The social context and the effect of alcohol consumption on economic behaviour

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Abstract

The paper studies how the acute effects of alcohol consumption affect economic behaviour, and in particular risk attitudes, willingness to pay, altruism, optimism and impatience. The paper aims at disentangling its pure pharmacological effect from that attributable to its interaction with the social context in which drinking takes place. Towards this goal we analyze the issue from two distinct but complementary viewpoints: the lab and the field.

In the field subjects self-select into the treatment, and many other relevant factors are at work in the social context where alcohol is consumed. By contrast, in the lab we plan to identify the pure pharmacological causal effect of alcohol, by means of an experiment in which economically motivated subjects are randomly assigned either to the treatment or to the control group.

Preliminary evidence based on pilot experiments shows mixed results about risk aversion. No significant effect emerges as far as willingness to pay, altruism, and optimism are concerned. Time preferences seem to be characterized by a counterintuitive result: the consumption of alcohol is associated to a significant decrease of impatience.

JEL codes: D10; I12

Keywords: alcohol consumption, risk attitude, altruism, willingness to pay

Introduction

There is a widespread consensus and social alarm on the potential costs of alcohol consumption, and especially of alcohol abuse, both at the individual and at the social level.

The empirical literature shows that alcohol consumption and abuse, especially (but not only) among adolescents, are related to a number of risky or harmful behaviours, ranging from driving under the influence and associated traffic fatalities (Dee, 1999; Levitt and Porter, 2001) to truancy and high-school drop out (Koch and McGeary, 2005; Chatterji and DeSimone, 2005; Duarte and Escario, 2006), from lower labour productivity and worse labour market outcomes of young adults (Chatterji and DeSimone, 2006) to health diseases (Dills and Miron, 2003), and from risky sexual behaviour (Grossman, Kaestner, and Markowitz, 2005; Grossman and Markowitz, 2005) to violent crimes (Markowitz, 2005).

Yet correlations need not reflect causality. In particular, since individuals self-select into drinking habits, in most empirical studies it is hard to identify to what degree alcohol causes risky or harmful behaviours. In particular, it is hard to disentangle the pure effects of alcohol from context and peer effects (Kremer and Levy, 2008). The latter has received increasing attention in recent years, with studies focusing, for instance, on the effects of fraternity membership (DeSimone, 2007, 2009), of social life and family influence (Buonanno and Vanin, 2007) and of having the "wrong" friends (Lundborg, 2006).

Alcohol might be associated to risky behaviours because it induces a change in attitudes towards risk. A number of studies have investigated the relationship between alcohol and risk preferences. Unfortunately, this literature has not so far yielded conclusive results. Some studies (Sjoberg, 1969; Cutter, Green, and Harford, 1973; Meier, Brigham, Ward, Myers, and Warren, 1996; Breslin, Sobell, Cappell, Vakili, and Poulos, 1999) find no or mixed effects of alcohol on risk attitudes. Abrams, Hopthrow, Hulbert, and Frings, 2006 (2006) find that after moderate alcohol consumption risk propensity is less likely to emerge in groups than individually. Lane, Cherek, Pietras, and Tcheremissine (2004) finds in a lab experiment a positive pharmacological effect of acute alcohol administration on risk taking, whereas Cortès Aguilar, Espin Martin, Exadaktylos, Segun, Palacios Garcia, and Proestakis (2008) find a negative effect on risk taking of actual (for women) and perceived (for men) alcohol levels collecting data on the field.

Other related experiments investigate the effects of altering mental conditions in various ways. Among them, Kosfeld, Heinrichs, Zak, Fischbacher, and Fehr (2005) find that oxytocin increases trust in humans and Ariely and Loewenstein (2006) investigate how sexual arousal influences preferences and behaviour.

A significant effect of alcohol consumption would be extremely valuable also from a methodological point of view. In fact, a growing behavioural economics literature supported by neuroscientific evidence started modelling the decision process as a compromise between deliberation and emotions. For instance Loewenstein and O'Donoghue (2007) posit that the affective system has initial control, but that the deliberative system can influence behaviour through the exertion of willpower. Cognitive load moves away from the deliberative optimum towards the affective optimum. Alcohol consumption could be a precious instrument that exogenously shifts the weight from deliberation to emotions in the decision making process, thereby allowing to test such theories. In what follows we borrow heavily from this paper to derive some testable implications for our experiment.

Data gathered in the field about the acute effect of alcohol suffer the problem of self-selection into the treatment (in our case alcohol consumption). Hence, any correlation between alcohol consumption and economic behaviour can be spurious. Moreover, the effect of alcohol is likely to

interact with the social context in which drinking takes places. A randomized experiment in a controlled setting is therefore necessary to isolate the pure pharmacological effect of alcohol.

The treatment consists in drinking a quantity of alcohol, tuned according to subjects' gender and weight, which should result in a Blood Alcohol Concentration (BAC) not too far from 0.8g/l (or, 0.08%, i.e. the legal intoxication threshold for the purpose of driving in many countries like the US and the UK).

The control consists in drinking a placebo, i.e. an alcohol-free long-drink equal at first sight to the one used in the treatment, so that all participants think they have been exposed to alcohol consumption. Of course, proper tricks are adopted to prevent subjects from distinguishing if what they drink contains alcohol or not.

In this way we isolate the pure pharmacological effect of alcohol, also net of the belief of having drunk, on subjects' economic behaviour and in particular on their risk attitude, willingness to pay, altruism, optimism, and impatience.

At the moment only preliminary evidence is available, based on 27 observations gathered in the field (2 sessions in a wine bar and 1 in a disco club) and on a pilot randomized experiment involving 12 subjects at a party. Pilot sessions have also been used to refine the design of the experiment that has partially changed over time. This is the reason why data from the field and from the pilot randomized experiment are not fully comparable, and why for some treatments data are available only for some sessions. The design has now reached its final version, apart from possible small changes, and it is ready to be implemented in the lab at the University of Milan, but we have been struggling for some time to get the approval of the ethical committee.

Preliminary evidence in the field shows a slight decrease of risk aversion attributable to the alcohol level not perceived by the subjects, while opposite emerges from the pilot randomized experiment. No significant effects emerge as far as willingness to pay, altruism, and optimism are concerned. Time preferences seem to be characterized by a counterintuitive result: the consumption of alcohol is associated to a significant decrease of impatience.

The paper is organized as follows: Section 1 summarizes our testable implications. Section 2 describes the design of the experiment. Section 3 presents the preliminary results gathered in the field (Section 3.1) and with a randomized pilot experiment (Section 3.2). Section 4 concludes. Instructions are attached in Appendix.

1. Testable implications

The following are the testable implications that we intend to test with our experiment. Some (1a, 2, 4, 6) are straightforwardly derived from common wisdom, which also explains alcohol consumption because inducing a pro-social behaviour. The others are taken from Loewenstein and O'Donoghue (2007). Testable implications 2 and 4 are also important because optimism and willingness to pay may act as confounding factors when measuring risk attitudes. In fact, what can be measured as risk propensity might actually hide a misperception of probabilities or an altered evaluation of the money at stake.

- **1a.** Drinking should be associated to a higher risk propensity.

- **1b**. BAC raises the lottery selling price when this is above the expected gain, and lowers it when it is below (i.e., it reinforces both risk love and risk aversion) implies that a higher BAC should imply an increasing insensitivity to probability changes in the middle range.

- **2.** Alcohol consumption should increase willingness to pay, particularly for items that are context-specific.

- **3.** Drinking reduces altruism at low levels of sympathy, but increases it at high levels.

- **4.** BAC increases optimism

- **5.** Alcohol raises myopia when the trade-off is between present and future, not when it is entirely in the future

- **6.** BAC reinforces happiness and trust

➢ 2. Experimental Design

The randomized experiment at the University of Milan will involve 120 non-teetotal voluntary students. Such a number is a good compromise between budget reasons and statistical significance of the results.
The choice of students is due to the fact that, besides being easier to recruit than other categories, they are the ideal term of comparison with the data gathered in the field, since alcohol consumption is particularly high among young people, often as part of their social activities.
They will be recruited with mailing list systems, announcing that the experiment might involve the consumption of a moderate quantity of alcohol. We require that volunteers already consumed alcohol before in their life without experiencing any problem, and that their physical and mental health do not advise against the consumption of a moderate amount of alcohol.

On arrival at the laboratory, participants will be reminded that the experiment might involve the consumption of a moderate quantity of alcohol and that they could withdraw from the study at any time without forfeiting their participation fee (5€). Then they will be asked to sign a consent form.

Subjects will randomly draw a number representing their ID during the experiment. On the one hand the number will ensure that all their choices during the experiment will be anonymous, since this number that they will type on the PC is the only way to link each participant to the amount of money (s)he will earn. On the other hand, the number (even Vs. odd) will also randomly assign them to the alcohol Vs placebo group, something about which they are obviously unaware.

Participants will be weighed and they will have their blood alcohol concentration (BAC) analyzed with a Lion500 professional alcolmeter, to ensure that they had no alcohol in their bloodstream prior to the experiment. Those for whom the test should reveal a positive level of alcohol will be asked to leave. Whether each subject can fit for our experiment or not will also be evaluated by a doctor by means of a medical examination and maybe of a transaminase test [compulsoriness of the latter depends on the final decision of the ethical committee].

All participants will be given a very strong tasting lozenge (“Fisherman’s Friend”) to disguise the taste of the drink. In the alcohol condition, participants will have to drink a mixture of tequila (40% alcohol by volume at 1-1.2g of ethanol per kg of body weight, the exact quantity depending on gender and drinking habits) mixed with equal parts pear juice and tonic water. This amount of ethanol should ensure that treated participants will be intoxicated at the .08% BAC level, in many countries the limit to drive under the influence. In the placebo condition, they will drink tonic water and pear juice mix with 1 ml of tequila passed on the border of the glass and floated on the surface (an insufficient quantity to register by means of a breath alcohol test).

All participants will be given 6 minutes to drink, being instructed that they should not find it uncomfortable to drink the required amount in 6 minutes. Should they experience any unpleasant effects, they should stop drinking right away without forfeiting their participation fee.

During the first phase of alcohol absorption, i.e. before any effect of alcohol can be appreciated (so that a subsequent different behaviour cannot be attributed to a different comprehension of the instructions), participants will be briefed on the format of the session and on the Becker, DeGroot, Marschak (1964) mechanism, an incentive compatible device used very often in experiments to elicit reservation prices. Under the BDM, an individual reports a bid (ask) for an item; the item’s price is then randomly drawn. If the bid (ask) is above (below) the price, the individual receives (sells) the good and pays (receives) the drawn price. If the bid (ask) is below (above) the price, the individual does not receive (sell) the good and pays (receives) nothing.[1]

[1] Instructions attached in Appendix contain a detailed explanation of the BDM mechanism.

We will then broadcast a video of comedy shows for the remaining time necessary to start the data collection 45 minutes after participants drunk the alcohol/placebo, since the peak of alcohol absorption should happen after 60 minutes. Immediately before data collection starts, they will have their BAC measured a second time.

2.1 Data Collection

The following tasks will be implemented in an incentive compatible way, with one of them that at the end will be randomly selected to determine the actual earnings of each participant (between 0 and 40€) in addition to the fixed participation fee.

Each task is explained in more details in the Instructions attached in Appendix. Note that payments in the randomized experiment as described this section as well as in the Instructions involve earnings that are twice as much as those actually paid in the pilot sessions that are described in Section 3, since the former is estimate to last twice as much.

2.1.a Risk attitude (see Instructions, Phase 1). First, we want to assess the risk attitude of individuals asking them the ask price of a battery of 10 lotteries using the Becker, DeGroot, Marschak (1964) mechanism. Lotteries entail the same events (0€ vs. 40€) with the probability to win that ranges from 10% to 100%. Lotteries are presented in a random order.
This task allows to test in a non parametric way the risk attitudes of the subjects along the whole domain of probabilities. According to testable implication 1A, drinking should be associated to a higher risk propensity. Alternatively, testable implication 1B implies that a higher BAC should imply an increasing insensitivity to probability changes in the middle range.
Add comparison with Holt and Laury

2.1.b Willingness to pay (see Instructions, Phase 2 and 3). In each phase subjects are endowed with 20€ and we estimate the willingness to pay for two items, one context specific (in the pilot sessions in the field it was a Christmas hat) and another not (e.g. a radio-videogame) again relying upon the BDM. Testable implication 2A foresees that alcohol consumption should increase willingness to pay. This effect should be even stronger as far as the context-specific item is concerned (testable implication 2B).

This task was initially planned as a control for the results about risk attitudes, since what is recorded as a different risk attitude could instead be confounded with a different marginal utility of money.

2.1.c Altruism (see Instructions, Phase 4 and 5). In each phase subjects are endowed with 20€ and we measure individuals' altruism by means of two dictator games in which subjects are asked to choose an amount of money to be handed over two different causes (the humanitarian aid agency Médecins Sans Frontières and the Italian website dedicated to economic information LaVoce.info). Testable implication 3 predicts that drinking should benefit relatively more the "heat" cause, i.e. Médecins Sans Frontières.

2.1.d Optimism (see Instructions, Phase 6). Also this phase has been thought as a control for risk attitudes, since an altered perception of probabilities could affect the results with overoptimism being confounded with risk propensity. We assess subjects' optimism randomly drawing 21 cards out of a maze of 52 poker cards. Each participant draws one card from the subsample and wins 0.5€ for each card that has the same colour as hers. In this way the subject is not indifferent between the two colours, with only one of them clearly associated with a success, the other with a loss. They

have then to guess how many of the 21 cards they expect to be of the same colour as that drawn by them. Beliefs are elicited in an incentive compatible way assigning a prize of 10€ if the number turns out to be correct.

2.1.e Impatience (see Instructions, Phase 7). In this phase each subject is given a cash card that in which the experimenters will transfer 20€ one hours after the experiment is over. We measure participants' impatience asking them how much money they want in order to wait for the money transfer to be done one, seven, and eight days after. The use of a cash card allows implementing a very clean design in which trust and transfer cost matter in the very same way in the present and in the future. *Add comparison with Camerer et al*

Our testable implication 5 says that alcohol should raise myopia when the trade-off is between present and future, not when it is entirely in the future

The data collection phase is expected to last 30 minutes and will finish with subjects filling an anonymous questionnaire aimed at gathering demographic and socio-economic information as well as some self-reported measures of happiness and trust.

Following data collection, participants will have their BAC measured for the third time. In case that some participants display a BAC above .05% they will be invite to remain in the laboratory until their BAC decreases below this threshold. Before leaving the laboratory, all will be asked to sign a statement (see Appendix B) in which they declare that they feel physically and mentally comfortable and that no impairment is perceived following the participation to the experiment. Should anybody refuse to sign, (s)he will be invited to remain in the laboratory until their BAC approaches zero.

3. Results

Data analysis correlates measured and perceived BAC with the results in the battery of tests and with demographic and socio-economic information provided in the questionnaire.

3.1 Preliminary results in the field

27 subjects have been individually tested in the field, 19 in a wine bar (in two different evenings), and 8 in a disco club. Both places are located in Belluno, a small town in the North East of Italy. Two third of the sample are males, and age ranges from 22 to 42 years (average 31).

Descriptive statistics about Blood Alcohol Concentration are as follows:

BAC	Mean	St Dev	Min	Max
Measured	.59	.49	0	1.51
Perceived	.72	.53	.1	2

The correlation coefficient between perceived and measured BAC is an astonishing 0.75, showing that people have a very good awareness of their level of intoxication. In fact, two third of the subjects reported having already taken an alcohol test before. However, also those who were unexperienced had on average a very good perception of their alcohol level (correlation 0.68 between measured and perceived BAC), meaning that they learned the rules of thumb to convert what they drink into BAC.

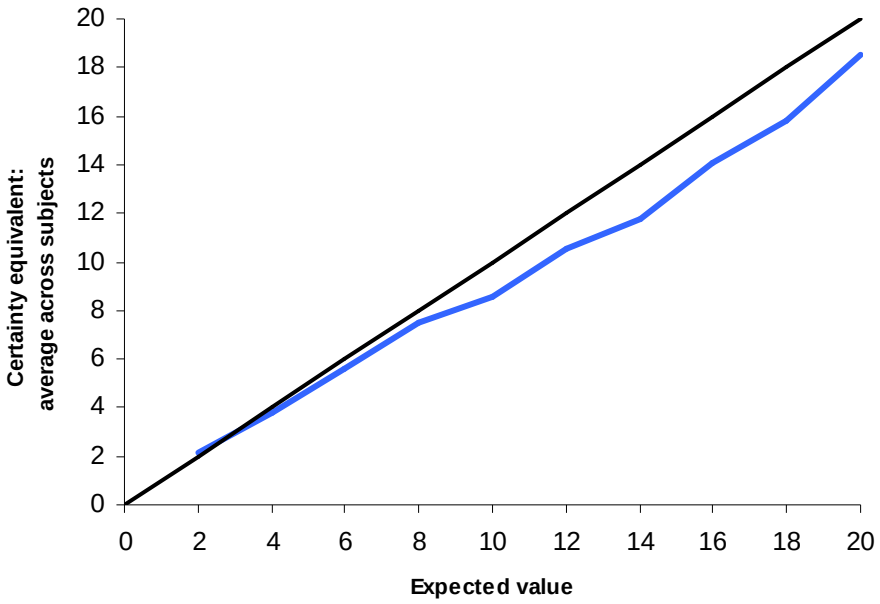
An explanation for this unexpectedly high correlation is that in Belluno a strict policy of controls against driving under the influence have been implemented in the last years, and such a policy was probably successful in increasing people awareness. Nevertheless, 12 subjects displayed a BAC higher than .5, the intoxication level allowed in Italy to drive.

Risk attitude

Subjects display on average a slight degree of risk aversion. In fact, taking the average across lotteries and across subjects their willingness to receive turns out to be about 10% lower than the expected value of the lotteries (9.82€ vs. 11€).

The willingness to receive tends to be lower than the expected value particularly in the lotteries where the probability to win is higher, as displayed in the following graph.

Figure 1: Certainty equivalent and expected value



Common wisdom says that alcohol should increase risk propensity. However, data seems to contradict this widespread belief, since the measured BAC turns out to be insignificant (see Table 1, column 1). In contrast, if we decompose the measured BAC into perceived and non-perceived alcohol levels what emerges is that the former significantly affects behaviour. Alcohol intoxication beyond subjects' perception decrease risk aversion (Table 1, column 2). Other control variables like gender, age, education, and different context do not display significant correlations.

Table 1. Risk attitudes in the field

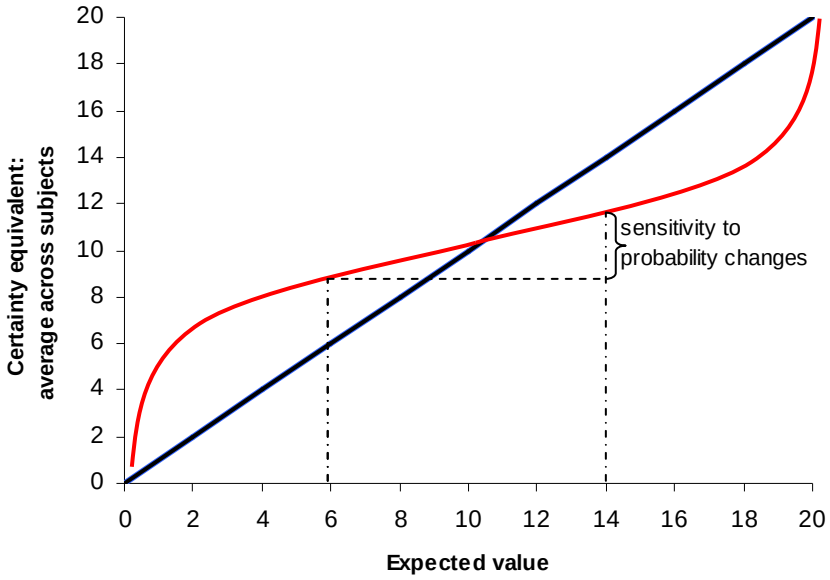
	col 1 avCE	col 2 avCE	col 3 insensitivity	col 4 insensitivity
BAC	0.604		3.561 *	
non perceived BAC		4.979 **		8.960 ***
perceived BAC		0.060		2.890 *
age	0.107	-0.006	0.140	0.015
female	-1.102	-0.639	3.201	3.772
femtest	-0.017	-3.778	-4.426	-9.067 **
education	-1.270	-1.255	-0.293	-0.275
disco club	-0.010	-0.858	1.305	0.259
constant	10.627 **	15.410 ***	0.118	6.022
R-squared	0.147	0.352	0.193	0.369

According to Loewenstein and O'Donoghue (2007) BAC should instead cause insensitivity to probability changes in the middle range. In other words, following overestimation of small probabilities and underestimation of high probabilities, the behaviour of the certainty equivalent should tend towards the shape depicted in Figure 2 as the BAC increases. Hence, we take the

difference between the certainty equivalent when the probability to win is 70% minus the certainty equivalent when such probability is 30% as a proxy for the sensitivity to probability changes in the middle range. The hypothesis is that the BAC should be negatively correlated with our proxy, but exactly the opposite emerges (see Table 1, column 3) because drunk subjects tend to price the lotteries at their expected value, instead of less.[2]

One could reasonably argue that such a result is due to the fact that drunk subjects have less cognitive capacities, and they are therefore more prone to anchoring their evaluation of a lottery to the only reference point available, i.e. its expected value. However, if we decompose the BAC into perceived and non perceived alcohol level we see that the bulk of the effect is due to the latter (Table 1, column 4). Hence, alcohol seems to genuinely increase risk propensity but only beyond the intoxication level that an individual perceives and probably manages to account for in his behaviour. Moreover, this effect seems to characterize only males.

Figure 2: Insensitivity to probability changes



Willingness to pay

No significant results emerge as far as subjects' willingness to pay for two different items, a videogame with radio and a Christmas hat. The idea was that the consumption of alcohol should increase the evaluation of the context-specific item relatively to the other. Hence drunk subject in the disco club should evaluate the Christmas hat relatively more.

Summing up the willingness to pay for the two items, the result is higher in the disco (9.4€ Vs. 8.4€) and for the subjects with a BAC above 0.5g/l (9.4€ Vs. 8.1€). As far as the difference between the two items is concerned, subjects with a BAC above 0.5g/l evaluate relatively more the Christmas (1.75€ less than the video Vs 2.56€). None of such difference is statistically significant, however, and nothing emerges interacting the context with the alcohol level.

[2] Evidence that drunk subjects tend to be risk neutral instead of risk averse comes from the negative and significant correlation between BAC and the variance of the differences between ask prices and expected values. This also points against the interpretation that drunk subjects give random answers.

Altruism

The testable implication is that BAC reduces altruism at low levels of sympathy, but increases it at high levels. Hence, the positive difference between donations to Médecins Sans Frontières and LaVoce.info should significantly increase with BAC.

Descriptive statistics point towards this direction since donations to Médecins Sans Frontières are 3.75€ higher on average than to LaVoce.info for the subjects with a BAC above 0.5g/l (Vs. 2€ higher for the other subjects). Interestingly, the higher relative contributions derive from much lower donations to LaVoce.info, while donations to MSF are similar in absolute terms. Also in this case the results are not statistically significant, not surprisingly since there are only 9 observations.[3]

Optimism

Two different tasks have been implemented to test for overoptimism. The first (in the disco and in the first session at the wine bar) consisted in guessing how many of 24 dice displayed a number different from six, even, and equal to six in three subsequent rolls. The second (in the second session at the wine bar) consisted in guessing how many of 21 cards randomly drawn from a poker maze were of a given colour (see Instruction in Appendix, Phase 6)

In both cases a sizeable variance of answers emerges (for instance in the cards game answers range from 8/21 to 13/21) but they are orthogonal with the alcohol level.

Impatience

Alcohol is expected to raise myopia when the trade-off is between present and future, not when it is entirely in the future. In other words it should foster hyperbolic discounting. Asking subjects how much they are willing to receive additionally in order to cash in their earnings until the day after, in seven days, and in eight days, we should observe subjects with higher BAC demanding a systematically higher amount of money. Moreover, since the effect should be more evident when the present is involved, also the ratio between additional amount of money to wait until tomorrow Vs to wait 24 hours in one week should be higher and positively correlated with BAC.

Results point towards the opposite direction (see Table 2, columns 1-3), in one case even significantly despite the extremely low number of observations (9). People with higher BAC seem to be more patient, as well as to evaluate relatively more 24 hours in the future than in the present (Table 2, column4), thereby contradicting our testable implication.

Table 2. Impatience in the field

	col 1 tomorrow	col 2 in 7 days	col 3 in 8 days	col 4 ratio
BAC	-3,77 **	-2,89	-5,34	-1,09
constant	4,88 ***	7,38 ***	10,06 ***	1,67 **
R-squared	0,52	0,20	0,29	0,29

[3] This phase has been introduced only in the second session at the wine bar.

Behaviour

The questionnaire collected some information about demographic variables as well as self-reported measures of happiness and trust.

Females report to be significantly happier than males, but happiness turns out to be orthogonal with alcohol consumption as well as with the context.

Females also trust the other people significantly more than males, but only in the wine bar and not in the disco club. Moreover, higher female trust tends to vanish as BAC of the respondent increases, becoming equal to that of males around a level of 0.8g/l on average.

3.2 Preliminary results from the pilot randomized experiment

In the pilot 'lab' experiment, held at a party in Florence in 2009, 12 subjects (7 males and 5 females), were randomly assigned to either a placebo or an alcohol treatment (with average BAC of 0.39g/l for treated individuals). To confound perception and equalize beliefs, placebo drinks had a fine alcohol smell and everybody had to taste an extra-strong mint before treatment. The experiment consisted in 4 phases, with random extraction on 1 phase for payment. The first phase extracts risk preferences with the same lotteries as in the field were used, but in random order to avoid that linearity becomes a focal driver of responses. The second phase extracts willingness to pay for a radio with videogames. The third and fourth one propose a dictator game, in which individuals choose how much to contribute to a fund for future experiments and to Medecines sans Frontiers, respectively. At the end perceived and actual BAC are measured, further questions are asked in a final questionnaire and payoffs are realized.

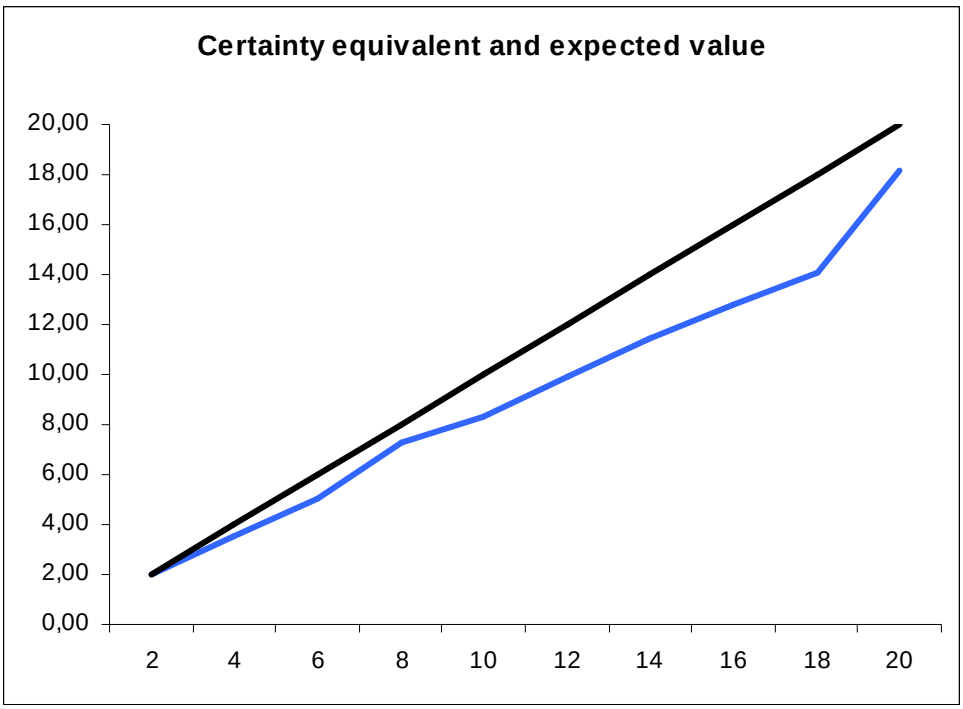
Descriptive statistics about Blood Alcohol Concentration are as follows:

BAC	Mean	St Dev	Min	Max
Measured	.32	.24	0	.7
Perceived	.43	.23	.1	.8

The correlation coefficient between perceived and measured BAC is an only 0.06, showing that our strategy to equalize beliefs between the alcohol and the placebo treatment was as successful as possible. Among subjects in the alcohol treatment, the mean BAC was .39, whereas among those in the placebo treatment it was .23, due to the fact that we could not exclude alcohol assumption before the experiment.

Risk attitude

Subjects display on average a slight degree of risk aversion. In fact, taking the average across lotteries and across subjects their willingness to receive turns out to be about 17% lower than the expected value of the lotteries (9.16€ vs. 11€). The willingness to receive is around 98% of the expected value when the probability of winning is 10%, and remains between 80% and 90% for higher probabilities, as displayed in the following graph.



The lab experiment confirms the result obtained in the field, that BAC per se is not significantly correlated with risk aversion. In particular, regressing the average selling price on BAC, the coefficient is negative (-6,12) but not significant. Yet perceived BAC seems to be much more important for risk aversion. Regressing the average selling price on perceived BAC, the coefficient is -8.5 and it is statistically significant at a 5% level. Controlling for both perceived and non perceived BAC, the coefficient of the former is -14.28 (significant at 1%) and the coefficient of the latter is -5.91 (significant at 10%).

The next question we ask is whether actual and perceived BAC affect the variance of risk aversion. The idea is that, by blurring precision of mental calculations, alcohol might introduce noise into decisions, and such noise should translate in an increase in variance. One way to measure this is by looking at the average squared difference between selling price and expected gain. When we regress it on BAC alone, the coefficient is 120.78 (significant at 5%); on perceived BAC it is 98.47 (significant at 10%); and both actual and perceived BAC are included, the respective coefficient is 118.42 (significant at 1%) and 95.77 (significant at 5%).

In summary, our results from the lab suggest, first, that BAC per se does not significantly affect risk aversion, whereas perceived BAC does, and interestingly it makes subjects more cautious rather than more risk prone; and second, that both actual and perceived BAC significantly increase the variance of risk taking. While, given the small numbers of the pilot experiments, statistical significance should obviously been taken with a grain of salt, such preliminary results are certainly consistent with Loewenstein and O'Donoghue's (2007) idea that alcohol (or mental load, in general) should reinforce risk aversion (we do not have cases of risk love here), but they also clearly point at the fact that we react to our own perceived condition more significantly than we do to our objectively measured condition, when the two differ.

Willingness to pay

The last point about variance in risk aversion raises the question of whether alcohol also affects the marginal utility of money. The idea is that the latter is the utility value attributed to one additional unit of money, when this is spent optimally. If alcohol affects individual ability to calculate the optimal way to spend money, the result may be that one additional unit of money is sometimes

spent in high value expenditures and sometimes in low value ones. We may thus conjecture that the variance of the marginal utility of money could increase with BAC. This point is of particular relevance when applying the experimental methodology, since the design of incentives in experiments is usually based on the assumption of constant marginal utility of money. To test such effects, we consider whether actual or perceived BAC raise the variance of the marginal utility of money, at least as captured by the willingness to pay for the radio with videogames. We find that the absolute value of such willingness to pay is significantly higher in the field than in the lab, but it is not significantly affected by either actual or perceived BAC. As far as the variance is concerned, again we find a negligible impact of actual and perceived BAC, a result which is reassuring for the interpretability of the other parts of the experiment.

Altruism

Loewenstein and O'Donoghue's (2007) conjecture that mental load should raise altruism at high levels of sympathy, and reduce it at low levels. We try to assess this through two dictator games, one in which the beneficiary is Medecines sans Frontiers, which we consider as characterised by a higher level of sympathy, and one in which it is a fund for future investments, which should stand for an emotionally neutral receiver. Regressing the average donation on perceived and non perceived BAC, we find that, contrary to the conjecture, neither of them is significant for Medecines sans Frontiers, whereas only actual BAC is significant (at 10%) for future experiments (with a coefficient of 5.98). When regressing the overall donation (the sum of the donation in the two games), we find the analogous result that the coefficient of actual BAC is positive (11.55) and significant (at 5%), whereas that of perceived BAC is not significant. An important caveat in the interpretation of these results is that the assumption on the sympathy intensity in the two different games is plausible in a true lab, but less credible in the context of an experiment run at a party. Clearly, further investigation is needed.

Behaviour

The questionnaire collected some information about demographic variables as well as self-reported measures of happiness and local trust (trust in other participants to the experiment).

Females report to be significantly happier and to trust more than males, but both happiness and local trust turn out to be orthogonal to both actual and perceived alcohol consumption.

4. Conclusions

Data collected so far do not allow to draw any sensible conclusion on the effect of alcohol consumption on economic behaviour, and we recognize that talking about significance throughout the paper dealing with such a small number of observations is somehow heroic. Nevertheless, preliminary results are promising from several points of view.

First, the correlation between measured and perceived BAC is interesting. Although it is intuitive that such a correlation is higher in the field where people know how much they have drunk, the numbers are striking nevertheless. In the lab the two variables are orthogonal, while in the field the correlation is very high (.75). This makes easier to test also the role played by perceived BAC, separately from that of measured BAC. Moreover, this confirms that our design is effective in

implementing the randomness of the assignment and that subjects cannot recognize after having drunk whether they belong to the treatment or to the control group.

Second, in the field risk aversion is lowered by non-perceived BAC, while in the ‘lab’ risk aversion is increased, mainly by perceived BAC. It will be interesting to test whether such a result derives genuinely from the different awareness of their BAC that the subjects have in the two situations, or if instead it is simply an artefact of the small number of observations available at the moment. In the first case, it could be that uncertainty about alcohol level (remember that in the ‘lab’ subjects did not know whether they were exposed to alcohol consumption or to the placebo) triggers additional risk aversion, a sort of precautionary behaviour. In contrast, when people are aware of how much they have drunk, they do not need to carry out such a precautionary behaviour and they are capable of tackling the effects of alcohol up to the point of perceived BAC, while they are ‘surprised’ by the BAC in excess, which decreases their risk aversion.

Third, it is worth stressing that as far as time preferences is concerned, BAC seems to have the opposite result than expected. Impatience seems to decrease with alcohol consumption.

Finally, no significant effect emerges as far as optimism, willingness to pay and altruism. If confirmed by a larger number of observations, this would be interesting from two points of view. On the one hand, it would be reassuring about the absence of interactions between the estimate of risk attitudes and a misperception of the likelihood of the events as well as an altered evaluation of the money at stake. On the other hand, together with the results about time preferences and risk propensity, it would confirm that the effects of alcohol on economic behaviour needs to be evaluated carefully, because it is far from that narrated by common wisdom.

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Appendix:

INSTRUCTIONS

Welcome!
Thanks for participating to this experiment on decision making. By following these instructions, you can win an amount (included between 0 and 40 €) that will be paid once the experiment is concluded.
Your choices as well as any personal information will remain be anonymously analyzed in aggregate terms and used for scientific purposes only.
Finally, there are not correct or wrong answers to the following tasks. Your choices will exclusively depend upon personal characteristics such as your preferences and your attitude to participate to gambles.
It is extremely important that you make your choices having completely understood these instructions. For this reason, feel free to ask questions about the instructions.

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The experiment

In this experiment you will participate to 7 consecutive phases, in each of which you will be required to make some economic choices. At the beginning of each phase, you will be given the instructions for the corresponding decisional task. Although you will participate to 7 consecutive phases, your final earnings uniquely depend on the outcome of one single phase. In particular, the phase used to determine your final earnings will be randomly selected at the end of the experiment by drawing one of seven cards, numbered from 1 to 7. Since phases have the same probability of being selected, you should make each choice as if it was the one effectively used to determine your final earnings. If you do not have any question, we can start with the experiment.

THE MARKET MECHANISM BDM

During the experiment, you will be required to make some choices using a peculiar market mechanism called BDM (from the names of the three economists that invented it, Becker, De Groot e Marschak).

In this market mechanism you will interact either with a seller robot or a buyer robot.

Seller robot. Suppose that you want to buy a generic item X from a seller robot and you are endowed with 10.00€. The bargaining is conducted as follows. The seller robot selects the price of X randomly, by picking a value included between 0.00 and 10.00€ (in steps of 0.10€) with equal probability. Before knowing the price selected by the seller robot, you will be asked to state the maximum price (included between 0.00 and 10.00€, in steps of 0.10€) you are willing to pay for X. If the price stated by you is lower than the price selected by the seller robot, then no agreement is reached: you do not buy X and the seller robot does not receive any amount of money. On the

contrary, if the price stated by you is higher than or equal to the price selected by the seller robot, then an agreement is reached: you buy X paying to the seller robot what it haw randomly selected.
Example. Suppose the price you are willing to pay for X is 6€ and the price selected by the seller robot is 4.90€. Given the previous instructions, an agreement is reached. You buy X paying 4.90€ to the seller robot.
It is easy to show that there is no incentive to miss-report the amount you are willing to pay for X. Suppose that, although you are willing to pay 6.00€ for X, you state a lower price, say 4.00€. Suppose that the seller robot selects a price equal to 4.10€. Although you would have been happy to buy X for 4.10€, the agreement is not reached since the price stated by you is lower than the price selected by the seller robot. Generally speaking, you should never report a lower price than what you are willing to pay for X because your choice does not affect the selling price and you might lose the opportunity to buy the item for a favorable exchange.
Instead, suppose that, although you are willing to pay 6.00€ for X, you state a higher price, say 7€. Suppose that the seller robot selects a price equal to 6.50€. In this case an agreement is reached but you have to pay a price which is higher than what you are willing to pay. Generally speaking, you should never report a higher price than what you are willing to pay for X because your choice does not affect the selling price and you might buy the item for an unfavorable too high price

Buyer robot. What said above also holds in a slightly different context in which you interact with a buyer robot. Suppose you have the opportunity to sell a generic item Y to a buyer robot which is endowed with 10.00€. The bargaining is conducted as follows. The buyer robot selects the price it is willing to pay for Y randomly, by picking a value included between 0.00 and 10.00€ (in steps of 0.10€) with equal probability. Before knowing the price selected by the buyer robot, you will be asked to state the minimum price (between 0.00 and 10.00€, in steps of 0.10€) you require to sell Y. If the price stated by you is higher than the price selected by the buyer robot, then no agreement is reached: you do not sell Y and the buyer robot does not pay any amount of money to you. On the contrary, if the price stated by you is lower than or equal to the price selected by the buyer robot, than an agreement is reached: you sell Y to the buyer robot for price it has selected. Even in this case, there is no incentive to miss-report the amount you require to sell Y.

PHASE 1

Please look at the following table carefully.

	LOTTERY	PRICE
L1	You receive 40€ if the number of the selected ball is included between 1 and 4. Otherwise, you do not receive anything if the number of the selected ball is included between 5 and 10.	_____ €
L2	You receive 40€ if the number of the selected ball is included between 1 and 9. Otherwise, you do not receive anything if the number of the selected ball is 10.	_____ €
L3	You receive 40€ if the number of the selected ball is included between 1 and 5. Otherwise, you do not receive anything if the number of the selected ball is included between 6 and 10.	_____ €
L4	You receive 40€ if the number of the selected ball is 1. Otherwise, you do not receive anything if the number of the selected ball is included between 2 and 10.	_____ €
L5	You receive 40€ if the number of the selected ball is included between 1 and 6. Otherwise, you do not receive anything if the number of the selected ball is included between 7 and 10.	_____ €
L6	You receive 40€ if the number of the selected ball is included between 1 and 3. Otherwise, you do not receive anything if the number of the selected ball is included between 4 and 10.	_____ €
L7	Whatever the number of the selected ball, you receive 40€	_____ €
L8	You receive 40€ if the number of the selected ball is included between 1 and 8. Otherwise, you do not receive anything if the number of the selected ball is included between 9 and 10.	_____ €
L9	You receive 40€ if the number of the selected ball is included between 1 and 2. Otherwise, you do not receive anything if the number of the selected ball is included between 3 and 10.	_____ €
L10	You receive 40€ if the number of the selected ball is included between 1 and 7. Otherwise, you do not receive anything if the number of the selected ball is included between 8 and 10.	_____ €

The previous table reports 10 lotteries, numbered from L1 to L10. As you see from the table, the only difference between lotteries concerns the probability of receiving a prize of 40 €. For each line of the table, you are asked to state in the last column (PRICE) the minimum price you are willing to sell the right to participate to the corresponding lottery to a buyer robot. At the end of the experiment, if this phase is selected, your final earnings will be determined according to the following procedure.

1) **Which lottery?**

Although you are asked to make a choice for each of the 10 lotteries reported in the table, you final earnings will uniquely depend on the outcome of a single lottery. In particular, the lottery to use will be randomly selected by drawing one of ten cards, numbered from L1 to L10, such that the probability of each lottery is the same.

2) **Do you participate to the lottery or sell this opportunity?**

Whether you will (or won't) participate to the selected lottery depends on the outcome of the BDM market mechanism explained above. In particular, the price that a buyer robot is willing to pay for participating to the selected lottery will be randomly selected by picking a value included between 0.00 and 40.00€ (in 0.10€ steps). If the price selected by the buyer robot is higher than or equal to the price stated by you for the selected lottery, then an agreement is reached and you sell the right to participate to the lottery for the price of the buyer robot. On the contrary, if the price selected by the buyer robot is lower than the price stated by you for the selected lottery, then an agreement is not reached: you will not receive any price from the buyer robot and you will participate to the selected lottery.

3) **The outcome of the selected lottery.**

On the contrary, if the price selected by the buyer robot is lower than the price stated by you for the selected lottery, then an agreement is not reached: you will not receive any price from the buyer robot and you will participate to the selected lottery. In this case, we will randomly draw one of ten balls, numbered from 1 to 10, with equal probability and your earnings will be determined according to the rules of the selected lottery reported in the table.

PHASE 2

Look at this item carefully. It is a combo radio-videogame that includes batteries.

You are asked to state the maximum price you are willing to pay (between 0.00€ to 20.00€, in steps of 0.10€) for buying this item from a seller robot knowing that in this phase you are endowed with 20.00€.

At the end of the experiment, if this phase will be randomly selected, your final earnings will be determined according to the BDM market mechanism explained above. In particular, the seller robot will randomly select the price it requires to sell the item by picking a value included between 0.00 and 20.00€ (in 0.10€ steps). If the price stated by you is higher than the price selected by the seller robot, than an agreement is reached: you buy the item for the price selected by the seller robot and you receive an amount given by the difference between 20.00€ and the price you paid. On the contrary, if the price stated by you is lower than that selected by the seller robot, no agreement is reached: you do not buy the item and receive an amount of 20.00€.

MAXIMUM PRICE YOU ARE WILLING TO PAY FOR THE ITEM (between 0.00 and 20.00€)

PHASE 3

Look at this item carefully. It is a Christmas hat with lights and included batteries.

You are asked to state the maximum price you are willing to pay (between 0.00€ to 20.00€, in steps of 0.10€) for buying this item from a seller robot knowing that in this phase you are endowed with 20.00€.

At the end of the experiment, if this phase will be randomly selected, your final earnings will be determined according to the BDM market mechanism explained above. In particular, the seller robot will randomly select the price it requires to sell the item by picking a value included between 0.00 and 20.00€ (in 0.10€ steps). If the price stated by you is higher than the price selected by the seller robot, than an agreement is reached: you buy the item for the price selected by the seller robot and you receive an amount given by the difference between 20.00€ and the price you paid. On the contrary, if the price stated by you is lower than that selected by the seller robot, no agreement is reached: you do not buy the item and receive an amount of 20.00€.

MAXIMUM PRICE YOU ARE WILLING TO PAY FOR THE ITEM (between 0.00 and 20.00€)

PHASE 4

In this phase, you are asked to state the amount (between 0.00€ to 20.00€, in steps of 0.10€) you want to donate to "LaVoce.info" knowing that in this phase you are endowed with 20.00€.

At the end of the experiment, if this phase is selected, your final earnings will depend on the amount you have donated to "LaVoce.info." In particular, you will receive an amount that is equal to the difference between 20.00€ and what you have donated to "LaVoce.info."

LaVoce.info is a free online press that is mainly managed by economists working for universities and other institutions. Its articles focus on economic, political and social issues and its editorial style is in the middle between non-specialized press and academic language. LaVoce.info self-financed by its members and authors of the articles work on voluntary base.

AMOUNT TO DONATE TO "LAVOCE.INFO" (between 0.00 and 20.00€)

Within 14 days from the end of the experimental sessions, your donation together with those of the participants overall sessions will be sent to "LaVoce.info" through postal transfer. The details of the postal transfer and the list of anonymous donations made by the participants to this experiment will be emailed on request.

PHASE 5

In this phase, you are asked to state the amount (between 0.00€ to 20.00€, in steps of 0.10€) you want to donate to “Médecins Sans Frontières” knowing that in this phase you are endowed with 20.00€.

At the end of the experiment, if this phase is selected, your final earnings will depend on the amount you have donated to “Médecins Sans Frontières” In particular, you will receive an amount that is equal to the difference between 20.00€ and what you have donated to “Medici sans Frontier.”

“Medici sans Frontier” is a humanitarian institution that offers medical and sanitary support in war areas.

AMOUNT TO DONATE TO “MÉDECINS SANS FRONTIÈRES” (between 0.00 and 20.00€)

Within 14 days from the end of the experimental sessions, your donation together with those of the participants overall sessions will be sent to “Médecins Sans Frontières” through postal transfer. The details of the postal transfer and the list of anonymous donations made by the participants to this experiment will be emailed on request.

PHASE 6

In this phase, each participant will be assigned a maze of 52 standard poker cards. Given his/her maze, for each participant, an experimenter will randomly select a subset of 21 unobserved cards. For simplicity, let us refer to this subset of cards with the word the “sample.” Please chose one card of your sample and observe it. At the end of the experiment, if this phase is selected, you will paid 1.00€ for each card in your sample reporting the same color (black or red) of that you have just selected.

Moreover, you are asked to guess the number of cards in your sample reporting the same color (black or red) of that you have just selected. If your conjecture is correct, you will receive an additional amount of 10.00€.

NUMBER OF CARDS IN YOUR SAMPLE REPORTING THE SAME COLOR OF THE ONE YOU HAVE SELECTED (BETWEEN 0 AND 21, INCLUDING THE ONE YOU HAVVE SELECTED)

PHASE 7

In this phase you are endowed with 20€.

As follows, we ask you to state the minimum additional amount (between 0.00 and 20 €) you would require from a hypothetical borrower to post-pone the payment by 1, 7 and 8 days respectively. In all these cases, the payment will occur through debit card.

At the end of the experiment, if this phase is selected, pone of the three possible dates will be randomly chosen by drawing one of three cards, numbered 1, 7 and 8 respectively. Given the date and following the BDM market mechanism explained above, the borrower robot will select the additional amount it is willing to pay to postpone the payment at that date by randomly picking a value included between 0.00 and 20.00€ (in 0.10€ steps) with equal probability. If the amount selected by the borrower robot is higher than the amount stated by you, then an amount of 20.00€ plus what selected by the borrower robot will be transferred to your debit card at the corresponding date. On the contrary, if the amount selected by the borrower robot is lower than the amount stated by you, then at the end of the experiment you will be paid 20€ in cash.

MINIMUM ADDITIONAL AMOUNT (BETWEEN 0.00 AND 20.00€) YOU REQUIRE FROM THE BORROWER ROBOT TO POSTPONE THE PAYMENT OF 20.00€ BY 1 DAY.

MINIMUM ADDITIONAL AMOUNT (BETWEEN 0.00 AND 20.00€) YOU REQUIRE FROM THE BORROWER ROBOT TO POSTPONE THE PAYMENT OF 20.00€ BY 7 DAY.

MINIMUM ADDITIONAL AMOUNT (BETWEEN 0.00 AND 20.00€) YOU REQUIRE FROM THE BORROWER ROBOT TO POSTPONE THE PAYMENT OF 20.00€ BY 8 DAY.