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Consumer Acceptance and Willingness to Pay for Genetically Modified Vegetable Oil and Salmon: A Multiple-Country Assessment

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The objective of this paper is to estimate the consumer willingness to pay (WTP) for selected genetically modified (GM) foods in Japan, Norway, Taiwan, and the United States. Our survey results reveal that there are notable differences in the attitude and perception of GM foods across these countries. Consumers are willing to pay substantial premiums for non-GM foods (vegetable oil and salmon) in order to avoid GM counterparts. These premiums may exceed 50% of the discounted prices of GM foods.

Key words: consumer acceptance, genetically modified foods, stated preference, survey, willingness to pay, WTP.

Introduction

Since the first approval for commercialization of genetically modified (GM) crops in 1996, the adoptions of GM soybeans in Argentina and the United States (US), Bt and herbicide-tolerant corns in the US, and Bt and herbicide-tolerant cottons in China, South Africa, and the US have been phenomenal (Fernandez-Cornejo & McBride, 2002; Darr & Chern, 2002). Table 1 shows that the adoption rate of GM soybeans in the US increased from a mere 7.4% in 1996 to 75% in 2002. The adoption rate of total GM corn reached the peak of 38% in 1999, then declined to 26% in 2001 and subsequently recovered to 34% in 2002. Genetically modified cotton also exhibits a trend similar to GM soybeans. US farmers in general have embraced genetically modified organisms (GMOs), but at the same time are frustrated with the uncertainty of marketing GM crops. Uncertainties of consumer acceptance have increased in many parts of the world, especially in Europe and Japan. In particular, the imposition of a mandatory labeling of GM foods in many agricultural importing countries has intensified the debates on the future of biotechnology application in agricultural production. Consumer acceptance has become a key for success in marketing GM foods in the global agricultural market.

Various factors are said to cause consumer concerns. Consumer organizations and other nongovernmental organizations (NGOs) have expressed concerns regarding antibiotic-resistant marker genes, potential allergic reactions, ethical and religious concerns, and the lack of consumer choice due to inadequate labeling (Franks, 1999). Such organizations have pushed for increasing regulation and GMO labeling in many parts of the world. Proposals for such regulation, in turn, make it more urgent and important to understand the extent of consumer acceptance and the factors affecting consumer attitudes and perceptions toward GM foods.

In the US, the labeling of GM foods is voluntary; no foods have been labeled as GM foods in the market, even though many food products do indeed contain GM ingredients. In other countries, such as those in the European Union (EU) and Japan, the labeling of GM foods for many products is mandatory. Under this regulatory environment, most if not all food manufacturers and retailers would not market any GM foods for fear of consumer resistance. Because GM foods labeled as such cannot be found in the marketplace, the extent of consumer acceptance of GM foods cannot be easily assessed. Thus, we need to use other means such as consumer surveys.

In order to understand the factors affecting the consumer acceptance of GM foods and to estimate the willingness to pay (WTP) for non-GM products, we have been conducting a multicountry survey project. Specifically, since 2000, we have organized a joint research project to conduct a multicountry analysis on consumer attitudes toward GM foods and on eliciting the consumer's WTP for GM vs. non-GM foods in Japan, Norway, Taiwan, and the United States. During 2000 and 2001, we conducted a uniform student survey in the four countries. Most recently, in March and April 2002, we completed a pilot national telephone survey in Norway and the US, using a revised but uniform questionnaire.

Other consumer surveys have been conducted in the US (Hoban, 1998, 1999; Hallman & Metcalfe, 2001; Moon & Balasubramanian, 2001; Mendenhall & Evenson, 2002), Italy (Boccaletti & Moro, 2000), the United Kingdom (Burton, Rigby, Young, & James, 2001), Germany (Spetsidis & Schamel, 2001), Belgium (Verdurme, Gellynck, & Viaene, 2001), and Japan (Macer &

Table 1. Percentages (%) of planted area of GM crops in the United States, 1996-2002.

Crops	1996	1997	1998	1999	2000	2001	2002
Herbicide-tolerant soybeans	7	17	44	57	54	68	75
Total GM corn	4	12	38	38	25	26	34
Bt corn	1	8	19	30	18	18	22
Herbicide-tolerant corn	3	4	18	8	6	7	9
Total GM cotton	—	26	43	65	61	69	71
Bt cotton	15	15	17	27	15	13	13
Herbicide-tolerant cotton	—	11	26	38	26	32	36

Note. From Agricultural Statistics Board, National Agricultural Statistical Service, United States Department of Agriculture. Available on the World Wide Web: http://usda.mannlib.cornell.edu//reports/nassr/field/pcp-bb.

Ng, 2000). Most of these studies are descriptive in nature, and few studies deal with the estimation of the WTP for GM foods. One exception is Moon and Balasubramanian (2001) who estimated the WTP for breakfast cereals made of non-GM ingredients in the US and the UK. Boccaletti and Moro (2000) also quantified the WTP for generic GM products with different hypothetical attributes in Italy, and Burton et al. (2001) calculated the WTP for generic GM food in the UK. Our project attempts to extend these previous works to design a survey instrument for eliciting the WTP for different GM foods used in the four countries participating in this project.

The objective of this paper is to present our survey results for comparing the consumer acceptance and the willingness to pay for GM foods in Norway, Japan, Taiwan, and the US. The paper covers the student surveys taken in all four countries and the recent telephone surveys completed in Norway and the US. The estimates of the WTP for GM vegetable oil and salmon are presented.

Comparison of Student Survey Results

A comprehensive survey questionnaire was developed in late 2000. The questionnaire contained five sections. First, respondents' awareness and knowledge of GM food were investigated. Next, we explored respondents' attitudes and perceptions of GM food, such as willingness to consume, environmental concern, and religious and ethical concerns associated with GM food products. Then we asked the respondents about their attitudes toward GM food labeling, as well as type of labeling they would support. Another section was on stated choice experiment, where respondents were asked to make choices between GM food products and their traditional counterparts, given various price scenarios. Based on the market prices of the products, we designed three price scenarios for all GM and non-GM products. The food products included vegetable oil, salmon, and tofu. The last section of the survey covered demographic information. The results for selected questions related to knowledge, attitudes toward GM foods and labeling, perception, and willingness to consume GM foods with alternative GM attributes are reported below. The responses to these questions provide a basis for constructing the independent variables used in the econometric model for estimating the WTP for premiums of a specific non-GM food.

The questionnaire, initially written in English, was translated into Chinese (Mandarin), Japanese, and Norwegian. The surveys were conducted with college students in the four countries. The US student survey was conducted at The Ohio State University, while the survey in Norway was conducted at the Agricultural University of Norway. The same questionnaire was also used in the surveys conducted at the University of Tsukuba (Japan) and National Taiwan University. All of these student surveys were taken during December 2000 to March 2001. Attempts were made to use the upper-level classes for juniors and seniors taken by students with different majors in various colleges.

Table 2 shows the sample sizes and the survey results for selected questions. Results show that even though US students had a higher percentage of being uninformed about GMOs or GM foods, they outperformed Japanese students in the two true-false questions related to specific knowledge on GMOs. It is surprising that 94% and 69% of Japanese student respondents answered "don't know" to the two true-false questions. It is possible that Japanese students were more conservative and perhaps misrepresented their familiarity with the subject matter asked in the preceding question. Perception of the health risk of GM foods varied from country to country. Although only 6% of US students ranked GM foods as "very risky," the percentages were higher in Norway (11%), Japan (10%), and Taiwan (17%). The acceptance level of GM foods varied greatly between Norway and the United States. Despite the low awareness of biotechnology, more than 80% of US students were at least "somewhat willing" to consume GM foods. By comparison, 56% of Norwegian students were not very willing or would avoid consuming GM foods, despite their high awareness of GM technology. The difference in the attitude on the willingness to consume

Table 2. Knowledge and attitudes toward GM foods, percentage distribution for each question from student surveys, 2001.

Question/Sample	Alternative	Norway	US	Japan	Taiwan
Sample Size		126	175	103	213
Before this survey, how well were you informed about GM foods or organisms?	Very well	1	8	20	2
	Somewhat	88	68	77	94
	Not informed	11	24	3	4
Non-GM soybeans do not contain genes while GM soybeans do.	True	6	3	0	5
	False	85	63	6	85
	Don't know	9	34	94	10
By eating GM foods, a person's genes could be altered.	True	6	5	16	13
	False	70	78	15	62
	Don't know	24	17	69	25
How safe or risky are GM foods to human health?	Very risky	11	6	10	17
	Neither	44	55	50	49
	Very safe	45	32	26	18
	Don't know	0	7	14	16
How willing are you to consume foods with GM ingredients?	Very willing	10	38	4	19
	Somewhat	34	44	13	60
	Not very	38	14	63	20
	Would avoid	18	4	20	1
How willing are you to consume GM foods if they reduce the amount of pesticides applied to crops?	Very willing	23	54	10	64
	Somewhat	41	37	33	27
	Not very	26	6	43	9
	Would avoid	10	3	14	0
How important is it to label GM foods?	Very	84	49	60	79
	Somewhat	13	29	21	19
	Not very	3	22	19	2
What type of labeling would you support?	Mandatory for GM and non-GM	48	39	30	67
	Mandatory for GM	48	37	52	27
	Voluntary	3	20	17	4
	Don't support any	1	4	1	2

GM foods was very dramatic between Japan and Taiwan. Although there were only 17% of Japanese students who were "somewhat" or "very willing" to consume GM foods, the figure was 79% for Taiwanese students. These results suggest that American and Taiwanese students were more willing to consume GM foods than Norwegian and Japanese students.

It is important to note that the willingness to consume GM foods increased notably if the GM foods contain explicitly stated benefits to the consumer, such as reduction of the amount of pesticides applied to crops. For example, the percentage of Taiwanese respondents "very willing" to consume GM foods increased from 19% to 64%, if these foods reduced pesticide uses. In all four countries, student respondents viewed GM food labeling as important and, with a large margin, would support a mandatory labeling system.

Willingness to Pay for Non-GM Foods from Student Surveys

The stated preference (SP) approach is frequently used in marketing and is somewhat similar to contingent valuation (CV) methods that have been used (for example) to evaluate consumer willingness to pay for food safety (Hammitt, 1986). The SP approach views a product as one of many possible products that differ in the values or positions they occupy on key characteristics. In the SP approach, characteristics are used to develop descriptions to which consumers react (Louviere, Hensher, & Swait, 2000).

In our student surveys, there was a section in which a stated choice experiment was presented. The characteristics involved were GM content and price. In designing the price matrix, we assumed that GM food products were cheaper than their non-GM counterparts. Therefore, we specified the prices of GM food products as discounts to the prices of non-GM food products. The discounts ranged from 10% to 25%. There were three price scenarios. In two versions, the base prices were changed slightly to provide more variation.

Based on the data from the SP portion of the student survey questionnaire, we can estimate the willingness to pay a premium for non-GM foods. The methodology is based on a random utility model described in Chen and Chern (2002). We first estimate a logit model in which the decision on buying a GM food is a function of attitude, perception, knowledge, demographic variables, and the price difference between GM and non-GM product. From the estimated logit model, we can calculate the expected WTP for a non-GM product respondent by respondent. The mean WTP can be computed by taking the mean from the entire sample.

Almost all respondents answered the stated choice questions for vegetable oil. However, there are many missing data for tofu and salmon, perhaps due to the unfamiliarity of the products. Consequently, the results of the logit model for these products are not very satisfactory. Table 3 shows only the results for vegetable oil. These results show that students in all four countries were willing to pay a premium for non-GM vegetable oil, ranging from 17-21% in Taiwan to 55-69% in Norway over the discounted prices of GM oil. Note that there is a range of WTPs in each country. This is due to the design of offered prices in the survey. Specifically, we varied the base price (i.e., for non-GM foods). When the percentage of premium is computed using the estimated mean of WTP as a percentage of the base price, the highest and lowest base prices yield the ranges presented in Table 3. It is somewhat surprising that the US students were willing to pay such a high premium (56-62%) in order to avoid buying GM vegetable oil, while qualitatively their willingness to buy GM foods is very high. These premium estimates are much higher than the 5-8% estimated by Chen and Chern (2002), using data from a mail survey conducted in Columbus, Ohio. We recognize that vegetable oil is an inexpensive food in the US, and the WTP elicited from the CV survey may be inflated because of the hypothetical nature of the question (List & Shogren, 1998). We also note from the regression results that the US students are not as sensitive to price variations as those in other countries, which contribute to their high WTP estimates. These estimates definitely need further validation.

Table 3. Estimated WTP to avoid GM vegetable oil, student surveys.

Item	Norway	US	Japan	Taiwan
Reference size	Liter	32 fl oz	Standard	600g
Mean WTP in local currency	NOK13.7	$1.13	88 Yen	NT$ 15
Mean WTP in US$	1.51	1.13	0.88	0.45
Percentage of premium (%)	55~69	50~62	33~40	17~21

Comparison of Public Surveys between Norway and the United States

Because the student samples cannot be viewed as representative of consumers in each of these countries, our next research task was to conduct public surveys of consumers. Unfortunately, the public surveys in Japan and Taiwan are still in the planning stage. Two pilot telephone surveys were conducted during March and April 2002 in Norway and the US.

The US survey consisted of 256 respondents aged 18 and over. The survey was conducted by telephone using a random digit dialing method. Based on our experience from the student surveys, we revised the survey instrument for this public survey. One important change in the revised questionnaire was that we did not assume a priori that GM foods are more inexpensive than their conventional counterparts. In addition, we designed the WTP questions with sequential closed-ended questions (Carson & Mitchell, 1995). The US survey was conducted within a three-week period in April 2002, covering a mix of daytimes and evenings. The overall response rate was 28.7%. The average age of the US survey respondents was 47; 77% were females. Note that in the US survey, we required each respondent to be a food shopper in his or her household. Vegetarians comprised 4.3% of the respondents.

The questionnaire developed for the US survey was translated into Norwegian. The Norwegian survey was conducted and reported by Skogmo (2002). There were 200 respondents in this pilot survey. The overall response rate was 20%. The sample consisted of 46% male and 54% female respondents. The average age of the respondents was 49 years, or about four years above the national average, for the age group 20 to 80 years. The high mean age was partly a result of 40% of the interviews being conducted during daytime, when many retired people answered the phone. Furthermore, four out of five calls were rejected, pointing to a potential

Table 4. Consumer attitudes toward GM foods, percentage (%) distribution for each question, pilot telephone surveys, 2002.

	Alternatives					
Country	**Extremely (1)**	**Somewhat (2)**	**Neither (3)**	**Somewhat (4)**	**Extremely (5)**	**Don't know**
How risky would you say GM foods are in terms of risk to human health? (1, 2 = risky; 4, 5 = safe)						
Norway	33.5	26.0	8.0	13.0	10.5	9.0
US	9.4	39.5	16.0	15.2	5.5	14.5
How willing are you to consume foods produced with GM ingredients? (1, 2 = willing; 4, 5 = unwilling)						
Norway	13.0	17.5	4.0	18.0	45.5	2.0
US	4.7	38.3	13.7	23.8	16.4	3.1
How willing would you be to consume GM foods if they reduced the amount of pesticides applied to crops? (1, 2 = willing; 4, 5 = unwilling)						
Norway	17.0	21.5	9.5	11.5	35.5	5.0
US	13.7	54.7	9.4	11.3	9.0	2.0
How willing would you be to purchase GM foods if they were more nutritious than similar foods that are not GM? (1, 2 = willing; 4, 5 = unwilling)						
Norway	17.5	19.5	7.5	10.0	39.0	6.5
US	18.0	53.9	5.1	9.4	10.9	2.7
How important is the price factor when you decide whether or not to buy GM foods? (1, 2 = important; 4, 5 = unimportant)						
Norway	16.0	20.0	6.0	7.0	50.5	0.5
US	29.7	37.5	7.0	12.1	12.5	1.2
How willing would you be to purchase GM foods if it posed a risk of causing allergic reactions for some people? (1, 2 = willing; 4, 5 = unwilling)						
Norway	1.5	8.5	2.0	4.0	83.5	0.5
US	3.5	21.5	5.9	26.2	41.4	1.6
How important are ethical or religious concerns when you decide whether or not to consume GM foods? (1, 2 = important; 4, 5 = unimportant)						
Norway	21.5	8.0	3.5	2.5	62.5	2.0
US	12.5	23.8	15.2	18.0	28.9	1.6
How important is it to you that food products are specifically labeled as GM or non-GM? (1, 2 = important; 4, 5 = unimportant)						
Norway	94.0	4.5	0.5	0.0	1.0	0.0
US	58.6	28.5	4.3	5.9	1.6	1.2

self-selection problem with less participation among younger people with more valuable time.

Comparison of Survey Results

The results from the pilot surveys are summarized in Table 4. Only selected questions are covered here due to space limitation. Clearly, the Norwegian consumers perceived GM foods as being more risky to human health than American consumers. Specifically, 33.5% of Norwegian respondents thought that GM foods are "extremely risky," whereas the corresponding figure for the American respondents is only 9.4%. Furthermore, 45.5% of Norwegian respondents were "extremely unwilling" to consume GM foods, whereas only 16.4% of American respondents indicated so. The survey results also show that in both countries, tangible benefits to the consumer would increase acceptance of GM foods. When respondents were asked about their willingness to purchase GM foods if they were more nutritious, the acceptance rate (either "extremely willing" or "somewhat willing") increased from 30.5% to 37% for the Norwegian consumers, while it increased from 43% to 71.9% for the American consumers. These results imply that the success of GM technology critically depends on whether the consumer also receives tangible benefits from GM foods.

On the other hand, if GM foods cause any allergic reactions—even only for some people—the consumer's willingness to purchase them drops significantly. The percentage of those unwilling to purchase these GM foods (under the categories of "somewhat" and "extremely" unwilling) increased to 87.5% in Norway and 67.6% in the US. Interestingly, ethical and religious

concerns were more important in the US than in Norway. Finally, a majority of respondents in both countries expressed that it is important to label GM and/or non-GM foods; 94% of Norwegian respondents and 58.6% of American respondents considered GMO labeling to be "extremely important." In addition, 28.5% of American respondents indicated that GMO labeling was "somewhat important." These results are in line with the results in the Eurobarometer (European Commission, 2001), where 94.6% of the 16,029 respondents in the 15 member states of the EU wanted to have the right to choose between GM and non-GM foods. Support for labeling was reduced when the respondents were reminded that labeling might increase food prices. The survey results (not presented in Table 4) show that 55% of Norwegians supported labeling even if prices were increased by 5% or more. The insensitivity to price may be partly explained by the hypothetical nature of the question.

The survey results indicate that in general the American consumers were more favorable to GM foods than the Norwegian consumers were. There were strong supports for GM food labeling in both countries, suggesting similar preferences regarding the consumer's right to choose.

Estimation of WTP

Even though we conducted the choice experiments for vegetable oil, salmon, and corn flake cereal, we report only the estimated WTP for salmon. Salmon is an interesting case, because salmon can be fed by GM soybean meal (GM-fed salmon); moreover, GM salmon is developed by the Canadian company Genesis. GM salmon has been widely reported in the news media, but it has not yet been approved for human consumption. Nevertheless, there is a considerable interest in assessing consumers' acceptance and the WTP for GM salmon in the aquaculture sector.

In the survey, we had three alternatives of salmon. The choice experiment consisted of two binary choices for salmon. In step one, we asked the respondents if they would choose (a) non-GM or GM-fed salmon and (b) non-GM or GM salmon given identical prices for each pair of alternative salmons. The base prices we used reflected prices found for the non-GM products in stores. More than 80% of Norwegians chose the non-GM salmon for each of the two choices. For the American respondents, 59.2% chose non-GM salmon (over GM-fed), and 68.9% chose non-GM salmon (over GM salmon). For none of the choices did more than 10% of the respondents prefer a GM product, but in the US close to a quarter of the respondents were indifferent between the GM and non-GM alternatives. In step two, each respondent was given the same choices as in step one but offered price reductions for the commodity he did not choose. The price reductions were in the interval 5-50% for both GM-fed and GM salmon in the US survey, and 5-50% for GM-fed salmon and 10-60% for GM salmon in the Norwegian survey. Respondents that were indifferent between the two alternatives in step one were randomly offered reduced price for one of the alternatives.

Table 5. Estimated WTP to avoid GM alternatives of salmon, pilot telephone surveys.

		Alternative[a]	
Country	**Item**	**GM-fed salmon**	**GM salmon**
US	Mean WTP, US$	2.45	3.15
	Percentage of premium (%)	41	53
Norway	Mean WTP, NOK	43.42	53.96
	Mean WTP, US$[b]	5.43	6.75
	Percentage of premium (%)	54	67

[a]The base price for salmon is US$ 6 per pound in the U.S. and NOK 80 per kilo in Norway.
[b]The exchange rate is set to NOK 8.00 per US$.

For computing the WTP, we extended the logit model used for the student surveys and estimated a multinomial logit model for the case for salmon with three alternative products. The estimated multinomial logit model was then used to compute the WTP for non-GM salmon as compared with both the GM-fed and GM salmon. The methodology of estimating the multinomial logit model and the specification of WTP based on a random utility model are discussed in detail by Chern and Rickertsen (2002). We present only the computed WTP for non-GM salmon here.

Table 5 presents the mean values of the WTP for a premium of non-GM salmon in Norway and the US. The results show that consumers in both countries were willing to pay more to avoid GM salmon than to avoid GM-fed salmon. American consumers were willing to pay a very substantial premium for non-GM salmon over GM-fed salmon (41%) and over GM salmon (53%). Norwegian consumers were willing to pay even higher premiums for non-GM salmon—54% over the price of GM-fed salmon and 67% over the price of GM salmon. Again, the estimated premiums for the US are higher than the estimate of 15-28% previously obtained by Chen and Chern (2002). Because the estimates repor-

ted here are based on pilot surveys, they need to be validated with a larger sample size. This will be done when we conduct a much larger scale of national surveys in 2003.

Concluding Remarks

There seems no doubt that the EU is taking the lead to push for more stringent GM food labeling regulations for its member countries. The latest development is the approval by the European Parliament of the European Commission's two new proposals for regulating GMO labeling. Under the new proposals, the previously exempted GM foods such as vegetable oils and GM feed will be subject to the new labeling requirement. It will be interesting to watch whether such extensions are followed by other countries such as Japan or Taiwan.

Mandatory labeling of GM foods has raised the importance of knowing the consumer's willingness to pay for GM versus non-GM foods in the marketplace. Because there are few, if any, GM foods so labeled and sold in the market, the WTP cannot be measured simply by prevailing market prices. Thus, we have been conducting consumer surveys in selected countries to elicit the WTP using stated choice experiments. Under this methodology, the WTP for a premium of a non-GM food is estimated using price, attitude and risk perception, and demographic characteristics as independent variables. We present two sets of surveys in this paper—student surveys in Norway, Japan, Taiwan, and the US, and two pilot national telephone surveys in Norway and the US.

Our student surveys were not the first to use students as subjects for studying consumer behavior. However, we recognize that college students are not representative of all consumers. Nevertheless, the student surveys offer useful data for a cross-country comparison. These survey results reveal that American and Taiwanese students were more favorable to GM foods than Norwegian and Japanese students. Furthermore, the majority of students in all four countries supported a mandatory labeling of GM foods. The estimated percentages of the WTP for a premium of non-GM vegetable oil are 55-69% for Norwegian students, 50-62% for American students, 33-40% for Japanese students, and 17-21% for Taiwanese students. These results imply substantial premiums that consumers in all of these countries were willing to pay in order to avoid GM foods. This finding is useful for the producers and manufacturers of GM foods for assessing their potential markets.

The pilot telephone surveys conducted in Norway and the US not only reinforce the findings obtained from the student surveys, but also provide more consistent data for a cross-country comparison. The surveys show that the Norwegian consumers were more concerned about GM foods than the American consumers. However, consumers in both countries showed strong support for mandatory labeling of GM foods and, in the case of salmon, were willing to pay for substantial premiums to avoid both GM-fed and GM salmon. However, the amounts of WTP for non-GM salmon were considerably higher in Norway than in the US.

Our results also have important implications for marketing GM and non-GM foods. The high WTP for non-GM vegetable oil and salmon could encourage food manufacturers to label their non-GM foods in order to capture the high market premiums as estimated. With only a few exceptions, this is not happening yet. Whether or not we will see more labeled non-GM foods in the US market would depend upon the costs of labeling and acquiring the identity preserved non-GM ingredients (such as corn or soybeans) as well as the food manufacturers' belief on WTP estimates.

As debates on GM foods and GMO labeling regulation continue, we need to monitor closely the changing patterns of the consumer acceptance of GM foods. We will further explore the WTP for GM versus non-GM foods among different demographic groups and also between groups of consumers with different levels of knowledge on GMOs. The relatively high WTP estimates obtained in this study need to be taken cautiously because of the small sample sizes. In addition, the stated choice experiments are hypothetical in nature, and thus tend to overestimate the WTP as discussed in (for example) List and Shogren (1998). These estimates need to be validated with a larger sample and also by experimental auctions involving real money and goods. Despite these shortcomings, the cross-cultural comparison between Norway and the United States remains valid.

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