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CONSUMER'S ATTITUDES, VERTICAL DIFFERENTIATION, AND LABELLING REGULATION IN THE FOOD INDUSTRY NEW GM-PRODUCTS VS. TRADITIONAL REGIONAL PRODUCTS[*]

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Abstract

The paper discusses results of a simulated marked research evaluating consumer's preferences toward GM and NGM food products in the South of Italy. Three experimental scenarios with different hypothesis of price ratio and product attributes of GM and NGM products were run. Consumers' choices were related to information and risk attitude. We find that consumers tend to prefer NGM products to GM products, without any statistical relationship with their information level and risk attitude. When the NGM product is compared with an enhanced GM product, most consumers still prefer NGM product. GM product consumption does rather depend on consumers' risk perception. The results demonstrate that there is room in the market for vertical differentiation policies based on the wholesomeness of traditional production methods.

Introduction

The major public concern with foods derived through biotechnology is to insure people against risks in production and consumption. The two faces of the problem are 1) assessing the risk of harmful effects on human health and environment, and 2) choosing policy instruments effective in lowering the social cost coming from the risk. The United Sates, by stating that genetically modified (GM) products are equivalent to conventional counterparts, assumes a very low risk, which then does not call for a GM-specific regulation[1]. On the other hand, the European Union (EU), by recognizing the indeterminacy of the risk-assessment procedures, appeals to the precaution principle and to the consumer right to choose. The precaution principle led to the present prohibition of producing GM foods inside the EU. Nevertheless, this prohibition will no longer hold, as the biotechnology spreading forces the EU to give in to protest from others countries in the WTO. The defense of the consumer right to choose is driving the European Commission to set a mandatory labeling law for GM products. In the policy maker's opinion this law should help non-GM (NGM) products compete with the GM ones in the European Market.

This paper focuses on the role of a mandatory labeling law in driving the competition between GM and NGM products in the market. We endeavour to show that when the consumer risk perception for GM products is very low, the market structure shaped by differentiation strategies does not leave room for NGM products, even with mandatory labeling. We address the issue both theoretically and empirically. In Section 1 we begin by analyzing the way in which risk perception affects the type of differentiation in the market. In Section 2 we then discuss, more from a sociologically-than an economically-rooted perspective variables influencing consumer risk perception and risk-taking behavior. In Section 3 the results of an empirical research, recently carried out among consumers in Southern Italy, offer an estimate of the current risk perception in the region. Section 4 contains a summary and draws some conclusions on the role of GM product regulations in driving market forces.

1. Labeling, Risk Perception, and Vertical Differentiation in Markets with GM Products

The introduction of mandatory labeling for GM products allows for the vertical differentiation of the market. Assuming that all consumers[2] perceive a risk related to GM products, we can consider GM products as of lower quality with respect the NGM ones. Furthermore, since the high quality of NGM products depends on an attribute (the absence of genetically modified substances) that is not verifiable either before or after the purchase, we can consider NGM products as credence goods.

Let's consider a market where two quality levels for a particular product are available. Let s_1 denote the low quality product (i.e. the GM product) and s_2 the high quality one (i.e. the NGM product). We assume that the difference between the low and the high

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[1] According to the equivalence principle, the United States does not generally require the labeling of GM products. A label is required only if the GM food product differs significantly from its traditional counterpart in its nutritional content, or if it poses a health threat.

[2] Vertical differentiation models require the consumers to have common preferences. In our analysis we assume that even when in a society there is not an unanimous consensus on risk related to GM products, it is still possible to identify definite segments of the demand sharing the same risk perception.

quality depends on the GM's risk perception. If consumers perceive a risk r related to GM products, then, under the same price and income conditions, they will prefer NGM products to the GM ones (this accounts for the vertical differentiation of the market). The difference $s_2 - s_1 = r > 0$, $s_1, s_2, r \in R^+$, can be thought of as a measure of the degree of product differentiation.

Many models have been proposed to address vertical differentiation. Stemming from the seminal paper of Gabsewicz and Thisse (1979), where only price competition is accounted for, subsequent models have drawn multistage non-cooperative games.

In his recent paper, Wauthy (1996) considers a model of vertical product differentiation where firms simultaneously choose the quality and then compete in price. Wauthy generalizes the previous two-stage models of Choi e Shin (1992) and Tirole (1988) (which respectively limit the analysis at the cases of uncovered and covered markets), showing that covered or uncovered markets are endogenous outcomes of the quality game. Shaked and Sutton (1982) make a further extension adding a third stage in the game: in the first stage firms choose whether or not to enter the industry, in the second stage they choose the quality, and in the final stage they choose the price.

If we assume that the degree of differentiation is exogenously determined by the consumer risk perception, then only the price competition is viable. In this case the characterization of the market is well described through the results attained by Gabszewicz and Thisse (1979). Given two firms A and B selling at no cost the product of high and low quality, respectively, and assuming consumers with common preferences making indivisible and mutually exclusive purchases, the authors define a particular uniform distribution of income as $R(t) = R_1 + R_2 t$, $R_1 > 0$, $R_2 \geq 0$ and the utility function as $U(0, R(t)) = U_0 R(t)$, $U(A, R(t)) = U_A R(t)$, $U(B, R(t)) = U_B R(t)$, $U_A > U_B > U_0$. They find the existence of three sets of Cournot equilibrium prices consistent with the following three situations: 1) both firms with positive profits selling their products and the market uncovered; 2) both firms with positive profits selling their products and the market covered; 3) the seller B out of the market. The outcome of the game will lead to the solutions 1), 2) or 3) depending on the values of the parameters U_A, U_B, R_1, R_2 (i.e. the equilibrium price values are functions of the parameters U_A, U_B, R_1, R_2). The authors identify three intervals for the values of the ratio R_1/R_2 leading to the three solutions and show that the bounds of these intervals depend on (U_A, U_B), i.e. on the degree of product differentiation.

A comparative static analysis of the equilibrium points leads to some further results summarized in the following statements:

1) a sufficient condition for the coexistence of both firms on the market is $R_1/R_2 < 1$; this means that the difference between the upper and the lower bounds of the income distribution must be greater than 2[3] (i.e. the utility of the income of the richest customer exceeds twice the utility of the income of the poorest one);

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[3] The uniform distribution of income is defined between 0 and 1. Given that $R(t) = R_1 + R_2 t$, the lower bound is $R(0) = R_1 = \underline{R}$ and the upper bound is $R(1) = R_1 + R_2 = \overline{R}$; accordingly, $R_1/R_2 > 1 \Rightarrow \overline{R} \leq 2\underline{R}$

2) At low average income levels both firms benefit from an increase of the average income until a limit value beyond which the seller *B* starts to lose customers;

3) a systematic reduction of income inequality (i.e. a decrease in the standard deviation of the income) enforces product *B* to disappear from the market.

The solutions of the model demonstrate that in a particular country with a given income distribution the market share of the GM and NGM products will depend on the degree of differentiation between the two products, i.e. on the perception of the risk for the GM products.

The comparative static analysis also demonstrates that given the same risk perception, the success of the GM products will depend on the country income distribution. As the first of the previous three statements points out, the income differentiation plays a central role to sustain the coexistence of the two markets: the market where GM products are sold at a low price to the poor people, and the market where NGM products are sold at a higher price to the rich ones. Moreover, as statements 2 and 3 point out, the more successful the NGM products are with respect to the GM ones, the higher the average income and the lower the income differentiation.

An important assumption in the previous model is the zero production cost. Introducing positive cost, with the cost for the high quality being greater than the cost of the low quality ($c_A > c_B$), would probably restrict the sets of equilibrium prices. Intuitively, there will be some upper bound for the cost of the high quality beyond which there will be no room in the market for this product.

In the case of NGM products, the high quality is a credence attribute because consumers are not able to discriminate between GM and NGM products either prior or after purchase. When quality is a credence attribute, there is a signaling problem. If consumers are not guaranteed from being cheated, the market for high quality collapses with only the low quality being sold. There is a demand for certification, broadly defined as a process for transforming a credence attribute into a search one. The costlier the certification process, the higher the risk for NGM sellers to lose the price game with GM ones. This means that the cost of certification along with the degree of risk perception, along with the level and distribution of income, is a critical factor in determining the market structure.

Generally, the self-certification from individual firms is very costly and leads to prices affordable only by the wealthier consumers. It can be showed (Auriol and Schilizzi, 2000) that independent certification, either publicly or privately funded, is generally more efficient than self-certification, and that the optimal choice between market funded certification or public funded certification depends on the shadow cost of public funding. Thus, political choices heavily influencing the estimate of the shadow cost of public intervention might be *a key factor* in assuring the survival of NGM products.

2. A Framework for Analyzing Risk Perception

A function of all social system is to reduce complexity and select those areas of concern for which it appears useful to spend scarce resources. This is true with regard to risk. Social systems need to define criteria that allow them to prioritize their actions and to neglect those risks that appear trivial.

What criteria are appropriate for dealing with risk? How safe is safe enough? Should society adopt a set of uniform criteria for all types of risk regardless of context? Who should be involved in designing these criteria? Who should be held accountable if the

criteria prove inadequate? These questions are the core of the present risk debate (Lind, 1987; Renn, 1984; Wildwsky, 1990). The responses to these questions depend on the perspectives of the different actors in society. If risk is seen as an objective property of an event or activity and measured as the probability of well-defined adverse affects, the policy implications are obvious: order risks according to objective measures of probability and magnitude of harm, and allocate resources to reduce the greatest risks. If, on the other hand, risk is seen as a cultural or social construction, risk management activities would be set according to different criteria, and priorities should reflect social values and lifestyle preferences.

All risk concepts have one element in common: the distinction between reality and possibility. If the future is either predetermined or independent of present human activities, the term risk makes no sense. If the distinction between reality and possibility is accepted, the term risk denotes the possibility that an undesirable state of reality may occur as a result of natural events or human activities. This definition implies that humans can and will make causal connections between actions (or events) and their effects, and that undesirable effects can be avoided or mitigated. Risk is therefore both a descriptive and a normative concept. It includes the analysis of cause-effect relationships but it also carries the implicit message to reduce undesirable effects through appropriate modification of the causes or mitigation of the consequences.

The psychometric paradigm encompasses a theoretical framework which assumes that risk is subjectively defined by individuals who may be influenced by a wide array of psychological social, institutional and cultural factors(Lopes, 1983; Kasperson et al., 1988). The paradigm assumes that with appropriate design of survey instruments, many of these factors and their interrelationships can be quantified and measured in order to illuminate the responses of individuals and their society to the hazards that confront them. Another important issue is linked with the role of perceptions in determining the degree of impact resulting from the occurrence of an unfortunate event.

Risk analyses typically model the impacts of such events in terms of direct harm to victim. The impact of an unfortunate event, however, sometimes extend far beyond these direct harmful effects, and may include indirect costs to the responsible government agency or private company that far exceed direct costs. In some case all companies in the industry are affected, regardless of which company was responsible for the mishap. In extreme cases, the indirect costs of a mishap may even extend past industry boundaries, affecting companies, industry, and agencies whose business is minimally related to the initial event. Thus an undesirable event can be thought of a stone dropped in a pond.

A conceptual framework aimed at describing how psychological, social, cultural and political factors interact to amplify risk has been presented at the end of eighteen. An important element of this framework is the assumption that the perceived seriousness of an accident or other unfortunate event, and the long-range costs and other higher-order impacts on the responsible company, industry, or agency are determined in part by what the event signals or portends. Signal value reflects the perception that the event provides new information about the likelihood of similar or more destructive future mishaps.

The information power or signal potential of an event, and thus its potential social impact, appears to be systematically related to the characteristics of the hazard. An accident that takes many lives may produce relatively little social disturbance if it occurs as part of a familiar and well understood system (train wreck). However, a small

accident in an unfamiliar system such as a recombinant DNA laboratory, may have immense social consequences if it is perceived as a harbinger of further and possibly catastrophic mishaps.

Psychometric studies have been sowed showing that risk perception can be affected by many factors. Among these factors the most relevant are: a) voluntariness of exposure (viewed as a key mediator of risk acceptance); b) familiarity; c) control; d) equity; e) level of knowledge.

More generally psychometric research demonstrates that whereas experts define risk in a narrow, technical way, people have a more complex view that incorporates value considerations such as equity, catastrophic potential and controllability. The issue is not whether these are legitimate rational considerations, but how to integrate them into risk analysis a1nd policy decisions.

3. GM Products and Consumers' Behavior: an Empirical Analysis

Mandatory labeling is an instrument which has been chosen to defend the consumers' freedom of choice between NGM and GM products. The possibility to classify food products is a fundamental requirement in a market which allows for the existence of every quality of food (NGM and GM products). However, mandatory labeling does not guarantee that differing markets can operate. In fact, it is necessary that consumers' choice is guided in accordance with risk perception properties associated with the production and consumption of genetically modified products. Such a perception depends on the identification and judgment of potentially negative effects and the probability that these will cause damage to health and the environment.

3.1 Demographics of Sample and Buying Behavior

A survey has been made using direct consumer interviews in order to identify both the perception of risk associated with such damage as well as consumer behavior during the purchasing stages. In this survey consumers were also asked to express an opinion about the necessity and type of public intervention to regulate experimentation, production and sales of genetically modified products. A specific questionnaire was set up for the survey. In accordance with the paragraph dedicated to factors which influence the perception of risk the structure of the questionnaire was formed in such a way as to:
a) classify the interviewee and his/her family;
b) identify his/her level of information;
c) identify the attitude towards risky behavior;
d) identify the most general behavior during the purchasing stage
e) investigate the level of knowledge regarding GMO and the willingness to purchase such GM products;
f) specify the necessity and the type of intervention in order to regulate GMO.

The survey was carried out at shopping centers located in Naples's metropolitan area in order to have the opinions of the city's inhabitants as well as those who live in suburban and surrounding districts. In order to obtain a representative sample of the various categories of consumers the interviews were made on different days of the week and at various times of the day. In relation to the commercial points where the interviews took place it is important to underline that neither discount stores nor supermarkets were represented as permission was always denied once the content of the survey (food products obtained form genetically modified organisms) was made known.

All interviews were made to consumers who were shopping at supermarkets (65.3%) or specialized shops (34.7%)

The majority of interviewees were women (70.7%) who, as part of their traditional housework duties, were shopping for their families. Among the male interviewees it can be observed that the majority purchased their products at supermarkets (over 60%). A great weight was given to couples (61.2%) whose choice of product to be purchased was made in the interest of the whole family nucleus. Most of these were family groups composed of more than three individuals (73.5%) even if only in 36.7% of all cases had at least a child.

The interviewees were classified into four age groups formed on the hypothetical base regarding the life cycle and its various phases and the type of behavior during the purchasing stages[4]. Young consumers or those over 60 years of age were virtually numerically the same but much less than the other two intermediate groups of which the adult one was the most representative (45.6%). Half of the males interviewed belonged to the adult group or the old people group whereas the females were the majority in every single age group. Considering the age group or the marital status the consumers were distributed as expected. Virtually all the young people (92.2%) were not married as were most of the components in the adult group; finally the elderly age group had the highest amount of married couples in them.

The level of formal education was generally high, in fact over 87% had a high school diploma and almost 40% were graduated.

The interviewees with a regular job were just over half of the consumers interviewed, housewives formed 1/5th while students and old-aged pensioners (10%) had equal weight and unemployed interviewees were slightly fewer than these. It is interesting to note that many family units had a single income source (49%) while just over a third of cases had two.

To sum-up, the interviewee's characteristics enables us to identify three main group profiles regarding consumers. The first was composed of consumers of a high education level forming part of a family nucleus where the married couple of working age was employed. The second profile identified the elderly living in a small family unit and finally the third profile were adults with a family where a child was present and where both parents worked.

There is a special relationship between the education level and behavior during the buying stages and therefore further questions were added in order to evaluate:
a) the level of exposure to the stream of information through reading or listening to radio/television programmes;
b) the level of general information, evaluated in terms of correctness and range;
c) the level of information in relation to the quality of food products (labeled HACCP and PDO).

The level of exposure to the stream of information reveals that the interviewees had experienced an average level (44.9%) or a high level of exposure (47.6%) to information. There were three main sources identified: daily newspapers, health magazines and television news. Radio programmes with a deeper cultural topic were

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[4] The four groups are a) individuals under the age of 29 (young people); b) individual between the age of 30 and 45(adults); c) individual between the age of 46 and 59 (elderly); d) over sixties (old people).

never listened to. The sample was distributed in an almost uniform way between those who do not read, rarely read or frequently read magazines with health themes. Reading daily newspapers was not one of the consumers' habits: in fact 15% declared not to read them or to read them only rarely (54.4%). On the other hand, over 80% of the interviewees listened to news programmes on a daily basis. However, there was a difference shown for preferences given to the listening of television programmes regarding reports and more widespread debate.

The consumers' educational level was characterized by the preference to the type of information: television news was listened to by those people who had a medium-low education level and who rarely read daily newspapers. Among those consumers with a medium-high education level the composition of information sources were more evenly balanced. In fact, this group added frequent reading of daily newspapers to their regular source of information from television.

The level of specific knowledge concerning the quality of agrarian food products supplied contrasting results: the percentage of those who knew the Mandatory requirements for labeling was high (80.3%) and what Protected Designation of Origin (PDO) identifies (85.5), but very few knew the existence of the HACCP requirements.

The third section of he questionnaire was dedicated to the identification of specific knowledge regarding genetically modified organisms. The first interesting observation is that almost 94% of all interviewees claimed to know what genetically modified organisms were. Such a high percentage can be interpreted as the result of an exposure effect to information sources, which have recently faced the GMO issue even if in a discontinuous and not always accurate way. However, the interviewees differ from each other when they were asked to identify the correct definition of GMO and in which products they could be present in among those on sale. In fact, just 66.7% of those who claimed to know GMO gave a correct definition, and such a rate is reduced to 47.3% when they were asked to precisely identify those food products which could contain them. It is therefore clear that correct information about these issues is still not satisfactory enough.

It is interesting to observe that among consumers, classified by age, the wrong definition is mainly given by younger individuals. The relationship between the correct definition of genetically modified organisms and the formal education increases with higher education levels. Finally, it is of note that that there is no dominant group of health magazine readers or television news listeners among those who know exactly what genetically modified organisms are. In conclusion, precise information about genetically modified organisms more often belongs to those who have a high education level, who dedicate time to the acquisition of information with daily newspapers being their preferred source.

The general behavior pattern during the purchasing stage is defined by label reading. The rate of people who have declared to regularly do so is 85.7% but 83% of consumers just stick to the expiry date and they very rarely take time to read the ingredients and the nutritional content.

The consumers interviewed were characterized by a low risk behavior (75.5%). While it was very low the amount of those who had a high propensity to risky behavior (4%).

The probability that from GMO consumption there could a harmful event is excluded by 1/5th of those interviewed while 1/3rd consider it highly probable. Many saw the severity of the damage that could be inflicted by the consumption of these food products

as medium-to-high or high (44.9%). The purchase of products from genetically modified organisms in relation to traditional ones is preferred only by 17.7% of those interviewed but on condition that they have a greater vitamin C content, which is seen as a protective factor against many illnesses. The high level of product preservation was not considered as a component of food quality whereas vitamin content was.

All the interviewees expressed favour that public bodies should intervene to regulate the experimentation, production and consumption of GMO.

3.2 GM Products and Consumers' Choice

As previously emphasized, this work aimed to identify the sample behavior with respect to GM products consumption and to ascertain factors influencing consumer's choice when there is a possibility to buy GM products.

In order to verify how consumer's choice is affected by factors like price and product characteristics, different buying scenarios were simulated. As a matter of fact, consumers were asked to choose in three situations of price ratio between GM and not GM products: parity of price, GM product more or less expensive than the alternative one. In each situation, consumers had to state their preferences when products had the same characteristics, when GM product preserved longer and when GM product had more vitamin C content.

Questionnaire results showed that most consumers are unwilling to buy GM product in any situation. Nevertheless some of them, 26 out of 147 (17% of the sample), state that they would choose GM products in some circumstances.

In table 1 consumers' answers in each scenario are shown. Four aspects should be stressed:

a) even when GM products have same price and same characteristics as other products, there are 7 consumers who state they would buy GM food product. In such a case consumers' choice seems to be driven by a strong "confidence in science";

b) price still plays some role in consumers' choice: even if 122 consumers would not buy GM products in any case, people willing to buy GM products with same characteristics of NGM ones increase to 15, when the scenario of a cheaper GM product is presented. For some consumers, then, the choice is not an ideological one, neither it represents the answer of adverse risk behavior;

c) differentiation by itself seems to show a less important effect on buying attitude. As a matter of fact, in the *same price* scenario 7 consumers (less than 5% of the sample) would choose GM products having more of some characteristic; in the *more expensive GM product* option, attention to specific product characteristics increases, but it still concerns less than 7% of the sample;

d) as intrinsic characteristics of goods are concerned, consumers pay less attention to durability than to vitamin content. This behavior could reflect a different perception of those attributes: while vitamin content is always positively perceived and does generally represent an element of vertical differentiation, durability could be related to chemical treatment and, then, is not universally desired.

Relationship between socioeconomic characteristics and consumers' choices were analyzed by means of a chi square test on contingency tables. Sex, age, education degree, professional condition, type of job, the presence of children in the family, were crossed with buying/not buying answers. None of those factors was found to influence

buying behavior significantly. On the contrary, choice was dependent on family size (table 2): the percentage of those choosing GM products decreases when family has more than three components.

A further step of the analysis aimed at testing how information and risk aversion could affect consumer choice. Information was investigated using different proxy variables: some of them relate to newspapers and TV programs as usual information sources; other ones are more specifically linked to consumers' knowledge level. Risk attitude was analyzed asking the consumer for the frequency with which she runs some risky actions. This aspect was further investigated asking for probability and level of damage she assigned to them.

Crossing data on buying behavior with information level and risk attitude did not show any statistical correlation between these variables[5]: frequency distribution of GM product buyers and non-buyers does not differ in relation to information and risk attitude classes. In particular consumers do not show a different behavior according to their knowledge on GMO.

As risk attitude is concerned, some more can be said looking at probability and level of damage the consumer assign to GM products. In tables 3 and 4 probability and level of damage of GM products, as they are perceived by consumers, are crossed and related to buying choices. Differences in frequency distributions show how people that would not buy GM product associate with it medium-high damage and medium-high probability of damage, while most of GM products buyers think the danger of GM is not high[6]. This result confirms that absence of genetically modified substances does generally act as a differentiation factor and that, as far as a risk is perceived, the consumer identifies GM products as lower quality goods. Moreover, the relationship between buying behavior and risk perception helps to explain why risk attitude did not come out as consumers' differentiation factor. As a matter of fact, GM product consumption, according to those who were willing to buy GM products, is not perceived as a risky action.

A further feature that can be analyzed relates to the need of regulation. Each interviewee stressed the importance to introduce some form of regulation. Three types of regulations were considered in the questionnaire: bans, licenses and standards, and mandatory requirements. The introduction of mandatory labeling was generally required: 75% of the sample looks at labeling as a wished policy option, either by itself or together with some other form of regulation. Consumers, then, want to be informed on GM products and labeling can have a very important role in market differentiation. With respect to regulation forms, buyers and non-buyers showed a very different frequency distribution. While non-buyers are more oriented at banning interventions, GM product buyers prefer more information on products through labeling (table 5). This result is strongly related to risk perception: as far as consumers perceive the damages coming from GM product are high, they wish to be more protected by means of bans and licenses rather than by labeling instruments.

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[5] Statistical dependence was tested through a chi square test
[6] Statistical correlation between level and probability of damage seems to show that the interviewed sample is not able to clearly distinguish between these concepts.

Table 1: Different Scenarios and Consumers' Behavior

Consumer Behavior		Same price	GM product more expensive than NGM ones	GM product less expensive than NGM ones
Never buying		90.5%	91.2%	83.0%
<u>Buying</u>	*Even if GM and conventional products have same characteristics*	4.8%	2.0%	10.2%
	Only if GM product preserve longer	0.0%	0.0%	0.0%
	Only if GM product has more vitamin content	4.1%	4.1%	4.8%
	Both if GM product preserve longer and has more vitamin content	0.7%	2.7%	2.0%

Table 2: Relationship between Consumers' Choice and Family Size

Consumer Choice	Family Size		Total
	1 to 3 components	*4 components or more*	
Never buying	52.1%	47.9%	100%
Buying	76.9%	23.1%	100%
Total	56.5%	43.5%	100%

Table 3: Level and Probability of Damage according to not buying GM Product Consumers

Level of damage	Damage probability			
	Low	*Medium*	*High*	*Total*
Low	87.5%	12.5%	0.0%	100%
Medium	12.5%	75.0%	12.5%	100%
High	3.3%	39.3%	57.4%	100%

Table 4: Level and probability of damage according to buying GMO consumers

Level of damage	Damage probability			
	Low	*Medium*	*High*	*Total*
Low	90.9%	9.1%	0.0%	100%
Medium	55.6%	33.3%	11.1%	100%
High	0.0%	75.0%	25.0%	100%

Table 5: Consumer preferences on GMO and regulation needs

Regulations needs	Never buying	Buying in some circumstances	Total
Bans*	20.3%	0.0%	16.7%
Licenses and standards*	5.1%	3.8%	4.5%
Labeling	16.1%	38.5%	20.1%
Bans and labeling	11.0%	7.7%	10.4%
Licenses and labeling	47.5%	50.0%	47.9%
Total	100%	100%	100%

*Bans: to prohibit experiments; to prohibit production and trade of GM products
*Licenses and standards: to limit production of GM products, allowing it for some certified firms; to limit genes modification

Conclusions

The European food sector allows consumers to choose among a wide variety of goods. Public intervention promotes both horizontal differentiation, through labeling rules for regional products, and vertical differentiation, through laws on quality certification.

The paper stresses the role of biotechnology in driving differentiation strategies in the food sector. It assumes that GM products can differ from the NGM ones in two ways: because they could have new attributes that meet further consumer's needs (which accounts mostly for horizontal differentiation); because their consumption could be perceived as risky (which accounts for vertical differentiation).

If consumers perceive a risk related to GM products, then, under the same price and income conditions, they will prefer NGM ones. Theoretical models of vertical differentiation suggest that the. NGM's market share is likely to be larger: the higher the degree of differentiation; the higher the average income; the lower the income differentiation; the lower the cost for the high quality.

Stemming from the evidence that the existence of a GM risk perception is a necessary condition to keep NGM products in the market, the empirical part of the paper examines how the risk perception affects the willingness to buy GM products, through a consumers' survey in Southern Italy. In the analyzed sample most part of consumers are risk adverse (76%). They (80%) retain the health risk associated with GM consumption medium or highly probable and consider the possible damage severe. Furthermore, even with a low price and enhanced attributes consumers are unwilling to buy GM product s and always ask for mandatory labeling.

The empirical results indicate that the high risk perception currently make NGM products competitive towards GM products. Nevertheless if risk perception fades spurred by changes in the informational and institutional environment, NGM products, and among them traditional products, will have to struggle to keep their position in the market. Furthermore GM producers, as the trust in new technologies increases, are very likely to launch new enhanced GM products able to fill every niche in the market and to give them a new horizontal differentiation-based competitive advantage. The result is that European agri-food system which strongly bases its competitive strength on horizontal differentiation and traditional regional products, could lose the competitive game with other countries, like US, hardly GM-oriented.

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