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CONSUMER ACCEPTANCE OF TRADITIONAL AND NUTRITIONALLY ENHANCED GENETICALLY MODIFIED FOOD: A PROBIT ANALYSIS OF PUBLIC SURVEY DATA IN ITALY

1. INTRODUCTION

In Europe, genetically modified (GM) crops still encounters a more or less generalized ban, and cannot be grown commercially (but commercial growing of GM Bt maize is already underway in Spain), although a number of trials are underway on oilseed rape, maize, sugar beet and potatoes. Commercial GM crops are grown mainly in four countries, namely US, Argentina, Canada and China. Farm-level adoption of GM crops in the United States (US) has increased dramatically since their commercial introduction in the mid-1990s. The yearly survey of the USDA National Agricultural Statistics Service show that in the 2003-2004 period, biotech varieties grew from 40 to 45% of all corn and from 81 to 85% of all soybean planted (USDA, 2004), with adoption

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rates higher than other agricultural innovations such as the hybrid corn (Kalaitzandonakes, 1999).

Although GM crops is supposed to deploy a wide range of economic, nutritional and social benefits, they also faces a lot of resistance due to fears about risks to human health and the environment. One argument is that the expected benefits may be basically private, shared between industry, farmers and consumers, but the prospected costs seem to be mainly public (Falck-Zepeda et al., 1999, cited by Traxler et al., 2004; Malagoli, 2000).

To some extent, consumer acceptance of GM food was neglected by the food industry, scientific community, and government. The first generation of GM crops was marketed to agricultural producers on the basis of having important input traits such as disease or pest resistance, offering better performance and cost-saving opportunities to farmers (Marra et al., 2002; Traxler et al., 2004). Scientists and the biotechnology industry operated under the presumption that "sound science" would automatically lead to consumer acceptance of GM products (Krueger, 2001) and that potentially adverse consequences can be effectively managed through government regulation (Comstock, 2000). Instead, resistance of small groups of motivated opinion leaders led to a wide refusal of this innovation. Among others, worries about compatibility between GM crops and organic agriculture, or traditional/local unique food products are widespread. Consumer concerns led to a mixed regulatory and public acceptance in the European Union, which requires strict labeling regulations, traceability, and the request of a substantial chains segregation. Also in the US signs of increased consumer anxiety about the safety of these crops are present (Priest, 2000).

The use of biotechnology has been criticized also on moral, ethical and social concerns (Rifkin, 1983; Gould, 1985; Comstock, 2000; Gifford, 2002; Raffensperger, 2002; Sandler, 2004), e.g. the perceived social consequences of permanent dependence of farmers (especially in developing countries) on multinational corporations for their "means of production".

Consumer resistance may also be due in part to the lack of tangible consumer benefits. The next wave of food biotechnology innovations new and improved products with enhanced quality attributes or nutritional benefits desired by consumers are expected (Dunahay, 1999; Riley and Hoffman, 1999; Schmidt, 2000; Feldman et al., 2000; Gamble et al., 2002).

Technological aspects may also matter: recent studies have found that consumers are less comfortable with genetic modification of animals than with genetic modification of plants (Hamstra, 1998; Grunert et al., 2000; Comstock, 2000; Hallman et al., 2002) and also different views about use of specific gene transfer technologies such as plant-to-plant technology and animal-to-plant technology have been found (Onyango and Nayga, 2004). GM ani-

mals are generally less supported than GM plants, and the purpose of the gene modification may also matter, considering that biotechnology applications aimed at developing new medicines are widely accepted (Hoban and Albert, 2004).

This article analyzes, using probit models, the factors that affect consumers' willingness to buy genetically modified (GM) food products with two different types of benefits: the traditional input trait benefit (i.e., reduced pesticides) and an output trait benefit (i.e. nutritionally enhanced). Probit models are estimated to examine the effect of various factors on consumers' willingness to buy GM foods with or without nutritionally enhanced attributes.

A short overview of previous related studies is given in the next section, followed by the theoretical framework used in the analysis, survey methodology, empirical model, results, and concluding remarks.

2. PREVIOUS LITERATURE

Regarding consumer acceptance of GM food and the related factors, Lusk and Sullivan (2002) found that it improved when genetic modification was achieved by inserting an extra gene from the host plant than when it involved a gene transfer from a different plant. Moon and Balasubramanian (2001) found that U.S. consumer acceptance of GM foods was related to their perceptions of risks and benefits of GM products, as well as their moral and ethical views. Individual attitudes towards corporations, trust in government, and knowledge of science were also found to be important determinants of consumer acceptance. In a later work (Moon and Balasubramanian, 2004) based on a representative sample of UK and US consumers, they also modeled trust in government and brands to understand its role in public acceptance, finding that it acts mediating risk and benefits perception.

Baker and Burnham (2001) also found consumer reception related to opinions, beliefs, levels of risk aversion, and perceptions of benefits and risks from GM foods. Moreover, Lusk et al. (2001) found that consumer willingness to pay GM foods was related to their concern about GM food products, but was unrelated to their socio-economic attributes.

Bredahl (2001) revealed that for consumers from several EU countries attitudes towards GM foods were driven by their perceptions of risks and benefits of biotechnology.

Grunert et al. (2000) revealed that consumers in Scandinavian countries generally associated non-GM foods with safety and good health, but they carried negative connotations and linked to negative concepts. Specific health benefits, product attributes (improved taste or functionality) did not fully compen-

sate the negative perceptions. Again, a more negative view of animal genetic modification than plant genetic modification was found.
Burton et al. (2001) in the U.K. found a link with the approach to organic foods, whose buyers were willing to pay considerably more for GM-free foods. Lower consumer reception of GM foods when genetic modification involved gene transfer across plants and animals was also found among Italian and British consumers (Frewer et al., 1998).
McGarry Wolf et al. (2004) found that Italian consumers are far less willing to buy genetically modified food than US consumers, and believe much more that it is important to label GM food thus supporting mandatory labeling.

3. THEORETICAL FRAMEWORK

Following Onyango and Nayga (2004), this study uses a random utility discrete choice model to analyze the willingness to consume nutritionally enhanced GM foods.
We take reference to the Lancaster (1966a,b) attributes-based approach to consumers' food choices. Consumers derive utility (U) from the characteristics of the product (**z**) they buy and from consumers' personal characteristics and beliefs (**x**), then the utility deriving to the *i*-th consumer by the consumption of the *j*-th product may be specified as follows:

$$U_{ij} = U(x_{1j}, x_{2j}, \ldots, x_{nj}, z_{i1}, z_{i2}, \ldots, z_{im}) \quad (1)$$

Individual utility is unobservable, but Marschak (1960) viewed utility as the underlying stimulus and applied the utility maximizing principle to derive the random utility model of discrete choice.
It is assumed that a consumer faces a choice between consuming a traditional (T) or a GM (G) variety of a product whose other characteristics remains equal. The GM product is then produced using ingredients from transgenic organisms and provides additional specific benefits in respect of the traditional one. Utilities derived from the GM and the non-GM product varieties are given by U_G and U_T, respectively.
The observable variables for each choice are a vector of consumer characteristics (**x**), a vector of product attributes (**z**), and the choice made by the consumer (y = T, G).
It may be assumed that the unobservable utility function is expressed as:

$$U_{ij} = V_{ij} + \varepsilon_{ij} \quad (2)$$

where:

- U_{ij} is the unobserved or latent utility level attained by the *i*-th consumer,

- V_{ij} is the explainable part of the latent utility that depends on the levels of the product attributes and the consumer characteristics, under the hypothesis that the effect of all the attributes is the same for all the individuals, and
- ε_{ij} is the 'unexplainable' random component of utility associated with the choice of the product *j* attributes at a certain level and consumer *i* characteristics, that is the part of variance that may be assigned to individual-specific interactions among product attributes and consumer characteristics.

If the other characteristics of the product do not vary, the different utility derived by consumer i from the consumption of the product j only depend by the level of attribute z_{i1} (where z_{i1} = T, G) and by the unexplained error term.
Then, the consumer i's choice ordering for the GM food (over the non-GM variety) is assumed to depend on the additional utility or disutility derived from the GM product relative to that from the non-GM product.
The function Z_i for the i-th consumer, according to which consumer i will be *unwilling* to consume the GM food ($y_i = 0$) if Z_i is not positive, *willing* ($y_i = 1$) if Z_i is positive. can be expressed as:

$$Z_i = U_{iG} - U_{iT} = (V_{iG} + \varepsilon_{iG}) - (V_{iT} + \varepsilon_{iT}) = (V_{iG} - V_{iT}) + (\varepsilon_{iG} - \varepsilon_{iT}) \quad (3)$$

Given that the $\varepsilon_i = \varepsilon_{iG} - \varepsilon_{iT}$ portion of the utility is stochastic in nature, the choice problem can be formulated in probability terms, and under the assumption that ε_i follows the standard normal distribution, the probabilistic model may be described by the probit one.
Then, in order to perform the empirical analysis, the choice to buy the non-GM/GM product Z_i is modeled as a function of the i-th consumer's attributes as follows:

$$Z_i = \beta_0 + \beta_1 x_1 + \beta x_2 + \ldots + \beta_m x_m + \nu_i = \beta' X_i \quad (7)$$

where $x_1, x_2, \ldots, x_m$ denote the m characteristics of the i-th respondent, β_0, $\beta_1, \ldots, \beta_m$ are the parameter vector to be estimated and ν_i is the random error or disturbance term.
In this setting, the probabilities of choice for $y_i = 0$ and $y_i = 1$ are given by:

$$\begin{aligned} P(y_i = 0) &= \Phi(-\beta' X_i) \\ P(y_i = 1) &= 1 - \Phi(-\beta' X_i) \end{aligned} \quad (8)$$

where Φ is the cumulative standard normalized function, and the elements of the β-vector can be estimated using the maximum likelihood (ML) procedure.
The marginal effects of each of the independent variables on the probability of choosing a GM or non-GM food, i.e. the change in probability of a buy response given by a change in one of the continuous independent variables are given by the partial derivatives of the previous function.

When X_i is a binary predictor variable, the marginal effect results from calculating the difference in probabilities when the equation is evaluated at both levels of the binary variable with the other explanatory variables held at their mean values. Hence, the marginal effect of a binary variable is given by the difference in probabilities resulting by the respective levels of the binary variable being all the other variables put at their mean value.

4. SURVEY METHODOLOGY AND EMPIRICAL MODEL

This study uses data from a national telephone survey of adult Italian consumers. The questionnaire was developed to collect information on the attitudes of respondents towards the use of biotechnology in agriculture and food production and their willingness to buy GM foods. Information were gathered on:

a. public awareness on the use of biotechnology in food production;
b. respondents' willingness to consume hypothetical GM foods instead of the conventional daily food, in this case exemplified by cookies and eggs to represent both plant-derived and animal-derived products;
c. public views about private and public institutions associated with biotechnology research and product development and the attitude towards organic agriculture;
d. the respondents' socio-economic and demographic characteristics.

The survey was completed in April-July, 2004. The targeted sample frame for the survey was the Italian adult aged 18 years or older. A random stratified proportional probability sample drawn from about 20 million telephone households in Italy was extracted from an internet-based telephone directory. The objective was to attain a sample size of 400 to achieve a sampling error rate of ±3.5 percent with a significance level α=0.05, under the hypothesis of an equal proportion of willing/non-willing consumers. Quotas were set according to geographical areas, and town size. 1725 working telephone numbers were called a maximum of three times each, at different times of the week and at different daytimes, but 599 listed numbers were never reached.
While 433 respondents completed the survey, another 673 individuals refused to participate and 20 terminated in the middle of the interview. This gave us a response/cooperation rate of about 38 percent.
The average length of the interview was about 7.5 minutes. All the interviews have been completed in the time range 11:00-20:00, in order to reduce the risk of an unequal selection of categories.
A cheap talk script was used to reduce the risk of hypothetical bias, an issue frequent in using telephone survey methodology. Since we were interested in the existing attitude towards GM food, we just provided a general statement

defining the issue, without an in-depth explanation that could have modified the attitude. The four key questions of interest in the questionnaire are:

- their willingness to buy breakfast cookies that are derived from genetically modified wheat, providing the benefits related to a reduced usage of pesticides (GMCOOKIE);
- their willingness to buy nutritionally enhanced breakfast cookies derived from wheat genetically modified to provide added vitamin E/antioxidant, believed to slow down the aging effect (GMCOOVIT);
- their willingness to buy eggs from hens fed with transgenic corn, providing the benefits related to a reduced usage of pesticides (GMEGGS);
- finally, their willingness to buy eggs from hens genetically modified to produce low-cholesterol eggs, more suitable for preventing heart diseases (GMEGGCHO).

Each respondent indicated his/her willingness to buy the products if it tasted and cost the same as regular product (i.e., non-GM). The willingness to buy questions were asked using a binary Yes/No choice. The explanatory variables included in the empirical models are the following, defined in Table 1:

(a) demographic variables: age (3 levels), gender, education (4 levels), knowledge of science (evaluated by the exact responses to 5 questions), number of adults and number of children in the household, if the respondent is normally in charge of food purchases, and place of residence (small, medium, large town and area within the country);
(b) economic variables: household's income (4 levels), and number of income takers within the household;
(c) value attributes: attitude towards organic foods, views about scientists, and trust and confidence in regulators.

Variables were chosen on the basis of existing literature on consumer choice and studies on public attitudes towards biotechnology (Hallman et al., 2002; House et al., 2001; Hossain et al., 2004; Onyango and Nayga, 2004).
The following empirical equation is specified to model a consumer's likelihood of choosing the GM food:

$$Z = \beta_0 + \beta_1\,\text{FEMALE} + \beta_2\,\text{BUYER} + \beta_3\,\text{HEARD} + \beta_4\,\text{YOUNG} + \beta_5\,\text{MIDAGE} + \beta_6\,\text{EDUC1} + \beta_7\,\text{EDUC2} + \beta_8\,\text{EDUC3} + \beta_9\,\text{OPINORG} + \beta_{10}\,\text{TRUSTSCI} + \beta_{11}\,\text{TRUSTGOV} + \beta_{12}\,\text{GMQUIZ} + \beta_{13}\,\text{INCOME1} + \beta_{14}\,\text{INCOME2} + \beta_{15}\,\text{INCOME3} + \beta_{16}\,\text{ADULMEMB} + \beta_{17}\,\text{KIDSMEMB} + \beta_{18}\,\text{REGION2} + \beta_{19}\,\text{REGION3} + \beta_{20}\,\text{REGION4} + \beta_{21}\,\text{REGION5} + \beta_{22}\,\text{TOWNMEDI} + \beta_{23}\,\text{TOWNLARG}$$

Four probit models, each corresponding to one of the key questions mentioned above were estimated to analyze willingness to buy GM foods. Maximum likelihood (ML) estimation procedure was used to obtain the model parameters.

5. MODELS RESULTS

As mentioned above, four variables are of interest in our analysis: GMCOOKIE, GMCOOVIT, GMEGGS, and GMEGGCHO (as described in Table 1). The means of these dependent variables as well as the independent variables are exhibited in Table 2. The means of the dependent variables suggest that majority of the respondents did not want to buy the GM products. When the technology involves gene transfer on plants, the acceptance is slightly higher (32%-39% for cookie product as opposed to 29% for egg product), and the introduction of a nutritional benefit in the GM plant based product seems to convince more people (39%) to accept the innovation. This result does not happen in the case of eggs, representing an animal-based food. The acceptance level is at about 29% for both the two egg products. In the case of the egg product the additional nutritional benefit does not seem to increase respondents' willingness to buy. Table 3 reports the parameter estimates and the standard errors of the models.

Marginal effects are exhibited in Table 4. Two variables have a statistically significant and consistent effect across all four models: GMQUIZ and TRUSTSCI. The results suggest that knowledge of science (GMQUIZ) is positively related to willingness to buy all four products. The role of trust is also confirmed. In fact those who trust scientists are more likely to buy all four products. Specifically, those who trust scientists are about 20%, 34%, 13%, and 15% more likely to buy GMCOOKIE, GMCOOVIT, GMEGGS, and GMEGGCHO, respectively.

As for the other results, respondents from large towns are more likely to buy cookies obtained from GM flour enhanced with vitamin E (12.6%) and eggs obtained from GM hens that lay eggs with less cholesterol (11.5%) than respondents from small towns.

Females are about 16% more likely to buy GMEGGS than males. Those who are in charge of household food purchases are about 12% less likely to buy GM eggs, both regular and nutritionally enhanced, than others. Young respondents are around 15% less likely to buy GMCOOKIE and GMEGGS than those of mature age.

These results suggest that higher educated individuals tend to be less likely to buy GM food products. In fact, individuals with less than middle school education (educ1) are 30% more likely to buy GMEGGCHO than those with uni-

versity degree (educ4). Those with only a middle school education (educ2) are also more likely to buy GMCOOVIT, GMEGGS and GMEGGCHO than those with a laurea degree or higher. This result partly contrast with the statistically significant positive effects of the GMQUIZ variable.
The regional variables as a group are statistically significant in the GMEGGS and GMEGGCHO models. Specifically, individuals who live in the south (region4) are 12% to 13% more likely to buy GMEGGS and GMEGGCHO than those who live in region1, which is the longer time established industrial zone in Italy, in which the presence of high-earning professionals, together with blue-collar workers, is more widespread. In contrast, individuals who live in the islands are less likely to buy GMEGGS and GMEGGCHO than those who live in the North-West.
The number of adults and the number of children are positively related to the probability of buying GMCOOKIE. Interestingly, none of the income variables are statistically significant in the models.

6. CONCLUDING REMARKS

Proponents of biotechnology view the current consumer resistance to GM foods as due, at least in part, to the lack of tangible consumer benefits from this technology. Under this hypothesis, new and improved products with enhanced nutritional benefits will see much greater public acceptance.
Our findings do not support this view, and are relatively mixed. For example, contrary to the findings of Onyango and Nayga (2004) in the US, our results suggest that majority of Italians are not willing to buy GM food products even if they have a nutritionally enhanced benefit. However, our survey revealed that more consumers are willing to buy a nutritionally enhanced plant based GM product (GMCOOVIT) than an input trait plant based GM product (GMCOOKIE). Willingness to buy for the two egg products (GMEGGS and GMEGGCHO) is relatively the same. It is not clear why not more of our respondents did not indicate a willingness to buy the nutritionally enhanced egg product. However, previous studies have found that consumers generally disapprove of animal based genetic modification (Onyango and Nayga, 2004) and are less favorable to genetically modified products derived from animal-to-plant gene transfer technology than from plant-to-plant gene transfer.
Our results could imply that nutritional enhancement could help increase consumer acceptance of GM food products in Italy but only if it is a plant based food product and not if it does involve use of animal gene transfer technology. While it is indeed possible that the presence of enhanced nutritional benefit in the product could moderate any negative attitude towards use of animal genes

to genetically modify plants or animals, our survey results do not appear to support this hypothesis.

Our probit results generally provided two major factors affecting Italian consumers' willingness to buy GM products: knowledge of science and trust in scientists. Our findings imply that an increase in these two measures can positively affect consumer's willingness to buy both input trait and output trait based GM food products in Italy.

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Table 1. Description of the Variables Used in the Probit Models

Variables	Description
GMCOOKIE	1 if respondent would choose to buy 500g cookie obtained from GM flour with less pesticide, rather than 500g non-GM traditional cookie at the same price of 1.60 Euro; 0 otherwise
GMCOOVIT	1 if respondent would choose to buy 500g cookie obtained from GM flour enhanced with vitamin E rather than 500g non-GM traditional cookie at the same price of 1.60 Euro; 0 otherwise
GMEGGS	1 if respondent would choose to buy a package of 6 eggs obtained from hens that eat GM maize with less pesticide rather than a package of 6 non-GM traditional eggs at the same price of 1.20 Euro; 0 otherwise
GMEGGCHO	1 if respondent would choose to buy a package of 6 eggs obtained from GM hens that lay eggs with less cholesterol rather than a package of 6 eggs from non-GM traditional eggs at the same price of 1.20 Euro; 0 otherwise
Covariates	**Description**
TOWNMEDI	1 if from a medium sized town (>20.000, <=100.000 inh.); 0 otherwise
TOWNLARG	1 if from a large sized town (>100.000 inh.); 0 otherwise
GMQUIZ	number of correct responses to 5 scientific questions
FEMALE	1 if is female; 0 otherwise
BUYER	1 if is in charge for household's food purchases; 0 otherwise
YOUNG	1 if is younger than 35; 0 otherwise
MIDAGE	1 if is between 35 and 54 years old; 0 otherwise
EDUC1	1 if education up to basic school (up to 5 yrs); 0 otherwise
EDUC2	1 if education up to middle school (at least 8 yrs); 0 otherwise
EDUC3	1 if education up to high school (at least 13 yrs); 0 otherwise
EDUC4	1 if education laurea degree or higher (at least 17 yrs); 0 otherwise
REGION2	1 if live in North-east: Trentino-Alto Adige, Veneto, Emilia-Romagna, Friuli-Venezia Giulia; 0 otherwise
REGION3	1 if live in Center: Toscana, Marche, Umbria, Lazio; 0 otherwise
REGION4	1 if live in South: Abruzzi, Molise, Puglia, Campania, Basilicata, Calabria; 0 otherwise
REGION5	1 if live in Islands: Sicilia, Sardegna; 0 otherwise
OPINORG	1 if thinks organic agriculture is important; 0 otherwise
TRUSTSCI	1 if express trust in self-regulating capacity of scientists; 0 otherwise
TRUSTGOV	1 if express trust in capacity of government to set and enforce suitable rules for GM food; 0 otherwise
ADULMEMB	household's members older than 14 (number of persons)
KIDSMEMB	household's members younger than or equal 14 (number of persons)
INCOME1	1 if household's net income is lower than 1,000 EUR; 0 otherwise
INCOME2	1 if household's net income is between 1,000 and 1,999 EUR; 0 otherwise
INCOME3	1 if household's net income is between 2,000 and 2,999 EUR; 0 otherwise
HEARD	1 if was aware of the existence of GM food; 0 otherwise

Source: Survey data

Table 2. Means of the Variables Used in the Probit Models

Variable	GMCOOKIE	GMCOOVIT	GMEGGS	GMEGGCHO
Dependent variable	0.318	0.388	0.295	0.294
TOWNSMAL*	0.459	0.456	0.462	0.456
TOWNMEDI	0.304	0.303	0.306	0.305
TOWNLARG	0.237	0.240	0.231	0.239
GMQUIZ	2.842	2.836	2.861	2.832
FEMALE	0.699	0.702	0.699	0.703
BUYER	0.842	0.842	0.838	0.841
YOUNG	0.254	0.249	0.253	0.250
MIDAGE	0.482	0.484	0.482	0.481
MATAGE*	0.265	0.268	0.265	0.267
EDUC1	0.076	0.082	0.078	0.082
EDUC2	0.259	0.254	0.259	0.253
EDUC3	0.507	0.508	0.510	0.511
EDUC4*	0.158	0.156	0.153	0.154
REGION1*	0.251	0.246	0.251	0.250
REGION2	0.192	0.191	0.192	0.192
REGION3	0.197	0.197	0.195	0.192
REGION4	0.242	0.246	0.245	0.245
REGION5	0.118	0.120	0.117	0.121
OPINORG	0.890	0.891	0.891	0.890
TRUSTSCI	0.831	0.831	0.830	0.830
TRUSTGOV	0.423	0.432	0.426	0.431
HSIZE	3.425	3.418	3.423	3.409
ADULMEMB	2.839	2.844	2.841	2.832
KIDSMEMB	0.586	0.574	0.582	0.577
INCOME1	0.085	0.087	0.089	0.088
INCOME2	0.383	0.380	0.379	0.376
INCOME3	0.321	0.325	0.323	0.324
INCOME4*	0.211	0.208	0.209	0.212
HEARD	0.907	0.904	0.905	0.904
Observations count:	355	366	359	364

* Baseline profile: small town; male, older than 54, education university degree; region of Valle D'Aosta, Piemonte, Liguria, and Lombardia; income of at least 3.000 Euros/month.

Source: Survey data

Table 3. Maximum Likelihood Estimates of the Probit Models

Variable	GMCOOKIE		GMCOOVIT		GMEGGS		GMEGGCHO	
	Value	*St.err.*	Value	*St.err.*	Value	*St.err.*	Value	*St.err.*
CONSTANT	-1.933 *	*(0.600)*	-1.597 *	*(0.586)*	-1.726 *	*(0.610)*	-2.031 *	*(0.255)*
TOWNMEDI	-0.038	*(0.178)*	0.233	*(0.171)*	0.167	*(0.180)*	0.140	*(0.178)*
TOWNLARG	0.128	*(0.195)*	0.334 *	*(0.190)*	0.271	*(0.200)*	0.347 *	*(0.197)*
GMQUIZ	0.130 *	*(0.063)*	0.105 *	*(0.062)*	0.209 *	*(0.069)*	0.157 *	*(0.065)*
FEMALE	0.100	*(0.172)*	0.159	*(0.168)*	0.476 *	*(0.181)*	0.237	*(0.177)*
BUYER	-0.155	*(0.221)*	-0.192	*(0.216)*	-0.371 *	*(0.225)*	-0.363 *	*(0.220)*
YOUNG	-0.438 *	*(0.242)*	-0.197	*(0.236)*	-0.435 *	*(0.248)*	-0.140	*(0.247)*
MIDAGE	-0.334	*(0.217)*	-0.104	*(0.208)*	-0.098	*(0.217)*	0.093	*(0.216)*
EDUC1	-0.324	*(0.403)*	0.230	*(0.360)*	0.333	*(0.402)*	0.910 *	*(0.378)*
EDUC2	0.230	*(0.269)*	0.414	*(0.261)*	0.488 *	*(0.278)*	0.531 *	*(0.274)*
EDUC3	0.208	*(0.228)*	0.161	*(0.221)*	0.361	*(0.239)*	0.204	*(0.239)*
REGION2	-0.102	*(0.226)*	-0.114	*(0.222)*	-0.088	*(0.234)*	-0.290	*(0.239)*
REGION3	-0.316	*(0.230)*	-0.335	*(0.224)*	-0.189	*(0.232)*	-0.311	*(0.234)*
REGION4	0.211	*(0.226)*	0.304	*(0.222)*	0.405 *	*(0.233)*	0.366	*(0.229)*
REGION5	-0.361	*(0.280)*	0.186	*(0.258)*	-0.461	*(0.296)*	-0.252	*(0.273)*
OPINORG	0.232	*(0.249)*	-0.010	*(0.231)*	0.236	*(0.254)*	0.412	*(0.263)*
TRUSTSCI	0.582 *	*(0.217)*	0.909 *	*(0.220)*	0.386 *	*(0.219)*	0.452 *	*(0.219)*
TRUSTGOV	-0.069	*(0.150)*	-0.099	*(0.145)*	0.204	*(0.152)*	0.134	*(0.151)*
ADULMEMB	0.145 *	*(0.079)*	0.081	*(0.077)*	0.030	*(0.081)*	0.034	*(0.080)*
KIDSMEMB	0.171 *	*(0.102)*	0.034	*(0.101)*	-0.056	*(0.108)*	0.003	*(0.105)*
INCOME1	0.190	*(0.339)*	0.056	*(0.323)*	-0.414	*(0.358)*	-0.150	*(0.338)*
INCOME2	0.092	*(0.210)*	0.063	*(0.210)*	-0.098	*(0.216)*	-0.067	*(0.217)*
INCOME3	-0.220	*(0.206)*	-0.239	*(0.202)*	-0.317	*(0.212)*	-0.251	*(0.211)*
HEARD	0.154	*(0.265)*	-0.166	*(0.247)*	-0.309	*(0.260)*	-0.059	*(0.255)*
CRAGG-UHLER R-SQUARE	0.134		0.176		0.183		0.169	

* Statistically significant at the 0.05 level.

Baseline profile: small town; male, older than 54, education university degree; region of Valle D'Aosta, Piemonte, Liguria, and Lombardia; income of at least 3.000 Euros/month.

Source: Survey data

Table 4. Marginal Effects of the Probit Models

Variable	GMCOOKIE	GMCOOVIT	GMEGGS	GMEGGCHO
TOWNMEDI	-0.013	0.088	0.055	0.046
TOWNLARG	0.045	0.126	0.090	0.115
GMQUIZ	0.045	0.040	0.069	0.052
FEMALE	0.035	0.060	0.158	0.079
BUYER	-0.054	-0.073	-0.123	-0.120
YOUNG	-0.153	-0.075	-0.144	-0.046
MIDAGE	-0.117	-0.039	-0.032	0.031
EDUC1	-0.113	0.087	0.110	0.302
EDUC2	0.080	0.157	0.162	0.176
EDUC3	0.072	0.061	0.120	0.068
REGION2	-0.035	-0.043	-0.029	-0.096
REGION3	-0.110	-0.126	-0.063	-0.103
REGION4	0.074	0.115	0.134	0.121
REGION5	-0.126	0.071	-0.153	-0.084
OPINORG	0.081	-0.004	0.078	0.137
TRUSTSCI	0.203	0.344	0.128	0.150
TRUSTGOV	-0.024	-0.037	0.067	0.044
ADULMEMB	0.051	0.030	0.010	0.011
KIDSMEMB	0.060	0.013	-0.019	0.001
INCOME1	0.066	0.021	-0.137	-0.050
INCOME2	0.032	0.024	-0.033	-0.022
INCOME3	-0.077	-0.090	-0.105	-0.083
HEARD	0.054	-0.063	-0.102	-0.019
Wald Tests P-values				
Town Size	0.701	0.170	0.366	0.212
Education	0.318	0.401	0.356	0.046
Region	0.104	0.066	0.014	0.014
Income	0.339	0.359	0.344	0.633
Age	0.174	0.703	0.148	0.499

* Baseline profile: small town; male, older than 54, education university degree; region of Valle D'Aosta, Piemonte, Liguria, and Lombardia; income of at least 3.000 Euros/month.

Source: Survey data