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TAXATION OR INFORMATION?
AN ECONOMIC ANALYSIS OF NUTRITIONAL HEALTH POLICIES

For the last few years, the nutritional quality of food has again become a concern to public health policies. Policy makers would like to find the best ways to act on the food choices of the population. This document shows how economists analyse nutritional taxation and information policies. Taking obesity as an example, it is shown that the main source of ineffectiveness of non-targeted policies (taxation or general information campaigns) is the presence of individual heterogeneity, unobservable or observable. Information policies targeted at high-risk populations, or taxes or subsidies to products provided by institutional catering could be more effective.

Introduction

While food safety has long been the main concern of food policies, they now try to achieve more qualitative objectives. It is no longer a matter of eating one's fill but of "eating better", the "better" being judged according to nutritional standards that summarise the legitimate perception of the benefits and costs of food products for the individual of today and tomorrow. Life expectancy has increased, chronic starvations belong to the past, and low-cost food products are widely available. As a consequence, using the epidemiological terminology, food abundance rather than food shortage is now the risk factor. A bad diet may contribute to the development of specific diseases - obesity, diabetes, digestive system cancers, osteoporosis, and cardio-vascular diseases - which have a social cost in terms of premature deaths, productivity losses and public health expenditure. In France, the medical cost of obesity was about one billion Euros in 1991, to be compared to the social cost of tobacco, which was about 4 billion Euros in 1997. For the economist, reducing the social cost of food-related diseases is a major reason for public intervention. How can we design the right incentives to modify consumers' choices? After a brief presentation of the economists' way of conceptualising the food-health relationship, we will focus on obesity, price and information policies.

Public policies and the full price of food consumption

The impact of public policies on food choices can be understood by using the concept of "full price". This represents the true price consumers pay when they buy one unit of food. Since food consumption affects the health, its full price is the sum of its market price, the implicit costs of access to food (the time required for buying products and preparing meals) but also the subjective anticipated costs of the health changes that will be induced by current consumption. Hence, designing the right incentives to encourage consumers to eat better requires that relative full prices of food products be modified. Three types of tools may be specifically used: an intervention on market prices, by using appropriate taxes or subsidies, or on food access by adopting selling restrictions such as the recent prohibition of vending machines in schools; spreading information on food health risks (for badly informed consumers, *see* for France **Le Plan National Nutrition Santé**); and altering the opportunity costs of a bad diet, *i.e.* the value of the years of life lost in the case of a premature death. This last point is often neglected in public policy analysis. But social inequalities generate a certain heterogeneity in the full price of consumption, since the longer an individual may expect to live with a good standard of living, the higher the future benefits of a good diet and thus the potential loss of a bad diet. For instance, if you consider, on the one hand, a manual worker and on the other hand a manager, both of them facing the choice of eating well to extend their life expectancy from 65 to 70 years, the manager will find a greater interest in choosing a good diet since his quality of life between 65 and 70 will be better because of his higher pension. As a consequence, redistributive policies may have an effect on the social heterogeneity of food choices, even though the importance of social norms must not be underestimated (excess weight is certainly more stigmatised in higher social classes).

The example of obesity

Cutler et al. (2003) emphasized the role of a decline in prices in the obesity epidemic in the United States. More specifically, they show that technical progress in food transformation, conservation and preparation explain the decline of the full price of a meal. The development of frozen food and ready-made meals has interacted with the rise in the relative cost of women's domestic activity: women work more, so they have more money to buy ready-made meals, and consuming these meals instead of preparing meals takes less time, which in turn allows them to work more. Technological advances have also encouraged the development of fast-foods which offer cheap and time-saving calories. Lastly, in this country the supply price of food decreased by more than 6% between 1981 and 1994, leading to a rise of 0.95 points in the average BMI (Body Mass Index): price variations have contributed up to 55% of the average BMI variation over the considered period. This fall in the supply price of food took place at a moment when the price of energy expenditure also rose. In fact, nowadays the productive system is oriented towards service sector jobs, a great number of industrial jobs have become automated and individual means of transport have largely replaced public transport or walking. While people used to be paid for expending their energy, nowadays they have to pay to expend their energy and not everyone can afford this cost.

The inequity and ineffectiveness of non-targeted taxation and information

Should we tax the supply of energy, i.e. the caloric content of food products, to slow down the obesity epidemic? The implementation of such a tax would entail high monitoring costs. Moreover, using data from the French nutritional INCA survey 1999 (Individual and national survey on food consumptions, see frame), table 1 shows that average individual calorie intakes do not vary with household income. Therefore, calorie intakes per income unit are decreasing, and a tax, proportional to the caloric content of food consumption, would be strongly regressive: the poorer would pay more in proportion to their income. Last, recommended caloric intakes vary according to several socio-demographic characteristics: children, elderly people and pregnant women do not have the same needs. A uniform tax, either on calories, fat or sugar, would certainly put some segments of population at a disadvantage.

Rather than targeting nutrients, it would be better to tax specific food groups such as ready-to-eat dishes or snacks (this would be similar to taxes on alcohol or tobacco), or to subsidize other products like fruit and vegetables. However, such non-targeted taxes or subsidies would probably be inequitable. For instance, the consumption of fruit and vegetables would increase much more in well-off households than in poor ones. The implementation of taxes on food groups must be supported by a meticulous analysis of consumers' reactions in terms of substitutions between groups of goods and varieties of the same product. An analysis of the effects of the prices of 16 food groups on the distribution of the Body Mass Index in the adult population of the SECODIP panel (in 2002) shows that the correlations between BMI and prices are often insignificant and do not always have the expected sign. For instance, seafood product prices are negatively correlated with most corpulent individuals' BMI, which can be explained by a quality effect: the seafood products of lower nutritional quality (breadcrumb fish or tarama) are also the cheapest (Boizot-Szantaï and Etilé, 2005). Even if these results should be confirmed on better-quality data including food-away consumption, they show that a nutritional tax policy would be unlikely to have a major short-term effect.

Since non-targeted tax policies are inequitable and ineffective in the short term, could information policies be an alternative? To appreciate the interest of information policies, one has to specify the incentives that lead people to collect information, in order to define the optimal supply of information. Information has a cost to consumers: they have to look for it, possibly buy it and process it. Therefore, the information that is disseminated during prevention campaigns or through labelling is only used if it yields some benefits to the individual.

Individual heterogeneity may modulate the costs and benefits of information. Several studies show that general information policies have a greater effect on the more educated people whose food choices are already well-informed and healthy, because they have a greater ability to understand information and, more importantly, their means of preserving their life expectancy are greater. Observable heterogeneities (in education, income), as well as less easily observable heterogeneities, therefore play an important role. In particular, the subjective value of the future alters the effect of information. For instance, teenagers react differently to information about nicotine disseminated at school or through the media according to their psychological state of health, a variable strongly correlated to the ability to project oneself into the future (Etilé, 2004). Food habits and social customs are another important factor in resistance to lifestyle changes promoted by information policies.

To illustrate this short analysis, a recent work on the INCA 1999 survey analyses the effect of attention given to nutrition on caloric intakes, "everything else being equal" (Etilé, 2005). According to the definition given by cognitive psychology, attention results from the selection of pieces of information that are relevant to the agent among the whole set of available information. Attention is then modelled as a function of access to information, which is by assumption predetermined by various individual factors (cognitive capacities, sociological proximity with information sources etc.). The frame presents the variables that are used with more precision.

The results of the estimations presented in Table 1 show that when the model is estimated equation per equation, not having access to information is negatively correlated with attention to nutrition and attention to nutrition is negatively correlated with caloric intakes. When one takes into account the existence of unobservable random factors that may simultaneously affect the attention given to nutrition and energy supplies (using a triple least-square method), the correlation between attention and intakes becomes positive though not significant. This means that there are unobservable factors which are positively correlated with attention and negatively correlated with caloric intakes. It could be, for instance, the case of a(n) (unobserved) taste for fat or sweets: the preferences of people who do not like

these flavours are usually turned towards less caloric diets and these people are more careful about their food content, whatever the sources of information they have access to. This example demonstrates that unobservable heterogeneity may limit the effectiveness of information policies.

Conclusion

Non-targeted taxation or information policies could at best only influence the food choices of the richest and best-educated consumers, specifically those individuals whose food choices already conform the most to the nutritional standards of healthy eating. More generally, a number of observable or unobservable individual factors limits the effectiveness of non-targeted policies and call their equity into the question. One may wonder whether targeted policies would be more efficient.

Some experiments have demonstrated that subsidizing low-caloric food in school catering firms could be interesting. Actually, nutritional pricing can easily be targeted to specific populations: children, teenagers, low-income individuals. Their generalisation would be all the easier in that employers have an interest in contributing to their employees' good health, at least in economic sectors where staff turnover is low. Moreover, information policies may be easily adapted to the heterogeneity of targeted populations thanks to classification procedures based on administrative categories characterized by epidemiological expertise (Etilé 2004). The implementation of nutritional educational actions in disadvantaged areas or the broadcasting of prevention advertisements on TV during children's slots could be useful. In a context of proliferation of information, spreading targeted information may prevent consumers from becoming indifferent to nutritional information. Some restrictive targeted advertisements could also be seriously envisaged, insofar as these advertisements manipulate signals (the appetence for the sweet, salted and fat) that were used by people, in the past, to select food in times of shortage (Smith, 2004).

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For further information

Boizot-Szantaï, C. ; Etilé, F. (2005). *The food prices/BMI relationship : theory and evidence from a sample of French adults.* Contribution to the XIth European Association of Agricultural Economists congress, Copenhague.
Cutler, D.M.; Glaeser, E.L.; Shapiro, J.M.(2003). Why have Americans become more obese. *Journal of Economic Perspectives*, n°17, pp.93-118.
Etilé, F. (2004). Les politiques publiques de prevention du tabagisme face à l'hétérogénéité des agents. *Revue Economique*, n°55, pp.947-972.
Etilé, F. (2005). *Estimation de l'impact de l'information sanitaire et nutritionnelle sur les comportements alimentaires à partir des données issues d'INCA.* Rapport à la direction générale de l'Alimentation.
Smith, T.G. (2004). The McDonald's equilibrium advertising, empty calories and the endogenous determination of dietary preferences. *Social Choice and Welfare*, n°23, pp.383-413.

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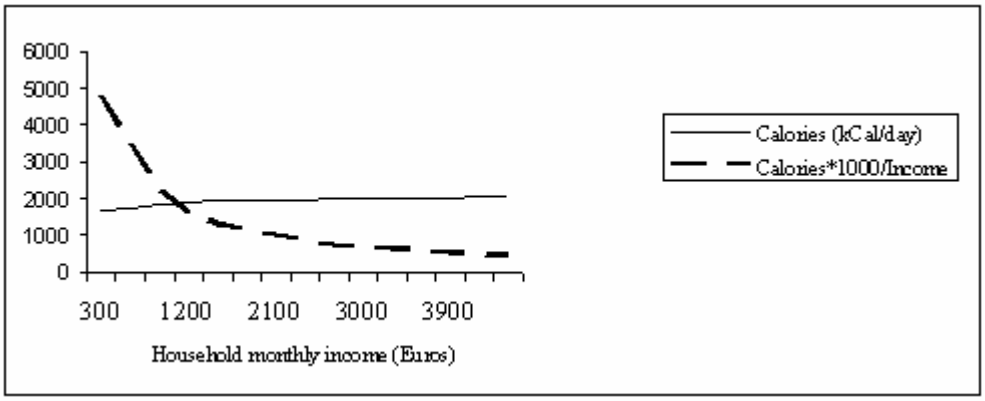
Table 1. Attention to nutrition and average daily caloric intakes.

Model **Estimation method**	**Separate regressions** **Ordinary Least Squares**		**Simultaneous equations** **Triple Least-squares**	
Dependent variable	*Attention*	*Caloric intakes*	*Attention*	*Caloric intakes*
Attention	_	-0.045***		0.253
Scientific information sources (mostly from doctors and teachers)	Reference	_	Reference	_
Non-scientific information sources (mostly from family and friends)	-0.081***	_	-0.077***	_
No information sources	-0.121***	_	-0.122***	_

Notes: *** = significant at the 1% level; control variables: attitudes revealed by answers to the question "For you, what does eating well mean?", age, sex, socio-economic status, labour market status.

Figure 1. Monthly household income and average daily individual caloric intakes (source: INCA 1999)



Frame: Data, variables and methods.

Identifying information effects ideally requires good panel data, so that it is possible to measure the impact of a change in the consumer's set of information on his/her perception of nutritional risks or knowledge, and the effect of a change in risk perception and knowledge on his/her food habits. Cross-sectional data should be used cautiously, since the information then has to be considered as endogenous. One has to have an instrumental variable with a strong impact on information, but not directly affecting consumers' food choices. As in a randomized trial, one would like to separate the population into a control group and a trial group, so that these groups differ by their information set. But the way these groups are formed must not be determined by individual characteristics that affect food choices. The economic theory does not propose ready-to-use instrumental variables, because the search for information depends on the expected food choices: food consumption and information are likely to be determined by the same set of individual characteristics. Last, defining good and reliable measures of information, risk perception and knowledge is crucial. Measuring information effects using French data is rather difficult because the data set we have is often incomplete compared to American data. For instance, the SECODIP household panel or the household expenditures surveys, which are quite complete regarding food expenditures, do not inform us about individual consumptions or nutritional knowledge. The INCA 1999 survey provides some interesting information about individual nutrients intakes, but some important socio-demographic variables such as education are absent. Last, the cohort SU.VI.MAX. is flawed with big selection biases. The results we present here are based on intensive exploitation of a number of attitude variables that are in INCA 1999. Household income is measured by an interval variable. As a consequence, the curve in Figure 1 was constructed using a linear interpolation method. Average daily caloric intakes are given in log(kCal). The attention variable is constructed by using a factorial analysis of several questions about the nutrients that the individual avoids or favours in his/her food style. The variables that describe the sources the individual has access to are constructed using a latent class analysis of the following questions: "Regarding food, who gives you information?
Doctors/Ads/TV/Newspapers/teachers/family/friends (multiple choice was possible).