

Intertemporal Wine Consumption : the Effect of Wine Addiction

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*“Does an alcoholic [...] user
maximize or weigh the future ?”*

G. S. Becker and K. M. Murphy, JPE, 1988

Abstract

This paper investigates the addictive nature of table wine consumption. The modeling framework is the rational addiction model proposed by Becker and Murphy (1988). It is found that table wines is an addictive good in that future consumption has an impact on current consumption. Our empirical results have an important implication for future Government policy aimed at reducing alcohol consumption through price increases. A particular property of table wine consumption series is also revealed which seems to shed light on the behavior of its stochastic trend.

Key words: Table wine demand ; Rational addiction.

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1 Introduction

Per capita demand for table wines in France and other major Mediterranean wine-producing countries of the European Community has steadily declined for the last five decades.¹ Poor quality production in this sector and low substitute prices turned consumer purchases more to soft drinks and other alcohol. These results are now well established (see Terraza, 1981, Seytes and Terraza, 1998 and Aigrain *et al.* (1998)). Other main economic factors such as changes in real income and demographic structure of the population play also an important contribution in explaining table wine consumption (see Salies and Terraza, 2000 and Salies, 2001, who derived short- and long-run income elasticity estimates). Although the economic changes mentioned above with the existence of shifts in tastes of most consumers and changes in consumption frequency may have turned consumers purchases to soft drinks, mineral waters, beer and high-quality wines, the series of consumption reveals a point of inflexion about a decade ago (a brief summary of the trends in French household expenditures on table wines is given in the appendix A of the paper).

Such situation is quite surprising given anti-alcoholism campaigns that started during the eighties and the 1991's Evin law adopted by French Government. The introduction of local wines is certainly the most important factor explaining that inflexion in the diminishing trend but it may be insufficient. No attention seems to have been actually given to the issue of addiction and the possibly related "French paradox" (moderate wine consumption is associated with much lower risk of heart disease and stroke) in econometric applications.² The addictive property of wines (or alcohol dependence we should probably use) includes many factors that are outside the economic literature. We retain essentially an economical approach of wine addiction following Becker and Murphy (1988) and Fenn *et al.* (2001). We assume that table wine consumers are rational to the extent that their wine consumption decisions are made in light of the future consequences of those decisions.³

It is important in a first instance to refer to studies on cigarette addiction as most empirical studies seems to have been devoted about that good.⁴ Unlike the cigarette industry where firms had private knowledge of nicotine's addictive effects by the early 1960s, in the case of wine, there is no such molecule as "nicotine" on which to refer. However, society and Governments seem to recognize equally the health hazards and addiction risks of drinking while the case of wine is ambiguous probably because of the

¹The definition of the "table wines" category is given by the European Community legislation. Basically they include red, pink (or *rosé*) and white non-sparkling wines, containing at least 8.5 and below 14-15 percent alcohol, with no flavor additives, and meeting minimum standards regarding grape varieties and acidity. The other and opposite main category is defined as "quality wines produced in specific regions" (European Commission, 1998, p. 69). In France there are wines labeled AOC and VDQS. They include standard wines with an appellation but also several *Chateaux*.

²More precisely, some red grape skins components contained in red wines would produce lower incidence of heart disease.

³The literature on addiction mainly focuses on the dependence of current consumption its past and future value and other events. Two models are confronted : a rational one against a myopic alternative.

⁴It may also be important in future research to consider the interactions between the addictive properties of the two goods.

existence of the so called “French Paradox”. In the case of Table wines the issue of the French paradox is less important since the factors developing the properties needed for a wine to develop favorable protection against heart disease are positively correlated to its quality. Nevertheless, table wines could be no less addictive than high quality wines or other alcohol which should be investigated.

In the next section we document Government initiatives to reduce – the consequences of – alcohol consumption through measures on alcohol marketing. We present the version of the rational addiction model to estimate and empirical results in section 3 then conclude in a last fourth section.

2 Crackdown on Drinking and the French Paradox : non self- contradictory statements

Despite a downward trend in the consumption of alcohol during the last 10 years, France remains the main consumer of alcohol in the world. One every 15 deaths is related to alcohol. Law and Wald (1999) note that “the excess mortality from alcohol related causes is so large that it abolishes the survival advantage from the low mortality from heart disease, highlighting the public health problem from alcohol in French men”. Some of the reasons for the decrease in alcohol consumption are : advertisements are controlled, taxes on liquors have been increased, drunken drivers are severely penalized. On the other hand, there is the controversial “French Paradox”. Nevertheless, Government actions seem not to conflict with the existence of that since both advertise that only heavy consumption is dangerous.

For the first time, in 1984, the French Committee for Health Education launched an information campaign concerning alcoholism (Vilain, 1985). Traditions and customs related to the consumption of alcohol still have a strong positive connotation in France. So this very important consideration had to be taken into account by the planners of the campaign. The keynote of the 1984’s campaign was therefore that one should drink moderately. The slogan chosen contains a note of humor which the translation does not render : “one glass is OK, three glasses, and your troubles begin” (*un verre ça va, 3 verres bonjour les dégâts, Tu t’es vu quand t’as bu, etc.*). Television spots were widely used in the campaign as well as pamphlets, and various public relations meetings took place. The 1991’s *Evin law* that engaged the Government in fighting against drinking – and also smoking – made use of slogan such as “abuse alcohol is dangerous!” (*l’abus d’alcool est dangereux!*).

Consumers may respond to those incentives given by Government. Vilain (1985) mentions a preliminary nationwide evaluation survey where it was shown that 70% of the viewers remembered the slogan three months after the end of the campaign. Out of these, 86% thought the campaign was necessary, and 69% considered the campaign had been well-conceived. T. Morvan (1996) reports some results from another study conducted by ONIVIN which is also informative. In 1995 almost 7% of 4000 interviewed households households recognized the impact campaigns against alcoholism had on their wine drinking behavior. The percentage was 4% in 1990. In the 1995’s study, 29% also

invoke medical reasons as the factor of the reduction or cancellation of wine consumption. This figure was 50% in the 1990's study.

3 The model

Becker and Murphy's 1988 theory of rational addiction relied on a continuous time model while Becker *et al.* (1994) have proposed later a simplified but estimable discrete time version of it where the stock of the addiction good for the period t is assimilated to the level of consumption of the previous period. The analysis builds on a representative-agent, discrete time, intertemporal utility maximization problem. Following that approach, in a recent paper, Fenn *et al.* (2001) generalizes only slightly Becker *et al.*'s 1994 model but remains too simple relatively to the original model of Becker and Murphy.

The results we present here investigate the model version of Fenn *et al.* (2001) where $a = 1$, $0 \leq b \leq 1$ and $h = 0$ above. The model leads to a demand equation of the form :

$$C_t = \alpha_0 + \alpha_1 C_{t-1} + \alpha_2 P_{TW,t} + \alpha_3 C_{t+1} + \alpha_4 P_{J,t} + \varepsilon_t, \quad (1)$$

where P_{TW} is the price of table wines and P_J the price of soft drinks. The particularity of the rational addiction model formulation is the presence of future consumption as an explanatory variable in Eq. (2). The underlying theories imply restrictions on the parameters :

$$\alpha_1 > 0, \alpha_2 < 0, \alpha_3 > 0.$$

More details of the mathematical technique of obtaining the model are in Fenn *et al.* (2001).

Before going the estimation stage of the paper it seems important to recall the role of current prices, lagged and future consumption in the model (a standard double logarithmic demand equation), especially in the case of table wines. The relationship between prices and domestic consumption for table wine is made easier given that futures markets for table wines do not exist yet. Any analysis of table wine demand which include retail prices as an explanatory variable is greatly simplified with respect to the role of expectational behavior. Unlike some wines produced in specific region, table wines do not mature and are not sold by auction. That situation is reflected by frequent consumers purchases aimed at consuming wine immediately. In other words table wines do not need to be held for investment purposes. The absence of futures markets would support the traditional behavior attached to rational but "myopic" consumers in that they are not supposed to form expectations on forthcoming prices, taking only their current value as exogenous at the time of purchase. Such consumers would not account for the the impact of past consumption on today's consumption

Regarding consumption variable, however, a demand equation with lagged consumption is relevant for different purposes. Retaining three of them we note on the analytical viewpoint that it allows estimating separately long-run and short-run responses from a single set of regression estimates. Besides, where the coefficient on lagged consumption appears significant such result may reflect habit persistence (Baltagi and Griffin, 1995). Moreover in the case of cigarette demand, Fenn *et al.* (2001) note that earlier econometric

studies included lagged consumption as an explanatory variable also to capture the effects of addiction (Winston, 1980)

4 Data and Preliminary results

The data consist of national aggregated annual time series from 1959 to 1998. Consumption C is measured by per capita sales in bottles and bulks. Table wine price is the average retail price per liter, including government taxes in 1980-1981 French francs. We also included the price of soft drinks which has shown to be well related to table wine consumption in different studies.

4.1 Stationarity properties of the series

We started studying the stationarity properties of each series to include into the model, focusing especially on consumption. This series has an interesting property which seems not to have been investigated in previous literature. Define c_t as the logarithm of per capita consumption for the year t . Our data span the period 1959 to 1998. We can not reject the null hypothesis that c is $I(1)$, employing the DF and PP tests for detecting an unit root in a model with constant against a.

4.2 Empirical results

Since C_{t-1} and C_{t+1} are endogenous, another estimation procedure must be applied such as 2SLS. We present the estimated model (2) using OLS but shall employ 2SLS for the next version of the paper. Results with OLS regression were also reported in Fenn *et al.*. We recognize that instrumental variable estimates shall reduce the bias of the coefficient on P_{TW} and increase its absolute value as shown in Salies (2001). We find

$$\hat{C}_t = \underset{(1.89)}{.86} + \underset{(4.67)}{.46} C_{t-1} - \underset{(-1.93)}{.15} P_{TW,t} + \underset{(4.10)}{.45} C_{t+1} + \underset{(1.57)}{0.05} P_{J,t},$$

where \hat{C}_t is adjusted consumption an parentheses contain the Student's t - statistics. Strict concavity of the underlying quadratic utility function is verified since the coefficient on P_{TW} is negative though it is significantly different from zero at 10%.

We can not reject a significant influence of past and future consumption on today's consumption. The positive sign of the coefficient on C_{t-1} verifies Becker *et al.* (1994)'s definition of an addictive good, that $\alpha_1 > 0$.⁵ In the case of addiction, past consumption should positively affect current consumption, holding price and future consumption constant. Regarding future consumption, the sign and significance of the coefficient on C_{t+1} conform to a rational addiction specification.

Relying on those results and the idea that rational addiction behavior would make, as others depend today's consumption on past and future consumption, we ran a regression

⁵The addictive good enters the utility function through an accumulated stock that is simply C_{t-1} in the Becker *et al.* (1994)'s model.

of c_t on both c_{t-1} and c_{t+1} and found the following interesting result

$$\hat{C}_t = \underset{(7.27)}{.50} C_{t-1} + \underset{(7.15)}{.49} C_{t+1},$$

in that it may have a strong implication regarding the non stationarity properties of wine consumption variable.

5 Conclusion and future extensions

Our result support the hypothesis that table wines could be an addictive good. There is also an important implication of the rational addiction model in that any “announced” wine policy change taking effect into the future should influence today’s consumption. As mentioned in Fenn *et al.* (2001), the

However, it is not obvious whether the significant relationship. Though there is no official futures market for wines, a few independent traders in France still play an important role as intermediate economic agents between producers and final consumers. They experience several economic functions : a *monopsonistic* situation, ordering huge quantities of table wines which they sell in part then to national stores. Many traders assemble grapes, bottle wine and also sell it at retail. The influence traders have on price suggests they may have some interest in applying a forward looking behavior with respect to future market prices and demand. Changes in today’s prices and thus consumption may depend on traders’ behavior. A similar idea involving cigarettes manufacturers is mentioned in Fenn *et al.* (2001).

Several addition to the present paper shall be made. First, it seems that it is essentially red grape skins that produce lower incidence of heart disease than for example those in Britain despite a diet similar in saturated fats which was termed the “French paradox”. White and rosé wines do not produce the same effect. Consequently, we should have an interest in focusing especially on red wine statistics instead of an aggregated consumption variable. Table wines could be more addictive than high quality wines.

The impact of addiction information on alcohol demand should be included in the model in accordance with the work of Fenn *et al.* (2001). In the next version of the paper we shall investigate an hypothesis similar to the one assumed in Fenn *et al.* (2001) that anti alcoholic campaigns and Government measures (*Loi Evin* of 1993) triggered a switch in table wine consumption behavior from a myopic pattern to a ‘rational’ pattern. In order for table wine consumers to take account of the future impact of current consumption, they would have had to have been aware of drinking’s addictive effects. Nevertheless it is possible that personal experience with the effects of drinking, by itself, is enough to inform smokers of the addiction risk, leading to a rational form for demand.

The model we are to estimate for the subsequent version of the paper include all coefficient and thus is more in accordance with the original formulation advocated in Becker and Murphy (1988) in that the “investment function” describing the rate of change in the stock of the addictive good is not eliminated.

A French household's behavior with respect to table wine consumption

Changes consumption frequency are investigated nationwide for about 20 years by the ONIVIN French institute. We give a brief summary of them and also include other figures. Per capita consumption by people aged over 14 has been reduced by half over thirty years. It was 160 litres per capita in 1965 and 80 liters in 1994. Only recently domestic purchases for table wines have decreased at a lower rate, while price series have maintained a slight upward trend. It seems that since 1960 we can distinguish roughly two sub-periods.

The first sub-period, 1960-1961 to 1985-1988 reflects a reduced budget share dedicated to wines of daily consumption. Young people tend to drink less than their parents did at the same age and regular consumers aged 45 or over purchase less wine. New young consumers and females aged over 45 have entered the market with different preferences from previous generations. Anti-alcoholism campaigns influenced purchases by people over 50 who reduced or definitely stopped drinking wine (Aigrain et al., 1996, 1998). In other words, shifts occurred in the preferences of consumers already in the market (Aigrain et al., 1996; Bentzen et al., 2000) and not only in consumers who left it.

The second sub-period, from 1985-1988 to 1998-1999 seems more related to an increasing interest by consumers in wines identified by a geographical indicator (local wines from specific areas, and wines made from particular grapes) which have improved general quality of the table wine sector. Table wines other than local wines accompany 42% of meals where wine consumption is present and represent only 11% of meals with guests or on special family occasions. Drinking habits for local wines are slightly different. Local wines accompany about 20% of meals. More substantially, this sub-period reflects also negative shocks on supply resulting in lower wholesale and retail prices. They are simply the response to the set-aside policy and vine replanting, replacing poor quality wine grape varieties with higher-quality grape varieties. For instance, in the Languedoc-Roussillon area, the most cultivated although recently introduced varieties for red wines are Cabernet-Sauvignon ; Chardonnay and Sauvignon for white wines.

Comparatively That wine category still represents an important part of the market in terms of quantity purchased with a figure that amounts to 50% of the whole, and a vineyard representing 30% of all vines aimed at producing grapes in France.

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