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RESEARCH IN ECONOMICS AND RURAL
SOCIOLOGY

Sustainable development and consumer behaviour

Food and the environment are at the heart of sustainable development. However, the results of experimental work carried out by researchers from the INRA-SAE2 Department on consumer perceptions and willingness-to-pay for products respecting some of the criteria of sustainable development, show that information transmission to consumers via labels is imperfect. In order to promote sustainable development practices, we show that use of other tools, such as taxes and quality standards, could be conceivable.

Sustainable development focuses on the search for sustainable modes of production and consumption that are respectful of the environment and consumers health while meeting social criteria, such as providing “decent” incomes throughout the chain. The sustainability of these practices is linked to the question of the viability of the production systems over time in a world subject to sharp variations in prices and to major yield risks.

This concept of sustainable development refers to a great number of characteristics, such as local production, carbon assessment of products, fair trade, reasoned use of pesticides or of water resources, “organic” production, good-quality nutritional practices for the whole population and food safety in times of drought and so on. Of course, this list of characteristics is not exhaustive and does not show all the different perceptions of

sustainability among consumers and citizens.

For consumers, it is difficult to have precise knowledge of the characteristics of the product they are buying. It is also difficult for them to identify and reward the efforts of producers who are trying to develop sustainable practices, especially when this good practice has little or no impact on the intrinsic quality of the products. Moreover, consumers are not always aware of certain consequences of their consumption practices, such as waste, pollution generated by travel to supermarkets or imperfect packaging recycling. Finally, the perception of sustainable development is also shaped by the scientific complexity of environmental and social assessments, making it difficult to provide plain, clear communication for consumers.

Consumer interest for sustainable development and the limited efficiency of labels

Experimental economics methods provide an analysis of consumer reactions in the face of sustainable development issues (see

box). Laboratory experiments show participants' willingness-to-pay for specific characteristics such as product carbon assessments, fair trade, reasoned pesticide use, organic products, production relocation, and so on.

Box: Information and experimental economics

The methods for identifying the value given by consumers to market and non-market goods question participants directly as to their willingness-to-pay for a better-quality good which, for example, allows a reduction in health risks. Experimental economics (which makes use of experiments in the laboratory or the field) places a group of agents in a situation where their real behaviour is simulated (laboratory) or influenced (in the field) in order to disclose their willingness-to-pay for given qualities.

The experiments providing the results quoted in this paper were carried out in a laboratory; in these experiments, products were offered to participants according to informational contexts which differed to help to isolate the impact of a quality characteristic relating to sustainable development. Participants voted with their purses in that they had to pay for the good according to their choices. The advantages of this experimental method lie in the objective payment of the good according to the values selected and in the precise control of the information revealed to consumers, including an assessment of their initial and final knowledge by *ex ante* and *ex post* questionnaires.

When participants modify their willingness-to-pay in a statistically-significant way, experimental economics gives individual measurements and an average willingness-to-pay for a special characteristic or a more precise piece of information. The variation in readiness to pay isolates the willingness-to-pay for the additional characteristic, regardless of the initial allocation or value of the product proposed in the experiment.

Table 1 presents the results of some recent INRA laboratory studies. Results clearly show consumers' interest in the sustainable characteristics listed in column 2, each one being associated with a product in column

1. The rises, as a percentage, in the average willingness-to-pay for a characteristic are relatively high, what means that there is major potential for market development.

Table 1 Average willingness-to-pay for sustainable characteristics

Product	Observed Characteristic	Average willingness-to-pay € (%)	Reference
Orange Juice (1 l)	Eco-label	0.25 € (+29%)	Bougherara and Combris (2009)
Shrimps (100g)	Organic product	0.50 (+21%)	Disdier and Marette (2012a)
Shrimps (100g)	Fair Trade	0.57 € (+26%)	Disdier and Marette (2012a)
Apples (1kg)	Integrated/Organic production	0.44/0.56 € (+43/55%)	Combris et al. (2011)
Gherkins (1jar)	Production proximity	0.58 € (+24%)	Disdier and Marette (2012b)

Note: The average willingness-to-pay for a characteristic is calculated by taking the variation between the average willingness-to-pay for the product with and without the observed characteristic. This data obtained from experiments conducted in laboratories on random samples of consumers living in France.

However, these results do not reflect real purchasing conditions in supermarkets since in laboratory experiments, participants have enough time to assimilate the detailed information they are given.

Field experiments show that consumers' attention and focus are much less in a supermarket than in a laboratory (Marette et al., 2011). Unlike in a laboratory, consumers purchase lots of products in a

supermarket and pay less attention to labels.

Consumers have a limited memorisation capacity and confusion is possible whenever the piece of information delivered is complex or technical. Furthermore, we observe a tendency towards a proliferation of labels, in particular with the multiplication of allegations on health, fair trade or environment, which may limit their impact in terms of informing consumers. Therefore, the willingness-to-pay shown in table 1 is not fully and perfectly transferred to the prices of sustainable goods available on market.

This problem of consumer attention arises especially with labels showing sustainable development characteristics. For instance, systematic labelling of carbon assessments on supermarket tickets is undoubtedly to little effect if clients do not dwell on that piece of information. If consumers pay more attention to price, then a tax mechanism implemented by the State may be more appropriate.

Theoretical works have focused on the consequences of the coexistence of credible and non-credible labels on sustainable practices. Marette (2010) explored the consequences of consumer confusion when firms have a choice between a credible label and a non-credible label to indicate quality and sustainability. This coexistence leads to confusion for some consumers who take the non-credible label for a credible one. The presence of confused consumers leads to the emergence of multiple equilibria on the goods market. In that situation, either all firms choose the credible certification, or all firms choose the non-credible

certification. In the presence of a lot of confused consumers, no firm chooses the credible label describing an effort on sustainable practices, despite the fact that this sustainable label would have been chosen by firms if consumers had not been confused. There is therefore a failure of the market regarding the emergence of credible sustainable practices.

More precisely, two broad categories of market failure can be identified: (a) faults affecting consumers, for instance imperfect information regarding their attitudes towards production methods like organic farming or fair trade; (b) environmental externalities and problems affecting collective resources such as water pollution, the spread of pesticides and the greenhouse effect.

In this context of failings, only lower-quality goods (less costly to produce) are traded and sustainable practices are excluded from market. To overcome these problems, sellers can describe the quality of their products and consumers may make use of private and public intermediaries who are better informed and can give them information on the quality of the goods on offer in a credible way. Such action is subject to limitations when there are a lot of producers, preventing effective traceability of the efforts made by each of them, or in a context of scientific uncertainty making simple, clear communication difficult with consumers who have limited attention capacities.

Even if it is often limited, public intervention remains useful to counter certain market failings which, in the absence of regulatory measures, often lead to sub-optimal choices by firms or consumers regarding sustainability.

Public intervention tools and experimental economics in public decision-making support

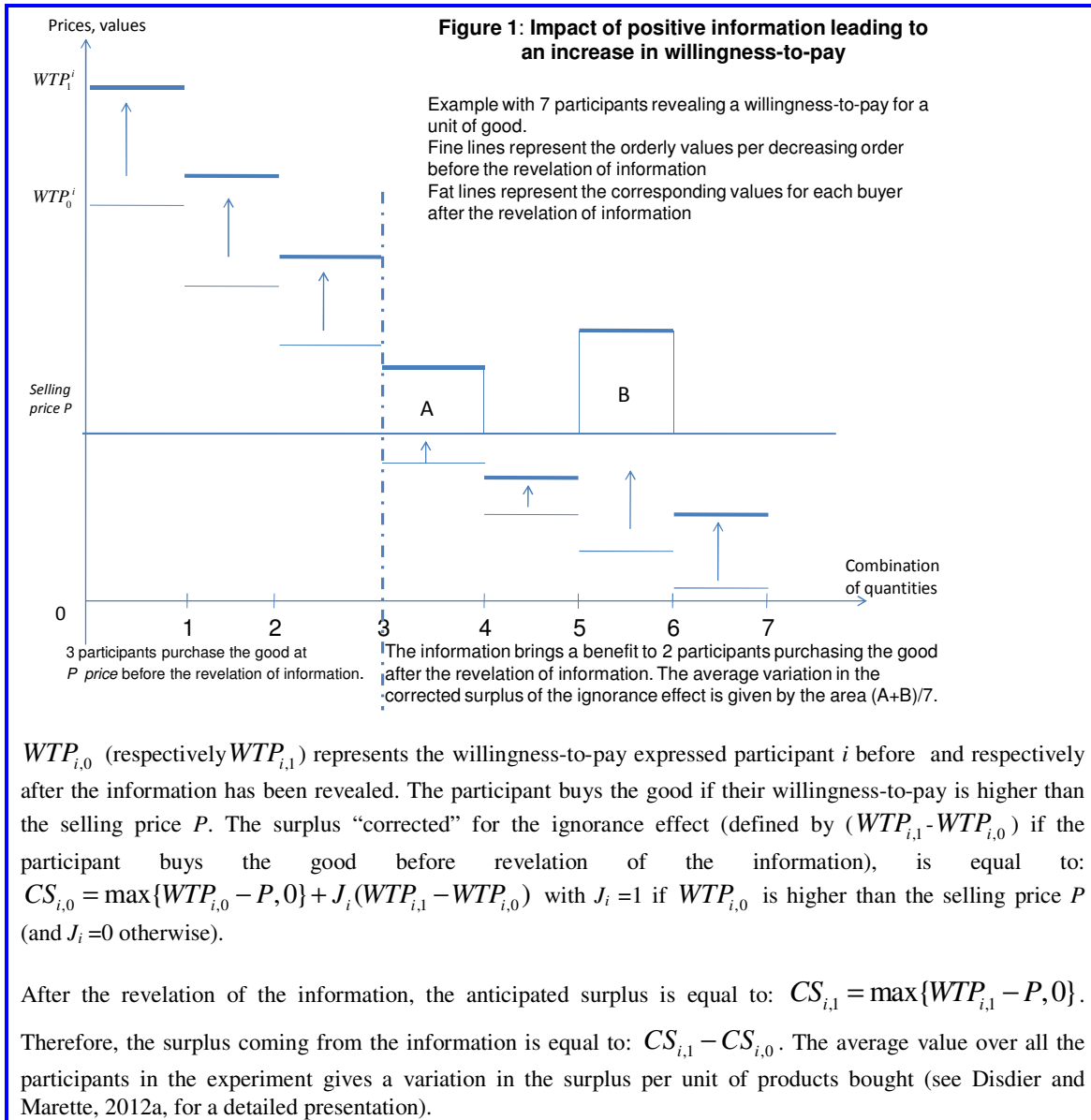
The proliferation of sustainability-related labels minimizes the efficacy of voluntary labelling approaches. In such a context, the State can intervene by requiring certain environmental or social data to be displayed so that consumers can detect the less virtuous producers, or publication of indicators giving the degree of “social responsibility” of listed companies. It can also turn towards other types of tools, such as taxes and subsidies to influence consumer purchasing decisions.

The public norms and standards which impose a minimal level of quality upon producers can take a lot of different forms, such as obligations to achieve a particular result regarding pesticide residues in products or water. They can impose production processes that are respectful of the environment or of employees’ health. Standards present the drawback of reducing the diversity of products, with each producer being encouraged to produce a good that just meets the minimal level of quality. They also restrict competition by excluding from the market those firms that are unable to bear the increase in production costs linked to the use of new production processes. Moreover, with the lack of scientifically sound tests, it is seldom possible to reach a level of zero risk or zero pollution.

The mechanisms of taxation on polluting products and of subsidies for

environmentally-friendly products rely on the influence that prices have on consumer choices, since they increase or decrease their selling price. While taxes seek to reduce purchases of polluting products, the income they generate provides fiscal resources that can go to finance subsidies for sustainable products or for other action, such as information campaigns. Such a process results in a double dividend in terms of the environment and tax resources. This point must be qualified as we often get high substitution elasticities between close variants of products. For instance, (Didier and Marette (2012b) show that almost all the consumers participating in the experiments are ready to substitute their consumption of gherkins without a specific label for gherkins with a “fair trade” label.

These various tools may be combined with each other and with existing labels. Theoretical studies provide necessary food for thought to conduct quantified analyses in order to choose the most effective regulatory tools (see Costa et al., 2009 for a review of the various effects). But theoretical works are limited to helping public decision-makers choose between these tools when facing a specific question. The experimental results may therefore be used as a basis to anticipate consumers’ reactions and calibrate the models to simulate price adjustments on markets according to the various types of tools. The resulting quantified analyses can serve for public debate.



The willingness-to-pay presented in the previous section may be used to assess the variations in the surplus (or welfare) of consumers (the producers' gains may also be easily included into the analysis). One of the potential methods consists in calculating a participant's surplus by the variation between his willingness-to-pay and the selling price of a product observed on the market. The information revealed in the laboratory by the experiment leads to

modifications in the consumer's willingness-to-pay. These changes allow an assessment of the change in the surplus compared to an equilibrium situation where agents are not aware of the characteristics of the various products available, or with a situation where the sustainable product is not yet introduced onto the market. Graph 1 illustrates the variation in the surplus linked to the revelation of information.

Table 2: Impact of various tools enabling an environmental improvement in tropical shrimp production

Per-unit t Tax * sold ¹ (€/100g)	$t^* = 0.7$
Per-unit variation in surplus (€/100g)	0.19 (+85%)
Aggregate variation in surplus ² (€ million)	105.8 (+85%)
minimum quality Standard ³	
Per-unit variation in surplus (€/100g)	0.61 (+276%)
Aggregate variation in surplus ² (€ million)	343.4 (+276%)
Environmental “perfectly spread out” label	
Per-unit variation in surplus (€/100g)	0.70 (+316%)
Aggregate variation in surplus ² (€ million)	393.4 (+316%)
Per-unit sold Environmental “perfectly spread out” label + t tax ** ¹ (€/100g)	$t^{**} = 0.36$
Per-unit variation in surplus (€/100g)	1.05 (+478%)
Aggregate variation in surplus ² (€ million)	593.6 (+478%)

Source: Disdier and Marette (2012a).

Note: ¹ the conventional shrimp tax is chosen in order to maximize the consumer surplus.

² The aggregate variation in welfare consists in multiplying the variation in welfare per unit by the number of purchases (for 100g) per year in France.

³ The standard imposing good environmental practices is not known by consumers, but it induces a 25% price rise compared with the price of conventional shrimps which are then prohibited.

Thanks to the method presented above, various regulatory scenarios were compared in order to maximize the collective surplus of French tropical shrimp consumers (Disdier and Marette, 2012a). The production of conventional shrimps leads to high pollution, and “organic” shrimps, grown in conditions that are respectful of the environment, begin to be offered on the market. The integration of the experimental results in an approach of partial equilibrium enables an estimation of the impact of the various tools on the consumer surplus. Table 2 sums up the results obtained by Disdier and Marette (2012a). The environmental label indicates the “organic” shrimps, the t^* (or t^{**}) tax applying to conventional shrimps, as the standard requires “organic” shrimps only to be sold on the market.

If the environmental label is perfectly understood by consumers, then it is the best tool. Ideally, it should be combined with a tax to limit the purchases of conventional shrimps by consumers who are little or not at all interested by environmental objectives. If the environment label is not

received/understood by consumers, then the other tools having a main influence on prices should be considered. In such a case, the standard imposing good environmental practices on all producers/importers is more effective than tax, because it induces a greater variation in welfare (+276% against +85%).

Sustainable development is valued by consumers, but markets cannot transmit complete information by themselves. Public intervention can correct some of the failings and facilitate consumer choices. The choice of instruments is an awkward question which requires a detailed examination of the economic effects on the agents concerned by that question.

Empirical estimations can identify the impact of regulatory choices. Previous examples have illustrated the essential contribution of experimental economics. Including the results from experiments on calibrated models gives an assessment of the impacts of *ex-ante* regulatory measures, meaning before the effective implementation of sustainable development policies.

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For further information

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