Does unemployment lead to hazardous drinking?

An empirical study

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Establishing a link between unemployment and alcohol use can be beneficial for both advising macroeconomic policy, and targeting alcohol education and treatment programs. The link is especially important when applied to the U.K. context, given the current cost to England's National Health Service of alcohol related harm, following the worst economic recession the economy has seen for decades. This dissertation explores the effect of unemployment on alcohol use, by using econometric analysis in the form of a binary dependent variable model, whilst controlling for income and demographic variables. The regression analysis shows that being unemployed does increase the likelihood of hazardous drinking, whereas a respondent's level of income has little impact. Thus, this dissertation concludes that unemployment does increase the likelihood of hazardous drinking due to the societal stress impact of being unemployed.

1. Introduction

Alcohol related harm costs the UK economy £21 billion annually, including a cost of £3.5 billion to the National Health Service (NHS) (HM Government, 2012). When considering these statistics, it becomes evident that establishing the true link between unemployment and alcohol use would be valuable to the economy and the NHS. Firstly, if unemployment is associated with an increased level of alcohol use, then the total costs of unemployment should include the extra cost that hazardous drinking may cause to the wider economy (Ettner, 1997). Therefore, establishing this link between unemployment and alcohol use could advise policy. For example, if it were confirmed that unemployment leads to alcohol misuse, policymakers would have an additional reason to reduce unemployment rapidly. At the very least, establishing the link could help make policymakers aware that alcohol consumption will increase during downturns (Popovici and French, 2013). Secondly, if a positive link is established, then promotion of alcohol education and treatment programs should be intensified during economic downturns (Ruhm, 1995). Further, at a local level, these programs should be targeted amongst the unemployed, or people who are soon to become unemployed. Improved targeting of such programs may reduce the likelihood of unemployment causing hazardous drinking, and subsequently reduce the impact of alcohol related harm on the economy.

Due to the importance of any findings, substantial research has been allocated to this topic. However, the themes that have emerged so far are conflicting. Namely, that alcohol consumption follows either a pro-cyclical or counter-cyclical relationship with economic performance, or its proxy, unemployment. The pro-cyclical argument is that as economy performance improves, drinking levels increase. The counter-cyclical argument states the opposite, in that drinking levels increase as the economy's performance declines. Confirming the true relationship would provide evidence for either targeting alcohol treatment programs during a strong or a poor performing economy.

This dissertation aims to establish whether unemployment does indeed lead to hazardous drinking, and subsequently to confirm the pro-cyclical or counter-cyclical relationship. Further, the aim is to develop the established literature by formulating a model that uses data originating from the UK, specifically England, and that dates from the economic recession of 2008. These are two areas where there is currently a paucity of research.

This study will be structured as follows. Firstly, a theoretical framework will be presented to establish the main theories behind the link between unemployment and alcohol use, specifically focussing on the pro-cylical and counter-cyclical arguments. Secondly, a review of the established literature will be presented, in order to understand and compare the results of the prominent empirical studies in this area. Thirdly, the methodology for the study will be set out, including a description of the dataset

used, the variables included, and the model that will be used to tackle the research question. Finally, the results of the study will be discussed, including any limitations of the dissertation, and areas for future research.

The result of this dissertation shows that those who are unemployed are more likely to demonstrate hazardous drinking behaviour, providing evidence for a counter-cyclical relationship. As the income categories regressed were mostly statistically insignificant, it can be concluded that the main reason for the counter-cyclical link is due to the societal stressor aspect of unemployment.

2. Unemployment and alcohol use: the theoretical link

Findings in the current literature on the relationship between unemployment and alcohol use can be broadly broken down into two categories, those that support a pro-cyclical relationship, and those that find evidence for a counter-cyclical relationship. The pro-cyclical relationship suggests that alcohol consumption increases as the economy improves and when unemployment decreases. Alternatively, the counter-cyclical relationship suggests that alcohol consumption increases as unemployment increases, or when the economy is performing badly, such as during a recession. This theoretical framework chapter explores the theories behind these relationships.

2. 1 The pro-cyclical theory

The main theory on the pro-cyclical side stems from the economic concept of the 'income effect'. As alcohol can be classed as a normal good, defined as "a good that is bought in greater quantities as income increases", the income effect dictates that consumption of alcohol will follow the trend of income (Nichoson *et al*., 2008, p.635). Therefore, as income increases, so will consumption of alcohol, and the opposite for a decrease in income. As unemployment is associated with lower income, the income effect suggests that consumption of alcohol would reduce when the unemployment rate increases, and individuals who are unemployed would drink less than those who are employed (Popovici and French, 2013; Ruhm, 1995). In other words, a fall in purchasing power, due to unemployment, would lead to a reduction in the prevalence of abusive drinking (Dee, 2001). This is further supported by Catalano *et al*. (2011, p.433), who introduce the concept of "effect budgeting". Effect budgeting states that risky goods, including goods that are associated with "risky behaviour", such as alcohol, are likely to be at the bottom of a household's list of goods to purchase, and therefore they are the first items to stop being bought when income falls (Catalano *et al*., 2011, p.434). Additionally, as a result, the risky behaviours associated with such consumption also reduce.

Moreover, another argument in favour of the pro-cyclical relationship is that working is the main cause of stress as opposed to not being in employment (Popovici and French, 2013). Therefore, as the unemployment rate falls, and employment rate increases, we would expect to see alcohol consumption increase as individuals in work turn to drinking as a stress reliever (Catalano *et al*., 2011). Such an effect is likely in stressful working environments, including occupations that pay a substantial wage. If this argument were true, individuals who are employed would be more likely to illustrate hazardous drinking behaviour relative to those that are unemployed.

2.2 The counter-cyclical theory

The counter-cyclical theory is similarly based on the fact that alcohol is seen as a stress reliever, or a way of blocking out the realities of life, especially at higher levels of consumption (Khan, Murray and Barnes, 2002). The difference here is that becoming unemployed or being unemployed is seen as a more stressful experience than being in employment, therefore causing individuals to drink more. Several authors highlight this link, citing economic hardship, stressful life events, and unemployment as reasons for turning to alcohol as a way of dealing with stress (Dee, 2001; Popovici and French, 2013; Catalano *et al*., 2011). Peirce *et al*. (1994, p.293) define this response as "affect regulation theory". That is, drinking to regulate the negative emotions that may surround job loss or joblessness. I have broken these negative emotions as a result of unemployment into two broad categories, 'societal stressors' and 'financial stressors'. Societal stressors include a loss of "work identity" (Peirce *et al*., 1994, p.292). This loss of work identity can be due to missing friends who are in the work network, and additionally the loss of feeling of accomplishment that working may bring. In the long-term, being unemployed can lead to greater stress as individuals lose the skills required to partake in the job market, making it harder to return to work. Financial stressors associated with unemployment include the loss of income and other bonuses that come from working. Societal or financial stressors or a combination of the both are seen to be likely to trigger drinking due to affect regulation theory.

Furthermore, "frustration aggression mechanism" encompasses an additional reason as to why unemployed individuals may drink more than their employed counterparts (Catalano *et al*., 2011, p.432). Frustration aggression mechanism postulates that individuals who are denied a reward will act aggressively, or turn to antisocial behaviour, including substance abuse. Employment, and the associated benefits like income and work relationships, may be seen as such a reward. Once denied this reward by being unemployed, individuals may act in an antisocial behaviour due to the frustration aggression mechanism.

Finally, unemployed individuals have more leisure time compared with those in employment. Therefore there is more time for social drinking leading to greater alcohol consumption (Popovici and French, 2013). The extent to which this is true is likely to depend on the individual's own circumstance, but combined with the other factors explored in the counter-cyclical argument above, may contribute to greater alcohol consumption amongst the unemployed.

3. Literature Review

Like the theories behind the pro-cyclical and counter-cyclical relationship between unemployment and alcohol use, the results of the empirical work in this field have been mixed. The relationship has been examined using both country/state level (aggregate/macro) and individual (micro) data, with most recent work focussing on the latter, the reasons for which will be discussed below. The majority of the research in this area studies behaviour of individuals in a single country. As Henkel (2011) identifies in his review of the unemployment and substance use literature, different countries are likely to have varying characteristics that influence alcohol consumption. Therefore, studies that focus solely on one country are most likely to show useful results. Most of the research has been based in the U.S.A. There has been a shortage of recent studies aimed at establishing the link between unemployment and alcohol use in England, offering a gap that this dissertation aims to fill. Only one such study was found in the literature search (Harhay *et al*., 2013). Additionally, due to the conflicting results of the research so far, any further work in this area will be useful in establishing a link between unemployment and alcohol use, which could prove vital for policymakers. This chapter will discuss and compare the main studies in the current literature and will conclude with a brief summary of the contribution that future research, including this study, can make.

Early work into examining the relationship between unemployment and alcohol use mainly used macro level data, that is country or state unemployment rates and alcohol consumption data. Ruhm (1995), using a fixed-effect model, found that the alcohol measures of overall consumption (calculated using purchase data) and vehicle fatalities varied pro-cyclically with the unemployment rate. This pro-cyclical variation was attributed to the income effect. Freeman (1999) re-ran Ruhm's (1995) study with a more robust model that included a larger dataset, adding seven years to the data collection. However, he found the same pro-cyclical result. It may be argued that the proxies for alcohol use in these models were not appropriate. Consumption data, when calculated using the amount of alcohol purchased, may be misleading, as the alcohol that is bought does not necessarily correspond to the amount that is drunk. Some may be saved, or alternatively, some may be home brewed, which would lead to a consumption figure higher than that of alcohol purchased. One could speculate that as home brewing alcohol is cheaper than purchasing it, it may specifically be an option for individuals on low

incomes, including the unemployed. Using macro data gives no way of understanding the conflicting drivers of these two factors. Aggregate statistics about vehicle fatalities are also an inaccurate proxy for alcohol use, despite, as Ruhm (1995) argues, that most night-time fatalities are attributed to drink driving. However, Kendall (1984) finds a similar pro-cyclical result between alcohol consumption and economic recession, and rising unemployment.

Other macro level studies include Australian and British alcohol reports. Both the Australian Institute for Health and Welfare (2008) and Coulthard *et al*.'s (2002) reports find that hazardous or high-risk drinking behaviour is more prominent amongst those who are unemployed. Whilst not empirical studies as such, they both give a snapshot that suggests there is a counter-cyclical relationship between unemployment and drinking in the countries studied. This is supported by work from Lee *et al*. (1990), who also found that the unemployed drink more than the employed, and are also more likely to illustrate binge drinking behaviour. Their results only included males aged 50-59, so are limited in their wider application, but alongside the work in Australia and Britain, show evidence of a counter-cyclical relationship.

Despite these results, macro level data is limited in breaking down the individual drivers behind the unemployment and alcohol use relationship, which are so important for any studies in this area. Freeman (1995, p. 886) himself states that aggregate data is limited in the sense that it does not show the "distributional effects" of the change in alcohol consumption. For example, we could observe a pro-cyclical relationship, but macro data does not show us which subgroups are driving this change. Such a relationship would suggest that all individuals consume less when the economy declines, but this may hide the fact that hazardous drinkers are consuming more. In this case, such studies hide the impact of unemployment on those most at risk, the hazardous drinkers. Further, as a result of not focussing on hazardous drinkers, such conclusions may misguide the advice given to policymakers, and health professionals who lead alcohol education programs. In this sense, the true value of these studies is lost. Additionally, aggregate data does not allow the researcher to understand which particular socioeconomic groups are affected by a change in unemployment, an important factor when targeting alcohol education programs (Ruhm and Black, 2002).

For the above reasons, an increasing body of research has examined the relationship using individual level data to understand alcohol use. A number of studies use the state unemployment rate in state fixed-effect models. Ruhm and Black (2002) ran such a study using survey results in the U.S. They found that drinking decreases during economic downturns, similar to Ruhm's (1995) original results. Dee (2001), using data from the same source, supported this pro-cyclical relationship for alcohol consumption. Interestingly however, is the fact that when calculated for binge drinking, he found the

relationship to be counter-cyclical. He attributes this to economic related stress, as even for those in employment during the downturn, binge drinking increased. This result provides support for the fact that just measuring consumption, as opposed to a set level of alcohol misuse, may obscure the true impact of unemployment on the drinking levels that lead to a high cost to society.

Most studies using state unemployment rate and individual level alcohol data in fixed-effect models include a variable for binge drinking. It is worth noting that studies that refer to binge drinking define it as over five or more drinks consumed in one sitting (Davalos *et al*., 2012; Dee, 2001; Latif, 2014; Peirce *et al*., 1994; Popovici and French, 2013). Arguably, whilst this is binge drinking behaviour, it does not define what the drinks are, and they could be weak enough to not cause their consumer any long-term harm. For example, someone who consumes five half-pints of lager is unlikely to do as much damage to himself or herself as another individual who consumes five triple-measure vodka and mixers. A more scientific measure of consumption would include a calculation of the units in each drink to allow a more accurate comparison. Using the above example, five half-pints of lager works out at approximately 5 units, whereas five triple-measure vodka and mixers is approximately 15 units (NHS Choices, 2015). This scientific approach is used in this study to calculate the amount of units imbibed over the past week, and whether this fits into hazardous or harmful drinking levels as defined by the Institute for Alcohol Studies (2013). This measure more precisely captures the level of drinking which is detrimental to health, and subsequently wider society.

Including binge drinking as a variable, Latif (2014) used a state fixed-effect model to examine drinking behaviours in Canada. He found that the unemployment rate had a significant positive effect on both the amount of alcohol consumed and risk of binge drinking. Davalos *et al*. (2012) used a similar model to examine data from the National Epidemiological Survey on Alcohol and Related Conditions (NESARC) in the U.S.A. They found a similar counter-cyclical result to Latif (2014) with four variables for alcohol use, including binge drinking and consumption, increasing as the economy declines. In this case, they argue that economic distress and greater leisure time dominate the income effect. As admitted by the authors, both of these studies would have been more beneficial for examining changing health behaviour in response to economic conditions if they had used data closer to an economic crisis. This is why my research uses data from 2013, as it examines behaviours close to a time of economic recession.

A further body of literature uses micro data for both employment status and alcohol use, mostly using surveys that include questions for both of these variables. Janlert and Hammarström (1992) used longitudinal data to examine whether there was correlation between unemployment, specifically the length of time out of work, and alcohol consumption. Over the 5-year period they looked at, they

found that unemployed males and females demonstrated higher levels of alcohol consumption than the employed. For males, this correlation remained positive for unemployment and change in consumption over the period, where as in females it did not. This illustrates a similar trend to other research, in that males tend to drink more, or are more likely to exhibit binge drinking behaviour (Lee *et al.*, 1990; San Jose *et al.*, 2000).

There are further studies that examine the causal link between unemployment and alcohol use. These focus on the financial stress of unemployment or job loss as a driver for binge drinking. Khan, Murray and Barnes (2002) use data from the Winnipeg Health and Drinking Survey to co-examine poverty and unemployment. They find that poverty causes stress and this leads to drinking as a coping mechanism. However, they find the conflicting result that whilst long-term unemployment leads to an increase in alcohol use, short-term unemployment leads to a decrease. This is possibly due to the fact that shortly after losing their job, unemployed individuals are still trying to engage with the job market, but lose their skills and will to work in the long-term. This study is limited in the sense that it only draws on respondents from one city. However, research by Peirce *et al.* (1994) also found that financial stress can lead to drinking as a coping mechanism, with depression as the mediating factor between them. This provides evidence that financial stressors cause an individual to drink more but does not examine unemployment specifically, and therefore cannot confirm the impact of societal stressors.

Finally, it is worth mentioning the study most like this dissertation, which uses micro data collected in England. Harhay *et al.*'s (2014) study was run using two waves of cross-sectional data in the Health Survey for England (HSE), the same survey that is used in this dissertation. Running similar regressions in the pre-crisis years of 2006/07 and then again during the crisis in 2008/09, they find that whilst there was a reduction in drinking frequency during the crisis years, there was a greater risk of binge drinking amongst a group of unemployed drinkers. A limitation that the authors mention themselves is the fact that the research uses data before the austerity measures of 2010 were established. This opens the door for research, such as this study, to find out whether the counter-cyclical trend they established continues in the current economic climate.

Evident from the research on this topic are a number of areas that need to be either confirmed or refuted with further research. Whilst most of the studies support the counter-cyclical relationship between unemployment and alcohol use, there is still some uncertainty as to the true link, and therefore additional research would be beneficial. Such research, as this study does, should use micro level and not aggregate level data, as this is key for understanding what a highly individual phenomenon is. As this dissertation uses micro data, this will aid understanding about the drivers behind the unemployment and alcohol use relationship. For example, if a counter-cyclical link is found,

it could be established whether this is due to the negative societal stressors or financial stressors, which only some research thus far has addressed. Further, any future studies in this area should incorporate a scientific measure of alcohol use, such as hazardous drinking. This more precisely captures a level of alcohol consumption that can lead to harm to the consumer, and consequently have an impact on society. Finally, as most of the research is based in the U.S.A., with only a number of studies based in Europe, and only one specifically devoted to establishing the connection recently in England, there is a gap present that further research can fill. Furthermore, the study of England can be built on, as even Harhay *et al.* (2013) note that one limitation of their work was that it came before the austerity measures of 2010, which further impacted employment in England. As this study is based on data three years after this, the impact of the austerity measures is likely to be present in the results.

4. Empirical Investigation

This chapter will set out the empirical investigation that has been used in this study to approach the research question. Firstly, the methodology will be set out, including a discussion of the data set, the variables and the model used in the regression. Then, the results of the regression will be presented. Finally, the limitations of the study, and potential areas for future research to examine will be discussed.

4.1 Methodology

4.1.1 The Data set

This dissertation uses data downloaded from the Health Survey for England (HSE) 2013[1]. The HSE is designed to monitor changes in the nations health, by providing annual data about the proportion of people with certain illnesses, the particular social groups effected, and progress towards meeting selected health targets (UK Data Service, 2016). The range of available data in the HSE that is concerned with the respondent's socioeconomic status makes it a good resource to use for this analysis. The sample includes 2013 data, as this is the most recent available. This is beneficial as it allows this dissertation to examine the research question in a period following the worst economic crisis for decades, which included a fluctuating unemployment rate.

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[1] Source: NatCen Social Research, Department of Epidemiology and Public Health, University College London (2015).

Table 1: Variable Summary Statics

Variable	Mean	Std. Dev.	Min	Max
Hazardous Drinking	0.220	0.414	0	1
Male	0.439	0.496	0	1
Age	43.390	12.637	18	65
Unemployed	0.048	0.213	0	1
Married	0.542	0.498	0	1
Interaction Term: Unemployed*Male	0.025	0.156	0	1
Origin				
Asian	0.066	0.248	0	1
Black/African/Caribbean	0.024	0.154	0	1
Mixed Race	0.016	0.126	0	1
Other	0.009	0.097	0	1
White – Reference Group	0.884	0.320	0	1
Highest Qualification Attained				
Foreign/Other	0.005	0.071	0	1
Higher Education Below Degree	0.117	0.321	0	1
O Level	0.259	0.438	0	1
A Level	0.173	0.378	0	1
Degree	0.315	0.464	0	1
No Qualifications – Reference Group	0.131	0.338	0	1
Income				
Less than £2,600 – Reference Group	0.010	0.098	0	1
£2,600<£7,800	0.052	0.222	0	1
£7,800<£15,600	0.137	0.344	0	1
£15,600<£23,400	0.143	0.350	0	1
£23,400<£31,200	0.139	0.346	0	1
£31,200<£41,600	0.136	0.343	0	1
£41,600<£60,000	0.158	0.365	0	1
£60,000<£90,000	0.133	0.340	0	1
£90,000<£120,000	0.046	0.210	0	1
Greater than £120,000	0.046	0.209	0	1

The individual dependent and explanatory variables in the model have all been taken from the HSE. Around 9,000 observations of adults were made in the HSE 2013. Only those aged 18-65 are included in the sample, as this age range includes those who can legally drink in England and is up to a general age of retirement. After removing missing values and non-respondents, a sample size of approximately 5,000 respondents remained. Table 1 details the variable and sample summary

statistics. This section will describe the variables to be used in the regression; full detail of these can be found in Appendix 1.

4.1.2 Hazardous drinking

Hazardous drinking is the focus of this dissertation and the dependent variable to be analysed. Hazardous drinking behaviour illustrates the more serious problems associated with alcohol use, and is also the most harmful for the economy in terms of its impact on health resources. The Institute for Alcohol Studies (2013) defines hazardous drinking as "a pattern of drinking which brings about the risk of physical or psychological harm". The dependent binary variable for hazardous drinking is equal to one if the individual demonstrates hazardous drinking behaviour, and is equal to zero otherwise. In the HSE, data about total units of alcohol consumed is derived from a number of questions asking the respondent about the types and amount of alcohol they have consumed in the past week. The derived variable is a summation of the amount of units they have consumed in the past week, where the amount of units is found using the following calculation:

Equation 1: Calculation of alcohol units

$$\frac{nr.\,of\,ml.\,in\,drink * Alcohol\,content\,by\,volume\,(\%)}{1,000}$$

Source: Institute for Alcohol Studies (2013)

The data has been adapted to create a binary variable, which equals one if the respondent has consumed over 21 units per week and is male, or over 14 units per week and is female. It is over this amount of units per week threshold that an individual is said to demonstrate hazardous drinking. Additionally, when the units per week consumed increase above 50 per week for men, and above 35 per week for women, this behaviour is called "harmful drinking" (Institute for Alcohol Studies, 2013). The binary dependent variable used in my model thus illustrates hazardous and harmful drinking, but will be referred to as hazardous drinking for simplicity.

4.1.3 Unemployment

The key explanatory variable to be examined in the model is unemployment. This is a binary variable and will take a value equal to one if the respondent is unemployed, or zero otherwise. The unemployment response in the survey is labelled as 'ILO Unemployed', which refers to the

International Labour Organisation's definition of unemployment[2]. The unemployment rate in the sample used in this dissertation can be seen in Table 1. The rate is at around 4.8% of the sample, which is lower than the ILO unemployment rate in 2013, which fluctuated between 7.9% and 7.2% for England (StatsWales, 2016). This may be due to the initial sample, but also is likely due to the adjustments to the data for the age range, missing values, or non-response on key variables. An interaction term between unemployed and males (shown as unemployed*male), has been added to the regression to examine whether males are more likely than females to turn to hazardous drinking when unemployed.

4.1.4 Income

Income is another key explanatory variable, because its inclusion allows this dissertation to examine the financial strain aspect of unemployment. Additionally, it is likely to have an effect on the dependent variable, possibly through the income effect, and may lead to omitted variable bias if not included in the regression. The income data in the HSE is derived from a series of questions asking the respondent about their various forms of household income. A number of respondents in the survey answered 'refused' or 'do not know'. These observations have been removed from the sample, as they would have prevented being able to run the regression. Approximately 1,000 observations were removed, however as there was a suitable amount remaining, the sample size is still reliable. The income variable has been broken down into ten categories of increasing income. The lowest category, less than £2,600 annual income, is used as the reference group in the regression.

4.1.5 Demographic Variables

A number of demographic variables were also included in the regression, mainly to prevent omitted variable bias, but also to provide a better breakdown of the individual socioeconomic determinants of hazardous drinking. Of the demographic variables included, only age is continuous, whereas the others are all dummy variables. The age range of 18-65 has been mentioned previously.

Ethnicity is included in the regression, as subgroups may consume different amount of drinks due to differences in cultures, thus affecting the dependent variable. Additionally, some ethnicities may be less inclined to drink alcohol because of religious beliefs prominent in their culture. I have consolidated the categories in the dataset to produce five subgroups: Asian, black/African/Caribbean, mixed race, white, and other. The 'white' category is used as a reference group in the regression.

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[2] The ILO definition of unemployment used in the UK: those without a job who have been actively seeking work in the past 4 weeks and are available to start work in the next 2 weeks. It also includes those who are out of work but have found a job and are waiting to start it in the next 2 weeks (ONS, 2016).

Marital status is included in the regression as a possible sign of stability. Married respondents are combined with those who answered 'in a civil partnership', as this illustrates a similar stability. Those who are in a marriage are likely to be more stable emotionally and financially than single persons, and are therefore less likely to feel the acute stressful effects of unemployment.

The final demographic variable to be included is the level of education of the respondent, as this is likely to impact employment, and hazardous drinking. I have decided to use qualifications attained as a proxy for level of education. An alternative would have been 'age at which left full time education', but as this offers no detail about how successful those years in education were, the qualifications count is a better proxy. Qualifications are more of an output measure whilst years in education is an input measure (Jenkins and Sabates, 2007). As we are trying to establish the effect of education on unemployment and drinking behaviours, it is better to use the output measure. The 'no qualifications' category is used as a reference group in the regression.

4.1.6 The model
The model for this dissertation is defined as the following:

Equation 2: The regression model

$$Hazardous\ drinking_i$$
$$= \beta_0 + \beta_1 Gender_i + \beta_2 Age_i + \beta_3 Employment\ status_i + \beta_4 Education_i$$
$$+ \beta_5 Income_i + \beta_6 Ethnicity_i + \beta_7 Marital\ status_i$$
$$+ \beta_8 Employment\ status \times Gender_i + \varepsilon_i$$

Where hazardous drinking is the binary dependent variable and is one if the respondent demonstrates hazardous drinking behaviour and zero otherwise, and ε_i is the standard error term. The explanatory variables included in the model are detailed above.

There are three models that can be used when the dependent variable as binary: the Linear Probability Model (LPM), the logit model, and the probit model. All three have been estimated for this study as a test of the robustness of the model.

As discussed previously, there has been a substantial amount of literature into the relationship between unemployment and alcohol use. Despite this, researchers are undecided about whether there is a pro-cyclical or counter-cyclical link between the two. However, the majority of the research analysed finds that unemployment does increase the likelihood of hazardous drinking behaviour, and I would expect to see that in the results of this dissertation.

4.2 The Results

After adjustments to the data were made, 4,981 observations were left for 2013. This is a reliable data size and should allow this dissertation to produce dependable results. Heteroskedasticity-robust standard errors are used in the regression to control for heteroskedasticity. The results of the LPM, the logit model, and the probit model are shown in Table 2. It is worth noting that the results for the LPM refer to the co-efficient, whereas in the logit and probit models, the value refers to the marginal effect of that variable at the average. This is due to the fact that the coefficients in the latter two models can only be interpreted as far as their sign, and not by their magnitude. Marginal effects values can be interpreted as showing changes in the likelihood of the dependent variable equalling one, in this case when the respondent illustrates hazardous drinking behaviour, due to a marginal change in the respective explanatory variable.

As can be seen in Table 2, the results are similar across all three models, proving that the model is robust. However, for the discussion of the results, this dissertation will focus solely on the probit model, which follows the normal cumulative distribution function. Returning to the interpretation of the marginal effects for the probit model, the number in Table 2 refers to the probability of the dependent variable equalling one for a change in the respective explanatory variable. Additionally, for discrete variables such as 'married/in a civil partnership', this change in the explanatory variable is from 0 to 1. To demonstrate how marginal effects work, consider the example of a change in the discrete variable 'married/in a civil partnership'. The marginal effect is -0.07053, which shows that being married or being in a civil partnership reduces the probability that an individual will participate in hazardous drinking by 7.1%.

The goodness of fit for the probit model is found using the percent of correctly predicted values. It is calculated using the following rule: "If Y=1 and the predicted probability exceeds 50% or if Y=0 and the predicted probability is less than 50%, then Y is said to be correctly predicted" (Stock and Watson, 2012, p.439). This shows the proportion of correctly predicted values over the amount of values predicted in the total sample. The percent of correctly predicted values is detailed at the bottom of the results table. For the probit model, this goodness of fit test found that 77.96% of values were correctly predicted, which is sufficiently high enough for the model to show good fit. It is additionally worth noting that the p-values are used to illustrate statistical significance, with the stars in the superscript of the values in table 2 signifying the level at which they are significant. These will be referred to when commenting on the results.

The focus of this dissertation is about the impact of unemployment on hazardous drinking. These factors are examined using binary variables, which show participation in each group. As hypothesised, being unemployed does increase the probability of hazardous drinking. The marginal effect of being unemployed is 0.08050, which suggests that being unemployed increases the likelihood of hazardous drinking by 8.1%. This marginal effect is significant at the 5% level. This provides evidence that a counter-cyclical relationship exists between unemployment and hazardous drinking. Whilst the societal stressors aspect of unemployment could not be examined in the model due to a lack of suitable data, the statistical insignificance of the income variables suggest that societal stressors are the main cause of the unemployed person's drinking behaviour. An explanation for this result therefore, is that unemployed people, who are depressed about the lack of community or sense of purpose that comes from working, turn to drinking as a way of coping. This result supports "affect regulation theory", in that unemployed individuals drink to regulate the negative emotions that surround joblessness (Peirce *et al*., 1994, p.293). Interestingly, the 'married/in a civil partnership' variable shows a statistically significant negative impact on hazardous drinking. As this variable was included as a sign of stability, including emotionally, it is not surprising to see its negative association with the dependent variable. Combining this with the above, it is likely that those who are married are less likely to turn to hazardous drinking, as they have a greater support network when facing stress. The counter-cyclical relationship established by this dissertation supports a number of studies in the established literature, which also find unemployment is positively associated with high levels of alcohol consumption. A further body of the literature found a similar positive association with unemployment and binge drinking (Davalos *et al*., 2012; Dee, 2001; Harhay *et al*., 2013; Latif, 2014; Popovici and French, 2013). However, this result is of particular importance because the dependent variable examines hazardous drinking and not the less scientific measure of binge drinking.

Income was included in the regression to examine the financial stressors impact of unemployment, but also to understand whether income effect theory has any impact on drinking outcomes. The income variables are mostly statistically insignificant. Of note, however, is the highest category, over £120,000 total annual income. This result shows a significant positive impact on hazardous drinking behaviour of 0.1321, suggesting that individuals in this category are 13.2% more likely to partake in hazardous drinking than the reference group, those who earn less than £2,600 annual income. There are two ways of interpreting this result. Firstly, it is probable that those in this very rich income category have more purchasing power for alcohol misuse than those in the lowest category, providing evidence that the income effect does play a part in drinking behaviour. However, stronger evidence for the income effect would be provided if all the income variables were significant and showed an increasing marginal effect on hazardous drinking as income increased. Alternatively, this result could

be due to the fact that individuals who are earning over £120,000 annually are in occupations that are highly stressful due to the line of work that such an income requires. Whilst different from loss of work identity, this hypothesis would suggest that work related stress is a greater cause of the negative effect that can lead to hazardous drinking, as opposed to financial stress.

For gender, the results show that males are 6.3% more likely to participate in hazardous drinking than females. This is despite the model controlling for different units drunk for males and females. These results support a large amount of similar work that has found that men consume more than women, and are more susceptible to alcohol misuse (Dee, 2001; Janlert and Hammarström, 1992; Latif, 2014; San José *et al*., 2000). Applying this to the unemployment scenario, it is possible that men suffer more than women from the adverse effects associated with unemployment. Traditionally the 'breadwinners' and highest income earners in a household, being unemployed could be seen as more detrimental to a male's psychological wellbeing. An interaction term of 'unemployed*male' was included in the regression to examine this hypothesis. However, as the interaction term is statistically insignificant, no difference can be inferred between the impact on hazardous drinking for males and females.

The regression results for ethnicity can only be interpreted for the 'Asian' and 'black/African/Caribbean' variables, as these are significant at the 1% level. 'Mixed race' and 'other ethnicity' have high p-values, and consequently are statistically insignificant, likely due to the small amount of observations that were available for each category. As ethnicity was a categorical variable, it was run in the regression as a series of dummy variables. The ethnicity 'white' was used as a reference group in this case. The results for 'Asian' and 'black/African/Caribbean' show that these subgroups are over 20% (-0.26695 and -0.22055 respectively) less likely to participate in hazardous drinking than whites. Dee (2001, p.262) also found that whites were "substantially more likely to consume alcohol". This was to be expected, as drinking as a habit is more prominently associated amongst white culture. It may also be the case that for the Asian category, some respondents included do not drink due to religious commitments. The significance and results of the majority of the variables confirm it was correct to include them in the regression.

Table 2: The determinants of hazardous drinking

Explanatory Variable	(1) LPM b	(2) Probit dy/dx	(3) Logit dy/dx
Age	0.00340*** (0.00050)	0.00354*** (0.00050)	0.00338*** (0.00049)
Married/In a Civil Partnership	-0.06707*** (0.01323)	-0.07053*** (0.01305)	-0.06646*** (0.01280)
Male	0.06346*** (0.01216)	0.06275*** (0.01190)	0.06014*** (0.01160)
Unemployed	0.07074* (0.03919)	0.08050** (0.04072)	0.07519* (0.04013)
Unemployed*Male	-0.03733 (0.05511)	-0.04248 (0.05438)	-0.03755 (0.05307)
Origin			
Asian	-0.15475*** (0.01398)	-0.26695*** (0.03589)	-0.28822*** (0.04413)
Black/African/Caribbean	-0.15635*** (0.02347)	-0.22055*** (0.05003)	-0.22774*** (0.05834)
Mixed Race	-0.00087 (0.04598)	-0.00031 (0.04446)	0.00154 (0.04289)
Other Ethnicity	-0.07726 (0.04962)	-0.08755 (0.06686)	-0.08876 (0.07118)
Highest Qualification Attained			
Foreign Qualification	-0.00805 (0.07467)	-0.00564 (0.08793)	-0.00798 (0.08982)
Higher Education Below Degree	0.03879* (0.02342)	0.04342* (0.02427)	0.04140* (0.02397)
O Level	0.02931 (0.01883)	0.03458* (0.02058)	0.03253 (0.02048)
A Level	0.05766*** (0.02132)	0.06104*** (0.02256)	0.05854*** (0.02221)
Degree	0.04070** (0.01974)	0.04551** (0.02150)	0.04358** (0.02129)
Income			
£2,600<£7,800	-0.01680 (0.05929)	-0.01791 (0.06587)	-0.02046 (0.06565)
£7,800<£15,600	-0.01178 (0.05637)	-0.01055 (0.06249)	-0.01425 (0.06226)
£15,600<£23,400	0.00537 (0.05651)	0.01047 (0.06243)	0.00581 (0.06216)
£23,400<£31,200	0.03033 (0.05696)	0.03936 (0.06255)	0.03333 (0.06223)
£31,200<£41,600	0.03988 (0.05722)	0.04651 (0.06272)	0.04283 (0.06238)

£41,600<£60,000	0.06420	0.07182	0.06598
	(0.05720)	(0.06255)	(0.06218)
£60,000<£90,000	0.09873[*]	0.10270	0.09684
	(0.05780)	(0.06285)	(0.06238)
£90,000<£120,000	0.05607	0.06424	0.05971
	(0.06167)	(0.06639)	(0.06580)
Greater than £120,000	0.13519[**]	0.13208[**]	0.12421[*]
	(0.06316)	(0.06611)	(0.06527)
Observations	4981	4981	4981
Percent of Correctly Predicted Values		77.96%	77.92%

Notes: robust standard errors in parenthesis.
***p<0.01 **p<0.05 *p<0.1
'b' for LPM refers to coefficients, whereas 'dy/dx' for Probit and Logit refers to the marginal effects at the average.

Finally, the level of education was examined by including a variable that detailed the respondent's highest qualification attained. As per the ethnicity variable, 'qualifications attained' is categorical, and the regression was run using a number of dummy variables. The reference group in this case was 'no qualifications attained'. All of the variables are statistically significant at the 10% level or below apart from 'foreign qualification', likely due to a lack of observations. Interestingly, the results show us that having qualifications increases the likelihood of hazardous drinking. I would have expected to see a higher level of education negatively associated with the dependent variable, due to the negative health outcomes that hazardous drinking can lead to. Supporting this is the fact that unemployment is associated with less or no qualifications, as those who are less educated will find it harder to get work. Further, as the level of an individual's education and income are usually correlated, it is surprising to see that higher qualification levels are positively associated with the dependent variable, as this dissertation found little impact of income on likelihood of hazardous drinking.

4.3 Limitations

Despite efforts to build a model suitable to examine the true relationship between unemployment and hazardous drinking, there are some developments that could be made to this study. These should be incorporated into future research. Firstly, as the data used only shows a single snapshot in time and does not draw on longitudinal data, it is limited in explaining the changing behaviour of individuals over a period of time. Specifically, as cross-sectional data only shows behaviour at one point in time, it cannot be ascertained whether individuals who are originally unemployed reduce their hazardous drinking behaviour once they find a job. Additionally, using cross-sectional data does not allow this dissertation to break down the different impact of short-term versus long-term unemployment. It cannot be inferred whether an unemployed individual drinks more due to the initial short-term shock of falling out of work, or alternatively the financial strain of being long-term unemployed. As the HSE

did not include data about the length of unemployment, only employment status, this could not be included in the model. A study such as Janlert and Hammarström's (1992), which uses repeated questionnaires from the same individual, would be the best way to examine the above. However, any future research should use such data whilst incorporating hazardous drinking as a dependent variable as opposed to alcohol consumption. Furthermore, whilst this study used data following a recession, including a wave of data pre-recession would have been useful to compare the results to. This would enable a stronger conclusion to be made about the impact of unemployment on drinking behaviours, specifically the change witnessed through a time of economic hardship.

Secondly, as this dissertation uses data from a self-report survey, it may be open to recall and social desirability bias. Recall bias may occur as respondents forget which or how many drinks they drank in the week before interview. This is more likely the case in individuals who misuse alcohol, given the fact that substantial consumption of alcohol may lead to poor recollection of alcohol levels consumed. Additionally, social desirability bias occurs when a respondent presents himself or herself in the "best possible light", leading to a distortion of the answers received (Fisher, 1993, p.303). As the data used was gathered from questions about the sensitive subject of alcohol consumption, respondents may have understated the amount they imbibed to portray a more socially acceptable amount. However, Harhay *et al*. (2013) faced a similar recall and social desirability bias in their work, and correctly point out that such a bias would likely cause the results to move in a "conservative direction" (Harhay *et al*., 2013, p.414). In other words, the only limitation would be that unemployment might have a greater impact on hazardous drinking than shown in this dissertation's results.

5. Conclusion

The aim of this dissertation was to examine whether unemployment leads to hazardous drinking, and in doing so, confirm whether there is a pro-cyclical or counter-cyclical relationship between them. To examine this, the theories behind each argument were explored in the theoretical framework. The established literature in the area was then reviewed to create an understanding of the current evidence surrounding the topic at hand. The methodology used to examine the research question was then presented. Next, a number of variables were regressed against the dependent variable in three binary models, the LPM, the logit and the probit.

A counter-cyclical relationship between unemployment and hazardous drinking was established in the results of the regression. This supports a number of studies discussed in the literature review. This result is likely to be due to the societal stress aspect of unemployment, due to the fact that the income categories included were mostly statistically insignificant. Such a result suggests that unemployed people develop a pattern of alcohol consumption that is hazardous, as a result of attempting to cope

with being stressed about their lack of feeling of community, or sense of purpose that they would normally achieve in employment. Such a conclusion supports the theory of Peirce *et al*. (1994) that unemployment can lead to increased consumption of alcohol due to a loss of work identity. Whilst most of the income categories were statistically insignificant, the highest income category of over £120,000 annual income was significant and positively associated with hazardous drinking. Whilst this may be in part due to the income effect, it may also be due to the fact that such an income is likely in occupations where the work is very stressful. Therefore, those who are in such employment turn to alcohol as a way of coping with the stress. In this respect, this supports the pro-cyclical argument that employment may lead to hazardous drinking as a response to stress, but only at a very high-income level.

One prominent limitation of this study is the fact that it uses cross-sectional data and cannot examine the changing drinking patterns of individuals over a period of time. Future research in this area should use longitudinal data. This would allow the researcher to see whether an individual reduces their drinking level when they move from unemployment to employment, or vice-versa, allowing them to more strongly confirm the true relationship between unemployment and alcohol use. This would also allow the researcher to examine whether the short-term or long-term unemployed are more vulnerable to the stressful impact of unemployment. A further limitation is due to the nature of alcohol data, which could possibly lead to recall or social-desirability bias. However, this would only move the results in a more conservative direction than was established above.

The aim of this dissertation was to establish the link between unemployment and hazardous drinking to advise policy and help target alcohol education and treatment programs. This is an especially important relationship to establish given the current cost to society of alcohol related harm, in a time when public expenditure budgets are being cut, including those of the National Health Service. The counter-cyclical result found suggests that policymakers should take into account the additional costs of alcohol related harm when calculating the impact of unemployment on the economy. Further, efforts around alcohol education and treatment programs should be intensified during downturns and targeted at unemployed people. Such efforts may reduce the likelihood that unemployment will lead to hazardous drinking and will soften the negative impact that unemployment has on society and the health system.

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Appendix

Appendix 1**:** Variable definitions

Variable	Definition and interpretation
Hazardous drinking	1 if exhibits hazardous drinking behaviour in week before interview 0 otherwise
Male	1 if male 0 otherwise
Age	Respondent's age
Unemployed	1 if ILO unemployed 0 Otherwise
Married/In a civil partnership	1 if married or in a civil partnership 0 otherwise
Unemployed*Male	1 if unemployed and male 0 otherwise
Origin Dummies	Asian Black/African/Caribbean Mixed race Other White Value of dummy is 1 if applicable, 0 otherwise
Highest Qualification Attained Dummies	Foreign/Other Higher education below degree O level A level Degree No qualifications Value of dummy is 1 if applicable, 0 otherwise
Income Dummies	Less than £2,600 £2,600<£7,800 £7,800<£15,600 £15,600<£23,400 £23,400<£31,200 £31,200<£41,600 £41,600<£60,000 £60,000<£90,000 £90,000<£120,000 Greater than £120,000 Value of dummy is 1 if applicable, 0 otherwise