Contextualizing smoking: the influence of household factors on individual practices

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XXVI IUSSP International Population Conference
Marrakech, 27 September – 2 October, 2009
Poster Session 4: 'health and ageing', Nr 52
Thursday, October 01, 12:00 PM - 1:30 PM , Poster Room, Royal room wings

The purpose of this analysis is to investigate the influence of household on smoking practices. Is there evidence for an household effect on smoking? In other words, do household factors (both observable and unobservable) affect individual probabilities of smoking, all other individual characteristics being equal? French data from the European Community Household Panel (ECHP) are used. All individuals aged more than 16 years were interviewed within the selected households. The probability to be a daily smoker is explained by variables at the individual level and at the household level. We take into account a possible specific effect of the household by implementing a random effects probit model.

1) Background

Studies dealing with tobacco consumption inevitably approach this topic as a health issue, whatever the reference discipline of the researchers is. Deleterious effects of smoking on health are indeed well-documented and largely diffused. It has long been shown that smoking significantly increases the risk of lung cancers, cardio-vascular and respiratory diseases. 90% of lung cancers for men and 52% for women were attributable to smoking in France in 2000. One death in five for men and one death in fifty for women were tobacco-related (Hill, [6]). In 2004, the French Health Ministry has developed in a law a series of '100 objectives' to be reached by 2008. One of them consisted in reducing the prevalence of regular smoking from 33% to 25% for men and from 26% to 20% for women, by targeting young people and high-prevalence groups.

A precise knowledge of smoking determinants is therefore needed for this public policy to be effective. Individual dimensions of smoking have already been abundantly described. Two of the most important results found in this area concern the existence of a strong sex differential that has been gradually narrowing and of a social gradient that has been progressively inverted (Pampel, [9] and [10]). But the smoker in these studies is often isolated, extracted from its social environment. However it seems that the question of interactions, norms transmission and social control within the family is a crucial question for what concerns tobacco consumption. Therefore, this analysis aims at studying the social context of smoking, by investigating the household influence on smoking practices.

A large body of work has found evidence for family concordance in heath statuses and health-related behaviour (Falba et al., [4]; Meyler et al., [8]; Wilson, [12]). Concerning alcohol drinking, a study based on a French epidemiological cohort revealed that getting married was accompanied by an increased level of drinking (Guégen et al., [5]). Using data from the Health Survey for England, economists found that the influence of household membership was nearly as great as that due to differences between individual characteristics in determining consumption of alcohol (Rice et al., [11]). These studies tend to prove that it is important to look not only at individual-level predictors, but also at household-level predictors.

For what concerns tobacco, taking into account household influence on individual practices might be all the more important since smoking has as a strong ritual dimension. The sociologist Randall

Collins highlights the fact that, because of this ritual dimension, smoking makes sense in a social environment.

> 'As sociologists, we should as always be awake to see that these activities *are not just individual lifestyles*, but rituals and thus markers of group boundaries.' (Collins, [3], p. 298)
>
> 'The advertising of tobacco is a phenomenon of the twentieth century. It cannot be the explanation of how tobacco spread initially. [...] It did not take advertising to spread tobacco use; it spread by what the media business calls 'word of mouth', or more accurately, *by example and collective participation*, and by acquiring prestige as a social custom.' (Collins, [3], p. 303)

Some analyses already try to grasp at the collective dimension dimension of smoking. A study conducted on the British Household Panel Survey proved that members of the same household tend to quit smoking simultaneously (Chandola, [1]). Same data were also used to show that there is a 'matching' of smokers on the marriage market (Clark and Etilé, [2]).

The analysis presented here investigates two levels: the individual level (influence of several individual characteristics such as age, gender, education, income, occupation, etc.) for variables control purposes, and the household level. More precisely, the main objective is to take advantage of data with a hierarchical structure in order to identify and quantify the sources of the variation of smoking practices. The research question is the following: are household factors predictors of smoking, all other individual characteristics being equal? This question is split into a series of objectives:
(1) to point out the existence of an household specific effect affecting smoking practices,
(2) to measure the portion of total variability explained by the household effect,
(3) to identify household characteristics related to tobacco use.

2) Data

2.1) The European Community Household Panel

The European Community Household Panel was designed to study household income dynamics at the European level. It consisted in an annual interview of randomly selected households. The first wave took place in 1994 and the eighth and last wave occurred in 2001. The ECHP database

provides many information on household and individual incomes, but it also contains several modules related to other topics (education, labour, social relations, health, etc.). Information on smoking practices is available from the 6th wave onwards for most countries. The final French sample consists in 10 500 individuals in 5 500 households.

2.2) Variables

Smoking status was ascertained using answers to the following question: 'Do you smoke or did you ever smoked?'. The possible responses were: 'I smoke daily', 'I smoke occasionally', 'I do not smoke, but I used to smoke daily', 'I do not smoke, but I used to smoke occasionally' and 'I never smoked'. The variable of interest is a dummy equal to one if the individual is a daily smoker, and 0 otherwise.

The independent variables are of different types: some relates to the individual level, others to the household level. Individual-level variables comprise sex, age, eductional attainnment and activity status. Household-level variables comprise household income (equivalised by the OECD-modified scale) and the composition of the houshold (single person, couple without children, couple with children, other types of household). A variable indicating if there are smokers in the household (*Ego* being excluded) lies at the intersection of these two levels.

3) Statistical Methodology

In the ECHP, individuals are nested within households. We can assume that two members of the same household are more likely to 'resemble' each other than two individuals randomly drawn from the sample. In other words, an unobservable household effect may affect practices. From a technical point of view, it means that there is a potential correlation of residuals for members from the same household. The responses cannot be assumed to be independent even after conditioning on the observed variables, because of this unobserved household specific effect. There is great chance that the assumption of mutual independence across observations is violated, so traditional statistical models cannot be used. In this case, the multilevel structure is not a nuisance factor but instead a key dimension of the analysis, thus multilevel models are appropriate, because the multilevel approach really exploits the richness of hierarchical data structures. A random intercept probit model has been implemented. Blocks of variables have been included step by step in the

model. This enables to observe the evolution of the proportion of total variance contributed by the household level.

4) Results

The null model - that is to say a model that does not contain any explanatory variable but just take into account the household clustering - confirms the existence of an household effect, because almost half of the variance is due to the household level. Adding individual and the household variables induced a very small decrease, whereas the household effect disappears totally in the final model which contains individuals and household covariates, the dummy 'presence of a(nother) smoker. The household affects individual practices mainly through interactions. There is evidence for a great 'concordance effect'.

This research gives evidence for clustering of smoking practices in household. Living with a smoker is associated with a larger probability to be a smoker. The effect of the household income is not significant. The household structure has a significant effect on probabilities and there is an interaction between the presence of a smoker in the household and the household structure: living with a smoker affects the probability of smoking differently according to the household structure. For instance, to live with non-smokers is associated with a negative effect on the probability to smoke in all familial contexts, the greater effect being observed for couples with children.

This analysis shows that there is a 'concordance' of pratices within households, but does not provide estimations of real 'peer effects'. The household effect can indeed have different sources: correlated effects (because members of household tend to share similar characteristics), exogenous effect (because individuals share the same environment) and endogenous effects (direct influence) (Manski, [7]). The methodology used here does not allow to distinguish between those effects. Next step would be to implement a strategy to determine the origin of the strong clustering effect.

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