Substance Use and Recessions: What can be learned from the alcohol literature?

Rosalie Liccardo Pacula, Rand Corporation

Available at: https://works.bepress.com/rosalie_pacula/23/
Commentary

Substance use and recessions: What can be learned from economic analyses of alcohol?

Rosalie Liccardo Pacula*  
RAND Corporation, 1776 Main St., P.O. Box 2138, Santa Monica, CA 90407-2138, USA

A R T I C L E   I N F O  
Article history:  
Received 14 December 2010  
Received in revised form 29 June 2011  
Accepted 2 July 2011  

Keywords:  
Alcohol  
Recessions  
Macro economy

A B S T R A C T  
In this paper, I conduct a review of the economics literature examining the relationship between alcohol use and the macro economy comparing methods, measures and findings. Like illicit drug consumption, the relationship between alcohol use and economic conditions is not entirely straightforward since there are various theoretical explanations for why they might be positively or negatively related. Empirical findings suggest that the relationship between drinking and the economy depends on the type of user and whether use is examined in developing or developed countries. In developed countries, heavy drinkers consume less in a downturn, while light drinkers consume more. This pro-cyclical relationship found for heavy drinking does not hold for developed countries where disposable income is low. The implications for researchers interested in understanding how illicit drug consumption varies with the business cycle are that they must be careful to consider differential responses across user types as well as expensive and inexpensive drugs.

© 2011 Elsevier B.V. All rights reserved.

Introduction

As a leading risk factor for disease, injury, and social problems around the globe, alcohol has received significant attention by scholars and policy makers alike, both interested in trying to understand and mitigate the negative consequences associated with its abuse. While light to moderate alcohol consumption is normative in most societies around the globe and has even been shown to benefit health in some cases, such as coronary heart disease and ischaemic strokes (Corrao et al., 2000; Murray et al., 2002; Stamper, Colditz, Willett, Speizer, & Hennekens, 1988; WHO, 2004), heavy and frequent binge drinking has consistently been associated with great costs in terms of health, mortality, lost productivity and crime in multiple societies (Anderson & Baumberg, 2006; Collins & Lapsley, 2008; Harwood, Fountain, & Livermore, 1998; Rehm, Gnam, & Popova, 2007). Globally, alcohol has been determined to cause 3.8% of all deaths and has been causally linked to more than 60 types of disease and injury, including liver cancer, cirrhosis of the liver, homicide, and motor vehicle accidents (Rehm et al., 2009).

Unlike the illicit drug field, there is quite a large literature in the alcohol field that has considered the relationship between economic downturns and alcohol abuse and/or alcohol-related mortality. Initial work in this area (Brenner, 1975, 1979) emphasised the psychological determinants of drinking and alcohol-related mortality, postulating that stress and risk-taking increase when the economy goes bad causing drinking and alcohol-related mortality to have a counter-cyclical relationship with the economy. Economists criticised the early work in that it lacked serious attention given to economic factors that also change during economic downturns, such as personal income, the relative prices of different goods including medical care, and the opportunity cost of non-work time. All of these factors have been shown to be important determinants of medical care utilisation and health outcomes within the context of human capital investments (Grossman, 1972). Ruhm (1995) provides a particularly insightful example of how the economic model yields fundamentally different insights than psychological models on the relationship between the business cycle and health. In an economic downturn, he explains, personal incomes fall which leads to a reduction in consumption of all “normal” goods, including alcohol use and driving. Reductions in both alcohol use and driving will lead to fewer alcohol-involved accidents, ceteris paribus. Thus the economic model posits a positive (pro-cyclical) relationship between the economy and drunk-driving while research using a psychological framework would hypothesise a negative relationship. Stress may still be a factor that could totally or partially off-set a reduction in heavy drinking, but the lower cost of time spent engaging in other stress-reduction activities (e.g. exercising) during periods of high unemployment might provide another reason for dealing with the stress rather than drinking, suggesting that a negative relationship

---

* Tel.: +1 310 393 0411x6494; fax: +1 310 393 4818  
E-mail address: Pacula@rand.org

0955-3959/$ – see front matter © 2011 Elsevier B.V. All rights reserved.  
The economics literature on how the economy impacts alcohol abuse and alcohol-related health harm

It is well established that long term economic growth improves health as measured through a variety of indicators, including infant mortality rates and life expectancy. The impact of short term economic fluctuations, however, has been the subject of considerable debate. A comprehensive review of the expansive literature examining the relationship between alcohol use and the business cycle is beyond the scope of this brief commentary. Interested readers are encouraged to read thorough reviews by Subroto and Stuckler (2010), Tapia Granados (2005), and Ruhm (2000). The purpose here is to focus on insights from the economics literature, which specifically consider the roll of income and prices on drinking decisions made by consumers and thus adopt the economic framework. The best place to identify papers using this framework is in economic journals, so my review focuses on papers identified through Econlit, the primary search engine for publications in the field of economics. A full text search of papers included within Econlit was conducted using the following search terms in various combinations: economic downturn, recession, business cycle, unemployment, alcohol, health, and drinking. Only papers published in English and available electronically were reviewed. Additional papers were identified from references in those papers identified through EconLit that hit on one of the key themes that emerged from the review. Those highlighted in this commentary represent papers that have clearly contributed to the development and improvement of empirical models that test the various aspects of the relationship short-term business cycle fluctuations and drinking behaviours using this economic framework.

While a significant literature exists examining the relationship between individual income and drinking and/or job retention (e.g. Ettner, 1996, 1997; Mullally & Sindelar, 1993), several studies have demonstrated the independent effect of the overall economy on drinking behaviour above and beyond one’s own income or job situation (Dee, 2001; Ruhm and Black, 2002). Moreover, the research shows that an individual’s poor health (and chronic drinking) can cause rather than result from joblessness (Cook & Moore, 2000). Thus, one of the first key contributions from the economics literature to the general literature on health and economy is that it is not sufficient to infer a relationship of the economy on drinking from micro-level analyses using individual personal income, as the macro economy can independently influence both an individual’s drinking as well as the likelihood of an individual currently being employed. Table 1 highlights the key studies that have investigated this direct and indirect effect of the macro economy in the economics literature. Not unlike other areas of research, the studies over time adopted improved methodologies and better measures of alcohol abuse and harmful drinking, thus providing better insight into the inconsistencies and contradictory findings identified in the early literature.

Ruhm (1995) is widely viewed as having conducted the first serious investigation of the relationship between economic downturns and drinking behaviours in the economics literature, as this was the first study to overcome a number of serious methodological problems caused by serial correlation in the error term (either over time or across geographic locations). He overcame these problems using a fixed effect model on panel data, which has now become the standard for estimating these sorts of models. Recognising that different types of drinking could be differentially influenced by the economy, Ruhm (1995) examined how changes in state-level unemployment rates (and employment-to-population ratios) influenced both general consumption, as measured by state-level liquor consumption, and heavy consumption, as measured by age-specific total highway vehicle fatalities. In the United States during the time period examined, over half of all highway vehicle fatalities and two-thirds of nighttime fatalities were attributable to drunk driving. Hence, a plausible mechanism through which changes in the unemployment rate might influence motor vehicle traffic fatalities is through its impact on heavy or binge drinking not just on driving, as the literature had already demonstrated that these fatalities were sensitive to changes in the price of alcohol (see Cook & Moore, 2000, for a review of the relevant literature here). Ruhm (1995) found evidence that alcohol is at a macro-level a “normal good” and that its consumption went up when the overall income within the economy went up. Thus, he concluded that alcohol consumption varied procyclically with the economy. According to his initial results from these state-aggregated data, a one standard deviation increase in the state unemployment rate (about 2 percentage point increase) predicting a reduction in drinking of 1.3% and traffic fatalities by nearly 7%.

While Ruhm’s (1995) work represented a major methodological breakthrough by being the first to adopt a fixed effect framework, it quickly came under attack by Freeman (1999), who raised concerns that Ruhm’s data were potentially non-stationary and failure to correct for the non-stationary would generate parameters that were sensitive to the time period examined. However, Freeman’s (1999) own re-examination of the data that addressed problems of non-stationary by using logarithmic first differences of similar state-level data confirmed Ruhm’s (1995) early finding of a procyclical relationship for state-level aggregate alcohol consumption. Interestingly, in subsequent work looking solely at beer consumption in the United States, Freeman (2001) finds that consumption of beer does not vary statistically with short run fluctuations in the business cycle although there is a long run pro-cyclical relationship.

Following Freeman’s work, Ruhm (2000) next explored the evidence regarding the relationship between the unemployment rate and health more generally, noting the prominent role that lifestyle factors like alcohol consumption play. Although the focus
Table 1
Economic analyses examining relationship between aggregate unemployment rate and alcohol consumption.

<table>
<thead>
<tr>
<th>Study</th>
<th>Data</th>
<th>Alcohol measure</th>
<th>Economic conditions measure</th>
<th>Methods</th>
<th>Additional controls</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruhm (1995)</td>
<td>Aggregated state-level data</td>
<td>(1) State-level measure of total alcohol consumed; (2) highway vehicle fatalities (total for 15–20, 21–24, nighttime for 15–20 and 21–24), State-level measure of total alcohol consumed</td>
<td>(1) State-level unemployment rate; (2) percent of the state population employed (employment to pop ratio)</td>
<td>State fixed effect (FE) models with linear time trend</td>
<td>Per capita income State tax on beer Minimum legal drinking age</td>
<td>Pro-cyclical relationship identified for both measures of drinking</td>
</tr>
<tr>
<td></td>
<td>from 1975 to 1988</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freeman (1999)</td>
<td>Aggregated state-level data</td>
<td>State-level measure of total alcohol consumed</td>
<td>(1) State-level unemployment rate; (2) percent of the state population employed (employment to pop ratio)</td>
<td>State FE models with linear time trend and additional runs with logarithmic first differences</td>
<td>Per capita income State tax on beer Minimum legal drinking age</td>
<td>Pro-cyclical relationship identified with total alcohol consumption</td>
</tr>
<tr>
<td></td>
<td>from 1970 to 1995</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ruhm (2000)</td>
<td>Aggregated state-level data</td>
<td>State-level fatality rates for (1) chronic liver disease and cirrhosis; (2) major cardiovascular disease; (3) motor vehicle accidents; (4) homicides; microanalysis of past month prevalence and number of drinks (self-reported)</td>
<td>State-level unemployment rates are primary measure, but sensitivity analyses are done with employment-to-population (EP) ratio</td>
<td>Log fatality rates estimated with weighted state fixed effects including year dummy variables. Micro-level analyses include state-fixed effects and year dummy variables.</td>
<td>Per capita income Education categories Race/ethnicity of pop</td>
<td>Pro-cyclical relationship identified for all four fatality measures No statistically significant findings for either alcohol consumption measure in the micro-level analysis</td>
</tr>
<tr>
<td></td>
<td>(U.S.) from 1972 to 1991 and micro-level data from 1987 to 1995 Behavioral Risk Factor Surveillance System (BRFSS)</td>
<td>(1) Past month prevalence; (2) number of drinks for past month users; (3) prob. of consuming 60+ drinks/month; (4) binge drinking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dee (2001)</td>
<td>Micro-level data</td>
<td>State unemployment rate for month in which survey took place. Also did sensitivity with unemployment rate over past year</td>
<td>State fixed effects with linear monthly time trend and state-specific year effects</td>
<td>Race/ethnicity Age Education Marital status Per capita income (state level)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>from 1984 to 1995 BRFSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ruhm and Black (2002)</td>
<td>Micro-level data</td>
<td>(1) Use in past month; (2) number of beverages consumed; (3) self-reported drinking and driving; (4) binge drinking; (5) heavy drinking (60+ and 100+ drinks/month); (6) light drinking (&lt;10 or &lt;20 drinks/month)</td>
<td>State unemployment rate for month in which survey took place</td>
<td>Regression weighted state fixed effects and linear monthly time trend. Show models with and without state-year dummies</td>
<td>Race/ethnicity Age Education Marital status Per capita income (state level)</td>
<td>State beer tax Pro-cyclical relationship identified for number of drinks and drunk driving Drinking participation in the past 30 days insensitive to changes in unemployment</td>
</tr>
<tr>
<td></td>
<td>from 1987 to 1999 BRFSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neumayer (2004)</td>
<td>Aggregated state-level data</td>
<td>Mortality rates for (1) chronic liver disease; (2) cardiovascular disease; (3) motor vehicle accidents; and (4) homicide</td>
<td>State unemployment rate. Sensitivity analyses also conducted using growth rate in GDP</td>
<td>Population-weighted state fixed effects models were estimated</td>
<td>Disposable income per capita Year fixed effects (national level) Age structure within the Lander</td>
<td>Pro-cyclical results for cardiovascular disease and motor vehicle accident fatalities. No statistical relationship between unemployment and chronic liver disease or homicide.</td>
</tr>
<tr>
<td></td>
<td>within Germany from 1980 to 2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tapia Granados (2005)</td>
<td>Aggregated province-level data for Spain from 1980 to 1997</td>
<td>Mortality rates for (1) cardiovascular disease; (2) traffic accidents; and (3) homicide</td>
<td>Annual unemployment rate at the province level</td>
<td>Population weighted fixed effects methods that also included province-specific time trends</td>
<td>Province-level real GDP per capita Age structure within the province</td>
<td>Pro-cyclical relationship only for traffic accidents. No statistical relationship found between unemployment and cardiovascular disease fatalities or homicide fatalities.</td>
</tr>
</tbody>
</table>
of the analysis was on health more generally, Ruhm examined four cause-specific sources of mortality tied directly to heavy and/or chronic alcohol use, specifically liver cirrhosis and disease, cardiovascular disease, motor vehicle fatalities, and homicides. Substantial evidence in both the medical and economics literature shows a strong link between alcohol consumption and each of these health problems (Biderman, De Mello, & Schneider, 2010; Carpenter & Dobkin, 2009; Cook, 1981; Cook & Tauchen, 1982; Rehm, Patra, & Popova, 2006; Sloan, Reilly, & Schenzler, 1994; Wagenaar & Toomey, 2002). What was particularly unique about Ruhm’s (2000) analysis was the combined presentation of both aggregate analyses of fatality rates as well as a micro-level analyses using individual level data showing the impact of state-level unemployment rates on lifestyle behaviours. Both sets of analyses used improved panel data methods that incorporated state-fixed effects to account for time invariant unobserved factors that could cause systematic correlation in the error terms. The findings specific to alcohol-related fatalities were surprisingly consistent. Higher unemployment rates were associated with fewer fatalities across all four alcohol-related fatality rates, implying a pro-cyclical relationship. However, Ruhm’s (2000) analysis of actual drinking behaviour using micro-level data from the Behavioral Risk Factor Surveillance Survey (BRFSS) did not show a statistically significant relationship. He did find a statistical relationship for other risk factors, including smoking and obesity, but individual alcohol consumption did not appear to be a major driver behind the aggregate trends. Ruhm’s explanations for the inconsistency between this finding using micro-level data and the fatality and consumption rates using macro-level data was that drinking prevalence reported in micro-level data largely reflected recreational drinking which could rise during downturns even if problem drinking was declining. The lack of a finding with respect to the number of drinks variable was attributed to the lack of control for alcohol tax rates, which varied across the states and had been included in his earlier (1995) analysis, as well as potential sampling effects associated with the data employed. His main conclusion was that there is indeed a pro-cyclical relationship between the economy and health, but more work was needed to elucidate the role of problem drinking.

Dee (2001) provided the first serious challenge to Ruhm’s finding of a pro-cyclical relationship between the economy and drinking. Dee (2001) used the same micro-level data set as Ruhm (2000), but included earlier survey years and a state-specific time trend in his fixed effects model. He found a pro-cyclical result for both the number of drinks consumed in the past 30 days and chronic drinking participation (defined as 60 or more drinks in the past 30 days) when state fixed effects are included in the model (the preferred specification). While these findings were actually consistent with Ruhm’s earlier findings, Dee (2001) put substantial weight on the main contradictory result with respect to prevalence of binge drinking. Dee (2001) showed that in his data participation in binge drinking was positively correlated with the unemployment rate, implying a counter-cyclical relationship for this distinct measure of problem drinking. The finding remained robust even when considering gender, race/ethnicity, age, and employment status differences, although the relationship was found to be particularly strong amongst specific groups including males, young adults, and those who remained employed. The contradictory finding for binge drinking behaviour raised some serious questions regarding the proper interpretation of previous findings related to alcohol-related mortality, particularly those that are highly tied to binge drinking rather than just heavy drinking (e.g. motor vehicle fatalities, and homicides).

In a paper published shortly after Dee (2001), Ruhm and Black (2002) thoroughly considered the possibility of differential responses of alternative drinking behaviours by examining a number of alternative measures of alcohol use available in the micro-level data from the 1987–1999 BRFSS. In addition to examining past month prevalence and the number of drinks reported for those who drank, they considered various indicators of light and heavy drinking. Specifically, in terms of heavy drinking they consider the prevalence of binge drinking in the past 30 days and dichotomous indicators of whether 60 or more drinks or 100 or more drinks were consumed in the past month. As measures of light drinking, they construct two measures, one indicating 10 or
fewer drinks in the past 30 days and the other indicating 20 or fewer drinks in the past 30 days. They also consider self-reported drinking and driving as a validity check on findings related to motor vehicle fatalities.

Ruhm and Black’s (2002) analysis differed from Dee (2001) in several important ways. First, their analysis used data from later years of the BRFSS, purposefully excluding the years between 1984 and 1986. This exclusion is important, the authors argued, because there are relatively few states included in the early waves of the BRFSS thereby limiting the variation available for identification when state fixed effects are included. Second, their analyses did not include state-specific year fixed effects and linear time trends, as including these two variables with state fixed effects absorbs almost all the variation in state unemployment rates during the time period examined. Instead their preferred model specifications included just state fixed effects and state-specific linear time trends, which still allowed for unique time trends in unobservables within each state but not fully absorbing all the variation in state unemployment rates during the time period. Third, Ruhm and Black’s (2002) analyses used the sample weights associated with the BRFSS in the panel regression methods. The inclusion of sample weights is important, the authors argue, because the sample selection was done based on race/ethnicity and socioeconomic status, which the existing literature shows are highly correlated with drinking patterns. Finally, Ruhm and Black (2002) included in their analysis several known important correlates of drinking that may have generated omitted variable bias in previous analysis, including marital status and the state-level tax on beer.

With these adjustments, Ruhm and Black (2002) find a more consistent set of results across all their measures of heavy drinking, including binge drinking. All four measures (number of drinks consumed, prevalence of 60+ drinks in the past month; prevalence of 100+ drinks in the past month; and binge drinking) showed a pro-cyclical relationship with the economy. The magnitude of the results was reduced a bit when per capita income or national unemployment was included in the model with state unemployment rates, but the main conclusions were the same and findings remained statistically significant. Importantly, the authors also found that measures of light drinking (i.e. fewer than 10 drinks and fewer than 20 drinks) were positively associated with the unemployment rate, implying a counter-cyclical relationship for measures of light or moderate drinking. They conclude from this that the observed macroeconomic variation in alcohol use, as measured by number of drinks, is dominated by changes in the number of drinks drunk by current users (i.e. the intensive margin) and not the number of people who start or quit drinking (the extensive margin). Heavy drinkers reduce their drinking level during economic downturns, while light drinkers increase their drinking. However, because of the health benefits of reducing heavy drinking more than offset the health effects of moderately increasing light drinking during recessions, the overall effect is a pro-cyclical relationship between alcohol consumption and health, particularly as measured by alcohol-involved fatalities. Importantly, the authors also find a pro-cyclical relationship for self-reported drunk driving, thereby verifying at least one mechanism through which fluctuations in the economy can cause changes in motor vehicle fatalities. As was consistently found in papers by other authors, Ruhm and Black also found that past month prevalence had no statistically significant relationship with the unemployment rate.

A key point that should be very apparent by now is that it is very important to understand what additional controls are being included in a model before comparing results of one study to another. The inclusion or exclusion of geographic fixed effects is only one example of how specific controls can fundamentally change the result, but several others exist. A particularly salient example of how it is important to consider specific controls included in a model is given by Economou et al. (2008), who evaluated the relationship between recessions and cause-specific mortality using data from thirteen European Union countries. They find a positive relationship between unemployment and fatalities associated with heart disease, motor vehicle traffic accidents and homicides, all apparently contradicting the results of Room and Black (2002). The authors did a careful job methodologically, controlling for unobserved time-invariant characteristics within countries as well as paying attention to time trends and potential confounders such as urbanisation and medical intervention indicators. However, what they also did was include in their analyses a control for per capita daily consumption of alcohol. Because of this, they explicitly limited the mechanism through which macroeconomic fluctuations could impact these mortality rates, making alcohol use no longer a major mechanism. Empirically, their models were asking an entirely different question regarding the relationship between business cycle fluctuations and specific-cause mortality that no longer considered alcohol as a cause and while they conclude that recessions are actually bad for one’s health, which may be true when these other factors are accounted for, their empirical results showed clearly that per capita alcohol consumption was indeed positively associated with each of the alcohol-involved mortality rates. Identifying when these important differences in models occur and properly considering their relevance to the question being asked is critical for interpreting the literature and its insights with respect to a particular relationship.

The focus of the economics literature since Ruhm and Black’s (2002) study has been on the broader question of the relationship between economic fluctuations and health more generally, although many studies examining cause-specific fatality rates, making it possible to consider whether the findings with respect to alcohol-involved fatalities are indeed robust. In an aggregate analysis of cause-specific fatalities and the unemployment rate in Germany, Neumayer (2004) used population-weighted panel data techniques that included state fixed effects to consider the role of unemployment on particular fatality rates across the German states. He, too, finds a pro-cyclical relationship for cardiovascular disease and motor vehicle accident fatalities. However, no statistically significant relationship was identified for chronic liver disease or homicide in models examining just the effect of contemporaneous unemployment. Interestingly, when short and long run dynamic models were evaluated, he does find a pro-cyclical relationship between the economy and chronic liver disease, but it is only for men. It is important to note that Neumayer’s (2004) empirical model did not consider within-state time trends but instead simply included year dummy variables. Moreover, trends in the availability of alcohol and population demographic differences, except by age, were not considered. Given that the time period examined includes a period of integrating East and West Germany after the fall of the Berlin wall, one cannot be sure that changes in the relative price of alcohol and/or medical care in formerly East German states did not have an independent effect that is inadequately considered in these analyses as the discussion below explains in greater detail. Thus it is likely that omitted variable biases could be generating the internally inconsistent findings across different alcohol-involved fatalities.

In an examination of the 50 provinces of Spain over an 18 year period, Tapia Granados (2005) also provides some conflicting evidence regarding the relationship between alcohol consumption and the economy. In his examination of cause-specific mortality rates, Tapia Granados (2005) finds only a statistically significant pro-cyclical result for traffic fatalities. The effect of unemployment rates on fatalities from cardiovascular disease and homicide is generally negative, but not statistically significant. Methodologically, the author uses the proper population-weighted state fixed effect
model to handle problems associated with omitted variables bias, but like Dee (2001), he also includes province-specific time trends in addition to year fixed effects that likely absorb too much of the remaining variation in unemployment rates. Evidence of this is suggested by the fact that only two cause-specific death rates out of 7 show statistically significant results with unemployment rates in any direction (both pro-cyclical), while there is a statistically significant negative association found between the unemployment rate and total fatalities overall. So while there is general evidence of a pro-cyclical relationship between the economy and health, his models do not suggest a strong relationship for most cause-specific fatality rates.

In an examination of economic fluctuations and health in 23 member nations of the OECD, Gerdtham and Ruhm (2006) again find evidence of a pro-cyclical relationship between the economy and fatalities from (a) liver disease; (b) motor vehicle accidents, and (c) cardiovascular heart disease for 23 member nations of the OECD. As in Ruhm’s previous work, only a country-specific time trend is included rather than country-specific time trends and year effects (which is the model used by Tapia Granados and Dee). Like Neumayer (2004), they find no statistically significant association between homicide and the state unemployment rate. The lack of a significant finding for homicides is likely to be driven by omitted variable variables, as there are several relevant socio-demographic and relative price measures missing from the analysis.

Another possible explanation for the inconsistent findings across various fatality measures in the Gerdtham and Ruhm (2006) study is the fact that data from countries in different stages of economic development are pooled together. Recent studies suggest that the general level of economic development is an important indicator for explaining conflicting findings in studies of the economy and health (Gonzalez & Quast, 2009; Subrcke & Stuckler, 2010). Key factors raised in the economics literature for these differences include differences in the availability and cost of medical care (which directly impacts health and mortality) and differences in average disposable income (which affects ability to consume nonessential goods). The impact of differences in average disposable incomes is potentially multi-faceted. For example, lower average disposable incomes mean that less alcohol is being consumed because available income must be used to purchase necessities, such as food, clean water, shelter and medical care. Lower levels of alcohol consumption in the population could translate into lower baseline rates of alcohol-attributable mortality, particularly for those health harms that are tied to chronic heavy use. Moreover, lower disposable incomes might also imply less access to the circumstances generating alcohol-related health harms, such as drunk driving. If fewer people in developed countries own cars and drive less frequently, then the general likelihood of driving (let alone drunk driving) will be systematically lower. Of course, other systematic differences between developing and industrialised countries might exist that could influence or de-link the relationship between the macro economy and alcohol, such as the availability of income safety nets, political stability, rates of religious fundamentalism and so on. Whether or not the key drivers across developed or developing countries are economic in nature is irrelevant for the current discussion. The main point is that ignoring these differences when evaluating the relationship between the macro economy and drinking can generate biased and potentially inconsistent results.

Gonzalez and Quast (2009) conduct a careful study that considers the possible influence of the differential economic development within a single country on the relationship between business cycles and alcohol consumption. In their study of mortality rates in Mexico, they show that several common causes of mortality, such as cardiovascular disease and cirrhosis, vary pro-cyclically with the economy in developed states within Mexico and vary counter-cyclically in less developed states. Furthermore, they find no statistically significant association between the economy and some cause-specific fatalities in less developed states of Mexico despite these cause-specific fatalities being key drivers of fatalities in developed parts of Mexico. They interpret their inconsistent results across regions of Mexico as evidence that individuals in the less developed areas have less disposable income on which to spend on nonessential items, such as alcohol, even in good economic times. Moreover, these areas typically have higher relative costs for basic medical care (due to limited access). Their study provides useful insights as to the importance of controlling for different stages of economic development even when exploring trends within a single country. Individual region-specific effects (or country-effects for broader studies) might be insufficient to account for unobserved time-varying aspects within regions (countries) that are relevant for understanding the underlying relationship.

It is most likely the aggregation of developed and developing economies that leads to the lack of a consistent finding for alcohol-involved fatalities in the recent work by Stuckler, Basu, Subrcke, Coutts, and McKee (2009) as well. In this study, aggregate country-level data from the 26 European Union countries are examined over the period of 1971–2006. As several of the current E.U. member states have had relatively slow or enigmatic growth for several years before joining the E.U., the consideration of country-specific fixed effects is likely to be insufficient to deal with the probable differential relationship between economic growth and health observed across developed versus developing member states (e.g. Slovenia or Portugal and Germany). Furthermore, given the significant amount of social change that has occurred in several of the E.U. member states over the time period, the omission of relative price measures including alcohol and medical care, might be further biasing results (as was observed in studies examining variation within the U.S.).

Evidence from natural experiments

Scientists often make use of insights gleaned from natural disasters or unpredictable market changes (referred to as “natural experiments”) as a way of shedding light on causal relationships. In the case of alcohol consumption and the economy there are several natural experiments to choose from. Various researchers have examined this instability on a variety of health indicators, including alcohol-involved fatalities (Khang, Lynch, & Kaplan, 2005; Kim, Song, Yi, Chung, & Nam, 2004; Men, Brennen, Boffetta, & Zaridze, 2003; Notzon et al., 1998; Shkolnikov, McKee, & Leon, 2001; Valkonen, Martikainen, & Jalovaara, 2000). A close examination of particular shocks, however, provides a good example as to why simple examination of age-adjusted mortality rates prior, during and post economic upheaval is insufficient for understanding the complex relationship between alcohol consumption and the economy.

Russia. In the relatively brief period surrounding the collapse of the Soviet Union and the emergence of Russia, there was huge variation in life expectancy amongst the Russian population. From 1984 through 1994, life expectancy for both males and females in Russia declined substantially and then, between 1994 and 1998, these trends reversed themselves to nearly the same levels as pre-1980 (Men et al., 2003; Shkolnikov et al., 2001). Many scholars have attributed the enormous variability in mortality to the social and economic transition that occurred during the period of the collapse of the Soviet Union in 1991. Numerous epidemiologists have further noted that heavy alcohol use played a significant role in those rising mortality rates during the collapse of the Soviet Union/Russian economy (Men et al., 2003; Notzon et al., 1998). The increases in mortality were mainly for causes that, in Russia,
can be linked directly to heavy drinking, including acute alcohol poisoning, cirrhosis, traffic injuries, homicide, stroke and cardiovascular disease, particularly for young and middle-aged adults who experienced the greatest increase in mortality (Leon, Chenet, & Shkolnikov, 1997; Men et al., 2002; Notzón et al., 1998; Shkolnikov et al., 2001). However, during the same time that mortality rates climbed, there was a substantial decline in the relative price of alcohol and cigarettes in particular, combined with substantial increases in the price of medical care, higher crime rates, and existing poor public health infrastructure (Ruhm, 2000). Thus, it would be unwise to attribute the rise in alcohol-related mortality to the weak economy without also considering, and controlling for, the enormous decline in alcohol prices and rise in medical care prices. Only a careful statistical analysis that can account for all the factors that were changing at the same time will provide a good understanding of the extent to which the economic downturn led to a rise in alcohol-related mortality in Russia.

South Korea. South Korea provides another useful example for understanding why one should not infer too much from simple trend analysis of mortality rates surrounding periods of economic volatility. After decades of growth, South Korea experienced a steep economic decline from 1998 to 2001, with unemployment rate rising from 2.6% in the last quarter of 1997 to 8.4% in the first quarter of 1999 (barely more than a year). Household income also fell in this short period of time (it declined 7.6% in 1998 alone). Khang et al. (2005) construct annualised age-standardised aggregate mortality measures at the national level from 1990 through 2002 and examine trends in these annualised rates. They find that all-cause mortality decreased for both sexes and age groups during the South Korean crisis, with liver disease being a major contributor to that decline in mortality during the crisis. Transport accident mortality also fell during the crisis, again consistent with a pro-cyclical relationship identified from more sophisticated econometric analyses. However, mortality from alcohol dependence and homicide increased, suggesting that there may have been a more heterogeneous response in drinking across different types of drinkers. Further evidence supporting a heterogeneous response comes from Khang and Lynch (2005), who note that according to national tax data, the quantity of alcoholic beverages delivered to drinkers 19 years and up declined during the South Korean crisis as did the national statics on daily drinking. Thus, one clearly needs to consider how fatalities from alcohol dependence are constructed to understand how these deaths differ from those associated with liver cirrhosis and traffic fatalities and one must also consider whether there was a differential response by type of drinker within Korea, while simultaneously controlling for possible changes in alcohol prices and medical care.

Finland. While Finland is similar to Russia and South Korea in that it experienced a sudden economic downturn from 1991 to 1995 after a prolonged period of economic growth (Luoto, Poikolainen, & Utela, 1998), it is unique in that it is a country that has maintained very high alcohol taxes, and the higher prices for alcohol tend to generate bigger swings in consumption when incomes rise and fall. Johansson, Bockerman, Prattala, and Utela (2006) make use of the variability observed in consumption during periods of the business cycle in Finland to evaluate the impact of these fluctuations on alcohol consumption and alcohol-related mortality. Using both aggregated mortality data from 1975 to 2001 and micro-level data of self-reported drinking in the past week from a national survey conducted from 1982 to 2001, Johansson et al. (2006) try to assess the impact of the variation on consumption using an economic framework and controlling for province specific fixed effects. Unfortunately, their results are not consistent across levels of analyses. In their macro-level analysis of alcohol-related mortality, they find that mortality rates are generally negatively related to employment, suggesting a counter-cyclical relationship. This counter-cyclical relationship is only statistically significant when the entire period is examined (1975–2001), however. When shorter periods are examined (1975–1987 and 1988–2001) the finding is not statistically significant and it even turns positive for one particular relevant period (1990–1996) when the severe recession occurred. The instability of the finding across sample periods considered cannot be entirely attributed to an unclear relationship between the economy and drinking, however, as none of the models included measures of per-capita income. Not unlike the studies of Mexico or the E.U. countries, provinces within Finland experienced very different patterns of economic growth during this long period, with some emerging quickly from an underdeveloped state and other emerging slowly (Kangasharju, 1998). Thus, important temporal variation in personal income within and across the provinces was not captured even though province-specific fixed and time effects were included. To the extent that trends in per capita income were relatively more stable during short windows of time, then specific models on particular periods may generate unreliable results. However, it is unclear in which years these factors might be relatively stable.

In the micro-level analysis conducted by Johansson et al. (2006), the regional employment rate had no statistically significant relationship with the probability of being a drinker or the number of drinks consumed. Again, however, there was no control for individual-level income, which earlier studies have shown to be important. To complicate things further, sensitivity analyses using GDP as a measure of the business cycle rather than employment show a positive association between the business cycle and the number of drinks reported, consistent with a pro-cyclical relationship, but the instability in findings across alternative measures of the business cycle coupled with the same omitted variable bias (no personal income) make it unclear how reliable these estimates are. The authors interpret their findings as providing general evidence that alcohol-related mortality increases in bad times (counter-cyclical relationship), although they make note that in times of exceptional economic crises the relationship might differ because of enormous income effects (which is why they show a positive relationship during 1991–1996 and with GDP). I interpret their findings as far less conclusive because important differences in the stage of economic development of different provinces over time are not accounted for and are likely to be biasing results from both the macro and micro analyses.

Key insights and implications for the illicit drug field

The previous review of the economics literature offers several important insights for those interested in trying to understand how the recent global recession is likely to impact consumption of illicit drugs and their related health harms. First, one should not draw inferences from studies that only consider the effects of individual income and employment on drug using behaviour, as the macro economy has its own direct effect on consumption of intoxicating substances that can either reinforce or offset the effects of individual income depending on the primary mechanism driving this relationship (psychological or economic). In the case of alcohol, there is strong evidence in developed countries of a pro-cyclical relationship between the macro economy and heavy drinking, suggesting that economic mechanisms dominate the psychological mechanisms for this type of drinking. It remains to be seen if this will also hold true for illicit drugs, given that illicit drug use is not as broadly socially acceptable as alcohol use.

Second, one must be careful drawing too strong of conclusions from simple prevalence measures of illicit drug use, as the effect of the business cycle on consumption of illicit drugs might depend on whether the prevalence rate more heavily represents light occa-
sional users or regular heavy users. Findings with respect to alcohol suggest that the effect of the business cycle on drinking behaviour differs between those that are already consuming alcohol regularly (the intensive margin) and those who use it infrequently or occasionally (the decision to drink, which represents the extensive margin). Therefore, the findings regarding the nature of the relationship has varied depending on which measure of alcohol use is used (e.g. Dee, 2001; Ruhrm & Black, 2002). The same may also hold true for illicit drug users. Thus, one must be careful to consider the specific measure of illicit drug use employed in various studies when trying to draw inferences from the literature.

A third insight from the economics literature is that empirical methods both in terms of model specification and controls are very important to consider when drawing comparisons across studies in main findings. A critically important factor in the alcohol literature is the inclusion or exclusion of geographically relevant (i.e. state or country) fixed effects (Dee 2001; Neumayer, 2004; Ruhrm, 1995, 2000). Excluding these fixed effects can lead to dramatically different conclusions regarding the association between the economy and alcohol consumption. However, the inclusion and exclusion of other economically relevant factors, such as personal income, can also be important as they limit the mechanisms through which the business cycle might impact alcohol use. It is very important for researchers considering the relationship between illicit drugs and the economy to evaluate the controls included in various models before drawing conclusions regarding the consistency of findings.

Finally, the economics literature reviewed here shows that it is very important to consider the homogeneity in the stage of eco-


economic development across geographic units aggregated in analyses of the impact of business cycle fluctuations on substance use, as an economic model, contradictions appear to arise but these con-


dictions are in many cases easily explained by differences in empirical specifications, measures of key variables, and inclusion or exclusion of key controls. When careful consideration is given to these factors, a few general conclusions emerge from the economics literature. First, as stated previously, in industrialised countries there appears to be a pro-cyclical relationship between the macro economy and heavy drinking, largely driven by the domination of economic mechanisms over psychological mechanisms influ-


eencing use. The pro-cyclical relationship does not hold for less developed countries where disposable income is low, possibly due to a greater share of income being spent on necessities but pos-


ibly also explained by other factors that can influence access to health care or attitudes towards drinking. Second, light drinking does not appear to have the same relationship with the macro economy as heavy drinking, suggesting that for some individuals economic downturns might in fact lead to more drinking. The het-


erogeneous response between light and heavy drinkers is likely explained by differences in the budget share dedicated to drinking between the two user groups. Like individuals from less developed countries, light drinkers dedicate a proportionately smaller share of their budget to drinking even in good economic times. Hence, the relatively smaller income response that this group experiences in an economic recession is likely to be dominated by the psychological response to find a coping mechanism. The implication is that researchers interested in understanding how illicit drug use varies with the business cycle must be careful to consider possible dif-


ferential responses across user types or inexpensive and expensive drugs as well.

Acknowledgement

This research was conducted with support from internal RAND funds to the Drug Policy Research Center.

References


Author's personal copy