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Abstract

It has been a persistent phenomenon in many societies that a large proportion of alcohol consumption takes place in company of other people. While the phenomenon of social or public drinking is well discussed in disciplines as social psychology and anthropology, economists have paid little attention to the social environment of alcohol consumption. This paper tries to close this gap and explains social drinking as a trust facilitating device. Since alcohol consumption tends to make some people (unwillingly) tell the truth, social drinking can eventually serve as a signaling device in social contact games.

social and public drinking, alcohol consumption, social contact games, signaling
JEL: C 72, D71, L14

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"Beau didn't like Glen much at all, couldn't, he admitted, since he never trusted a man who didn't drink." (Dorothy Allison, 1992)

1 Introduction

A large proportion of alcohol consumption takes place in social environments such as bars, pubs or on parties, or, more generally, in company of other people. Many people rather consume alcoholic beverages in company than alone. While the empirical phenomenon of social or public drinking is discussed by social psychologists (see, e.g., Vogel-Sprott, 1992; Hennessy and Saltz, 1993, or, Sykes et al., 1993) as well as anthropologists (see, e.g., Pittman and Snyder, 1962, and Douglas, 1987), economists have only paid little attention to it only until recently. This paper closes the gap of a theoretical underpinning of the recent empirical results and offers a rational choice explanation for social drinking.

Whereas alcoholism has been empirically detected to lead to poor labor market outcomes (MacDonald and Shields, 2004; Jones and Richmond, 2006; Johansson et al., 2007) recent studies in economics show that moderate drinking may increase wages (compare MacDonald and Shields (2001) for England, Buonanno and Vanin (2012) for Italy, Ormerod and Wiltshire (2009) for UK, and Peters and Stringham (2006) for USA). In Japan, the results can be confirmed for males (Sato and Ohkusa, 2003). With Russian data, Tekin (2002) shows that the often detected U-shaped relation between alcohol consumption and wages does not hold when using models accounting for unobserved heterogeneity. Furthermore, then, the relation between alcohol consumption and wages of females becomes negative. Ziebarth und Grabka (2009) use the German Socioeconomic Panel (GSOEP) and differentiate between the drinking occasion and the type of drinks. They show that the positive effect of social drinking does not only differ by the amount of consumption but also by the choice of drink. Cocktails induce the highest increase in income for individuals living in urban areas whereas in rural areas beer consumption has the highest effect. Underlying reasons may be that social capital is increased through engagement in social networks which can be supported by drinking together. Bray (2005) models the positive effect of moderate alcohol consumption through the formation of human capital which, however, suffers from heavy drinking. Ziebarth and Grabka (2009) conclude, that moderate drinking - being a social norm in Western cultures - may enhance social skills and lead to a greater efficiency in the production of human capital. Ioannides and Loury (2004) and Montgomery (1991) state that social skills and the ability for networking determine wages to a high degree.

In contrast to the theory of rational addiction, as developed by Stigler and Becker (1977) and Becker and Murphy (1988), we do not focus on possible intertemporal effects of alcohol consumption and the "risk" of becoming addicted, but on the social context in which alcohol consumption takes place. Hence, this paper is strongly related to the work of Becker (1991) who studies social determinants of demand. Becker's models starts from the assumption that individuals receive utility from the very fact that they are consuming certain goods together with certain other individuals. However, a remaining question is: Which goods can be predicted to be preferably consumed in company and which are rather consumed in private? Why are alcoholic beverages of all goods so commonly consumed in public?

To provide at least a partial answer to this question, this paper will take a different approach towards the social consumption of alcohol. In contrast to the work cited above we do neither assume that economic agents receive any direct utility from the consumption of alcohol nor is it assumed that individuals receive direct utility from consuming it together with other people. This paper suggests a signaling explanation for social drinking instead: Rather than explaining social consumption by integrating the consumption environment into an individual's utility function, we will focus on the peculiar property of alcohol that its consumption makes some people (unwillingly) tell the truth. Basically, we proceed from insights of the ancient Romans: In Vino Veritas.

To be more precise, it is assumed that the population consists of two types of individuals, "high" and "low". These notions can have different meanings, e.g. they can describe a person's productivity level or his willingness to cooperate. These individuals can carry out a social interaction from which they receive utility. The utility derived from this social interaction depends on the individual's own type as well as her partner's type. In this sense, the model is similar to the "dating" and "social contact games" analyzed by Pesendorfer (1995) and Bagwell and Bernheim (1996). However, the signaling mechanism analyzed is quite different. While Pesendorfer and Bagwell and Bernheim consider models in which consumers can signal their wealth or their potential payoffs from matching by conspicuously consuming expensive or fashionable commodities, we consider a different signaling mechanism: By drinking alcoholic beverages, individuals take the risk of revealing their true type. Depending on payoffs and the distribution of types within the population, the resulting equilibrium might be pooling or separating. Especially if individuals face capital constraints and cannot borrow against future payoffs, "social drinking" might be an important signaling and trust facilitating device. From a welfare economic perspective social drinking might be a superior signaling mechanism compared to conspicuous consumption activities because it is a rather nondissipative signal if the (social) costs of alcohol consumption are low.

2 The Model

2.1 A Basic Model of Social Interaction

Suppose that there are two types of individuals, L and H, both of which receive utility from some basic social interaction. An individual's utility is dependent not only on her own type, but on the partner's type as well as. The payoffs may be depicted by the following matrix where the first figure represents Row's payoff and the second figure the payoff of Column:

	H	L
H	(α, α)	(γ, β)
L	(β, γ)	(δ, δ)

Table 1: Payoff matrix of social interaction when the population consists of different types.

That means that an individual of type L receives a utility of β when interacting with an individual of type H and so on. Let us also assume that $\alpha > \beta > \delta > \gamma$. Furthermore, it is assumed that individuals have the given outside option of staying alone (i.e., not interacting), the utility of which is $\omega > \gamma$ for both types. For the sake of simplicity suppose that $\omega = \delta$. Moreover, we assume that an individual's type is private information. That means, an individual's own type is only known to the individual himself; potential partners cannot detect an individual's type ex ante. Finally, let the probability distribution over the two possible types be given by $(p, L; (1-p), H)$. Suppose now that the agents can decide whether to stay alone or to be randomly matched, i.e. to interact without drinking. Then, an individual of type H will choose to interact if her expected payoff, E_H, exceeds ω, i.e.

$$E_H = (1-p)\alpha + p\gamma \geq \omega \tag{1}$$

Similarly, an individual of type L will interact if

$$E_L = (1-p)\beta + p\delta \geq \omega \tag{2}$$

Let us assume that the prior probability distribution $(p, L; (1-p), H)$ induces sufficiently optimistic beliefs, so that both types choose to interact. In this case, total welfare is given by

$$W = N[(1-p)E_H + pE_L] \tag{3}$$

where N is the size of the population and E_i the expected utility for an individual of type i with $i \in \{L, H\}$ as given by (1) and (2). In a world of complete information or fully trustworthy individuals, however, total welfare would be given by

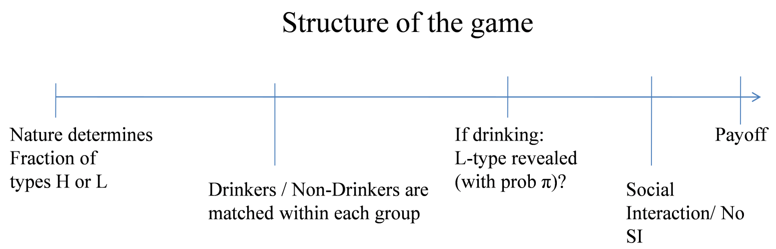
$$W^* = N[(1-p)\alpha + p\delta] \tag{4}$$

Thus, the welfare loss due to people's dishonesty is given by

$$WL \equiv W^* - W = Np(1-p)(\alpha - \beta + \delta - \gamma) \tag{5}$$

2.2 Social Interactions after Social Drinking

Now, let us slightly change the game and suppose that individuals can go out for a drink before interacting. Figure 1 shows the full timing of the game.



As the ancient Roman proverb "In Vino Veritas" tells us, people tend to tell the truth when drinking. Therefore, let us assume that every individual reveals his true type with probability π when drinking. π is not assumed to be type dependent. However, people also incur costs of drinking, denoted by D.[1] Furthermore, let $d \in [0, 1]$ stand for the individual decision whether or not to engage in social drinking, and let $d = 1$ denote a positive engagement. Finally, let s_i denote the fraction of the population that is of type i and socially drinking where $s_H \in [0, 1-p]$ and $s_L \in [0, p]$. Accordingly, the fraction of the population not engaging in social drinking is given by $1 - s_H - s_L$ where $1 - p - s_H$ are of type H and $p - s_L$ of type L. For reasons of simplicity, the equilibrium values of s_L and s_H will be assumed to be common knowledge.

[1] The figure D is assumed to include all costs of drinking, including possible external costs as well as the risk of becoming addicted. If we assume that individuals directly receive utility from alcohol consumption, D might be interpreted as the difference between the costs of drinking and the utility received. Hence, D can take positive as well as negative values.

We consider a matching technology that is quite similar to the one proposed by Pesendorfer (1995). If an individual is the only one of the population to go out for a drink he is matched to someone who does not drink. In addition, we assume that there is always a small (measure-zero) group of low types who do not drink to assure that there is always a match for each consumer. Furthermore, the matching technology has the following properties:

(a) If $s_H + s_L > 0$, then the probability of being matched with an individual of type i when engaging in social drinking is given by $s_i/(s_H + s_L)$ for $i \in \{L, H\}$
(b) If $s_H + s_L = 1$, then a consumer who is not going out for a drink will meet a low type with probability 1. He thus prefers to stay alone and receives a payoff of ω.
(c) If $s_H + s_L = 0$, then the probability of meeting a high type for a consumer who drinks alone before the meeting is equal to the probability of meeting a high type when not drinking.

Let us now analyze the decision problem the two types of individuals face. Each agent basically has to decide whether or not to whether or not to engage in social drinking and, in any case, whether or not to socially interact with each other afterwards. First, consider the decision of a type-H individual: For an individual of type H it does not matter whether she reveals her type or not; true revelation only makes the interaction with her more desirable, but does not do any harm to her. Independent from whether or not she truthfully reveals her type, her payoff will be the same. What matters for her is the case in which a potential partner truthfully reveals that he is of type L. In this case, a type-H individual would refrain from interacting and retreat to the outside option of staying alone. Hence, for a type-H individual the expected payoff of drinking before potentially interacting is given by:

$$E_H^D = \frac{s_H}{s_H + s_L}\alpha + \frac{s_L}{s_H + s_L}(\pi\omega + (1-\pi)\gamma) - D \tag{6}$$

Accordingly, her expected payoff of not drinking before interacting can be written as

$$E_N^{ND} = \frac{1 - p - s_H}{1 - s_H - s_L}\alpha + \frac{p - s_L}{1 - s_H - s_L}\gamma \tag{7}$$

Notice at this point that E_H^D is increasing in s_H and decreasing in s_L while the opposite is true for E_H^{ND} . Furthermore, E_H^D exceeds E_H^{ND} if

$$\frac{p - s_L/(s_H + s_L)}{1 - s_H - s_L}(\alpha - \gamma) - \frac{s_L\pi}{s_H + s_L}(\omega - \gamma) \geq D \tag{8}$$

In some sense, condition (8) can be interpreted as an incentive compatibility constraint for a type-H individual to engage in social drinking. If condition (8) is met, type-H individuals will prefer going out for a drink before the social interaction over meeting without having consumed alcohol together before. However, for social drinking to occur its payoff also has to exceed the payoff of staying alone. That means, E_H^D has to exceed ω. Therefore, the participation constraint for social drinking before the meeting can be rewritten as

$$\frac{s_H}{s_H+s_L}(\alpha-\omega) \geq \frac{s_L}{s_H+s_L}(\omega-\gamma)(1-\pi)+D \tag{9}$$

Similarly, one can easily formulate a participation constraint for "blind dates", i.e. social interaction without social drinking.

Now, let us have a look on type-L individuals. For an individual of type L it is rather unimportant whether or not a potential partner reveals his type. Even if the partner reveals his true type as L, the best choice for a type-L individual is still "interaction" due to assumption that $\omega=\delta$. For an individual of type L the risk of drinking rather lies in the fact that she might reveal her true type so that type-H individuals will refrain from interacting with her. Hence, if she happens to reveal her type, the payoff will be $\omega=\delta$, independent of the drinking partner's type.

The expected payoff from social drinking can be written as

$$E_L^D=\frac{s_H}{s_H+s_L}(\pi\omega+(1-\pi)\beta)+\frac{s_L}{s_H+s_L}\omega-D \tag{10}$$

while her expected payoff of not drinking is given by

$$E_L^{ND}=\frac{1-p-s_H}{1-s_H-s_L}\beta+\frac{p-s_L}{1-s_H-s_L}\omega \tag{11}$$

Comparing these two figures we see that an individual of type L finds it attractive to engage in social drinking if

$$\frac{p-s_L/(s_H+s_L)}{1-s_H-s_L}(\beta-\omega)-\frac{s_H\pi}{s_H+s_L}(\beta-\omega)\geq D \tag{12}$$

The participation constraint for social drinking for a type-L individual demands that E_L^D exceeds ω and can be rewritten as:

$$\frac{s_H}{s_H+s_L}(\beta-\omega)(1-\pi)\geq D \tag{13}$$

Proceeding from condition (12) and (13) let us state the following

Lemma 1 *If $s_H = 0$, an individual of type L will never find it attractive to drink (independent of the value of s_L) as long as social drinking is not an enjoyable activity in itself, but costly ($D \geq 0$) due to the binding participation constraint (13).*

Having explored the individuals' incentives to engage in social drinking, let us examine some possible equilibria. For this purpose, let us specify individual beliefs about a potential partner's type as $b(i|d)$ where i represents the type with $i \in \{L, H\}$, and $d \in \{0, 1\}$ is the drinking decision of the potential partner. Since games with asymmetric information are almost always characterized by multiple equilibria, let us restrict ourselves to what we think are the three focal equilibria: A teetotaler economy in which no individual consumes alcoholic beverages, a mixed economy in which one group of individual engages in social drinking while the other remains abstinent, and a boozer economy in which all individuals engage in social drinking. Consider first a pooling equilibrium in which both types remain teetotaler, i.e. $s_L = 0$ and $s_H = 0$. From Lemma 1 it follows immediately that, given $s_H = 0$, a type L's best response is to remain abstinent as well. Given $s_L = 0$, a type-H's payoff from social drinking is $\omega - D$ for $s_H = 0$ (always being matched to an L-type and thus staying at home) and $\alpha - D$ for $s_H > 0$ (always meeting another H-type). Accordingly, the expected payoff from not drinking is $E_H = (1-p)\alpha + p\gamma$ as given by (1) for $s_H = 0$ and $((1-p-s_H)\alpha + p\gamma)/(1-s_H)$ as given by (7) for $s_H > 0$. Hence, we can formulate

Proposition 2 *Given Equation (1) holds with $E_H = (1-p)\alpha + p\gamma \geq \omega$, there exists a Nash Equilibrium in which both types of individuals interact without social drinking ($s_L = 0$, $s_H = 0$) and $b(i = H|\forall d) = 1 - p$.*

Proof. Given $s_H = 0$ and $b(H|\forall d) = 1-p$, an individual of type L will never find it optimal to engage in social drinking as stated by Lemma 1. Hence, all type-L individuals will refrain from social drinking, i.e. $s_L = 0$.[2] Given $s_L = 0$ and $s_H = 0$ social drinking is not attractive for a type-H individual either. Since $(1-p)\alpha + p\gamma \geq \omega \geq \omega - D$, type-$H$ individuals will interact without social drinking, so that $s_H = 0$. ■

Obviously, total welfare in a pooling equilibrium without social drinking is given by (3) as before. However, a pooling equilibrium in which both types remain teetotaler is not a "sensible" equilibrium and inherently unstable if $D \leq (\alpha - \omega)$. In this case, type-H individuals could do better if only sufficiently many of them became social drinker. The reasoning behind this

[2] Since we assumed that $\delta = \omega$, a type-L individual is at best indifferent between not drinking and staying alone

is the following: As can be seen by condition (8), given $s_L = 0$ and $s_H > 0$, E_H^{ND} only exceeds E_H^D if $p(\alpha-\gamma) \leq D(1-s_H)$. Let us assume that there are values of $s_H \in [0, 1-p]$ meeting this constraint. However, if there also exist values of s_H for which $p(\alpha-\gamma) \geq D(1-s_H)$ holds, a type-H individual would be better off with social drinking before interacting. Moreover, $D \leq (\alpha-\omega)$ implies $D < (\alpha-\gamma)$. Under the circumstances described, this means that there exists some $s_H^* < (1-p)$ for which $p(\alpha-\gamma) = D(1-s_H^*)$. Furthermore, as long as $s_L = 0$, type H's incentive to engage in social drinking is increasing in s_H since E_N^{ND} is decreasing in s_H. Hence, once s_H exceeds s_H^* a kind of bandwagon effect arises since every type-H individual prefers to engage in social drinking, ceteris paribus. Proceeding from these considerations let us state

Proposition 3 *There exists a Nash Equilibrium in which individuals of type H engage in social drinking while type-L individuals interact without social drinking* ($s_L = 0$, $s_H = 1-p$) *and in which* $b(i = H|d = 1) = 1$ *and* $b(i = L|d = 0) = 1$, *if* $(\alpha-\omega) \geq D \geq (1-\pi)(\beta-\omega)$.

Proof. Given $s_L = 0$ and $s_H = 1-p$, the payoff from social drinking for a type-H individual is given by $\alpha - D$, while the payoff from not drinking is γ. Since we assumed that $\gamma < \omega$, type H's incentive compatibility constraint holds automatically if her participation constraint for social drinking is met. The latter is secured by the first part of the inequality given in Proposition 2, i.e. $(\alpha-\omega) \geq D$. Furthermore, as mentioned before, a type-L individual is at best indifferent between not drinking and staying alone. Her incentive compatibility condition for not drinking is fulfilled by the second part of the inequality given above, i.e. $D \geq (1-\pi)(\beta-\omega)$. ■

In a separating equilibrium, social drinking perfectly signals an individual's type. While type-L individuals remain teetotaler, type-H individuals engage in social drinking. Total welfare is then given by

$$W^{DS} = N[(1-p)(\alpha-D) + p\delta] \tag{14}$$

That means, compared to a pooling equilibrium without social drinking welfare increases if $W^{DS} - W \geq 0$, or

$$p(\alpha-\beta+\delta-\gamma) \geq D \tag{15}$$

That means that the separating equilibrium will be welfare increasing compared to a society of teetotalers if the group of L-type individuals is sufficiently big and the costs of drinking D (including reductions in productivity) are small. Finally, let us consider a boozer economy in which all individuals engage in social drinking, i.e. $(s_L = p, s_H = 1-p)$. Due to property

(b) of the matching technology, the incentive compatibility constraint for social drinking resembles the participation constraint in this case, and we can concentrate on conditions (9) and (13) and state

Proposition 4 *If* $(1-p)(\alpha-\omega)-p(1-\pi)(\omega-\gamma) \geq D$ *and* $(1-p)(1-\pi)(\beta-\omega) \geq D$, *then there exists a Nash Equilibrium in which all individuals engage in social drinking* ($s_L = p$, $s_H = 1-p$) *and where* $b(i = H|d = 1) = 1-p$ *and* $b(i = L|d = 0) = 1$.

Proof. Given $s_L = p$ and $s_H = 1-p$, the payoff from social drinking for a type-H individual is given by $E_H^{DP} = E_H + p\pi(\omega-\gamma) - D$, while the payoff from not drinking is ω because of property (b) of the matching technology. The first inequality of Proposition 3 ensures that $E_H^{DP} \geq \omega$ (compare Equation (9)). Similarly, the payoff for a type-L individual is given by $E_L^{DP} = E_L - (1-p)\pi(\beta-\omega) - D$. The second inequality in the assumptions of Proposition 2 states that $E_L^{DP} \geq \omega$ (compare Equation (13)). Hence, both types of individuals will go out drinking before an interaction. ■

In this "boozer economy" all individuals go out drinking, so that welfare is given by

$$W^{DP} = W + N(1-p)p\pi[(\omega-\gamma) - (\beta-\omega)] - ND \tag{16}$$

That means, compared to a pooling equilibrium without social drinking, welfare increases if $WDP - W \geq 0$, or

$$(1-p)p\pi[(\omega-\gamma) - (\beta-\gamma)] \geq D, \tag{17}$$

i.e. a boozer economy is preferred in societies where H and L-types occur in similar size, the costs of drinking (e.g. due to lower productivity) are low, and the probability of revelation is high. However, a pooling equilibrium in which all individuals go out drinking is only stable if drinking is an enjoyable activity in itself. If, however, drinking is costly as we have assumed, then the equilibrium is inherently unstable. If all type-L individuals go out for a drink, type-H individuals can distinguish themselves by not going out. However, as s_H becomes smaller it becomes also less attractive for type-L individuals to engage in social drinking. Finally, as s_H approaches zero, type-L individuals will switch to non-drinking behavior as stated in Lemma 1. As stated earlier, other equilibria might exist as is almost always true in games of incomplete information. Depending on payoffs and players' beliefs, there might also be a pooling equilibrium in which some fraction of both types engages in social drinking. However, we think that the general mechanism is clear and that the value added by exploring innumerable equilibria is rather low. Therefore, we shift our focus to the potential effects of hangovers and blackouts.

2.3 Social Drinking With Hangovers and Blackouts

As we have shown that social drinking might be socially beneficial, the incentives to engage in social drinking change if we allow for hangovers and blackouts. While hangovers simply increase the expected costs of drinking, a blackout implies that people cannot recall whether or not a partner has revealed his true type, i.e. a blackout can be viewed as analogous to a reduction in π. Increases in the probability of a hangover as well as in the probability of a blackout decrease the likelihood of a separating equilibrium as measured by the possible range of payoffs enabling a separating equilibrium. Obviously, the likelihood of a boozer equilibrium is reduced as well.

3 Conclusion

This paper has endeavored to offer a rational choice explanation for the empirical phenomenon of social drinking. If alcohol consumption makes people reveal their true type with some positive probability, social drinking might be an efficient signaling mechanism and might be interpreted as a trust facilitating device. This is the case if the share of less productive or less trustworthy individuals is sufficiently big and the costs of drinking (including reductions in productivity) are sufficiently small. Moreover, even pooling equilibria with social drinking might be efficient in a second-best sense. The idea that social drinking serves as a trust facilitating device might help to explain, why social or public drinking is such a widespread phenomenon in many societies. As anthropologists report, from primitive societies to the modern business world, many people rather tend to drink together than alone (Douglas, 1987). Fellow workers, business partners and friends often tend to get together for a drink. Drinking songs and chants may even reinforce this pattern. Hence, in its implications the model developed here is much closer to anthropology than to social psychology since anthropology - in sharp contrast to social psychology - does not view social and public drinking as a social problem, but simply as a persistent phenomenon (Douglas, 1987). Complementary empirical research indeed tends to indicate that, on a cross-country level, a positive relationship between levels of trust and moderate alcohol consumption may exist (see Haucap, Herr and Frank, 2012).

Of course, the model presented here can only offer a partial picture and should be viewed as complementary to the existing theories of rational addiction and social influences on demand. However, we hope that it might stimulate further research to combine these two existing strands of consumer theory as well as the recent advances in endogenizing social determinants of demand.

Finally, we think that the model might be interpreted in a more general sense. Basically, any activity that reveals an actor's type with a certain probability can be viewed through the lens of this model. To give an example, the employment of external auditing firms might be interpreted in this way. If there are different types of firms and external auditing firms reveal a firm's type with some probability, the employment of external auditing services might serve as a signal for a firm's type to potential business partners, shareholders or even consumers.

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