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TOBACCO CONSUMPTION AND GENDER SOCIOECONOMIC DIFFERENCES IN SOUTH EUROPE: EVIDENCE FROM PANEL DATA

By

Agelike Nikolaou
Department of Economics
University of Macedonia

Abstract

The purpose of this paper is to investigate the socioeconomic inequalities of individual smoking behaviour across four south EU countries. Three indicators for the socioeconomic status of the individuals are used; equivalised household income, educational level and employment status. According to our findings Italy is the only country where socioeconomic inequalities in smoking behaviour are quite clear for both genders. For the rest three countries weak socioeconomic inequalities or even reverse educational gradient for the female population is observed. Socioeconomic inequalities in smoking behaviour are emerging in this part of the EU region. Incorporating inequality aspects into antismoking measures will assist a more targeted tobacco control policy. JEL Classifications: I12, I18, C23.

1. Introduction

Tobacco consumption in EU countries is considered a leading preventable cause of premature death and disability among adults. More than 650,000 people die each year while 13 million people suffer from a serious illness caused by smoking. Furthermore, it is estimated that nearly 80,000 non-smoking Europeans die each year from exposure to second-hand smoking (European Commission 2004). Smoking prevalence for adult population in EU, as we can see in Table 1, varies from 16% in Sweden to 48% in Greece. In recent years there has been an overall declining trend in smoking across the region. However, this decline is more evident among men, whereas among women smoking has remained unchanged or even increased in some cases (Graham 1996, Marques-Vidal *et al.*, 2003).

A large part of the literature in the area of health economics for Europe is engaged with the socioeconomic status effects in smoking patterns of the indi-

viduals. The individual socioeconomic status (SES) is usually measured by education, occupation or income. Most of these studies have revealed that the prevalence and amount of smoking is considerably higher among both genders at lower SES groups, in northern countries (Cavelaars *et al.*, 2000, Knust *et al.*, 2004, Giskes *et al.*, 2005). In south EU countries, inequalities among men are less pronounced, while for women it is found that there are weak or even reverse associations between SES and smoking (Borras *et al.*, 2000, Cavelaars *et al.*, 2000, Nobile *et al.*, 2000, Fernadez *et al.*, 2001, Knust *et al.*, 2004, Giskes *et al.*, 2005, Nikolaou 2008).

Thus a north-south smoking pattern appears in the literature. However few are the studies investigating smoking behaviour and SES among genders in the EU, in a longitudinal setting using cross country comparisons. Even fewer are those which are based on the ECHP data set (Nikolaou 2008), and according to my knowledge none of them, is focusing on the south part of the EU region. This study aims at examining the tobacco consumption behaviour of men and women from different SES, in four southern EU countries: Greece, Italy, Portugal and Spain, for the period 1998-2001, using the valuable information included in the ECHP data set.

Reducing the prevalence and consumption of tobacco as well as socioeconomic inequalities connected with premature death and disability from smoking, is a high priority of EU's public health agenda. Thus recent estimates of smoking behaviour and its sociodemographic and socioeconomic correlates are important for policy makers in planning group specific antismoking policies.

2. Methodological framework

The dataset used in this paper is that of the European Community Household Panel survey (ECHP, UBD, version December 2003), a longitudinal micro-level database, for fifteen EU countries, which was initiated in 1994. A wide range of information is provided for the period 1994-2001, for individuals sixteen years old and over, such as demographic characteristics, income, employment, education, housing conditions, health, social relations, satisfaction and financial situation.

In the present study we use a pooled sample for the years 1998-2001, for which information on smoking frequency is available while the final sample is consisted from: 14,912 observations for Greece, 33,896 for Italy, 31,468 for Portugal and 23,816 observations for Spain. The analysis is carried out separately for each country.

Tobacco consumption is a continuous variable regarding the number of cigars, cigarettes and pipes smoked daily by the participants in the survey. A number of explanatory variables categorized either as sociodemographic (age, gender, marital status, social networks, look after others) or socioeconomic (income, education, employment) characteristics are controlled for in the analysis. Further details on the definition of the variables considered in this study, are presented in Table 2, along with some descriptive statistics in Table 3.

The distribution of the tobacco consumption variable seems rather discrete, and this is mainly due to the fact that there are a large number of zero readings, reported by questioned individuals. Therefore, count data regression techniques are used. In particular, a random effects negative binomial model of type 2 is employed in order to account for the excess zeros and the high degree of overdispersion in the data, as well as to take advantage of the time series element of the dataset. The same econometric model is used for all four countries in order to facilitate cross-country comparisons.

Let n_{it} denote the counts of individuals in group i, i=1,..., N, t=1,...,T_i. Following Hausman *et al*. (1984), in the random-effects negative binomial regression model, the Poisson parameter λ_{it} follows a gamma distribution with parameters (γ_{it}, δ_i), where $\gamma_{it}=\exp(x_{it}\beta)$. The unobserved heterogeneity δ_i, being the individual-specific random effect, is distributed as a beta random variable across individuals with parameters (a,b) and independently of the regressors x_{it}. Finally, the joint density function for the counts of the random-effects negative binomial model for the i group is

$$\Pr\left(n_{i1},\ldots,n_{iT_i}/x_{i1},\ldots,x_{iT_i}\right)=\frac{\Gamma(a+b)\Gamma\left(a+\sum_t\gamma_{it}\right)\Gamma\left(b+\sum_t n_{it}\right)}{\Gamma(a)\Gamma(b)\Gamma\left(a+b+\sum_t\gamma_{it}+\sum_t n_{it}\right)}\prod_t\frac{\Gamma(\gamma_{it}+n_{it})}{\Gamma(\gamma_{it})\Gamma(n_{it}+1)} \quad (1)$$

t=1,...,T_i. The parameters β, α, and b are estimated by maximizing the log-likelihood implied by (1), and the coefficients will be consistent if the random effect δ_{it} is independent of the regressors x_{it}.

3. Results

The random effects negative binomial regression results for males and females on the determinants of tobacco consumption for Greece, Italy, Portugal and Spain, are presented in Table 4. Income, education and employment are the socioeconomic variables used in the analysis. Income is significantly related to smoking, for all four countries for the case of females. A non-linear

concave relationship is exhibited between equivalised household income and smoking, indicating that as income increases tobacco consumption increases, but after a specific income threshold this is decreasing. For males, the same nonlinear concave pattern appears for Italy and Portugal, while for Greece the relationship is reversed. Thus, in the case of men, the income effect is not clearcut. Duarte *et al*. (2006), has used this nonlinear income approach with similar results, however the majority of the existing literature has focused on the linear relationship and in most cases the association appears to be weak or positive (Chaix *et al.*, 2004, Laaksonen *et al.*, 2005, Raptou *et al.*, 2005).

Unemployment does not seem to affect women smoking behaviour, while Portuguese and Greek unemployed men appear to smoke less than the employed. Moreover, inactivity status is related to a lower level of tobacco consumption in comparison to the remainder and the finding is robust for all countries and for both sexes. Some studies support that unemployed and inactive people might adopt healthier lifestyles, owing to greater availability of time (Ruhm, 2000). However, most studies provide evidence that unemployed males and females smoke more than their employed counterparts, especially in the north of Europe, while in the south such evidence is rare (Graham 1996, Marques-Vidal *et al.*, 2003, Chaix *et al.*, 2004).

Finally, for the female group the relationship between educational level and smoking patterns is significant for all four countries. In Greece, Portugal and Spain an inverse gradient is observed where medium and highly educated women are smoking more than their lower educated counterparts, while this pattern appears reversed for Italy. It should be noted however that the above result for Spain is low. In the case of males, this relationship is statistically significant and negative only for the Italian and the Greek sample. Thus, for Italy, educational inequalities in smoking for both sexes are quite clear.

Our findings are in line with most of the existing literature. Among men, inequalities in smoking in relation to their educational background, are observed in most member states, even thought in the south these inequalities are small. For women, a north-south smoking pattern appears in the literature with highly educated female population to smoke more in southern Europe, (Cavelaars *et al.*, 2000, Giskes *et al.*, 2004, Kunst *et al.*, 2004, Huisman *et al.*, 2004). There is reported evidence, however, according to which inequalities related to education are emerging in Italy and Spain for females (Fagiano *et al.*, 2001, Fernandez *et al.*, 2001, Sciaffino 2003).

For males, being a member of different social clubs is related positively with

smoking in all countries, whereas for females this relationship is totally insignificant. Hence, a Mediterranean divide is observed, where engagement in social activities affects the smoking behaviour of males and females in a quite different way. Perhaps, social norms and the cultural framework in these countries mediate in the relationship of interest and produce these findings. On the contrary, having increased responsibilities over looking after other people is more robust between genders. In particular, taking care of other people is associated with increased tobacco consumption in Italy, Portugal and Spain. This finding is probably associated with psychological and psychosocial factors, such as the increased tension and stress due to the increased responsibilities.

Demographic characteristics are found to affect smoking behaviour in the expected way and the results are robust for all countries. Age is negatively related to tobacco consumption for both males and females, whereas the effect is more evident in the case of males possibly due to the higher frequency of male smokers. This finding is rather straightforward due to the diminishing health capital and the onset of health problems as age increases. Finally, being married, divorced or widowed is generally associated with increased tobacco consumption in most cases.

4. Conclusions

The findings of the study, which are supported by the existed literature, indicate that there are gender differentials in the smoking-SES relationship. From the four southern EU countries we examined, Italy is the only country where socioeconomic inequalities in smoking behaviour, for both genders are quite clear. For the rest three countries in the case of men, weak socioeconomic gradient in smoking is observed. In the case of women, high-income levels are negatively associated with smoking while reverse education gradient is revealed which is stronger for Greece and Portugal.

Socioeconomic inequalities in smoking are emerging in the southern part of the EU, even among women and the low socioeconomic status appears to be a major determinant for the classification of an adult individual as smoker. Thus the north-south pattern in tobacco consumption seems to have weakened and confined to the female educated population in Greece and Portugal.

The growth of these inequalities is going to lead in the future, in increased incidents of premature illness, disability and death connected with smoking among the more disadvantaged population. Tobacco control policies should be aiming not only at reducing smoking prevalence and consumption, but also at

confining socioeconomic discrepancies connected with smoking in the region. Hence the main challenge is to develop new and effective policies to address the determinants involved in these inequalities. Examples of such policies might be: health promotion interventions with disadvantaged smokers as priority group, free and confidential quit lines, removal of financial barriers for smoking cessation treatment, counselling, intensive support, and nicotine replacement therapy for poor people. Incorporating inequality aspects into antismoking measures will assist a more targeted tobacco control policy.

TABLE 1

Proportion of Adult Smokers in the European Union

Country	Total %	% of men	% of women	Country	Total %	% of men	% of women
Austria	40.7	41.3	40.0	Belgium	21.5	23.1	20.0
Bulgaria	32.3	41.3	23.4	Cyprus	24.2+	38.0	10.5
Czech Republic	25.3	30.0	20.7	Denmark	26.2	28.4	24.0
Estonia	31.3	42.0	20.7	Finland	21.0	24.5	17.4
France	27.1	30.6	23.6	Germany	26.6	31.1	22.2
Greece	48.0	60.7	35.4	Hungary	34.4	39.0	29.8
Ireland	19.2	19.6	18.9	Italy	22.3	29.1	15.5
Latvia	32.1	46.8	17.4	Lithuania	25.6	37.2	14.0
Luxembourg	30.9	33.8	27.9	Malta	24.8	29.2	20.4
Netherland	29.5	31.6	27.5	Poland	30.4	37.6	23.3
Portugal	31.6	37.0	26.3	Romania	26.9	33.9	19.9
Slovakia	25.1	34.8	15.5	Slovenia	23.3	28.4	18.3
Spain	29.9	32.7	27.1	Sweden	16.2	14.4	18.1
UK	28.3	28.8	27.9				

Source: WHO Report on the Global Tobacco Epidemic, 2008 and ASH Essential Information on Tobacco Policy and the EU, 2009.

+ Figures for Cyprus taken from the European Tobacco Control report, 2007.

TABLE 2

Definition of Variables

Variables	*Definitions*
Tobacco	Number of cigars/cigarettes/pipes smoked per day
Age	Age in years (divided by 100)
Married	Dummy equal to 1 if the respondent is married, 0 otherwise
Divorced/ owed	Dummy equal to 1 if the respondent is either separated/divorced or wid- widowed, 0 otherwise
Single	Dummy equal to 1 if the respondent is single, 0 otherwise (omitted from regressions)
Social networks	Dummy equal to 1 if the respondent is member in any social club, such as sports or entertainment club, a local or neighbourhood group, a party, etc., 0 otherwise
Look after others	Dummy equal to 1 if the respondent looks after, daily and without pay, children or elderly people who need special help due to illness, disability or old age, 0 otherwise
High education	Dummy equal to 1 if the respondent is of higher level education, 0 otherwise
Middle education	Dummy equal to 1 if the respondent is of middle level education, 0 otherwise
Lower education	Dummy equal to 1 if the respondent is of lower level education, 0 otherwise (omitted from regressions)
Employed / Self-employed	Dummy equal to 1 if the respondent is employed or self-employed, 0 otherwise (omitted from regressions)
Unemployed	Dummy equal to 1 if the respondent is unemployed, 0 otherwise
Inactive	Dummy equal to 1 if the respondent is out of the labour force (inactivity is defined by: working in apprenticeship, working for training, working in unpaid work, being in education, being retired, being inactive, working less than 15 hours/week), 0 otherwise
Income	Equivalised household income (divided by 100,000 for GR, PO, SP, and by 1,000 for IT)

TABLE 3

Variable Mean Values

Countries / *Variables*	**Greece**	**Italy**	**Portugal**	**Spain**
Tobacco Consumption	12.75	5.40	5.63	8.20
Age	48.05	47.32	48.61	47.91
Married	0.71	0.66	0.66	0.65
Divorced/ widowed	0.11	0.10	0.13	0.11
Social networks	0.10	0.24	0.19	0.26
Look after others	0.25	0.34	0.18	0.23
High education	0.12	0.07	0.06	0.17
Middle education	0.30	0.34	0.10	0.17
Unemployed	0.04	0.06	0.03	0.06
Inactive	0.47	0.50	0.46	0.51
Income	2.01	1.58	0.96	1.26
Observations	14,912	33,896	31,468	23,816

TABLE 4

Tobacco Consumption and Socio-economic Status

Dependent Variable / Indep. Variables	*Number of cigarettes/cigars/pipes smoked per day, Random Effects Negative Binomial Regressions*							
	Males				*Females*			
	Greece	**Italy**	**Portugal**	**Spain**	**Greece**	**Italy**	**Portugal**	**Spain**
Age	-0.02 ***	-0.02 ***	-0.01 ***	-0.01 ***	-0.03 ***	-0.004	-0.002 ***	-0.06 ***
Married	0.25 ***	0.18 ***	0.36 ***	0.45 ***	0.62 ***	-0.09	-0.15	0.48 ***
Divorced/ widowed	0.62 ***	0.38 ***	0.48 ***	0.60 ***	0.66 ***	-0.07	0.57 ***	0.85 ***
Social networks	0.10 ***	0.17 ***	0.07 ***	0.06 ***	0.09	-0.01	0.10	0.05
Look after others	-0.06 **	0.12 ***	0.19 ***	0.18 ***	0.07	0.10 **	0.22 ***	0.19 ***
High education	-0.29 ***	-0.42***	-0.04	-0.07	0.65 ***	-0.63 ***	0.54 ***	0.04 ***
Middle education	-0.05	-0.16***	-0.04	0.02	0.21	-0.11 *	0.54 ***	0.14 ***
Unemployed	-0.11 **	0.03	-0.09 *	0.03	0.04	-0.07	-0.14	0.01
Inactive	-0.26 ***	-0.33 ***	-0.36 ***	-0.31 ***	-0.23 ***	-0.45 ***	-0.42 ***	-0.24 ***
Income	-0.07 ***	0.22 ***	0.17 ***	0.10	0.30 ***	0.44 ***	0.39 ***	0.32 ***
Income squared	0.01 ***	-0.02 ***	-0.03 *	-0.02	-0.04 ***	-0.05 ***	-0.06 **	-0.04 **
Constant	2.34 ***	1.21 ***	1.43 ***	1.08 ***	0.43 **	0.50 ***	1.24	2.36 ***
Wald $\chi 2$	278.33	440.58	251.97	337.76	178.97	144.99	130.76	341.08
Log Likelihood	-27,862.02	-38,414.02	-34,719.50	-34,312.30	-10,453.12	-15,932.52	-6,274.90	-15,247.82
Observations	7,356	15,864	14,256	11,460	7,556	18,032	17,212	12,356

** The signs next to coefficients indicate statistical significance: *** significance at 1%, ** significance at 5%, * significance at 10% respectively.*

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