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Abstract

This paper investigates the relationship between macroeconomic conditions and alcohol consumption using country-level data from 159 countries between 1961 and 2004. We use the change in per capita alcohol consumption as the main dependent variable and the growth of per capita gross domestic product as main independent variable. Overall, we find a robust procyclical relationship. Furthermore, our results suggest that whereas high-, middle-, and low-middle income countries show a clear procyclical trend, drinking behavior in low-income countries remains largely unchanged following macroeconomic shocks. Studying different alcoholic beverages, our results indicate that the consumption of spirits is most sensitive to economic swings, whereas the consumption of wine and beer is less elastic.

JEL classification: I120; E320
Keywords: Macroeconomic conditions; alcohol consumption; economic growth

1. Introduction

The recent global economic downturn has called for increased scientific exploration between the macroeconomic climate and health. The World Health Organisation (WHO) has recently attempted to develop a monitoring framework of health impact assessment, to evaluate evidence of changes to health outcomes associated with the economic crisis, whilst at the same time recognising the need to target and prioritise certain areas within health. Alcohol consumption is a particular area of interest because it is recognized to be sensitive to changes in the economy, and at the same time, is known to have major effects on health. Excessive consumption of alcohol is associated with over 60 diseases including cirrhosis, cardiovascular and psychological issues (Rehm et al 2003), intentional and unintentional injuries such as road traffic

accidents, violence and burns. Indeed, every year an estimated 2.3 premature deaths worldwide are attributable to alcohol (WHO 2009) and as such identifying factors associated with alcohol consumption is crucial for curtailing morbidity and mortality. The economic climate is one such factor.

This study quantifies statistically the relationship between economic growth and alcohol consumption. To date most studies have been unable to take a panel perspective owing to lack of data, however by taking advantage of a newly available dataset this paper provides a unique international perspective for 159 countries over 45 years between 1961 and 2004. It tests whether GDP growth is a key driver of consumption, in addition to unemployment as in previous studies. Three key questions are addressed:

1) How do macroeconomic conditions affect alcohol consumption?
2) Does a country's level of economic development influence alcohol consumption?
3) Are varying types of alcoholic beverage (beer, wine, spirits) affected differently by changes in the economy?

Our investigation confirms that alcohol consumption is affected by GDP growth, hence patterns are largely procyclical. This is in line with existing research that have used national data. In addition, we show that changes in consumption depend on average per capita income. When countries are classified by level of economic development, however, we find strong procyclical effects in high, middle, and lower-middle income countries, but no such effect in low income countries. Finally, studying certain types of alcohol, our results suggest that the consumption of spirits fluctuates more widely than the consumption of wine and beer.

The paper is structured as follows: We first give a short overview of existing literature on the topic. The data source and descriptive statistics are then presented, after which the basic econometric model is outlined. Results and robustness checks follow. The paper ends with a discussion and general conclusion.

2. Background

Previous work on the associations between alcohol consumption and the macro-economy has tended to focus on national outcomes rather than taking an international perspective. Of the few who use panel data, Ruhm (1995) argues that alcohol consumption and the economy are related in a pro-cyclical manner in the United States[1]. Ruhm's conjecture is that people spend less on alcohol and more on necessities in times of hardship. As levels of unemployment rise and earnings fall, health insurance coverage suffers and health necessarily deteriorates. Ruhm also finds that alcohol consumption and deaths from vehicle accidents are pro-cyclic, with variables of particular interest including taxes on beer - which is inversely related to consumption and vehicle fatality rates – suggesting that economic conditions influence health through income and price variables. By breaking down alcohol into three categories (wine, beer, liquor), he shows that liquor is most sensitive (highly income elastic) to the state of the economy, with a one percent increase in unemployment lowering the predicted consumption of liquor by over 1.1%. The respective figures for beer and wine are around 0.4% (Ruhm 1995:595). Using slightly different econometric techniques, Freeman (1999) also finds similar results to Ruhm.

Other pro-cyclic mechanisms have also been hypothesised. In downturns, people may fear job loss and therefore act in a more risk-averse manner by spending more time working and be less inclined to spend time socialising and drinking – in other words, the opportunity cost of losing their jobs may be increased as employment becomes harder to find (Catalano et al 1993) and individuals substitute work for leisure. Thus, as the economy deteriorates, alcohol consumption may fall. Similarly, as the economy grows, individuals are more able to spend money on alcohol, there may be more reasons to celebrate and be in more care-free moods to consume alcohol (Skog 1986, Ruhm 1995).

Those arguing that counter-cyclic patterns dominate infer that rises in unemployment will induce a self-medication mechanism, where people attempt to lower their stress via drinking (Baker 1985; Karasek and Theorell 1990; Fenwick and Tausig 1994; Sokejim and Kagamimori 1998). Over a certain threshold this can lead to abusive and

[1] Which then implies that health *outcomes* are countercyclical to economic growth

risky behaviour (Brenner and Mooney 1983; Winton et al 1986; Pierce et al 1994). For example, Davalos et al (2011) use data from USA to show how state unemployment rates are positively associated with a rise in probability of excessive drinking. Loss of inhibition may also be related to less care about losing one's job especially where working hours may already have been reduced and job prospects are bleak. Thus, a downturn could be associated with heavy time discounting and rises in current alcohol consumption. However, Ruhm and Black (2002) argue that such stress-induced rises in consumption are over-ridden by falls in consumption owing to unfavourable economic conditions, and that changes in consumption are concentrated among heavy drinkers, with light drinking increasing slightly during bad times.

Alcohol consumption patterns vary according to geographic location and economic development. The overriding trend indicates that developed economies, on the whole, drink more, (although their consumption has levelled out since the 1980s (WHO 2007:11)) whilst those on the Indian subcontinent and countries with a strong Islamic influence consume considerably less (WHO 2007:11). The WHO notes; 'the general rule seems to be that alcoholic beverage consumption rises with improving economic circumstances..' (WHO 2007:12). In line, developing countries are argued to have experienced a sudden rise in alcohol consumption as increased trade and globalisation have allowed for better availability and access to alcohol. For example, Brazil has seen a tripling of consumption since the 1960s, from 2 litres to 6 litres per capita for those aged 15 years and over (Caetano and Laranjeira 2006:149). A similar rise is seen in Asia's consumption (WHO:2007 11)

The main type of alcohol consumed – and hence their corresponding elasticities - also varies across the world. Overall, alcohol is conventionally a 'normal good' but when subdivided into the three main categories of spirits, wines and beers, different patterns of consumption are observed. McKee (1999) writes that in Russia, consumption is skewed towards spirits (vodka), and is drunk in binges rather than in small quantities. At the individual level, Clements and Selvanathan (1991) calculate beer and wine to be necessities, whilst spirits are demonstrated to be a strong luxury. Further, they find beer and spirits to be complements (a rise in relative price of spirits decreases beer consumption; the marginal utility of beer increases with additional consumption of spirits), and the preference for wine is independent of beer and spirits. However,

Nelson (1997) finds that the all three types of alcohol are substitutes for one another. Thus, income and cross elasticities of demand dictate consumption patterns. If beer and spirits are complements one might speculate consumption of spirits to fall in line with decreases in beer consumption. If they are instead substitutes, a rise in consumption of one will be associated with a fall in consumption of the other. Similarly, if certain alcohol types are considered necessities, the consumption of these goods may not be much affected by the state of the economy.

2. Data source and descriptive data

2.1. Data source

Given the significant impact of alcohol consumption on health, WHO has undertaken major efforts to develop a comprehensive database on worldwide alcohol consumption, named the 'Global Information System on Alcohol and Health'. This database contains a wealth of information about alcohol consumption, related harms and consequences, economic aspects and alcohol control policies. Basic data on alcohol consumption are available since 1961, whereas more recent years allow for more comprehensive data..

Datasets are compiled from a wide array of sources, but three sources dominate. Firstly, in countries where health authorities lack the resources to monitor alcohol use, estimates of per capita alcohol consumption have generally originated from alcohol industry sources. Secondly, countries use retail sales data for tax collection purposes. This provides a very accurate estimate of the amount of alcohol consumed by the population in a given year.[2] Data on the production and trade of alcoholic beverages can also be used to estimate these variables. Thirdly, alcohol consumption are estimated through national population surveys, which offer additional information such as drinking patterns and behaviour. However, the lack of a global consensus on survey questions, time frames and definitions of terms does not allow one to use these types of studies for cross-country analysis. To improve this situation, the WHO has developed and published an international guide for monitoring alcohol consumption

[2] Even these data may not necessarily reflect consumption, since beverages purchased in a given year may not be consumed in that year.

and harm that in the longer term aims to improve the quality and comparability of alcohol-related data. Furthermore, WHO has undertaken substantial efforts to ensure that data fulfill basic data collection standards such as timeliness and consistency.

Dependent variable

Our key variable is per capita consumption of alcohol per year by persons above the age of 15. The total alcohol consumption per capita is the sum of alcohol consumption consisting of beer, wine, and spirits.[3] Data by types of alcohol are also available for a substantial number of countries and thus for analysis.

One major problem when working with alcohol data is that some countries report zero consumption of alcohol. This may be for cultural (eg religious) or political reasons, or both. For example, Iran reported positive per capita alcohol consumption prior to the political change in 1979 but zero afterwards. In order to control for these changes that most likely do not reflect real change in consumption, we excluded all countries that report in one or more year zero per capita alcohol consumption.

For specific types of alcohol the question of zero observations countries becomes even more relevant. Again, one might conjecture that for cultural or political reasons the consumption of certain types of alcohol might not be recorded. However, it could also be that specific types of alcohol are traditionally not consumed and that economic growth triggers a change in lifestyle and hence consumption. We find that in case of beer about 2 % of all observations are zero, for wine, 16 % and for spirits, 11 %. As it is extremely difficult to know whether the zero observations stem from cultural/religious change that are unrelated to economic growth or whether economic growth caused the change in consumption, we have excluded all countries with zero observations for specific alcohol groups.

We include a maximum number of 159 countries in our study (see annex).[4] Our main sample on alcohol consumption of persons above the age of 15 covers 44 years (1961 to 2004) and thus 6996 possible observations (159x44). It is an unbalanced panel, as

[3] WHO estimates amount of pure ethanol in litres in every category.

[4] Strictly speaking not all observational units are countries, some of them are territories belonging to a certain country, but for which separate data has been collected, e.g. French Polynesia.

the dependent variables were not available for all years[5]. In order to test the robustness of our results, we create, among others, a balanced panel and rerun the estimations.

Our main explanatory variable, growth of GDP per capita, is the key proxy measuring the macroeconomic condition.[6] We calculate the growth of per capita GDP by simply dividing GDP by the country's population and calculating the growth rate year on year. Inflation is used as additional macro variable. We conjecture that the inflation rate provides a valid measurement of prices changes, which might also impact the price and hence the consumption of alcohol. In the majority of studies, such as Ruhm (1995, 2000), unemployment is used as main explanatory variable. We decided not to include unemployment data in our analysis as unemployment data is very often not comparable across countries and/or not available for most countries for the relatively long time period that we are covering. Finally, we add export growth as another economic variable. A country's degree of outward orientation (proxied by export growth) may be associated with trade and cross cultural influences, which in turn may influence alcohol consumption. Finally, our regressions will be augmented with two more variables, namely population growth as well as the growth in life expectancy. We suspect that both variables provide some indication of the relative size of the population that potentially consumes alcohol.

3.2. Econometric Model

Our basic econometric specification is the following:

$$lnAlc_{it} = \alpha_{it} + \beta \ln X_{it} + \ln E_{it} + \delta_t + \varepsilon_{it} \qquad (1)$$

where Alc_{it}measures the alcohol consumption per capita, for country *i* in year *t*. X is the vector of covariates (in most specifications it is the growth in GDP per capita) in country *i* and year *t*. E represents other socio-economic conditions at the national level

[5] In case of alcohol consumption 1376 are missing, for beer consumption 1400 are missing, 1622 for wine and 1773 of spirits.
[6] Data source: World Development Indicators, World Bank.

i and year *t*. ε is the disturbance term, and α and δ represent unobserved determinants of alcohol use associated with the country and year of the consumption. [7]

As we work with a panel data set, we first test whether a fixed or random effects model is more appropriate using a Hausman test. We then also use a Breusch and Pagan Lagrangian multiplier test for random effects to check whether pooled GLS might better estimate the model.

As we know that consumption of beer, wine and spirits are, to a certain extent, substitutes, the seemingly unrelated regression approach is selected to estimate the relationship between the change in consumption of all different types of alcohol (beer, wine, as spirits) and economic growth. Finally, we will run different robustness checks (including the transformation of the unbalanced panel into a balanced panel) for confirmatory analysis.

4. Estimation Results

4.1. Baseline Regressions: Drinking is procyclical

In equation (1) α_i is an individual effect that can be treated as fixed or random. Columns 1 to 3 in table 2 therefore present results for fixed effects whereas columns 4 to 7 present random effects models. All models use logged variables and are shown in a stepwise manner. In columns (1) and (4) we use per capita GDP growth as the sole explanatory variable. The coefficient for growth in per capita GDP is statistically significant at the 1 % level and close to 0.1. In columns (2), (3), (5) and (6) we add additional variables, namely the level of GDP per capita, inflation, and export growth. Inflation and export growth are insignificant in models 1-6 and despite these additional controls, GDP growth retains its significance throughout, and the magnitudes of the coefficients do not change by much.

Appling a Hausman test to models (2) and (3) against models (5) and (6) we find that they the latter are indeed very similar (insignificant P-value, Prob>chi2 = 0.6549). Further, using a Breusch and Pagan Lagrangian multiplier test for random effects versus pooled OLS, we obtain a P-value that is smaller than 0.1 (Prob > chi2 =

[7] Before taking the logarithm, we add 1 to all observations in order not to lose any observation.

0.0317) and therefore choose the RE model. Finally, in column (7) we add two more variables, namely population growth as well as the growth in life expectancy. However, none of the latter variables turns out to be statistically significant.

Overall, our estimations indicate a positive relationship between the growth in GDP per capita and the consumption of alcohol. The higher the level of GDP per capita the more prominent this relationship seems to be.

Table 1: Baseline Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per capita growth	0.088***	0.088***	0.094***	0.091***	0.095***	0.100***	0.066**
	(0.031)	(0.031)	(0.034)	(0.032)	(0.032)	(0.035)	(0.033)
GDP per capita		-0.011***	-0.010***		-0.003**	-0.003*	-0.008**
		(0.003)	(0.003)		(0.002)	(0.002)	(0.004)
Inflation			-0.006			-0.009	-0.034**
			(0.011)			(0.010)	(0.015)
Export Growth			-0.010			-0.003	0.002
			(0.042)			(0.037)	(0.027)
Popul. Growth							0.240
							(0.430)
Life exp. Growth							-0.200
							(0.745)
Constant	4.198***	4.273***	4.320***	4.184***	4.191***	4.221***	4.333
	(0.144)	(0.149)	(0.297)	(0.148)	(0.148)	(0.277)	(3.987)
Observations	4829	4829	4496	4829	4829	4496	1121
Nbr of countries	159	159	155	159	159	155	53
Estimation	FE	FE	FE	RE	RE	RE	RE
R-squared	0.004	0.006	0.007	-	-	-	-

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

We then turn to our second research question, which investigates whether a country's economic development (as measured by income per capita) has any differing impacts on alcohol consumption. We do this by grouping our countries into one of four categories. A country is considered to be low income if per capita income is below $500; low middle income if it is $500-$2000; middle income if $2000-$8000 and high

income if it exceeds $8000. The thresholds were chosen based on a categorization provided by the World Bank applicable during the period of our panel. Where countries have changed income categories over time, they have been double counted, hence the total sum of countries is higher than 159. Over the whole period, 38 countries were classed as belonging in the high income category, 80 in middle income, 101 in low-middle and 79 in the lowest category.

The estimation results are presented in Table 2. Comparing the coefficients for per capita growth, we observe that high-income countries (column (1)) have the highest elasticity. High GDP growth boosts alcohol consumption as indicated by significantly positive coefficients. Middle and low-income countries demonstrate the same procyclical behavior, but to a lesser extent. Interestingly, the coefficient on per capita growth for low income countries (column 4) suggests that whilst the relationship may be pro-cyclical, such effects are not significant. Thus, low-income countries do not seem to adjust their drinking behavior according to economic conditions.

Table 2: Random effects estimations by income groups

Country Group:	High	Middle	Low-Middle	Low
	(1)	(2)	(3)	(4)
Per capita growth	0.139**	0.066**	0.094**	0.081
	(0.058)	(0.033)	(0.040)	(0.074)
GDP	-0.043	0.031	0.060*	0.019
	(0.082)	(0.033)	(0.037)	(0.040)
Inflation	0.011	0.071*	0.031	-0.020
	(0.054)	(0.038)	(0.037)	(0.035)
Export Growth	0.006	-0.012	-0.009	-0.009
	(0.008)	(0.013)	(0.016)	(0.011)
Popul. Growth	0.088	0.007	-0.002	-0.013)
	(0.092)	(0.017)	(0.014)	(0.020)
Life exp. Growth	0.181	-0.044	-0.014	-0.018
	(0.118)	(0.036)	(0.040)	(0.057)
Constant	2.799***	4.109***	3.881***	4.438***
	(0.944)	(0.425)	(0.368)	(0.535)
Observations	680	902	1299	1419
Number of countries	38	80	101	79

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

4.2. Lags, Balanced Panel and Different Types of Alcohol

One might conjecture that economic booms and busts might not only have a contemporaneous impact on alcohol consumption, but also with a delay in time. In order to take into account the dynamics of the adjustment process, we include lags for our key explanatory variable, growth in per capita income. Table 3 presents the results, starting in column (1) which shows the simplest specification with only one lag. Whereas the first lag is statistically significant and positive, adding an additional lag (column (2)) has no effect. Comparing all four estimations, we notice that the first lag is positive and statistically significant in three out of four cases. Therefore the effect of a higher consumption seems partly due to a delayed effect. One explanation might be that because of the addictive nature of alcohol, some drinking habits change only very slowly, even when individuals face changing economic conditions.[8] [9]

Table 3: Random effects estimation including lags

	(1)	(2)	(3)	(4)
Per capita growth	0.084**	0.084**	0.087***	0.091**
	(0.033)	(0.034)	(0.033)	(0.036)
Per capita growth (L.1)	0.041*	0.040*	0.044**	0.036
	(0.022)	(0.024)	(0.022)	(0.023)
Per capita growth (L.2)		0.002		
		(0.024)		
GDP per capita			-0.003*	-0.002
			(0.002)	(0.002)
Inflation				-0.006
				(0.010)
Export Growth				-0.013
				(0.037)
Constant	4.023***	4.022***	4.019***	4.126***
	(0.146)	(0.183)	(0.146)	(0.279)
Observations	4702	4573	4702	4401
Number of countries	159	158	159	155

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

In our sample, certain countries have not reported any data, or have reported zero consumption for different time periods. In order to achieve a more balanced panel, we limit the sample to the 102 countries in which data on consumption are complete for

[8] We have also tested for autocorrelation of the error term (STATA: xtserial), but the latter does not seem to be relevant in our sample.
[9] See Becker and Murphy (1988) for a theoretical model on addictions.

the years 1961 to 2003.[10] The same regressions as table 2 are run, and presented in table 4.

Table 4: Baseline regressions applied to balanced panel

	(1)	(2)	(3)	(4)	(5)
Per capita growth	0.074**	0.073**	0.077**	0.092**	0.056***
	(0.034)	(0.035)	(0.036)	(0.041)	(0.019)
GDP per capita			-0.003**	-0.003*	-0.008***
			(0.001)	(0.001	(0.002)
Inflation				-0.006	-0.022
				(0.011)	(0.022)
Export Growth				0.051**	0.059*
				(0.022)	(0.033)
Population Growth					0.118
					(0.402)
Life exp. Growth					(0.663)
					(0.454)
Constant	4.266***	4.268***	4.275***	3.991***	6.762**
	(0.16)	(0.165)	(0.165)	(0.256)	(2.96)
Observations	3676	3676	3676	3471	844
Number of countries	102	102	102	101	32
Estimation	FE	RE	RE	RE	RE
R squared	0.004	-	-	-	-

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

The results are very similar to that reported in Table 1. We find a robust and positive relationship between GDP per capita growth and alcohol consumption per capita. The Hausman test again favors RE estimations.

Applying RE estimations, we find that the coefficients are slightly lower compared to Table 1. The coefficient for the level of GDP per capita remains negative and statistically significant at the 10 % level in the two specifications. Interestingly, the coefficient that measures the openness of a country to trade (in terms of exports) is now statistically significant. Economies with a high growth rate in exports seem to

[10] For the year 2004, only 4 countries had already reported their consumption level and therefore we set the threshold at 43 years of reporting.

change their consumption of alcohol more markedly than economies with lower growth in exports.

Finally, we turn to our third research question, which asks whether economic growth has differing effects on the consumption of alcohol by type. . Since the consumption of the three are not interdependent, we apply a seemingly unrelated regression (SUR) to exploit the fact that SUR has only recently become available for unbalanced panels (Biorn, 2004).

Results show that all types of alcohol are positively linked to economic growth. The higher the alcohol content (lowest content found in beer, then wine and highest in spirits), the higher is the coefficient. The consumption of 'harder' alcohol therefore seems to be particularly elastic to changes in macroeconomic conditions. .

Table 5: Seemingly unrelated regression (SUR) in unbalanced panel data set

	Growth in beer cons.	Growth in wine cons.	Growth in spirits cons.
Per capita growth	0.497***	0.559***	0.583***
	(0.005)	(0.004)	(0.003)
GDP	-0.030***	-0.032***	-0.020***
	(0.001)	(0.001)	(0.001)
Inflation	0.103***	0.052***	0.077***
	(0.004)	(0.003)	(0.002)
Export Growth	0.434***	0.434***	0.365***
	(0.005)	(0.004)	(0.003)
Nbr. of Obs.	3273		
Nbr. of groups	34		

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

5. Discussion

Using panel data, this study has found a significantly positive link between macroeconomic conditions and alcohol consumption. This study adds to the current literature in three ways. Firstly, it is the only study that investigates the relationship at the international, rather than national, level. Secondly, we show that there is

substantial variation in consumption according to their level of economic development. Whereas low-income countries show no clear reaction to changes in the economic environment, countries with higher per capita income demonstrate a clear pro-cyclical drinking pattern. Thirdly, at the international level we observe that the reaction is different with respect to the type of alcohol. In particular, beer consumption seems to be the least sensitive to economic swings.

The study stands to confirm the pro cyclical behavior found in national level studies. It appears that in booms alcohol consumption rises, whereas in busts consumption falls. This lends support to Ruhm's hypothesis that people spend less on alcohol and more on necessities in times of hardship. Further, the finding that low income countries are less prone to adjust their drinking behaviour according to economic conditions suggests that individuals in these countries choose to finance other activities than drinking in times of hardship. Given that data are based on official sources, there is also the possibility of under reporting of alcohol consumption in lower income countries. This is particularly the case in countries where underground markets thrive (eg certain years in Russia, Mckee 1999) and home brewing is common. The WHO (2007:10) estimates that 90% and 85% of all alcohol consumed in Tanzania and Kenya respectively, is unregistered.

By breaking down alcohol into three categories (wine, beer, spirits), we found that consumption varies linearly by alcoholic content. Spirits demonstrated the highest income elasticity, the intuition being that such drinks are often relatively more expensive than wine or beer in many countries. This finding is in line with Ruhm (1995) who calculates a one percent increase in unemployment to lower the consumption of liquor by over 1.1%. The respective figures for beer and wine are around 0.4% (Ruhm 1995:595).

Given that excessive alcohol consumption has negative effects on health, it may be possible to conjecture that economic downturns are actually good for health. However, any positive gains are likely to be too small to outweigh the possible negative effects resulting from economic busts. Economic downturns have detrimental effects on numerous factors that directly impact health outcomes. Typically, decreased spending for health care at the individual and governmental level

has a substantial impact on health outcome in the short- and long-run. Our results should therefore not be understood as a call for less spending on health in time of economic crisis, but rather to shed new light on some linkages and to contribute to a more informed discussion on how to react most appropriately to major challenges arising from changes in the economy.

The use of cross-country data in this study has several drawbacks. It is not possible to control for individual behavior, such that whilst overall trends are procyclic, it may be that consumption among some groups are more sensitive than others in economic cycles, with considerable negative impact on health outcomes (Black and Ruhm, 2002). For example, consumption might decline in bad times among employed persons, while the unemployed increase their intake. The potential differences can also run across other variables, such as sex, age groups, which cannot be controlled for in our study.

However, studies that analyse the link between economic conditions and microdata have not yet yielded conclusive results. For example, Ettner (1997) finds that in the USA, alcohol consumption and dependence are procyclical, but with mixed effects of involuntary unemployment. Dee (2001) obtains contradictory results since he shows that economic downturns are associated with reductions in overall drinking, but with a higher likelihood of consuming more drinks on a single occasion. Covering a longer and more recent time period, Ruhm and Black (2002) confirm a procyclical variationand that the decrease in difficult economic times is concentrated among heavy drinkers.

The precise amount and nature of alcohol intake might also be important to evaluate the final health impact, given that some studies indicate moderate intake of alcohol to have beneficial effects on health (e.g. Gaziano et al, 1993).

Finally, the direction of association also remains to be investigated. Brenner (1975) proposes that alcohol has both indirect and direct effects on GDP. This is shown to be the case in Russia, where in 1985 Gorbachev started an anti-alcohol campaign, raising the price of alcohol, banning drinking in public places and even on state occasions. The health and life expectancy of Russians improved dramatically with falls in road

traffic accidents, absenteeism and morbidity caused by alcohol (McKee 1999). Indirectly, it could be argued that this national policy had mixed effects on GDP: in the 1980s, before the policy, between 75-90% of absences from work were attributable to alcohol, with the loss of productivity estimated to be up to 20% (McKee 1999, 826). The national ban would have had positive effects on GDP as productivity increased, but official figures also suggest a fall of a third in production of spirits, with serious consequences for government revenue (McKee 1999, 827). A new report analysing the contribution made by beer on the European economy also suggests significant direct and indirect impacts related to jobs, value added and consumption (Brewers of Europe/E&Y).

6. Conclusion

The findings of this study provide important input to the current efforts by the WHO to better understand the impact of economic crises on public health. The interlinkages between economic condition and public health outcomes are complex, as public health depends on numerous determinants and transmission mechanisms which are not identical among countries. The only possible approach is to study specific linkages, such as the change in certain risk factors due to macroeconomic shifts. Alcohol consumption is a key risk factor of disease and as such, a better understanding of the response of alcohol consumption to macroeconomic swings constitutes a very relevant contribution to public health policy.

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8. Annex

List of countries:

1	Albania	57	French Polynesia	113	Niger
2	Algeria	58	Gabon	114	Nigeria
3	American Samoa	59	Georgia	115	Norway
4	Angola	60	Germany	116	Pakistan
5	Antigua and Barbuda	61	Ghana	117	Panama
6	Argentina	62	Greece	118	Papua New Guinea
7	Armenia	63	Greenland	119	Paraguay
8	Aruba	64	Grenada	120	Peru
9	Australia	65	Guam	121	Philippines
10	Austria	66	Guatemala	122	Poland
11	Azerbaijan	67	Guinea	123	Portugal
12	Bahrain	68	Guinea-Bissau	124	Republic of Moldova
13	Belarus	69	Guyana	125	Romania
14	Belgium	70	Haiti	126	Russian Federation
15	Belize	71	Honduras	127	Rwanda
16	Benin	72	Hungary	128	Saint Kitts and Nevis
17	Bermuda	73	Iceland	129	Saint Lucia
18	Bhutan	74	India	130	Saint Vincent and the Grenadines
19	Bolivia	75	Indonesia	131	Samoa
20	Bosnia and Herzegovina	76	Iraq	132	Sao Tome and Principe
21	Botswana	77	Ireland	133	Senegal
22	Brazil	78	Israel	134	Serbia and Montenegro
23	Brunei Darussalam	79	Italy	135	Seychelles
24	Bulgaria	80	Jamaica	136	Sierra Leone
25	Burkina Faso	81	Japan	137	Singapore
26	Burundi	82	Jordan	138	Slovakia
27	Cambodia	83	Kazakhstan	139	Slovenia
28	Cameroon	84	Kenya	140	Solomon Islands
29	Canada	85	Kiribati	141	South Africa
30	Cape Verde	86	Kyrgyzstan	142	Spain
31	Central African Republic	87	Lao People's Democratic Republic	143	Sri Lanka
32	Chad	88	Latvia	144	Sudan
33	Chile	89	Lebanon	145	Swaziland
34	China	90	Lesotho	146	Sweden
35	Colombia	91	Liberia	147	Switzerland
36	Comoros	92	Libyan Arab Jamahiriya	148	Syrian Arab Republic
37	Costa Rica	93	Lithuania	149	Tajikistan
38	Croatia	94	Luxembourg	150	Thailand
39	Cuba	95	Madagascar	151	Timor-Leste
40	Cyprus	96	Malawi	152	Togo
41	Czech Republic	97	Malaysia	153	Tonga
42	Côte d'Ivoire	98	Mali	154	Trinidad and Tobago
43	Denmark	99	Malta	155	Tunisia
44	Djibouti	100	Mauritania	156	Turkey
45	Dominica	101	Mauritius	157	Turkmenistan
46	Dominican Republic	102	Mexico	158	Ukraine
47	Ecuador	103	Mongolia	159	United Kingdom of Great Britain
48	El Salvador	104	Morocco	160	United Republic of Tanzania
49	Equatorial Guinea	105	Mozambique	161	United States Virgin Islands
50	Eritrea	106	Myanmar	162	United States of America
51	Estonia	107	Namibia	163	Uruguay

52	Ethiopia	108	Netherlands	164	Uzbekistan
53	Faroe Islands	109	Netherlands Antilles	165	Vanuatu
54	Fiji	110	New Caledonia	166	Viet Nam
55	Finland	111	New Zealand	167	Zambia
56	France	112	Nicaragua	168	Zimbabwe