A few drinks behind. A research note on alcohol consumption in Europe

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> The problem with the world is that everyone is a few drinks behind.
>
> Humphrey Bogart

Abstract

There is an overwhelming growing literature on the determinants of alcohol consumption. Although there remain very wide differences across the European countries in their mix of alcoholic beverages (Beer, Wine or Spirits) consumed, there has been significant convergence. Contrary to previous research that estimated, the determinants of consumption only with macroeconomic data, we provide new evidence on European alcohol consumption based on a microdata approach of individual behavior. We use the 2014 wave of the European Social Survey, merged with the Annual Database of National Beverage Consumption. We estimated a generalized Heckman model on the individual and national determinants of alcohol consumption with standard errors bootstrapped at the country level. We were able to provide estimation of elasticities and cross elasticities, identification of drinkers and abstinents, and specific determinants of the probability of drinking and of the level of consumption. We show that the price effect is not always relevant for lowering consumption, contrary to social interactions that directly influence the frequency of consumption and indirectly the volume consumed. Finally, we highlight that the consumption of beers and spirits is not explained in the same way as wine consumption.

JEL.

C34; D12; L66

Keywords.

Alcohol consumption, alcohol price elasticities, generalized Heckman model

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I. Introduction

Alcohol consumption is an abundant scientific subject and is for interest for public policymakers. Hart et Alston (2020) highlights three main reasons: public finance, public health, industrial policy and commercial decisions. There is an overwhelming growing literature on the determinants of alcohol consumption (Anderson et al. 2018, Angerer et al. 2019, Bentzen & Smith 2018, Clements et al. 2020, Colen & Swinnen 2016, Fanelli 2018, Fedoseeva 2018, Hart & Alston 2019, Holmes & Anderson 2017a, Mills 2018). Although there remain very wide differences across the European countries in their mix of alcoholic beverages (Beer, Wine or Spirits) consumed, there has been significant convergence. Holmes & Anderson (2017) highlight for example a convergence in the beer-focused countries not in terms of spirits but in beer and wine consumption on the one hand and a convergence in the spirits-focused countries not in terms of wine but in spirits and beer (on the other hand). De Goeij et al. (2015) explain that both country-level context (drinking culture, political and social situation, alcohol price) and individual context (gender, age, education, religion, alcohol history, psychological distress and social situation) play a role in alcohol consumption. Kuntsche et al. (2009) underline the heterogeneous impact of the number of social roles (partner, child(ren), paid labour) on alcohol consumers among the 10 industrialized countries they studied.

Unfortunately, these previous researches tried to estimate the determinants of consumption only with macroeconomic data. This may lead to two different problems of interpretation. The first one is known as the "ecological fallacy". This fallacy can lead to misidentify spurious relationships in aggregated data (Gelman et al. 2001), when one tries to infer individual behavior from aggregated relations (See for example Angerer et al. 2019). The second one is known as the corner solution problem, as there is a various share of non-drinkers across the different countries. As shown by Nelson (2014a) in his meta-analysis of beer price elasticity, the total impact of price or income can be misidentified on the whole population if they have different and separate effects on the probability or the level of drinking.

Our research is therefore original. We provide new evidence on European alcohol consumption based on a microdata approach of individual behavior. We use the 2014 wave of the European Social Survey, merged with Holmes & Anderson (2017b) Annual Database of National Beverage Consumption. Our microeconometrics approach is an extension of a precedent paper (Coisnon et al. 2019). We estimated a generalized Heckman model on the individual and national determinants of alcohol consumption with standard errors bootstrapped at the country level. We were able to provide estimation of elasticities and cross elasticities, identification of drinkers and abstinents, and specific determinants of the level of drinking.

The remainder of this research note is as follow. In section 2, we present the data and the methodology. We explain eventually in the section 3 the main results of our benchmark. Finally, we discuss in the conclusion some policy implications.

II. Methodology

II.1 Econometric Strategy

To control for sample selection bias and for simultaneity between the various alcohol consumption, we rely on the methodology proposed by Yen (2005). We implement a multivariate sample selection model also known as generalized Heckman model. The model used here is a generalization of the works of Heckman (1979) and Amemiya (1974) using *n* equations. It is also a special case of the more general framework of "multilevel multiprocess model" (Bartus & Roodman, 2014). We use the CMP (conditional mixed process) framework proposed by Roodman (2011) which relies on a performant maximum likelihood simulation algorithm for system of simultaneous equations.

We have therefore:

$$\begin{cases} \ln Y_i = \alpha_i + \sum_{k=1}^{K} \eta_{i,k} V_k + \sum_{m=1}^{M} \zeta_{i,m} C_m + \epsilon_i \\ if \sum_{s=1}^{S} \gamma_{i,s} Z_s + \mu_i \geq 0 \\ ln\, Y_i = 0 \; otherwise \end{cases}$$

With Y_i the consumption of the alcohol $i = \{1,2,3\}$, C a vector of M national (contextual) variables, V a vector of K individual variables and Z a vector of S variables for the selection equation.

We have also ρ_{ij} the correlation between ϵ_i and ϵ_j and $\rho_{\mu i}$ the correlation between ϵ_i and μ_i. $\rho_{\mu i} = 0$ leads to a generalized version of the Cragg's model (Cragg, 1971) and $\rho_{\mu i} 0$ leads to a generalized version of the Heckman model (Heckman, 1979).

As we estimated both individual and institutional drivers of alcohol consumption, a traditional approach would consist in a multilevel model with fixed or random effects However, in our case, it would lead to an intractable model, as the estimation time exponentially increases along with the number of parameters (Bartus and Roodman, 2014). We have therefore two possible options. If the country variability is of particular interest, the first one is a two-step method, initially developed by Saxonhouse (1976) and eventually refined by several authors such as Wooldridge (2010), Hornstein and Greene (2012) or Bryan and Jenkins (2016), and implemented in various empirical studies (Hug and Sporri, 2011; Jansen et al., 2013; Barattieri et al., 2016, Coisnon et al. 2019).This approach is an approximate estimation of a random coefficient multilevel model. If one want to estimate a fixed effects models with variables at both individual and institutional levels, one may prefer the second option which consists in using a country-specific bootstrap approach in order to preserve the cluster dimension of our data and correct standard errors that might therefore be biased (Field & Welsh, 2007; Cameron et al., 2008). This strategy was adopted by Harden (2011) and Musson and Rousseliere (2020). Therefore this system of equations is estimated according to the method

of simulation of maximum likelihood based on draws from Halton sequences and the standard errors are obtained through bootstrapping at the cluster (country) level using 100 replications.

II.2. Data and variables

Our sample contains 37,513 respondents from 21 countries[†], surveyed in 2014 from the seventh wave of the European Social Survey. One of the main interest of the ESS is to be a representative sample, in contrast with the Global Drug Survey, which is an opportunistic and non-probabilistic web survey of the population (Barratt et al. 2017) .This sample has been matched with Holmes & Anderson (2017b) Annual Database of National Beverage Consumption (price of alcohol) and Eurostata data on GDP. The descriptive statistics of the various variables are reported in appendix 1.

Three dimensions of alcohol consumption are measured namely frequency of alcohol consumption, quantity of alcohol consumed, and frequency of binge drinking. The quantity of alcohol consumption was measured by asking respondents two separate questions about how much they drank on the last occasion that they drank alcohol on a weekday (Monday to Thursday) and on a weekend day (Friday to Sunday). Country-specific showcards were used to enable respondents to indicate which drinks and how many drinks they had consumed on these occasions (Huijts et al. 2014). Using the disaggregated data and the information of these showcards, we were able to attribute for each kind of alcohol (beer, wine and spirits) the corresponding frequency and level of consumption. Although there is some limitation with these data (some major countries like Italy are missing), the high quality of ESS is assessed in several publications (Eikemo et al. 2017).

As independent variables, we use the socio-economic variables (age, gender, occupation, social interactions, domicile, body mass index, marital status, presence of children at home …) commons to most of the studies on alcohol consumption. For example, according to Smarandescu et al. (2014), male consume more drinks of beer than females and there is positive association with BMI (Body Max Index). However other researches shown some mixed results as there is in continually increase in women consumption (Haydon et al. 2016) and BMI may has opposite association with total consumption or frequency of drinking (Breslow & Smothers 2005). Social interactions and peer pressure (Piacientini & Banister 2006, Morris et al. 2020) may lead to an increase in the probability of drinking. Finally, immigrants tend to consume less than people born in the country (Alamilla et al. 2020). As in Yen (2005), we also control for other addiction such as cigarette smoking.

The price is log-transformed variable in order to directly estimate own and cross price elasticities (Meng et al. 2014; Clements et al. 2020). Following Colen & Swinnen (2015), GDP is also log-transformed but introduced with both main and interacted terms in order to test for a nonlinear relation of consumption with GDP.

[†] Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Israel, Lithuania, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

As an instrumental variables, following Baena et al. (2019) and Tomkins et al. (2019), we use the religious affiliation. Authors show that there is a connection between religious affiliation, religiosity and the probability to never consuming alcohol.

III. Results

Coefficients are reported in Appendix 2. The cross equation correlation parameters are significant and support the hypotheses of sample selection bias (in addition to the significance of the religiosity variable) and simultaneity between the various alcohol consumption. Due to interaction effects and the presence of the same variables in both level and selection equations, the coefficients are not by themselves informative. Therefore we report in the marginal effects in the following table (table 1). Three effects are of interest: the effects on the probability of drinking, the direct (conditional) effect on the level of drinking and the total (unconditional) effect on the level of drinking.

Table 1: Marginal Effects

	Conso			Level (conditional effects)			Level (unconditional effects)		
VARIABLES	beer	wine	spirits	beer	wine	spirits	beer	wine	spirits
age	-0.004***	0.003***	-0.003***	-0.010***	-0.001	-0.011***	-0.017***	0.011***	-0.012***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
gender (ref. Male)									
Female	-0.301***	0.129***	-0.039***	-0.569***	-0.132***	-0.250***	-1.309***	0.400***	-0.200***
	(0.005)	(0.005)	(0.005)	(0.026)	(0.013)	(0.019)	(0.019)	(0.019)	(0.017)
Social meeting (ref. Never)									
Less than one a month	0.075***	0.083***	0.079***	0.048	-0.136*	-0.043	0.292***	0.260***	0.257***
	(0.020)	(0.020)	(0.017)	(0.069)	(0.078)	(0.087)	(0.075)	(0.077)	(0.061)
Once a month	0.114***	0.116***	0.088***	-0.011	-0.200***	-0.036	0.411***	0.355***	0.290***
	(0.019)	(0.020)	(0.017)	(0.068)	(0.077)	(0.087)	(0.074)	(0.076)	(0.060)
Several times a month	0.120***	0.171***	0.096***	-0.082	-0.216***	-0.117	0.403***	0.541***	0.295***
	(0.019)	(0.019)	(0.016)	(0.067)	(0.075)	(0.085)	(0.071)	(0.074)	(0.058)
Once a week	0.124***	0.163***	0.091***	-0.022	-0.216***	-0.084	0.444***	0.513***	0.286***
	(0.019)	(0.019)	(0.016)	(0.067)	(0.075)	(0.085)	(0.072)	(0.074)	(0.058)
Several times a week	0.124***	0.187***	0.109***	-0.038	-0.191**	-0.128	0.435***	0.607***	0.334***
	(0.019)	(0.019)	(0.016)	(0.067)	(0.075)	(0.085)	(0.071)	(0.073)	(0.058)
every day	0.112***	0.185***	0.100***	-0.014	-0.199***	-0.034	0.402***	0.597***	0.331***
	(0.019)	(0.020)	(0.017)	(0.068)	(0.076)	(0.087)	(0.073)	(0.076)	(0.060)
Cigarettes smoking behaviour (ref. smoke daily)									
Smoke but not every day	0.057***	0.132***	0.002	-0.065**	-0.016	-0.223***	0.181***	0.477***	-0.069
	(0.014)	(0.014)	(0.014)	(0.033)	(0.036)	(0.043)	(0.053)	(0.055)	(0.049)
used to smoke	-0.036***	0.125***	-0.055***	-0.237***	-0.122***	-0.257***	-0.244***	0.397***	-0.271***
	(0.007)	(0.008)	(0.008)	(0.019)	(0.021)	(0.027)	(0.028)	(0.029)	(0.027)
only smoked a few times	-0.021**	0.149***	-0.044***	-0.348***	-0.181***	-0.358***	-0.241***	0.455***	-0.263***
	(0.009)	(0.010)	(0.009)	(0.023)	(0.024)	(0.031)	(0.034)	(0.036)	(0.032)
never smoked	-0.137***	0.039***	-0.115***	-0.344***	-0.235***	-0.405***	-0.644***	0.048*	-0.505***
	(0.006)	(0.007)	(0.007)	(0.021)	(0.019)	(0.030)	(0.025)	(0.025)	(0.024)
Lives with partner (ref. yes)									
No	-0.004	-0.070***	0.002	0.101***	-0.005	0.093***	0.026	-0.250***	0.034*
	(0.005)	(0.006)	(0.005)	(0.016)	(0.014)	(0.020)	(0.021)	(0.021)	(0.019)
Children at home (ref. yes)									
No	0.029***	0.010*	0.032***	0.091***	0.062***	0.052**	0.141***	0.063***	0.121***
	(0.006)	(0.006)	(0.005)	(0.016)	(0.014)	(0.021)	(0.021)	(0.022)	(0.019)

VARIABLES	Conso			Level (conditional effects)			Level (unconditional effects)		
	beer	wine	spirits	beer	wine	spirits	beer	wine	spirits
Domicile (ref. Big city)									
Suburbs of big city	0.032***	0.011	0.010	0.036	0.100***	0.056*	0.129***	0.085**	0.048*
	(0.008)	(0.009)	(0.008)	(0.023)	(0.021)	(0.030)	(0.032)	(0.033)	(0.029)
tow or small city	0.017***	-0.013*	0.008	0.002	0.052***	0.038	0.063***	-0.024	0.036
	(0.006)	(0.007)	(0.006)	(0.018)	(0.017)	(0.023)	(0.024)	(0.025)	(0.022)
country village	0.015**	-0.002	-0.001	-0.067***	-0.065***	-0.048*	0.025	-0.034	-0.017
	(0.007)	(0.007)	(0.007)	(0.019)	(0.018)	(0.024)	(0.025)	(0.026)	(0.023)
countryside	0.075***	-0.075***	0.015	0.050*	0.015	0.141***	0.293***	-0.257***	0.091**
	(0.011)	(0.011)	(0.011)	(0.029)	(0.028)	(0.039)	(0.040)	(0.040)	(0.038)
education	0.005***	0.013***	0.003***	-0.006***	0.007***	-0.006**	0.017***	0.050***	0.008***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Main activity (ref. Paid Work)									
Education	-0.022**	-0.033***	-0.013	-0.052*	-0.042	-0.000	-0.098**	-0.133***	-0.044
	(0.011)	(0.012)	(0.010)	(0.030)	(0.034)	(0.036)	(0.039)	(0.044)	(0.036)
Unemployed	0.005	-0.067***	-0.021**	0.137***	0.042	0.192***	0.078*	-0.218***	-0.018
	(0.011)	(0.011)	(0.010)	(0.029)	(0.033)	(0.042)	(0.040)	(0.043)	(0.037)
Retired	-0.005	-0.028***	-0.016*	0.048*	0.004	-0.014	0.002	-0.095***	-0.057*
	(0.009)	(0.009)	(0.009)	(0.026)	(0.021)	(0.033)	(0.035)	(0.034)	(0.031)
Housework	-0.061***	-0.067***	-0.034***	0.059*	0.057**	0.020	-0.197***	-0.214***	-0.106***
	(0.010)	(0.010)	(0.010)	(0.034)	(0.025)	(0.038)	(0.040)	(0.038)	(0.034)
Other	-0.086***	-0.131***	-0.048***	0.025	-0.109***	0.055	-0.300***	-0.499***	-0.146***
	(0.012)	(0.013)	(0.012)	(0.039)	(0.041)	(0.049)	(0.046)	(0.046)	(0.041)
BMI	0.001***	-0.005***	0.004***	0.009***	0.003**	0.009***	0.009***	-0.018***	0.015***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Born in country (ref. yes)									
No	-0.098***	-0.058***	-0.037***	-0.114***	-0.073***	-0.040	-0.393***	-0.232***	-0.131***
	(0.007)	(0.008)	(0.007)	(0.024)	(0.020)	(0.030)	(0.027)	(0.028)	(0.025)
Belonging to religion (ref. yes)									
No	0.019***	0.037***	0.015***	-0.026***	0.003***	0.007***	0.059***	0.133***	0.051***
	(0.004)	(0.005)	(0.005)	(0.006)	(0.000)	(0.002)	(0.014)	(0.019)	(0.017)
beer price (ln)	-0.051***	-0.164***	-0.027***	-0.138***	-0.021	0.125***	-0.241***	-0.589***	-0.053
	(0.010)	(0.010)	(0.010)	(0.028)	(0.027)	(0.040)	(0.037)	(0.037)	(0.033)
wine price (ln)	-0.021***	-0.058***	0.079***	0.412***	0.100***	0.553***	0.097***	-0.160***	0.416***
	(0.008)	(0.008)	(0.008)	(0.022)	(0.022)	(0.033)	(0.029)	(0.030)	(0.028)
spirits price (ln)	-0.039**	0.207***	-0.175***	-0.286***	-0.081*	-0.462***	-0.258***	0.696***	-0.705***
	(0.015)	(0.016)	(0.015)	(0.042)	(0.043)	(0.067)	(0.058)	(0.060)	(0.052)
GDP/cap (ln)	0.141***	0.174***	0.070***	0.163***	0.005	-0.431***	0.584***	0.635***	0.095***
	(0.009)	(0.009)	(0.009)	(0.026)	(0.024)	(0.038)	(0.032)	(0.034)	(0.030)

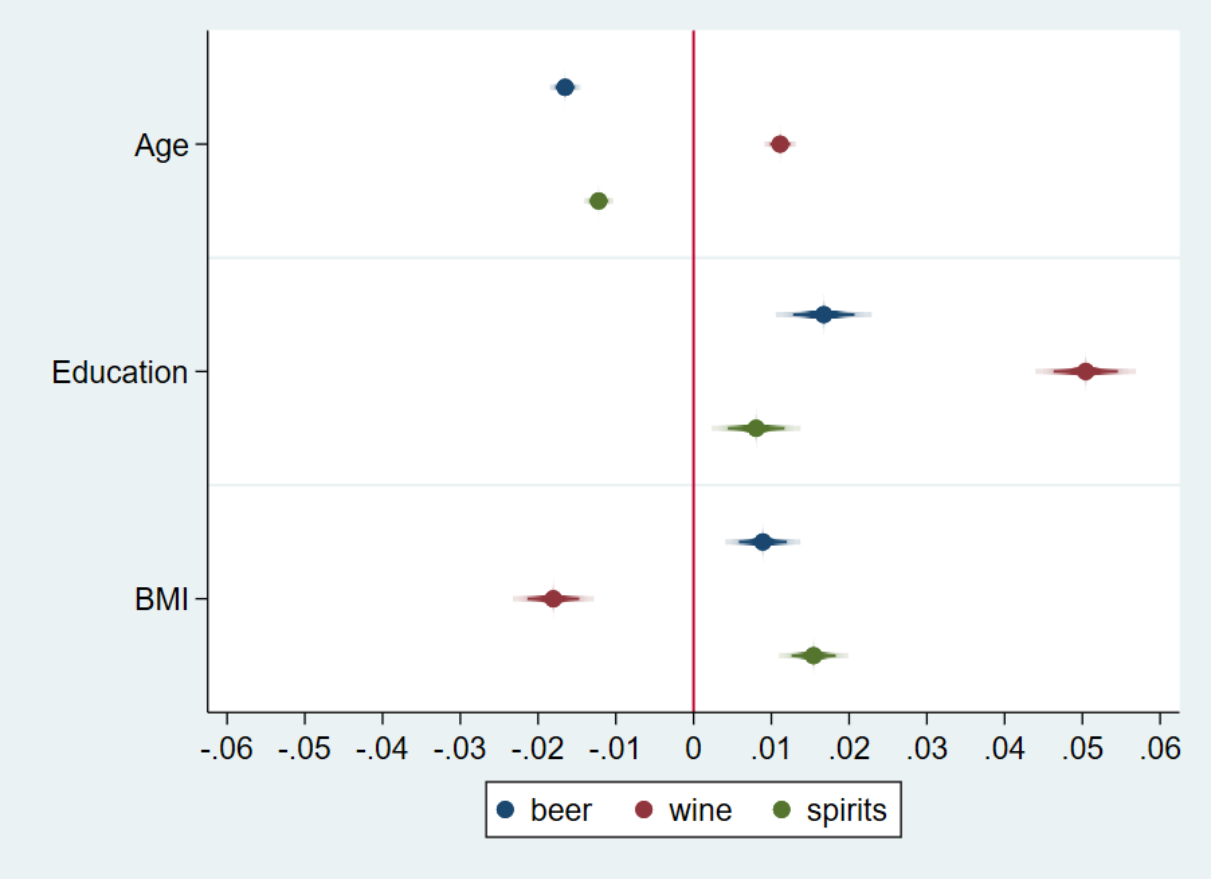
*Lecture : Bootstrapped Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; N=37,513.*

Marginal effects of Gender, Family (having a partner or a child), place of birth are in line with previous researches. Interestingly social meeting has no direct effect on the level of consumption of beer or spirits (for the drinker) but an indirect effect through the augmentation of the probability of drinking. This direct effect is negative for wine (drinkers tend to drink less if they have more social meetings), but the total effect is still positive. Finally, there is a tendency to drink wine in cities and beer or spirit in rural areas.

Total marginal effects of continuous covariate are reported in figure 1. There is an opposite relation between BMI and beer or spirits (on the one hand) and wine (on the other hand), as in the latter case the association is negative. More educated people tends to drink more wine,

beer or spirit. The average marginal effects of age is negative for beer and spirit but positive for wine

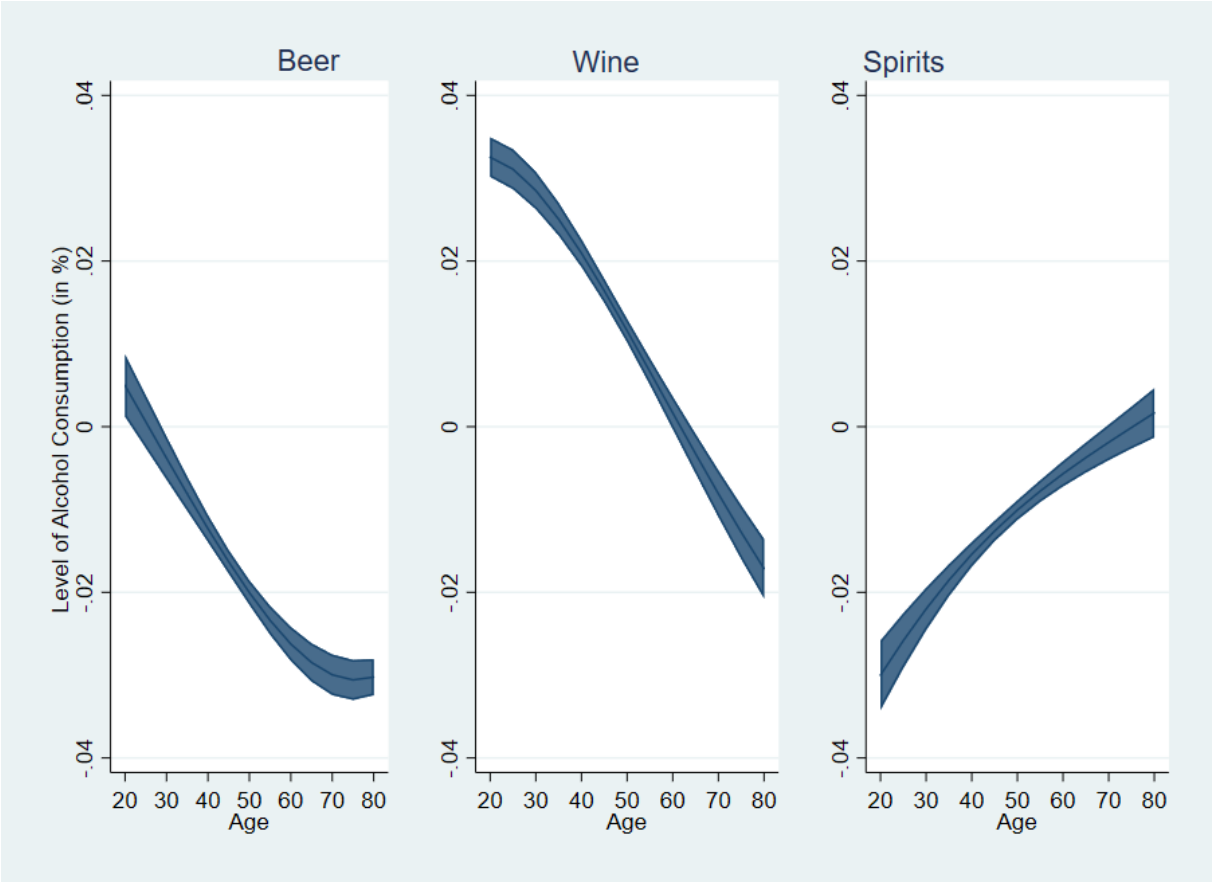
Figure 1. Unconditional Marginal Effects of Continuous covariates on Alcohol Consumption



Lecture : Marginal effects with 90% confidence intervals

As shown in figure 2, age has contrasted non-linear effects on the level of consumption. Before 30 years old, an increase in age leads to an increase in beer consumption. After 30, the evolution of consumption is a negative percentage. For wine consumption, this level is reached at 60 years. For spirits, the negative effect of age is decreasing from 20 to 70 and is null only after 70 years.

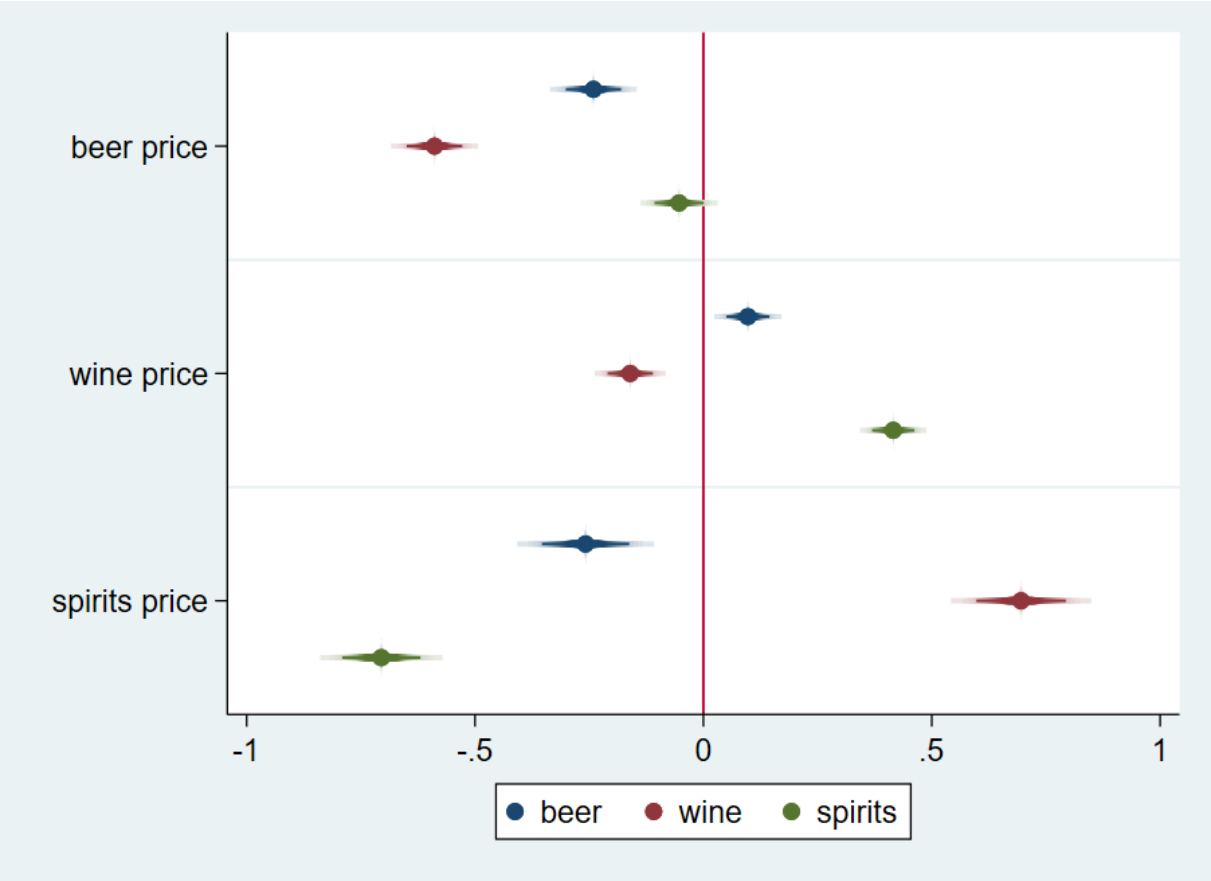
Figure 2. Unconditional Marginal Effects of Age on Alcohol Consumption



Lecture : Marginal effects with 90% confidence intervals

We reported the unconditional elasticities and cross-elasticities of price on alcohol consumption in figure 3. Consumption of beer and wine are relatively inelastic to price. An increase of 1% of price leads to a decrease of respectively 0.24 and 0.16 in consumption of beer and wine. In comparison, as in Fogarty (2010), spirits consumption is more elastic (with an elasticity of -0.71). We have estimated also cross-prices elasticities. In line with previous researches (Meng et al. 2014), these cross-elasticities are not symmetric. They show moderate substitutability between wine and beer and a moderate complementarity with spirits for beer drinkers. On the other hand, substitutability is higher between spirits and wine for wine drinkers (an increase of 1% of spirits price leads to an increase of 0.61% of wine consumption).

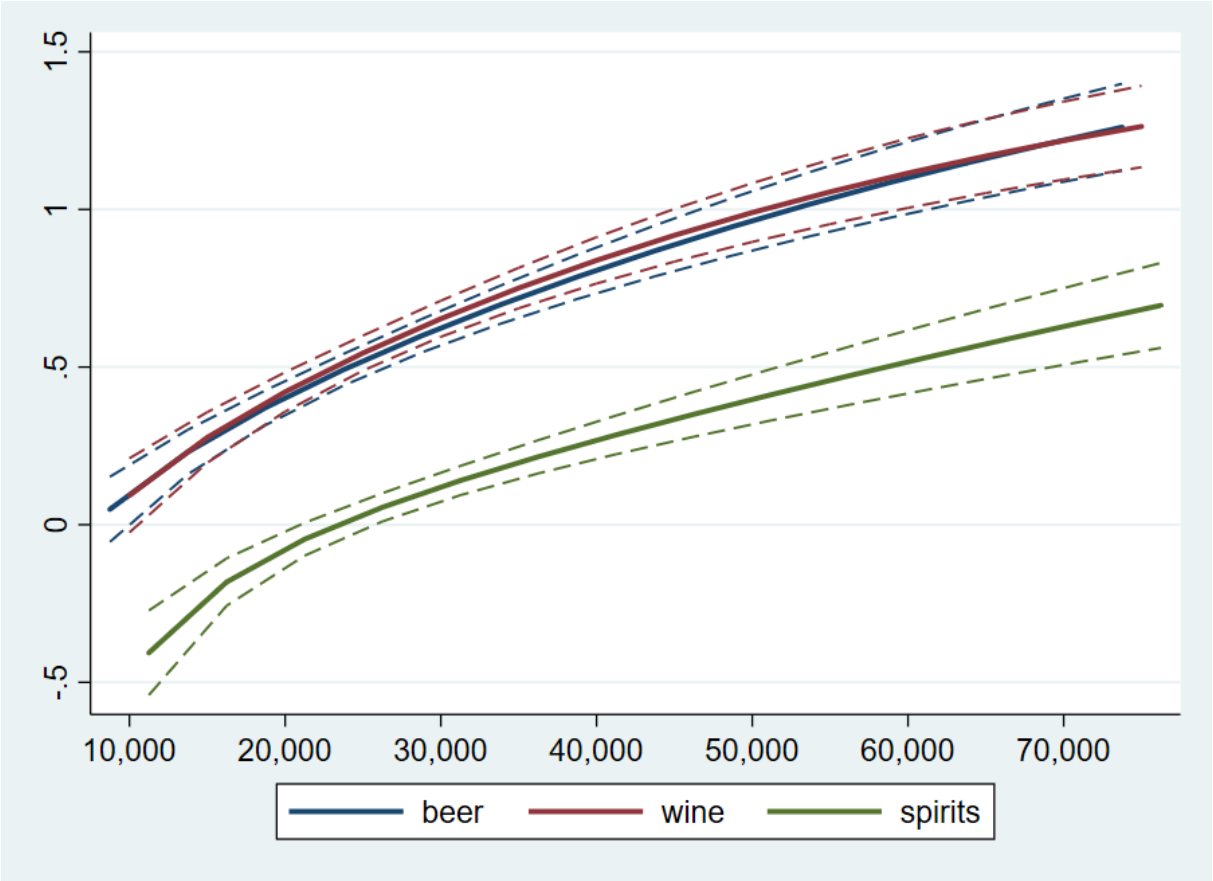
Figure 3. Elasticities and Cross Elasticities of Alcohol Prices on Alcohol Consumption



Lecture : Marginal effects with 90% confidence intervals

As shown in figure 4, alcohol consumption elasticity increases as the GDP/capita increases. Note however that, this relation has to be interpreted as an income elasticity with caution since we do not control for any other confounder than price at the national level. On average, as reported in table 1, this income elasticity is respectively 0.58, 0.64 and 0.1 for beer, wine and spirits, which is comparable to the estimation of 0.69 for alcohol consumption in the European Union between 1975 and 2008 from Nelson (2014b). This figure is slightly different from those of Colen & Swinnen (2015), who suggest a decreasing relationship, but is in line with the meta-analysis correcting for publication bias from Nelson (2013).

Figure 4. Elasticity of GDP/cap on Alcohol Consumption



Lecture : Marginal effects with 90% confidence intervals

IV. Discussion and Conclusion

This work aims to describe the European alcohol consumption using a microdata approach of individual behavior

First, we find an heterogenous effect of prices, which depends on the type of alcohol consumed. Controlling for individual and contextual effects, and sample selection, our estimates of elasticities (of respectively -0.24, -0.16 and -0.71 for beer, wine and spirits) are comparable to previous researches. In a meta-analysis of beer price elasticity, Nelson (2014a) reports an average value of -0.2 which account for selection bias and heterogeneity. This total effect is a combination of a negative effect of price on the probability of drinking and an effect on the level of consumption for drinkers. The Direct (conditional) effect of price on wine consumption is positive, suggesting a structural change in the quality for wine drinkers. This change has been already documented by other researchers (e.g. Pryce et al. 2019). On the other hand, the direct effect is negative on beer consumption, suggesting that beer consumption is still dominated by industrial beer and that the switch toward craft beer or sustainable beer is not fully implemented (Carley & Yahng, 2018; Staples et al. 2020). The same effect holds for spirits consumption (Bhattacharyya et al. 2019). Finally the estimated cross-elasticities suggest substitutability and complimentary effects : wine and spirits consumptions

are clearly substitutable while there is some mixed evidence of a complimentary relation between beer and other alcohols.

We underline the difference between consuming a lot and consuming often. In comparison with the work of Colen & Swinnen (2015), the different shape of the estimated elasticity curve in figure 2 may be caused by the mixed nature of alcohol consumption. On the one hand, alcohol consumed during the week and at home ("off trade") may be considered as an inferior product whereas on the other hand, it may be a normal good when consumed on tap (or "on trade beer") as suggested by Tomlinson & Branston (2014). This issue is connected with our other empirical finding about the impact of social meeting. We show an important impact of social meeting on the probability of drinking but not (unless for wine) on the level of consumption for drinkers. However our model does not identifiy the specific dynamic of weekly consumption and week end consumption, which be more related to bringe drinking. This distinction may be policy relevant. For example, in a systematic review, Nelson (2015) show that increased alcohol taxes or prices are unlikely to be effective as a means to reduce binge drinking, regardless of gender or age group. Our results show that policy measures to reduce alcohol consumption need to be targeted, depending on the target population, the type of consumption and the kind of alcohol consumed. Furthermore, the different nature of consumption (more or less socially embedded) may have different impact on life satisfaction. This issue will be investigated in future researches.

Our research note highlights the interest of an access to disaggregated data as we are able to disentangle effects on the probability of drinking and on the level of consumption. Access to panel or pseudo-panel data will be needed if one wants to address another important issue on the effect of time on consumption. In our case we are unable to identify the three different effects, namely age (due to a life-cycle effect), generation (or cohort effect as each generation share specific social experiences) and period (change in the regulation or in the industry). As shown in a previous research on GMO consumption (Rousselière & Rousselière 2017), this identification is interesting at a scientific level and has important public policies implications. We hope that future waves of the European Social will include the same version of this alcohol consumption module.

VI. References

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VI. Appendix

Appendix 1

Table: Descriptive statistics

	mean	se	min	max
Beer - level of consumption (in g)	24.564	51.064	0	2080
Beer - Drinker	0.408	0.491	0	1
Wine - level of consumption (in g)	20.467	43.239	0	3040.6
Wine - Drinker	0.427	0.495	0	1
Spirits - level of consumption (in g)	13.650	45.662	0	1680
Spirits - Drinkers	0.274	0.446	0	1
Age (years)	49.282	18.741	14	114
Gender				
Male	0.470	0.499	0	1
Female	0.530	0.499	0	1
Social meeting				
Never	0.019	0.138	0	1
Less than one a month	0.082	0.274	0	1
Once a month	0.103	0.304	0	1
Several times a month	0.209	0.407	0	1
Once a week	0.185	0.388	0	1
Several times a week	0.274	0.446	0	1
every day	0.128	0.334	0	1
Cigarettes smoking behaviour				
smoke daily	0.204	0.403	0	1
Smoke but not every day	0.034	0.182	0	1
used to smoke	0.216	0.412	0	1
only smoked a few times	0.098	0.297	0	1
never smoked	0.447	0.497	0	1
Lives with partner	0.593	0.491	0	1
Children at home	0.356	0.479	0	1
Domicile				
Big City	0.212	0.409	0	1
town or small city	0.118	0.322	0	1
country village	0.285	0.451	0	1
countryside	0.063	0.244	0	1
education (years)	12.905	3.945	0	50
Main activity				
Paid Work	0.503	0.500	0	1
Education	0.084	0.278	0	1
Unemployed	0.054	0.226	0	1
Retired	0.254	0.435	0	1
Housework	0.067	0.251	0	1
Other	0.038	0.190	0	1
BMI (Body Mass Index)	25.691	4.771	10.519	141.967
Born in country	0.887	0.317	0	1
Belonging to religion	0.577	0.494	0	1
beer price ($)	125.637	69.801	38.131	284.168
wine price ($)	113.466	52.420	42.224	233.192
spirits price ($)	138.061	55.213	52.253	278.380
GDP/cap ()$	31440.540	14973.310	10600	73500

Appendix 2.

Table : Coefficients of the generalized Heckman model

	beer		wine		Spirits	
VARIABLES	Level (ln)	Conso	Level (ln)	Conso	Level (ln)	Conso
Age	0.015***	0.014***	0.017***	0.040***	-0.018***	-0.024***
	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
age^2	-0.000***	-0.000***	-0.000***	-0.000***	0.000**	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
gender (ref. Male)						
Female	-0.951***	-0.854***	-0.143***	0.365***	-0.233***	-0.122***
	(0.027)	(0.015)	(0.013)	(0.014)	(0.019)	(0.015)
Social meeting (ref. Never)						
Less than one a month	0.163**	0.243***	-0.144*	0.258***	-0.083	0.278***
	(0.075)	(0.066)	(0.078)	(0.064)	(0.088)	(0.066)
Once a month	0.158**	0.363***	-0.211***	0.355***	-0.081	0.308***
	(0.074)	(0.065)	(0.077)	(0.063)	(0.088)	(0.065)
Several times a month	0.095	0.381***	-0.231***	0.510***	-0.166*	0.334***
	(0.073)	(0.063)	(0.075)	(0.062)	(0.085)	(0.063)
Once a week	0.161**	0.395***	-0.231***	0.487***	-0.130	0.316***
	(0.073)	(0.063)	(0.075)	(0.062)	(0.086)	(0.063)
Several times a week	0.144**	0.393***	-0.208***	0.553***	-0.183**	0.373***
	(0.073)	(0.063)	(0.075)	(0.062)	(0.086)	(0.063)
every day	0.152**	0.357***	-0.216***	0.548***	-0.085	0.345***
	(0.074)	(0.064)	(0.076)	(0.063)	(0.087)	(0.064)
Cigarettes smoking behaviour (ref. smoke daily)						
Smoke but not every day	0.003	0.167***	-0.027	0.369***	-0.224***	0.007
	(0.035)	(0.040)	(0.036)	(0.039)	(0.043)	(0.039)
used to smoke	-0.283***	-0.106***	-0.133***	0.349***	-0.235***	-0.160***
	(0.021)	(0.022)	(0.021)	(0.022)	(0.027)	(0.022)
only smoked a few times	-0.374***	-0.061**	-0.193***	0.417***	-0.341***	-0.126***
	(0.025)	(0.026)	(0.024)	(0.027)	(0.031)	(0.027)
never smoked	-0.527***	-0.411***	-0.239***	0.112***	-0.356***	-0.353***
	(0.022)	(0.019)	(0.019)	(0.019)	(0.030)	(0.019)
Lives with partner (ref. yes)						
No	0.095***	-0.013	0.001	-0.198***	0.092***	0.007
	(0.017)	(0.017)	(0.014)	(0.016)	(0.020)	(0.017)
Children at home (ref. yes)						
No	0.131***	0.088***	0.061***	0.029*	0.038*	0.102***
	(0.017)	(0.017)	(0.014)	(0.017)	(0.021)	(0.017)
Domicile (ref. Big city)						
Suburbs of big city	0.079***	0.096***	0.099***	0.031	0.051*	0.031
	(0.026)	(0.026)	(0.021)	(0.025)	(0.030)	(0.026)
tow or small city	0.026	0.053***	0.053***	-0.038*	0.035	0.024
	(0.020)	(0.020)	(0.017)	(0.019)	(0.023)	(0.020)
country village	-0.047**	0.045**	-0.065***	-0.004	-0.047*	-0.004
	(0.021)	(0.021)	(0.018)	(0.020)	(0.025)	(0.021)
countryside	0.149***	0.228***	0.021	-0.215***	0.134***	0.048
	(0.032)	(0.032)	(0.028)	(0.032)	(0.040)	(0.033)
education	0.001	0.017***	0.005***	0.038***	-0.008***	0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Main activity (ref. Paid Work)						
Education	-0.081**	-0.066**	-0.039	-0.092***	0.005	-0.041
	(0.032)	(0.033)	(0.034)	(0.033)	(0.037)	(0.033)
Unemployed	0.144***	0.016	0.048	-0.188***	0.202***	-0.066**
	(0.031)	(0.032)	(0.033)	(0.033)	(0.042)	(0.033)
Retired	0.042	-0.016	0.006	-0.077***	-0.006	-0.050*
	(0.029)	(0.028)	(0.021)	(0.026)	(0.033)	(0.028)
Housework	-0.026	-0.188***	0.063**	-0.190***	0.035	-0.106***
	(0.037)	(0.032)	(0.025)	(0.029)	(0.039)	(0.032)

	beer		wine		Spirits	
VARIABLES	Level (ln)	Conso	Level (ln)	Conso	Level (ln)	Conso
Other	-0.097**	-0.268***	-0.097**	-0.380***	0.077	-0.154***
	(0.043)	(0.039)	(0.041)	(0.039)	(0.049)	(0.040)
BMI	0.011***	0.004***	0.003**	-0.015***	0.007***	0.012***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Born in country (ref. yes)						
No	-0.255***	-0.308***	-0.069***	-0.164***	-0.023	-0.117***
	(0.027)	(0.024)	(0.020)	(0.022)	(0.030)	(0.024)
Belonging to religion (ref. yes)						
No		0.059***		0.105***		0.047***
		(0.013)		(0.015)		(0.016)
beer price (ln)	-0.207***	-0.156***	-0.008	-0.465***	0.137***	-0.083***
	(0.031)	(0.030)	(0.027)	(0.029)	(0.041)	(0.031)
wine price (ln)	0.384***	-0.064***	0.105***	-0.164***	0.518***	0.248***
	(0.024)	(0.024)	(0.022)	(0.024)	(0.032)	(0.025)
spirits price (ln)	-0.338***	-0.118**	-0.098**	0.586***	-0.385***	-0.545***
	(0.047)	(0.047)	(0.043)	(0.046)	(0.068)	(0.048)
GDP/cap (ln)	-5.120***	-2.648***	-4.694***	-2.404***	-6.930***	-3.063***
	(0.509)	(0.526)	(0.483)	(0.530)	(0.644)	(0.541)
GDP/cap (ln)^2	0.267***	0.150***	0.229***	0.141***	0.316***	0.160***
	(0.025)	(0.026)	(0.024)	(0.026)	(0.032)	(0.027)
Constant	29.477***	14.852***	27.508***	8.017***	39.260***	18.473***
	(2.568)	(2.633)	(2.462)	(2.654)	(3.297)	(2.707)
sig	0.957**		0.768***		0.874***	
	(0.018)		(0.004)		(0.013)	
rho		0.695***	0.190***	-0.225***	0.162***	0.046***
		(0.030)	(0.013)	(0.009)	(0.014)	(0.010)
			-0.072***	-0.082***	-0.071***	0.109***
			(0.010)	(0.009)	(0.014)	(0.009)
				-0.057**	0.175***	0.008
				(0.026)	(0.014)	(0.011)
					-0.216***	0.073***
					(0.012)	(0.009)
						-0.218**
						(0.083)

*Lecture : Bootstrapped Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; N=37,513.*