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The effect of alcohol consumption on household income in Ireland

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ABSTRACT

This paper presents a study of the effects of alcohol consumption on household income in Ireland using the Slán National Health and Lifestyle Survey 2007 dataset, accounting for endogeneity and selection bias. Drinkers are categorised into one of four categories based on the recommended weekly drinking levels by the Irish Health Promotion Unit; those who never drank, non-drinkers, moderate and heavy drinkers. A multinomial logit OLS Two Step Estimate is used to explain individual's choice of drinking status and to correct for selection bias which would result in the selection into a particular category of drinking being endogenous. Endogeneity which may arise through the simultaneity of drinking status and income either due to the reverse causation between the two variables, income affecting alcohol consumption or alcohol consumption affecting income, or due to unobserved heterogeneity, is addressed. This paper finds that the household income of drinkers is higher than that of non-drinkers and of those who never drank. There is very little difference between the household income of moderate and heavy drinkers, with heavy drinkers earning slightly more. Weekly household income for those who never drank is €454.20, non-drinkers is €506.26, compared with €683.36 per week for moderate drinkers and €694.18 for heavy drinkers.

1. Introduction

This paper investigates the effect of alcohol consumption on household income in Ireland accounting for endogeneity and selection bias using data from the 2007 Slán national health and lifestyle survey. As part of the analysis into the effect of alcohol consumption on household income, the relationship between other socioeconomic variables with both household income and alcohol status is examined. Such an analysis of the effect of alcohol consumption on income in Ireland has not been done previously, despite Ireland being among the highest consumers of alcohol in the OECD countries, with a consumption of 11.6 L per adult in 2012. Despite alcohol consumption in Ireland declining over the past decade, it still remains well above the OECD average (9.0 L) (OECD, 2014).

According to an OECD report Ireland has the 10th highest consumption levels of alcohol per capita of 40 countries (Department of Health, 2012). Alcohol consumption can place a huge cost on society. In 2007 the estimated cost of alcohol related problems in Ireland was approximately €3.7bn. On the other hand, alcohol consumption is very important to the Irish economy; in 2008 the alcohol industry in Ireland provided an estimated 50,000 whole time equivalent jobs (Department of Health, 2012). The alcohol manufacturing industry had a turnover of €2.95bn in 2008 (Foley, 2010) and in 2009 produced €1bn in exports and a net trade surplus of €330m. In 2008, alcohol manufacturing and retail provided €2bn in VAT and excise revenues to the State (Department of Health, 2012).

Ireland experienced high economic growth during the period 1994 to 2008, however in 2008 the financial crisis resulted in the Irish economy going into a recession. While the data from the Slán survey used in this study was taken in 2007 during the boom period, Butler and Hope (2015) in a study into the influence of the financial crisis on alcohol consumption in Ireland, find that despite disposable income dropping during the crises, alcohol consumption was not greatly affected. They cite two studies regarding

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hazardous drinking in Ireland; one before the recession in 2009 and the other in 2014, and both studies reported similar levels in terms of hazardous drinkers. Butler and Hope (2015) state that alcohol consumption was in fact far more responsive to different tax changes implemented by government in various budgets particularly during the period 2009 to 2013. They state that in the years that saw tax on alcohol increase, a reduction in alcohol consumption was evident and the years where there was a reduction in taxes saw an increase in alcohol consumption.

Over recent years there has been numerous policies developed and actions carried out which have helped control the levels of alcohol consumption in Ireland (Department of Health, 2012). The Alcohol Beverage Federation of Ireland (ABFI), an umbrella organisation for the drinks industry manufacturers and suppliers in Ireland, argue that previous approaches to targeting problematic drinking in Ireland has primarily been a population based approach which has reached its peak (ABFI, 2012). They suggest that going forward a target based approach, which the WHO (2007) describe as an approach targeted at vulnerable populations as opposed to the population at large, should be used.

Much research has been carried out into the effect of alcohol consumption on income (Barrett, 2002; French & Zarkin, 1995; Hamilton & Hamilton, 1997; Heien, 1996), however many of the earlier studies are limited in so far as drinking status is treated exogenously (French & Zarkin, 1995; Heien, 1996); therefore, the estimated impact of alcohol consumption on earnings may reflect the reverse effect of earnings on alcohol consumption (Barrett, 2002). More recent research in this area has accounted for potential endogeneity and selection bias but this has just been done for three categories of drinkers; non-drinkers, moderate and heavy drinkers (Barrett, 2002; Hamilton & Hamilton, 1997). Generally, findings have been that there is a positive association between moderate alcohol consumption and earnings, compared with no alcohol consumption and earnings or heavy consumption of alcohol and earnings and that this can be depicted by an inverse U-Shaped relationship between alcohol consumption and earnings (Barrett, 2002; Hamilton & Hamilton, 1997).

Endogeneity is where an independent variable included in the model is potentially a choice variable and is determined within the context of the model (Chenhall & Moers, 2007). In relation to the study of alcohol on income, alcohol consumption is governed in part by unobserved factors which may also be important determinants of the dependent variable income, implying the possibility that the drinking status variables may be correlated with the error term of the conditional demand equation (Barrett, 2002; Di Pietro & Pedace, 2008; Hamilton & Hamilton, 1997; Zarkin, French, Mroz, & Bray, 1998). Sample selection bias arises when a sector selection is non-random due to individuals choosing a particular sector because of their personal characteristics (Heckman, 1979; Zhang, 2004). In relation to categorising individuals based on their levels of alcohol consumption, selection bias can arise as people may select into a particular drinker group due to the fact that they know that by doing so it will not have a negative effect on their income or health (Barrett, 2002; Di Pietro & Pedace, 2008; Hamilton & Hamilton, 1997).

The remainder of this paper is presented as follows. Section II presents the theory in relation to the issue of endogeneity bias and selection bias that can arise in the estimation of the effect of alcohol consumption on income. Section III outlines the empirical model used to analyse the effect of drinking status on income while accounting for possible selection bias and endogeneity. Section IV identifies and describes the data and empirical results. Section V concludes the paper.

2. Endogeneity and selection bias of alcohol consumption and income

French, Maclean, Sindelar, and Fang (2011) state that one of the most prominent statistical challenges in the estimation of the effect of alcohol use on labour market outcomes is the potential endogeneity of alcohol use in employment equations. Endogeneity of alcohol use may occur due to reverse causality, unobservable variables or measurement error (French et al., 2011; French & Popovici, 2011; Leigh & Schembri, 2004). A common way to deal with the problem of endogeneity is through the Instrumental Variables (IV) approach, whereby an instrument is used as a proxy for the endogenous explanatory variable X, that is highly correlated with X but is uncorrelated with the error term of the demand equation (Gujarati, 1995). A difficulty however with this method is finding suitable instruments (MacDonald & Shields, 2001; Milbourne, Otto, & Voss, 2003). Many studies that look at the effects of lifestyle variables use panel data whereby original data is used which is then supplemented by follow-up panel data as advantage can be taken from the exogenous variables from the follow up data (Contoyannis & Jones, 2004; French & Popovici, 2011).

Selection Bias, arising due to individuals selecting themselves into a particular category where they have a preference, results in the sample being non-random, implying unobserved factors being correlated with both the sector choices and the primary equation which suggests a potential bias in the ordinary least squares (OLS) estimator (Devanto, 2014; Griffith & McFall 2013; Hamilton & Hamilton, 1997). Where this occurs choices have to be treated endogenously to get consistent estimates of the income equation coefficients (Barrett, 2002; French et al., 2011; Hamilton & Hamilton, 1997; Zarkin et al., 1998; Zhang, 2004). Lee (1982) extends the Heckman two step model to a Multinomial Logit OLS Two Step Estimate, to allow for selection correction of polychotomous choices. Step one uses a multinomial logit model to estimate the selection equation and step two uses an OLS regression which includes the inverse mills ratio as an additional regressor, which represents the variable(s) omitted by controlling for the probability that a given observation would be observed (Griffith & McFall 2013). By including the Inverse mills ratio in the income equations, endogeneity arising from individuals choosing their drinking status is corrected for (Barrett, 2002; Griffith & McFall 2013; Hamilton & Hamilton, 1997).

3. Empirical model

The relationship between alcohol use and household income is examined for four categories of drinkers, those who never drank, non-drinkers who are those respondents who did not have a drink in the last month or longer but cannot say that they never drank, moderate and heavy drinkers. This is carried out using the Lee Multinomial Logit OLS Two Step Estimate (Lee, 1982). Similar to the estimation of alcohol consumption on earnings by Hamilton and Hamilton (1997) and Barrett (2002), step one involves the estimation of the drinking status equation using a multinomial logit model. This estimate generates predicted values for the inverse mills ratio which are then included as an additional variable in the income equations estimated in step two. By estimating the income regression using this two-step procedure selection bias and the potential endogeneity of alcohol consumption is accounted for (Barrett, 2002; Hamilton & Hamilton, 1997). The estimation of income regressions for each category of drinker using this two step procedure, allows household income returns to individual characteristics to differ by drinking status. This