

Keller, Patrick

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Alcohol: Does it make you successful? A longitudinal analysis

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SOEP – The German Socio-Economic Panel study at DIW Berlin

830-2016

**Alcohol: Does it make
you successful?
A longitudinal analysis**

Patrick Keller

SOEPPapers on Multidisciplinary Panel Data Research at DIW Berlin

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German Socio-Economic Panel (SOEP)
DIW Berlin
Mohrenstrasse 58
10117 Berlin, Germany

Contact: Uta Rahmann | soeppapers@diw.de



Alcohol: Does it make you successful? A longitudinal Analysis

Master Thesis
Department of Economics
University of Zurich

Prof. Dr. Rainer Winkelmann
Supervisor: Florian Schaffner

Year: 2015
Author: Patrick Keller
E-Mail: keep@zhaw.ch

Abstract

This thesis analyzes the link between alcohol consumption and labor market outcomes, such as income, employment or hazard rate of leaving unemployment. It does so by using panel data from the German Socio-Economic Panel (SOEP) for the period 2006 until 2010. While cross-sectional methods show a positive relationship between non-abusive alcohol consumption and labor market outcomes, fixed effects methods do not confirm a causal effect of alcohol consumption on labor market outcomes. These results suggest, that the often replicated, cross-sectional finding of a positive relationship between income and alcohol consumption (alcohol income puzzle) is due to selection bias.

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1 Introduction

The World Health Organization (WHO) states that excessive alcohol consumption is one of the leading causes of death in Western industrialized countries. Harms from drinking are not only personal or limited to health. Harmful alcohol use also imposes large economic costs on society. Among those are the costs on the health, police or justice system or the unmeasurable costs of suffering which the social environment of the drinker has to carry. Another group of costs which impacts society are of an indirect nature: Costs that are due to a loss in workforce productivity. (WHO 2014: 17–18)

While it is beyond dispute that excessive drinking has adverse effects on personal health and socioeconomic outcomes, the consequences of non-abusive alcohol consumption tend to point in the other direction. Some medical studies have revealed positive health effects of moderate alcohol consumption (Arranz et al. 2012: 759). Also, studies in the field of economics have found a positive relationship between income and alcohol consumption, referring to this as the alcohol income puzzle: People who drink a moderate amount of alcohol tend to earn more than abstainers. To explain this positive relationship, it has been speculated about networking or productivity increasing health effects, which moderate alcohol consumption could exhibit (Sayette et al. 2012: 2; Burton et al. 2005: 769–777).

Up to now, research has tended to focus on a descriptive relationship between alcohol consumption and labor market outcomes rather than a causal link. The purpose of this master thesis is therefore to shed more light on the link between alcohol consumption and labor market outcomes and to determine whether this relationship is indeed a causal one. First and foremost, the focus lies on the examination of how alcohol consumption affects individuals' income, their likelihood to become unemployed or the duration of unemployment. Thereby, one key point is to determine whether the alcohol income puzzle is robust to panel based within-subject analysis.

Even though the issue of problem drinking cannot be reduced to an economic dimension, analyzing the effect of alcohol on labor market outcomes may still be important. Knowing the size and direction of the effect, corresponding policy measures can better be applied and justified. But not only problem drinking has to be analyzed, also moderate alcohol consumption. If non-abusive alcohol consumption has indeed a positive causal relationship on income, as stated by the alcohol income puzzle, it has the implication that drinking can make people earn more money. However, if this positive rela-

tionship is due to selection bias, the implications are false and the practical application dangerous. Therefore, it is relevant to examine not only the effects of excessive alcohol consumption on labor market outcomes, but also the effects of moderate alcohol consumption.

In contrast to most previous studies, this thesis uses panel data. This approach relies on weaker assumptions than the cross-sectional approach and is therefore more trustworthy in detecting an unbiased, causal relationship. The data used in this thesis comes from the German Socio-Economic Panel (SOEP) for the waves in 2006, 2008 and 2010 (Wagner et al. 2007).

Given the relevance of the topic, the following research questions are proposed to fill the gap in the current literature:

1. What is the relationship between alcohol consumption and labor market success in Germany between 2006 and 2010?
2. Is there evidence for a causal relationship of alcohol consumption on labor market success?

In order to measure labor market success, several proxies in the given data are used. Those are: labor income, probability of being unemployed, the probability that dismissal was the reason for job termination given a job termination and finally the duration of unemployment. The research questions, together with the proxies for labor market success, lead to the following set of testable hypotheses:

Null Hypothesis 1 *Alcohol consumption has no effect on labor income.*

Null Hypothesis 2 *Alcohol consumption has no effect on the probability of being unemployed.*

Null Hypothesis 3 *Alcohol consumption has no effect on the probability that the reason for job termination was dismissal.*

Null Hypothesis 4 *Alcohol consumption is not linked to the duration of unemployment.*

The organization of this master thesis is as follows. Chapter 2 summarizes previous studies. Chapter 3 explains the empirical methods used in the thesis. Chapter 4 describes the variables and outlines the dataset. In chapter 5, the results of the thesis are presented and then discussed and concluded in chapter 6 and 7.

2 Background and Literature Review

To provide an overview on the topic, this chapter is divided in three parts. The first part gives some background information on alcohol consumption. It is particularly concerned with the distinction between problem drinking and non-abusive alcohol consumption and explains how problem drinking is defined in medical terms. In part two, studies are presented that analyze the effect of alcohol consumption on income and unemployment. Finally, part three sheds light on the methods used in previous studies and explains how and why this master thesis deviates from most of those methods used earlier.

2.1 Background

When analyzing the effect of alcohol consumption, it must be distinguished between normal and abusive consumption. Problem drinking, abusive or excessive alcohol consumption is a symptom of the psychiatric diagnosis *alcohol use disorder*. The term non-excessive alcohol consumption in this thesis is also referred to as normal or non-abusive consumption. It is defined as alcohol consumption, which is not connected to the alcohol abuse disorder. (Association 2013)

Alcohol abuse disorder (AUD) is a psychiatric diagnosis that is described by the American Psychiatric Association in the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5). The diagnosis AUD integrates the previously distinct disorders alcohol abuse and alcohol dependence into one single category. It consists of 11 different symptoms, of which at least 2 need to be present in order to diagnose a light AUD. Amongst them are that alcohol was taken in larger amounts over a longer period than intended, a strong desire or urge to use alcohol (craving) was present, or that important social, occupational, or recreational activities are given up or reduced because of alcohol use. (Association 2013)

Abusive alcohol consumption and non-abusive alcohol consumption might therefore affect labor market success differently. While an alcohol use disorder probably destroys human capital by lowering health, some argue that moderate alcohol consumption might even help to increase human capital, for example due to increased health or due to networking effects (Sayette et al. 2012: 2; Burton et al. 2005: 769–777).

2.2 Findings of Previous Studies

A considerable amount of literature has been published on the effect of alcohol consumption on labor market outcomes, mostly focusing on labor income. Some studies have reported that excessive alcohol consumption not only has harmful effects on health, but is also associated with worse labor market outcomes (Mullahy and Sindelar 1996: 409–410; Auld 2005: 40).

Despite the adverse effect of excessive alcohol on labor market outcomes, economists have also identified positive effects of moderate alcohol consumption on income. The so called alcohol income puzzle claims that moderate drinking is associated with higher income (Mullahy and Sindelar 1996: 409–410; Auld 2005: 40). Several studies have found an inverse U-shaped relationship between alcohol consumption and income (Berger and Leigh 1988: 1343–1351; French and Zarkin 1995: 319–344; Ziebarth and Grabka 2009: 219; Bray 2005: 279): Moderate alcohol consumers tend to earn higher wages than abstainers and excessive alcohol consumers.

The finding that alcohol consumption can have positive effects on income has led researches to hypothesize about several causal explanations. It has been speculated about alcohol consumption facilitates bonding across individuals, which would suggest that alcohol consumption has a networking effect (Sayette et al. 2012: 2). Other hypotheses focus on the often replicated finding that moderate alcohol consumption can have positive health effects, which increase productivity and therefore lead to an increase in income (Burton et al. 2005: 769–777). In a recent paper, Haucap and Herr (2014: 381–392) use a game theoretical approach to explain the alcohol income puzzle. They posit the view that alcohol can make people unwillingly tell the truth. Drinking might therefore be an efficient signaling mechanism and serve as a trust facilitating device, which in turn has positive effects on labor market outcomes.

Ziebarth and Grabka (2009: 219–244) believe to have found evidence that the alcohol income puzzle also exists in Germany. They develop the idea of beverage-specific wage gains due to moderate alcohol consumption. According to their estimates, drinking wine leads to a higher wage gain compared to drinking beer. They use the same data source (SOEP) as this thesis does. Given that less data on alcohol consumption was available at the time of their publication, their analysis is not longitudinal and restricted to the year 2006. They try to correct for endogeneity bias by using instrumental variables.

In contrast to the literature on alcohol consumption and income, there has been less research on the relationship between alcohol consumption and

employment, and the direction of the effect is still in dispute. Feng et al. (2001: 511) look at the effect of problem drinking on unemployment. Using cross-sectional data from the United States, they do not find a negative association between problem drinking and employment, neither for men nor for women. MacDonald and Shields (2001: 427-453) find positive and significant occupational attainment returns to moderate levels of drinking for data from England between 1992 and 1996. To overcome endogeneity issues, they use a set of instrumental variables. Other research finds negative effects on employment due to problem drinking (Mullahy and Sindelar 1996: 409-434), also using an instrumental variable approach.

Taken together, most studies which analyze the effect of alcohol consumption on income find positive effects for non-abusive alcohol consumption. Some studies have found negative effects on abusive alcohol consumption. The impact of alcohol consumption on unemployment is still in dispute.

2.3 Methods of Previous Studies

The aforementioned studies provide interesting findings. Despite this, they probably do not identify a causal effect of alcohol consumption on labor market outcomes. It is highly likely that moderate alcohol consumers differ in personal characteristics from abstainers or heavy drinkers, which results in selection bias. Treatment alcohol is not assigned randomly across population, and therefore, endogeneity is likely to have distorted the results. Even though cross-sectional analysis allows to control for observed personal characteristics, it fails to control for unobserved characteristics. The use of instrumental variables might under some conditions reduce the selection bias. But good instruments are hard to find, and their reliability hinges on a couple of strong assumptions (Angrist and Pischke 2008: 221).

Another way to deal with unobserved confounders is the use of fixed effects panel regressions. Using panel data, causal effects can be identified under weaker assumptions compared to standard cross-sectional analysis. This method allows, for example, to use the knowledge of the time-ordering of events. Furthermore, individual fixed effects estimation eliminates all potential time-constant confounders. (Brüderl and Ludwig 2015: 353)

Despite obvious advantages of panel data, so far Tekin (2002: 7-10) is the only researcher using panel data. He examined the alcohol income puzzle with a fixed effects regression on panel data from Russia. He first ran a pooled OLS regression, followed by a fixed effects regression. The pooled OLS results

still show support for the inverse U-shaped relationship between alcohol and income, but fixed effects regression has failed to reveal any significant effect. As a consequence, Tekin (2002) questions the view that the alcohol income puzzle actually exists. His results indicate that earlier estimates, which were based on cross-sectional OLS regression might have been biased due to unobserved, time constant heterogeneity.

Apart from Tekin there is a general lack of knowledge, on whether there is a causal influence of alcohol consumption on labor market outcomes. This master thesis aims to clarify the link between alcohol consumption and labor market incomes in a similar way as Tekin does by using data from Germany. In contrast to Tekin, not only individuals' income is examined, but also the probability of being unemployed, the probability that the reason of job termination was dismissal and the duration of unemployment.

3 Empirical Strategy

The goal of this chapter is to discuss the econometric methods used to analyze the effect of alcohol consumption on labor market success. As this thesis uses different variables to approximately measure labor market success, different estimation methods are needed that account for the specific nature of the variables of interest.

3.1 Labor Income

Income from labor¹ is a non-negative, quantitative variable which is strongly right skewed. Therefore, the natural logarithm is used to account for the positive skewness and the non-negativity. To show how the results from a cross-sectional approach differ from a within-estimation, a pooled OLS (POLS) is conducted first and then a fixed effects (FE) model is used.

The pooled OLS model is specified as follows:

$$\log(\text{income}_{it}) = \beta_0 + \beta_1 \text{alcohol}_{it} + u_{it} \tag{1}$$

where alcohol_{it} is a categorical variable (set of dummy variables) for the amount of alcohol consumed and β_1 gives the percentage change in income if a specific amount of alcohol is consumed².

¹To enhance readability labor income is in the following just referred to as income.

²The variables will be described more exactly in chapter 4.

Because the same individuals are repeatedly observed, it is unrealistic to assume that the error terms of different points in time are uncorrelated (Verbeek 2008: 373). To account for this, standard errors are clustered on an individual basis (Cameron and Trivedi 2010: 250).

The estimator β_1 captures the consistent and unbiased effect of alcohol consumption on income if the exogeneity assumptions hold, saying that the errors should have mean zero ($E(u_i) = 0$) and that the regressors are uncorrelated with the errors ($cov(x_i, u_i) = 0$). If the exogeneity assumptions do not hold, causal statements on the effect of alcohol consumption on income cannot be made.

One reason that leads to a violation of the exogeneity assumptions are unobserved confounders that affect both the dependent and independent variables. In the framework of this master thesis, this could be the case if labor market outcomes and alcohol consumption are both affected by a similar variable. Sociability or intelligence are only two examples. Sociability might lead to more alcohol consumption, as alcohol is often consumed in social environments. At the same time, sociability could also lead to a higher income, because social skills are an advantage in the labor market. Another reason for the violation of the exogeneity assumption is reversed causality. This is the case if labor market outcomes do also affect alcohol consumption. For example, if people with a high income can afford to drink more wine. A similar situation is imaginable with unemployment covered in the next section. As unemployment is associated with psychological pain, more alcohol might be consumed to feel better.

The above mentioned examples raise serious doubt on whether the exogeneity assumptions hold. To overcome endogeneity issues, econometric theory provides several approaches. Among the most prominent are the use of instrumental variables or the use of panel data in combination with fixed effects. Instrumental variables have been used in previous studies. However, the efficiency and reliability on this approach hinges on whether good instruments can be found and whether the instruments are valid. Good instruments are usually hard to find, and the validity of the instruments cannot be tested (Brüderl and Ludwig 2015: 354). Therefore, the second option is chosen to tackle the endogeneity issue in this master thesis: fixed effects estimation.

Panel data allows to decompose the error term. This yields the error com-

ponents model:

$$\log(\text{income}_{it}) = \beta_0 + \beta_1 \text{alcohol}_{it} + \alpha_i + \epsilon_{it} \quad (2)$$

where α_i is a person specific time-constant error term and ϵ_{it} is a time-varying error term (Brüderl and Ludwig 2015: 354). Individual heterogeneity that is constant over time (α_i) can be eliminated by subtracting the person specific mean at a certain point in time. This leads to the following fixed effects model:

$$\log(\widetilde{\text{income}}_{it}) = \beta_1 \widetilde{\text{alcohol}}_{it} + \widetilde{\epsilon}_{it} \quad (3)$$

where tilde indicates de-meaned values, β_1 is now the fixed effects estimator and $\widetilde{\epsilon}_{it}$ the de-meaned time-varying error term. This eliminates omitted variable issues due to time constant individual confounders. However, time-varying confounders could still bias the results. Therefore, the strict exogeneity assumption equation ($E(\epsilon_{is}|x_{it}) = 0$ for all t and s) has to hold, which implies that income trends for alcohol consumers and abstainers must be parallel. Family events or health events might affect both alcohol consumption and labor market outcomes and therefore endanger this assumption. To reduce the endogeneity problematic due to time-varying confounders, control variables that vary over time such as health status, marriage or widowhood are included in the model. (Brüderl and Ludwig 2015: 353–354)

The fixed effects estimator only uses the within variation. Therefore, it is also only generalizable to those units that show within variation (Brüderl and Ludwig 2015: 353–354). Inevitably several observations will be lost, which results in less efficient estimators. In order to use the fixed effects approach in this thesis, the amount of alcohol consumed has to vary sufficiently over time. Given that the data provides three points in time (2006, 2008, 2010) over six years, enough variation within individuals should be observed.

3.2 Unemployment Probability

Unemployment is a binary variable that takes the value 1 if an individual is officially unemployed and 0 if the individual is employed at a specific point in time. Similar to the analysis of income, a pooled model is estimated first and then a model that uses within-variation only.

To account for the binary nature of the variable, a pooled logit model is

estimated, which is specified as follows:

$$P(unemp_{it} = 1|x_{it}) = \Lambda(\beta_0 + \beta_1 alcohol_{it} + u_{it}) \quad (4)$$

where Λ is the logistic function. To account for serial correlation a robust variance matrix estimator is used (Wooldridge 2010: 624).

Similar to the pooled OLS regression, the pooled logit estimation does not take full advantage of the longitudinal structure of panel data, which allows to control for all unobserved time-constant heterogeneity. But due to the binary nature of the variable unemployed it is less clear, which model to choose. Amongst the possible models are random effects probit, Chamberlain's probit, a simple linear probability model or a fixed effects logit (Wooldridge 2010: 624). Wooldridge (2010: 624) claims that there is no procedure which dominates the other. A linear probability model is not bounded between zero and one, Chamberlain's RE probit requires independence of error terms and regressors. The fixed effects logit has the drawback that the coefficients are hard to interpret. However, the fixed effects model is rather consistent as unobserved time-constant heterogeneity is dropped.

In order to answer the research question, on whether there is a causal effect of alcohol consumption on unemployment, I consider it more important to consistently estimate the model, rather than to being able to interpret the coefficients quantitatively. Therefore, I suggest the estimation of a fixed effects logit model also known as conditional logit model. In the fixed effects logit model

$$P(unemp_{it} = 1|x_{it}, \alpha_i) = \Lambda(x_{it}\beta + \alpha_i) \quad (5)$$

fixed effects transformation like done in the linear case leads not to an immediate elimination of individual specific time-constant effects. However, in the fixed effects logit model there exist nevertheless a procedure to estimate the conditional log-likelihood independent of α_i . Wooldridge (2010: 620–622) shows in detail how the joint distribution of $unemp_i = (unemp_{i1}, \dots, unemp_{iT})'$ conditional on x_i, α_i and $\sum_{t=1}^T y_{it}$ can be found in the simple case of $T = 2$ and the more advanced and general cases of $T > 2$. What has to be mentioned is that in the case of no variation in the variable $unemp$ (cases = 0 or = 1 over the 3 periods for an individual) the individual's contribution to the log-likelihood is zero and therefore not included in the estimation. This leads in general to a substantial drop in the number of observations, which will become evident in

the fixed effects estimations in chapter 5. The downside of this reduction in sample size is a decrease in efficiency. On the other hand, this approach profits from all the benefits of using panel data dealing in an advantageous way with unobserved confounders as outlined previously.

3.3 Reason for Job Termination

Becoming unemployed does not capture labor market success to its full extent, as it depends highly on the reason, why the job has been terminated. The variable $dismissed_{it}$ is binary, thus the same procedure is used as when analyzing unemployment. To estimate whether alcohol consumption increases the likelihood of being fired conditional on becoming unemployed, the following pooled logit model is estimated first:

$$P(dismissed_{it} = 1 | x_{it}, unemp_{it} = 1) = \Lambda(\beta_0 + \beta_1 alcohol_{it} + u_{it}) \quad (6)$$

where Λ is the the logistic function. Similar to the analysis of the unemployment probability, I also use the fixed effects logit model to account for time constant unobserved heterogeneity.

3.4 Unemployment Duration

Another way of measuring labor market success is to analyze how fast an individual, once she gets unemployed, is able to find a job again. The hazard rate $\lambda(t)$ is the proportion of unemployment spells that end during period t . In order to analyze how alcohol consumption influences the hazard rate of the unemployment state, three models are estimated: First, a basic model which assumes a constant hazard rate, then a piecewise-constant proportional hazard model and finally an accelerated failure model estimated with log-normal distribution and gamma frailty. To keep alcohol consumption of individuals constant over time, the individual alcohol consumption category that appeared most often replaced the categories in the other years³. The simple duration model with constant hazard function

$$\lambda(t|x) = exp(x'\beta) \quad (7)$$

will serve as a baseline model, where $\lambda(t|x)$ stands for the hazard rate. The drawbacks of this model are the restrictive assumptions: it does neither allow

³This was implemented by using $mode(alcohol_{it}) = alcohol_i$

the hazard function to change over time nor for additionally heterogeneity. (Winkelmann and Boes 2006: 271)

The piecewise-constant proportional hazard model is the second duration model used in this thesis. It is specified as follows:

$$\lambda(t|x) = \exp(x'\beta)\lambda_m \quad (8)$$

where λ_m is the baseline hazard that represent the risk for a particular interval m . This model is more flexible, because it allows the hazard to be different across time-intervals, but still constant over each time-interval. (Wooldridge 2010: 1013–1014).

The third duration model used in this thesis has the advantage over the other models in that it accounts for duration dependence *and* unobserved heterogeneity (Winkelmann and Boes 2006: 259–278). A modification of the simple hazard function where unobserved heterogeneity enters multiplicative leads to the following equation:

$$\lambda(t|x) = \tilde{\lambda}(t|x)u \quad (9)$$

where $\tilde{\lambda}(t|x)$ captures observable characteristics and u is the just mentioned term depicting unobserved heterogeneity. A gamma distribution with parameters $\theta > 0$ and $\gamma > 0$ for the unobserved heterogeneity term is assumed. Integrating out u taking into account the assumed distribution leads to the following result:

$$\lambda(t|x) = \tilde{\lambda}(t|x)[1 + \theta^{-1}\tilde{H}(t|x)]^{-1} \quad (10)$$

where $\tilde{\lambda}(t|x)$ is the hazard function with log normal distribution and the term in brackets takes account of the unobserved heterogeneity. (Winkelmann and Boes 2006: 278–281)

4 Data

This chapter outlines the dataset used in the analysis and describes the used variables. To answer the research question, some variables such as alcohol consumption have to be constructed. This is also documented in this chapter. Furthermore, it will be explained how problem drinker are tried to be identified.

4.1 Dataset

The data used in this empirical analysis comes from the Socio-Economic Panel (SOEP), version 31 (doi:10.5684/soep.v3) (Wagner et al. 2007; SOEP). The G-SOEP is a representative, longitudinal household based panel study for Germany. It has currently more than 20'000 individual respondents. Data related to alcohol consumption is available for the waves of 2006, 2008 and 2010.

To ensure that the analysis is about individuals on the labor market, observations of respondents younger than 18 or older than 65 are excluded from the analysis. In addition, observations of people who are not in the labor force or who are employed by the army are dropped as well. This leaves a dataset with 14'979 observations. 5'843 observations are available for all years between 2006 and 2010. The data is unbalanced with an average of 2.5 observations per individual.

4.2 Definition of Variables

To analyze how success in the labor market is linked to individuals' alcohol consumption, not only different dependent variables are used, but also different variables that capture the amount of alcohol consumption. These variables are described here.

4.2.1 Dependent Variables of Labor Market Success

To ensure the correct temporal ordering between cause and effect, all dependent variables are shifted one year into the future before conducting the analysis. For example, the variable $income_{i,2010}$ is then replaced by $income_{i,2011}$, meaning that the alcohol consumption in the year 2010 is matched with the income in the year 2011. As the information on the dependent variables are available until the year 2013, no years are lost due to this time shift.

LogIncome: The first dependent variable is the logarithm of the gross yearly income, which also includes profit shares and bonuses. Gross wage is used because it is a less disturbed measure for labor market success than net wage. Contrary to Ziebarth and Grabka (2009), I do not use hourly gross wage, because the use of hourly wages needs information about the hours worked. As this information is not available for all individuals, using hourly wages would inevitably lead to a smaller sample size. Furthermore, it is not clear that the missing information on hours worked are missing randomly. Using

Table 1: Alcohol Consumption Categories

Group 1		Group 2	
Abstainer	No alcohol consumption	Abstainer	No alcohol consumption
Seldom	At least one beverage seldomly, no beverage regularly or occasionally	Seldom	At least one beverage seldomly, no beverage regularly or occasionally
Occasionally	At least one beverage occasionally, no beverage regularly	Beer	Only beer regularly or occasionally
Regularly	At least one beverage regularly	Wine	Only wine regularly or occasionally
		Drinks	Only drinks regularly or occasionally
		Spirits	Only spirits regularly or occasionally
		Multiple	At least two beverages regularly or occasionally

Categorization according to Ziebarth and Grabka (2009: 6-7)

it, could confound the analysis. To account for differences in worked hours, a part-time dummy will serve the purpose.

Unemployment: The second dependent variable is the probability of being unemployed. This binary variable takes the value 1 if an individual is unemployed in a specific year. If individuals are not in the working force, due to their age or due to other circumstances, they are not considered to be unemployed and are dropped at the beginning of the analysis.

Dismissal probability: Dismissal probability should provide an in-depth picture of the employment status. The variable takes the value 1 if the employment reason is dismissal and 0 for every other reason. This variable is only available for individuals who experienced unemployment during the analyzed period.

Unemployment duration: A further measure of labor market success is the duration of unemployment. The SOEP provides information on the employment status on a monthly basis. An unemployment spell starts with the month an individual gets unemployed and ends with the last month of unemployment before a new job is found. The spells are calculated over the period 2006 and 2010.

4.2.2 Variables of Alcohol Consumption

Ziebarth and Grabka (2009) constructed two categorical variables representing alcohol consumption based on the questions asked in the SOEP. Respondents

had to indicate for each beverage – wine, beer, drinks/cocktails⁴ and spirits – whether they consume it never, seldom, occasionally or regularly. The exact question can be found in appendix B.

Table 1 provides an overview over the different categories constructed by Ziebarth and Grabka (2009: 6–7). The first categorical variable is a proxy for the amount of alcohol consumed. An individual is an abstainer at a specific point in time if she does not consume any of the four beverages. If she does not drink any beverage regularly or occasionally, but she states that she drinks at least one beverage seldomly, she belongs to the category seldom drinkers. If she does drink at least one beverage occasionally, but no beverage regularly, she is called a moderate or occasional drinker. If she drinks at least one beverage regularly, she is categorized as a regular drinker. (Ziebarth and Grabka 2009: 6–7)

The second categorical variable is more specific on the type of beverage consumed. Someone is called a beer drinker if she drinks beer occasionally or regularly, but no other beverage regularly or occasionally. The same rule applies for the other beverage categories. If someone drinks at least two different beverages regularly or occasionally, she is called a multiple drinker. In order to have mutually exclusive categories, the dummies abstainer and seldom drinker are included in the second group as well. (Ziebarth and Grabka 2009: 6–7)

4.2.3 Identification of Problem Drinker

The information about alcohol consumption in the SOEP alone does not permit identifying people suffering from alcohol use disorder (AUD). Drinking larger amounts of alcohol over longer period than intended is one of eleven DSM-5 symptoms for AUD. However, the amount of alcohol consumed, which is ordinal given on in the dataset, is not a sufficient criteria to diagnose AUD. Furthermore, the classification of drinking behavior, with the highest category regular, does not only account to potential problem drinkers, but also to normal alcohol consumers. The term regular itself does not imply abusive alcohol consumption.

An attempt to identify people suffering from alcohol use disorder is to search for individual characteristics that are correlated with the disorder. Therefore, the symptoms given by the DSM-5 are compared to information available in the SOEP. Subsequently, a dummy $potentialAUD_{it}$ is created that takes the value 1, if all of the following four criteria hold:

⁴The terms drinks and cocktails are used fully interchangeable in this thesis.

- regular or moderate alcohol consumption
- bad/very bad health status or psychiatric illness in the past
- impatient or impulsive personality
- low satisfaction with social life or low satisfaction with life in general

Table 13 in the appendix depicts, how symptoms of the DSM-5 description of AUD and variables in the SOEP are matched.

The drawback of this approach is, that it does not allow the detection of a causal effect of alcohol consumption due to the other criteria. However, the rationale for this approach is not to establish a causal relationship of alcohol consumption on labor market success, but rather to see whether a negative relationship between potential AUD candidates and income or unemployment can be identified.

4.2.4 Interaction Variables

Even though fixed effects estimation drops all time-constant covariates, time-constant variables can still be used as an interaction term with alcohol consumption. This allows to measure, whether the effect of alcohol consumption on labor market outcomes differs between groups. The used interaction variables are sex and the personality traits patience and impulsiveness.

Sex: The most obvious groups, whose effects from alcohol consumption on labor market outcomes could differ, are men and women. Gender differences are therefore analyzed by using an interaction variable *female* which is 1 if the individual is female and 0 otherwise.

Patience and impulsiveness: A growing strand of literature in the field of substance abuse links personality traits, such as impatient or impulsive behavior, to a higher vulnerability to substance abuse (Hawkins et al. 1985: 75–76; Petry 2001: 243–250; Slater et al. 1999: 667–674; Whiteside and Lynam 2003: 210; Poulos et al. 1995: 810-814). It is therefore possible that the consequences of alcohol consumption on labor market outcomes differ depending on the amount of patience or impulsiveness that a person possesses. In the most extreme case, when people with a high patience get positive consequences from alcohol consumption and impatient people negative consequences, the effects of the two groups could cancel each other. To prevent this, patience and impulsiveness will serve as interaction variables. In the SOEP, people had to report in the year 2006 how impatient they consider themselves on a scale

from 0 to 10, with zero being very impatient and 10 very patient. Respondents also indicated in the year 2006 how impulsive they consider themselves on a scale from 0 to 10, with 0 being not impulsive and 10 being very impulsive. The variables patience and impulsiveness were only collected in the year 2006. Under the assumption that personality traits are relatively stable over time, the values of the year 2006 are also used for the other years. To enlarge group size, four different categories are created for patience and impulsiveness, each representing a quartile of the distribution.

4.2.5 Other Control Variables

Control variables such as age, gender, years of education or years of experience are used. The list of variables can be seen in table 9 in the appendix. With a mean variance inflation factor of 2.38, the analysis of multicollinearity does not lead to further concerns.

5 Results

This chapter is divided into three parts. First, a summary statistics is presented to show how the different alcohol consumption categories differ from each other. Second, the analysis is presented for each of the labor market success variables. In the last part, the results of further robustness checks are described.

5.1 Descriptive Statistics

Table 2 presents an overview of the characteristics for the different groups of alcohol consumers, aged 18 to 65. To avoid confounding effects due to different multiple measurements of the same person, the presented means are a snapshot of the year 2010. An exception is unemployment duration, which measures the average duration of the unemployment spells between 2006 and 2010, in case someone is unemployed.

It is apparent from this table that gender-specific differences in alcohol consumption exist. First, there are differences in beverage choice. While, for example, only 16 percent of beer drinkers are female, they dominate the group of wine and cocktail drinkers. Second, males and females differ in the amount of alcohol they consume. In the group of regular alcohol consumers, which is defined by consuming at least one alcoholic beverage regularly, only

Table 2: Means by Alcohol Consumption Group

	All	Abstinent	Seldom	Moderate	Regular	Beer	Wine	Drinks	Spirits	Multiple
Yearly income	64'953	54'546	60'944	65'397	74'376	58'960	75'985	49'010	69'475	69'259
Unemployed	0.04	0.07	0.04	0.04	0.03	0.04	0.03	0.05	0.07	0.03
Duration	5.20	6.72	5.63	5.15	4.56	5.43	4.95	5.53	4.59	4.77
Age	43.03	42.46	42.43	42.67	45.17	42.97	46.63	32.56	41.67	42.41
Female	0.50	0.65	0.62	0.48	0.27	0.16	0.79	0.68	0.44	0.36
Education	12.89	11.86	12.77	12.91	13.54	12.55	13.41	12.26	11.83	13.27
Part-time	0.29	0.40	0.34	0.28	0.17	0.14	0.39	0.33	0.29	0.22
Experience	15.79	13.68	14.36	15.77	19.03	18.80	16.37	8.29	15.37	16.14
Good health	0.60	0.57	0.56	0.62	0.60	0.58	0.62	0.64	0.59	0.63
Patience	6.02	6.29	6.14	6.00	5.76	5.98	6.05	5.88	5.64	5.85
Impulsiveness	5.20	5.17	5.16	5.23	5.19	5.06	5.37	5.35	5.38	5.21
Satisfaction	7.27	7.20	7.14	7.34	7.31	7.16	7.44	7.56	7.44	7.35
Observations	9500	808	2633	4356	1703	1518	1492	126	87	2836
Share	1	0.11	0.29	0.44	0.17	.15	0.15	0.01	0.01	0.29

Only data for year 2010 included

Duration refers to unemployment duration in months (only for unemployed)

For impulsiveness and patience the values were evaluated in 2006 and copied for the following years

Source: German Socio-Economic Panel

a minority (27 percent) of the respondents are female. Given these gender specific differences, the distinction of women and men in the further analysis seems to be inevitable, which will be done by using the interaction variable *female*.

Table 3: Transition Probabilities

Initial State	Final State				Total
	Abstainer	Seldom	Moderate	Regular	
Abstainer	68.29	21.95	9.76	0.00	100.00
Seldom	7.95	53.79	37.50	0.76	100.00
Moderate	2.18	23.54	61.89	12.38	100.00
Regular	1.61	6.45	31.45	60.48	100.00
Total	9.98	30.05	45.46	14.51	100.00

Row: alcohol consumption at beginning; column: alcohol consumption at end

Source: German Socio-Economic Panel

Table 3 provides information on how the alcohol consumption of individuals changes over the years 2006 and 2010. 68 percent of the abstainers were abstainers at the beginning and stayed abstainers until the end, while 22 percent of the abstainer become seldom drinker over the measurement period. 12 percent of the moderate drinker become regular drinker. Interestingly, people can also reduce their alcohol consumption frequency: 31 percent of the initial regular drinkers turn to moderate drinkers. Over all, roughly 40 percent of the respondents change their drinking frequency. It is important to know that there is enough within-variation for fixed effects analysis.

5.2 Analytical Results

In this part, the results from the analysis are presented for each dependent variable. The included control variables are listed below the corresponding table, but are not reported, as they show the expected sign. The analysis is conducted with Stata 12.

5.2.1 Labor Income

Table 4: Regression Models on LogIncome

	(1)	(2)	(3)	(4)
	OLS1	OLS2	FE1	FE2
Seldom Drinker	0.153*** (0.033)	0.031 (0.029)	0.024 (0.028)	0.039 (0.029)
Moderate Drinker	0.218*** (0.031)	0.087** (0.028)	0.021 (0.030)	0.037 (0.030)
Regular Drinker	0.290*** (0.033)	0.113*** (0.029)	0.040 (0.032)	0.054 (0.032)
Female	-0.168*** (0.043)	-0.007 (0.039)		
Seldom Drinker × Female	0.041 (0.047)	0.087* (0.042)	0.009 (0.037)	-0.023 (0.039)
Moderate Drinker × Female	0.058 (0.046)	0.088* (0.041)	-0.000 (0.040)	-0.023 (0.042)
Regular Drinker × Female	0.218*** (0.054)	0.148** (0.048)	-0.010 (0.047)	-0.023 (0.050)
Controls	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.025	0.271	0.019	0.039
Observations	25243	22818	25243	22818

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Standard errors clustered on individual basis in parentheses

Controls: age, east, migration, health, married, widowed, experience, years of education, years in firm, blue collar, part-time, firm-size

Source: German Socio-Economic Panel

Table 4 presents the results of the regression on income by frequency of drinking. This table is quite revealing in several ways. Column 1 and 2 of table 4 indicate, that male alcohol consumers earn more than male abstainers. The differences between seldom, moderate and regular drinkers are all highly significant ($p < 0.001$) – suggesting that income increases monotonically with the amount of alcohol consumed. Even when control variables are included (column 2), male moderate and regular drinker still earn more than male abstainers, but the difference between regular and moderate drinkers is only marginally significant ($p = 0.093$). Looking at female respondents, female regular drinkers earn even more than male regular drinkers (column 1), and

if control variables are included, both moderate and seldom drinkers have a significantly higher income than their male counterparts (column 2). The size of the relationship is quite substantial. Assuming that the results in column 2 are consistently estimated and therefore have a causal interpretation, it implies that if an abstainer starts to drink regularly, his income increases by 11.9⁵ percent. Looking at columns 3 and 4 of table 4, however, it turns out that this is quite a strong assumption.

Compared to the cross-sectional approach (columns 1 and 2), the results of the within approach (columns 3 and 4) can be reported much faster: no significant effect of alcohol consumption on income is found. The results obtained from the regression with the beverage specific categorical variable are shown in table 10 in the appendix. The key point is the same as with the frequency-specific analysis in table 4: While the cross-sectional regressions mostly show significant positive estimates, the within-estimation fails to do so.

In summary, the results from cross-sectional regressions indicate that income weakly increases with the amount of alcohol consumption, for both men and women. This is in line with earlier results and is referred to as alcohol income puzzle. Using within estimation, the results from cross-sectional analysis cannot be replicated. The null hypothesis 1, saying that alcohol consumption has no effect on income, cannot be rejected.

Table 5: Regression Models of Variable Risk-Drinking

Dependent Variable:	(1) LogIncome	(2) LogIncome	(3) Unemployed	(4) Unemployed
Potential AUD	-0.107 (0.063)	0.006 (0.063)	-0.255 (0.458)	-0.698 (0.531)
Female	-0.142*** (0.013)	0.018 (0.013)	0.178** (0.055)	-0.113 (0.067)
Potential AUD × Female	0.024 (0.103)	-0.053 (0.097)	1.197* (0.534)	1.437* (0.596)
Constant	10.850*** (0.009)	9.900*** (0.041)	-3.207*** (0.055)	-1.597*** (0.210)
Controls	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.010	0.226		
Pseudo R^2			0.002	0.068
AIC	96476.521	82204.322	18694.468	16518.080
ll	-48230.260	-41084.161	-9339.234	-8245.040
Observations	42837	41413	52056	50145

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Standard errors clustered on individual basis in parentheses

AUD refers to potential Alcohol Use Disorder patient

Controls: years of education, age, migration, married, east, blue collar, health, experience

Source: German Socio Economic Panel

⁵ $100(\exp(0.113) - 1)$

The above shown results did not show any negative association between alcohol consumption and income. One reason for that might be that problem drinkers were not identified properly. Therefore, table 5 shows the regression of the dummy variable *potentialAUD*. Columns 1 and 2 present the results of the pooled OLS regressions without and with control variables, respectively. Neither for men, nor for women are the coefficients significant. The income of people with a potential alcohol use disorder is not significantly different from other people. This is surprising. However, this approach never intended to make a ceteris paribus analysis, but rather to show whether the labor market outcomes of people with a potential AUD differ from other people⁶. Controlling for other factors is therefore not important, which makes column 1 without control variables the relevant column. In this column the dummy variable *potentialAUD* has the expected sign and is only marginally insignificant. The reason for that might just be the small sample for which *potentialAUD* = 1 holds (302 observations).

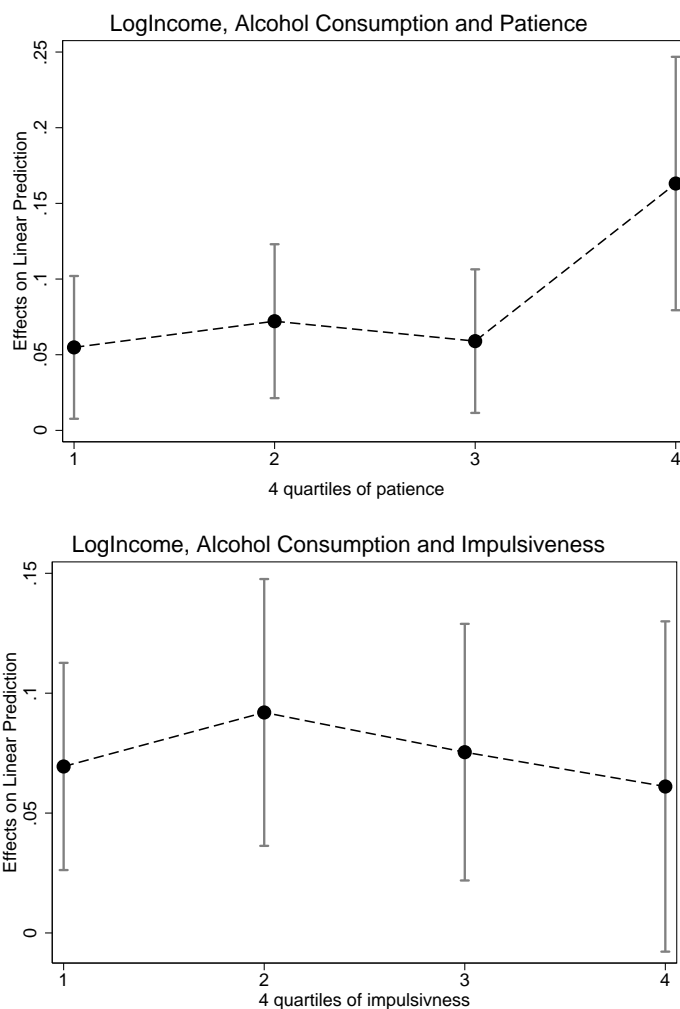
The top half of figure 1 shows the average marginal effects of a pooled OLS regression of regular or moderate drinking on the logarithm of income by different quartiles of patience. To enhance readability, moderate and regular drinkers are put into one single group called drinker. The first quartile represents the observations with the lowest 25 percent of patience. The fourth quartile represents the group with the highest patience. Moderate and regular drinkers earn more than abstainers and seldom drinkers, independent of whether they are patient or not. While the average marginal effect of moderate or regular drinking is increasing in patience (with the exception of quartile 3), the increase is not significant.

If we now turn to the bottom half of figure 1, the average marginal effects of regular or moderate drinking on the logarithm of income by different quartiles of impulsiveness are depicted, with 4 being the most impulsive group. For the most impulsive group, the average marginal effects are the lowest and not significantly different from zero. However, the estimates do not significantly differ from each other as impulsiveness changes. Therefore, these results cannot confirm, that more impulsive people suffer from worse consequences regarding income if they consume a moderate or regular amount of alcohol.

Figure 1 only showed the pooled cross-sectional results with the interaction variables patience and impulsiveness. The rationale for this interaction variable approach was to use the variables together with fixed effects estimation.

⁶Because of this, no fixed effects analysis is conducted here

Figure 1: Effect of Drinking on LogIncome by Patience and Impulsiveness



Estimation method: pooled OLS with individual clusters
 Average Marginal Effects (AME) with 95 percent confidence interval
 Drinking dummy = 1 if moderate or regular drinker = 1
 Controls: age, east, migration, health, married, year, experience,
 years of education, years in firm, blue collar, part-time, firm-size
 Source: German Socio-Economic Panel

Fixed effects estimation was also conducted, but non of the estimates were significantly different from zero. Therefore, only the cross-sectional results are presented, to show at least a descriptive relationship.

5.2.2 Unemployment Probability

Columns 1 and 2 of table 6 show the estimates of the cross-sectional logit regressions of alcohol on the binary variable unemployment without and with control variables, respectively. From column 1 it can be inferred that drinking alcohol is associated with a smaller probability to become unemployed (the base variable is abstainer). This relation does not significantly differ by gender. The probability of unemployment also seems to decrease with the amount of alcohol consumed. Seldom alcohol consumers also have a significant ($p = 0.038$) higher probability of becoming unemployed than moderate drinkers, and regular drinkers in turn have a marginally significant ($p = 0.053$) lower probability of being unemployed than moderate drinkers. If control variables are included in the regression (column 2), moderate and regular drinker still have significant lower probability of becoming unemployed, while the unemployment probability of seldom drinking is not significantly different from abstainers anymore. The magnitudes are quite substantial. Looking at the relative change in the odds⁷, regular drinking is associated with a 53 percent decrease (38 percent in the model with control variables) in the odds of being unemployed compared to being abstinent. Turning to the within estimation in columns 3 and 4, the results resemble those obtained in the analysis of income before. The fixed effects logit cannot replicate the results obtained in the cross-sectional analysis: no coefficient is significantly different from zero. What also becomes evident is the loss in the number of observations when using fixed effects logit. Table 11 in the appendix, which estimates beverage specific effects, shows essentially the same result. Interestingly, drinking wine regularly (column 1) or drinking beer regularly (column 2) is associated with an higher likelihood of being unemployed for women compared to men. While cross-sectional analysis shows a negative relationship between unemployment and drinking for male individuals (with the exception of cocktail drinker), the within approach (columns 3 and 4) fails to do so.

To sum up: Cross-sectional methods show a weakly decreasing negative association between unemployment and alcohol consumption for men, within-estimation does not find any significant effect, neither for men nor for women.

⁷ $100(\exp(-0.772) - 1)$

The null hypothesis 2, saying that alcohol has no effect on the probability of unemployment, cannot be rejected.

Table 6: Regression Models on Unemployment

	(1)	(2)	(3)	(4)
	Logit1	Logit2	FE-Logit 1	FE-Logit 2
Seldom Drinker	-0.326* (0.164)	-0.146 (0.176)	-0.321 (0.400)	-0.257 (0.398)
Moderate Drinker	-0.553*** (0.152)	-0.364* (0.165)	-0.395 (0.421)	-0.303 (0.421)
Regular Drinker	-0.772*** (0.166)	-0.473** (0.180)	-0.573 (0.473)	-0.489 (0.478)
Female	0.084 (0.175)	-0.178 (0.191)		
Seldom Drinker \times Female	-0.171 (0.209)	-0.253 (0.221)	0.098 (0.518)	-0.023 (0.526)
Moderate Drinker \times Female	0.157 (0.197)	0.166 (0.209)	0.623 (0.549)	0.492 (0.560)
Regular Drinker \times Female	0.027 (0.255)	0.158 (0.270)	0.523 (0.674)	0.365 (0.688)
Controls	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
Pseudo R^2	0.006	0.068	0.012	0.025
AIC	10811.195	9577.124	1364.545	1286.948
Log Likelihood	-5397.597	-4772.562	-675.273	-632.474
Observations	30891	29764	1901	1804

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Standard errors clustered on individual basis in parentheses

Controls: years of education, age, migration, east, health, experience

Source: German Socio Economic Panel

Looking back at table 5, in columns 3 and 4 the results of the pooled logit regressions of the dummy variable *potentialAUD* on unemployment can be seen. While for men the estimates in both models are negative and insignificant, the estimates in the model without control variables (column 3) show an increased likelihood for females with a potential alcohol use disorder to be unemployed. In terms of relative risk, this means for females an increase in the relative risk of being unemployed by 1.57⁸. When control variables are included in the model, the difference of becoming unemployed for females compared to male potential AUD becomes even higher, although not significantly. Even with control variables, female potential AUD have higher probability to become unemployed than females without potential AUD (odds ratio of 2.06⁹). Taken together, these results suggest that there is a negative association between females with a potential alcohol use disorder and the employment status. Even though this is not a causal effect, it shows that the amount of alcohol consumption together with other personality characteristics (impatience or im-

⁸ $100(\exp(-0.255 + 1.197) - 1)$

⁹ $100(\exp(-0.698 + 1.437))$

pulsiveness, low satisfaction with social environment, low health or psychiatric problems) can be linked to lower labor market success.

The top half of figure 3 in the appendix provides the results obtained by a pooled logit regression of regular or moderate drinking on unemployment by different quartiles of patience. The average marginal effects of regular or moderate drinking on unemployment are no significantly different from those of abstainers or seldom drinkers, and this relationship does not differ by the amount of patience. The bottom half of figure 3 compares the average marginal effects of moderate or regular drinking on different groups of impulsiveness. The point estimates of the respondents do not change over different quartiles of impulsiveness.

Figure 3 only shows the pooled cross-sectional results with the interaction variables patience and impulsiveness. Fixed effects estimation was also conducted, but non of the estimates were significantly different from zero. Contrary to prior expectations, this indicates that the effect of alcohol consumption on unemployment does not differ among people with different impulsiveness or patience.

5.2.3 Reason for Job Termination

In table 7, the estimates of the logit regression of alcohol consumption on the probability of being fired are presented in columns 1 and 2. In column 1, no significant relationship between the frequency of alcohol consumption and the chance of being dismissed is detected. Column 2 shows a link between those who consume drinks regularly and the probability that if the job contract ends, the reason was that the person has been dismissed. Quantitatively, this means that the odds of getting fired increase by factor 2¹⁰ if drinks are consumed regularly, compared to abstainers. The logit fixed effects regressions were conducted as well. However, the remaining sample size was too small to yield meaningful, not to mention significant results. This in turn means that no evidence is was found for a causal relationship and consequently the null hypothesis 3, saying that alcohol consumption does not affect the probability of getting dismissed, cannot be rejected.

Table 7: Probability of Dismissal

	(1) Logit-1	(2) Logit-2
Seldom Drinker	0.43 (0.29)	0.43 (0.29)
Moderate Drinker	0.41 (0.27)	
Regular Drinker	0.12 (0.31)	
Beer		0.38 (0.31)
Wine		0.27 (0.32)
Drinks		1.11* (0.46)
Spirits		1.00 (0.68)
Multiple		0.25 (0.29)
Controls	Yes	Yes
Year FE	Yes	Yes
Pseudo R^2	0.078	0.080
AIC	1309.40	1312.42
ll	-641.70	-640.21
Observations	1689	1689

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Standard errors clustered on individual basis in parentheses

Controls: sex, east, migration, years of education, age, health, experience, year

Source: German Socio-Economic Panel

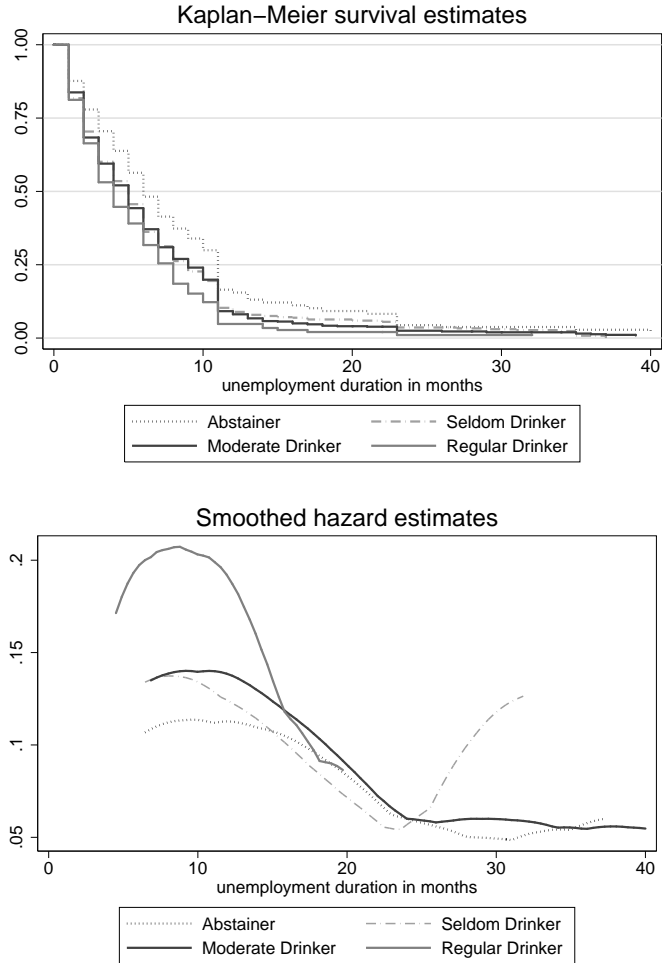
5.2.4 Unemployment Duration

The top half of figure 2 shows the Kaplan-Meier survival estimates by groups of drinking frequency over the years 2006 to 2010. It can be seen that when unemployed, abstainers stay longer in unemployment than alcohol consumers. To enhance readability and enlarge sample size, I do not distinguish between men and women. The smoothed hazard estimates shown in the bottom half of figure 2 confirm that alcohol frequency is negatively related to unemployment duration. The hazard rate peaks for all groups at around 10 months and declines over time. Interestingly, the hazard rate for seldom drinkers is U-shaped. The form of the hazard rate in figure 2 supports the use of a log-normal distribution with gamma frailty to estimate the hazard rate analytically. The figure also suggests to use a period dummy variable for the piece-wise constant hazard model that is 1 for a duration between 10 and 20 months.

The analytical results of the duration analysis for drinking frequencies are presented in table 8. To enhance the comparison between the models, all coefficients are presented in the AFT structure, meaning that the coefficients refer to the expected unemployment duration rather than the hazard rate. Column

$$^{10}100(\exp(1.11) - 1)$$

Figure 2: Duration of Unemployment Spells



1 shows the estimates for the simple constant hazard model. Drinking alcohol is linked to a decreased duration of unemployment. For example: Being a regular drinker is associated with an approximately 31.9 percent lower unemployment duration compared to abstainers. The same holds for the log-normal model with gamma frailty in column 3. The point estimates of the piecewise proportional constant hazard model in column 2 also indicate, that drinking alcohol is associated with a lower unemployment duration. As expected the dummy variable for the period 10 to 20 months is negative, implying that the hazard rate in this period is bigger than in other periods. However, only the estimates for regular drinkers are statistically different from those of abstainers. Comparing the different models against each other, both the Bayesian information criterion (BIC) and the Akaike information criterion (AIC) favor the log-normal model with gamma frailty over the other two models. The analysis of the beverage specific alcohol consumption is not reported, but shows

Table 8: Duration Analysis of Unemployment

	(1) Exponential	(2) Piecewise Exponential	(3) Log-Normal (Gamma-Frailty)
Seldom Drinker	-0.212** (-2.96)	-0.0118 (-0.16)	-0.246*** (-3.50)
Moderate Drinker	-0.221*** (-3.32)	-0.0173 (-0.25)	-0.251*** (-3.79)
Regular Drinker	-0.319*** (-4.16)	-0.181* (-2.31)	-0.294*** (-3.57)
10-20 months		-0.0546*** (-7.76)	
Constant	1.423*** (9.44)		1.153*** (7.79)
$\hat{\sigma}$			-0.174*** (-9.90)
$\hat{\theta}$			-17.42 (-0.04)
Observations	10623	10623	10623
<i>AIC</i>	4420.0	4425.9	4151.7
<i>BIC</i>	4529.1	4535.0	4275.3
ll	-2195.0	-2198.0	-2058.8

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; t statistics in parentheses

AFT structure: coefficients show effect on unemployment duration

Base in (2): period under 10 months and above 20 months, abstainers

Controls: sex, years of education, age, east, health, experience, part-time, year

Source: German Socio Economic Panel

essentially the same results.

Taken together, alcohol consumption is associated with a lower unemployment duration. We can therefore reject the null hypothesis 4, saying that alcohol consumption is not linked to the duration of unemployment. As mentioned in the beginning, this does not have to be a causal effect. The rationale for analyzing unemployment duration was simply to shed light on the relationship of alcohol consumption and another variable of labor market success.

5.3 Robustness Checks

The generated categories for alcohol consumption proposed by Ziebarth and Grabka (2009: 6–7) might be not be able to catch heavy drinkers, while the dummy variable *potentialAUD* might be too restrictive. Therefore two other dummy variables are generated to see whether the effect on income and unemployment might be different. The first variable takes the value 1 if the respondent drinks at least three beverages regularly. This yields 93 observations. The second, less restrictive, indicator variable is 1 if the respondent drinks at least two beverages regularly, which is true for 771 observations during the period 2006–2010. However, using this two dummies does not yield

qualitatively different results from those obtained in the analysis before.

Silva and Tenreyro (2006: 641–658) suggest to use a Poisson regression instead of OLS for the (pooled) log-linearized income equation $\log(\text{income}_{it}) = \beta_0 + \beta_1 \text{alcohol}_{it} + u_{it}$ estimated in section 5.2.1. They emphasize the known but often neglected fact that the expected value of the logarithm of random variable is different from the logarithm of its expected value. This implies that under heteroskedasticity, the interpretation of the parameters of log-linearized models estimated by OLS as elasticities, can be misleading (Goldberger 1968: 464–472, Manning and Mullahy 2001: 461–494). In a Poisson process the mean equals the variance, which certainly is an unrealistic assumption for the equation of interest. However, it can be shown that the coefficients of the maximum likelihood Poisson estimation do not depend on the assumption $E(\text{income}_{it}) = \text{Var}(\text{income}_{it})$ (Silva and Tenreyro 2006: 645). What does depend on that assumption are the standard errors of the estimated coefficients. To account for this, robust standard errors have to be used, which also account for serial correlation (Cameron and Trivedi 2010: 574, Wooldridge 2010: 756).

To ascertain that the results obtained on the relationship between alcohol consumption and income do not hinge on the used estimation procedure, a maximum likelihood Poisson estimation is conducted. The estimated coefficients are presented in table 12 in the appendix and can be interpreted as semi-elasticities. If compared to the results of the pooled OLS estimates (column 1 and 2 of table 4), no significant differences between the two estimation procedures can be detected.

The effects of alcohol consumption on unemployment and income may come with a substantial lag in time. To check, whether fixed effects estimation is able to find an effect of alcohol consumption on labor market outcomes, the dependent variables income and unemployment was shifted forward until the year 2013, meaning that $\text{income}_{i,2013}$ and $\text{income}_{i,2012}$ were matched to $\text{alcohol}_{i,2010}$. The fixed effects results for income and unemployment are not significantly different from the results obtained when matching $\text{income}_{i,2011}$ with $\text{alcohol}_{i,2010}$ as done in the analysis before.

A final check was conducted to see whether the hourly income rather than the annual income might change the results. The qualitative results for the effect of alcohol consumption on income and unemployment stay the same in the cross-sectional as well as in the fixed effects analysis.

6 Discussion

The key result of this thesis is that the fixed effects estimation does not provide evidence for a causal effect of alcohol consumption on income or on the probability of unemployment. This contrasts the cross-sectional findings, which show a positive relationship between the amount of alcohol consumption and variables of labor market success. Independent of several factors – such as age or education – people who regularly or occasionally consume alcohol have on average a higher income, a lower chance of being unemployed and a lower unemployment duration.

The cross-sectional finding that non-excessive alcohol consumption has a positive effect on labor market success is in line with the results of previous studies mentioned in chapter 2. The positive relationship between alcohol consumption and income found in this thesis confirms the existence of the alcohol income puzzle. However, the finding that the fixed effects estimation did not confirm a positive causal effect of alcohol consumption on employment or income, raises doubt on whether a causal relationship actually exists. This non-existence of the causal relationship contradicts the finding of earlier studies which claim to have found evidence for a causal relationship, mostly by using instrumental variables.

There are three possible explanations for the result that no causal effect of alcohol consumption on labor market outcomes was found. First, there is indeed neither a positive nor a negative causal effect of alcohol consumption on labor market outcomes. The within-analysis was right in not rejecting the null hypotheses. The positive relationship detected in the cross-sectional analysis of this study and earlier cross-sectional studies is due to selection bias. Unobserved confounders, such as sociability, might impact the amount of alcohol consumed as well as labor market success.

The second explanation is that earlier research based on cross-sectional data was right in saying that alcohol consumption has negative and positive effects, but the data for alcohol consumption was not available for a long-enough period. This would mean that the longitudinal analysis in this thesis did not have enough power to reject the null hypotheses, as fixed effects analysis requires enough variation within-person. Clearly, the fact that data on alcohol consumption was only available for three waves is a drawback. However, the analysis of the amount of within variation (table 3) showed satisfactory amounts of change within persons.

The third and most likely explanation pictures the idea that there indeed

is a causal effect of alcohol consumption, but only a negative one if people consume an excessive amount of alcohol. This implies that the within-estimation was right in not rejecting the null hypothesis because problem drinkers were not identified in the analysis. Despite the ample scope of the data, it might still be rich enough to capture individuals with an alcohol use disorder. Potential reasons for this are manifold. Individuals with an alcohol use disorder might not volunteer to answer the survey, as their physical or mental condition does not allow them to do so. The questions asked in the survey might also not be fine-grained enough to capture excessive amounts of alcohol consumption since the highest category is regular drinking. This category might also apply for alcohol consumers without an alcohol use disorder. A further problem to identify people with an alcohol use disorder could be that those people tend to neglect or play down their illness. Thus, they might choose a lower category than regular drinking or possibly even state that they are abstainers. Even though I tried to identify people suffering from alcohol use disorder by additionally using DSM-5 symptoms or dividing people according to their patience and impulsiveness, it is likely that my identification strategy failed.

Apart from the difficult identification of problem drinking, there are also other caveats that question the reliability of the results. One caveat is panel conditioning. This is a well known measurement error in context with panel data. It captures the idea that the survey question itself alters the future behavior of the respondent (Cantwell 2008: 566–567). It cannot be ruled out that the pure act of asking people about the amount of alcohol they consume could change their future alcohol consumption. Even though the direction of the bias is unclear, panel conditioning would rather lead to a decrease in alcohol consumption. It is difficult to imagine that a question about alcohol consumption elicits the desire to drink more alcohol. If panel conditioning exists, it would probably lead to less alcohol consumption since people might reconsider their lifestyle. A positive effect of alcohol consumption on labor market outcomes could therefore be downward biased.

Another issue concerns the time lag between alcohol consumption and labor market outcomes. Even though I conducted fixed effects estimation with a time lag up to three years, this might simply not be enough to capture long term consequences in labor market success. The effects of alcohol consumption on income and employment could arise after several years of regular alcohol consumption. Measuring such long term effects is currently impossible with the given data.

7 Conclusion

This master thesis had two aims. The first aim was to determine whether there is a relationship between alcohol consumption and labor market outcomes in Germany between 2006 and 2010. The second aim was to ascertain whether this relationship is causal. In other words, does alcohol consumption have an impact on labor market outcomes.

The thesis showed that there is a positive relationship between labor market success and alcohol consumption for men. However, no evidence for a causal relationship of alcohol consumption on labor market outcome was found, neither for men nor for women.

A major limitation of this study is that problem drinking could not be identified with certainty. Therefore, the generalisability of the results is limited to the effect of non-abusive alcohol consumption.

Nevertheless, the finding is relevant as it raises doubt upon the alluring idea implied by the causal interpretation of the alcohol income puzzle, that consuming more alcohol increases labor market success. This thesis also adds to current literature by showing that non-excessive alcohol consumption is negatively linked to the duration of unemployment.

To develop a full picture of the consequences and costs of alcohol consumption, additional studies are needed. A sharp focus should be put on the collection of better data. To tackle the endogeneity issue of the research questions, panel data has great advantages over cross-sectional data, as it allows to follow individuals over time and to make causal statements under weaker assumptions. But also panel data surveys require careful implementation. One recommendation for the implementation in a survey is to use absolute values for the amount of alcohol consumption instead of broad categories such as regular or moderate drinking. While in Germany, the SOEP provides at least a coarse longitudinal database for alcohol consumption; other countries, such as Switzerland, do not have information on alcohol consumption in household panels. Including only a few questions on alcohol consumption in existing household panels could sharpen our knowledge concerning the consequences and costs of alcohol consumption.

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A Appendix

A.1 Tables and Figures

Table 9: Summary Statistics and Definition of Variables

Variable	Definition	Mean	Std. Dev.	Min.	Max.	N
Alcohol Consumption						
Abstainer	1 if abstainer, 0 else	0.08	0.272	0	1	102633
Seldom Drinker	1 if seldom drinker, 0 else	0.38	0.485	0	1	102633
Moderate Drinkers	1 if moderate drinker, 0 else	0.274	0.446	0	1	102633
Regular Drinker	1 if regular drinker, 0 else	0.101	0.302	0	1	102633
Beer Drinker	1 if beer drinker, 0 else	0.128	0.334	0	1	102633
Wine Drinker	1 if wine drinker, 0 else	0.109	0.311	0	1	102633
Cocktail Drinker	1 if cocktail drinker, 0 else	0.01	0.098	0	1	102633
Spirits Drinker	1 if spirits drinker, 0 else	0.01	0.101	0	1	102633
Multiple Drinkers	1 if multiple drinker, 0 else	0.159	0.366	0	1	102633
Labor Variables						
LogIncome	logarithm of yearly gross labor income	10.54	1.044	2.773	13.998	67733
Not Working	1 if not working, 0 else	0.429	0.495	0	1	102633
Unemployed	1 if unemployed, 0 else	0.075	0.263	0	1	102633
Parttime	1 if working part time, 0 else	0.166	0.372	0	1	102633
Years in Firm	number of years in current firm	11.049	10.314	0	62.1	57856
Education	years of schooling	12.246	2.706	7	18	97194
White collar worker	1 if white collar worker, 0 else	0.056	0.23	0	1	102633
Blue collar worker	1 if blue collar worker, 0 else	0.096	0.294	0	1	102633
Size of Firm	size of firm (incr. scale 1 to 11)	6.608	3.249	1	11	54997
Army	1 if working in army, 0 else	0.001	0.035	0	1	102633
Demographics						
Female	1 if female, 0 if male	0.524	0.499	0	1	102633
Age	current age of respondent	49.477	17.623	17	100	102633
Children	number of children in household	0.455	0.845	0	8	102633
Married	1 if married, 0 else	0.596	0.491	0	1	102633
Widowed	1 if widowed, 0 else	0.068	0.252	0	1	102633
Migration	1 if migrated to Germany, 0 else	0.174	0.379	0	1	102633
East Germany	1 if living in East Germany, 0 else	0.242	0.428	0	1	102633
Year	year of survey			2006	2010	102633
Characteristics						
Health	health status (1 good - 5 bad)	2.646	0.96	1	5	102452
Satisfaction	life satisfaction (incr. scale 0-10)	6.982	1.774	0	10	102363
Patience	personal patience (incr. scale 0-10)	6.066	2.284	0	10	19643
Impulsiveness	personal impulsiveness (incr. scale 0-10)	5.094	2.195	0	10	19635
Risk Seeking	willingness to take risks (incr. scale 0-10)	4.161	2.296	0	10	59194

Table 10: Beverage Specific Regressions on LogIncome

	(1)	(2)	(3)	(4)
	OLS1	OLS2	FE1	FE2
Seldom	0.153*** (0.033)	0.031 (0.029)	0.025 (0.028)	0.040 (0.029)
Beer	0.125*** (0.032)	0.028 (0.029)	0.024 (0.030)	0.037 (0.031)
Wine	0.516*** (0.040)	0.204*** (0.035)	0.013 (0.033)	0.026 (0.033)
Drinks	0.057 (0.065)	0.151** (0.054)	0.035 (0.056)	0.043 (0.058)
Spirits	0.133 (0.080)	0.215** (0.071)	0.042 (0.063)	0.078 (0.058)
Multiple	0.284*** (0.032)	0.122*** (0.028)	0.025 (0.031)	0.045 (0.031)
Female	-0.168*** (0.043)	-0.007 (0.039)		
Seldom × Female	0.041 (0.047)	0.088* (0.042)	0.009 (0.037)	-0.023 (0.039)
Beer × Female	-0.014 (0.060)	0.016 (0.052)	0.015 (0.049)	0.003 (0.051)
Wine × Female	-0.117* (0.054)	0.048 (0.047)	0.002 (0.044)	-0.017 (0.045)
Drinks × Female	0.016 (0.089)	-0.011 (0.077)	0.016 (0.076)	-0.020 (0.081)
Spirits × Female	0.168 (0.118)	0.064 (0.106)	0.130 (0.088)	0.058 (0.087)
Multiple × Female	0.012 (0.049)	0.038 (0.043)	-0.014 (0.043)	-0.037 (0.044)
Controls	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.034	0.275	0.019	0.039
Observations	25243	22818	25243	22818

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Standard errors clustered on individual basis in parentheses

Controls: age, east, migration, health, married, widowed, experience, years of education, years in firm, blue collar, part-time, firm-size

Source: German Socio-Economic Panel

Table 11: Regression Models on Unemployment: Beverage Specific

	(1)	(2)	(3)	(4)
	Logit 1	Logit 2	FE-Logit 1	FE-Logit 2
Seldom	-0.326*	-0.211	-0.328	-0.265
	(0.164)	(0.175)	(0.396)	(0.391)
Beer	-0.509**	-0.473**	-0.295	-0.230
	(0.162)	(0.174)	(0.437)	(0.434)
Wine	-1.250***	-0.640*	-0.758	-0.681
	(0.260)	(0.267)	(0.591)	(0.589)
Drinks	0.107	-0.254	-0.232	0.062
	(0.335)	(0.336)	(0.699)	(0.701)
Spirits	-0.121	-0.060	-0.765	-0.526
	(0.367)	(0.376)	(0.844)	(0.848)
Multiple	-0.674***	-0.489**	-0.552	-0.488
	(0.157)	(0.169)	(0.434)	(0.428)
Female	0.084	-0.199	0.010	-0.024
	(0.175)	(0.191)	(.)	(.)
Seldom \times Female	-0.171	-0.243	0.130	-0.003
	(0.209)	(0.221)	(0.517)	(0.521)
Beer \times Female	0.461	0.612*	0.487	0.233
	(0.247)	(0.259)	(0.700)	(0.708)
Wine \times Female	0.722*	0.322	1.306	1.242
	(0.295)	(0.303)	(0.707)	(0.711)
Drinks \times Female	-0.019	0.265	-0.065	-0.383
	(0.420)	(0.430)	(0.857)	(0.866)
Spirits \times Female	0.149	-0.136	1.027	0.173
	(0.545)	(0.598)	(1.469)	(1.599)
Multiple \times Female	0.113	0.092	0.595	0.451
	(0.213)	(0.226)	(0.586)	(0.593)
Controls	No	Yes	No	Yes
Year FE	Yes	Yes	No	Yes
Pseudo R^2	0.008	0.068	0.016	0.024
AIC	10798.579	9596.859	1370.325	1298.453
Log Likelihood	-5385.290	-4777.429	-672.162	-633.226
Observations	30891	29764	1901	1804

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Standard errors clustered on individual basis in parentheses

Controls: years of education, age, migration, east, health, experience

Source: German Socio-Economic Panel

Table 12: Poisson Regression Models on Income

	(1) Poisson-1	(2) Poisson-2
Seldom Drinker	0.156*** (0.036)	0.043 (0.035)
Moderate Drinker	0.209*** (0.033)	0.077* (0.033)
Regular Drinker	0.293*** (0.036)	0.114** (0.036)
Female	-0.070 (0.047)	0.028 (0.048)
Seldom Drinker × Female	-0.021 (0.050)	0.022 (0.049)
Moderate Drinker × Female	0.014 (0.049)	0.039 (0.048)
Regular Drinker × Female	0.157** (0.057)	0.086 (0.055)
Controls	No	Yes
Year-FE	Yes	Yes
Pseudo R^2	0.025	0.260
AIC	6.629e+08	4.517e+08
ll	-3.314e+08	-2.258e+08
Observations	25251	22821

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Standard Errors clustered on individual basis in parentheses

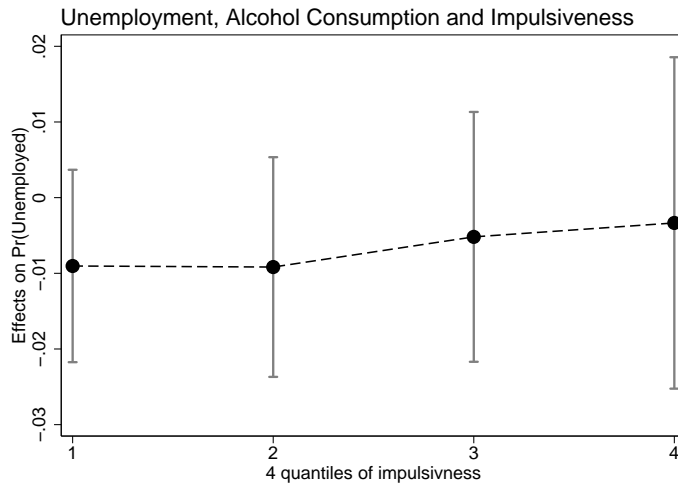
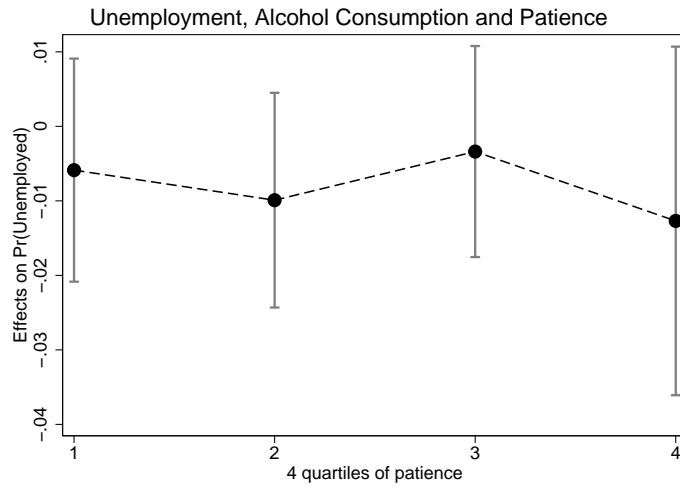
Controls: age, east, migration, health, married, widowed, experience, years of education, years in firm, blue collar, part-time, firm-size

Source: German Socio Economic Panel

Table 13: Matching of DSM-5 and G-SOEP

Criteria	DSM-5 Symptom	in G-SOEP
Alcohol	1) <i>Alcohol is often taken in larger amounts or over longer period than was intended.</i>	Regular or moderate alcohol consumer = 1
Craving	4) <i>Craving, or a strong desire or urge to use alcohol.</i>	Patience <5 or impulsiveness >5
Health	9) <i>Alcohol use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by alcohol.</i>	Bad/very bad health status or psychiatric problems in the past = 1
Satisfaction	6) <i>Continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol.</i>	Satisfaction with social life <5 or life satisfaction <5

Figure 3: Effect of Drinking on Unemployment by Patience and Impulsiveness



Estimation method: pooled logit with individual clusters
 Average Marginal Effects (AME) with 95 percent confidence intervall
 Drinking dummy = 1 if moderate or regular drinker = 1
 Controls: age, east, migration, health, married, year, experience,
 years of education, years in firm, blue collar, part-time, firm-size
 Source: German Socio-Economic Panel

A.2 Questions

How often do you drink the following alcoholic beverages?

1. Beer
2. Wine, Champagne
3. Spirits (schnaps, brandy etc.)
4. Mixed drinks (alcopops, cocktails, etc.)

Answers:

1. Regularly
2. Occasionally
3. Seldom
4. Never

Source: German Socio-Economic Panel