

The Effects of Alcohol on Earnings

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May 3, 2022

Research Question and Motivation for Research

Alcohol consumption has a significant impact on oneself and others around them. It is the third most preventable cause of death, trailing only tobacco and health and lack of exercise. An estimated 95,000 people lose their life to alcohol each year. According to the National Institute of Abuse and Alcoholism, in 2019 alone, drunk driving accounted for 10,142 deaths in the United States alone. The consequences of alcohol abuse are not just death but also health and mental conditions while living are also altered and sometimes incapacitated due to the amount of alcohol put into a body.

This finding could also alter the social life of many who are alcoholics, as alcohol addiction and abuse can tear a family apart. According to Gateway Foundation 2021, more than 10% of children live with a parent with an alcohol problem, and as these same children grow into adults, they are more likely to become depressed. They also report that a person's odds of marrying someone with a drinking problem are 3 to 4 times higher if they grew up with a parent addicted to alcohol. Alcohol addiction can also affect the person's health and the life of the people around them. Concerning physical health, alcohol addiction can damage several such parts of the human body as the heart, liver, kidney, pancreas, and immune system. (Gateway Foundation, 2021) In addition, alcohol dependence has been linked to increasing risk of cancers. (CDC, 2022) When it comes to a human's mental health, addiction and a mental health disorder go hand in hand. While battling an addiction, it is more likely that someone will develop a mental health disorder, while if one has a mental health disorder, they are more

likely to develop an addiction. So, if someone is trying to quit their addiction but faces a mental health disorder, the battle to quit becomes exponentially harder to do.

My research will determine whether a person's alcohol addiction reduces their wages or if a person's low wages reduce the amount of alcohol they consume during their year. Many papers state a positive correlation between a person's wages and the amount of schooling the said person has gone through, so this study will also control for education. A multiple-regression analysis will find the impacts on the log of the wage of those who abuse alcohol, those who are heavy drinkers but not problematic, and those who are moderate drinkers and abstain altogether.

Literature Review

Previous economic studies have analyzed determinants of alcoholic consumption. Cerdá et al. (2011) examined the relationship between impoverished neighborhoods and the percentage of people living there who are alcoholics. The variables used for their study included age cohort (25 or older at baseline), sex, race/ethnicity, marital status, the number of stressors and traumatic events experienced in daily life, and positive social support from family and friends. (pg. 484) The models they used included marginal structural logistic regression models for repeated binary measures used to find odds of bingeing and a marginal structural means of regression with a log link to find the number of drinks consumed per week in the last year. (pg. 484) Their results supported their hypotheses. They found that neighborhoods with 20% more people than average living in poverty also had a 10% higher chance of binge drinking. (pg. 485) Another result was that a 20% increase in the poverty rate in the neighborhood studied would increase the weekly consumption from 4.8 drinks to 5.3 drinks. (pg. 485) This

article suggests that there is a relationship that low wages do increase the number of drinks one consumes. However, they find that while abstaining has higher wages than abuse of alcohol, those who drink in moderation have the highest median income.

Francesco Renna (2008) looked at hours worked and the earnings that one got paid. This study does not only look at those who are alcoholics but also non-alcoholics and alcohol abusers, people who continue to drink alcohol despite the adverse consequences, as comparisons. Renna sets up two regression equations in this model, one to find the log wage of the employee and the other to find the number of hours that the employee had worked over the year. (pg. 94) The results found agreed with the expectation that alcoholics' wages are altered by their addiction. In the year of the study, 1994, an alcoholic or alcohol abuser worked on average 2154.98 hours, while a non-alcoholic or non-alcohol abuser averaged working 2257.14 hours. In terms of hourly wages, alcoholics and alcohol abusers averaged an hourly wage of \$12.944, while the non-alcoholic and non-alcohol abusers averaged an hourly wage of \$14.056. In this case, the alcoholics lost about \$3,832.30 per year due to their addiction. The reasoning, according to studies such as Jody Sindelar 1993, and Jeremy Bray 2005 may not be spending time drinking the alcohol causing them to miss workdays directly. [repet] The effects alcoholism has on one's body may cause missed work time. For instance, Jody Sindelar (year) suggested that depression may be what leads to most of these workdays missed. This leads back to the previous point of the psychological effect that alcoholism has on the body. The argument is not saying that one sip of alcohol will derail one's livelihood altogether, as long as one drinks in moderation. Jeremy W. Bray 2005 suggested that "moderate alcohol use more than doubles to the returns." (pg. 301). This study shows that alcohol itself is not what is

dangerous in terms of a person's livelihood, as long as one drinks appropriately. Once they get into the heavy drinking phase consistently, one can see the adverse effects that alcohol can have in their lives.

Then what causes people to become addicted to alcohol? Benjamin Ukert studies the role of ceasing to smoke. His model is that the number of drinks consumed depends on independent variables such as if the person studied was a smoker when the experiment first started, along with age, gender, marital status, and educational attainment. (pg. 504). Ukert's findings were that smoking positively affects the number of drinks someone may have both in the long and short run. During the short run, if someone was a smoker, they, on average, have .5 more drinks per week than a non-smoker (pg. 514). Additionally, in the long run, someone who smoked for at least the past five years drank 10-25% more alcoholic beverages, while those who did not smoke at all during the last five years could reduce the amount of alcohol they consumed by over 50%. However, there were outliers in the data that increased the amount of alcohol had increased their Body Mass Index to the point that they developed health problems.

The morning after: alcohol misuse and employment problems written by Michael T. French, Johanna Catherine Maclean, Jody L. Sindelar, and Hai Fang (2011) studied how people who deal with alcoholism may get let go and for how long they are unemployed. They constructed three tables of descriptive statistics and different patterns found in their study, two for the entire population and one based on separate equation estimates for men and women. Shown in table A1 was that people who have an addiction are twice as likely to have a conflict with their boss and/or coworker than the entire sample, and the same thing for being

unemployed for more than a month. They used a multiple regression method to find the result for these tables. In table two, there was a slight decrease in the probability of the employee being laid off in wave two. Wave one in this study was from 2001-2002, and wave 2 was from 2004-2005, but an increase in the conflicts with the boss or coworkers compared to wave one. Table three shows an increase in conflicts with the employee's boss/coworker as the seriousness of the drinking increases. Table three shows that women who binge drink in the prior week and year are more likely than men with the same habits. It explains why people suffering from alcohol addiction may get laid off rather than production problems.

Hypothesis and Research Methodology

For my research, I will be doing a regression using the log of the average wage of the ordinary person while evaluating alcohol dependence in three categories; nondrinker or moderate drinkers, non-problematic heavy drinkers, and problematic heavy drinkers. The data are drawn from a survey during the course of 2001-2011 in Japan. There was a survey that was sent in the mail that people would voluntarily fill out and send back. The survey asked questions of the people such as age, their marital status, their educational attainment, if they were currently employed, if they suffered from psychological distress, their health, and how much alcohol they drank on a weekly basis.

There are 1919 observations over the course of 10 years, with 192 people responding to the survey as the data considers their marital status, educational attainment, salary, and the amount of alcohol they drink. In general, 1,620 observations self-recorded themselves to either be a nondrinker or a moderate drinker, making up 84% of the responses over the 10 years. Heavy non-problematic drinkers made up 9% of the survey, or 171 observations, and heavy

problematic drinkers made up 7 % of the survey at 128 observations. Although the data cannot be put into this thesis, the table below will show the abbreviations for each variable and what they correspond to. The averages of the three different classifications are not that different. However, when looking at the actual individual respondents' data, there is a difference when considering the outliers in each category.

(table 1 goes about here)

The independent variables will be real GDP per capita, the number of hours worked per person, inflation rate, marital status, educational attainment level, unemployment rate, as well as the number of alcoholic drinks per week for the people in the survey during the course of 2001-2011 in Japan. Because a recession took place during the middle of the study, wages may well fall during the middle years; this motivated including the macroeconomic indicators, GDP per capita and the unemployment rate.

I hypothesize that those who consume more alcohol than the rest will have lower average earnings. My second hypothesis is that those who drink alcohol but do not have a drinking problem will have the highest earnings in the three categories: nondrinker/moderate, heavy non-problematic drinkers, and problematic heavy drinkers. This is because previous studies show that people who drink in moderation have statistically been the highest-paid workers most of the time. Additionally, I also predict that the percentage of alcoholics will increase at the later end of this survey. This is due to the recession. Unemployment contributes to depression, and more people who were functioning before may begin drinking at a rate that they had not in the past.

My regression equation for this data is

$\logwage = \beta_0 + \beta_1educ_attain + \beta_2y + \beta_3infl + \beta_4Unem_rate + \beta_5dw + \beta_6marital_stat + \epsilon$,

where ϵ is assumed to be random-normally distributed. Going into this regression I expected $\beta_1, \beta_2, \beta_3$ and $\beta_6 > 0$, and $\beta_4 < 0$. Because of the possibility that low wages contribute to alcohol dependence, as well as the opposite, this study will also explore a two-way causal model.

Results

The first regression done was running the regression with an XTREG command used for panel data. The Hausman test suggested fixed effects should be accounted for. With this in consideration, $Gdprealpercap$ was the only variable with a significant t-score of 6.49. Like the first three regressions, there were 1,919 observations with an R-squared score of .0435 and a significant F-statistic of 7.55. The same equation without fixed effects had two more of the variables with a significant t-score, as $drinks$ per week had a value of -6.02 and $morethanBABS$ had a score of 2.04. While these t-scores were better than when accounting for fixed effects, the majority of the t-scores were still insignificant. The observations stayed at 1,919 for this regression as the regression fit better than when fixed effects were taken into account. The R-squared score is .0967, with the F-statistic still significant, with that number being 93.45. Neither one of these regressions was ideal.

(tables 2A, 2B go about here)

The next step was to control for possible heteroskedasticity in the regression equation with robust standard errors. (see table 4)The first attempt saw that only $Gdprealpercap$ and $drinks$ per week were significant while marital status and advanced educational attainment were not. In addition, the R-squared was .09543 with a chi-squared statistic of 81.75 over the

same 1,919 observations as before. In the following equation, we substituted if they received at least a bachelor's degree for only a bachelor's degree, BABS, or more than a bachelor's degree, morethanBABS. In this equation, Gdprealpercap, drinks per week, and more than a bachelor's degree were all significant. However, marital status and receiving a bachelor's degree were insignificant. The second equation fit the regression better than the first by a marginal amount as the R-squared was .0973. In addition, the chi-squared for the equation is 82.29 over the 1,919 observations. And there is evidence of heteroskedasticity.

(tables 3A and 3B go about here)

The next plan of attack that was used to get the desired regression equation was to control for both heteroskedasticity and fixed effects. Before we controlled for both of these things a Hausmann test was used, and in the end it did say that fixed effects were warranted in the regression. The first equation used the independent variables of Gdprealpercap, drinks per week, marital status, higher than bachelor's degree, and the number of drinks per week squared. Gdprealpercap was the only significant variable as every other variable was insignificant. This showed that there were fixed effects in this equation. The equation did not fit the regression very well as the R-squared value of .0261 and an F-statistic of 5.46. A second equation was then run where drinks per week and drinks per week squared were taken out of the equation and replaced by if the individual is a self-identified heavy drinker. The results were not much different as Gdprealpercap was still the only significant variable. The R-squared was .0024 showing the equation did not fit the line well, and the F statistic was 7.28. So, we found out that we still had work to do to find if there was a regression equation that would give the desired output.

(tables 4A and 4B go about here)

Next, it was decided to use a method where the regression included simultaneous equations. The two variables that would be the dependent variables are the wages per hour, which had been the dependent variable throughout all the regressions, and drinks per week. The first regression had the independent variables for the wage equation of Gdprealpercap, drinks per week, marital status, more than a bachelor's degree, and if they are a heavy drinker.

$$\log\text{wage} = \beta_0 + \beta_1\text{moreBABS} + \beta_2\text{GDPrealpercap} + \beta_3\text{marital status} + \beta_4\text{DW} + \beta_5\text{HeavyDrink} + \mu,$$

Where μ is assumed to random normal, and the expected signs are the same as before. The drinks per week equation ran the independent variables of real wages, marital status, more than a bachelor's degree, and the psychological distress level, which is self-reported in the survey:

$$\log\text{DW} = \beta_6 + \beta_7\text{marital status} + \beta_8\text{MoreBABS} + \beta_9\text{PsychDistress} + v,$$

using this formula, you would expect $\beta_9 > 0$ as the distress would cause higher those to drink more and β_7 and $\beta_8 < 0$.

However, this regression turned out to have no significant variables in the wage equation, and only Gdprealpercap was significant in the drinks per week equation. The R-squared values for both equations were not good, with the wage equation R-squared being -.1014 and the drinks per week equation having the value of -3.8057. The chi-squared scores of 292.68 in the wage equation and 209.66 in the drinks per week equation.

(table 5 goes about here)

In light of collinearity, we took the variable of self-identified heavy drinkers out of the wage equation. This had a big effect on the results. In the wage equation, every variable except marital status became significant, with Gdprealpercap and more than a bachelor's degree being

positive and drinks per week and marital status being negative. In the drinks per week equation, every variable except wages were significant at the 1% level, wages were significant at the 5% level in a one-tailed test. On top of this, wages were also significant at the 10% level in a two-tailed test. That is, the expectation was clearly that low wages would contribute to depression and drinking. On top of this, more than a bachelor's degree and psychological distress were positive and marital status was negative, as hypothesized. The Chi-squared for both equations are significant. This was finally the equation that validated the original expectations.

(table 6 goes about here)

Discussion

The result that I found most helpful in this paper is that wages also directly affect drinking, not only that drinking affects wages. Many of the studies done before have explored primarily if drinking affected wages. This research shows both sides of the question and shows that they both significantly affect each other. This is important as people can no longer only blame the amount of alcohol they consume on their wages, as this shows that there is evidence that their drinking habit may be the reason behind their low wages.

One result that I questioned was the significant positive value for more than a bachelor's degree in the drinks per week equation during the simultaneous-regression equation. The best explanation that I would have for this is that the stress level of higher-paying jobs will make them turn to drink more to lessen the stress. While there may have been no evidence of a direct association between the two, one can draw the inference. However, one could also recognize that they have greater access to alcohol. With the higher wages they earn, those people could afford to buy more alcohol. So, there are two solid potential explanations as to why those who have received more than a bachelor's degree drink more per week, it is not stated in the paper.

Conclusion

For years now, people worldwide have tried to figure out whether and how alcohol consumption and wages relate to each other. According to the findings in the paper, it is not just that alcohol causes lower wages, but lower wages also cause increased consumption of alcohol. People have gone on physical disability because of the amount of alcohol they consume during the week.(Samokhvalov et al. 2010) In recent years companies have been exploring the possibility of allowing alcohol into their place of work to increase productivity. In some cases, this idea could turn out fine, but there is the alternative reality where people drink too much, and their productivity would decrease significantly. The policy should not be put into effect because of studies that show the same evidence that this one does. It may lead to employees continuing to drink until the night and hurting their wages and, most likely, their ability to get their job done effectively. Those who are already prone to drinking at night do not need access to drinking at their job. In conclusion, drinking habits affect the wage one earns, but the wage one earns can also affect the amount of alcohol one consumes.

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Table 1

Descriptive Statistics for Data Sorted by Categories of Alcohol Consumption

a) Heavy, Non Problematic Drinkers

Variable	Obs	Mean	Std. dev.	Min	Max
-----+					
wageshr	171	10.0955	2.746647	0	17.5
inflationr~e	171	-.0022626	.0072022	-.0135	.0138
Unemployme~e	171	.0465135	.0051214	.039	.054
GDPpercapita	171	37965.86	4331.602	32289	48168
drinks	171	12.1462	2.662755	7	18
maritalsta~s	171	.497076	.5014599	0	1

b) Heavy, Problematic Drinkers

Variable	Obs	Mean	Std. dev.	Min	Max
-----+					
year	128	2006.563	3.146677	2001	2011
wages	128	7.187969	3.899407	0	15.96
inflationr~e	128	-.0033047	.0081176	-.0135	.0138
unemployme~e	128	.0471828	.0049393	.039	.054
GDPpercapita	128	38807.5	4303.425	32289	48168
drinks	128	22.25	4.781855	16	39
maritalsta~s	128	.421875	.4957993	0	1

c) Non drinkers or Moderate Drinkers

Variable	Obs	Mean	Std. dev.	Min	Max
years	1,620	2006.49	3.287378	2001	2011
wages	1,620	12.07097	4.509008	0	85.5
inflationr~e	1,620	-.0031541	.0073428	-.0135	.0138
unemployme~e	1,620	.0473302	.005085	.039	.054
GDPpercapita	1,620	38821.98	4874.309	32289	48168
drinks	1,620	3.115361	1.704646	0	8
maritalsta~s	1,620	.4892042	.5000377	0	1

Notes: Variable Names

Educ_attain	Educational attainment
y	GDP per capita
infl	Inflation rate
Unem_rate	Unemployment rate
dw	Drinks per week
Marital_stat	Marital status

Table 2A

Panel Regression Results for lwagereal

Explanatory Variables	Coefficients	t-Statistics	Regression Statistics
Gdprealpercap	.0001	6.49	R-squared .0435
drinkspw	-.021	-.43	F-stat 7.55
marital	-.175	-.46	N 1,919
BABS	.802	-1.35	
morethanBABS	.370	.39	
babsdrinks	.076	1.02	

Table 2B

Panel Regression Results for lwagereal

Explanatory Variables	Coefficients	t-Statistics	Regression Statistics
Gdprealpercap	.0001	7.15	R-squared .0967
drinkspw	-.184	-6.02	F-stat 93.45
marital	-.079	-.28	N 1,919
BABS	-.733	-1.63	
morethanBABS	.908	2.04	
babsdrinks	.083	1.42	

Table 3A

Robust Panel Results for lwagereal

Explanatory Variables	Coefficients	t-Statistics	Regression Statistics
Gdprealpercap	.0001	5.52	R-squared .0953
drinkspw	-.156	-7.09	Chi-squared 81.75
marital	-.058	-.26	N 1,919
BABS+	.072	.32	

Table 3B

Robust Panel Results for lwagereal

Explanatory Variables	Coefficients	t-Statistics	Regression Statistics
Gdprealpercap	.0001	5.53	R-squared .0973
drinkspw	-.167	-7.27	Chi-squared 82.29
marital	-.069	-.32	N 1,919
BABS	-.338	-1.63	
morethanBABS	.813	1.82	

Table 4A

Xtreg Results for lwagereal fixed effects, heteroskedasticity

Explanatory Variables	Coefficients	t-Statistics	Regression Statistics
Gdprealpercap	.0001	5.06	R-squared .0261
drinkspw	-.012	-.16	F-statistic 5.46
marital	-.158	-.52	N 1,919
morethanBABS	.281	.53	
drinkspwsq	.0004	.17	

Table 4B

Xtreg Results for lwagereal

Explanatory Variables	Coefficients	t-Statistics	Regression Statistics
Gdprealpercap	.0001	5.09	R-squared .0024
marital	-.157	-.51	F-statistic 7.28
morethanBABS	.285	.54	N 1,919
heavydrinker	1.02	1.88	

Table 5

 3 SLS Results for lwagereal and drinkspw

Explanatory Variables	Coefficients	t-Statistics	Regression Statistics
lwagereal			R-squared -.1014
Gdprealpercap	-.0001	-.64	Chi-squared 292.68
drinkspw	-.757	-.97	N 1,919
marital	-.395	-1.39	
morethanBABS	1.784	1.68	
heavydrinker	6.84	.50	
ldrinkspw			R-squared -3.8057
lwagereal	-2.80	-13.39	Chi-squared 209.66
marital	-.907	-1.59	N 1,919
morethanBABS	3.56	4.90	
psych_distress	-.441	-.66	

Table 6

3 SLS Results for lwagereal and drinkspw

Explanatory Variables	Coefficients	t-Statistics	Regression Statistics
lwagereal			R-squared. -.0815
Gdprealpercap	.0001	5.50	Chi-squared 54.39
drinkspw	-.581	-2.57	N 1,919
marital	-.625	-1.55	
morethanBABS	1.97	2.40	
ldrinkspw			R-squared .1431
lwagereal	-.273	-1.72	Chi-squared 173.06
marital	-1.41	-5.87	N 1,919
morethanBABS	3.32	10.82	
psych_distress	.933	3.32	