Which economic tools for quality regulation?  
Markets and regulations in the agrifood industry

Faced with the issues of obesity and malnutrition, sanitary crises, the presence of chemical residue in food, issues surrounding market authorizations for genetically modified organisms or meat from cloned animals and so on, the Public Authorities must often intervene to guarantee the transparency of information toward consumers and a satisfactory quality level. However, the impacts of such interventions are not simple and require painstaking research. For example, when the information to consumers is imperfect, the introduction of a minimum quality standard may lead to a reduction in competition. Conversely, by sharing its advertising cost between producers, a collective information policy such as generic advertising counteracts the reduction in competition inherent in advertising, quality or safety expenditure. Furthermore, from an analysis of consumer behaviour faced with the risks (methyl-mercury) and benefits (omega-3) of fish consumption, we show that a taxation/subsidy policy is more efficient than the information policies most often implemented in such a case. A judicious choice between the tax levels applied to the species with toxic product and the subsidy levels to the healthiest species may even result in market regulation with a balanced public budget.

The questions linked to quality and food safety acutely raise the issue of public intervention which is efficient when it guarantees, at the least cost, the credibility of the information essential to the running of the markets and a satisfactory quality level. However, its efficiency is far from certain. Public intervention has a cost resulting from price and competition distortions, as much for public finance as for producers and consumers. There is a major risk of useless and costly regulation. The aim of the economic analysis is to rationalize this recourse to regulation.

After setting out the advantages and drawbacks of the main intervention tools on markets, we illustrate the risks with the help of recent theoretical results about the impact of regulation on competition between firms. A method for quantification of the economic impacts of regulation tools, based on an experimental economic approach, helps analyse the consumers’ risks and benefits linked to fish consumption (methyl-mercury versus omega-3). These examples lead us to emphasise the relevance of such research in order to define the cost-profit analyses enlightening public decision.

Main regulation tools

Public intervention is useful to counteract certain market failures which, in the absence of regulatory intervention, often lead to sub-optimal choices by firms or consumers (see frame 1). We may group the various tools of intervention and market regulation into three categories:

1) The norms and standards which impose on producers a minimum level of quality/safety can take many forms, such as obligations to achieve a particular result as regards pesticide residue in products or specifications on processes, for example the cold chain or food irradiation to combat pathogenic bacteria (E. Coli O157:H7, salmonella…). Standards also concern the authorization procedures for new products such as genetically modified organisms or
cloned meat. By guaranteeing a minimum level of quality/safety to consumers, standards make trade easier. However, standards have the drawback of reducing both the diversity of products, by eliminating poor qualities, and competition by limiting entry to the market for some firms. Furthermore, as regards the innocuousness of food products, it is seldom possible to reach a zero-risk level, which may generate intense controversies, particularly in times of health crises.

2) **Information and labelling policies** are more favourable to product diversity because they allow the presence of various qualities bought by consumers in full knowledge of the facts. These policies concern quality labels like Red label or “Bio” labels. Labels are sometimes compulsory, as in the case of informative messages on the dangers of alcohol during pregnancy. These policies aim to give consumers a sense of responsibility while guaranteeing their freedom of choice. One of the limits of labels lies in the low memorization capacity of consumers and the possible confusion as soon as the information given is technical or complex. Furthermore, a tendency toward the proliferation of labels is observed, with in particular, the multiplication of allegations on health and the environment, which may limit the impact of labels toward consumers.

3) **The mechanisms for taxation on dangerous products and/or subsidies for healthy products** are based on a price effect on the consumers’ choices, since prices are affected by a tax/subsidy per unit sold. If taxes aim to reduce the purchases of dangerous products, the revenue that they generate creates a tax resource available to finance subsidies for healthy products or other actions such as the information campaigns. Such a process results in double profit (double dividend). But the low elasticity of food demand in relation to prices limits the impact of price variations induced by tax/subsidies on the quantities consumed.

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**Frame 1: Failures in the market**

The food industry is characterized by problems of information on the quality/safety of products, risks for producers and/or environmental issues. Three major categories of market failures can be listed: (a) failures concerning consumers, such as the imperfect information relating to food safety or organoleptic quality, but also the consumers’ concerns about production methods like organic farming or genetically modified organisms; (b) failures affecting producers, such as epizooties (foot-and-mouth disease or avian flu); (c) environmental externalities and concerns affecting collective resources like water pollution or pesticide dissemination.

By being limited to the imperfect information to consumers about the quality/safety of products, the latter may cause a lack of trade if, for lack of information, the consumers’ willingness-to-pay is insufficient to cover the production costs, while the trade would have taken place in a situation of perfect information. If the consumers’ willingness-to-pay is lower than the production cost of good quality goods, only low quality goods (less costly to produce) are traded and the good quality is excluded from the market. To compensate for these problems, sellers may signal products’ quality and consumers may use middlemen, who are better informed, pointing out the quality of the goods presented to them. These actions soon find their limits if there are many producers, preventing effective traceability of the producers’ efforts or in a context of scientific uncertainty, which makes simple and clear communication difficult to accomplish.

Economic analyses do not give any definitive conclusions on the optimal use of these tools. Their combination often limits some of the drawbacks presented above, even if the unnecessary redundancy of tools is expensive for the taxpayer. As a rule, it seems better to allow firms to choose the way to fulfil a given objective, allowing them to choose the process with the least cost and to innovate in order to reach it. It is then important to systematically examine the regulatory costs linked to each type of tools, which may affect the firms’ competitiveness as well as their viability, chiefly for
small and medium-sized firms. Recent research has taken an interest in the impact of regulation on the competition between firms.

**Quality standard, policies of information and labels: impact of the costs induced by regulation on competition**

The regulatory requirements usually lead to an increase in variable costs and so-called “non recoverable” costs (sunk costs) to firms. Variable costs directly depend on production and are passed on to consumers via prices. Conversely (once the investment has been made), non recoverable costs like the purchase of specific equipment for refrigeration and irradiation or staff training expenses do not directly depend on production. They do not directly affect prices but influence the competition structure when the producers’ margins do not cover these non-recoverable costs. By opting for relatively high compulsory safety norms, synonymous with high non recoverable costs, some potential competitors may be removed from the market. As a consequence of this reduction in the number of producers on the market, prices rise and as a result of the implementation of regulations, the variety of products tends to decrease.

The choice of a minimum safety standard maximizing the collective surplus by taking into account the entry of firms was recently analysed in the presence of non recoverable costs linked to safety efforts (Marette, 2007). The minimum safety standard corrects a safety under-investment by producers. But if the optimal standard selected in the situation of perfect information to consumer leads to a competitive situation, the one selected in the situation of imperfect information leads to a situation reducing the number of producers. Because of imperfect information, a greater safety effort than in a situation of perfect information is imposed on firms, leading to a restriction in the number of firms. This result raises the question of information to consumers when a standard policy is decided.

A more recent work studied the link between minimum safety standards and labels informing consumers (Marette, 2008). It shows that a standard and a label may be substitutes or complements with a view to improving the working of the market. As the standard also changes the producer’s choice of label, compared to a situation without regulation, the imposition of a safety standard leads to the absence of label (tool substitution) or the emergence of a voluntary or compulsory label (complementarity).

Other works have raised questions about the possibility of preventing the reduction in competition induced by regulation in the presence of high non recoverable costs. Lence et al. (2007) show that, for a label policy, the producers’ organization mode greatly depends on the structure of non recoverable costs. In the same way, Crespi and Marette (2009) show that the generic advertising policies of the type “eat fruit and vegetables” allow the advertising costs to be shared between producers and competition to be maintained (the same mechanism applies to pooled R&D expenses). By pooling the non recoverable expense of generic advertising between producers, generic advertising counteracts the phenomenon inherent to the reduction in competition linked to quality, safety or advertising expenses when these are non recoverable. This effect of maintaining a competitive structure must be taken into account when a regulatory choice is decided.

These various conceptual works give the areas for thought required for quantified analyses allowing the choice of the most efficient regulatory tools. Explicit account taken of the costs and competition structures is often lacking in empirical analyses. But there are few theoretical works to help the public decision-maker when faced with a particular food question.

**Consumer information or taxation/subsidy? A quantitative analysis of the regulation policies on the risks and benefits of fish consumption**

Several empirical works have turned to experimental economics methods to have quantitative assessments of public policies (Marette, Roosen and Blanchemanche, 2008a and 2008b). These methods may measure consumers’ reactions which can then be integrated into calibrated models (see frame 2). The experimental methods assess the value given to a particular characteristic by a group of consumers, representative of the general population. This value allows quantification of the modifications to demand following various regulatory decisions linked to that characteristic. The frame (2) aims to analyse the agents’ surpluses (or profits) which can then be calibrated, which helps to make an optimal choice of tools maximizing the whole of the surpluses.
There are many methods for identification of the value given by consumers to market and non-market goods (such as environmental goods). These methods assume questioning the individuals on their willingness-to-pay to reduce the risk of illness or more generally to obtain better quality goods. Experimental economics (which include experiments in laboratories or in the field) put a group of agents in a position where their real behaviour is simulated (laboratory) or influenced (in the field) in order to reveal their willingness-to-pay for given qualities. The advantages of the experimental method lie in the payment of the goods according to the selected values and in the precision of the control of the information revealed to consumers, including with an assessment of their initial knowledge through ex ante and ex post questionnaires.

When participants modify their willingness-to-pay in a statistically significant way, the experimental economics provide an average assessment of the willingness-to-pay for a particular characteristic. The relative variation in this willingness-to-pay isolates the willingness-to-pay for the additional characteristic, irrespective of the initial allocation or of the original value of the products offered during the experiment.

This relative variation helps calibrate and assess the potential variation in the demand for the considered products in relation to (1) a situation of equilibrium where the agents are not conscious of the product characteristics or to (2) a situation where the product is not yet on the market, as it is the case in France with many genetically modified organisms or cloned meat. If consumers are not conscious of the specific characteristic, it is not internalized in the demand, but is taken into account in the collective surplus via the ignorance cost.

As all the demand parameters are characterized, it is possible to do the same with producers, to calculate the surpluses (the profits) and quantify the impact of the various types of tools while maximizing the collective surplus. A very simplified model allows the calculation of consumers’ profits linked to the presence or absence of a characteristic depending on a regulation.

Following the disclosure of information on the risks linked to toxic substances (methyl-mercury) and on the health benefits linked to the omega-3 present in fish, a laboratory experiment shows statistically significant variations in consumption behaviours. These reactions were integrated into a calibrated model representing the demands for tuna and sardine in France. Various regulatory scenarios were compared in order to maximize the consumers’ collective surplus. In particular, the impacts of providing information to consumers on the risks and benefits of a tax per unit sold on tuna contaminated by methyl-mercury and of a subsidy per unit sold on sardines rich in omega-3 (reducing the risks of cardiovascular diseases) were calculated and compared (Marette, Roosen and Blanchemanche, 2008a).

Except in cases where information is actually received by more than 95% of the consumers concerned, the taxation/subsidy system is more effective than the provision of information linked to fish consumption, this last tool being nevertheless widely used in several OECD countries. In the absence of disclosure of information, the values attributed to omega-3 and mercury are internalized via a variation in the prices coming from the taxation/subsidy. This suggests the optimal taxes and subsidies in table 1.

The importance of the unit subsidy attributed to sardines comes from a high valuation of the beneficial effect of the omega-3 on health shown in the experimental protocol. The taxes and subsidies in the first column maximize the collective surplus without a constraint on budgetary balance, while the second column sets a balanced public budget for which the revenues from the tax on tuna are strictly equal to the expenses from the subsidies for sardines. As taxes and subsidies generate a surplus of public budget in the programme of the first column, the budget is strictly balanced with slightly less tax and slightly more subsidy in the scenario of the second column.
The optimum collective surpluses indicated in the last line of table 1 are very close for the two taxation/subsidy programmes. The combination of a tax and a subsidy increases the collective surplus of fish consumers by about 11 million Euros in relation to the absence of policy, by re-orienting the consumption of tuna toward sardines through a system of price adjustment. This social benefit speaks in favour of the implementation of this tax and subsidy mechanism.

Toward aid in public decision-making

The results of the previous analysis depend on the configuration and the quality of the data used. To determine the reliability of the results and highlight the limits on the study, we can proceed to an analysis of sensitivity by means of other assumptions, other range value of the various parameters and different scenarios. This example shows the applicable nature, the feasibility and flexibility of the suggested framework. Of course, it would merit being coupled with sociological analyses in order to provide a better understanding of the perceptions and reactions of some socio-economic groups.

The integration of experimental economic results in calibrated models helps assess the impacts of ex ante regulatory measures, that is to say, before the effective implementation of food, environmental or health policies. The experimentation results are a basis to anticipate consumers’ reactions and so the calibrated models help anticipate the price adjustments on markets and achieve quantified analyses directly usable by the public decision-maker. These methods may be mobilized for cost-profit analyses enlightening the decision-makers on the consequences of the various public choices.

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For further information


