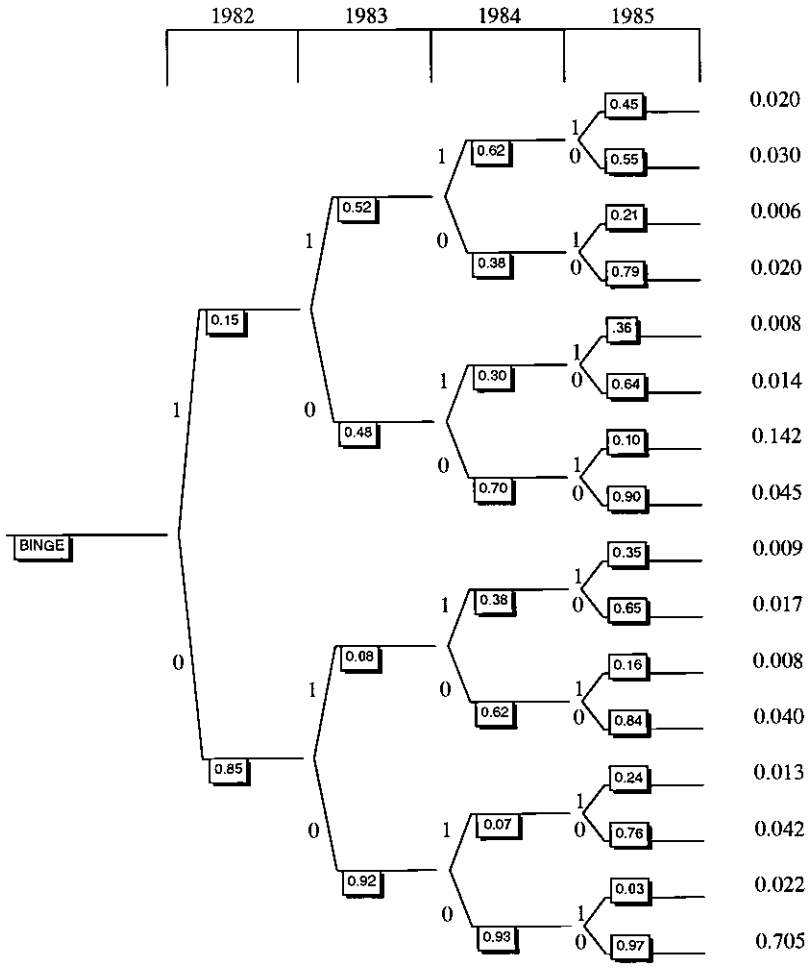

Fig. 8.6 Probability tree for bingeing, 1982–85
Note: 1 = binge drinking; 0 = did not binge drink.

participation patterns of married women (Heckman and Willis 1977) and a wide range of other behaviors that are strongly autocorrelated give rise to the same question of interpretation. If the event experienced in time $t - 1$ somehow alters preferences or opportunities in such a way that the likelihood of experiencing the event in period t is altered, the observed correlation reflects a structural relation or true state dependence (Heckman 1981).[11] If the event is more likely to be experienced by a given indi-

11. There is sometimes a distinction made in the literature between habit formation and state dependence, habit formation relating to persistence in continuous outcomes (quantities)

vidual only because he or she possesses some permanent trait or characteristic that renders the event more likely, such as unobserved tastes, abilities, or motivation, spurious state dependence results, and the observed correlation of events has no structural interpretation. It is also possible that serial correlation in other unobservables, such as environment, will give rise to spurious state dependence.

In distinguishing between habit and heterogeneity, only habit clearly predicts that more recent behavior should have greater weight in generating that prediction. Table 8.8 presents the results of probit estimates based on an autoregressive specification for the six years for which the NLSY includes drinking items. The predicted probability that a respondent reports drinking in 1989 is analyzed as the weighted sum of previous indicators (with controls for race, sex, and age), where the weights, calculated from the probit coefficient estimates, are reported in the table. The weights are always positive, as would be expected from both the heterogeneity and the habit models: the fact that they tend to decline as the lag increases is some evidence of habit formation, although that evidence is far from definitive.[12]

In an effort to bypass this last problem, we now turn to a reduced-form version of the habit-formation model, where past consumption is replaced by variables that act as proxies for the availability of alcohol in the youth's early environment.[13] As shown by Chamberlain (1984), this model allows us to test for the presence of habit formation in a straightforward manner (Hsiao 1986).

8.4.1 Reduced-Form Estimation

We seek to determine whether the association between current drinking and past drinking reflects the habit-forming properties of alcohol (true state dependence) or the influence of some unobserved dynamic feature in the environments in which drinking decisions are made. This distinction is illuminated by specifying a conceptual experiment. Suppose that a sample of youths is randomly assigned to one of two groups, designated *Wet* and *Dry.* The Wets are frequently offered drinks, while the Dries are somehow kept in an alcohol-free environment. The outcomes of this experiment would be measured by the subsequent differences in quantity and patterns of alcohol consumption. If the Wets drink more in later years, we could then conclude that drinking history has a direct effect on current drinking choices.

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and state dependence describing persistence in discrete outcomes. We will use the concepts interchangeably as descriptions of the same phenomenon.

12. One of many alternative interpretations is that environment is heterogeneous but changes from time to time.

13. This model is not, strictly speaking, a true reduced form. Rather, we eliminate potentially endogenous right-hand-side drinking variables by substituting measures of the early drinking environment. See Moore and Cook (1995) for the first application of this procedure to the habit-formation problem.

Table 8.8 **Autoregressive Drinking Equations, Reduced-Form Probit Models, Marginal Effects, Selected Coefficients (S.E.s)**

Variable	pr(drinks = 1/1989)	pr(binges = 1/1989)	pr(drinks = 1/1985)	pr(binges = 1/1985)
30-day indicator, 1988	.430***	.249***		
	(.012)	(.015)		
30-day indicator, 1985	.151***	.052***		
	(.014)	(.011)		
30-day indicator, 1984	.123***	.071***	.369***	.149***
	(.015)	(.010)	(.012)	(.012)
30-day indicator, 1983	.081***	.062***	.243***	.068***
	(.015)	(.010)	(.013)	(.010)
30-day indicator, 1982	.098***	.039***	.176***	.045***
	(.014)	(.009)	(.012)	(.008)
Male	.091***	.054***	.078***	.056***
	(.011)	(.006)	(.010)	(.005)
Black	−.025	.027***	−.028***	−.020***
	(.013)	(.007)	(.012)	(.005)

Note: Estimated using 1982–85 and 1988–89 NLSY data: $N > 9{,}600$. Marginal effects are computed at full sample means. All equations include age indicators for each year of age (not shown). The 30-day indicator is defined as the *drinks* or *binges* in correspondence with the dependent variable. Cluster-corrected standard errors are given in parentheses.

***Statistically significant at the 1 percent level.

While we cannot literally create this experimental setup, we can mimic it with the NLSY data, which include information on the respondent's state of residence at age fourteen. From this item, we are able to say something about the alcohol availability that prevailed in that time and place. While individuals in the NLSY sample are not randomly assigned to this alcohol-availability condition, as in our hypothetical experiment, it is true that fourteen-year-olds rarely have any influence on which state they live in. In that sense, the assignment is exogenous.

Knowing the state of residence at age fourteen allows us to impute for each respondent the MPA, the beer excise tax, and the per capita sales of alcoholic beverages relevant to the individual at that age. We include this sales variable as an indicator of how wet that state's environment was at that time, on the assumption that the fourteen-year-old would have more opportunities to drink—and perhaps more inclination—in an environment where drinking was more common, for given prices and MPA restriction.

8.4.2 Results

Table 8.9 presents estimated effects of contemporaneous and age-fourteen levels of the key variables for both *drinks* (panel A) and *binges* (panel B) for various specifications. Each row of this table is extracted from a different regression. For the contemporaneous variables, the results are much the same as those reported in table 8.7 above and discussed above. The new results are for the age-fourteen variables. They have no discernible effect on the prevalence of drinking, but the bingeing results (presented in panel B of table 8.9) are a different story: the estimated effects of the MPA variable on bingeing are fairly consistent across specifications and offer an indication of habit formation. In particular, respondents who at age fourteen lived in a state where the MPA was eighteen are more likely to binge drink in subsequent years than are respondents who lived in states with a higher minimum age. The effect is not large—about 1 percentage point—but statistically significant in most specifications. The estimated effects for the other age-fourteen variables have the wrong sign but are small and, with one minor exception, not discernibly different than 0.

The result on MPA at fourteen provides some indication that availability of alcohol during adolescence may have an effect on the likelihood of alcohol abuse years later. That is, the persistence that we observed in binge drinking appears at least in part to be the result of habit formation. Since the MPA at fourteen does not have a discernible effect on drinking per se, we speculate that adolescent experience may have a greater long-term effect on the style of drinking (bingeing or moderation) than on whether one drinks at all.

Table 8.9 **Probit Regression Results, NLSY 1982–85, 1988–89, Estimated Coefficients (S.E.s), Policy Variables Only**

	Beer Tax	MPA Binding	State per Capita Ethanol Use	Beer Tax at Age 14	MPA at Age 14 Was 18	State per Capita Ethanol Use at Age 14
			A. Drink in Last 30 Days (× 100), including Age 14 Variables			
No state fixed effects:						
Short form	−2.581***	−5.618***		.243	.293	
	(.838)	(1.101)		(.448)	(.760)	
Long form	−2.518***	−5.836***		.0787	−.167	
	(.865)	(1.149)		(.462)	(.778)	
Short form	−2.056**	−5.674***	6.658***	.289	−.031	−1.007
	(.853)	(1.101)	(1.360)	(.466)	(.761)	(1.235)
Long form	−2.109**	−5.900***	5.408***	.173	−.447	−.307
	(.882)	(1.151)	(1.427)	(.482)	(.780)	(1.309)
State fixed effects:						
Short form	−17.233***	−6.730***		.0004	−.139	
	(3.032)	(1.119)		(.4650)	(1.026)	
Long form	−14.222***	−6.773***		−.080	−.956	
	(3.172)	(1.175)		(.481)	(1.056)	
Short form	−5.551*	−6.335***	12.070***	.054	−.160	.133
	(3.073)	(1.116)	(2.648)	(.481)	(1.029)	(1.284)
Long form	−2.474	−6.403***	11.367***	.078	−1.000	.728
	(3.258)	(1.171)	(2.726)	(.500)	(1.058)	(1.350)

(*continued*)

Table 8.9 (continued)

	Beer Tax	MPA Binding	State per Capita Ethanol Use	Beer Tax at Age 14	MPA at Age 14 Was 18	State per Capita Ethanol Use at Age 14
			B. Binge (× 100), including Age 14 Variables			
No state fixed effects:						
Short form	−.898*	−2.179***		.332	1.301***	
	(.488)	(.599)		(.262)	(.430)	
Long form	−.610	−2.321***		.215	1.086***	
	(.478)	(.576)		(.257)	(.421)	
Short form	−.751	−2.162***	1.656**	.264	1.259***	−1.011
	(.491)	(.600)	(.672)	(.270)	(.429)	(.627)
Long form	−.485	−2.293***	1.271*	.119	1.075**	−1.120*
	(.481)	(.577)	(.683)	(.265)	(.420)	(.637)
State fixed effects:						
Short form	−9.525***	−2.342***		.259	1.120*	
	(1.871)	(.586)		(.261)	(.575)	
Long form	−7.276***	−2.467***		.149	.906	
	(1.867)	(.565)		(.258)	(.573)	
Short form	−3.988**	−2.179***	5.954***	.229	1.071*	−.645
	(2.027)	(.591)	(1.579)	(.272)	(.574)	(.717)
Long form	−2.478	−2.324***	5.189***	.096	.869	−.797
	(2.032)	(.571)	(1.522)	(.203)	(.572)	(.720)

Note: Estimated using 1982–85 and 1988–89 NLSY data: $N \geq 50{,}692$. Marginal effects are computed at full sample means. Cluster-corrected robust standard errors are given in parentheses. All equations included indicators for sex, race, ethnicity, age in 1979, residence in SMSA, parents' education, family structure at age 14, AFQT percentile, and family religion. The long-form equations also include schooling, employment status, income, current school enrollment, weight, marital status, whether either parent was a problem drinker, number of children under 18 in household, living arrangements, and education aspirations in 1982.

***Statistically significant at the 1 percent level.

**Statistically significant at the 5 percent level.

*Statistically significant at the 10 percent level.

8.5 Discussion

The results presented above further establish the importance of the MPA as a deterrent to drinking and bingeing by those who are young enough to be governed by it. The effects are substantial and hold up well over a variety of specifications. We also present evidence that the minimum age has an effect on the likelihood of binge drinking years after the youth is no longer directly affected: youths who are exposed at age fourteen to a lower drinking age appear to be more likely to acquire a habit of heavy drinking. That evidence is relevant to judging, not only the importance of the MPA, but also the habit-forming potential of youthful drinking and, consequently, the importance of early intervention.

The beer excise tax also appears to be an effective deterrent to youthful drinking and bingeing, although the evidence is not as consistent as in the case of the MPA. A clearer resolution to the controversy in the literature may have to await a more powerful experiment than that provided by the small and infrequent changes in state excise taxes.

Finally, we note that per capita ethanol consumption has a consistent and important estimated effect on youthful drinking and bingeing, even after controlling for tax, MPA, state fixed effects, and a long list of individual characteristics. Clearly, youthful drinking decisions are closely linked to overall consumption; whether that link is the result of direct influence or shared but unmeasured determinants is an important issue for future research.

Appendix

Table 8A.1 Variable Means and Definitions from the MTF (N = 367,043)

Variable	Mean (S.D.)	Definition
Drinks	.626	Dummy variable (d.v.): 1 if respondent drank any alcohol in the past 30 days, 0 otherwise
Number of drinks[a]	8.38 (11.52)	
Binges	.351	D.v.: 1 if respondent drank 5 or more drinks containing alcohol in a row in past 30 days
Number of times bingeing[a]	3.48 (3.43)	
Black	.124	D.v.: 1 if respondent is black
Other race	.160	D.v.: 1 if respondent is Hispanic
Male	.490	D.v.: 1 if respondent is male
Age 17	.017	D.v.: age 17
Age 19	.246	D.v.: age 19
Both parents	.716	D.v.: both parents live in household
Parents' education:		D.v.: highest grade completed
Mother:		
12 years	.386	
13–15	.187	
16 or more	.263	
Father		
12 years	.303	
13–15	.168	
16 or more	.336	
Mother working when growing up?		D.v.
Sometimes	.277	
Most of the time	.177	
Always	.282	
Location of respondent's residence		D.v.
In SMSA	.774	
Region:		D.v.
Northeast	.231	
North Central	.271	
South	.309	

Table 8A.1 (continued)

Variable	Mean (S.D.)	Definition
Environment grew up in:		D.v.
Rural area	.147	
Town	.258	
City	.287	
Marital status:		D.v.
Married	.020	
Engaged	.062	
Divorce/separated	.006	
Current employment status:		
Working	.770	D.v.: 1 if working
Hours of work	14.966	
	(13.367)	
Income from work	7.731	
	(14.615)	
Income from other sources	6.664	
	(10.192)	
GPA	5.800	
	(1.944)	
High school type:		
College prep	.510	D.v.
Vocational/technical	.122	
Religiosity:		
Frequency of attending services	1.561	Number of times attend religious services each month
	(1.819)	
Religion is important	.590	D.v.
Number of school days missed	2.688	
	(4.208)	
Other drug use:		
Used marijuana in past 30 days	.252	D.v.
Used other drugs in past 30 days	.224	D.v.
Smoker	.312	D.v.: 1 if currently smokes
Education aspirations: going to college?		D.v.
Definitely no	.182	
Probably no	.152	
Probably yes	.228	

[a]Conditional on those who report drinking/bingeing only.

Table 8A.2 **30-Day Drinking Participation, Short Form, Age 17–19 Only, Coefficient Stability, MTF 1976, 1986, 1996**

Variables	1996	1986	1976	1996–86	1986–76	1996–76
Black	−.225***	−.311***	−.200***	.086***	−.111***	−.025
	(.014)	(.015)	(.017)	(.020)	(.022)	(.022)
Other race	−.088***	−.170***	−.079***	.082***	−.091***	−.009
	(.012)	(.013)	(.016)	(.018)	(.021)	(.020)
Male	.067***	.061***	.114***	.006	−.053***	−.047***
	(.009)	(.008)	(.009)	(.012)	(.012)	(.012)
Age 17	−.084**	−.075**	−.039	−.009	−.036	−.045
	(.037)	(.034)	(.026)	(.050)	(.043)	(.046)
Age 19	.030***	−.002	.0004	.032**	−.001	.031**
	(.010)	(.010)	(.011)	(.014)	(.014)	(.014)
Both parents	−.053***	−.045***	−.038***	−.008	−.007	−.015
	(.010)	(.010)	(.011)	(.014)	(.015)	(.015)
Mother's education:						
12 years	.017	.015	.037***	.003	−.022	−.020
	(.015)	(.013)	(.012)	(.020)	(.018)	(.020)
13–15	.020	.018	.004	.001	.015	.016
	(.016)	(.015)	(.016)	(.022)	(.022)	(.023)
16 or more	.014	.019	.031**	−.005	−.013	−.018
	(.016)	(.015)	(.016)	(.022)	(.022)	(.023)
Father's education:						
12 years	.015	−.005	−.006	.020	.001	.021
	(.014)	(.013)	(.012)	(.019)	(.017)	(.018)
13–15	.035**	−.013	−.024	.048**	.011	.059***
	(.016)	(.015)	(.015)	(.022)	(.021)	(.022)
16 or more	.043***	.006	.002	.037*	.004	.041**
	(.015)	(.014)	(.014)	(.020)	(.020)	(.020)

Mother worked when growing up:						
Sometimes	.053***	.004	.004	.050***	.0001	.050***
	(.014)	(.011)	(.010)	(.018)	(.015)	(.017)
Most time	.051***	.024*	.025*	.026	−.001	.026
	(.015)	(.013)	(.014)	(.019)	(.018)	(.020)
Always	.082***	.032***	.030**	.050***	.002	.052***
	(.013)	(.012)	(.013)	(.017)	(.018)	(.018)
SMSA	.003	.009	.012	−.006	−.003	−.008
	(.012)	(.011)	(.012)	(.016)	(.016)	(.016)
Northeast	.079***	.055***	.140***	.024	−.085***	−.062***
	(.014)	(.013)	(.013)	(.019)	(.019)	(.019)
North Central	.036**	.072***	.085***	−.036*	−.013	−.049**
	(.015)	(.012)	(.013)	(.019)	(.018)	(.019)
South	.035**	−.005	−.004	.041**	−.002	.039**
	(.014)	(.012)	(.013)	(.018)	(.018)	(.019)
Environment grew up in:						
Rural	−.071***	−.054***	−.050***	−.018	−.004	−.021
	(.015)	(.014)	(.015)	(.021)	(.020)	(.021)
Town	−.020	−.022***	−.013	.001	−.009	−.008
	(.013)	(.011)	(.012)	(.017)	(.017)	(.017)
City	−.020*	.009	−.012	−.030*	.021	−.008
	(.012)	(.011)	(.011)	(.016)	(.016)	(.016)
Constant	.440***	.666***	.617***	−.226***	.049	−.177***
	(.025)	(.023)	(.023)	(.034)	(.033)	(.034)
N	12,768	12,979	10,857			
Adjusted R^2	.039	.059	.053			

Note: OLS estimates (standard errors in parentheses).

***Statistically significant at the 1 percent level.

**Statistically significant at the 5 percent level.

*Statistically significant at the 10 percent level.

Table 8A.3 30-Day Drinking Participation, Long Form, Age 17–19 Only, Coefficient Stability, MTF 1976, 1986, 1996

Variables	1996	1986	1976	1996–86	1986–76	1996–76
Black	−.110***	−.222***	−.163***	.112***	−.060***	.052**
	(.014)	(.015)	(.017)	(.021)	(.023)	(.022)
Other race	−.028**	−.134***	−.089***	.106***	−.045**	.061***
	(.012)	(.013)	(.016)	(.018)	(.021)	(.020)
Male	.032***	.035***	.059***	−.002	−.024**	−.027**
	(.008)	(.008)	(.009)	(.012)	(.012)	(.012)
Age 17	−.054	−.062*	−.057**	.008	−.005	.003
	(.034)	(.032)	(.026)	(.047)	(.041)	(.043)
Age 19	.028***	−.004	.007	.031**	−.010	.021
	(.009)	(.009)	(.010)	(.013)	(.014)	(.014)
Both parents	.003	−.006	.003	.010	−.009	.001
	(.009)	(.010)	(.011)	(.014)	(.015)	(.015)
Mother's education:						
12 years	.005	.033**	.041***	−.028	−.008	−.036*
	(.014)	(.013)	(.012)	(.019)	(.017)	(.018)
13–15	.003	.039**	.006	−.036*	.032	−.004
	(.015)	(.015)	(.015)	(.021)	(.021)	(.022)
16 or more	.019	.046***	.050***	−.027	−.004	−.031
	(.015)	(.015)	(.015)	(.021)	(.021)	(.022)
Father's education:						
12 years	.013	−.009	.009	.022	−.017	.005
	(.013)	(.013)	(.011)	(.018)	(.017)	(.017)
13–15	.033**	−.014	.0004	.047**	−.014	.033
	(.014)	(.014)	(.014)	(.020)	(.020)	(.020)
16 or more	.043***	.005	.010	.038**	−.005	.033**
	(.014)	(.014)	(.014)	(.019)	(.019)	(.019)

Mother worked when growing up:						
Sometimes	.029**	−.015	−.016	.044***	.001	.045***
	(.013)	(.010)	(.010)	(.017)	(.014)	(.016)
Most time	.015	−.001	−.008	.016	.006	.022
	(.014)	(.012)	(.013)	(.018)	(.018)	(.019)
Always	.043***	−.002	.006	.045***	−.007	.038**
	(.012)	(.011)	(.013)	(.016)	(.017)	(.017)
SMSA	−.013	.001	.002	−.013	−.001	−.015
	(.011)	(.011)	(.011)	(.015)	(.015)	(.015)
Northeast	.039***	.036***	.118***	.003	−.082***	−.079***
	(.013)	(.013)	(.013)	(.018)	(.018)	(.018)
North Central	.003	.074***	.072***	−.071***	.002	−.069***
	(.014)	(.012)	(.012)	(.018)	(.017)	(.018)
South	.027**	.026**	.012	.002	.013	.015
	(.013)	(.012)	(.013)	(.017)	(.018)	(.018)
Environment grew up in:						
Rural	−.042***	−.015	−.012	−.027	−.003	−.030
	(.014)	(.014)	(.014)	(.020)	(.020)	(.020)
Town	−.005	−.002	−.003	−.003	.001	−.002
	(.012)	(.011)	(.012)	(.016)	(.016)	(.016)
City	−.016	.013	−.005	−.029*	.018	−.011
	(.011)	(.010)	(.011)	(.015)	(.015)	(.015)
Marital status:						
Married	−.038	−.044	−.029	.006	−.014	−.008
	(.031)	(.030)	(.032)	(.043)	(.044)	(.044)
Engaged	−.038**	−.092***	−.043***	.054**	−.048**	.006
	(.018)	(.017)	(.017)	(.025)	(.024)	(.025)
Divorced/separated	−.054	−.034	.015	−.020	−.048	−.068
	(.054)	(.054)	(.074)	(.076)	(.091)	(.091)

(*continued*)

Table 8A.3 (continued)

Variables	1996	1986	1976	1996–86	1986–76	1996–76
Currently working	.039***	.059***	.010	−.019	.049***	.030
	(.013)	(.013)	(.013)	(.018)	(.018)	(.019)
Hours worked	.001**	.001***	.002***	−.001	.0003	−.001
	(.0004)	(.0003)	(.0004)	(.001)	(.0006)	(.001)
Income from work	.0002	.0004	.0006**	−.001	.0002	−.0009**
	(.0003)	(.0003)	(.0003)	(.0007)	(.0004)	(.0004)
Income from other sources	.002***	.002***	.001*	.0007	.001	.0013***
	(.0003)	(.0003)	(.001)	(.001)	(.0008)	(.0007)
GPA	−.009***	−.011***	.0002	.002	−.011***	−.009
	(.002)	(.002)	(.003)	(.003)	(.004)	(.004)
Type of high school:						
College prep	.007	.021**	.016	−.015	.006	−.009
	(.010)	(.010)	(.011)	(.014)	(.015)	(.015)
Vocational	−.011	−.021	.010	.010	−.031	−.021
	(.016)	(.014)	(.013)	(.021)	(.019)	(.021)
Frequency attending religious services	−.019***	−.017***	−.021***	−.002	.004	.001
	(.003)	(.003)	(.003)	(.004)	(.004)	(.004)
Religion is important	−.017*	−.033***	−.055***	.016	.022*	.038***
	(.010)	(.009)	(.010)	(.013)	(.013)	(.014)
Number of days missed school	.005***	.007***	.003***	−.001	.004**	.002
	(.001)	(.001)	(.001)	(.001)	(.002)	(.001)

Used marijuana in past 30 days	.287***	.229***	.243***	.058***	−.014	.044***
	(.011)	(.011)	(.010)	(.016)	(.015)	(.015)
Used other drug in past 30 days	.025***	.017***	.003	.008	.014*	.022***
	(.006)	(.006)	(.006)	(.009)	(.008)	(.008)
Current smoker	.291***	.179***	.177***	.112***	.002	.114***
	(.010)	(.010)	(.010)	(.014)	(.014)	(.014)
Planning to go to college?						
No plan	−.023	−.029**	−.022	.006	−.006	.0002
	(.016)	(.014)	(.014)	(.021)	(.019)	(.021)
Probably will not	−.018	−.020	−.014	.002	−.007	−.005
	(.015)	(.013)	(.014)	(.020)	(.019)	(.020)
Probably will	−.022**	−.014	−.005	−.008	−.009	−.016
	(.011)	(.010)	(.011)	(.015)	(.015)	(.016)
Constant	.301***	.528***	.473***	−.227***	.055	−.171***
	(.030)	(.030)	(.033)	(.043)	(.044)	(.045)
N	11,593	11,867	9,655			
Adjusted R^2	.269	.205	.232			

Note: OLS estimates (standard errors in parentheses).

***Statistically significant at the 1 percent level.

**Statistically significant at the 5 percent level.

*Statistically significant at the 10 percent level.

Table 8A.4 Binge Drinking: Participation, Short Form, Age 17–19 Only, Coefficient Stability, MTF 1976, 1986, 1996

Variables	1996	1986	1976	1996–86	1986–76	1996–76
Black	−.211***	−.267***	−.183***	.056***	−.084***	−.028
	(.013)	(.015)	(.017)	(.019)	(.023)	(.021)
Other race	−.090***	−.126***	−.032*	.036**	−.094***	−.058***
	(.011)	(.014)	(.017)	(.018)	(.022)	(.020)
Male	.121***	.170***	.210***	−.049***	−.040***	−.089***
	(.008)	(.008)	(.009)	(.011)	(.012)	(.012)
Age 17	−.099***	−.082**	−.058**	−.017	−.023	−.041
	(.033)	(.034)	(.027)	(.048)	(.044)	(.043)
Age 19	.030***	.008	.015	.022*	−.006	.015
	(.009)	(.010)	(.011)	(.013)	(.015)	(.014)
Both parents	−.037***	−.049***	−.040***	.013	−.010	.003
	(.009)	(.010)	(.012)	(.013)	(.015)	(.015)
Mother's education:						
12 years	.005	.016	.026**	−.012	−.010	−.021
	(.014)	(.013)	(.012)	(.019)	(.018)	(.019)
13–15	.005	−.012	−.018	.018	.006	.024
	(.015)	(.016)	(.017)	(.021)	(.023)	(.022)
16 or more	.008	−.003	−.012	.011	.009	.021
	(.015)	(.015)	(.016)	(.021)	(.023)	(.022)
Father's education:						
12 years	.008	−.003	−.003	.011	.0004	.011
	(.013)	(.013)	(.012)	(.018)	(.018)	(.018)
13–15	.014	−.016	−.012	.030	−.004	.026
	(.014)	(.015)	(.016)	(.021)	(.022)	(.021)
16 or more	.025*	−.011	−.017	.036*	.006	.042**
	(.013)	(.014)	(.015)	(.019)	(.020)	(.020)

Mother worked when growing up:						
Sometimes	.019	.033***	.017	−.014	.016	.001
	(.013)	(.011)	(.011)	(.017)	(.015)	(.017)
Most time	.022*	.022*	.037***	.0001	−.015	−.015
	(.013)	(.013)	(.014)	(.018)	(.019)	(.019)
Always	.041***	.045***	.033**	−.004	.012	.008
	(.012)	(.012)	(.014)	(.017)	(.018)	(.018)
SMSA	.025**	−.010	−.006	.035**	−.004	.031
	(.011)	(.011)	(.012)	(.016)	(.017)	(.016)
Northeast	.051***	.032**	.095***	.019	−.062***	−.043**
	(.013)	(.013)	(.014)	(.018)	(.019)	(.019)
North Central	.032**	.068***	.085***	−.036*	−.018	−.054***
	(.013)	(.012)	(.013)	(.018)	(.018)	(.019)
South	.019	−.003	.003	.022	−.006	.016
	(.012)	(.013)	(.014)	(.018)	(.019)	(.019)
Environment grew up in:						
Rural	−.019	−.033**	−.004	.014	−.029	−.015
	(.014)	(.015)	(.015)	(.020)	(.021)	(.020)
Town	−.001	−.024**	.031**	.023	−.055***	−.032*
	(.011)	(.011)	(.013)	(.016)	(.017)	(.017)
City	−.015	.006	−.007	−.021	.013	−.008
	(.010)	(.011)	(.012)	(.015)	(.016)	(.016)
Constant	.217***	.334***	.253***	−.116***	.080**	−.036
	(.023)	(.023)	(.024)	(.033)	(.034)	(.033)
N	12,790	13,010	10,928			
Adjusted R^2	.052	.068	.073			

Note: OLS estimates (standard errors in parentheses).

***Statistically significant at the 1 percent level.

**Statistically significant at the 5 percent level.

*Statistically significant at the 10 percent level.

Table 8A.5 Binge Drinking: Participation, Long Form, Age 17–19 Only, Coefficient Stability, MTF 1976, 1986, 1996

Variables	1996	1986	1976	1996–86	1986–76	1996–76
Black	−.116***	−.187***	−.163***	.071***	−.024	.046**
	(.013)	(.015)	(.018)	(.019)	(.023)	(.022)
Other race	−.049***	−.086***	−.052***	.037**	−.034*	.003
	(.011)	(.013)	(.016)	(.017)	(.021)	(.019)
Male	.089***	.136***	.148***	−.047***	−.012	−.059***
	(.008)	(.008)	(.009)	(.011)	(.012)	(.012)
Age 17	−.078***	−.067**	−.054**	−.010	−.013	−.024
	(.031)	(.032)	(.026)	(.044)	(.041)	(.040)
Age 19	.027***	−.004	.015	.031**	−.018	.013
	(.008)	(.009)	(.010)	(.012)	(.014)	(.013)
Both parents	.008	.004	.008	.004	−.004	.0001
	(.009)	(.009)	(.011)	(.013)	(.015)	(.014)
Mother's education:						
12 years	−.004	.036***	.036***	−.040**	.0005	−.040**
	(.013)	(.013)	(.012)	(.018)	(.017)	(.018)
13–15	−.006	.015	−.003	−.022	.019	−.003
	(.014)	(.015)	(.015)	(.020)	(.021)	(.021)
16 or more	.011	.027*	.021	−.016	.006	−.011
	(.014)	(.015)	(.015)	(.020)	(.021)	(.021)
Father's education:						
12 years	.006	−.007	.015	.013	−.022	−.008
	(.012)	(.012)	(.011)	(.017)	(.017)	(.017)
13–15	.014	−.011	.019	.025	−.030	−.005
	(.013)	(.014)	(.015)	(.019)	(.020)	(.020)
16 or more	.021*	.0003	.007	.022	−.007	.015
	(.012)	(.014)	(.014)	(.018)	(.019)	(.019)

Mother worked when growing up:						
Sometimes	−.001	.014	−.001	−.015	.015	.0006
	(.012)	(.010)	(.010)	(.016)	(.014)	(.015)
Most time	−.008	−.002	−.004	−.006	.002	−.004
	(.012)	(.012)	(.013)	(.017)	(.018)	(.018)
Always	.015	.015	.001	.0002	.014	.013
	(.011)	(.011)	(.013)	(.015)	(.017)	(.017)
SMSA	.014	−.018*	−.025**	.033**	.007	.040***
	(.010)	(.011)	(.011)	(.015)	(.015)	(.015)
Northeast	.024**	.012	.065***	.011	−.053***	−.042**
	(.012)	(.013)	(.013)	(.017)	(.018)	(.018)
North Central	.011	.070***	.068***	−.060***	.003	−.057***
	(.012)	(.012)	(.012)	(.017)	(.017)	(.017)
South	.015	.029**	.016	−.014	.014	−.001
	(.011)	(.012)	(.013)	(.016)	(.018)	(.017)
Environment grew up in:						
Rural	.008	.004	.025*	.004	−.021	−.017
	(.013)	(.014)	(.014)	(.019)	(.020)	(.019)
Town	.013	−.004	.036***	.017	−.040**	−.023
	(.010)	(.011)	(.012)	(.015)	(.016)	(.016)
City	−.006	.006	.004	−.012	.002	−.010
	(.010)	(.010)	(.011)	(.014)	(.015)	(.015)
Marital status:						
Married	−.031	−.054*	−.093***	.023	.039	.062
	(.028)	(.030)	(.032)	(.041)	(.044)	(.043)
Engaged	−.073***	−.101***	−.043***	.029	−.059**	−.030
	(.017)	(.017)	(.017)	(.024)	(.024)	(.024)
Divorced/separated	−.002	.032	.087	−.034	−.055	−.089
	(.048)	(.053)	(.074)	(.072)	(.091)	(.089)

(*continued*)

Table 8A.5 (continued)

Variables	1996	1986	1976	1996–86	1986–76	1996–76
Currently working	−.004	.006	.007	−.010	−.001	−.011
	(.012)	(.013)	(.013)	(.017)	(.018)	(.018)
Hours worked	.001***	.001***	.001***	.0002	.0002	.0003
	(.0003)	(.0004)	(.0003)	(.0005)	(.0005)	(.0006)
Income from work	.0004	.0002	.0003	.0001	.0006	.0007*
	(.0003)	(.0003)	(.0002)	(.0004)	(.0004)	(.0004)
Income from other sources	.002***	.002***	.001**	.0002	.0005	.0003
	(.0003)	(.0003)	(.001)	(.0005)	(.0008)	(.0007)
GPA	−.008***	−.016***	−.018***	.008**	.002	.010**
	(.002)	(.002)	(.003)	(.003)	(.004)	(.003)
Type of high school:						
College prep	−.008	.012	−.002	−.021	.014	−.007
	(.009)	(.010)	(.011)	(.013)	(.015)	(.014)
Vocational	−.034**	−.019	−.005	−.015	−.015	−.030
	(.015)	(.014)	(.013)	(.020)	(.019)	(.020)
Frequency attending religious services	−.007***	−.014***	−.008***	.007*	−.006	.001
	(.002)	(.002)	(.003)	(.003)	(.004)	(.004)
Religion is important	−.009	−.004	−.034***	−.006	.030**	.024*
	(.009)	(.009)	(.010)	(.013)	(.013)	(.013)
Number of days missed school	.006***	.007***	.006***	−.0007	.0006	.0001
	(.001)	(.001)	(.001)	(.001)	(.002)	(.001)

Used marijuana in past 30 days	.259***	.288***	.283***	−.029*	.005	−.024*
	(.010)	(.011)	(.010)	(.015)	(.015)	(.015)
Used other drug in past 30 days	.057***	.063***	.048***	−.006	.015*	.010
	(.006)	(.006)	(.006)	(.008)	(.008)	(.008)
Current smoker	.229***	.169***	.170***	.060***	−.001	.059***
	(.009)	(.010)	(.010)	(.013)	(.014)	(.013)
Planning to go to college?						
No plan	−.021	−.011	.007	−.010	−.018	−.028
	(.014)	(.013)	(.014)	(.020)	(.019)	(.020)
Probably will not	−.037***	−.003	.013	−.033*	−.016	−.050**
	(.014)	(.013)	(.014)	(.019)	(.019)	(.020)
Probably will	−.017*	.001	.007	−.018	−.006	−.024
	(.010)	(.010)	(.011)	(.014)	(.015)	(.015)
Constant	.110***	.210***	.165***	−.100***	.045	−.055
	(.028)	(.029)	(.033)	(.040)	(.044)	(.043)
N	11,589	11,866	9,664			
Adjusted R^2	.264	.258	.294			

Note: OLS estimates (standard errors in parentheses).

***Statistically significant at the 1 percent level.

**Statistically significant at the 5 percent level.

*Statistically significant at the 10 percent level.

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