Does drinking really decrease in bad times?

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Ruhm, C. and W. E. Black. (2002). Does Drinking Really Decrease in Bad Times? *Journal of Health Economics*, Vol. 21(4): 659-678.

Abstract:
This paper investigates the relationship between macroeconomic conditions and drinking using individual-level data from 1987 to 1999 interview years of the "behavioral risk factor surveillance system" (BRFSS). We confirm the procyclical variation in overall drinking identified in previous research using aggregate sales data and show that this largely results from changes in consumption by existing drinkers, rather than movements into or out of drinking. Moreover, the decrease occurring during bad economic times is concentrated among heavy consumers, with light drinking actually rising. We also find no evidence that the decline in overall alcohol use masks a rise for persons becoming unemployed during contractions. These results suggest that any stress-induced increases in drinking during bad economic times are more than offset by declines resulting from changes in economic factors such as lower incomes.
Keywords: Macroeconomic conditions; Behavioral risk factor surveillance system (BRFSS); Alcohol consumption

Article:

1. INTRODUCTION

Research emphasizing psychological responses to economic downturns predicts that alcohol use will rise during these periods as a form of self-medication for stress, with particularly large growth in abusive drinking and risky behaviors such as drunk-driving (e.g. Brenner and Mooney, 1983; Winton et al., 1986; Pierce et al., 1994). However, the causal effects of macroeconomic conditions are actually more complicated. A separate psychological literature emphasizes the role ofjob stress (e.g. Baker, 1985; Karasek and Theorell, 1990; Fenwick and Tausig, 1994; Sokejima and Kagamimori, 1998), implying that drinking may increase with the intensity of employment. Previous research also indicates that consumption is positively related to incomes (e.g. Skog, 1986; Sloan et al., 1995; Ruhm, 1995). Thus, stress-induced drinking during depressed periods might be partially or fully offset by reductions due to decreased earnings. The costs of drinking may also rise for employed persons fearing job loss. Conversely, the opportunity cost of alcohol use might fall if the negative consequences of intoxication during the work-day are reduced due to declining work hours or increased unemployment. Finally, drinking patterns could differ across groups. For instance, employed individuals might drink less while alcohol problems increase among the newly unemployed (Catalano et al., 1993).

This paper analyzes the relationship between economic conditions and drinking using individual-level data from the "behavioral risk factor surveillance system" (BRFSS). Several features make this study unique. First, we consider a wider range of outcomes than in previous research, including differences in the responsiveness of "light" and "heavy" drinkers. Second, we examine the dynamics of the adjustment of alcohol use to changes in macroeconomic conditions. Third, we explore whether the cyclical fluctuations differ across population subgroups stratified by sex, race/ethnicity, age, and employment status.

Our investigation confirms the procyclical variation in overall drinking identified in previous research. In addition, we show that almost all of the fluctuation results from changes in consumption for existing drinkers, instead of entry into or exit from alcohol use. In fact, decreased drinking during bad times is dominated by reductions in heavy rather than recreational drinking. Although the strength of the macroeconomic variations differ across demographic groups, these patterns appear fairly universal. Finally, we uncover no evidence that drinking increases among persons becoming newly unemployed during bad economic times.

2. PREVIOUS RESEARCH

Considerable research examines how alcohol use is affected by taxes or prices, minimum legal drinking ages, restrictions on availability, and laws aimed at reducing drunk-driving.[1] By contrast, macroeconomic conditions have received less attention. Ruhm (1995) investigates how these are related to alcohol consumption and highway vehicle fatalities using aggregate data for the 48 contiguous states over the 1975–1988 period. The primary finding is that drinking and vehicle mortality vary *procyclically*.[2] One reason is because incomes grow when the economy expands and alcohol is a normal good. Freeman (1999) raises concern that the data used by Ruhm may be non-stationary. Nevertheless, using an expanded data set (covering the 50 states and District of Columbia for the 1970–1995 period) that is rendered stationary by using growth rates instead of levels, he confirms the procyclical pattern of alcohol consumption.[3]

The use of aggregate data in these studies introduces several complications. First, the set of covariates controlled for is generally limited, although this shortcoming is partially surmounted by estimating fixed-effect models, which automatically account for time-invariant factors. Second, it is difficult to ascertain individual behavior; this is often referred to as the "ecological

1. *US Department of Health and Human Services (2000) provides a useful recent literature review on price elasticities and alcohol taxation. The effects of availability constraints and minimum drinking ages are discussed in Gruenewald (1993) and Wagenaar (1993). Cook and Moore (2000) provide an excellent overview of economic research related to alcohol.*

2. *For example, a 1 standard deviation (2.12 percentage point) increase in the state unemployment rate is predicted to reduce drinking by 1.3 % and traffic fatalities by almost 7%. The consumption of distilled spirits is more sensitive to macroeconomic conditions than purchases of beer or wine. These results are consistent with earlier research findings by O'Neill (1984) and Evans and Graham (1988) indicating that vehicle fatalities and single vehicle night-time crashes (which frequently involve drunk-driving) are procyclical and those of Wagenaar and Streff (1989) suggesting that alcohol consumption increases in good times.*

3. *Freeman finds that the failure to correct for non-stationarity yields parameter estimates that are sensitive to the choice of time periods; however, this may be an artifact of the data he uses. Whereas Ruhm transforms beer, wine, and distilled spirits consumption into ethanol-equivalents using constant conversion rates, Freeman use information from the "alcohol epidemiologic data system" (AEDS) where the conversion factors vary over time—wine is assumed contain 16.0% alcohol prior to 1972,14.5% from 1972 to 1976, and 12.9% after 1976, and distilled spirits 45.0%, 43.0%, and 41.1% alcohol in the three periods. These sharp discontinuities could render Freeman's data non-stationary.*

inference" problem. For example, overall alcohol consumption might fall during recessions because of decreases among recreational users, even while heavy drinking increases. Since moderate alcohol use has recently been linked to health benefits (e.g. Gaziano et al., 1993; Thun et al., 1997) and drinking problems are likely to be concentrated among those imbibing large amounts, reductions in total use could therefore mask increased alcohol abuse.[4] Similarly, consumption might decline in bad times because workers drink less, even while persons becoming newly unemployed raise their intake. Such a pattern might help to reconcile the psychological literature emphasizing drinking as self-medication for stress with an overall procyclical pattern of alcohol use.[5] Third, potential differences across sex, race/ethnicity, or age groups cannot be identified using sales data. Cross-border purchases, illegal production, breakage, and untaxed alcohol from abroad are also not accounted for.

These shortcomings indicate that much can be gained by investigating the relationship between economic conditions and drinking with microdata. The few previous studies doing so yield inconclusive results. Ettner's (1997) analysis of the 1988 National Health Interview Survey concludes that alcohol consumption and dependence are procyclical but with mixed effects of involuntary unemployment—it is associated with more drinking but less alcohol dependence. Moreover, Ettner's use of cross-sectional data implies that the impact of economic conditions may be confounded with unobserved determinants of drinking that vary across states.[6]

Dee (2001) avoids some of these problems by estimating fixed-effect models using data from 1984 to 1995 period of the BRFSS. He obtains the contradictory result that economic downturns are associated with reductions in overall drinking and in the probability of consuming 60 or more drinks per month but also with a higher likelihood of consuming five or more drinks on a single occasion. There are several possible explanations for these inconsistencies. First, early waves of the BRFSS contain data for relatively few states (only 15 in 1984), which is problematic for fixed-effect specifications that exploit within-state variations. This shortcoming becomes even more severe since year (as well as state) dummy variables are included in his models, although doing so removes most of the sample variation in unemployment. We elaborate on this point in the following sections. Second, the data are not weighted to account for differences in sampling probabilities, even though the BRFSS is only nationally representative after weighting and there are sharp differences in drinking behavior across demographic groups. Third, the set of

4. *Some empirical evidence supports the possibility of differential responses for light and heavy drinkers. Manning et al. (1995) find that the price elasticity of demand for alcohol is fairly high for recreational drinkers but approximately zero for the heaviest consumers. Kenkel (1996) indicates lower price elasticities for heavy than moderate alcohol users, particularly for those who are poorly informed about the related health risks. On the other hand, Cook and Tauchen (1982) show that cirrhosis mortality, which disproportionately affects heavy drinkers, is a declining function of alcohol taxes, indicating that even these individuals are price sensitive.*

5. *Feather (1990) provides an excellent review of the literature on the relationship between employment, joblessness, and psychological well-being. Theodossiou (1998) supplies an example of recent economic research on this topic.*

6. *Ettner sometimes uses state unemployment rates to instrument individual labor market status. However, this approach is only valid if economic conditions influence drinking exclusively through their impact on employment. Evidence presented below casts doubt on this.*

explanatory variables included is quite limited. For instance, Dee does not control for alcohol taxes or prices and most specifications exclude information on education or marital status.[7]

We improve on prior research in several ways. First, our analysis of the BRFSS data covers a longer (and more recent) period. Second, we consider a broader array of outcomes, paying particular attention to the distinction between recreational drinking and heavy use. Third, we investigate the dynamics of the adjustment to sustained changes in macroeconomic conditions. Fourth, we offer a more complete examination of differences in drinking behavior on the basis of age, sex, race/ethnicity, and employment status.[8]

3. DATA AND METHODS OF ANALYSIS

Data are from 1987 to 1999 interview years of the BRFSS. The BRFSS, administered by the Centers for Disease Control and Prevention, is an annual telephone survey of the non-institutionalized adult population designed to produce uniform state-specific data on preventive health practices and risky behaviors, including alcohol use and abuse. One goal of the survey is to enable public health professionals to monitor state and national progress towards meeting the Healthy People 2010: National Health Promotion and Disease Prevention Objectives. Only 15 states participated in the BRFSS in its first year (1984) but 34 states did so by 1987 and 45 or more in each year of the 1990s. Sample sizes are large, exceeding 50,0000 (sic) in each year we analyze, and increase over time so that our 13 years sample contains over one million observations. Information on alcohol use is available for all respondents except in 1994, 1996, and 1998, when these questions are in optional modules included by 12, 17, and 12 states (covering 22,046, 42,424, and 32,472 individuals). Further information on the BRFSS can be obtained from http://www.cdc.gov/nccdphp/brfss.

The BRFSS, while extremely useful, does contain several limitations. First, since the data are obtained from telephone surveys of residential households, persons without phones or whose abode is non-residential (e.g. military bases, college dorms, or institutions) are excluded. Second, no information is provided on youths (under the age of 18). Third, alcohol use is likely to be understated in self-reported data (Midanik,1982); however, the self-report errors appear to be consistent over time (Johnston et al., 1992) and the estimates will only be biased if the underreporting systematically differs with economic conditions.

3.1. Dependent variables

The BRFSS collects various information on alcohol use. Respondents are asked whether they had at least one drink of any alcoholic beverage (i.e. one can/bottle of beer or wine coolers, one glass of wine, one cocktail, or one shot of liquor) during the prior month. Those answering in the affirmative are questioned about the number of drinks, whether they had more than five drinks on a single occasion, and if they had driven after having “had perhaps too much to drink”. Using these data, we created several measures of alcohol use in the last month. “Drinking participation” has a value of one (zero) for persons with some (no) consumption. “Conditional drinking”

7. *Ruhm’s (2000) preliminary analysis of BRFSS data for the 1987–1995 period suggests a countercyclical variation in alcohol consumption but suffers from many of these same shortcomings.*

8. *Dee (2001) provides a limited investigation of demographic group differences in binge drinking.*

indicates the number of alcoholic beverages imbibed by drinkers. “Alcohol-involved driving” is a dummy variable set to one for persons who have driven when they have “had perhaps too much to drink”. Dummy variables for conditional drinking in the ranges of 1–10, 1–20, 21–59, ≥ 60 and ≥ 100 alcoholic beverages are used to distinguish between different levels of drinking. Finally, “binge drinking” is a binary outcome indicating whether consumers had imbibed five or more beverages on a single occasion.

The distinction between drinking participation and conditional drinking is common in health applications because the process distinguishing some versus no use is frequently distinct from that generating alternative positive values (Mullahy,1998). In this formulation, expected consumption for individual i with characteristics X is determined by

$$E[Y_i|X_i] = Pr[Y_i > 0|X_i] \times E[Y_i|Y_i > 0, X_i] \tag{1}$$

where Y is the number of drinks per month, E(·) and Pr(·) indicate conditional expectations and probabilities, and the first (second) term on the right-hand side of (1) refers to drinking participation (conditional drinking). As is conventional, we assume that the natural log of conditional drinking is linearly related to the explanatory variables according to for $\hat{\beta}$ the

$$E[ln(Y_i)|Y > 0, X_i] = X_i\hat{\beta} \tag{2}$$

vector of regression coefficients. We similarly estimate conditional probabilities of light, moderate, heavy, or binge drinking after restricting the sample to alcohol users.

A small number of respondents report extremely high (and presumably erroneous) levels of consumption. To avoid assigning these outliers undue influence, we censor conditional drinking at 450 drinks per month (15 drinks per day). This affects <0.02% of the sample and the results are not sensitive to using other criteria for top-coding. Information on drinking participation is unavailable for 0.2% of the sample (2150 individuals), with additional missing values for the other outcomes.[9] There does not appear to be a consistent pattern of non-response for conditional drinking, but missing values for alcohol-involved driving and binge drinking are concentrated among heavy consumers. However, there is no indication that non-response biases the parameter estimates for the variables of key interest.[10]

3.2. Explanatory variables

Our main proxy for macroeconomic conditions is the survey month state unemployment rate for the civilian non-institutionalized population (aged 16 years and over). Data are from the Bureau of Labor Statistics Local Area Unemployment Statistics (LAUS) Database at the web-site: http://stats.bls.gov/lauhome.htm. Some regressions also control for the national unemployment

9. *This includes 21,874 persons for whom there is insufficient information to construct the number of drinks consumed, and 2791 and 7778 individuals not reporting on alcohol-involved driving or binge drinking.*

10. *We tested for this by examining whether the parameter estimates changed substantially when observations with missing values were added to the sample and assigned various possible values (e.g. a zero or one in alternative regression estimates for the dichotomous variables).*

rate. Others include lagged unemployment rates or hold constant annual state per capita personal income (obtained from the Bureau of Economic Analysis web-site: http://www.bea.doc.gov/bea/regional/spi), converted to thousands of 1999 US$ using the all-items consumer price index.

The econometric models also control for a quadratic in years of age and dummy variables for sex, education (high school dropout, some college, college graduate), race/ethnicity (non-Hispanic black, other non-Hispanic non-white, Hispanic origin), marital status (married, divorced/separated, widowed), as well as interactions between age, sex, and race/ethnicity. Finally, the sum of the state and federal taxes (in 1999 US$) on a case of beer (24–12 ounce cans or bottles) is held constant, using data from various issues of the US Brewers' Association Brewer's Almanac and the Federation of Tax Administrators web-site (http://www.taxadmin.org/fta/rate/beer.html). Information on one or more demographic characteristic is not reported for 0.8% of respondents (8298 persons). To avoid excluding these individuals, the relevant regressor was set to zero and missing value dummy variables were created.

3.3. Descriptive information

Table 1 presents sample means for selected variables. The first column shows averages for the raw data; the second weights observations using BRFSS final sampling weights.[11] Males, young adults, minorities, Hispanics, and currently married individuals are underrepresented in the raw data. Since drinking behavior differs substantially across population groups, analysis of unweighted data may therefore provide unreliable estimates of the average "treatment-effect". As a result, sampling weights are incorporated in most of the econometric analysis.

Drinking is highly concentrated. Just over half of adults imbibed alcohol in the last month and those doing so averaged around 21 drinks. However, 50% of consumers had fewer than 10 drinks and 75% less than 25, while only 5% imbibed 80 or more alcoholic beverages. Similarly, fewer than 3% of adults claim to have driven after "perhaps having had too much to drink". Conversely, those drinking 25 (80) or more beverages during the prior month accounted for 70% (30%) of total alcohol consumption.

Fig. 1 displays the pattern of average unemployment rates and alcohol consumption using quarterly data obtained by taking weighted averages over three-month periods and normalizing by subtracting the sample mean and dividing by the standard deviation. The figure thus shows fluctuations in terms of standard deviations from the mean. Two points are noteworthy. First, drinking was at relatively low levels during the bad economic times of the early-1990s, suggesting that alcohol use is procyclical. However, since other factors could have changed simultaneously (e.g. the federal beer tax was doubled in 1991), a multivariate analysis is needed to confirm this. Second, unemployment and alcohol consumption both trended down over the sample period. The decline in joblessness resulted from the economic expansion of the middle and late-1990s. The fall in drinking reflects a secular trend whereby per capita ethanol

11. *Weighted estimates from the BRFSS are comparable to those for in person surveys (Remington et al., 1988).*

Table 1
Sample means for variables used in analysis

Variable	Unweighted mean	Weighted mean
Alcohol use in last month		
Drinker (any use)	0.496	0.521
Number of drinks (top-coded at 450)	19.7	21.4
Alcohol-involved driving	0.024	0.027
Age (years)	46.1	44.1
Female	0.582	0.520
Employed (at survey date)	0.619	0.626
Race/ethnicity		
Black	0.085	0.096
Other non-white	0.052	0.058
Hispanic origin	0.053	0.089
Race not reported	0.003	0.002
Hispanic origin not reported	0.003	0.003
Education		
High school dropout	0.148	0.154
Some college	0.256	0.254
College graduate	0.262	0.256
Education not reported	0.002	0.002
Current marital status		
Married/cohabiting	0.572	0.628
Divorced/separated	0.146	0.106
Widowed	0.110	0.074
Marital status not reported	0.002	0.001
State-level variables		
Survey month unemployment rate (%)	5.42	5.85
Personal income (thousands of 1999 US$)	24.9	25.6
Beer tax per case (1999 US$)	1.92	1.85

Note: data are from 1987 to 1999 period of the BRFSS, with additional information on state economic conditions and beer taxes merged in from other sources. The first column of the table shows unweighted averages; the second weights the observations using BRFSS final sampling weights.

consumption declined 21 %between 1981 and 1997 (Nephew et al., 1999). It, therefore, is presumably not causally related to recent reductions in unemployment. This is dealt with in the empirical analysis by including a vector of state-specific time trends.

3.4. Econometric methods

The basic econometric specification is

$$Y_{ijmt} = \alpha_j + X_{ijmt}\beta + E_{mjt}\gamma + \delta_m + \varepsilon_{ijmt} \qquad (3)$$

where *Y* is the alcohol outcome for individual *i* living in state *j* interviewed in month *m* of year *t*, *X* the vector of covariates (individual characteristics and beer taxes), *E* the measure of local

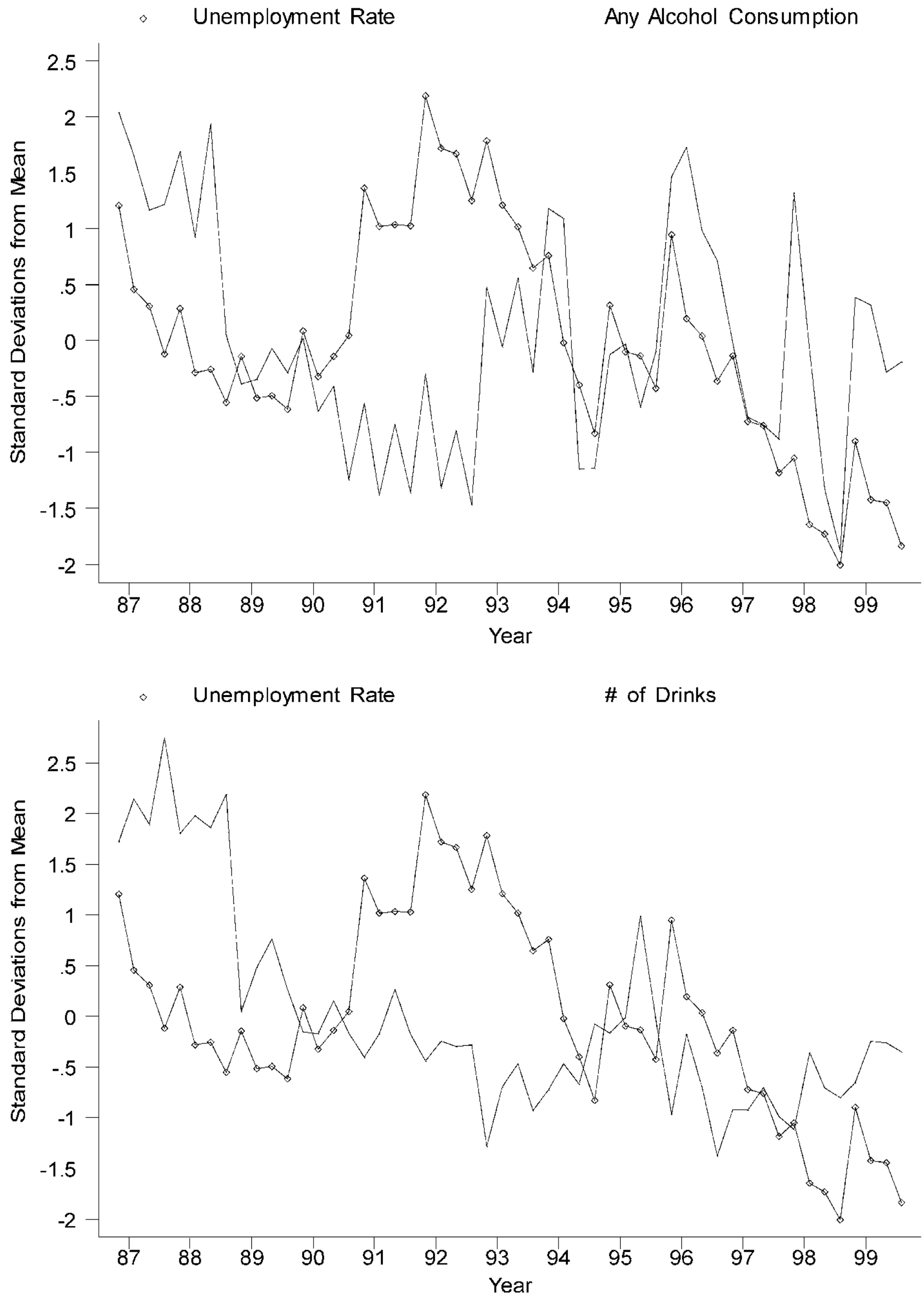

Fig. 1. Trends in unemployment rates and alcohol use.

economic conditions, ε the regression disturbance, and α and δ represent unobserved determinants of alcohol use associated with the state and survey month.

The month-effects control for seasonal variations in drinking and the state fixed- effect holds constant time-invariant determinants that differ across locations. The impact of the macroeconomic fluctuations is therefore identified by within-state variations in economic conditions, relative to changes occurring in other states. Most models also include state-specific linear time trends ($\alpha_j \times \times T_{mt}$), registering months elapsed since January 1987, to control for factors that vary over time within-states, implying the regression equation

$$Y_{ijmt} = \alpha_j + X_{ijmt}\beta + E_{mjt}\gamma + \delta_m + \alpha_j T_{mt}\lambda + \varepsilon_{ijmt} \tag{4}$$

For ease of interpretation, the results of linear probability models are usually presented for the dichotomous outcomes. Very similar predicted effects are obtained from corresponding binary probit estimates. The Huber–White sandwich estimator is used to calculate robust S.E., assuming that observations are independent across states and months but not within-states in a given calendar month. This is done because unemployment rates are the same for all observations in a given state–month–year cell. The reported S.E. are typically 0–35% larger than those obtained assuming that all observations are independent.

4. DRINKING IS PROCYCLICAL

Table 2 summarizes alternative econometric estimates of the effect of a one percentage point increase in the state unemployment rate on drinking participation, conditional drinking, and alcohol-involved driving. One percentage point corresponds to a 17% (0.62 standard deviation) change from the sample mean of 5.85%. The first three columns differ according to whether or not they include state-specific time trends or weight the data. All specifications also control for individual characteristics, beer taxes, month dummy variables, and state fixed-effects. The parameter estimates for the supplementary regressors (not shown) are consistent with those obtained in previous research. Females, minorities, and married persons drink relatively little; college graduates have high rates of drinking participation but consume moderate amounts and seldom engage in alcohol-involved driving, and beer taxes are negatively correlated with alcohol use.

The data consistently indicate that drinking participation is insensitive to macroeconomic conditions, while conditional drinking exhibits a sharp procyclical variation and drunk-driving appears to become less common in bad times. The model we prefer and will focus on throughout the remainder of the paper, because it includes state-specific trends and sampling weights, is shown in column (c).[12] In this case, a one point rise in unemployment reduces predicted drinking participation, conditional drinking, and alcohol-involved driving by 0.3%,3.1%, and 3.3%.13

12. *Weighting reduces efficiency if sampling is based on exogenous variables and the conditional distribution is correctly specified (Wooldridge, 1999; Butler, 2000). However, these conditions do not hold for the BRFSS (e.g. because men drink more than women and are underrepresented), implying that weighting is likely to be required to obtain consistent estimates of the average treatment-effect.*

13. *Percentage changes in drinking participation and alcohol-involved driving are calculated at the sample mean values (52.1% and 2.7%). Virtually identical estimates are obtained when deleting from the sample the 3 years (1994, 1996, and 1998) where the alcohol questions are included only in optional modules.*

Table 2

Predicted effect of a one percentage point increase in the state unemployment rate on alcohol use and problems

Outcome	(a)	(b)	(c)	(d)	(c)	(f)
Drinker	−4.5E−4 (7.8E−4)	−6.1E−4 (8.2E−4)	−0.0018 (0.0013)	−0.0019 (0.0013)	−0.0021 (0.0014)	−3.3E−4 (0.0031)
Log of number of drinks	−0.0151 (0.0024)	−0.0184 (0.0027)	−0.0313 (0.0048)	−0.0099 (0.0045)		−0.0408 (0.0141)
Alcohol-involved driving	−4.1E−4 (1.8E−4)	−1.8E−4 (2.0E−4)	−8.9E−4 (3.4E−4)	−4.8E−4 (3.7E−4)	−5.1E−4 (2.0E−4)	−6.7E−4 (4.7E−4)
Type of data	Individual	Individual	Individual	Individual	Individual	Aggregate
State-specific time-trends	No	Yes	Yes	Yes	Yes	Yes
Year effects	No	No	No	Yes	No	No
Sampling weights	No	No	Yes	Yes	Yes	Yes
Estimation technique	OLS	OLS	WLS	WLS	Probit	WLS

Note: the table displays predicted effects of a one percentage point increase in the state unemployment rate, using data from 1987 to 1999 BRFSS. The first five columns show results using individual-level data. Robust S.E., calculated assuming that observations are independent across months and states but not within-states in a given month, are reported in parenthesis. These specifications include month and state dummy variables and control for beer taxes, age, sex, race/ethnicity, education, marital status, and interactions between age, sex, and race/ethnicity. Columns (b–e) also contain state-specific linear time trends and specification (d) includes year dummy variables. “Drinking” refers to a dichotomous variable indicating whether the respondent had at least one drink in the last month. The “number of drinks” refers to alcoholic beverages imbibed in the last month for those with some consumption. Alcohol-involved driving is a binary variable set to one if the respondent reported driving at least once during the last month when he/she “had perhaps to much too drink”. Sample sizes are 1,032,965, 490,653, and 1,030,174 for the three outcomes. Predicted effects are equal to the unemployment rate coefficients for the OLS and WLS estimates. For the probit models they are calculated as marginal effects with the independent variables, other than the unemployment rate, evaluated at the sample means. Column (f) shows the results of models estimated by regressing state level aggregates on the state unemployment rate, beer tax, state dummy variables, and state-specific time trends. These data are obtained by taking (weighted) averages for each state–year cell in the BRFSS sample, with observations weighted by the square root of the adult state population (aged 18 years and over).

Specification (d) adds a vector of year dummy variables to the model. Unfortunately, doing so absorbs much of the remaining variation in state unemployment rates, so it is no surprise that the predicted impacts of macroeconomy are substantially attenuated: by almost one-half for alcohol-involved driving and over two-thirds for conditional drinking.[14] The key issue is that, even with 13 years of data, fluctuations in state economic conditions are largely accounted for by the combination of general year effects (which capture the effects of the national economy and other factors changing uniformly across states over time), fixed-effects, and state-specific secular trends. However, the point estimates continue to suggest a procyclical variation in drinking. The remaining analysis focuses on models without year dummy variables. We believe this to be the most reasonable procedure, since the general time effects account for so much of the residual variation. Nevertheless, we recognize that an ideal data source would contain sufficient independent local fluctuations to make this exclusion unnecessary.

Binary probit models are used for the two dichotomous outcomes (drinking participation and alcohol-involved driving) in column (e). The resulting predicted effects, calculated with other explanatory variables than unemployment evaluated at the sample means, are very close to the corresponding linear probability model estimates. Thus, little is lost by not explicitly accounting for the discrete nature of these dependent variables.

The estimates in specification (f) use state-level aggregates, constructed by calculating average values for each state–year cell from the (weighted) BRFSS data. The alcohol outcome is then regressed on unemployment rates, beer taxes, state fixed-effects, and state-specific time trends, with observations weighted by the square root of the adult population in the state. These models approximately correspond to previous research (e.g. Ruhm, 1995; Freeman, 1999) examining the macroeconomic variation in state alcohol sales or traffic fatalities using aggregate data. Our findings once again indicate a procyclical pattern of conditional drinking and possibly drunk-driving combined with little change in drinking participation, suggesting that individual and aggregate data yield consistent predictions.

Table 3 provides additional findings. The first column repeats the results of the preferred model from Table 2. The next two specifications separately control for monthly national unemployment rates and average survey year per state capita incomes. Coefficients on the US unemployment rate proxy the effects of national (rather than local) economic conditions. However, since joblessness trended down during this period and there is only one turning point in the data (the early-1990s), the parameter estimates will be biased if important omitted variables follow similar patterns.[15] Noting this caveat, specification (b) suggests that national downturns are associated with larger reductions in drinking than corresponding deteriorations in state economic conditions. A one point rise in the US unemployment rate decreases predicted conditional drinking by over 6%, drinking participation by 1.6 percentage points (3.1%), and alcohol-involved driving by 0.15 points (5.6%); the same rise in state joblessness (controlling for the

14. *The year variables eliminate 60.3% of the variation in unemployment rates remaining after including month dummy variables, state fixed-effects, and state-specific time trends. By contrast, the addition of state time-trends absorbed just 27% of the variation remaining after controlling for month and state fixed-effects.*

15. *This problem is likely to be less severe (but not completely eliminated) when considering state unemployment rates, to the extent that state economies fluctuate independently.*

Table 3
Additional estimates of the effects of changes in macroeconomic conditions on alcohol use and drinking problems

Regressor	(a)	(b)	(c)
	Drinker		
State unemployment rate	−0.0018 (0.0013)	0.0021 (0.0013)	−0.0021 (0.0013)
National unemployment rate		−0.0163 (0.0025)	
Per capita personal income (US$ 1000)			−0.0012 (0.0023)
	Log of number of drinks		
State unemployment rate	−0.0313 (0.0048)	−0.0131 (0.0050)	−0.0231 (0.0052)
National unemployment rate		−0.0664 (0.0095)	
Per capita personal income (US$ 1000)			0.0537 (0.0080)
	Alcohol-involved driving		
State unemployment rate	−8.9E−4 (3.4E−4)	−5.2E−4 (3.7E−4)	−6.7E−4 (3.6E−4)
National unemployment rate		−0.0015 (6.6E−4)	
Per capita personal income (US$ 1000)			0.0012 (5.8E−4)

Note: see note on Table 2. The regressions also control for personal characteristics, beer taxes, month and state dummy variables, and state-specific linear time trends. They are estimated by weighted least squares, using BRFSS final sampling weights. Robust S.E. are reported in the parentheses.

national rate) reduces expected conditional drinking by just 1.3% while having no impact on the other two outcomes. This raises the possibility that the state-level variations focused upon in this analysis understate the reduction in alcohol use occurring during national downturns.

Alcohol consumption falls in bad times partly because incomes decline. In our data, a one point rise in the state unemployment rate is associated with a US$ 640 fall in per capita income, controlling for state and month effects. As shown in column (c), a US$ 1000 (or 0.28 standard deviation) reduction in income, in turn, is expected to decrease conditional drinking by over 5% and alcohol-involved driving by more than 4%. These results accord with evidence by Ruhm (1995) and others that alcohol use and drunk-driving are normal goods.

To test whether declines in overall drinking mask increased consumption among persons entering unemployment, we estimated an augmented regression that included a dummy variable for persons reporting being “out of work for less than 1 year”, as well as interactions between this variable and the state unemployment rate. These specifications provided no indication of increased drinking among persons becoming jobless in bad times. Instead, the interaction coefficient was almost always negative, suggesting larger procyclical variations in alcohol use for recently unemployed individuals than for workers. For instance, a one percentage point increase in the state unemployment rate was predicted to reduce the conditional drinking of employed 25–55-year-old males by 3.9%, compared to an almost 6% decrease for those out of work less than 1 year.[16]

16. *Changes in the composition of unemployment could account for a portion of the negative interaction effect.*

5. LIGHT VERSUS HEAVY DRINKING

The aforementioned findings demonstrate that the macroeconomic variation in alcohol use is dominated by changes at the intensive margin (how much drinkers consume) rather than the extensive margin (whether they drink at all). We next consider fluctuations in conditional drinking by limiting the sample to alcohol users and analyzing dichotomous variables for binge drinking and consumption of 1–10, 1–20, 21–59, >60, >100 drinks during the last 30 days.

The 60 drink cut-off is frequently used to delineate “chronic” drinking (e.g. Dee, 2001) and corresponds to the threshold between moderate and heavy drinking for males according to current federal guidelines (US Department of Agriculture and US Department of Health and Human Services, 2000). Only 8% of consumers (4% of sample members) report consuming this much alcohol. However, since two drinks per day has been linked to decreased risk of coronary heart disease in some studies, we pay particular attention to “heavy drinking” defined by consumption of at least 100 alcoholic beverages per month. Fewer than 3% of drinkers imbibe this much, implying that this standard captures the upper tail of the distribution of alcohol use. Conversely, 1–10 or 1–20 drinks per month are used to represent “light” drinking and 21–59 beverages to define moderate use.[17] The final binary outcome, binge drinking, proxied by consumption of five or more alcoholic beverages on a single occasion, could occur without heavy alcohol use over the course of a month, although this is rare in our data.[18]

The econometric results, displayed in Table 4, demonstrate that drinking falls in bad economic times because of reductions in chronic or heavy use. A one point increase in unemployment decreases the expected probability of consuming 60 (100) or more drinks by 0.63 (0.28) percentage points or 7.8% (9.7%). Small declines in moderate consumption and binge drinking are also observed, but there is a statistically significant 2.0% (1.3%) rise in the likelihood of imbibing 10 (20) or fewer drinks. Once again a portion of the macroeconomic fluctuation is due to changes in incomes; a US$ 1000 reduction is predicted to decrease the probability of reaching the 60 (100) drink threshold by 6.8% (1.6%) and to cut binge drinking by 4.7%, while raising the frequency of recreational drinking.

These estimates, combined with those above, indicate that alcohol use falls during contractions because some drinkers switch from heavy to more moderate levels of consumption, rather than because recreational users give up liquor or reduce their intake. Since heavy drinking is associated with alcohol abuse and light consumption may have medical benefits, it is almost certain that drinking problems become less common in bad times.

6. DYNAMICS

Economic conditions have been assumed to have only a contemporaneous impact on alcohol use until now. Information on the dynamics of the adjustment process is provided in Table 5. Models that include 18 months lags of the state unemployment rate are estimated and the predicted

17. *Since federal guidelines recommend that women drink no more than one alcoholic beverage per day, we also tested specifications using a 30 drink cut-off for females. The results are qualitatively similar to those obtained using 60 or 100 drink thresholds.*

18. *For instance, binge drinkers consumed almost 4 times as many alcoholic beverages as non-bingers, were 11 (23) times more likely to imbibe at least 60 (100) drinks per month, and had driven under the influence 15 times as often.*

Table 4

Econometric estimates of categorical amounts of drinking for persons consuming some alcohol during the last month

Regressor	Number of drinks in last month					
	1–10	1–20	21–59	≥60	≥100	≥5 drinks on one occasion
Sample mean	0.518	0.694	0.225	0.081	0.029	0.286
State unemployment rate	0.0102 (0.0017)	0.0092 (0.0017)	−0.0029 (0.0013)	−0.0063 (0.0012)	−0.0028 (6.6E−4)	−6.9E−4 (0.0013)
State unemployment rate	0.0077 (0.0018)	0.0070 (0.0018)	−0.0013 (0.0014)	−0.0057 (0.0012)	−0.0027 (7.2E−4)	0.0013 (0.0014)
Per capita personal income (US$ 1000)	−0.0167 (0.0028)	−0.0145 (0.0027)	0.0107 (0.0022)	0.0038 (0.0018)	4.5E−4 (0.0011)	0.0134 (0.0023)

Note: see note on Table 2. The dependent variables are dichotomous outcomes indicating whether respondents consumed the specified amounts of alcohol. The sample is restricted to persons with some drinking during the last month. The first row of the table shows the weighted mean for each dependant variable. The second row presents regression results for the models which control for personal characteristics and beer taxes, month and state dummy variables, state-specific linear time trends, and the state unemployment rate. The third and forth row display results for a model which is identical except that it also holds per capita incomes constant. The regressions are estimated by weighted least squares, using BRFSS final sampling weights. Robust S.E. are reported in the parentheses.

Table 5
Predicted effect of a sustained one percentage point increase in the state unemployment rate on alcohol use and drinking problems

Months since rise in unemployment	Drinker	Log of number of drinks	Alcohol-involved driving	Heavy drinking (≥100 drinks)
0	−0.0133 (0.0043)	−0.0348 (0.0159)	−0.0020 (0.0011)	−0.0041 (0.0019)
3	−0.0134 (0.0040)	−0.0375 (0.0156)	−0.0038 (0.0012)	−0.0037 (0.0021)
6	−0.0093 (0.0031)	−0.0270 (0.0129)	−0.0011 (8.7E−4)	−0.0051 (0.0019)
9	−0.0047 (0.0030)	−0.0616 (0.0127)	−0.0012 (9.0E−4)	−0.0063 (0.0017)
12	0.0048 (0.0042)	−0.0286 (0.0160)	−0.0007 (0.0011)	−0.0020 (0.0018)
15	0.0031 (0.0041)	−0.0514 (0.0157)	0.0014 (0.0011)	−0.0041 (0.0021)
18	0.0059 (0.0015)	−0.0180 (0.0053)	−0.0007 (4.2E−4)	−4.7E−4 (7.3E−4)

Note: see notes on Tables 2 and 4. This table shows the predicted effect of a one percentage point increase in the state unemployment rate that is sustained for the number of months shown in the first column. These predictions are made using models that correspond to column (c) of Table 2, except that they also include lagged unemployment rates for the first through eighteenth month prior to the survey date. The effect of a rise in the unemployment rate lasting for k months is calculated as $\sum_{n=0}^{k}\hat{\beta}_{t-n}$, for $\hat{\beta}_{t-n}$ the regression coefficient on the n months lag of the unemployment rate. Robust S.E. are shown in the parentheses.

impact of a one percentage point rise in joblessness that has been sustained fork months is calculated as $\sum_{n=0}^{k}\widehat{ß}_{t-n}$ for $\widehat{ß}_{t-n}$ the regression coefficient on the n months lag of unemployment.

The adjustment patterns exhibit some instability, leading to imprecise estimates. Two patterns nevertheless emerge. First, a sustained rise in joblessness is associated with a short-lasting reduction in drinking participation. A persistent one point increase in unemployment reduces expected drinking participation by 1.3, 1.3, 0.9, and 0.5 percentage points (2.6%, 2.6%, 1.8%, 0.9%) after 0, 3, 6, and 9 months but is associated with small and statistically insignificant changes beyond 1 year.[19] The decline in alcohol-involved driving also appears temporary, with negative impacts expected in most of the first 9 months but essentially no subsequent effect. Second, there are long-lasting changes in alcohol use at the intensive margin. Conditional drinking is anticipated to fall 3.4%, 3.7%, 6.0%, and 5.0% after 0, 3, 9, and 15 months, and heavy consumption (100 or more drinks) by 0.4%, 0.4%, 0.6%, and 0.4 percentage points (14.1%, 12.8%, 21.7%, 14.1%). It is noteworthy that we uncover no evidence of larger permanent than transitory effects, contrary to the predictions of Becker and Murphy's (1988) theory of rational addiction.

19. *Similar evidence of larger short-run than long-run changes in alcohol consumption has been obtained by previous researchers examining the effects of treatment programs (Humphreys et al., 1997), divorce (Hartford et al., 1994), DUI-legislation (Ross, 1984), and the privatization of alcohol sales (Mulford et al., 1992).*

7. Population subgroups

We next test for differences across population groups. Table 6 shows that males drink much more than females, consumption falls with age, and non-Hispanic minorities consume relatively little alcohol. These patterns are consistent with the findings of other research (e.g. see US Department of Health and Human Services, 1997). The econometric results summarized in Table 7 confirm a strong procyclical variation in conditional drinking and heavy consumption for most subgroups, with weaker impacts for drinking participation and alcohol-involved driving. One exception is that nonwhites and senior citizens are more likely than others to stop drinking during economic downturns. The large cyclical variation in alcohol use by Hispanics is also noteworthy and may be explained by specific employment patterns (e.g. the high representation of Hispanics in agricultural jobs) or cultural considerations. For instance, Hispanics often consume alcohol as a reward for hard work (Heath, 1995; Ames and Rebhun, 1996).

The adjustment to sustained changes in economic conditions was also examined using procedures described above. The results (not shown) again indicate that a sustained rise in joblessness generally leads to temporary reductions in predicted drinking participation or alcohol-involved driving but persistent decreases in conditional drinking and heavy alcohol use.

Table 6
Sample means on alcohol outcomes for population subgroups

Group	Drinker	Number of drinks	Alcohol-involved driving	Heavy drinking	Binge drinking	Sample size
Full sample	0.521	21.4	0.027	0.028	0.285	1032965
Sex						
Male	0.608	28.0	0.043	0.045	0.378	431902
Female	0.440	13.0	0.012	0.008	0.166	601063
Race/ethnicity						
White (not Hispanic)	0.541	21.5	0.028	0.028	0.282	855506
Black (not Hispanic)	0.402	19.8	0.016	0.028	0.246	85033
Other race (not Hispanic)	0.453	19.0	0.020	0.029	0.256	37985
Hispanic	0.496	22.5	0.031	0.035	0.352	54441
Age (years)						
18–24	0.589	26.2	0.054	0.044	0.481	101363
25–64	0.550	20.5	0.027	0.026	0.272	731096
≥65	0.344	20.4	0.003	0.023	0.085	200506

Note: observations are weighted using BRFSS final sampling weights. The number of drinks and the probability of heavy or binge drinking are calculated for persons with some alcohol use during the last month. Heavy drinking refers to the consumption of 100 or more drinks in the last month, for persons with some alcohol use.

Table 7
Predicted effect of a one percentage point increase in the state unemployment rate on alcohol use and drinking problems

Group	Drinker	Log of number of drinks	Alcohol-involved driving	Heavy drinking
All respondents	−0.0018 (0.0013)	−0.0313 (0.0048)	−8.9E−4 (3.4E−4)	−0.0028 (6.6E−4)
Sex				
Male	−0.0020 (0.0017)	−0.0342 (0.0062)	−0.0017 (6.5E−4)	−0.0042 (0.0011)
Female	−0.0018 (0.0015)	−0.0277 (0.0055)	−1.2E−4 (2.8E−4)	−0.0011 (4.5E−4)
Race/ethnicity				
White (not Hispanic)	−0.0012 (0.0013)	−0.0302 (0.0048)	−4.8E−4 (3.8E−4)	−0.0028 (6.5E−4)
Black (not Hispanic)	−0.0086 (0.0037)	−0.0089 (0.0159)	−0.0012 (0.0010)	−0.0027 (0.0026)
Other race (not Hispanic)	−0.0158 (0.0059)	−0.0596 (0.0247)	−6.8E−4 (0.0015)	6.9E−4 (0.0031)
Hispanic	2.8E−4 (0.0046)	−0.0684 (0.0216)	−0.0047 (0.0018)	−0.0054 (0.0027)
Age (years)				
18–24	−0.0029 (0.0034)	−0.0276 (0.0112)	−0.0032 (0.0015)	−0.0027 (0.0020)
25–64	−7.5E−4 (0.0014)	−0.0333 (0.0049)	−5.6E−4 (4.0E−4)	−0.0030 (6.7E−4)
≥65	−0.0050 (0.0023)	−0.0209 (0.0120)	−2.0E−4 (2.4E−4)	−0.0017 (0.0013)

Note: see notes on Tables 2, 4 and 5. The regressions control for personal characteristics, beer taxes, month and state dummy variables, and state-specific linear time trends. They are estimated by WLS using BRFSS final sampling weights. Robust S.E. are reported in the parentheses. Heavy drinking refers to the consumption of 100 or more drinks in the last month, for persons with some alcohol use.

8. CONCLUSION

This investigation uses microdata to confirm that drinking decreases in bad economic times and expands on previous analyses by providing three new findings. First, almost all of the procyclical variation is due to changes in the consumption of existing drinkers with, at most, short-lasting movements into or out of alcohol use. Second, the decrease in alcohol use during downturns is concentrated among heavy rather than recreational drinkers. Since heavy use is associated with alcohol problems and light drinking may yield health benefits, these results provide strong evidence that alcohol abuse is procyclical. Third, the macroeconomic responses tend to be relatively similar across demographic categories but with relatively large cyclical fluctuations observed for groups with high average levels of drinking and for Hispanics. There is also suggestive evidence that recent job losers, as well as those remaining employed, cut their consumption when the economy deteriorates.

One caveat deserving mention is that this analysis covers a relatively limited time span. Although the 13 years period is longer than that in previous research using microdata, it includes just one national turning point (the early-1990s). For this reason, we focus on state-level variations in economic conditions and show that our results are consistent with those of prior analyses of aggregate data.

The findings have important implications. While we cannot rule out the possibility that the stress of a deteriorating economy causes some individuals to self-medicate by increasing alcohol use, any such effect is more than offset by broader reductions in drinking. One reason for the fall in consumption is that incomes decline. It is, therefore, not surprising that the decrease is concentrated among heavy drinkers, who spend the most on liquor. Nevertheless, it is noteworthy that this apparently dominates any resistance to decreasing consumption due to the potentially addictive nature of substantial alcohol use.

The failure to adequately account for the macroeconomic environment could also result in biased estimates of the social costs of alcohol problems calculated using data from a single point in time. For instance, one frequently cited study concludes that alcohol abuse cost the US$ 148 billion in 1992 (US Department of Health and Human Services, 1998). However, given the weak economy in that year (e.g. the unemployment rate was 7.5%), these figures may understate the expenses in more robust periods, such as the middle and late-1990s.[20]

ACKNOWLEDGEMENTS
We thank Michael Grossman, Doug Staiger, and seminar participants at the Triangle Applied Microeconomics Conference, NBER Summer Institute in Health Economics, and the Lund University Center for Health Economics for helpful comments. Olga Khavjou provided outstanding research assistance. Ruhm gratefully acknowledges financial support from the National Institute on Alcohol Abuse and Alcoholism (AA12309) and the National Science Foundation (SES-9876511). The opinions, findings, and conclusions expressed in this paper are those of the authors and do not necessarily reflect the views of the funding agencies.

REFERENCES
Ames, G.M., Rebhun, L.A., 1996. Women, alcohol, and work: interactions of gender, ethnicity, and occupational culture. Social Science and Medicine 43 (11), 1649–1663.

Baker, D.B., 1985. The study of stress at work. Annual Review of Public Health 6, 367–381.

Becker, G.S., Murphy, K.M., 1988. A theory of rational addiction. Journal of Political Economy 96 (4), 675–700. Brenner, M.H., Mooney, A., 1983. Unemployment and health in the context of economic change. Social Science Medicine 17 (16),1125–1138.

Butler, J. S., 2000. Efficiency results ofMLE and GMM estimation with sampling weights. Journal of Econometrics 96,25–37.

Catalano, R., Dooley, D., Wilson, G., Hough, R., 1993. Job loss and alcohol abuse: a test using data from the epidemiologic catchment area project. Journal of Health and Social Behavior 34 (3), 215–225.

Cook, P.J., Moore, M.J., 2000. Alcohol. In: Culyer, A.J., Newhouse J.P. (Eds.), Handbook of Health Economics. Elsevier, Amsterdam, pp. 1630–1673.

Cook, P.J., Tauchen, G.,1982. The effect of liquor taxes on heavy drinking. Bell Journal of Economics 3, 379–390. Dee, T.S., 2001. Alcohol abuse and economic conditions: evidence from repeated cross-sections of individual-level data. Health Economics 10 (3),257–270.

Ettner, S.L., 1997. Measuring the human cost of a weak economy: does unemployment lead to alcohol abuse? Social Science Medicine 44 (2),251–260.

20. *This estimate also does not account for price changes or population growth occurring since that time. Conversely, there are numerous reasons why the costs of alcohol use may be overstated. For instance, almost half of the expense is attributed to lost earnings due to "impaired productivity", even though the empirical evidence linking alcohol use to reduced wages is weak.*

Evans, W., Graham, J.D., 1988. Traffic safety and the business cycle. Alcohol, Drugs, and Driving 4, 31–38.

Feather, N.T., 1990. The Psychological Impact of Unemployment. Springer, New York.

Fenwick, R., Tausig, M., 1994. The macroeconomic context of job stress. Journal of Health and Social Behavior 35 (3), 266–282.

Freeman, D.G., 1999. A note on economic conditions and alcohol problems. Journal of Health Economics 18 (5), 661–670.

Gaziano, J.M., Buring, J.E., Breslow, J.L., Goldhaber, S.Z., Rosner, B., VanDenburgh, M., Willett, W., Hennekens, C.H., 1993. Moderate alcohol intake, increased levels of high-density lipoprotein and its subfractions, and decreased risk of myocardial infarction. New England Journal of Medicine 329, 1829–1834.

Gruenewald, P.J., 1993. Alcohol problems and the control of availability: theoretical and empirical issues. In: Hilton, M., Bloss, G. (Eds.), Economics and the Prevention of Alcohol Related Problems. National Institute of Alcohol Abuse and Alcoholism, Rockville, MD, pp. 59–90.

Hartford, T.C., Hanna, E.A., Faden, V.B.,1994. The long- and short-term effects of marriage on drinking. Journal of Substance Abuse 6, 209–217.

Heath, D.B., 1995. International Handbook of Alcohol and Culture. The Greenwood Press, London.

Humphreys, K., Moos, R.H., Cohen, C., 1997. Social and community resources and long-term recovery from treated and untreated alcoholism. Journal of Studies on Alcohol 58 (3), 231–238.

Johnston, L.D., O'Malley, P.M., Bachman, J.G. (Eds.), 1992. Smoking, Drinking, and Illicit Drug Use Among American Secondary School Students, College Students, and Young Adults, 1975–1991. College Students and Young Adults, Vol. II. NIH Publication No. 93-3481, National Institute on Drug Abuse, Rockville, MD.

Karasek, R.A., Theorell, T., 1990. Healthy Work: Stress, Productivity, and the Reconstruction of Working Life. Basic Books, New York.

Kenkel, D.S., 1996. New estimates of the optimal tax on alcohol. Economic Inquiry 34, 296–319.

Manning, W.G., Blumberg, L., Moulton, L.H., 1995. The demand for alcohol: the differential response to price. Journal of Health Economics 14, 123–148.

Midanik, L.T., 1982. The validity of self-reported alcohol consumption and alcohol problems: a literature review. British Journal of Addiction 77, 357–382.

Mulford, H.A., Ledolter, J., Fitzgerald, J.L.,1992. Alcohol availability and consumption: iowa sales data revisited. Journal of Studies on Alcohol 53 (5), 487–494.

Mullahy, J., 1998. Much ado about two: reconsidering retransformation and the two-part model in health econometrics. Journal of Health Economics 17 (3), 247–281.

Nephew, T.M., Williams, G.D., Stinson, F.S., Ngyen, K., Dufour, M.C., 1999. Surveillance Report #51: Apparent Per Capita Alcohol Consumption: National, State, and Regional Trends, 1977–1997. National Institute on Alcohol Abuse and Alcoholism, Bethesda, MD.

O'Neill, B., 1984. Recent trends in motor vehicle crash deaths. American Association for Automotive Medicine 6,29–32.

Pierce, R.S., Frone, M.R., Russell, M., Cooper, M.L., 1994. Relationship of financial strain and psychosocial resources to alcohol use and abuse: the mediating role of negative affect and drinking motives. Journal of Health and Social Behavior 35 (4), 291–308.

Remington, P.L., Smith, M.Y., Williamson, D.F., Anda, R.F., Gentry, E.M., Hogelin, G.C., 1988. Design, characteristics and usefulness of state-based behavioral risk factor surveillance 1981–1986. Public Health Reports 103 (4), 366–375.
Ross, L.H., 1984. Social control through deterrence: drinking-and-driving laws. Annual Review of Sociology 10, 21–35.
Ruhm, C.J., 1995. Economic conditions and alcohol problems. Journal of Health Economics 14 (5), 583–603. Ruhm, C.J., 2000. Are recessions good for your health? Quarterly Journal of Economics 115 (2), 617–650.
Skog, O.-J., 1986. An analysis of divergent trends in alcohol consumption and economic development. Journal of Studies on Alcohol 47, 19–25.
Sloan, F.A., Reilly, B.A., Schenzler, C.,1995. Effects of tort liability and insurance on heavy drinking and drinking and driving. Journal of Law and Economics 38, 49–78.
Sokejima, S., Kagamimori, S., 1998. Working hours as a risk factor for acute myocardial infarction in Japan: a case-control study. The British Medical Journal 317 (19), 775–780.
Theodossiou, I., 1998. The effects of low-pay and unemployment onpsychological well-being: a logistic regression approach. Journal of Health Economics 17, 85–104.
Thun, M.J., Peto, R., Lopez, A.D., Monaco, J.H., Henley, S.J., Heath Jr., C.W., Doll, R.,1997. Alcohol consumption and mortality among middle-aged and elderly US adults. New England Journal of Medicine 337 (24), 1705– 1714.
US Department of Agriculture and US Department of Health and Human Services, 2000. Nutrition and Your Health: Dietary Guidelines for Americans, 5th Edition. Washington, DC.
US Department of Health and Human Services, 1997. Epidemiology of Alcohol Use and Alcohol-related Consequences in 9th Special Report to Congress on Alcohol and Health. NIH Publication No. 97-4017, National Institutes of Health, Bethesda, MD, pp. 1–31.
US Department of Health and Human Services, 1998. The Economic Costs of Alcohol and Drug Abuse in the United States, 1992. Public Health Service, Rockville, MD.
US Department of Health and Human Services, 2000. Effect of Changes in Alcohol Taxes and Prices in 10th Special Report to Congress on Alcohol and Health. NIH Publication No. 00-1583, National Institutes of Health, Bethesda, MD, pp. 341–354.
Wagenaar, A.C., Streff, F.M., 1989. Macroeonomic conditions and alcohol-impaired driving. Journal of Studies on Alcohol 50, 217–225.
Wagenaar, A.C., 1993. Minimum drinking age and alcohol availability to youth: issues and research needs. In: Hilton, M., Bloss, G. (Eds.), Economics and the Prevention of Alcohol Related Problems. National Institute of Alcohol Abuse and Alcoholism, Rockville, MD, pp. 175–200.
Winton, M., Heather, N., Robertson, I., 1986. Effects of unemployment on drinking behavior: a review of the relevant evidence. The International Journal of Addictions 21 (12), 1261–1283.
Wooldridge, J., 1999. Asymptotic properties of weighted M-estimators for variable probability samples. Econometrica 67 (6), 1385–1406.