# RESEARCH IN ECONOMICS AND RURAL SOCIOLOGY

## What is to be expected from food taxes?

*In the fight against rising obesity, public authorities have implemented policies over the last 10 years aiming to change food behaviours. In France, in 2001, the Health Minister launched the French National Nutritional Health Programme. Most of the political tools implemented aim to bring information to consumers in order to help them make more "sensible" choices from a nutritional point of view. However, the actions completed so far have not significantly slowed the growth in obesity. Other types of tools aiming to modify the consumer market environment have rarely been used. Among those, price changes via taxes or subsidies are often debated but rarely implemented.*

*In Europe, several countries like Hungary, Finland or Denmark recently implemented taxes on products deemed to be harmful to the health. In France, since January 1st 2012, Non-Alcoholic Refreshing Beverages (NARB) have been taxed up to 7.16 €cents per litre. From the French example, we present a synthesis of the potential effects of the implementation of nutritional taxes. Since there are few examples of implementation of nutritional taxes, most analyses of their potential impact on consumption and health are ex ante, relying on simulations. The models used, estimated on past consumption observations, enable assessments of consumption changes induced by the price changes of one or several goods. The studies on the French case integrate not only consumers' reactions to the price changes of goods but also the impact of the implementation of the tax on product prices, and that is its main originality. Beverage producers and retailers may partially offset the tax by reducing their margins, or pass on more than the tax amount to the final price by increasing their margins. Our work shows that these price adjustment strategies depend on the type of tax implemented. It also enables the assessment of the impact of tax on sugar consumption through beverages by integrating the transfer of consumption between various types of beverages.*

## Favouring transfers between product families or within a family of products

Price-elasticity measures the sensitivity of demand for a good to its price variation. For large categories of food products (beverages, biscuits, meat…) it is usually between -0.5 and -1. This means that if the price of the good increases by 10%, its consumption will only fall by 5% to 10%. These low price-elasticity values are explained by the fact that, given food habits, it is difficult for consumers to significantly modify their diet. To obtain significant variations in the consumption of a category of products, taxes that sufficiently change the product price would have to be applied. Because of the low substitution between categories of products, a tax policy applied to broad categories of products may have rather limited effects on consumers.

Usually, *ex-ante* analyses teach us that if the policy objective is to cause a change in the consumption of a given nutrient (limit the consumption of added sugars, unsaturated fat acids and salt), it is more effective to define a tax based on the nutrient than one based on foods. The studies also show that it is difficult to define a policy which leads to an improvement in consumption of all the nutrients because of the substitution or complementarity relations between foods.

Additional works have explored the impact of taxes focused on a product category by penalizing the most harmful ones within the category (the tax needs to be set by the gram of nutrient which is to be discouraged). These works show that substitutions within a category of products are much bigger than between categories of products (see Griffith et al. (2010) in the case of butters and margarines in the United Kingdom, or Bonnet and Requillart (2001) in the case of NARB in

France). This can be easily explained by the fact that substitutions within a family of products do not fundamentally challenge food habits. The price-elasticities specific to a given product are around -2 to -4 while the price-elasticities specific to a category of products are usually between -0.5 and -1. Consequently, in order to develop a tax policy, a rationale of product categories focusing on a substitution within the category would be more effective in introducing a change in food consumption.

The potential impact on health of a nutritional tax policy is, nevertheless, subject to controversy. For some, it would be very low while for others the global impact is not insignificant because a modification, albeit small, in diet affects a great number of people. There is the same type of debate between the strategy which aims to favour substitutions between categories of products and that within a same family of products. In the first case, the health impact of the consumption change is potentially big for people modifying their diet but that type of policy may reach only a small number of consumers. In the second case (favouring substitutions within a family of products), the health impact of the consumption change is lower, a priori, for people modifying their consumption, but the policy is likely to reach more people. The global health impact of the second strategy could prove to be bigger.

## How would firms react to the implementation of taxes?

It is often assumed that firms would passively pass on the tax cost to the consumer price. In a competitive framework, economic theory shows us that the tax cost would be shared between firms and consumers, with the breakdown fundamentally dependent on the elasticities of supply and demand. A 100% pass-on of the tax to the consumer price is a borderline case in this framework. In a context of "imperfect" competition, that is to say when few firms are present on the market, which happens frequently in the case of food products, the analysis becomes complicated because firms may sometimes have an interest in passing on more than the tax cost to the consumer. This repercussion may vary according to the type of the tax chosen. Theoretical and empirical works show that taxes *ad valorem* (proportional to the pre-tax price, for example VAT) are passed on less to the final consumer price than excise duties (which are determined by unit of product, such as the tax on NARB in France). Ex ante assessments of the impact of butter tax in the United Kingdom (Griffith et al., 2010) or of refreshing beverages in France (Bonnet and Requillart, 2013) come to similar conclusions as to the repercussion level of the price tax on the consumer. In the case of ad valorem tax, around 80% of the tax would be passed on to the consumer price. In the case of excise duty, the repercussion rate is higher than 100%, around 130 or even 140%. So excise duty has a bigger potential impact on consumption given the amplification of the price-effect by firms. Within a nutritional tax, excise duty should be preferred if a maximum impact on consumption is desired.

## The impact of tax on sweet beverages: the French case

In October 2011, France decided to tax NARB. At first, presented as a way of fighting rising obesity, the tax was to be only on sweet beverages. This objective was strongly contested by the food-processing industry which wanted to avoid any reference to the nutritional tax. Finally, the 7.6 €cent tax concerns all ready-to-drink NARB which have sweeteners added, whatever their nature. So light NARB are taxed. Only fruit juices without added sugar and syrups are exempt from the tax. We have simulated the impact of both these tax options through the empirical methods from structural econometrics (see frame).

**Table 1: Impact of a NARB tax on home consumption of NARB and sugar and on prices**
**Simulation from market data 2003-2005**

| | Tax on sweet NARB Variations of | | | | Tax on all the NARB Variations of | | | |
|---|---|---|---|---|---|---|---|---|
| | Prices in € cents | Consumption l | Added sugar g | Total sugars g | Prices in € cents | Consumption l | Added sugar g | Total sugars g |
| Sweet beverages | 9.0 (+13.1%) | -4.8 (-27%) | -440 | -78 | 8.1 (12.2%) | -3.8 (-21%) | -342 | + 135 |
| of which trademarks | 9.4 (+10.8%) | -2.1 (-19%) | -215 | | 8.5 (+9.7%) | -1.3 (-12%) | -136 | |
| of which SB | 7.7% (+19.6%) | -2.7 (-34%) | -225 | | 7.6 (+19.4) | (-2.5) (-31%) | -206 | |
| Light beverages | -1.7 (-1.6% | +1.2 (+24%) | | | 8.5 (+13.5%) | -0.95 (-19%) | | |

## A significant impact on beverage prices and consumptions

The results of the ex-ante analysis suggest that NARB retail prices would increase by more than the tax amount. The retail prices of sweet beverages would increase between 8 and 9 €cents according to the scenario while the tax is 7.16 €cents per litre (see Table 1).

This result is partly confirmed by an *ex post* analysis of the actual growth in NARB prices following the tax implementation. For example, Berardi et al. (2012) showed that on the soda market 85% of products saw their price increase. The average increase was 124% of the tax amount, confirming for those products an over-transmission of the tax to the consumer. In our simulations, the increase in retail prices is not insignificant since it stands at around 13% on average. The increase in the price of Store Brands (SB) would be around 20% and those of National Brands (NB) around 10%. This is due to the fact that NB prices are a great deal lower than SB prices.

It is also interesting to note that when the tax only concerns sweet beverages, light beverage prices are adjusted all the same. Producers managing a range of products which include sweet versions and light versions integrate into their pricing the fact that consumers may substitute a sweet version with a light one, and therefore adjust the prices of all the products in the same portfolio.

NARB consumption is significantly affected by the tax (Table 1). Consumption variations in percentage are high. Particularly, when the tax only focuses on sweet beverages, the consumption of sweet beverages is strongly affected and a significant transfer of consumption towards light drinks and towards alternatives such as fruit juices is noted. When the tax is applied to all the NARB, the substitution mainly takes place with fruit juices. Finally, it must be underlined that consumers' response to the tax becomes amplified by the fact that the tax is over-transferred to the retail price.

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### Methodological frame

First, the approach used consists in assessing consumer demand by using the data from a panel of 19,000 households collected by Kantar WorldPanel. This panel is representative of the French population and provides information on all households' food purchases as well as on their characteristics. The analysis only concerns home consumption. We use consumption data from 2003 to 2005. The specified demand model includes a large number of differentiated products. Three major categories of products are considered: sodas, colas and tea-based beverages. For each of them, sweet products and light products are distinguished; for each of them, we consider the main soft drinks, including store brands as well as the main stores distributing these products. In all, about 120 differentiated products are taken into account. This detailed analysis of demand enables the numerous substitution possibilities existing within a family of products to be taken into account. The demand model integrates the fact that consumers may transfer their consumption to other non-taxed beverages such as fruit juices in response to the increase in the NARB price.

Second, various supply models are assessed. They represent the various types of contracts which may bind beverage producers and retailers on this market. On the basis of statistical tests, the approach consists in selecting the contracts between industrialists and retailers who best represent the reality. In our case, it turns out the chosen model is that of non-linear pricing combining a wholesale price and a premium. This conforms to a certain number of observations which show the importance of premiums, for example referencing bonuses or what is commonly called "back margins", in the contracts between food industries and retailers.

Third, the model integrating both a demand module and a pricing module is used as a simulation tool. For a given tax scenario (amount, tax type, products on which the tax is implemented), the model enables the calculation of new prices on the market and the demand for each product considered by taking into account the industrialists and retailers' strategic reactions faced with this tax. With knowledge of the sugar content of the various beverages, the impact of the implementation of the tax on sugar consumption via beverages can be assessed.

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### Is the taxation policy regressive?

The various studies show that taxation on food policies are "regressive", that is to say that they penalize low-income consumers more. Food is a compulsory budget item, so the income share dedicated to it tends to fall with increased income. However, low-income consumers are on average bigger consumers of products potentially targeted by taxes. For instance, the consumption of sweet beverages by a low-income agent is, on average, 8% higher than that of a wealthy agent (Bonnet and Requillart, 2013). As the consumer response to the tax depends on the price-elasticity of demand but also on the initial consumption level, these policies may have a higher impact on the consumption of a low-income consumer and may therefore be gradual in terms of their potential effect on health (see, for example, Allais et al., 2010).

## Conclusion

While they are still little used in practice, taxation policies which aim to modify consumer trade-offs by acting on the relative prices of products are often considered. Scientific research assessing the potential impacts of these policies shows that it is better to focus on substitutions within product categories than on substitutions between product categories. This militates in favour of the implementation of taxes (subsidies) which are proportional to the nutrient content the consumption of which is to be reduced (increased).

Our work on the NARB tax in France shows that the definition of the tax is fundamental. The initial objective of the tax was to limit the consumption of sugar through beverages. This objective will not be achieved given the definition of the tax on all NARB. A reduction in sugar consumption could be attained on the condition that the tax is limited solely to sweet beverages in order to encourage transfers between the sweet and light versions of the products. In the case of France, the potential impact would have been limited anyway given the low level of NARB consumption at home. Another important finding of this work is that firms do not passively pass on the tax to retail prices. Quite the contrary, they adjust all the retail prices of their products. In particular, duties are over-transferred to consumer prices, thus increasing the impact of the tax on consumption.

Over the longer term, firms may also adapt the nutritional composition of products in response to taxation policies. It could therefore be effective from the health point of view to encourage firms to re-formulate their products towards better nutritional quality. This question is still little studied, notably because of the lack of consistency of the product characteristics over time (Réquillart and Soler 2014). Developing bonus-malus policies focused on certain categories of products (similar to those implemented in the automobile sector) could be an interesting option to encourage transfers between products of the same family and encourage firms to progressively re-formulate their products towards better nutritional quality.

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**For further information**

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