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Does Alcohol Consumption Reduce Human Capital Accumulation? Evidence from the College Alcohol Study

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Abstract:
It is often conjectured that a significant cost of youthful drinking is the future labor market consequences of having accumulated a lower stock of human capital. While several studies have investigated the effect of youthful drinking on the quantity of human capital stock accumulated, measured by years of education completed or high-school graduation, this paper investigates the effect of alcohol consumption on the quality of human capital stock accumulated as measured by college students' GPA. Using data from the Harvard School of Public Health College Alcohol Study, we estimate the indirect effect of the quantity of alcohol consumed on GPA through hours spent studying as well as the direct effect. Our results show that the net total effect of alcohol consumption on GPA is negative for the sample of college students, and that the main effect is via a reduction in the hours spent studying. This finding confirms that high levels of alcohol consumption have an overall negative consequence for academic achievement, and hence future labor market outcomes.

1. INTRODUCTION

An interesting puzzle in the economics literature is that, despite the conventional view that alcohol use diminishes productivity, most empirical studies tend to find that drinkers earn more than nondrinkers.[1] The focus of this literature is on identifying the direct effect of contemporaneous drinking on earnings, conditional on the individual's level of human capital stock. However, because the intertemporal consequences of drinking via human capital accumulation are unaccounted for, the true labor market costs associated with drinking are likely to be underestimated.

The idea that drinking during youth may negatively impact the accumulation of human capital stock and hence long-term labor market success is not new.[2] Moreover, several studies provide evidence that, in fact, this is the case. These studies, discussed in the following section, examine the effect of drinking on the extensive margin of human capital accumulation, as measured by years of education completed or high-school graduation. In addition to the number of years spent in education, drinking may also affect the quality of human capital stock accumulated. For example among college students, drinking may affect educational achievement as measured by their grade point average (GPA). Empirical evidence has found a positive relationship between GPA and earnings - over and above its effect through admission to graduate and professional programs (Jones and Jackson, 1990). However, there is no body of research that investigates the effect of drinking on this aspect of human capital accumulation. In this paper, we address this issue by investigating the effect of drinking on college students' educational achievement as measured by their GPA using data from the Harvard School of Public Health College Alcohol Study.

[1] See for example, Hamilton and Hamilton, 1997; Zarkin, French, Mroz and Bray, 1998; Heien, 1996**.** An exception is Kenkel and Ribar (1994). A good review of this literature is provided by Cook and Moore, 2000.
[2] See for example Mullahy and Sindelar, 1993.

The most obvious mechanism by which drinking may affect GPA is through the allocation of time to study. Since both drinking and studying take time, drinking may reduce the number of hours that a student spends studying outside of class and hence their level of academic achievement. Similarly, time spent studying may reduce time available for drinking. In addition to its indirect effect on academic performance through time spent studying, drinking could also have a direct effect on students' GPA. *A-priori* it is unclear whether this direct effect is negative or positive. For example, drinking may reduce cognitive functioning, in which case the direct effect is negative. It is also possible that the social interactions associated with drinking may provide a means of relieving stress, and thereby enhance academic performance. In order to quantify the effect of drinking on college students' GPA, we account for both the direct effect and the indirect effect of drinking on GPA through hours spent studying.

The remainder of this paper is set out as follows. In the next section, we place our research within the context of the existing literature on drinking and educational attainment. Section 3 outlines our conceptual framework and estimation strategy. Section 4 describes the data used in the analysis. The results from estimation are presented in section 5, and section 6 discusses the implications of these results.

2. LITERATURE REVIEW

The literature that investigates the relationship between drinking and educational attainment can be separated into those studies that take drinking to be an exogenous determinant of educational attainment and those that allow for a potential correlation in unobserved characteristics determining drinking and education. Beginning with studies that fall in the former category, Mullahy and Sindelar (1989, 1994) investigate the effect of early onset of alcoholism on the number of years of education completed. Their studies draw on the Epidemiological Catchment Area data for New Haven, and use a sample of males aged 25-59

years of age. Results from regressing years of schooling on indicators for age of onset of alcohol dependence indicate that teenage alcohol dependence is associated with early termination of schooling. Yamada, Kendix and Yamada (1996) examine the relationship between high-school graduation and drinking. Their study is based on the sample from the National Longitudinal Survey of Youth (NLSY) who were in the 12^{th} grade during the 1981-1982 academic year. The authors find that contemporaneous drinking is associated with a reduction in the probability of high-school graduation.

The earliest study that estimates the causal relationship between drinking and schooling is by Cook and Moore (1993). Using the NLSY sample of youths who were high-school seniors at the time of the 1982 survey, Cook and Moore estimate the impact of drinking on the number of years of post-secondary school completed by 1988. The beer tax and an indicator for living in a state with a binding minimum legal age for drinking alcohol (MLDA) are used to identify the effect on drinking on schooling. The authors find that increasing the number of drinks consumed per week, being a frequent drinker (drinking on more than one occasion per week), and being frequently drunk (at least four occasions consuming six or more drinks in the last month) reduces years of education completed.

Dee and Evans (1997) criticize Cook and Moore's use of cross state variation in beer taxes and MLDA laws to identify the effect of drinking on educational attainment. Rather, they use within state variation in the MLDA to identify the effect of teen drinking on the probability of high-school graduation, college entrance, and college persistence. Using matched cohorts from the Monitoring the Future surveys and the 1960-1969 birth cohorts in the Public use Microdata Sample (PUMS), Dee and Evans report two sample instrumental variables (TSIV) results that indicate that teen drinking has a statistically insignificant effect on college entrance, college completion, and the probability of completing high-school.

Chatterji (1998) uses NLSY data to explore the relationship between educational attainment by the age of twenty-one and weekly alcohol use before the age of seventeen. When alcohol use is treated as exogenous, the ordinary least squares (OLS) results indicate that weekly alcohol use reduces the number of grades completed by the age of twenty-one. Exogeneity tests, however, provide some evidence that alcohol use is not exogenous. When drinking is instrumented (using state excise tax on beer, percent of counties in the state that prohibit alcohol sales, and MLDA laws), weekly use of alcohol before the age of seventeen is not found to have a significant effect on the years of education attained.

Koch and Ribar (2001) examine the relationship between drinking onset and educational attainment using same sex sibling data from the NLSY. Educational attainment is measured by completed years of schooling by age twenty-five. In order to identify the effect of age of drinking onset on educational attainment, the authors use a fixed effects model in which the effect is a family level factor, and an IV estimator in which each sibling's drinking onset serves as an instrument for the other's onset. The magnitude of the estimated effect of the age of drinking onset on educational attainment is sensitive to alternative assumptions about the correlation of unobserved determinants of drinking and schooling. Nonetheless, an older age of initiation into drinking is associated with a greater number of years of education completed.

Overall, this research finds that drinking is associated with reduced educational attainment. However, when the potential correlation between unobserved characteristics determining education and drinking are accounted for, the evidence is mixed as to whether drinking has a detrimental effect on education. Findings of both no effect of drinking on education and a negative effect arise even though most studies use data from the NLSY. The differences in findings stem from using differing measures for educational attainment and drinking, using different instrumental variable estimators and different variables as instruments for drinking.

3. METHODOLOGY

Most students attend college in order to increase their future earnings through investment in human capital accumulation. Also, most students drink (at least occasionally), presumably because of the utility they derive from the euphoric effects of intoxication as well as the social interaction associated with drinking. Because both the acquisition of human capital and drinking are time intensive activities, we consider the decision to drink and spend time studying within a standard time allocation framework.[3] In this framework the rational drinker will take into account the consequences of time spent drinking on their academic performance, trading off the current period utility of drinking and socializing against the future benefits of their human capital investment.

More formally, we assume that students maximize a concave, twice differentiable utility function that depends on their GPA (representing future consumption), current period consumption commodities including alcohol, and leisure, subject to budget and time constraints.[4] We also assume that the production of GPA depends on both the hours a student spends studying, the quantity of alcohol he consumes, and individual level characteristics (both observed and unobserved). While it seems reasonable to assume that GPA is an increasing function of time spent studying, *a-priori*, it is unclear whether the direct effect of drinking on GPA is negative or positive. If drinking impairs cognitive functioning, then the direct effect of drinking on GPA will be negative. On the other hand, time spent socializing or relaxing after studying with a drink may relieve stress and hence have a therapeutic effect on the student's academic performance. In this case drinking may have a positive direct effect on GPA. In reality, both of

[3] In addition to its impact via time constraints, drinking may affect time spent studying because intoxication may affect the students ability to concentrate, result in injury from accidents or fights, lead to unwanted sex and the associated risks of pregnancy or disease, or lead to trouble with parents or the law.

[4] We assume that there are monetary costs associated with these activities, such as the price of alcohol in the case of drinking, and tuition and books in the case of human capital accumulation.

these effects may be present and it depends on which is largest as to whether the (net) direct effect of drinking on GPA is negative or positive.

Denoting the choice variables drinking and hours spent studying outside class by D and S, respectively, the empirical formulation to the solution to the maximization problem is the following set of structural equations:

$$D_i = \beta_0 + \beta_1 S_i + \beta_2 X_i + \beta_3 P_i + \varepsilon_{1i}. \quad (1)$$

$$S_i = \gamma_0 + \gamma_1 D_i + \gamma_2 X_i + \gamma_3 R_i + \varepsilon_{2i} \quad (2)$$

$$GPA_i = \alpha_0 + \alpha_1 D_i + \alpha_2 S_i + \alpha_3 X_i + \varepsilon_{3i}. \quad (3)$$

where *i* is the index over individuals, X contains observable individual and school characteristics that may effect GPA, drinking and hours spent studying; P is a vector containing the full price of alcohol consumption; and R measures school characteristics that effect study hours but have no direct effect on drinking decisions or GPA, such as the academic competitiveness or reputation of the school. The structural disturbances, $\varepsilon_i = (\varepsilon_{1i} \ \varepsilon_{2i} \ \varepsilon_{3i})'$, are assumed to be randomly drawn from a trivariate distribution with $E[\varepsilon_i]=0$, $E[\varepsilon_i \varepsilon_i']=\Sigma$, $E[\varepsilon_i \varepsilon_j']=0 \ \forall \ i \neq j$.

Of primary interest to this study is the effect of drinking on GPA. This is measured as:

$$\frac{\partial GPA_i}{\partial D_i} = \alpha_1 + \alpha_2 \frac{\partial S_i}{\partial D_i} = \alpha_1 + \alpha_2 \gamma_1 \quad (4)$$

Due to the simultaneity between drinking and hours spent studying, and the endogeneity of each of these variables in the equation determining GPA, OLS estimation of equation 2 and 3 will not provide consistent estimates of the parameters of interest. However, the exclusion of variables measuring the full price of alcohol use and academic competitiveness of the college the student attends identifies drinking and hours spent studying, respectively, in the GPA equation. Similarly, hours spent studying is identified in the equation for drinking by the exclusion of

variables measuring academic competitiveness, and drinking is identified in the hours studying equation by the exclusion of measures of the full price of alcohol.

As each of the three equations in this system are identified, two-stage least (2SLS) squares estimation of each equation can be used to obtain consistent estimates of the parameters of interest.[5] Within this framework, the exclusion restrictions used to identify each equation can be examined using the overidentification test proposed by Davidson and MacKinnon (1993).

4. DATA

4.1 The College Alcohol Study

This research pools data from the 1993, 1997 and 1999 waves of the College Alcohol Study. The Harvard School of Public Health College Alcohol Study first surveyed 140 colleges and universities in 1993. This was a nationally representative sample of 4-year colleges and universities selected from the American Council on Education's list of accredited universities using probability proportionate to size sampling. One hundred and thirty of the original colleges and universities participated in the 1997 survey and 128 participated in the 1999 survey. The schools captured by the Study are located in 40 states and the District of Columbia, and consist of both public and private schools.

Administrators at each college were asked to provide a random sample of undergraduates drawn from the total enrollment of full-time students, and strict guidelines were provided regarding how to generate this sample. Over 200 students from each school were sent an anonymous survey in February of each year. Mailings were timed to avoid the period immediately preceding and following spring break, so that students would be responding about behavior during a time when they were on campus. Student participation was voluntary and

[5] Both 2SLS and 3SLS provide consistent estimates, although, as a systems estimator, 3SLS is efficient relative to 2SLS. However, 3SLS has the drawback that any specification error in the structure of the model will be propagated

anonymous. Over 17,000 students (17,582) responded to the survey in 1993, 15,685 responded in 1997 and 14,907 students responded in 1999. The details of the sample and research design can be found in Wechsler et al. 1994, Wechsler et al. 1998, and Wechsler et al. 2000.

The CAS provides a unique opportunity to investigate the relationship between study effort, drinking, and GPA. Nonetheless, there are several caveats that should be noted. First, the CAS is representative of students enrolled in college. Therefore, individuals who have dropped out of college are not part of the universe from which the sample is drawn. To the extent that students who drink heavily are more likely to fail courses and drop out of school, we will tend to underestimate the effect of drinking on GPA. A second caveat is that we are using self-reported information on drinking, hours spent studying, and GPA. As drinking rates in the CAS for each survey year were almost identical to rates obtained by other studies using different sampling methodologies (Johnston et al., 1997; Presley, 1996; Douglas, 1997), we are reasonably confident in our measures on drinking. We are unaware of any other survey that asks about GPA and hours spent studying with which to verify the CAS sample information. That being said, the empirical distributions of these variables are stable across years and appear reasonable. For example, the average number of hours spent studying per day (outside of class) is almost 3, and the average GPA reported for the year of survey is a B.

The number of hours per day spent studying outside of class and the students' GPA for the year are discussed more fully in section 4.2. The measures of current drinking behavior are discussed in section 4.3. Demographic, background, and other characteristics of the students that may be related to drinking, studying and GPA are discussed in section 4.4. Variables used to instrument drinking and hours spent studying are discussed in section 4.5.

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throughout the system, whereas 2SLS, confines a problem to the particular equation in which it appears (Greene, 1997).

4.2 Human Capital Accumulation

The input to human capital accumulation that we use in this study is the average number of hours spent studying outside of class per day over the past 30 days. In the sample used for analysis, 2% of students reported that they usually did not study outside class, 17% reported that they usually studied an hour per day, 26% usually studied 2 hours per day, 22% reported they usually studied 3 hours, 15% usually studied 4 hours per day, and 18% usually studied 5 or more hours outside class per day.

The measure of human capital stock we use is the students' self-reported grade point average (GPA) for the year. In the sample used for analysis, about a half of a percent reported a GPA of D (coded as 1) for the year, 1% reported a GPA of C- (coded as 1.7), 5% reported a GPA of C (coded as 2), 8% reported a GPA of C+ (coded as 2.3), 13% reported a GPA of B- (coded as 2.7), 22% reported a GPA of B (coded as 3.0), 20% reported a GPA of B+ (coded as 3.3), 18% reported a GPA of A- (coded as 3.7), and 12% reported a GPA of A (coded as 4.0).

4.3 Drinking Behavior

We use three measures of college drinking behavior: the number of drinks the respondent usually had when they drank alcohol in the 30 days prior to survey, the number of occasions the respondent consumed alcohol in the 30 days prior to survey, and the total number of drinks consumed in the 30 days prior to survey (constructed as the product of the former two measures). A drink was defined in the questionnaire as either a 12-oz bottle or can of beer, a 4-oz glass of wine, a 12-oz bottle or can of wine cooler, or a shot of distilled spirits (either straight or in a mixed drink). Possible responses to the number of times the respondent consumed alcohol are: not at all, 1-2 occasions (coded as 1.5), 3-5 occasions (coded as 4), 6-9 occasions (coded as 7.5), 10-19 occasions (coded as 14.5), 20-39 occasions (coded as 29.5), 40 or more

occasions (coded as 40). Those students who did not drink in the 30 days prior to survey were coded as usually drinking zero drinks, and consuming an alcoholic beverage zero times.

In the sample used for analysis, 30% of students did not drink in the month prior to survey, 8% reported that they usually had a single drink, 14% usually had 2 drinks, 13% reported they usually had 3 drinks, 11% reported they usually had 4 drinks, 9% had 5 drinks, 6% reported that they usually had 6 drinks, 3% reported they had 7 drinks, 2% usually had 8 drinks, and 4% reported that they usually had 9 or more drinks.[6] In terms of the number of occasions students consumed alcohol in the month prior to survey, 30% reported never drinking, 20% reported drinking on 1 or 2 occasions, 21% reported drinking on 3-5 occasions, 14% reported drinking on 6-9 occasions, 12% reported drinking on 10-19 occasions, with less than 3% reporting drinking more often.

4.4 Individual and College Characteristics

In addition to information on study habits, GPA, and drinking, the student survey obtained detailed information about socioeconomic and demographic characteristics that we control for in the analysis. These are an indicator for gender (male), age and age squared, binary indictors for race (African American, Asian, Native American, other race, white is the omitted group), an indictor for ethnicity (Hispanic, non-Hispanic is the omitted group), a set of binary indicators for the religion that they grew up in (Catholic, Jewish, Moslem, Protestant, other religion, no religion is the omitted group), and indicators for marital status (married, divorced, separated, and never married is the omitted group). We also include an indicator for sorority or fraternity membership, and indicators for living arrangements (living in a single sex residence hall, co-ed residence hall, other university housing, a fraternity or sorority house, other type of housing, with off-campus house or apartment as the omitted group). In terms of parents'

characteristics, we include an indicator for parents' education (at least one parent completed college), and for both mothers and fathers we control for parents' drinking behavior with the following variables: parent not present, parent heavy drinker or problem drinker, parent moderate to light drinker, parent former drinker while the student was growing up, with parent abstainer as the omitted category.

We also control for the type of college with an indicator for the college being a women's college, a historically African American college, a commuter college, a small private college, a large private college, a small public campus, with large public campus as the omitted group. Year indicators for 1993 and 1997, and census region dummies for South, West, and Midwest were also included in all specifications.

4.5 Instrumental Variables

Since the full price of alcohol is a determinant of drinking but has no direct impact on hours spent studying or GPA, variables capturing the full price of alcohol are used to identify drinking in the GPA and hours study equations. The full price of current alcohol consumption is captured using measures of both the monetary and non-monetary costs associated with drinking. The monetary cost of alcohol consumption is measured by the beer tax. This measure reflects both state and federal taxes (measures in cents) on a 12 pack of beer. The federal excise tax rate on beer has been constant since 1991. We obtained the state level tax information from the United Brewers' Almanac, an annual publication by the Beer Institute. The tax on beer is converted to constant 1999 prices (measures in cents) using the Consume Price Index (CPI) (CPI=100 in 1982-1984). We measure non-monetary costs of alcohol consumption using state level variables related to access and opportunity to use, state level variables related to the costs of drinking and driving, and an individual measure designed to reflect the psychic costs of

[6] The questionnaire top codes the number of drinks usually consumed on drinking occasions at 9 or more drinks.

drinking. In terms of state level policies governing access and opportunity to use, we use indicators for state level restrictions on happy hours, state level restrictions on pitcher sales, and state level open container laws. The costs of drinking and driving are proxied by the per se illegal blood alcohol concentration (BAC) for driving for adults at the time of survey. We measure potential psychic costs of drinking using an indicator of religiosity, where the indicator is equal to one if the respondent reports that religion is very important or important to them, and zero if the respondent reports that religion is somewhat important or not important at all.

A student's study habits are generally influenced by the academic standards of the institution that they attend. However, there is no reason to expect the academic excellence of a college to have a direct effect on either drinking behavior or the GPA of students. If this is the case, then the academic excellence of the college attended is a candidate for serving as an instrument to identify hours spent studying in the drinking and GPA equations. We measure the academic environment of each college using the U.S. News college rankings. In particular, we construct indicators for the college being ranked in the first tier of national universities and liberal arts colleges, the second tier of national universities and liberal arts colleges, the third tier of national universities and liberal arts colleges, the fourth tier of national universities and liberal arts colleges, with not ranked as a national university or national liberal arts college as the omitted category.[7] A description of the methodology used by U.S. News to calculate rankings of undergraduate colleges is provided in appendix 1.

Descriptive statistics for the pooled sample of the 1993, 1997 and 1999 waves of the CAS, along with the beer tax, state laws pertaining to alcohol use, and college rankings

[7] There are 249 national universities–doctoral in the U.S. (162 public, 87 private), based on categories developed by the Carnegie Foundation for the Advancement of Teaching. The universities offer a full range of undergraduate majors, as well as master's and doctoral degrees; many strongly emphasize research. The 218 liberal arts colleges–bachelor's emphasize undergraduate education and award at least 50 percent of their degrees in the liberal arts.

indicators for the sample are reported in Table 1. The sample size of 34,056 reflects the number of observations on students aged 17 to 24 for which we have non-missing data.

5. RESULTS

Table 2 presents the key results from estimating the equations for drinking, hours spent studying, and GPA given in section 3. The first panel contains the coefficient estimates for the direct effect of drinking and hours spent studying on GPA. The second panel contains key results for the hours spent studying equation, and the final panel contains key results for the drinking equation. To establish the robustness of our findings to the measure of drinking used, results are presented (moving from left to right in Table 2) using the average number of drinks usually consumed per drinking occasion in the past 30 days, the number of drinking occasions in the past 30 days, and the total number of drinks consumed in the past 30 days.

For each measure of drinking, we present both structural results from two-stage least squares (2SLS) estimation and ordinary least squares (OLS) estimates. The exogeneity and overidentification tests associated with the 2SLS estimator proposed by Davidson and MacKinnon (1993**)** are reported for these models. The OLS estimates serve as a benchmark for gauging the bias that results from ignoring the potential simultaneity of drinking and hours spent studying and the endogeneity of these variables in the equation for GPA. Since all three measures of drinking give qualitatively similar results, we focus on the results using the average number of drinks consumed in our discussion.

Before interpreting the structural model results, the stochastic relationship between the drinking and hours spent studying decision, and the exogeneity of these variables in determining GPA is addressed. In all models the null hypothesis that drinking is exogenous in both the hours spent studying and the GPA equations is rejected. Similarly, we reject the null hypothesis that

hours spent studying is exogenous in the equations for drinking and GPA production. The results of these tests imply that failing to account for the endogeneity of drinking in the choice of hours spent studying and the production of GPA, and the endogeneity of hours spent studying in the drinking decision and the production of GPA will lead to biased and inconsistent estimates of the parameters of interest.

As weak instruments are also associated with biased and inconsistent results, we next consider the validity of the instrument set used. Beginning with the identifying restrictions for hours spent studying in the drinking equation, we find that the null hypothesis that the indicators for the national ranking of the college attended can be excluded from the equation for drinking cannot be rejected at the 1% level of significance.

In the model for hours spent studying, the effect of drinking is identified by the exclusion of the set of measures for the full price of alcohol (the tax on beer, state restrictions on happy hours, state restrictions on pitcher sales, state level open container laws, the per se BAC limit for driving, and the individual's religiosity). On examining the empirical validity of these exclusion restrictions, we found that at least one of the identifying variables could not be excluded from the hours spent studying equation (p-vlaue=0.00016 when drinking is measured by the number of drinks consumed on a typical drinking occasion, not reported in Table 2). Moreover, this was found to be the case for each of the three measures of drinking used. Investigation revealed that the tax on beer could not be excluded from the model for hours spent studying. Table 2 shows the estimation results and the p-values for the exogeneity and over-identification tests when the tax on beer is included in the hours spent studying model. *A-priori* we can think of no reason why this variable should be correlated with the hours a student spends studying. We note however, that inclusion of the tax on beer in the hours spent study equation had a very small effect on the size of the estimated coefficient on the drinking variable. In the case when drinking

is measured by the number of drinks consumed on a typical drinking occasion, the estimated coefficient is –0.255 when the tax on beer is used to identify drinking compared to –0.265 when it is not.

In examining the validity of the exclusion restrictions identifying drinking and hours spent studying in the equation for the production of GPA, we find that at least one of the instruments belongs in the equation for GPA (p-vlaue=0.0048 when drinking is measured by the number of drinks consumed on a typical drinking occasion, not reported in Table 2). In this instance, we find that the indicator for state restrictions on happy hours is correlated with GPA. Once again, it is unclear *a-priori* why this should be the case, although, as in the above case, inclusion of the indicator for this state policy has almost no impact on the magnitude of the coefficient estimates. The point estimate for the effect of hours spent studying on GPA is identical to three decimal places with or without the state policy indicator included in the model for GPA. In the case when drinking is measured by the number of drinks consumed on a typical drinking occasion, the estimate for the direct effect of drinking on GPA is 0.035 when the indicator for state restrictions on happy hours is used to identify drinking compared to 0.031 when it is not used as an identifier. However, as the over-identification test suggests that this variable is empirically relevant in determining the production of GPA, it is included in the model and the tests reported in Table 2 reflect its inclusion.

Turning to the interpretation of the coefficient estimates in Table 2, and beginning with the equation for drinking, we find that all else being equal, more time spent studying reduces drinking. Based on the 2SLS estimates, we find that an extra hour spent studying per day is associated with a reduction of about 0.73 of a drink on a typical drinking occasion. All measures of the full price of drinking have the expected effect on drinking. Specifically, the beer tax (proxy for the price of alcohol) is negatively (and significantly) related to the number of drinks

consumed on a typical drinking occasion, as are state laws that reduce access and opportunity to drink. Students who attend colleges in states with higher per se BAC levels drink more on average than if they faced stricter BAC laws. Higher psychic costs associated with drinking, proxied by an indicator for religion being important to the student, have a negative and significant impact on the average number of drinks consumed. In comparing the 2SLS and OLS estimates, we find that failing to account for the simultaneity between drinking and studying leads to an underestimate of the impact of an extra hour spent studying on drinking, as expected.

Similarly, we find that students who drink a greater number of drinks per drinking occasion spend fewer hours studying. On average, an extra drink on a typical drinking occasion is associated with a quarter of an hour less time spent studying per day. In terms of the impact of academic environment of the college attended, we find that students at top tier schools spend about 20 minutes more per day studying than students at a school that is not nationally ranked. Students at second or third tier schools spend about 9 minutes more per day studying than students at schools that are not nationally ranked. Students at fourth tier schools spend about 4 minutes less per day studying outside than students at non-ranked schools. As with the equation for drinking, on comparing the OLS and 2SLS estimates we find that failing to account for the simultaneity between drinking and studying leads to an underestimate of the effect of drinking on study.

Turning to the equation for GPA, we see from the results in Table 2 that both hours spent studying outside of class and drinking have a positive effect on GPA. All else being equal, an extra hour spent studying outside class per day increases a student's GPA by 0.37. Evaluated at the sample average of a 3.13 GPA, this takes a student from a B to a B+. The direct effect of an additional drink per occasion on GPA (holding time spent studying constant) is an increase in the student's GPA of 0.03. Comparing the 2SLS and OLS estimates, we find that OLS

underestimates both the effect of hours spent studying and drinking on GPA. It is interesting to note that the OLS estimate of the effect of drinking on GPA is negative and significant, compared to a positive significant effect estimated using 2SLS, which accounts for the endogeneity of drinking and studying in the production of GPA. Using equation 4 from section 3 to calculate the combined direct and indirect effect of drinking on GPA, we find that a unit increase in the number of drinks usually consumed reduces a student's GPA by 0.07. According to our estimates, about 5 additional drinks per drinking occasion would reduce a student's GPA from a B to a B-.

In addition to our findings with respect to the effect of drinking on GPA, this research provides insights about the effect of individual and college characteristics on drinking, hours spent studying, and GPA. The coefficient estimates and standard errors for these variables from 2SLS estimation of the structural equation for GPA and corresponding reduced form models for hours spent studying and drinking are given in Table 3. These results use the average number of drinks per drinking occasion as the measure of drinking.[8] Although not discussed here, the point estimates and standard errors for the instruments in the reduced form equations are reported in Appendix 2.

The results in Table 3 indicate that although males spend less time studying and drink more on average than women, they do not differ from women in terms of academic achievement, as measured by GPA.[9] We find that students drink more as they get older up until the age of 21, they spend more hours studying as they age, and achieve a better GPA as they get older until they reach 21. In part, this last finding may reflect self-selection, to the extent that our sample is drawn from students currently enrolled, rather than ever enrolled in college. If students who

[8] Results are qualitatively similar when the number of drinking occasions or total number of drinks consumed in the past 30 days are used to measure drinking.

drink more and perform poorly drop out, then we would expect this to be reflected in students doing better academically in older cohorts.

In terms of race, we find that African Americans, Asians, and students in the "other race" category drink less and study more than white students, and that white students have a higher GPA on average than students of any other race or ethnicity. In terms of religious affiliation of students, we find that students raised in the Jewish or Moslem faith drink less, students raised as Catholics or as "other religion" drink more than students raised without a religious affiliation. However, Catholics, students of other religious upbringings, and Moslems study more than students with no religious affiliation. Nonetheless, on average Catholics and students raised in other religious affiliations do worse, and Jewish students do better, in terms of GPA compared to students with no religious affiliation. Married students are found to drink less, study less and achieve a better GPA than single students, all else being equal. In contrast, students in a fraternity or sorority report drinking more, studying less, and achieving a worse GPA than students not in a fraternity or sorority. Compared to students who live in a house or apartment off-campus (the omitted group), students who live in university accommodation (unisex dorms, co-ed dorms, fraternities and sororities, and other university housing) study more and perform worse academically, although only those living in co-ed dorms and fraternities and sororities drink more. Students who live in "other housing" drink less and do worse in terms of GPA than students who live in a house or apartment off-campus, although they do not differ in terms of time spent studying.

As a large literature has established that earnings are increasing in education, parents' education can be considered a proxy for household/family income. Under this interpretation, our

[9] At this point it is worth re-iterating that our measure of GPA is self-reported, and potentially subject to reporting error which may differ by gender.

finding that students who have at least one parent with a college degree drink more than students who do not have at least one parent with a college degree is consistent with alcohol being a normal good (i.e. a positive income effect). Despite spending less time studying, we find that students with college educated parents have a higher GPA on average. This is consistent with investment in children's human capital being a normal good. Specifically, households with higher incomes invest more financial resources in their children's human capital accumulation. In terms of parents drinking behavior while the student was growing up, we find that having parents who used alcohol has a positive effect on students drinking and no effect on hours spent studying. Students who had parents who were infrequent or moderate drinkers, a father who drank heavily or was a problem drinker, or had no father when growing up do slightly worse in terms of GPA compared to students whose parents abstained from alcohol use.

We find that the type of college attended is an important determinant of drinking, studying and GPA. In particular, students at large public schools (the omitted group) drink more than students at other types of colleges. Students at private colleges, women's colleges or small public colleges spend more time studying, while students at commuter colleges spend less time studying than students at large public colleges. Finally, we find that students at (small or large) public colleges have a lower GPA on average than students at other types of colleges.

6. DISCUSSION

It is often conjectured that a significant cost of youthful drinking is the future labor market consequences of having accumulated a lower stock of human capital. In this paper, we investigate the impact of drinking on human capital, as measured by college students' GPA using nationally representative data on students at four-year colleges.

Our empirical model allows for both a direct effect of drinking on GPA and an indirect effect via the number of hours spent studying. Both the simultaneity between drinking and time

spent studying and the endogeneity of these variables in the production of GPA are accounted for in our estimation strategy. We find that although drinking has a small positive direct effect on GPA, this is outweighed by the negative effect of drinking on GPA via reduced time spent studying. The net estimated impact of consuming an additional drink on a typical drinking occasion on students' GPA is modest. The effect is more substantial if one considers the effect of increasing the typical number of drinks consumed from moderate to heavy drinking levels.

However, when interpreting our results, one must bear in mind that the CAS data are representative of students enrolled at four-year colleges at the time of survey. As such, it does not include individual's who were previously enrolled in college but dropped out. To the extent that students who drink heavily are more likely to fail courses and drop out of school, we will tend to underestimate the effect of drinking on GPA.

This caveat not withstanding, our results provide evidence that heavy drinking in college has a detrimental effect on the accumulation of human capital stock, as measured by the GPA. Results from the structural modeling of drinking behavior confirm that, as has been found in other studies, college students' drinking is responsive to increases in both the monetary cost of drinking (as measured by the tax on beer) and the non-monetary cost of drinking. In particular, increasing the non-monetary cost of drinking by lowering the per se BAC limit for driving, by reducing access to drinking by imposing restrictions on happy hour and pitcher sales, and by reducing opportunity for drinking through open container laws, all reduce college students' drinking.

It follows that, in addition to reducing other adverse outcomes associated with drinking, using these types of policies to reduce college students' drinking can be expected to improve the quality of human capital they accumulate. The immediate benefits of this include reducing the likelihood of students dropping out of college because of poor grades and improving the

likelihood of entrance into graduate programs (which is based largely on college GPA). The long-term consequences of improved academic performance include greater labor market participation and higher earnings.

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Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
GPA	3.143	0.590	1	4
hours spent studying	2.859	1.408	0	5
Usual Number of Drinks	2.755	2.591	0	9
Number of Occasions	4.709	6.260	0	40
Total number of Drinks	22.298	39.700	0	360
college nationally ranked - tier 1	0.159	0.365	0	1
college nationally ranked - tier 2	0.188	0.390	0	1
college nationally ranked - tier 3	0.138	0.345	0	1
college nationally ranked - tier 4	0.085	0.278	0	1
real beer tax (measured in 1999 cents)	1.900	0.407	1.445	4.253
state restrictions on happy hour sales	0.460	0.498	0	1
state restrictions on open containers	0.498	0.500	0	1
state restrictions on the sale of pitchers	0.050	0.219	0	1
the allowable blood alcohol content for driving	0.095	0.008	0.08	0.1
religious	0.401	0.490	0	1
Male	0.403	0.491	0	1
Age	20.359	1.583	17	24
Age squared	416.991	65.372	289	576
Hispanic	0.064	0.245	0	1
African American	0.048	0.213	0	1
Asian	0.071	0.256	0	1
Native American	0.005	0.070	0	1
Other Race	0.065	0.247	0	1
raised catholic	0.372	0.483	0	1
raised jewish	0.036	0.185	0	1
raised moslem	0.008	0.088	0	1
raised protestant	0.366	0.482	0	1
raised other religion	0.095	0.294	0	1
Married	0.032	0.177	0	1
Divorced	0.003	0.052	0	1
Separate	0.002	0.040	0	1
live in a single sex dorm	0.144	0.351	0	1
live in a co-ed dorm	0.252	0.434	0	1
live in other university housing	0.031	0.172	0	1
live in afraternity/sorority house	0.035	0.183	0	1
other housing	0.031	0.174	0	1
one parent completed college	0.834	0.372	0	1
Member of a fraternity of sorority	0.160	0.367	0	1
No father present	0.024	0.154	0	1
Father former drinker	0.022	0.146	0	1
Father infrequent/moderate drinker	0.643	0.479	0	1
Father heavy/probelm drinker	0.102	0.302	0	1
No mother present	0.007	0.082	0	1
Mother former drinker	0.007	0.083	0	1
Mother infrequent/moderate drinker	0.606	0.489	0	1
Mother heavy/problem drinker	0.022	0.146	0	1
Womens college	0.045	0.206	0	1
African American College	0.010	0.100	0	1

Commuter college	0.122	0.328	0	1
Small private college	0.109	0.311	0	1
Large private college	0.162	0.369	0	1
Small public college	0.153	0.360	0	1
SOUTH	0.285	0.451	0	1
WEST	0.162	0.368	0	1
MIDWEST	0.308	0.462	0	1
year of survey is 1997	0.325	0.468	0	1
year of survey is 1993	0.363	0.481	0	1

Table 2: Structural Model Results

	Measure of Drinking					
	Average No. Drinks (N=34,056)		Drinking Occasions (N=34,030)		Total No. Drinks (N=34,030)	
dependent variable is GPA	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**
hours spent studying	0.367 [a]	0.046 [a]	0.342 [a]	0.047 [a]	0.398 [a]	0.046 [a]
	(0.036)	(0.002)	(0.027)	(0.002)	(0.034)	(0.002)
drinking	0.031 [c]	-0.032 [a]	0.011 [b]	-0.009 [a]	0.003	-0.002 [a]
	(0.016)	(0.001)	(0.006)	(0.001)	(0.001)	(0.000)
p-value for test of exogeneity	<0.001		<0.001			
p-value for over-identification test	0.040		0.297			
dependent variable is hours studying						
drinking	-0.267 [a]	-0.051 [a]	-0.120 [a]	-0.026 [a]	-0.022 [a]	-0.004 [a]
	(0.023)	(0.003)	(0.010)	(0.001)	(0.002)	(0.000)
college nationally ranked - tier 1	0.337 [a]	0.403 [a]	0.452 [a]	0.426 [a]	0.348 [a]	0.407 [a]
	(0.029)	(0.026)	(0.028)	(0.026)	(0.030)	(0.026)
college nationally ranked - tier 2	0.166 [a]	0.173 [a]	0.220 [a]	0.185 [a]	0.180 [a]	0.176 [a]
	(0.027)	(0.025)	(0.027)	(0.025)	(0.028)	(0.025)
college nationally ranked - tier 3	0.136 [a]	0.137 [a]	0.175 [a]	0.145 [a]	0.137 [a]	0.138 [a]
	(0.028)	(0.025)	(0.028)	(0.025)	(0.029)	(0.025)
college nationally ranked - tier 4	-0.063 [c]	-0.034	-0.038	-0.030	-0.061 [c]	-0.034
	(0.033)	(0.031)	(0.033)	(0.030)	(0.034)	(0.030)
p-value for test of exogeneity	<0.001		<0.001		<0.001	
p-value for over-identification test	0.635		0.947		0.507	
dependent variable is drinking						
hours spent studying	-0.729 [a]	-0.143 [a]	0.347	-0.434 [a]	-7.740 [a]	-2.829 [a]
	(0.101)	(0.009)	(0.240)	(0.023)	(1.533)	(0.146)
Tax on beer	-0.108 [b]	-0.075 [c]	-0.156	-0.200 [c]	-1.867 [a]	-1.596 [b]
	(0.047)	(0.044)	(0.111)	(0.109)	(0.711)	(0.694)
state restrictions on happy hour sales	-0.065 [b]	-0.084 [a]	-0.251 [a]	-0.226 [a]	-1.230 [a]	-1.389 [a]
	(0.030)	(0.029)	(0.073)	(0.071)	(0.464)	(0.454)
state restrictions on open containers	-0.059 [c]	-0.070 [b]	-0.104	-0.089	-0.521	-0.614
	(0.035)	(0.033)	(0.083)	(0.081)	(0.528)	(0.519)
state restrictions on the sale of pitchers	-0.054	-0.080	-0.281 [c]	-0.246	1.704 [c]	1.482
	(0.065)	(0.061)	(0.154)	(0.151)	(0.987)	(0.969)
allowable BAC for driving	4.852 [b]	4.482 [b]	-7.443	-6.893	-22.878	-26.339
	(2.044)	(1.932)	(4.872)	(4.788)	(31.145)	(30.623)
religious	-0.599 [a]	-0.709 [a]	-1.727 [a]	-1.581 [a]	-7.348 [a]	-8.265 [a]
	(0.035)	(0.028)	(0.084)	(0.069)	(0.534)	(0.444)
p-value for test of exogeneity	<0.001		<0.001		0.001	
p-value for over-identification test	0.013		0.221		0.084	

a. Statistically significant at 1%, two-tailed test
b. Statistically significant at 5%, two-tailed test
c. Statistically significant at 10%, two-tailed test

Table 3: Structural Model Results for GPA– individual and college characteristics*

			Reduced Form Equation for			
	GPA		Hours spent studying		Usual Number of Drinks	
	Coef.	Std. Error	Coef.	Std. Error	Coef.	Std. Error
Male	-0.016	0.013	-0.337 [a]	0.016	0.882 [a]	0.027
Age	0.171 [a]	0.060	0.283 [b]	0.109	0.377 [b]	0.188
Age squared	-0.004 [b]	0.001	-0.006 [b]	0.003	-0.009 [b]	0.005
Hispanic	-0.073 [a]	0.022	0.080 [c]	0.040	0.007	0.069
African American	-0.440 [a]	0.024	0.274 [a]	0.038	-1.020 [a]	0.066
Asian	-0.139 [a]	0.020	0.340 [a]	0.031	-0.966 [a]	0.053
Native American	-0.164 [a]	0.056	0.051	0.106	-0.024	0.182
Other Race	-0.142 [a]	0.022	0.174 [a]	0.040	-0.414 [a]	0.068
raised catholic	-0.097 [a]	0.017	0.085 [a]	0.026	0.610 [a]	0.044
raised jewish	0.051 [b]	0.024	0.010	0.046	-0.140 [c]	0.078
raised moslem	0.004	0.047	0.340 [a]	0.088	-0.356 [b]	0.150
raised protestant	0.013	0.014	0.017	0.026	0.023	0.044
raised other religion	-0.080 [a]	0.018	0.105 [a]	0.033	0.139 [b]	0.057
Married	0.169 [c]	0.030	-0.083 [c]	0.043	-0.988 [c]	0.074
Divorced	-0.001	0.075	0.091	0.142	-0.031	0.243
Separate	0.145	0.099	-0.129	0.186	-0.174	0.319
live in a single sex dorm	-0.098 [a]	0.016	0.227 [a]	0.025	-0.056	0.044
live in a co-ed dorm	-0.129 [a]	0.017	0.266 [a]	0.021	0.268 [a]	0.035
live in other university housing	-0.035	0.024	0.160 [a]	0.044	0.080	0.076
live in afraternity/sorority house	-0.126 [a]	0.030	0.188 [a]	0.046	0.763 [a]	0.079
other housing	-0.043 [c]	0.025	0.001	0.044	-0.476a	0.075
one parent completed college	0.066 [a]	0.011	-0.038 [c]	0.021	0.157 [a]	0.035
Member of a fraternity of sorority	-0.034 [c]	0.018	-0.054 [b]	0.023	0.949 [a]	0.039
No father present	-0.078 [a]	0.029	0.015	0.052	0.393 [a]	0.089
Father former drinker	-0.035	0.030	-0.003	0.054	0.506 [a]	0.092
Father infrequent/moderate drinker	-0.029 [b]	0.014	-0.009	0.022	0.434 [a]	0.038
Father heavy/probelm drinker	-0.011 [a]	0.018	-0.082 [a]	0.031	0.485 [a]	0.052
No mother present	-0.075	0.050	0.093	0.093	-0.406 [b]	0.160
Mother former drinker	-0.021	0.048	-0.044	0.090	0.184	0.154
Mother infrequent/moderate drinker	-0.018 [c]	0.011	0.004	0.019	0.268 [a]	0.032
Mother heavy/problem drinker	0.000	0.029	-0.047	0.053	0.348 [a]	0.091
Womens college	0.153 [a]	0.023	0.269 [a]	0.043	-0.667 [a]	0.074
African American College	0.152 [a]	0.043	0.034	0.082	-0.343 [b]	0.141
Commuter college	0.116 [a]	0.021	-0.101 [a]	0.029	-0.660 [a]	0.050
Small private college	0.078 [a]	0.015	0.207 [a]	0.030	-0.464 [a]	0.051
Large private college	0.094 [a]	0.013	0.114 [a]	0.025	-0.235 [a]	0.043
Small public college	0.003	0.013	0.079 [a]	0.027	-0.292 [a]	0.047
SOUTH	0.044 [a]	0.014	-0.045 [c]	0.026	-0.043	0.045
WEST	0.002	0.018	0.045	0.034	-0.502 [a]	0.058
MIDWEST	0.049 [a]	0.012	-0.007	0.026	0.058	0.044
year of survey is 1997	-0.036 [a]	0.010	0.053 [a]	0.020	-0.155 [a]	0.034
year of survey is 1993	-0.158 [a]	0.012	0.236 [a]	0.022	-0.092 [b]	0.038
_cons	0.193	0.599	-0.579	1.133	-1.757	1.943

*see notes for Table 2

Appendix 1

Description of the Methodology used by U.S. News to Rank Colleges.

The following information, pertaining to the rankings for 2001, is provided by U.S. News at their web site http://www.usnews.com/usnews/edu/college/rankings/about/weight.htm.

The ranking of colleges and universities is a three-step process. First, schools are grouped with similar schools in one of 10 categories, based on the Carnegie classifications. The Carnegie classifications were determined by the Carnegie Foundation for the Advancement of Teaching in late 2000, its first revision since 1994. The classifications group American colleges and universities according to their mission as defined by factors such as the highest level of degrees conferred by discipline. Specialty schools, colleges with enrollments below 200, and schools whose undergraduate focus is other than traditional students are not ranked. This system is the generally accepted classification system for higher education. U.S. News collapses eight of those categories into four: National Universities–Doctoral, Liberal Arts Colleges–Bachelor's, Universities–Master's, and Comprehensive Colleges–Bachelor's. The schools in the Universities–Master's and Comprehensive Colleges–Bachelor's categories are placed into one of four geographic regions—North, South, Midwest, and West. Second, data on up to 16 indicators of academic quality are gathered from each school and tabulated. Finally, colleges are ranked in their category by their total weighted score.

The indicators used to capture academic quality fall into seven categories: academic reputation, retention of students, faculty resources, student selectivity, financial resources, alumni giving, and (for national universities-doctoral and liberal arts colleges-bachelor's) "graduation rate performance," the difference between the proportion of students expected to graduate and the proportion who actually do. The indicators include input measures that reflect a school's student body, its faculty, and its financial resources, and outcome measures that signal how well the institution does its job of educating students.

Academic reputation. (weight=25%) The U.S. News ranking formula gives greatest weight to reputation because the reputational survey allows the top academics we contact to account for intangibles such as faculty dedication to teaching. The other reason we give reputation the most weight is because a degree from a distinguished college so clearly helps graduates get good jobs or gain admission to top graduate programs. A school's reputation is determined by surveying the presidents, provosts, and deans of admissions at institutions in a single category. Each individual was asked to rate peer schools' academic programs on a scale from 1 (marginal) to 5 (distinguished). Those individuals who didn't know enough about a school to evaluate it fairly were asked to mark "don't know." Market Facts Inc., an opinion-research firm based near Chicago, collected the reputational data; 67 percent of the 4,087 people sent questionnaires responded.

Retention. (weight=20%) The higher the proportion of freshmen who return to campus the following year and eventually graduate, the better a school may be at offering the classes and services students need to succeed. This measure has two components: six-year graduation rate (80 percent of the retention score) and its freshman retention rate (20 percent of the score). The graduation rate indicates the average proportion of a graduating class who earn a degree in six years or less; we consider freshman classes that started between 1991 and 1994. Freshman retention indicates the average proportion of freshmen entering between 1996 and 1999 who returned the following fall.

Faculty resources. (weight=20%) Research shows that the more satisfied students are with their contact with professors, the more they will learn and the more likely it is they will graduate. We use six factors from the 2000-2001 academic year to assess a school's commitment to instruction. Class size has two components: One represents the proportion of classes with fewer than 20 students (30 percent of the faculty resources score); the second represents the proportion with more than 50 students (10 percent of the score). Faculty salary (35 percent) is the average faculty pay, plus benefits, during the 1999-2000 and 2000-2001 academic years, adjusted for regional differences in the cost of living (using indexes from Runzheimer International). We also weigh the proportion of professors with the highest degree in their fields (15 percent of the score), the student-faculty ratio (5 percent), and the proportion of the faculty who are full time (5 percent).

Student selectivity. (weight=15%) A school's academic atmosphere is determined in part by the abilities and ambitions of the student body. We therefore factor in test scores of enrollees on the sat or act tests (40 percent of this ranking factor); the proportion of enrolled freshmen who graduated in the top 10 percent of their high school classes for all schools in the national universities–doctoral and liberal arts colleges–bachelor's categories, and the top 25 percent of institutions in the master's and comprehensive colleges categories (35 percent of the score); the acceptance rate, or the ratio of students admitted to applicants (15 percent of the score); and the yield, or the ratio of students who enroll to those admitted (10 percent of the score). The data are for the fall 2000 entering class.

Financial resources. (weight=10%) Generous per-student spending indicates that a college is able to offer a wide variety of programs and services. U.S. News measures the average spending per student on instruction, research, student services, and related educational expenditures during the 1999 and 2000 fiscal years.

Graduation rate performance. (weight=5%) This indicator of "added value" was developed to capture the effect of the college's programs and policies on the graduation rate of students after controlling for spending and student aptitude. We measure the difference between a school's six-year graduation rate for the class that entered in 1994 and the predicted rate for the class. The predicted rate takes into account the standardized test scores, among other characteristics, of these students as incoming freshmen, and a variety of characteristics of the school, including the school's expenditures on them. If the actual graduation rate is higher than the predicted rate, the college is enhancing achievement.

Alumni giving rate. (weight=5%) The percentage of alumni who gave to their school during the 1999 and 2000 academic years is an indirect measure of alumni satisfaction.

To arrive at a school's rank, we first calculated the weighted sum of its scores. The final scores were rescaled: The top school was assigned a value of 100, and the other schools' weighted scores were calculated as a proportion of that top score. Final scores for each ranked school were rounded to the nearest whole number and ranked in descending order.

Appendix 2: Reduced Form Equations Results- the Instruments

	Hours Spent Studying		Usual Number of Drinks	
	Coef.	**Std. Error**	**Coef.**	**Std. Error**
tax on beer	-0.096 [a]	0.026	-0.059	0.045
state restrictions on happy hour sales	0.039 [b]	0.017	-0.083 [a]	0.029
state restrictions on open containers	0.001	0.020	-0.040	0.034
state restrictions on the sale of pitchers	0.051	0.037	-0.126 [b]	0.063
allowable blood alcohol content for driving	0.147	1.141	4.532 [b]	1.956
religious	0.198 [a]	0.016	-0.744 [a]	0.028
college nationally ranked - tier 1	0.438 [a]	0.026	-0.372 [a]	0.045
college nationally ranked - tier 2	0.187 [a]	0.026	-0.083 [c]	0.045
college nationally ranked - tier 3	0.158 [a]	0.026	-0.090 [b]	0.045
college nationally ranked - tier 4	-0.036	0.031	-0.097 [c]	0.053
adjusted R2 for equation	0.062		0.186	

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