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Nutritional labelling in the face of health-taste choices

In several countries, nutritional labelling is one of the tools being considered or already implemented by public authorities to attempt to modify consumer behaviour in the face of the health impacts of imbalanced diets. The results summarised here attempt to identify the interests and limits of these labelling approaches and to assess the existing or potential effects both on the demand side (modification of consumer choices) and on food supply (modification of corporate strategies). Descriptive labelling would seem to have a more modest, diffuse and longer-term impact on consumers who prefer short-term taste properties to nutritional impacts. Prescriptive labelling identifying "nutritionally healthy" products and products "to be limited" could have a more pronounced impact by helping reorientate consumer behaviour. However, its impact on the supply side depends on the practical terms of implementation; there is a risk of seeing the emergence of balances between supply and demand in which the changes in the former are cancelled out by the latter, without any significant nutritional improvement.

Nutritional labelling, a tool indicating the nutritional quality of food to help consumers in their choices, can take two different forms. The first is *descriptive* in nature: it is the nutritional table placed on the back of the packaging, often completed by wording explaining the contribution of product consumption to daily nutritional recommendations (DNR), or even consumption advice. This descriptive form is widespread in France and now concerns more than 80% of the products on the market. However, its use varies according to food sectors. The second, less widespread type of labelling is *prescriptive* in nature. It completes the descriptive labelling and reaches beyond a strictly informative purpose by adding an explicit front-of-pack signal as to whether consumption of the product should be given preference or, conversely, limited for health reasons. It generates a strong effect, not only by focusing the attention of consumers, but also by influencing their choice criteria by highlighting health issues. It also aims to facilitate comparisons between the products available on market.

Descriptive labelling: some significant impacts but limited in scale…

…on consumption behaviour...

The influence of nutritional labelling on consumers has been widely studied. The studies have looked into the understanding buyers have of the information supplied, its acceptability and the modifications it induces in their attitudes or opinions, as well as potential variations in their behaviour (Drichoutis et al., 2011). They show that the use of labelling is linked to sociodemographic variables (age, gender, education level) and that such use is all the more frequent when agents or their next of kin have faced health events. While informative labelling may sometimes contribute to healthier diets, its general impact remains rather modest. It depends chiefly on population categories, with those in the most deprived categories making use of labelling less frequently. The majority of consumers consider that the information is credible, although difficult to understand, useful because it helps improve their knowledge of nutrition and, finally, endows them with value (Campos et al., 2011).

Beyond the quantity and nature of the information supplied, the question of the labelling *format*, meaning the way that this information is dimensioned and presented, is a major issue. In what form is information useful to consumer? What degree of simplification is

advisable? On the one hand, the amount of information supplied to consumers might be increased if it should be postulated that they are attentive and rational. On the other hand, the information *format* might be determined by considering the degree and quality of consumer attention, their cognitive capacity, beliefs and the time at their disposal in a purchase situation. Some of the studies have attempted to identify the "right" compromise by assessing the efficacy of a dual approach: one on the front of the product pack and the other on the back (Wansink, 2003). It would appear that this combination improves labelling efficacy and credibility, although this result must be mitigated by a "halo effect": the signal placed on the front of the pack generates an overall appreciation of the product (even of the category) which may be in contradiction with a part of the precise characteristics (Andrews et al.2011; Chandon, 2012).

…and on product characteristics

Public authorities expect labelling not only to modify consumer behaviour, but also corporate supply strategies.

In countries where labelling is compulsory and long-established enough to provide a longer-term view, it would seem that the obligation to label calories, fats, sugars and salt encourages industrialists to change the wording of their products in a more nutrition-friendly sense (Caswell and al., 2003). For example, the obligation to mention *trans*-fatty acid content contributed to its reduction, as products were reformulated (Unnevehr and Jagmanaite, 2008). Front-of-pack nutritional logos encouraged the launch of new improved products in their sodium and fibre content (Vyth et al., 2010). However, this product reformulation sometimes concerns high-price segments of the market (Ricciuto et al., 2008).

In France, recent studies have shown that the presence of deliberately detailed nutritional labelling, in a range of products is not correlated with nutritional quality. Nor is the firm's choice to label a product in a detailed way associated with higher-priced products.

These studies show that implementation of clear labelling for firms is a matter of brand strategies rather than product strategies. Health and nutritional allegations are given preference by national brands (although changes to the regulations are resulting in a reduction in their frequency). On the other hand, some distributors and industrialists favour detailed nutritional labelling, including on the front of the pack, for all their products. In such cases, in particular in mass distribution (supermarkets/hypermarkets), the labelling policy that is chosen covers the whole or at least a large part of the products concerned. All in all, the deliberate labelling decision seems to be more a matter of brand or company policy, linked to questions of reputation and corporate social responsibility, rather than of product differentiation policy.

The limited impact of descriptive labelling would seem to play a large part in the difficulty of taste and health choices

Why does descriptive nutritional labelling not induce greater changes in consumption behaviour? A first part of the answer lies in the information content of the labelling. It would not seem to be this kind of information consumers need to modify their behaviour. A second part of the answer lies in the predominance of hedonic and taste dimensions over health questions.

Psychological dimension

Psychologists show that changes in diet practices are complex mechanisms in which the individual dimension plays a major role. A research study in cognitive psychology attempted to assess the facilitation and inhibition effects of emotional indices on decisional processes relating to food consumption (Jacquier et al. 2012). It appears that the choice between health and pleasure in feeding follows a specific process which depends on consumer motivation and knowledge. The brain retains "pleasure" information in an emotional mode, that is to say as low-level perceptual information. This information is processed automatically and unconsciously. In order to be remembered, however, "health" information requires a superior cognitive involvement requiring an effort of the consumer. This difference in the status of signal perception induces a cognitive cost of an increase in nutritional quality in consumers' choices. This cost takes the form of a slowdown in decision-making. Such a slowdown is unsuited to most purchase decisions (little time, low motivation, multiple decisions). The descriptive labelling which brings a lot of analytical information is therefore of little use or even counterproductive, since it weighs down the decision process by making it cognitively costly.

Hedonic information therefore has greater value at the time of consumer decision-making than health information. Slowing down the decision-making process, thereby enabling rationalisation of the decision, would modify the balance between taste and health to the benefit of the latter. When pleasure is activated by the perception of an attractive foodstuff, the control mechanism on the volume consumed is inhibited and self-control becomes more difficult.

Inter-temporal preferences: contribution of behavioural economics

Behavioural economists' studies explain the gap between the health and hedonic dimensions in two additional ways (Kahneman, 2011). First, they include the contributions of cognitive psychology explained above, noting that the conditions of food decision-making influence choices. Second, even if the decision-making process is slower and rationalized, economists suggest that consumers' inter-temporal choices are made to the detriment of health. Hedonic

pleasure is immediate or in the near future while the health effect is postponed to a more remote and uncertain future. The "average" consumer, seeking to maintain their health as a preventive measure, has some knowledge stemming from statistical data. Yet, these data show wide individual scattering of the health-nutrition connection. What economists call the law of small numbers therefore operates to the full: a few familiar, optimistic cases prevail over pessimistic statistical data. The preference bias in favour of the present (Frederik et al., 2002), which is translated by a decreasing inter-temporal discount rate on the future effects of immediate consumption, no doubt carries much weight in health-pleasure choices.

Moreover, health effects, unlike taste, are balanced out by other variables, such as physical activity. An overestimation of such compensation ("since I do sport") may distort the choice in favour of the hedonic dimension. Last, the procrastination effect plays all the more significant a roll insofar as each food decision taken in isolation, given its low weight in the overall nutritional balance, induces an immediate hedonic satisfaction, in the face of a health effect that can easily seem quite negligible.

Social dimension

Sociologists have shown that the way we address the links between food and health is a part of the socially-constructed standards which come on top of the individual dimension seen above.

In this way, the ability to accept nutritional information and put it into practice varies according to social categories (Régnier, 2009; Régnier and Masullo, 2010; Gojard and Cardon, 2010). Food consumption is an area where tastes and identities are formed, which can be a hindrance to public health recommendations. On the one hand, these recommendations can come up against beliefs as to what healthy food might be. On the other hand, the choice between health and pleasure will be all the more difficult in that what is considered greater as far as hedonism is concerned is not particularly recommended as far as nutrition is concerned, and *vice versa*. Last, change can be perceived as costly as such, either by inertia or because the diet repertoire is limited.

In well-off social classes, intuitive nutritional preferences are often consistent with public health recommendations and they are not so far from hedonic preferences, at least from those favoured culturally within such categories. Healthier products are available in the food repertoire and change therefore seems accessible and not too expensive. What is good for health will, in principle, be tasty, or at least something you can come to appreciate. The same does not always go for the less favoured categories. In these social groups, we observe that food is often perceived as a (rare) area of choice and freedom in which pleasure is put first. In this area, even nutritional messages that are accepted advertisements may be perceived as restrictions or constraints which are seen as being all the more contrary to "eating well" in that they are very much in contradiction with hedonic preferences. These preferences may have been defined irrespective of public health considerations. Public health messages trying to restrain consumption of highly-valued food as far as hedonism is concerned ("less fat, less sugar, less salt") are perceived as the expression of a reduction in freedom that has been gained through a broad and diversified range of available food and prices which have been on a falling trend and are now accessible to the most humble households. If, for reasons of taste, costs or habits, nutritionally-healthier products are not available in the common food repertoire, the change will be perceived as being beyond their reach by such households.

Nutritional characteristics not always appreciated by the market

The assumption according to which consumers would look for better nutritional quality and buy it if they had the relevant information to identify it is far from being proven. Recent studies show that, all other things being equal and not taking account of the market in products with health allegations, the presence of nutritional labelling has little or no effect in increasing willingness to pay for a product.

In this respect, the cases of dairy products and biscuits and breakfast cereals are particularly interesting, as the nutritional contrasts between products in the category are great. Contrary to what might be hoped for from a public health point of view, willingness to pay may increase according to content in nutrients that should be limited.

In the case of breakfast cereals or biscuits, reduced sugar or fat content is not necessarily appreciated in terms of demand (Oqali, 2013a).

In the case of dairy products, willingness to pay is high for whole milk soft-cheese lovers (Allais et al., 2011). As for milk, consumer preferences are positively correlated to fat content (Saulais and Ruffieux, 2012). In the cheese sector, salt and fat content are often perceived as positive signals of hedonic quality (Saulais et al., 2012). Fat content may be considered a positive value, with labelling acting as a means of segmentation, directing fat lovers towards fat.

Moreover, in some sectors, a negative willingness to pay for nutritional labelling is observed for a non-insignificant fraction of households (Allais et al., 2011): some consumers would rather "not know". When consumers favour a product for its taste, they prefer not to know the truth as far as health is concerned. That information would reduce their pleasure so they do not take it into account.

All in all, a number of results suggest that indications of better nutritional quality may be perceived as negative indications as far as hedonism is concerned and by some consumers. Studies suggest that the nutritional dimension is not a major variable in itself, or at least not one that can be isolated from the workings of competition. Therefore, even if descriptive nutritional labelling finds its legitimacy in the need for transparency and consumer information, it is not an effective enough way to guide competition on the basis of the *actual* nutritional content of the products.

The product offering in the face of tensions between taste and health

Firms are fully conscious of the consumer dilemma when it comes to making choices between taste and health. It would not be a problem if they were able – by designing new products or improving existing products – to reduce or even eliminate the antagonism that sometimes exists between hedonic quality and nutritional quality. If such decoupling were possible to a large enough extent and without increasing production costs significantly, it would no longer be necessary to encourage consumers to modify their consumption. Today, product supply and labelling strategies echo this tension between taste and health, even if the integration of the nutritional aspect into the product design and production process remains rather recent. Research in sensorial analysis on products containing various levels of fat and sugar indicates that there is technological room for manoeuvre (Biguzzi, 2013; Biguzzi et al., 2013). But the commercial risk related to any sensorial modification of the products largely dominates and guides strategies.

Three non-exclusive strategies are possible. The first one, referred to as the "deaf strategy", is that of an implicit improvement in nutritional quality without consumers knowing, reformulating existing products "step by step". The second one, "allegation strategies", openly offer new products with improved nutritional qualities, differentiating products according to segments based on nutrition. The third, called the "substitution strategy," is based on the launch of new products with an improved nutritional quality, sometimes replacing references of lower quality, but in which the innovation criterion put forward to the consumer is precisely not this nutritional aspect. In countries where the obligation of nutritional labelling has existed for a long time, studies sometimes show ambiguous results (Moorman et al., 2012). On the one hand, it favours modifications of nutrient content in existing products, all the more so when these changes do not affect product taste. On the other hand, it reserves these composition modifications affecting taste to products where commercial risks are lower. Therefore, the probability of an improvement in nutritional quality seems to be higher in the case of new products rather than in the case of existing products that are already well-known by consumers, or even in the case of products with smaller market shares.

In France, studies have shown several points. First, the modifications of nutritional composition made by firms in recent years have often focused on specific categories of products and on critical nutrients (Oqali, 2013b). These modifications concern both stores' own brands and producers' national brands. In some cases, these modifications may be of significant size for a firm or a given category of products. The impact is all the greater when the modifications are guided by collective dynamics in the sector (Combris et al., 2011), notably because they may be compatible with taste changes. Finally, improvement is made more frequently lby reformulations that are implicit or not brought to the attention of the consumer and less often by withdrawing products with less favourable nutritional qualities from the market or by the launch of products in families of more positive quality (Oqali, 2012).

Beyond informative labelling: what can be expected of prescriptive labelling?

The first lesson learned from the previous results consists in acknowledging the secondary place that health occupies in consumers' food preferences. Any successful change towards a better nutrition will be achieved by keeping at least a part of the collective habit of hedonic preferences. This lession suggests that we should look carefully into credible product substitutability perimeters according to the hedonic, cultural, and economic preferences and then stick to such acceptable perimeters. In the longer term, nutritional improvements will imply modifications in hedonic preferences: new collective "global preferences" including both the hedonic and nutritional dimensions.

The second lesson is that diet is the result of a multitude of micro-choices. Taken individually, each of these choices has a strong and immediate hedonic effect and a low nutritional impact. Each micro-decision is made quickly, most often in an almost automatic way. While it seems an illusion to try to slow down these choices in order to rationalize them, a rise in consumer nutritional expertise cannot be taken as the basis for a rise in the nutritional quality, especially as such an approach might well have disappointing effects (Ariely, 2010 et 2011). Could effective labelling not guide choices by suggesting small substitutions that are tenable from the hedonic point of view and without too many related effects on the other product attributes (prices, social standards, brands and so on)?

May a "prescriptive" labelling policy take this direction? In what measure can it favour good consuming decisions more effectively than informative labelling does, while giving good incentives to firms?

Is the scientific legitimacy of prescriptive labelling sufficient?

Before addressing the pertinence of a prescriptive nutritional indicator placed on each product, we should look at the feasibility of such an indicator. Do we have the tools to aggregate the nutritional quality of a product as compared to others, in such a way as to satisfactorily guide consumers' choices by suggesting that they should reduce some consumption, increase others or substitute one product for another? This implies establishing a "ranking" of products on solid foundations with regard to nutritional issues. Do the foundations of such a ranking exist?

An example of such a basis is the SAIN-LIM profiling system which ranks products according to their intrinsic nutritional qualities. On the basis of their content in 5 essential nutrients (SAIN score), of 3 nutrients to be limited (LIM score) and on the definition of a threshold for each score, foods are divided into four nutritional quality groups. The pertinence of the system was demonstrated by modelling showing notably that the best group foods (SAIN high, LIM low) are strictly indispensable to meeting nutritional recommendations. This basis may be used to compare some categories of foods or compare products within the same category.

Several studies have been carried out on the basis of such scores. By using an individual intake modelling approach, one study showed that to achieve an adequate diet, the share of the highest-ranking SAIN-LIM profile products should be two-thirds of global weight intake (Darmon et al., 2009). Another study modelled the range of nutritional recommendations with a limited budget (Maillit et al., 2011). The modelled baskets were preferentially composed of foods of a very good nutritional quality/price ratio which can be identified by nutritional profiling. Nutritionally healthy diets with low budget are indeed possible, as long as such foods are given preference (Maillot et al., 2008).

Studies in industrial engineering have shown that these indicators could be used in production management, enabling the link to be assured between the nutritional objective and steering industrial processes (Achir et al., 2010).

Prescriptive labelling: its potential effects on consumers

Prescriptive labelling consists of a front-of-pack logo placed on products, which, by its colours, allows quick identification of product nutritional quality by the consumer. In practical terms, various formats of such logos have been considered and studies conducted as to what extent these logos may contribute to a better nutritional understanding and may have significant impacts on consumption choices.

As far as labelling comprehension and acceptability are concerned, a research study (Mejean et al., 2013a et 2013b) tested five logos for ready-to-eat soups, ranging from aggregate nutritional information – single green traffic light, PNNS logo or green tick) to more complete information such as multiple three-coloured traffic-lights per nutrient. The logos that were tested expressed a judgement that was either only positive (PNNS logo, ticked green), or positive, neutral or negative (British traffic-lights which use green, orange, and red colours to classify foods in good, acceptable or bad). Some more finely-shaded judgements are possible in 5 or 7 categories. The analyses took account of the demographic and socioeconomic household profiles, their purchasing practices, their food quality and their corpulence. The results show that logo acceptability depends on paradoxical considerations. Consumers want a logo which meets their need for complete and reliable information, but also one that provides simplified information. It also appears that the preferred simplified logo model depends on the target population. If the aim is to implement a policy reaching the whole population set, the three-coloured traffic lights are the best accepted. However, such a logo is overwhelmingly approved by better-off populations, those who already have positive diet behaviour. If the priority is to improve the food behaviour of more deprived populations, who are less receptive to nutritional information and have a higher nutritional risk, the single aggregated logos, such as the three-coloured traffic-light or a green key seem to be best accepted. However, are these logos effective enough to modify purchasing behaviour?

To determine the effects on consumption decisions, some experimental studies have assessed effective individual food behaviour changes of individual food behaviours measured on the diet as a whole (Muller and Ruffieux, 2011; Muller and Ruffieux, 2012).
The impact on the content of the family shopping basket of exhaustive and homogenous introduction of a nutritional logo on food was assessed. The logo that was tested was of three-coloured traffic-light type. If we confine ourselves to the sole physical quantities consumed, it was observed that while consumption of products to be given preference did increase under the effect of the information policy, the quantities of the products to be limited fell in an even clearer way.

The study showed the impact on purchases of 6 alternative sizes of prescriptive logos, of the three-coloured traffic-light or green badge type, and compared their performances with more conventional DNR information. The six prescriptive logos were distinguished according to three criteria: (i) an

aggregated assessment or a nutrient-by-nutrient one; (ii) varying references per category of products or a common one for all foods; (iii) limiting the scope only to products to be favoured (in green) or extending to use of three colours.

The results showed a clear ranking of relative logo performances and revealed the role of the different criteria. A summarised message is preferable, with the improvement in nutritional quality being twice as great with aggregated qualification, rather than information for each separate nutrient. Tricolour labelling is preferable to green-only labelling, but the tricolour label generates undesirable effects for a significant proportion of consumers for whom basket nutritional quality deteriorates with tricolour labelling. However, a common reference is not significantly more effective than a category one, although the changes induced by the two options are different. In the case of a common reference, the consumer tends to reply by inter-category substitutions in relatively small numbers but with each one inducing big nutritional gains. In the case of a category-by-category reference, the consumer replies by many more substitutions within categories but which induce smaller nutritional gains. It would be interesting to design a labelling model cumulating both effects.

Considering adjustments between supply and demand

The evaluation of a nutritional policy must take account not only of the effects on consumption behaviour, but also of its impact on firms' strategies (Duvaleix-Treguer et al. 2012). The effects of a labelling policy must be measured in the light of the market balance, considering the firms' and consumer behaviour simultaneously.

On a specific market, that of the soft white cheese and "plain" dairy specialities, a study was carried out on the question of possible compulsory fat-content labelling as a way for individuals and households to reduce their fat consumption (Allais et al., 2011). Posting the fat rate on the front of the package is compulsory on the soft white cheese market, but is left to the appreciation of firms on the dairy speciality market, where fat content is often higher than that of soft white cheese. On the basis of modelling of the decisions of economic market players (consumers and firms) it was possible to simulate the new equilibrium resulting from the hypothetical introduction of a compulsory labelling policy. Assuming an absence of reactions from producers (no price adjustment), posting a fat rate would significantly reduce the intakes of fat from these products. By introducing price readjustments by producers in reply to public policies, compulsory labelling has almost no more effect. Firms lower their prices to offset the fall in market share caused by posting fat content on dairy specialities. The information effects are greatly lessened by price effects.

Regarding prescriptive labelling, the results are still insufficient to anticipate all the combined effects of supply and demand. However, it is clear that the effects on firms' strategies and on the equilibrium between supply and demand are likely to vary according to the labelling size that is chosen, since we know that it has an influence on consumer behaviour. Aggregated labelling should therefore induce bigger reactions from firms since its impact is greater on consumers, just like tricolour labelling. Finally, it has been shown that for consumers, the comparison perimeter – (per category or transversal) has various effects. The impact studies on firm strategies should be decisive here.

The first studies have confirmed that if we accept that prescriptive labelling affects consumers' perception of the product quality, its implementation would affect product differentiation strategies and have an influence on firms' quality choices and price fixing (Duvaleix-Treguer et al., 2012). In the end, the negative or positive result would depend on the degree of price competition easing (more or less according to the impact of labelling on the product differentiation level and on the fall or increase in product quality according to the market segments.

Conclusion

We may probably assume that consumers know rather well how to differentiate nutritionally healthy categories of products. But the effective improvement of the nutritional quality of a diet will not come from large-scale substitutions between categories, at least in the short term, at least for a healthy consumer under the sole effect of nutritional labelling.

Nutritional labelling must therefore enable more detailed consumer choices, allowing the substitution of products that are reasonable for them from the hedonic point of view (that is to say which do not reduce too much the pleasure hederived from eating them) and the economic point of view (that does not modify their food budget too much), while guaranteeing them a significant nutritional improvement. We saw that it is not by an increase in the analytical precision of the nutritional information provided to consumers, that is to say by making them experts, that we shall succeed in influencing choices which must remain simple, quick and intuitive. The substitutions to be favoured must be compatible with the firms' incentives and their effects on the choice of quality and price, at the risk of generating unintentional effects which reduce the benefits expected of the labelling.

Some smart, simple decision-aid tools must be designed, among which labelling is no doubt just one aspect (Thaler et Sunstein, 2009). But the development of such tools is not so simple. It raises questions that are not usually mentioned in the discussion on

nutritional labelling: what are the easiest and the least expensive pathways of nutritional improvement (in price, hedonic quality, change of habits) for consumers? What is the most useful labelling to show the way and encourage people to follow it? What nutritional impact may we expect from each label format when reactions from consumers and firms are combined? The works in progress in psychology, in sociology, in industrial and behavioural economy, and studies in nutrition, flavour sciences and industrial engineering, should shed light on the approach to be followed to answer these questions.

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For further information

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