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Heilsuhagfræði

Drinking behavior

The Icelandic economic crisis and recovery

Ásgerður Theodóra Björnsdóttir

Leiðbeinandi:

Hagfræðideild

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HÁSKÓLI ÍSLANDS

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The Icelandic Economic Crisis and Recovery

Ásgerður Th. Björnsdóttir

Lokaverkefni til MS -gráðu í hagfræði

Leiðbeinendur: Þórhildur Ólafsdóttir og Tinna Laufey Ásgeirsdóttir

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Drinking behavior, the Icelandic economic crisis and recovery

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Formáli

Ritgerð þessi er 30 ECTS-eininga lokaverkefni til meistaragráðu í heilsuhagfræði við Háskóla Íslands. Leiðbeinendur eru Þórhildur Ólafsdóttir doktorsnemi í hagfræði við Háskóla Íslands og Tinna Laufey Ásgeirsdóttir, doktor í hagfræði og prófessor við Hagfræðideild Háskóla Ísland. Ég vil þakka þeim kærlega fyrir góða og uppbyggilega leiðsögn og ráðleggingar við skrif og tölfræðilegar úrlausnir á verkefninu. Embætti landlæknis er þakkað fyrir veittan aðgang að gögnum úr rannsókninni Heilsu og líðan Íslendinga 2012. Stjórn SÁÁ og Arnþóri Jónssyni formanni þakka ég fyrir sveigjanlegan vinnutíma meðan á námi mínu stóð. Einnig vil ég þakka vinkonu minni Solu B'Oconnor fyrir yfirferð á málfari og síðast en ekki síst vil ég þakka börnunum mínum og eiginmanni Böðvari Héðinssyni fyrir þolinmæði og stuðning meðan á skrifum stóð.

Abstract

Alcohol consumption, in particular excessive alcohol consumption, imposes high costs on societies through consequences, such as lost productivity, early mortality, health-care costs, car accidents and crime. The main objective of this study is to examine how drinking behavior developed over an economic boom, subsequent crisis, and an eventual recovery. We use individual longitudinal data collected through a postal survey by The Directorate of Health in Iceland in 2007, 2009 and 2012. Pooled OLS and linear probability models are used to study four outcomes: Alcohol-consumption frequency, frequency of binge drinking, binge-drinking participation and alcohol dependence. Alcohol-consumption frequency declined during the crisis, with a further decline during the recovery period. This change is driven by female behavior between 2007 and 2009, but a combined gender effect between 2009 and 2012. This effect is suppressed by male labor-market-changes, but partly mediated by labor marked changes in the case of females. Alcohol dependence declined during the crisis, with suggestive evidence of partially reverting back to previous levels during the recovery. There is some indication that during the crisis real price changes of alcohol played a role in the decline in alcohol consumption but that is not a likely determinant of changes in alcohol consumption for the three year period post-crisis that we explore. Men's consumption can partly be explained through income changes while women's consumption changes are rather driven by changes in work hours or other factors.

Útdráttur

Neysla áfengis, einkum óhófleg neysla áfengis, er samfélögum kostnaðarsamt vandamál vegna afleiðinga eins og ótímabærra andláta, skertrar framleiðni, aukins heilbrigðiskostnaðar, bílslysa og glæpa. Meginmarkmið þessarar rannsóknar er að skoða hvernig efnahagsleg uppsveifla, hrun og efnahagslegur bati hefur áhrif á áfengisdrykkju. Notuð voru einstaklingsbundin langsniðsgögn úr spurningalistarannsókn Embættis landlæknis; Heilsa og líðan Íslendinga fyrir árin 2007, 2009 og 2012. Notaðar voru aðhvarfsgreiningar með almennri aðferð minnstu kvaðrata fyrir úrtakið í heild og línulegri líkindadreifingu fyrir fjóra þætti áfengisneyslu: tíðni áfengisneyslu, tíðni óhóflegrar áfengisneyslu, þátttöku í óhóflegri áfengisneyslu og vanabindandi áfengishegðun. Áfengisneysla minnkaði almennt við efnahagshrunið og hélt áfram að dragast saman í upphafi efnahagsbatans. Breytingarnar má einkum rekja til minni áfengisneyslu kvenna milli áranna 2007 og 2009, en samdrátt í neyslu milli áranna 2009 og 2012 má sjá hjá báðum kynjum. Breytingar á vinnumarkaði karla virðast síður leiða til minni áfengisneyslu en hjá konum þar sem minni áfengisneysla stafar að hluta til af breytingum á vinnumarkaði. Vanabindandi áfengishegðun dróst saman við efnahagshrunið en vísbendingar eru um að efnahagsbatinn hafi eytt þeim áhrifum alla vega að hluta til. Líkur eru á að raunverðshækkanir á áfengi hafi dregið úr neyslu í kreppunni en það á ekki við um neysluna á tímum efnahagsbata. Neysla karla stjórnast í meira mæli af breytingum á rauntekjum en neysla kvenna stjórnast fremur af breytingum á vinnustundum eða af öðrum óskírðum orsökum.

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1 Introduction

Do individuals change their alcohol drinking behavior as a response to a macroeconomic crisis? If so, are such behavioral changes likely to be long lasting or do they revert to their previous levels when the economy recovers? In this paper, we use individual longitudinal data covering a boom, a sudden economic crisis and the subsequent recovery to explore four different measures of drinking behavior. We contribute to the literature by studying in detail whether a previously documented reduction in alcohol consumption during a recession in Iceland was only a short-term effect or whether the effect was prolonged over the additional 3 years included in this study. Furthermore, we explore the possible role of income and work hours on the pathway between business cycles and drinking behavior.

Studies from several countries have shown that when unemployment rates go up mortality rates decline. In those studies data were used from e.g. the U.S. (Granados et al., 2014; Ruhm, 2000, 2003, 2005a, 2005b), Spain (Granados, 2005), and 23 European Union countries (Toffolutti & Suhrcke, 2014), although, within the OECD countries, cyclicality of mortality appears less tangible in countries with greater social insurance systems (Gerdtham & Ruhm, 2006).[1] This seemingly pro-cyclical relationship between unemployment and mortality rates calls for studies on the mechanisms through which the macro-economy could affect people´s health. One proposed mechanism is individual behavioral changes. Of particular interest among the health behaviors studied for this purpose is alcohol drinking. The four major causes of increased mortality in upswings are heart diseases, liver diseases, driving fatalities and homicides. Heavy alcohol drinking affects all of these causes and is thus an important research topic.

[1] Ruhm (2000) estimates that one-percentage point higher unemployment rate leads to 0.5% lower mortality rate. Using aggregate data for 23 countries Gerdtham and Ruhm (2006) find that one percentage point decrease in national unemployment rate is related to 0.4% higher total mortality, especially applying to countries with low social protection.

Furthermore, it cannot be ruled out that any alcohol consumption affects some of these causes as well.

Changes in the macroeconomic environment can affect alcohol consumption through various pathways and somewhat conflicting hypotheses have been put forward on whether drinking increases or decreases during recessions. Alcohol consumption could decrease during recessions through income effects as individuals have less income to purchase alcohol. Furthermore, there are likely fewer social opportunities to drink, i.e. events at workplaces are fewer when business goes down. Another hypothesis is that individuals decrease their drinking because they are afraid of losing their job when employment goes down. However, individuals may increase their alcohol consumption in recession due to increased stress or other emotional pathways. It is furthermore not clear whether the abovementioned directions of a drinking response to a recession is turned around during a recovery or whether the proposed effects of a recession on drinking affect the long-term trend in drinking over a sustained period of time. In light of the conflicting hypotheses on the direction of a possible drinking response to business cycles it is of interest to understand if and why macroeconomic conditions affect drinking behavior. As an example, for policy purposes it is important to understand whether it is more likely that business cycles affect alcohol consumption through individual time and budget constraints or through other pathways, e.g. mental stress.

Xu (2013) used combined data from the Behavioral Risk Factor Surveillance System and the National Health Interview Survey from the United States to investigate the effects of wages and work hours on health behaviors of low-educated people. Results showed that unhealthy behaviors increased in economic upturns, such as alcohol use and cigarette smoking, while physical activity and visits to physicians went down. Changes in employment appeared to drive the changes in health behaviors rather than changes in income, indicating that as individuals spend less time on leisure and more time working, less time is available for time consuming health-promoting behavior. Thus, referring to Grossman's human-capital model of the demand for health (Grossman, 1972) it can be argued that with transitory increase in earnings, individuals may be motivated to draw on their health stock in the short run and take advantage of

the fleeting opportunity and likewise in crisis when employment goes down individuals have more time to spend on health-promoting behavior. A reduction in work hours during a recession can therefore contribute to less drinking if refraining from drinking is complementary to other time-consuming health behaviors.

Aggregate findings on alcohol consumption and business cycles are mixed. Goeij et al. (2015) in their systematic review conclude that economic crises can affect alcohol consumption through two ways; a reduction in alcohol consumption due to tighter budget constraints and a rise in harmful drinking due to increased psychological distress. Catalano et al. (2011) found in their systematic review that alcohol consumption was both counter- and pro-cyclically related to unemployment rate and there were also findings of no relationship. Bor et al. (2013) found that during The Great Recession there was an increase in rates of abstinence from alcohol for adults (in the U.S.), but they also document a rise in total alcohol drinking driven by an increase in moderate and heavy drinking. Latif (2014) found that unemployment rate is positively related to alcohol consumption as well as probabilities of binge drinking. Ruhm and Black (2002) reported a pro-cyclical pattern in heavy drinking.

The literature indicates that drinking responses to business cycles vary by gender. In their systematic review Modrek et al. (2013) show that though overall alcohol use tends to decrease in crisis there is a subgroup of men at risk for increased heavy drinking. This is in accordance with results from Dávalos et al. (2012) who found that four types of problematic alcohol consumption (binge drinking, number of binge drinking days, driving after having too much to drink and an indicator for alcohol abuse) increased as the economy declined and that an increase in problematic alcohol consumption is more pronounced for men than women. Richman et al. (2012) report that a relationship between economy-related stressors[2] and problematic drinking pattern (drinking to

[2] Economy-related stressors is referred to in Richman´s et al. paper as an instrument developed in their study: Life Change Consequences of the Great Recession, which includes 7 categories; 1) Home Ownership Problems, 2) Undesirable Living Situation, 3) Problematic Employment Situation, 4) Unemployment or Underemployment, 5) Inadequate Health Insurance, 6) Social Role Constraints and 7) Inadequate Sick Time.

intoxication, binge drinking, and problem-related drinking) were positive and statistically significant for men but not for women. Even though many recent papers report that men are more vulnerable to heavy drinking in economic downturns than women, Mulia et al. (2014) report that a severe economic loss is positively associated with alcohol dependence and drunkenness among women (who experienced job loss, lost retirement savings and reduced work hours). Those women consumed 41-70% more alcohol than women unaffected by the crisis. Most of these studies use cross sectional data (Bor et al., 2013; Mulia et al., 2014; Richman et al., 2012; Xu, 2013) but Dávalos et al. (2012) used panel data in their study. Another paper that used individual longitudinal data collected with interviews in late 2009 to early 2010 and again in 2011, shows that those who lost their jobs between interviews did not take up harmful or hazardous alcohol use. However, respondents´ perceived decline in economic resources was linked to taking up harmful and hazardous drinking. Thus, the drinking response was sensitive to which measure of hardship experienced was included in the analysis (Kalousova & Burgard, 2014).

Researchers have taken advantage of the sudden Icelandic economic collapse to explore the effects of the collapse on drinking behaviors, using comprehensive individual panel data. The Icelandic economic collapse was sudden and distinct even to the point where it is often pinned on a specific date, October 6th 2008, when the prime minister of Iceland addressed the nation in a speech which ended with unusually dramatic words in the Icelandic political context: “God bless Iceland” (Haarde, 2008). Within in a week the three main banks in Iceland collapsed, leading to the largest banking-system collapse in history relative to GDP (Johnsen, 2014). What followed was a decline in employment and gross domestic product in Iceland. GDP growth in Iceland declined from 9.5 in 2007 to -4.7 in 2009 compared to a 6% average annual growth from 2004 (Statistics Iceland, 2016a). The number of indebted individuals went up by 48% between 2007 and 2009 (Statistics Iceland, 2013) and the unemployment rate rose up to 7.2% of the workforce 2009 from 2.3% the year 2007. Keeping in mind that Iceland experienced unemployment rate of 2.7% on average during the 10 years prior to the collapse (Statistics Iceland, 2016b), this is a considerable change. In the year 2012 the unemployment rate had declined to 6% and GDP growth was 1.2% and rising. The consumer price index (CPI) increased by 27% between 2007 and 2009 and by 12.4%

between 2009 and 2012 it (Statistics Iceland, 2016c). All of this affected individuals through reductions in real individual income and work hours that we use in this study as possible mediators between macroeconomic conditions and alcohol use.

Asgeirsdottir et al. (2014a) examined the short-term effects of the Icelandic economic collapse on a wide range of behaviors, one of which was binge-drinking participation. That study has two limitations with regard to alcohol consumption worth noting that have partly, but not fully, been elaborated on in later work. Firstly, due to the range of behaviors considered, Ásgeirsdóttir et al. do not examine each behavior in depth. Secondly, they only examine the short term effects of the collapse (2007 vs. 2009). This second limitation prompted a follow up study, Asgeirsdottir et al. (2016), including the recovery period (year 2012). The main conclusion was that despite some short-term effects found in Ásgeirsdóttir et al., all health behaviors reverted back to their pre-crisis levels or trends, with the exception of their only measure of alcohol consumption (binge-drinking participation), which continued to decline but at a slower rate. These findings draw attention to the specifics of drinking and call for further examination of various types of alcohol use, as only one crude alcohol measure was used in their study; a dummy for binge drinking. Therefore we expand on their study, examining alcohol consumption in greater detail covering the period from the crisis to the recovery period. The current study can similarly be seen as an expansion of Ólafsdóttir and Ásgeirsdóttir (2015), which did a more in depth comparison of alcohol consumption in Iceland between 2007 and 2009. However, the alcohol-specific results found during the recovery period call for a more in depth analysis of the 2012 data that has not been carried out. Specifically Ólafsdóttir and Ásgeirsdóttir (2015) examined how the Icelandic economic collapse affected alcohol-consumption frequency, frequency of binge drinking, binge-drinking participation and alcohol dependence. They used data from health and lifestyle survey “Heilsa og líðan” (Health and Wellbeing) collected by the Directorate of Health in Iceland, the same data as used in the other aforementioned Icelandic studies. In light of the previous research it is intriguing to expand Ólafsdóttir and Ásgeirsdóttir´s research and dilate upon alcohol consumption.

Economic fluctuations and health have in a majority of cases been examined using aggregate data and thus without the possibility to directly testing individual-level

mechanisms. Here, we study how changes in the macroeconomic environment from collapse to recovery affect four variables of drinking behavior using micro data with repeated measures for each individual, and information on individual-level labor-market changes that can be examined as mechanisms. In particular, it is of interest is to see how drinking behavior evolved after the recession. That is, we study medium-term effects of the crisis on drinking behaviors to see if the short-term effects are enduring or not.

The purpose of this paper is thus also in a more general sense to add to the rather mixed literature on how economic downturns and recovery affect alcohol drinking behavior, using an established natural experiment in Iceland and comprehensive data with information on the same individuals during boom, bust and recovery periods, as well as possible individual-level mediators.

2 Materials and Methods

Data are from the health and lifestyle survey “Heilsa og líðan” (Health and Wellbeing) carried out by the Icelandic Directorate of Health (formerly the Public Health Institute of Iceland) in November, 2007, 2009 and 2012. The survey contains questions on alcohol consumption as well as demographics, participation in the job market and income. A total of 3,238 individuals answered all three waves, providing information on the same individuals before the collapse, during the crisis and subsequent recovery. The sample was stratified by age and residence, with oversampling in certain groups. Thus all results presented here are weighted using sample weights. In 2007 a random group of 9,711 individuals aged 18-79 received the questionnaire and 60.9% responded. Of those participating in 2007, 69.3% answered the questionnaire in 2009. In 2012 the response rate was 67.2% of those who had given permission for being contacted for the third wave. Individuals answering all three waves are more likely women, living in the capital region and slightly younger than the population of Iceland (Guðlaugsson et al., 2014). For each of the four outcomes; alcohol-consumption frequency, frequency of binge drinking, binge-drinking participation and alcohol dependence, subsamples are generated, conditional on non-missing dependent and independent variables.

We show results from pooled OLS/LP models as opposed to individual fixed-effects (FE) models for the reasons outlined in (Asgeirsdottir et al., 2014b) For purpose of comparison between models and with results from Asgeirsdottir et al. (2016), we show results from FE models in an Appendix. Like in the previous short-term study by Ólafsdóttir and Ásgeirsdóttir (2015) we use four outcomes for drinking behavior to measure course of development between waves using data from the year 2007 to reveal pre-crisis drinking and from 2009 to show short-term effects and then using data from 2012 to demonstrate recovery or medium-term effects. Models are estimated without any covariates, then with basic covariates, but excluding possible mediators; that is including age, sex, number of children if any, cohabitation status, marital status, rural residence (for area of fewer than 1000 inhabitants) and education. Finally, we add potential mediators; real individual income (yearly) and work hours (weekly). The

unadjusted model is reported for completeness, as any time-varying control variable can hypothetically represent a mechanism between the macroeconomic changes and changes in drinking behavior. That is, even though those are commonly used demographics, it may be the case that the collapse changed family structures that subsequently changed drinking behavior. However, the main theories about the effect of crises on drinking behaviors focus on changed incentives related to the labor market and thus our main focus is on results adjusted for demographics and how those results change when adding the proposed labor-market mediators.

Defining a subgroup of working age individuals (25-61) is of interest, as their behavior is expected to be affected to a greater extent than other groups through changes in labor-market environment. In Iceland the retirement age is 67, hence the age-restriction of the working-age sample is 61 years during the first wave, making the included individuals within retirement limits for all three waves.

In order to interpret the point estimates of the year dummies as unbiased causal effects of the crisis and the recovery, the assumption has to be made that nothing else affected alcohol consumption besides the changing aggregate environment, or at least that this change was of such magnitude that it makes other concurrent changes in Iceland minimal. For this reason we need to pay close attention to other possible societal factors that could have a confounding effect on the relationship between changes in the economy and drinking behavior. In this regard one thing stands out; the trend in alcohol consumption. Aggregate data for alcohol consumption in Iceland reveals that consumption of alcohol had been rising for 20 years before the crisis. Figures from The Directorate of Health (2015) show that according to sales data from The State Alcohol and Tobacco Company of Iceland, alcohol sales had been rising by about 4% per year between 1996 and 2007 with a peak late in 2008. Alcohol sales in 1996 was 4.08 liters of pure alcohol per capita (15 years and older) and in 2008 sales had escalated to 6.11 liters per capita. Alcohol sales then declined during the crisis and continued to decline and were 5.86 liters per capita in 2009 and 5.32 liters per capita in 2012. We will consider this when interpreting the results.

Using longitudinal data rather than cross-sectional, the results from an analysis covering a period of five years, could possibly be biased by aging of the sample. In the

last wave every individual is five years older than when the first questionnaire was answered. We address this concern by following Ásgeirsdóttir et al. (2016) in two ways. The first is that we estimate our models with standard errors clustered on individuals and furthermore control for various covariates, one being age. Then we focus on individuals of working age (25-61), expecting that the time period between waves would have smaller effects on their behavior as opposed to the age-group 18-25 years in particular (this has reference in particular for the FE-models in the Appendix where age is not included as a control variable).

It is always a possibility to have unaccounted for differences between stayers and leavers despite sampling weights adjusting for lack of data due to attrition. Following Asgeirsdottir et al. (2016) we show sample means in Table A1 in the Appendix for stayers, those who answered all three waves and leavers, those who only completed the 2007 questionnaire. Stayers are more likely to be older and married than leavers. Leavers are more likely to consume more alcohol and are more likely to note that they have alcohol dependence.

2.1 Dependent variables

We will now describe the four measures that we use to estimate drinking behavior; alcohol-consumption frequency, frequency of binge drinking, binge-drinking participation and alcohol dependence. Alcohol-consumption frequency includes answers from the following questions: “How often did you drink at least one alcoholic beverage during the past 12 months? The variable ranges from 1.5 to 365 and was generated from 7 possible answers choices using the midpoint for references in each category which were: 1) daily or almost daily 2) 3-4 times a week 3) 1-2 times a week 4) 1-3 times a month 5) 7-11 times in the past 12 months 6) 3-6 times in the past 12 months 7) 1-2 times in the past 12 months. Frequency of binge drinking is measured by the question “How often during the past 12 months, if ever, did you consume at least 5 alcoholic drinks in one day?” Same options for answers were provided as for the alcohol-consumption frequency question with the midpoint chosen for each category. Binge-drinking participation was created as a binary variable and equals 1 if the individual consumed at least 5 drinks in one day at least once a month for the past 12 months and equals 0 if he/she consumed this amount of drinks on fewer occasions than

once a month, including never at all. An indicator for alcohol dependence is estimated from three combined questions. “How often in the past 12 months have you: 1) Needed an alcoholic drink in the morning to get yourself going after a heavy drinking session? 2) Found that you were not able to stop drinking once you had started? 3) Failed to do what was normally expected from you because of drinking? The answer options for the above questions were: 1) never 2) once a month or less 3) 1-3 times in a month 4) once a week 5) daily or almost daily. If individuals answer all of these three questions never the dummy variable takes the value 0, otherwise 1. The variables for alcohol-consumption frequency and binge-drinking frequency were utilized in continuous form.

2.2 Control variables

We control for age, sex, number of children, marital status, cohabiting, education and residency. Age and age squared, as well as number of children present in the household are used in a continuous form. For marital status we use two indicators, one for whether a person is married or not and another for whether a person is cohabitating or not. The question for education was changed between the years 2007 and 2009 that is more answer choices were given in subsequent years. To limit missing data between waves we improve the education variable with imputations from the most recent answer available. We deem those imputations justifiable under the assumption that education is a sticky and slowly changing variable, used mainly to adjust for socio-economic status. Thus, although the variable is time-variant, education is fairly stable over such short periods for most individuals. Residence is a binary variable for residency that takes the value 1 if the subject lives in a town of more than 1000 inhabitants and 0 otherwise.

2.3 Mediators

Yearly individual income and weekly work hours are used as potential pathways through which the economic turmoil may have influenced drinking behavior. The variable for yearly individual income is defined as total income before taxes. This includes salaries, overtime, differentials, bonuses, interests and dividends, grants/benefits, and pensions. 10 answer options were provided, ranging from <900 thousand ISK annually to >8.4 million ISK a year. For each category the midpoint of the income range was used, resulting in the lowest value 0.45 million and the highest coded at 8.95 million. The

variable is handled as continuous. To report the data as real income at the 2012 price level, the figures were adjusted for inflation. Amounts are scaled to millions of ISK. A separate question in the questionnaire referred to household income. Following Ólafsdóttir and Ásgeirsdóttir (2015) and their closer examination of the household income variable, we conclude that household income is more likely than individual income to reflect a nonrandom measurement error. Results using household income instead of individual income are available on request.

The variable for weekly work hours was derived from a question on hours spent on paid work each week. Thirteen answers possibilities are given that range from 0 to 60 hours or more per week. The midpoint of each category was taken and scaled to working hours per day given that the working week is 5 days. The top category was put at 64.5 hours.

3 Results

Weighted sample means for the full sample and working-age sample are displayed in Table 1, that is for those participating in all three waves; 2007, 2009 and 2012 and who had no missing data on the variables used. Mean values for the four dependent variables decline between 2007 and 2009 and keep on declining through the recovery period except for alcohol consumption frequency for the full sample of 18-79 years and alcohol dependence for the working age sample (25-61 year). Mean real individual income is 16.5% lower during bust compared to its value during the boom, and then increased by 3% in the recovery period. Mean work hours declined by 6% between 2007 and 2009 but almost reached its former level during the recovery period, as it increased by 5% (Table 1). Demographics changed as expected. For example, the number of married subjects grew between the three waves, as expected with an aging sample in this age range. As previously mentioned, aggregate statistic on the economy in Iceland show that it had recovered considerably at the end of 2012 but not entirely to the pre-crisis level and the sample means for real income and work hours are confirmative of that.

In our main results we use OLS and LP models (results from FE models are shown in Appendix, Tables A2 and A3). In Tables 2 and 3 we show estimates for the short- and medium-term effects of the crisis on: Alcohol-consumption frequency, frequency of binge drinking, binge-drinking participation, and alcohol dependence. We report coefficients for 2009 and 2012 where 2009 stands for crisis (short-term) and 2012 for recovery (medium-term), using the 2007 pre-crisis state as a baseline. We also show *p*-values for the difference between 2009 and 2012 to test for a specific recovery effect. Standard errors are shown in parentheses along with each point estimate. Point estimates are shown with no covariates (Panel 1a), with covariates, excluding mediators (Panel 1b) and then with covariates and mediators (Panel 1c) both for the full sample (ages 18-79 years) in Table 2 and the subsample of working age individuals (25-61 years) in Table 3. All results are also stratified by gender.

As can be seen in Table 2, Panel 1b, alcohol-consumption frequency decreased by 8.8% on average between 2007 and 2009 (statistically significant at the 5% level) and the point estimate for 2012 suggests a 12.2% decrease between 2007 and 2012, (1% level of significance). However, when the proposed mediators, individual income and work hours are included, the coefficients are fully or almost fully attenuated with one coefficient even reversing. Point estimates thus indicate that the mediators, income and work hours fully explain the effect between 2007 and 2009, and 78% of the reduction in alcohol-consumption frequency between 2007 and 2012 (Table 2, Panel 1c - coefficients with mediators are not statistically significant and therefore should be interpreted with caution). Point estimates for the working-age sample are very similar (Table 3). Results for alcohol-consumption frequency by gender reveal that the reduction in alcohol consumption frequency for the whole sample (Panel 1b, Table 2) is largely driven by substantial changes in women's behavior over the time period. Female point estimates (Panel 3b, 3c, in Table 2) are negative and are generally estimated at the 1-10% level of significance with a significant difference between 2009 and 2012 point estimates. The point estimates for the 2012 indicator are indicative of an increase in alcohol consumption frequency in 2012 compared to 2009 for females (Panel 3b and 3c).

Considering results for binge-drinking frequency and binge-drinking participation, point estimates for year 2012 suggest a decline in those behaviors during the recovery time compared to 2007 (Panels 1b and 1c, columns 2 and 3 in Table 2. The reduction in binge-drinking participation (measured at 5% level of significance) may have been already under way in 2009, although not to a considerable extent or measured with great precision. Men seem to drive the reduction in binge-drinking participation; a response to the crisis that does not revert back during the recovery period as the point estimate for year 2012 in Panel 2b suggests (measured at 5% level of significance). The point estimate is reduced in absolute value when the mediators are included in Panel 2c and measured with less precision. Thus, changes in income and work hours explain a large part of the binge-drinking participation response among men. Specifically 49% of this medium-term male response to the crisis is explained by the mediators. Point estimates for alcohol dependence show a reduction during the crisis with a 3.4 percentage point decrease in alcohol dependence in 2009 compared to 2007 (Panel 1b, column 4 in Table 2). Thus using this point estimate, we calculate that the likelihood of

being alcohol dependent was reduced in year 2009 by 9% relative to its mean in 2007. The reduction in 2012 relative to the mean value for alcohol dependence in 2007 was calculated 6% (difference between 2009 and 2012 is not significant, nor the coefficient for 2012 and results should thus be interpreted with precaution). Results for alcohol dependence appear to be almost solely driven by changes in male behavior.

It should be noted that in general, results for the full sample (age 18-79 years) have by construction greater statistical power than the working-age subsample (25-61 years). However, it might be hypothesized that the working-age sample coefficients for 2009 and 2012 would in general show a greater response to the inclusion of mediators in the models than in the case of the full sample. However, the effect of the mediators are quite similar between the two samples, although a slightly larger mediation effects can be detected for the 2012 coefficients in the working-age sample.

As Tables 2 and 3 do not show point estimates for the effect of individual income and work hours on drinking behavior we provide those in Appendix, Tables A4 and A5. It is of interest to see the relative importance of each of those variables in explaining drinking behavior. For estimated effects of the crisis (short- and medium-term) on the mediators see Table A6. To identify the effect of individual income and work hours separately as mediators through which the crisis affected drinking behavior, one can explore the change in the coefficients for year 2009 and 2012 in models where the mediators are included one at a time. Such models suggest that individual income plays a larger role as a mediator than work hours (see Tables A7 to A10).

The nominal price of alcohol increased by 48.7% between 2007 and 2009 and by 13.0% between 2009 and 2012 but the overall price level for the same time period increased by 27.0% and 12.8% respectively (Statistics Iceland, 2016d). Thus, real price of alcohol rose by 21.7% between 2007 and 2009, but only by 0.2% between 2009 and 2012. Previous research (the aforementioned Icelandic studies) suggests that real price changes are likely to have explained to a large extent the short-term effect of the crisis on alcohol consumption (a reduction). As real price changes were miniscule between 2009 and 2012, we could only hypothesize on whether a change in drinking behavior between 2009 and 2012 was affected by changes in real income and work hours.

The main results from our research are in harmony with aggregate sales data that overall alcohol-consumption frequency declined between 2007 and 2009 and kept on declining through the year 2012 but at slower rate. Tables 2 and 3 confirm the findings by Ólafsdóttir and Ásgeirsdóttir (2015) on a reduction in alcohol consumption frequency, alcohol dependence and binge-drinking participation between 2007 and 2009. However the point estimate for binge-drinking frequency is generally positive in our models as opposed to a negative one in their paper from 2015. As has been pointed out, results are not directly comparable due to changed sample restriction as a result of the inclusion of only those individuals who answered all three waves of the questionnaire. Effects of income and work hours on drinking behaviors are somewhat larger in OLS/LP models than in FE models which was also the case in the paper by Ólafsdóttir and Ásgeirsdóttir.

Table 1 Sample Means (weighted)

	Full Sample 18 - 79 years			Working Age 25-61 years		
	2007	**2009**	**2012**	**2007**	**2009**	**2012**
Dependent variables						
# of times 1+ drink (past year)	49.20	47.75	48.48	50.75	48.67	46.64
5+ drinks in a day at least 1 time/month (past year)	.23	.21	.18	.20	.19	.18
# of times 5+ drinks in a day (past year)	18.52	17.70	16.78	16.68	16.04	15.20
Alcohol dependence	.18	.14	.14	.17	.13	.14
Independent variables - Potential Mediators						
Yearly individual income (millions of 2012 krona/year)	5.33	4.45	4.60	6.11	4.95	4.97
Weekly work hours	31.27	29.41	30.89	36.58	34.31	36.01
Independent variables - Time-Varying Covariates						
Age	42.57	44.12	47.08	42.27	42.43	42.69
Children	1.89	1.95	2.12	2.05	2.03	2.03
Cohabiting	.22	.20	.20	.24	.21	.24
Female	.49	.49	.49	.50	.50	.50
Married	.51	.55	.57	.57	.59	.57
Residence (Population >1,000)	.89	.90	.89	.89	.90	.90
High school or less	.28	.24	.22	.22	.19	.17
Some college	.01	.14	.13	.01	.14	.12
Undergraduate	.37	.22	.22	.34	.19	.21
Graduate degree	.34	.39	.43	.43	.47	.49
Men						
Dependent variables						
# of times 1+ drink (past year)	57.42	57.85	58.13	60.56	60.10	56.30
5+ drinks in a day at least 1 time/month (past year)	.33	.30	.25	.29	.28	.25
# of times 5+ drinks in a day (past year)	22.69	21.97	20.35	21.39	20.68	18.43
Alcohol dependence	.26	.20	.19	.23	.18	.19
Independent variables - Potential Mediators						
Yearly individual income (millions of 2012 krona/year)	6.35	5.18	5.26	7.35	5.85	5.74
Weekly work hours	35.47	32.56	34.95	41.71	38.71	41.05
Independent variables - Time-Varying Covariates						
Age	42.74	44.10	47.13	42.70	42.71	42.74
Children	1.82	1.87	2.04	2.00	1.96	1.96
Cohabiting	.21	.18	.21	.25	.19	.25
Married	.52	.58	.60	.59	.64	.59
Residence (Population >1,000)	.89	.90	.90	.89	.90	.90
High school or less	.25	.20	.19	.20	.17	.17
Some college	.02	.24	.21	.02	.25	.20
Under graduate	.42	.20	.20	.39	.17	.20
Graduate degree	.31	.35	.40	.39	.40	.43
Women						
Dependent variables						
# of times 1+ drink (past year)	40.25	36.94	37.99	40.52	37.15	36.70
5+ drinks in a day at least 1 time/month (past year)	.13	.12	.10	.11	.10	.10
# of times 5+ drinks in a day (past year)	12.52	11.52	11.50	10.12	9.75	10.79
Alcohol dependence	.11	.09	.08	.11	.08	.09
Independent variables - Potential Mediators						
Yearly individual income (millions of 2012 krona/year)	4.25	3.69	3.90	4.86	4.07	4.21
Weekly work hours	26.85	26.17	26.62	31.42	30.04	30.99
Independent variables - Time-Varying Covariates						
Age	42.43	44.15	47.02	41.84	42.16	42.65
Children	1.95	2.04	2.21	2.09	2.09	2.11
Cohabiting	.23	.21	.20	.23	.23	.23
Married	.49	.52	.54	.55	.55	.55
Residence (Population >1,000)	.89	.89	.89	.89	.90	.89
High school or less	.30	.28	.26	.24	.20	.17
Some college	.00	.04	.04	.00	.04	.04
Under graduate	.31	.24	.24	.29	.22	.22
Graduate degree	.37	.43	.46	.47	.53	.56

Full sample corresponds to those who participated in all three waves of the survey and had non-missing data on the right-and left-hand side variables in the regression model.

Table 2 Short- and Medium-Term Effects of the Economic Crisis in Iceland on Drinking Behavior – OLS/LPM

Full Sample Ages 18-79 Years	Alcohol-consumption frequency	Binge-drinking frequency	Binge-drinking participation	Alcohol dependence
1.a)No covariates				
Effect of 2009 indicator	-0.06130* (.0331)	-0.01745 (.0434)	-0.02149* (.0115)	-0.04578*** (.0124)
Effect of 2012 indicator	-0.05122 (.0353)	-0.15551*** (.0460)	-0.05527*** (.0132)	-0.04961*** (.0137)
p-value for difference between 2009 and 2012	0.761	0.001	0.003	0.760
b)With covariates				
Effect of 2009 indicator	-0.08791** (.0348)	0.01193 (.0471)	-0.01308 (.0123)	-0.03352** (.0131)
Effect of 2012 indicator	-0.12166*** (.0371)	-0.08204 (.0500)	-0.03121** (.0138)	-0.02242 (.0145)
p-value for difference between 2009 and 2012	0.297	0.024	0.112	0.383
c)With covariates plus mediators				
Effect of 2009 indicator	0.00629 (.0395)	0.04669 (.0496)	0.00068 (.0135)	-0.03045** (.0133)
Effect of 2012 indicator	-0.02686 (.0417)	-0.04095 (.0533)	-0.01734 (.0148)	-0.01948 (.0149)
p-value for difference between 2009 and 2012	0.094	0.368	0.763	0.349
d)N (person years)	**5097**	**3395**	**5688**	**5639**
Men				
2.a)No covariates				
Effect of 2009 indicator	0.01033 (.0493)	-0.02380 (.0603)	-0.03366* (.0193)	-0.06490*** (.0209)
Effect of 2012 indicator	-0.03550 (.0517)	-0.16591*** (.0616)	-0.08238*** (.0221)	-0.07004*** (.0231)
p-value for difference between 2009 and 2012	0.346	0.011	0.011	0.807
b)With covariates				
Effect of 2009 indicator	0.02396 (.0543)	0.04057 (.0695)	-0.02405 (.0213)	-0.04723** (.0230)
Effect of 2012 indicator	-0.06300 (.0550)	-0.05814 (.0722)	-0.05545** (.0238)	-0.03249 (.0256)
p-value for difference between 2009 and 2012	0.065	0.075	0.099	0.494
c)With covariates plus mediators				
Effect of 2009 indicator	0.13917** (.0638)	0.10672 (.0746)	-0.00097 (.0245)	-0.04422* (.0237)
Effect of 2012 indicator	0.06722 (.0654)	0.02983 (.0795)	-0.02832 (.0139)	-0.02667 (.0270)
p-value for difference between 2009 and 2012	0.476	0.941	0.987	0.315
d)N (person years)	**2422**	**1870**	**2684**	**2656**
Women				
3.a)No covariates				
Effect of 2009 indicator	-0.13872*** (.0425)	-0.01773 (.0601)	-0.00901 (.0121)	-0.02526** (.0128)
Effect of 2012 indicator	-0.07047 (.0464)	-0.16153** (.0672)	-0.02668** (.0134)	-0.02820** (.0138)
p-value for difference between 2009 and 2012	0.113	0.022	0.150	0.823
b)With covariates				
Effect of 2009 indicator	-0.19964*** (.0434)	-0.01138 (.0608)	-0.00168 (.0127)	-0.01827 (.0128)
Effect of 2012 indicator	-0.16448*** (.0490)	-0.08434 (.0680)	-0.00534 (.0139)	-0.00999 (.0138)
p-value for difference between 2009 and 2012	0.418	0.243	0.762	0.523
c)With covariates plus mediators				
Effect of 2009 indicator	-0.13539*** (.0469)	-0.01570 (.0628)	0.00208 (.0130)	-0.01646 (.0134)
Effect of 2012 indicator	-0.10410** (.0508)	-0.08809 (.0699)	-0.00102 (.0143)	-0.00754 (.0142)
p-value for difference between 2009 and 2012	0.025	0.220	0.959	0.515
d)N (person years)	**2675**	**1525**	**3004**	**2983**

Alcohol-consumption frequency (OLS): # of times at least one alcoholic beverage during the past year

Binge drinking consumption (OLS): # of times that drank 5+ alcoholic beverages in 1 day during the past year

Binge-drinking participation (LPM): =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year

Alcohol dependence (LPM): =1 if at least 1 of three questions on alcohol dependence answered positively

Values are OLS/LPM estimates of short- and medium-term effects of the crisis, comparing 2012 and 2009 to 2007.

Covariates are age, age squared, cohabiting with partner, number of children, marital status, residing in rural areas and 4 dummies for education.

Standard errors are shown in parentheses (panel-robust standard errors computed by clustering on the individuals).

Mediators are real income and hours at work. **p<0.10;**p<0.05;***p<0.01.*

Table 3 Short- and Medium-Term Effects of the Economic Crisis in Iceland on Drinking Behavior- OLS/LPM

Subsample Ages 25-61 Years	Alcohol-consumption frequency	Binge-drinking frequency	Binge-drinking participation	Alcohol dependence
1.a)No covariates				
Effect of 2009 indicator	-0.09382** (.0383)	-0.00675 (.0454)	-0.01242 (.0129)	-0.03368** (.0136)
Effect of 2012 indicator	-0.09703** (.0397)	-0.17155*** (.0490)	-0.02343 (.0149)	-0.01985 (.0156)
p-value for difference between 2009 and 2012	0.934	<0.001	(0.01332)	(0.01435)
b)With covariates				
Effect of 2009 indicator	-0.08100** (.0402)	0.04683 (.0509)	-0.01509 (.0133)	-0.04263*** (.0144)
Effect of 2012 indicator	-0.11476*** (.0418)	-0.05843 (.0527)	-0.02550* (.0149)	-0.02385 (.0163)
p-value for difference between 2009 and 2012	0.374	<001	0.408	0.335
c)With covariates plus mediators				
Effect of 2009 indicator	0.02309 (.0458)	0.09258* (.0532)	0.00228 (.0143)	-0.02470* (.0146)
Effect of 2012 indicator	-0.01260 (.0470)	-0.00840 (.0568)	-0.00803 (.0158)	-0.00687 (.0169)
p-value for difference between 2009 and 2012	0.151	0.023	0.432	0.195
d)N (person years)	**3705**	**2640**	**4071**	**4034**
Men				
2.a)No covariates				
Effect of 2009 indicator	-0.03893 (.0581)	0.04784 (.0704)	-0.01684 (.0220)	-0.04896** (.0233)
Effect of 2012 indicator	-0.12147** (.0578)	-0.07559 (.0733)	-0.04483* (0256)	-0.03375 (.0269)
p-value for difference between 2009 and 2012	0.144	0.059	0.220	0.537
b)With covariates				
Effect of 2009 indicator	0.03591 (.0647)	0.09510 (.0775)	-0.01335 (.0244)	-0.05624** (.0263)
Effect of 2012 indicator	-0.07587 (.0648)	-0.03594 (.0795)	-0.04424* (.0265)	-0.03553 (.0293)
p-value for difference between 2009 and 2012	0.047	0.042	0.177	0.411
c)With covariates plus mediators				
Effect of 2009 indicator	0.16291** (.0774)	0.19387** (.0832)	0.02091 (.0276)	-0.04402 (.0270)
Effect of 2012 indicator	0.06696 (.0784)	0.08003 (.0900)	-0.00578 (.0299)	-0.02236 (.0310)
p-value for difference between 2009 and 2012	0.721	0.885	0.755	0.253
d)N (person years)	**1651**	**1380**	**1793**	**1776**
Women				
3.a)No covariates				
Effect of 2009 indicator	-0.15008*** (.0486)	0.04508 (.0628)	-0.00791 (.0132)	-0.01786 (.0136)
Effect of 2012 indicator	-0.07576 (.0519)	-0.02876 (.0674)	-0.00170 (.0142)	-0.00612 (.0150)
p-value for difference between 2009 and 2012	0.140	0.254	0.637	0.414
b)With covariates				
Effect of 2009 indicator	-0.18660*** (.0493)	0.02143 (.0621)	-0.01186 (.0130)	-0.01866 (.0135)
Effect of 2012 indicator	-0.13221** (.0526)	-0.04576 (.0665)	-0.00214 (.0143)	-0.00397 (.0153)
p-value for difference between 2009 and 2012	0.270	0.307	0.466	0.305
c)With covariates plus mediators				
Effect of 2009 indicator	-0.10361* (.0528)	0.02130 (.0652)	-0.00756 (.0134)	-0.01766 (.0140)
Effect of 2012 indicator	-0.06188 (.0540)	-0.04671 (.0686)	0.00177 (.0146)	-0.00304 (.0156)
p-value for difference between 2009 and 2012	0.022	0.268	0.393	0.372
d)N (person years)	**2054**	**1260**	**2278**	**2258**

Alcohol-consumption frequency (OLS): # of times at least one alcoholic beverage during the past year

Binge drinking consumption (OLS): # of times that drank 5+ alcoholic beverages in 1 day during the past year

Binge-drinking participation (LPM): =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year

Alcohol dependence (LPM): =1 if at least 1 of three questions on alcohol dependence answered positively

Values are OLS/LPM estimates of short- and medium-term effects of the crisis comparing 2012 and 2009 to 2007. Time-varying Covariates are age, age squared, cohabiting with partner, number of children, marital status, residing in rural areas and 4 dummies for education.

Standard errors are shown in parentheses (panel-robust standard errors computed by clustering on the individuals).

Mediators are real income and hours at work. **p<0.10;**p<0.05;***p<0.01.*

4 Discussion

In this paper we use comprehensive individual-level longitudinal data from three time points to study the short- and medium-term effects of the Icelandic economic collapse on drinking behavior. These time points coincide with the pre-crisis boom, the crisis itself and the subsequent recovery and are used to examine if effects from the crisis wear of quickly or persist over time. The Icelandic economic collapse has been used as a natural experiment in previous studies on business cycles and health behaviors and as such, its strengths with regard to research design has been well described elsewhere (Asgeirsdottir et al., 2014a; Ólafsdóttir & Ásgeirsdóttir, 2015). The third time point offers an opportunity to estimate the medium-term effects of the economic crisis. To our knowledge the only research that used this design of study with the same time points was Asgeirsdottir et al. (2016).

In this study we confirm that the Great Recession of 2008 had a positive effect on health behavior through declining alcohol use. The medium-term effects of the crisis on alcohol consumption found in this study is that alcohol-consumption frequency and binge-drinking participation are likely to be reducing between 2009 and 2012 or not reverting to the same amount as before crisis. The results are in accordance with the findings of Asgeirsdottir et al. (2016) that looked at binge-drinking participation over the same study period although the point estimate for year 2009 is not statistically significant (see FE-models in Tables A2 and A3). Our short-term effects are also in accordance with those found by Ólafsdóttir and Ásgeirsdóttir (2015), although with a differently specified sample. Prices are likely to play a smaller role during recovery time than during the crisis.

Women reduced their alcohol-consumption frequency during the crisis and continued, during the recovery period, to drink less frequently than before the crisis. This applies to both the full sample (ages 18-79 years) and the subsample (ages 25-61years). Men decreased their binge-drinking participation both in the short term as well as the medium term (although only statistically significant in the medium term). Men also reduced their alcohol dependence during the crisis and the size of the

negative coefficients for the recovery period suggests that alcohol dependence among men did not revert fully to pre-crisis levels during the recovery period, although maybe partially. This decline is made even more convincing, considering the steady 4% annual rise in alcohol consumption before the crisis and that strong habits in drinking ease off the effects of the economic fluctuation on drinking behavior. Binge-drinking participation keeps on declining despite economic recovery and largely unchanged real alcohol price between 2009 and 2012. Thus, if the trend occurring before the study period was expected to continue, one may say that our estimates are conservative and biased towards zero.

Effects of macroeconomic contractions on health and health behavior may vary between countries subject to the strength of infrastructure and social support (Gerdtham & Ruhm, 2006). Modrek et al. (2013) discuss that a strong social protection programs could minimize the effects of crises on drinking behavior. Iceland can be categorized having a strong infrastructure and support system. That could partly explain the fact that men respond to the crisis with a decline in binge-drinking participation and alcohol dependence, which contradicts some studies that found men to be at risk for binge drinking and alcohol dependence during economic downturns (Bor et al., 2013; Dávalos et al., 2012; Modrek et al., 2013). Real price increases of alcohol during the Icelandic economic crisis are also likely to play a role in explaining the reduction in alcohol behavior for Iceland, although it is not quite clear why indicators for alcohol behavior don't revert back to previous levels during the recovery period. The role of infrastructure and social support (health care, social assistance, housing, social service, sick leaves and unemployment payments) in explaining drinking behavior responses to business cycles is an interesting topic for further research.

There are some limitations to this study. 1) With no control group we need to make some assumptions as mentioned earlier. An apparent threat of the validity of our assumptions is the difficulty of separating the effects of pre-crisis trends in alcohol drinking from other estimated effects. As mentioned earlier aggregate data show that alcohol consumption prior to pre-crisis was increasing by 4% annually between 1996 and 2007. With these considerations in mind, our estimates indicate a decrease in drinking behavior. 2) Data are self-reported and refer to past behavior, introducing the

possibility of a recall bias. Data from postal surveys, however, tend to be more reliable than data collected by phone or interview. Bias from underreporting alcohol use will only harm the analysis if they systematically differ across economic conditions. Johnson et al. (1992) state that self-report errors tend to be consistent over time. 3) In order to control for age, we had to give up controls for unobserved individual effects in our main estimations. However, we estimated all models with individual fixed effects, and found that there were little qualitative differences from our main results. FE models show though more significant results in binge-drinking frequency and binge-drinking participation for difference between 2012 and 2009. And that women drive the change in binge-drinking frequency and men in binge-drinking participation.

Recently published research on the effect of economic expansion or recessions on drinking behavior has shown mixed results. Our findings are in line with Asgeirsdottir et al. (2016) on binge-drinking participation applying the same dataset. This research shows that changes in the economic environment affect individual drinking behavior and that both the responses and the pathways are gender specific.

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Appendix

Table A1 Characteristics of 2007 survey participants (ages 18-79 years), by attrition status

Sample Characteristics (measured in 2007)	**Leavers Unweighted** (did not carry out all 3 interviews)	**Stayers Unweighted** (carried out all 3 interviews)
Dependent variables		
# of times 1+ drink (past year)	41.15	42.54
5+ drinks in a day at least 1 time/month (past year)	.60***	.56***
# of times 5+ drinks in a day (past year)	13.37***	9.72***
Alcohol dependence	.18***	.13***
Independent variables - Potential Mediators		
Yearly individual income (millions of 2012 krona/year), mean	4.41***	4.83***
Weekly work hours	26.56	27.49
Independent variables - Time-Varying Covariates		
Age	47.89***	53.46***
Children	2.21***	2.58***
Cohabiting	.18***	.14***
female	.53	.54
Married	.51***	.64***
Residence (Population >1,000)	.83	.82
High school or less	.43**	.40**
Some college	.01**	.02**
College Graduate	.34*	..34*
University degree	.22**	.24**

P-Values from t-tests are shown for difference in means between leavers and stayers. *p<0.10. **p<0.05. ***p<0.01.

Table A2 Short- and Medium-Term Effects of the Economic Crisis in Iceland on Drinking Behavior - Fixed-Effects Models

	Alcohol-consumption frequency	Binge-drinking frequency	Binge-drinking participation	Alcohol dependence
Full Sample Ages 18-79 Years				
1.a)No covariates				
Effect of 2009 indicator	-0.05975*(.0310)	-0.07225*(.0428)	-0.02115*(.0116)	-0.04523***(.0125)
Effect of 2012 indicator	-0.06240*(.0337)	-0.19191***(.0461)	-0.05402***(.0133)	-0.04899***(.0138)
p-value for difference between 2009 and 2012	0.931	0.003	0.004	0.766
b)Time-varying covariates				
Effect of 2009 indicator	-0.05327*(.0299)	-0.03888 (.0432)	-0.01593 (.0116)	-0.04214***(.0124)
Effect of 2012 indicator	-0.03409 (.0329)	-0.11302**(0473)	-0.03867***(.0129)	-0.04173***(.0137)
p-value for difference between 2009 and 2012	0.527	0.072	0.044	0.974
c)Time-varying covariates plus mediators				
Effect of 2009 indicator	-0.03075 (.0358)	-0.06314 (.0478)	-0.01831 (.0132)	-0.03995***(.0127)
Effect of 2012 indicator	-0.01885 (.0371)	-0.13723***(.0502)	-0.04135***(.0134)	-0.03987***(0138)
p-value for difference between 2009 and 2012	0.297	0.027	0.033	0.895
d)N (person years)	**5097**	**3395**	**5688**	**5639**
Men				
2.a)No covariates				
Effect of 2009 indicator	0.00434 (.0465)	-0.06906 (.0585)	-0.03388*(.0193)	-0.06554***(.0209)
Effect of 2012 indicator	-0.05116 (0508)	-0.16934***(.0610)	-0.08027***(.0222)	-0.06988***(.0233)
p-value for difference between 2009 and 2012	0.232	0.06	0.015	0.838
b)Time-varying covariates				
Effect of 2009 indicator	-0.00115 (.0442)	-0.03778(.0597)	-0.02629 (.0190)	-0.06409***(.0209)
Effect of 2012 indicator	-0.04314 (.0499)	-0.08928 (.0621)	-0.05946***(.0204)	-0.06476***(.0225)
p-value for difference between 2009 and 2012	0.365	0.343	0.071	0.974
c)Time-varying covariates plus mediators				
Effect of 2009 indicator	0.03997 (.0591)	-0.05284 (.0713)	-0.03092 (.0247)	-0.06291***(.0218)
Effect of 2012 indicator	-0.00738 (.0623)	-0.09850 (.0709)	-0.06323**(.0248)	-0.06262***).0239)
p-value for difference between 2009 and 2012	0.724	0.482	0.143	0.853
d)N (person years)	**2422**	**1870**	**2684**	**2656**
Women				
3.a)No covariates				
Effect of 2009 indicator	-0.13120***(.0398)	-0.07738 (.0610)	-0.00764 (.0121)	-0.02365*(.0129)
Effect of 2012 indicator	-0.07452*(.0432)	-0.22891***(.0697)	-0.02610*(.0135)	-0.02669*(.0138)
p-value for difference between 2009 and 2012	0.140	0.018	0.132	0.815
b)Time-varying covariates				
Effect of 2009 indicator	-0.11147***(.0389)	-0.03198 (.0607)	-0.00309 (.0124)	-0.01749 (.0126)
Effect of 2012 indicator	-0.01460 (.0409)	-0.11831 (.0729)	-0.01351 (.0146)	-0.01151 (.0145)
p-value for difference between 2009 and 2012	0.008	0.180	0.409	0.665
c)Time-varying covariates plus mediators				
Effect of 2009 indicator	-0.10804***(.0413)	-0.06492 (.0615)	-0.00707 (.0123)	-0.01764 (.0135)
Effect of 2012 indicator	-0.01304 (.0424)	-0.14542**(.0715)	-0.01713 (.0145)	-0.01196 (.0146)
p-value for difference between 2009 and 2012	0.007	0.050	0.218	0.722
d)N (person years)	**2675**	**1525**	**3004**	**2983**

Alcohol-consumption frequency: # of times at least one alcoholic beverage during the past year
Binge drinking consumption: # of times that drank 5+ alcoholic beverages in 1 day during the past year
Binge-drinking participation: =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year
Alcohol dependence: =1 if at least 1 of three questions on alcohol dependence answered positively
Values are Fixed-Effect Models estimates of short- and medium-term effects of the crisis, comparing 2012 and 2009 to 2007.
Time-varying covariates are cohabiting with a partner, number of children, marital status, residing in rural areas.
Mediators are real income and hours at work. **p<0.10;**p<0.05;***p<0.01.*

Table A3 Short- and Medium-Term Effects of the Economic Crisis in Iceland on Alcohol Behavior -Fixed-Effect Models

	Alcohol-consumption frequency	Binge-drinking frequency	Binge-drinking participation	Alcohol dependence
Subsample Ages 25-61 Years				
1.a)No covariates				
Effect of 2009 indicator	-0.06109*(.0352)	-0.05228 (.0439)	-0.02331*(.02331)	-0.04256 (.0133)
Effect of 2012 indicator	-0.04367 (.0351)	-0.12134***(.0468)	-0.04200***(.0138)	-0.04025 (.0152)
p-value for difference between 2009 and 2012	0.614	0.117	0.138	0.870
b)Time-varying covariates				
Effect of 2009 indicator	-0.06303* (.0336)	-0.02198 (.0219)	-0.01638 (.0120)	-0.04064 (.0132)
Effect of 2012 indicator	-0.03311 (.0331)	-0.05354 (.0483)	-0.02389*(.0134)	-0.03312 (.0154)
p-value for difference between 2009 and 2012	0.381	0.488	0.546	0.604
c)Time-varying covariates plus mediators				
Effect of 2009 indicator	-0.05232 (.0416)	-0.03725 (.0497)	-0.01647 (.0129)	-0.03879 (.0135)
Effect of 2012 indicator	-0.02914 (.0379)	-0.07241 (.0510)	-0.02518*(.0133)	-0.03162 (.0157)
p-value for difference between 2009 and 2012	0.373	0.290	0.499	0.639
d)N (person years)	**3705**	**2640**	**4071**	**4034**
Men				
2.a)No covariates				
Effect of 2009 indicator	-0.01986 (.0544)	-0.03888 (.0608)	-0.03014 (.0205)	-0.06546***(.0228)
Effect of 2012 indicator	-0.08058 (.0806)	-0.11140*(.0639)	-0.06625***(.0237)	-0.06558**(.0260)
p-value for difference between 2009 and 2012	0.251	0.223	0.098	0.996
b)Time-varying covariates				
Effect of 2009 indicator	-0.04086 (.0507)	-0.01558 (.0601)	-0.02051 (.0206)	-0.06862***(.0230)
Effect of 2012 indicator	-0.10119**(.1012)	-0.04384 (.0643)	-0.04261**(.0216)	-0.06402**(.0260)
p-value for difference between 2009 and 2012	0.251	0.648	0.294	0.850
c)Time-varying covariates plus mediators				
Effect of 2009 indicator	-0.05518 (.0723)	-0.02785 (.0762)	-0.02036 (.0244)	-0.07221***(.0239)
Effect of 2012 indicator	-0.11573*(.0727)	-0.05593 (.0737)	-0.04304*(.0227)	-0.06692**(.0277)
p-value for difference between 2009 and 2012	0.224	0.640	0.391	0.853
d)N (person years)	**1651**	**1380**	**1793**	**1776**
Women				
3.a)No covariates				
Effect of 2009 indicator	-0.10532**(.0532)	-0.07249 (.0609)	-0.01665 (.0122)	-0.01976 (.0135)
Effect of 2012 indicator	-0.00364 (.0429)	-0.13634**(.0671)	-0.01795 (.0138)	-0.01507 (.0153)
p-value for difference between 2009 and 2012	0.019	0.319	0.917	0.742
b)Time-varying covariates				
Effect of 2009 indicator	-0.09088**(.0437)	-0.03498 (.0629)	-0.01257 (.0123)	-0.01438 (.0133)
Effect of 2012 indicator	0.04966 (.0431)	-0.04561 (.0739)	-0.00510 (.0153)	0.00091 (.0166)
p-value for difference between 2009 and 2012	0.001	0.869	0.570	0.327
c)Time-varying covariates plus mediators				
Effect of 2009 indicator	-0.07669*(.0466)	-0.04951 (.0658)	-0.01448 (.0124)	-0.01294 (142)
Effect of 2012 indicator	0.05235 (.0437)	-0.05903 (.0736)	-0.00831 (.0152)	0.00157 (.0168)
p-value for difference between 2009 and 2012	0.001	0.621	0.772	0.352
d)N (person years)	**2054**	**1260**	**2278**	**2258**

Alcohol-consumption frequency: # of times at least one alcoholic beverage during the past year
Binge drinking consumption: # of times that drank 5+ alcoholic beverages in 1 day during the past year
Binge-drinking participation: =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year
Alcohol dependence: =1 if at least 1 of three questions on alcohol dependence answered positively
Values are Fixed-Effect Models estimates of short- and medium-term effects of the crisis comparing 2012 and 2009 to 2007.
Time-varying covariates are cohabiting with a partner, number of children, marital status, residing in rural areas.
Mediators are real income and hours at work. **p<0.10;**p<0.05;***p<0.01.*

Table A4 Estimated Effects of Mediators on Drinking Behavior, OLS/LP Models

	Alcohol-consumption frequency	Binge-drinking frequency	Binge-drinking participation	Alcohol dependence
Full Sample Ages 18-79 Years				
Real Individual income	0.07731***	0.03220*	0.01170***	0.00345
Hours of Work	0.00233	-0.00140	0.00021	0.00020
N (person years)	**5097**	**3395**	**5688**	**5639**
Men				
Real Individual income	0.07725***	0.05276**	0.01873***	0.00638
Hours of Work	-0.00128	-0.00469*	-0.00087	-0.00076
N (person years)	**2422**	**1870**	**2684**	**2656**
Women				
Real Individual income	0.07476***	-0.00904	0.00256	0.00111
Hours of Work	0.00640***	0.00329	0.00148***	0.00117**
N (person years)	**2675**	**1525**	**3004**	**2983**
Subsample Aged 25-61 Years				
Real Individual income	0.07602***	0.05809**	0.02224***	0.00951
Hours of Work	-0.00225	-0.00395	-0.00100	-0.00009
N (person years)	**1651**	**1380**	**1793**	**1776**
Men				
Real Individual income	0.07602***	0.05809**	0.02224***	0.00951
Hours of Work	-0.00225	-0.00395	-0.00100	-0.00009
N (person years)	**1651**	**1380**	**1793**	**1776**
Women				
Real Individual income	0.07603***	-0.00897	0.00218	-0.00025
Hours of Work	0.00791***	0.00329	0.00133***	0.00088*
N (person years)	**2054**	**1260**	**2278**	**2258**

Alcohol-consumption frequency:# of times at least one alcoholic beverage during the past year
Binge drinking consumption: # of times that drank 5+ alcoholic beverages in 1 day during the past year
Binge-drinking participation: =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year
Alcohol dependence: =1 if at least 1 of three questions on alcohol dependence answered positively
Covariates are; age, age squared, cohabiting, children, marital status, urban and 4 dummies for education.
Sample weights are applied.**p<0.10;**p<0.05;***p<0.01.*

Table A5 Estimated Effects of Mediators on Drinking Behavior, Fixed-Effect Models

	Alcohol-consumption frequency	**Binge-drinking frequency**	**Binge-drinking participation**	Alcohol dependence
Full Sample Ages 18-79 Years				
Real Individual income	0.02027*	-0.01358	0.00019	0.00753*
Hours of Work	0.00306***	0.00110	0.00035	-0.00005
N (person years)	**5097**	**3395**	**5688**	**5639**
Men				
Real Individual income	0.02464	0.00650	0.00470	0.01221*
Hours of Work	0.00109	-0.00185	-0.00036	-0.00046
N (person years)	**2422**	**1870**	**2684**	**2656**
Women				
Real Individual income	0.01786	-0.04530**	-0.00511	0.00169
Hours of Work	0.00543***	0.00614**	0.00131***	0.00047
N (person years)	**2675**	**1525**	**3004**	**2983**
Subsample Ages 25-61 Years				
Real Individual income	0.01144	-0.00928	0.00164	0.00702
Hours of Work	0.00284**	0.00244	0.00055	-0.00002
N (person years)	**3705**	**2640**	**4071**	**4034**
Men				
Real Individual income	0.00514	-0.00026	0.00485	0.01075
Hours of Work	-0.00003	-0.00005	0.00010	-0.00020
N (person years)	**1651**	**1380**	**1793**	**1776**
Women				
Real Individual income	0.02654	-0.01917	-0.00114	0.00316
Hours of Work	0.00592***	0.00619**	0.00112**	0.00019
N (person years)	**2054**	**1260**	**2278**	**2258**

Alcohol-consumption frequency: # of times at least one alcoholic beverage during the past year

Binge drinking consumption: # of times that drank 5+ alcoholic beverages in 1 day during the past year

Binge-drinking participation: =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year

Alcohol dependence: =1 if at least 1 of three questions on alcohol dependence answered positively

Values are Fixed-Effect Models estimates of the effect of proposed mediators on drinking behaviors. Time-varying covariates are cohabiting with partner, number of children, marital status, residing in rural areas.

Sample weights are applied. *p<0.10;**p<0.05;***p<0.01.

Table A6 Short- and Medium-Term Effects of the Economic Crisis in Iceland on Real Individual Income and Hours of Work, OLS/LP Models

	Real Individual income		Hours of Work	
Full sample Ages 18-79 Years				
(N = 5,799 person years)				
Effect of 2009 indicator	-1.14467***	-0.93856***	-2.96374***	-1.95382***
Effect of 2012 indicator	-1.19360***	-0.76531***	-1.59333**	-0.38622
With covariates	Yes	No	Yes	No
Men				
Effect of 2009 indicator	-1.47975***	-1.25948***	-4.62234***	-3.70964***
Effect of 2012 indicator	-1.59183***	-1.12766***	-1.51407	-0.55270
With covariates	Yes	No	Yes	No
Women				
Effect of 2009 indicator	-0.81395***	-0.59667***	-1.18224	-0.08331
Effect of 2012 indicator	-0.77309***	-0.37929***	-1.63220**	-0.20887
With covariates	Yes	No	Yes	No
	Real Individual income		**Hours of Work**	
Subsample Ages 25-61 Years				
(N = 5,799 person years)				
Effect of 2009 indicator	-1.28127***	-1.29805***	-3.28929***	-3.05155***
Effect of 2012 indicator	-1.31953***	-1.21022***	-1.67822**	-0.99211
With covariates	Yes	No	Yes	No
Men				
Effect of 2009 indicator	-1.67667***	-1.73638***	-4.63302***	-4.59408***
Effect of 2012 indicator	-1.76105***	-1.73403***	-1.60713	-1.31012
With covariates	Yes	No	Yes	No
Women				
Effect of 2009 indicator	-0.91482***	-0.85367***	-1.89126**	-1.48818*
Effect of 2012 indicator	-0.86693***	-0.68138***	-1.69576*	-0.68798
With covariates	Yes	No	Yes	No

Values are OLS/LPM estimates of short- and medium-term effect of the crisis on real individual income and hours of work.
Covariates are; age, age squared, cohabiting, children, marital status, urban and 4 dummies for education.
Sample weights are applied. **p<0.10;**p<0.05;***p<0.01.*

Table A7 Estimates of the Short- and Medium-Term Effects of the Economic Crisis in Iceland on all Outcomes, including Mediators, for Always-in Sample – OLS/LPM

	Alcohol consumption frequency (OLS)			
Full Sample Ages 18-79 years	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women				
Year 2009	-0.08791**	0.00687	-0.07174**	0.00629
	(0.03489)	(0.03954)	(0.03502)	(0.03958)
Year 2012	-0.12166***	-0.02197	-0.11418***	-0.02686
	(0.03714)	(0.04165)	(0.03701)	(0.04171)
Income		0.08354***		0.07662***
		(0.01380)		(0.01448)
Work Hours			0.00527***	0.00237
			(0.00142)	(0.00147)
N (person years)	**5097**			
Men				
Year 2009	0.02396	0.13966**	0.03263	0.13917**
	(0.05434)	(0.06392)	(0.05536)	(0.06389)
Year 2012	-0.06300	0.06340	-0.06028	0.06722
	(0.05506)	(0.06548)	(0.05517)	(0.06548)
Income		0.07940***		0.08290***
		(0.01926)		(0.02012)
Work Hours			0.00189	-0.00122
			(0.00199)	(0.00206)
N (person years)	**2422**			
Women				
Year 2009	-0.19964***	-0.12843***	-0.18829***	-0.13539***
	(0.04347)	(0.04714)	(0.04280)	(0.04699)
Year 2012	-0.16448***	-0.09769*	-0.15366***	-0.10410**
	(0.04903)	(0.05167)	(0.04808)	(0.05089)
Income		0.08798***		0.06911***
		(0.02018)		(0.02060)
Work Hours			0.00887***	0.00649***
			(0.00194)	(0.00196)
N (person years)	**2675**			

	Binge-drinking frequency (OLS)			
Full Sample Ages 18-79 years	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women				
Year 2009	0.01193	0.04657	0.01176	0.04669
	(0.04720)	(0.04968)	(0.04744)	(0.04964)
Year 2012	-0.08204	-0.04348	-0.08215	-0.04095
	(0.05002)	(0.05323)	(0.04991)	(0.05332)
Income		0.02773*		0.03173*
		(0.01680)		(0.01729)
Work Hours			-0.00005	-0.00132
			(0.00181)	(0.00185)
N (person years)	**3395**			
Men				
Year 2009	0.04057	0.10747	0.02905	0.10672
	(0.06951)	(0.07498)	(0.06990)	(0.07464)
Year 2012	-0.05814	0.01565	-0.06312	0.02983
	(0.07223)	(0.07923)	(0.07192)	(0.07951)
Income		0.04271*		0.05651**
		(0.02333)		(0.02411)
Work Hours			-0.00238	-0.00462*
			(0.00254)	(0.00260)
N (person years)	**1870**			
Women				
Year 2009	-0.01138	-0.01303	-0.00676	-0.01570
	(0.06084)	(0.06308)	(0.06089)	(0.06283)
Year 2012	-0.08434	-0.08615	-0.07843	-0.08809
	(0.06804)	(0.07054)	(0.06818)	(0.06995)
Income		-0.00202		-0.01174
		(0.02020)		(0.02002)
Work Hours			0.00289	0.00331
			(0.00224)	(0.00222)
N (person years)	**1525**			

Alcohol-consumption frequency (OLS): # of times at least one alcoholic beverage during the past year

Binge drinking consumption (OLS): # of times that drank 5+ alcoholic beverages in 1 day during the past year

Binge-drinking participation (LPM): =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year

Alcohol dependence (LPM): =1 if at least 1 of three questions on alcohol dependence answered positively

Values are OLS/LPM estimates of short- and medium-term effects of the crisis comparing 2012 and 2009 to 2007.

Time-varying Covariates are age, age squared, cohabiting with partner, number of children, marital status, residing in rural areas and 4 dummies for education.

Standard errors are shown in parentheses (panel-robust standard errors computed by clustering on the individuals).

Mediators are real income and hours at work. **p<0.10;**p<0.05;***p<0.01.*

Table A7 Continued

	Binge-drinking participation (LPM)			
Full Sample Ages 18-79 years	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women				
Year 2009	-0.01308	0.00076	-0.01118	0.00068
	(0.01236)	(0.01350)	(0.01254)	(0.01351)
Year 2012	-0.03121**	-0.01692	-0.03018**	-0.01734
	(0.01382)	(0.01489)	(0.01389)	(0.01484)
Income		0.01185***		0.01120**
		(0.00436)		(0.00447)
Work Hours			0.00063	0.00023
			(0.00046)	(0.00046)
N (person years)	**5688**			
Men				
Year 2009	-0.02405	-0.00043	-0.02502	-0.00097
	(0.02139)	(0.02466)	(0.02179)	(0.02456)
Year 2012	-0.05545**	-0.03052	-0.05578**	-0.02832
	(0.02382)	(0.02703)	(0.02393)	(0.02691)
Income		0.01546**		0.01764**
		(0.00700)		(0.00720)
Work Hours			-0.00020	-0.00081
			(0.00074)	(0.00076)
N (person years)	**2684**			
Women				
Year 2009	-0.00168	0.00406	0.00006	0.00208
	(0.01273)	(0.01317)	(0.01277)	(0.01309)
Year 2012	-0.00534	0.00012	-0.00289	-0.00102
	(0.01398)	(0.01454)	(0.01398)	(0.01436)
Income		0.00706		0.00260
		(0.00434)		(0.00421)
Work Hours			0.00157***	0.00148***
			(0.00046)	(0.00045)
N (person years)	**3004**			

	Alcohol dependence (LPM)			
Full Sample Ages 18-79 years	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women				
Year 2009	-0.03352**	-0.03037**	-0.03269**	-0.03045**
	(0.01312)	(0.01337)	(0.01310)	(0.01336)
Year 2012	-0.02242	-0.01911	-0.02195	-0.01948
	(0.01453)	(0.01499)	(0.01452)	(0.01499)
Income		0.00274		0.00215
		(0.00372)		(0.00374)
Work Hours			0.00028	0.00021
			(0.00042)	(0.00043)
N (person years)	**5639**			
Men				
Year 2009	-0.04723**	-0.04383*	-0.05000**	-0.04422*
	(0.02308)	(0.02369)	(0.02315)	(0.02375)
Year 2012	-0.03249	-0.02882	-0.03343	-0.02667
	(0.02567)	(0.02698)	(0.02567)	(0.02707)
Income		0.00229		0.00436
		(0.00565)		(0.00580)
Work Hours			-0.00061	-0.00076
			(0.00066)	(0.00068)
N (person years)	**2656**			
Women				
Year 2009	-0.01827	-0.01497	-0.01686	-0.01646
	(0.01285)	(0.01347)	(0.01286)	(0.01342)
Year 2012	-0.00999	-0.00682	-0.00792	-0.00754
	(0.01385)	(0.01433)	(0.01389)	(0.01427)
Income		0.00407		0.00053
		(0.00379)		(0.00360)
Work Hours			0.00120***	0.00118***
			(0.00046)	(0.00045)
N (person years)	**2983**			

Alcohol-consumption frequency (OLS): # of times at least one alcoholic beverage during the past year

Binge drinking consumption (OLS): # of times that drank 5+ alcoholic beverages in 1 day during the past year

Binge-drinking participation (LPM): =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year

Alcohol dependence (LPM): =1 if at least 1 of three questions on alcohol dependence answered positively

Values are OLS/LPM estimates of short- and medium-term effects of the crisis comparing 2012 and 2009 to 2007.

Time-varying Covariates are age, age squared, cohabiting with partner, number of children, marital status, residing in rural areas and 4 dummies for education.

Standard errors are shown in parentheses (panel-robust standard errors computed by clustering on the individuals).

Mediators are real income and hours at work. **p<0.10;**p<0.05;***p<0.01.*

Table A8 Estimates of the Short- and Medium-Term Effects of the Economic Crisis in Iceland on all Outcomes, including Mediators – OLS/LPM

	Alcohol consumption frequency (OLS)			
Subsample				
Ages 25-61 years	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women				
Year 2009	-0.08100**	0.02346	-0.06301	0.02309
	(0.04028)	(0.04569)	(0.04044)	(0.04585)
Year 2012	-0.11476***	-0.00669	-0.10723**	-0.01260
	(0.04186)	(0.04694)	(0.04169)	(0.04709)
Income		0.08204***		0.07471***
		(0.01517)		(0.01585)
Work Hours			0.00554***	0.00276*
			(0.00156)	(0.00162)
N (person years)	**3705**			
Men				
Year 2009	0.03591	0.16230**	0.03965	0.16291**
	(0.06478)	(0.07771)	(0.06577)	(0.07745)
Year 2012	-0.07587	0.05948	-0.07473	0.06696
	(0.06485)	(0.07839)	(0.06489)	(0.07846)
Income		0.07679***		0.08257***
		(0.02152)		(0.02234)
Work Hours			0.00092	-0.00220
			(0.00225)	(0.00234)
N (person years)	**1651**			
Women				
Year 2009	-0.18660***	-0.10144*	-0.16463***	-0.10361*
	(0.04938)	(0.05273)	(0.04886)	(0.05288)
Year 2012	-0.13221**	-0.05398	-0.11969**	-0.06188
	(0.05262)	(0.05470)	(0.05171)	(0.05407)
Income		0.09270***		0.07192***
		(0.02194)		(0.02217)
Work Hours			0.01030***	0.00793***
			(0.00210)	(0.00211)
N (person years)	**2054**			

	Binge-drinking frequency (OLS)			
Subsample				
Ages 25-61 years	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women				
Year 2009	0.04683	0.09256*	0.04944	0.09258*
	(0.05097)	(0.05327)	(0.05082)	(0.05326)
Year 2012	-0.05843	-0.00963	-0.05685	-0.00840
	(0.05272)	(0.05656)	(0.05240)	(0.05684)
Income		0.03313*		0.03504*
		(0.01786)		(0.01852)
Work Hours			0.00070	-0.00070
			(0.00199)	(0.00205)
N (person years)	**2640**			
Men				
Year 2009	0.09510	0.19109**	0.09014	0.19387**
	(0.07753)	(0.08331)	(0.07731)	(0.08325)
Year 2012	-0.03594	0.06668	-0.03798	0.08003
	(0.07954)	(0.08884)	(0.07921)	(0.09009)
Income		0.05559**		0.06632**
		(0.02501)		(0.02612)
Work Hours			-0.00124	-0.00394
			(0.00289)	(0.00298)
N (person years)	**1380**			
Women				
Year 2009	0.02143	0.02014	0.02946	0.02130
	(0.06210)	(0.06487)	(0.06238)	(0.06521)
Year 2012	-0.04576	-0.04710	-0.03812	-0.04671
	(0.06657)	(0.06898)	(0.06666)	(0.06867)
Income		-0.00139		-0.00977
		(0.02158)		(0.02166)
Work Hours			0.00297	0.00330
			(0.00232)	(0.00231)
N (person years)	**1260**			

Alcohol-consumption frequency (OLS): # of times at least one alcoholic beverage during the past year

Binge drinking consumption (OLS): # of times that drank 5+ alcoholic beverages in 1 day during the past year

Binge-drinking participation (LPM): =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year

Alcohol dependence (LPM): =1 if at least 1 of three questions on alcohol dependence answered positively

Values are OLS/LPM estimates of short- and medium-term effects of the crisis comparing 2012 and 2009 to 2007.

Time-varying Covariates are age, age squared, cohabiting with partner, number of children, marital status, residing in rural areas and 4 dummies for education.

Standard errors are shown in parentheses (panel-robust standard errors computed by clustering on the individuals).

Mediators are real income and hours at work. **p<0.10;**p<0.05;***p<0.01.*

Table A8 Continued

	Binge-drinking participation (LPM)				Alcohol dependence (LPM)				
Subsample Ages 25-61 years	**(1)**	**(2)**	**(3)**	**(4)**	**Subsample Ages 25-61 years**	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women					*Men and Women*				
Year 2009	-0.01509	0.00230	-0.01311	0.00228	Year 2009	-0.04263***	-0.02426*	-0.03792***	-0.02470*
	(0.01337)	(0.01438)	(0.01347)	(0.01439)		(0.01441)	(0.01462)	(0.01444)	(0.01463)
Year 2012	-0.02550*	-0.00779	-0.02450	-0.00803	Year 2012	-0.02385	-0.00513	-0.02120	-0.00687
	(0.01490)	(0.01587)	(0.01492)	(0.01586)		(0.01635)	(0.01702)	(0.01637)	(0.01700)
Income		0.01337***		0.01302***	Income		0.01343***		0.01103***
		(0.00464)		(0.00475)			(0.00360)		(0.00376)
Work Hours			0.00060	0.00013	Work Hours			0.00129***	0.00078*
			(0.00047)	(0.00047)				(0.00042)	(0.00044)
N (person years)	**4071**				**N (person years)**	**4034**			
Men					*Men*				
Year 2009	-0.01335	0.02123	-0.01407	0.02091	Year 2009	-0.05624**	-0.04401	-0.05547**	-0.04402
	(0.02442)	(0.02770)	(0.02468)	(0.02761)		(0.02637)	(0.02700)	(0.02650)	(0.02701)
Year 2012	-0.04424*	-0.00853	-0.04450*	-0.00578	Year 2012	-0.03553	-0.02266	-0.03526	-0.02236
	(0.02659)	(0.02997)	(0.02662)	(0.02993)		(0.02933)	(0.03111)	(0.02936)	(0.03110)
Income		0.02011***		0.02255***	Income		0.00728		0.00753
		(0.00764)		(0.00775)			(0.00609)		(0.00625)
Work Hours			-0.00015	-0.00096	Work Hours			0.00017	-0.00010
			(0.00079)	(0.00079)				(0.00072)	(0.00073)
N (person years)	**1793**				**N (person years)**	**1776**			
Women					*Women*				
Year 2009	-0.01186	-0.00663	-0.00929	-0.00756	Year 2009	-0.01866	-0.01715	-0.01700	-0.01766
	(0.01304)	(0.01337)	(0.01311)	(0.01346)		(0.01358)	(0.01405)	(0.01353)	(0.01404)
Year 2012	-0.00214	0.00279	0.00013	0.00177	Year 2012	-0.00397	-0.00253	-0.00241	-0.00304
	(0.01433)	(0.01469)	(0.01433)	(0.01461)		(0.01536)	(0.01571)	(0.01537)	(0.01569)
Income		0.00569		0.00202	Income		0.00165		-0.00078
		(0.00452)		(0.00453)			(0.00385)		(0.00378)
Work Hours			0.00140***	0.00133***	Work Hours			0.00086*	0.00088*
			(0.00045)	(0.00045)				(0.00045)	(0.00045)
N (person years)	**2278**				**N (person years)**	**2258**			

Alcohol-consumption frequency (OLS): # of times at least one alcoholic beverage during the past year

Binge drinking consumption (OLS): # of times that drank 5+ alcoholic beverages in 1 day during the past year

Binge-drinking participation (LPM): =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year

Alcohol dependence (LPM): =1 if at least 1 of three questions on alcohol dependence answered positively

Values are OLS/LPM estimates of short- and medium-term effects of the crisis comparing 2012 and 2009 to 2007.

Time-varying Covariates are age, age squared, cohabiting with partner, number of children, marital status, residing in rural areas and 4 dummies for education.

Standard errors are shown in parentheses (panel-robust standard errors computed by clustering on the individuals).

Mediators are real income and hours at work. **p<0.10;**p<0.05;***p<0.01.*

Table A9 Estimates of the Short- and Medium-Term Effects of the Economic Crisis in Iceland on all Outcomes, including Mediators, for Always-in Sample – FE Models

	Binge-drinking participation (FE)			
Full Sample Ages 18-79 years	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women				
Year 2009	-0.01593	-0.01796	-0.01520	-0.01831
	(0.01161)	(0.01325)	(0.01179)	(0.01324)
Year 2012	-0.03867***	-0.04042***	-0.03857***	-0.04135***
	(0.01298)	(0.01416)	(0.01302)	(0.01397)
Income		-0.00208		-0.00335
		(0.00475)		(0.00478)
Work Hours			0.00035	0.00043
			(0.00045)	(0.00045)
N (person years)	**5688**			
Men				
Year 2009	-0.02629	-0.03087	-0.02759	-0.03092
	(0.01909)	(0.02469)	(0.01985)	(0.02466)
Year 2012	-0.05946***	-0.06377**	-0.05993***	-0.06323**
	(0.02044)	(0.02514)	(0.02076)	(0.02480)
Income		-0.00339		-0.00268
		(0.00814)		(0.00826)
Work Hours			-0.00030	-0.00023
			(0.00072)	(0.00073)
N (person years)	**2684**			
Women				
Year 2009	-0.00309	-0.00453	-0.00350	-0.00707
	(0.01237)	(0.01240)	(0.01234)	(0.01229)
Year 2012	-0.01351	-0.01448	-0.01465	-0.01713
	(0.01459)	(0.01475)	(0.01440)	(0.01446)
Income		-0.00242		-0.00592
		(0.00462)		(0.00457)
Work Hours			0.00123**	0.00134***
			(0.00050)	(0.00050)
N (person years)	**3004**			

	Alcohol dependence (FE)			
Full Sample Ages 18-79 years	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women				
Year 2009	-0.04214***	-0.03993***	-0.04200***	-0.03995***
	(0.01244)	(0.01265)	(0.01241)	(0.01266)
Year 2012	-0.04173***	-0.03982***	-0.04172***	-0.03987***
	(0.01367)	(0.01386)	(0.01367)	(0.01383)
Income		0.00229		0.00222
		(0.00454)		(0.00460)
Work Hours			0.00007	0.00002
			(0.00042)	(0.00042)
N (person years)	**5639**			
Men				
Year 2009	-0.06409***	-0.06287***	-0.06555***	-0.06291***
	(0.02099)	(0.02175)	(0.02099)	(0.02178)
Year 2012	-0.06476***	-0.06361***	-0.06524***	-0.06262***
	(0.02254)	(0.02385)	(0.02255)	(0.02392)
Income		0.00091		0.00214
		(0.00689)		(0.00707)
Work Hours			-0.00033	-0.00039
			(0.00067)	(0.00068)
N (person years)	**2656**			
Women				
Year 2009	-0.01749	-0.01663	-0.01770	-0.01764
	(0.01260)	(0.01340)	(0.01260)	(0.01350)
Year 2012	-0.01151	-0.01091	-0.01200	-0.01196
	(0.01449)	(0.01467)	(0.01447)	(0.01465)
Income		0.00146		0.00011
		(0.00568)		(0.00575)
Work Hours			0.00051	0.00051
			(0.00046)	(0.00046)
N (person years)	**2983**			

Alcohol-consumption frequency: # of times at least one alcoholic beverage during the past year

Binge drinking consumption: # of times that drank 5+ alcoholic beverages in 1 day during the past year

Binge-drinking participation: =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year

Alcohol dependence: =1 if at least 1 of three questions on alcohol dependence answered positively

Values are Fixed-Effect Models estimates of the effect of proposed mediators on drinking behaviors.

Time-varying covariates are cohabiting with partner, number of children, marital status, residing in rural areas.

Sample weights are applied. *p<0.10;**p<0.05;***p<0.01.

Table A9 Continued

	Binge-drinking participation (FE)			
Full Sample Ages 18-79 years	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women				
Year 2009	-0.01593	-0.01796	-0.01520	-0.01831
	(0.01161)	(0.01325)	(0.01179)	(0.01324)
Year 2012	-0.03867***	-0.04042***	-0.03857***	-0.04135***
	(0.01298)	(0.01416)	(0.01302)	(0.01397)
Income		-0.00208		-0.00335
		(0.00475)		(0.00478)
Work Hours			0.00035	0.00043
			(0.00045)	(0.00045)
N (person years)	**5688**			
Men				
Year 2009	-0.02629	-0.03087	-0.02759	-0.03092
	(0.01909)	(0.02469)	(0.01985)	(0.02466)
Year 2012	-0.05946***	-0.06377**	-0.05993***	-0.06323**
	(0.02044)	(0.02514)	(0.02076)	(0.02480)
Income		-0.00339		-0.00268
		(0.00814)		(0.00826)
Work Hours			-0.00030	-0.00023
			(0.00072)	(0.00073)
N (person years)	**2684**			
Women				
Year 2009	-0.00309	-0.00453	-0.00350	-0.00707
	(0.01237)	(0.01240)	(0.01234)	(0.01229)
Year 2012	-0.01351	-0.01448	-0.01465	-0.01713
	(0.01459)	(0.01475)	(0.01440)	(0.01446)
Income		-0.00242		-0.00592
		(0.00462)		(0.00457)
Work Hours			0.00123**	0.00134***
			(0.00050)	(0.00050)
N (person years)	**3004**			

	Alcohol dependence (FE)			
Full Sample Ages 18-79 years	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women				
Year 2009	-0.04214***	-0.03993***	-0.04200***	-0.03995***
	(0.01244)	(0.01265)	(0.01241)	(0.01266)
Year 2012	-0.04173***	-0.03982***	-0.04172***	-0.03987***
	(0.01367)	(0.01386)	(0.01367)	(0.01383)
Income		0.00229		0.00222
		(0.00454)		(0.00460)
Work Hours			0.00007	0.00002
			(0.00042)	(0.00042)
N (person years)	**5639**			
Men				
Year 2009	-0.06409***	-0.06287***	-0.06555***	-0.06291***
	(0.02099)	(0.02175)	(0.02099)	(0.02178)
Year 2012	-0.06476***	-0.06361***	-0.06524***	-0.06262***
	(0.02254)	(0.02385)	(0.02255)	(0.02392)
Income		0.00091		0.00214
		(0.00689)		(0.00707)
Work Hours			-0.00033	-0.00039
			(0.00067)	(0.00068)
N (person years)	**2656**			
Women				
Year 2009	-0.01749	-0.01663	-0.01770	-0.01764
	(0.01260)	(0.01340)	(0.01260)	(0.01350)
Year 2012	-0.01151	-0.01091	-0.01200	-0.01196
	(0.01449)	(0.01467)	(0.01447)	(0.01465)
Income		0.00146		0.00011
		(0.00568)		(0.00575)
Work Hours			0.00051	0.00051
			(0.00046)	(0.00046)
N (person years)	**2983**			

Alcohol-consumption frequency: # of times at least one alcoholic beverage during the past year

Binge drinking consumption: # of times that drank 5+ alcoholic beverages in 1 day during the past year

Binge-drinking participation: =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year

Alcohol dependence: =1 if at least 1 of three questions on alcohol dependence answered positively

Values are Fixed-Effect Models estimates of the effect of proposed mediators on drinking behaviors.

Time-varying covariates are cohabiting with partner, number of children, marital status, residing in rural areas.

Sample weights are applied. *p<0.10;**p<0.05;***p<0.01.

Table A10 Estimates of the Short- and Medium-Term Effects of the Economic Crisis in Iceland on all Outcomes, including Mediators – FE Models

	Binge-drinking participation (FE)				Alcohol dependence (FE)				
Subsample Ages 25-61 years	**(1)**	**(2)**	**(3)**	**(4)**	**Subsample Ages 25-61 years**	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women					*Men and Women*				
Year 2009	-0.01638	-0.01608	-0.01509	-0.01647	Year 2009	-0.04064***	-0.03877***	-0.04050***	-0.03879***
	(0.01201)	(0.01291)	(0.01223)	(0.01289)		(.001321)	(0.01344)	(0.01315)	(0.01346)
Year 2012	-0.02389*	-0.02364*	-0.02396*	-0.02518*	Year 2012	-0.03312*	-0.03154**	-0.03313**	-0.03162**
	(0.01339)	(0.01351)	(0.01337)	(0.01329)		(0.01542	(0.01573)	(0.01542)	(0.01569)
Income		0.00026		-0.00123	Income		0.00159		0.00152
		(0.00428)		(0.00438)			(0.00493)		(0.00499)
Work Hours			0.00058	0.00060	Work Hours			0.00006	0.00003
			(0.00042)	(0.00044)				(0.00047)	(0.00048)
N (person years)	**4071**				**N (person years)**	**4034**			
Men					*Men*				
Year 2009	-0.02051	-0.02040	-0.01966	-0.02036	Year 2009	-0.06862***	-0.07218***	-0.06944***	-0.07221***
	(0.02061)	(0.02436)	(0.02152)	(0.02440)		(0.02300)	(0.02393)	(0.02300)	(0.02394)
Year 2012	-0.04261**	-0.04251*	-0.04236*	-0.04304*	Year 2012	-0.06402**	-0.06730**	-0.06425**	-0.06692**
	(0.02155)	(0.02308)	(0.02178)	(0.02273)		(0.02604)	(0.02770)	(0.02606)	(0.02771)
Income		0.00007		-0.00046	Income		-0.00219		-0.00182
		(0.00721)		(0.00749)			(0.00732)		(0.00743)
Work Hours			0.00020	0.00021	Work Hours			-0.00018	-0.00014
			(0.00069)	(0.00072)				(0.00080)	(0.00081)
N (person years)	**1793**				**N (person years)**	**1776**			
Women					*Women*				
Year 2009	-0.01257	-0.01269	-0.01249	-0.01448	Year 2009	-0.01438	-0.01263	-0.01437	-0.01294
	(0.01234)	(0.01243)	(0.01237)	(0.01235)		(0.01327)	(0.01414)	(0.01326)	(0.01424)
Year 2012	-0.00510	-0.00518	-0.00691	-0.00831	Year 2012	0.00091	0.00212	0.00053	0.00157
	(0.01531)	(0.01540)	(0.01514)	(0.01519)		(0.01657)	(0.01691)	(0.01653)	(0.01685)
Income		-0.00016		-0.00268	Income		0.00236		0.00193
		(0.00463)		(0.00461)			(0.00653)		(0.00660)
Work Hours			0.00110**	0.00114**	Work Hours			0.00023	0.00019
			(0.00051)	(0.00051)				(0.00052)	(0.00052)
N (person years)	**2278**				**N (person years)**	**2258**			

Alcohol-consumption frequency: # of times at least one alcoholic beverage during the past year

Binge drinking consumption: # of times that drank 5+ alcoholic beverages in 1 day during the past year

Binge-drinking participation: =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year

Alcohol dependence: =1 if at least 1 of three questions on alcohol dependence answered positively

Values are Fixed-Effect Models estimates of the effect of proposed mediators on drinking behaviors.

Time-varying covariates are cohabiting with partner, number of children, marital status, residing in rural areas.

Sample weights are applied. *p<0.10;**p<0.05;***p<0.01.

Table A10 Continued

Binge-drinking participation (FE)				
Subsample Ages 25-61 years	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women				
Year 2009	-0.01638	-0.01608	-0.01509	-0.01647
	(0.01201)	(0.01291)	(0.01223)	(0.01289)
Year 2012	-0.02389*	-0.02364*	-0.02396*	-0.02518*
	(0.01339)	(0.01351)	(0.01337)	(0.01329)
Income		0.00026		-0.00123
		(0.00428)		(0.00438)
Work Hours			0.00058	0.00060
			(0.00042)	(0.00044)
N (person years)	**4071**			
Men				
Year 2009	-0.02051	-0.02040	-0.01966	-0.02036
	(0.02061)	(0.02436)	(0.02152)	(0.02440)
Year 2012	-0.04261**	-0.04251*	-0.04236*	-0.04304*
	(0.02155)	(0.02308)	(0.02178)	(0.02273)
Income		0.00007		-0.00046
		(0.00721)		(0.00749)
Work Hours			0.00020	0.00021
			(0.00069)	(0.00072)
N (person years)	**1793**			
Women				
Year 2009	-0.01257	-0.01269	-0.01249	-0.01448
	(0.01234)	(0.01243)	(0.01237)	(0.01235)
Year 2012	-0.00510	-0.00518	-0.00691	-0.00831
	(0.01531)	(0.01540)	(0.01514)	(0.01519)
Income		-0.00016		-0.00268
		(0.00463)		(0.00461)
Work Hours			0.00110**	0.00114**
			(0.00051)	(0.00051)
N (person years)	**2278**			

Alcohol dependence (FE)				
Subsample Ages 25-61 years	**(1)**	**(2)**	**(3)**	**(4)**
Men and Women				
Year 2009	-0.04064***	-0.03877***	-0.04050***	-0.03879***
	(.001321)	(0.01344)	(0.01315)	(0.01346)
Year 2012	-0.03312*	-0.03154**	-0.03313**	-0.03162**
	(0.01542	(0.01573)	(0.01542)	(0.01569)
Income		0.00159		0.00152
		(0.00493)		(0.00499)
Work Hours			0.00006	0.00003
			(0.00047)	(0.00048)
N (person years)	**4034**			
Men				
Year 2009	-0.06862***	-0.07218***	-0.06944***	-0.07221***
	(0.02300)	(0.02393)	(0.02300)	(0.02394)
Year 2012	-0.06402**	-0.06730**	-0.06425**	-0.06692**
	(0.02604)	(0.02770)	(0.02606)	(0.02771)
Income		-0.00219		-0.00182
		(0.00732)		(0.00743)
Work Hours			-0.00018	-0.00014
			(0.00080)	(0.00081)
N (person years)	**1776**			
Women				
Year 2009	-0.01438	-0.01263	-0.01437	-0.01294
	(0.01327)	(0.01414)	(0.01326)	(0.01424)
Year 2012	0.00091	0.00212	0.00053	0.00157
	(0.01657)	(0.01691)	(0.01653)	(0.01685)
Income		0.00236		0.00193
		(0.00653)		(0.00660)
Work Hours			0.00023	0.00019
			(0.00052)	(0.00052)
N (person years)	**2258**			

Alcohol-consumption frequency: # of times at least one alcoholic beverage during the past year

Binge drinking consumption: # of times that drank 5+ alcoholic beverages in 1 day during the past year

Binge-drinking participation: =1 if consumed 5+ alcoholic beverages in one day at least once a month during the past year

Alcohol dependence: =1 if at least 1 of three questions on alcohol dependence answered positively

Values are Fixed-Effect Models estimates of the effect of proposed mediators on drinking behaviors.

Time-varying covariates are cohabiting with partner, number of children, marital status, residing in rural areas.

Sample weights are applied. *p<0.10;**p<0.05;***p<0.01.