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## NON-TRADING BEHAVIOUR IN CHOICE EXPERIMENTS

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# Non-Trading Behaviour in Choice Experiments

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**Abstract:** This paper addresses a methodological problem of choice experiments, namely the problem that respondents sometimes avoid the intellectual effort of thoroughly considering the trade-offs between different alternatives that are the essence of every choice experiment, and tick instead the next best alternative without the necessary deliberation. This kind of behaviour which is called "non-trading" in the respective literature calls into question the validity of choice experiments. In this paper, which is based on an online choice experiment concerned with consumer's tastes for table grapes with 1,000 participants, we suggest possibilities to identify potential non-traders not only by their answering behaviour but also by some general characteristics we found to be typical of this kind of respondent.

**Keywords:** Non-Trading Behaviour, Discrete Choice Experiment, Table Grapes

## 1. Introduction

In this study we try to identify and characterize respondents who do not take the pain of carefully considering and comparing each alternative offered in a choice experiment, but instead always choose the same alternative across different choice sets. As possible explanations of this kind of "non-trading" behaviour, as they call it, Hess et al. (2010, p. 406) suggest either an extreme preference for one single attribute so that always the alternative is chosen in which this attribute scores especially high or strategic behaviour to influence the outcome of the study towards a certain direction. Another possibility is that a respondent is too tired, too bored or too disinterested in the topic of the choice experiment to engage in considering seriously the different choice alternatives suggested. In our study we find that non-traders are more probable than the average respondent to be male, younger, lower educated and to show a protest attitude towards such surveys in general.

We study these problems using a choice experiment on the assessment of different sorts of table grapes. Besides the methodological goal of our study, i.e. the analysis of non-trading behaviour, we are also interested in the attributes of table grapes that are decisive for the purchasing decision of consumers and for their willingness to pay (WTP) for different sorts of table grapes.

The remainder of this paper is organized as follows: In section 2, we give a short description of our survey and of the general features of our choice experiment. In Section 3 we present our results and discuss their importance for future choice experiments facing the problem of non-trading behaviour of respondents. Section 4 contains our concluding remarks.

## **2. Material and Methods**

For our study, we set up an online survey with a questionnaire asking questions with respect to respondents' socio-demographic characteristics, details of their preferences regarding various properties of table grapes, consumption habits, general attitudes towards environmental preservation, environmentally friendly behaviour, lifestyle, fear of future threats, satisfaction with several aspects of their lives etc. Further, a choice experiment\* was set up in order to assess respondents' WTP for several characteristics of table grapes. The survey was programmed using the UniPark Survey Software and operated as a self-administered internet survey. To ensure representativeness of the sample for the adult German resident population with respect to gender, age, education and household income, we contracted an online panel provider, who recruited the participants for our survey.

All in all, 2418 participants started the survey. Of these, 1084 were screened out after the first four questions due to quota restrictions. The online panel provider then further reduced the sample by 334 participants. Thus, a data set with 1000 participants who completed the survey and who are representative of the adult German population with respect to the criteria mentioned above was created.

One half of the survey participants (50.9%) were female and 49.1% were male. The distribution of age, education and household income was as presented in table 1. This is representative of the German resident population according to data from the German Federal Statistical Office.

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\* For details on the economics and econometric theory of choice experiments, see e.g. Bateman et al. (2002), Train (2007) or Hoyos (2010).

| Age                                 | Share of respondents | Highest educational degree             | Share of respondents | Household Income                                  | Share of Respondents |
|-------------------------------------|----------------------|--|----------------------|---|----------------------|
| 18-29                               | 16.8%                | Tertiary Education                     | 14.6%                | 1299 € or less                                    | 19.0%                |
| 30-39                               | 14.2 %               | High School                            | 14.0%                | 1300 € to 2599 €                                  | 31.1%                |
| 40-49                               | 19.0 %               | 10 years of schooling                  | 30.2%                | 2600 € to 3599 €                                  | 18.6%                |
| 50-59                               | 17.9%                | 8 or 9 years of schooling              | 37.2%                | 3600 € to 4999 €                                  | 16.1%                |
| 60 and older                        | 32.1%                | Dropped out of school                  | 4.00%                | 5000 € and more                                   | 15.2%                |
| - Age distribution of respondents - |                      | - Educational degrees of respondents - |                      | - Distribution of respondents' household income - |                      |

**- Table 1: Socio-demographic characteristics of respondents -**

All respondents were asked a number of questions regarding their occupational status, their household size and their general fruit consumption at the beginning of the questionnaire. Afterwards, those respondents who answered that they never eat table grapes were screened out (7.1%) because we expected that they could hardly give substantial answers regarding the type of grapes they prefer or would choose in a choice experiment. Of the remaining 92.9% of the respondents that buy table grapes at least occasionally, 42.09% stated that they buy table grapes once a month or less often, while 57.91% stated that they eat table grapes more often than once a month.

Scarpa et al. (2005) also conduct a choice experiment on table grapes when looking for a “patriotic preference” (p. 334) of consumers in Italy. For grapes, they include as attributes, besides the price the packaging format, whether the product is from a farm employing an integrated pest management scheme or organically produced, if it comes with some sort of quality certification, whether the grape is red or white, whether it is over-ripe, scarcely ripe or normally ripe etc. Moreover, Scarpa et al. (ibid.) included the grape size and the presence or absence of seeds into their choice task but excluded these from their final model

specifications as they turned out to be insignificant. Especially the last result is in stark contrast to the experience of winemakers.

The already mentioned choice experiment in our study represented the core piece of the questionnaire. The grape attributes of the choice experiment were selected after discussions with consumers, oenologists and other experts. We decided then to characterize the different versions of table grapes in our choice cards by the attributes "thickness of skin", "grape size", "number of seeds", "level of resveratrol", "number of treatments with pesticides per year" and "price per kilo". With six different attributes, we are still within the scope that should be intellectually manageable by respondents (s. e.g. Ryan and Gerard 2003, p. 57). For each of these attributes different levels were defined. For "thickness of skin" for example we offered the levels "thin" and "thick", for "size of grape" we suggested the levels "small", "medium" and "large", and for the attribute "number of seeds" we offered the alternatives "zero", "one", "two" and "four".

Resveratrol is a stilbenoid naturally contained in grapes. It is sometimes claimed that the consumption of resveratrol affects human health in a beneficial way, although the scientific evidence on this is limited so far. Participants were informed about the potentially health improving effects of an increased level of resveratrol in the grape prior to the actual choice experiment. Although there is a connection between the level of resveratrol in a table grape and the number of seeds included, this was not explicitly mentioned in order to rule out interaction effects. The suggested levels of resveratrol were "none", "low" "medium" and "high".

The attribute "number of treatments with pesticides" was included to assess the nonuse value of a reduced use of pesticides. The pesticides used in viticulture are typically not hazardous to consumers' health but they do harm to the ecosystems in areas adjacent to vineyards (Geiger et al. 2010). Participants were also informed on these negative effects of pesticide use on biodiversity. As alternative levels of pesticide application "once", "thrice" and "five times" were included as these were described as realistic by oenology experts.

The attribute "price per kilo" was included with the levels 1.99€, 2.99€, 3.99€, 4.99€, 5.99€ and 6.99€. We had conducted market research before starting the survey and had found that these price levels appropriately reflect the range of prices that are charged per kilogram of table grapes in German supermarkets and by discounters.

In the choice experiment respondents were offered different (hypothetical) sorts of grapes, where each sort was described by different combinations of the six attributes mentioned above. To achieve D-Efficiency, the choice sets were created with Ngene software using priors from the pretest. Thus, 72 different hypothetical table grape varieties were generated. Based on this stock of different grape sorts our choice cards were designed, where each choice card contained three options to choose from, i.e. two different grape sorts and one "no-buy" option for cases where the respondent did not like any of the two grape sorts offered on the respective choice card (s. Table 2). This seems to be reasonable since in a supermarket, a

consumer who does not like any of the grapes actually available will typically resort to buying no grapes at all. In order to keep the number of different choices plausible and intellectually manageable for respondents we formed six different groups of respondents, where each participant was randomly allocated to one of these groups. Participants in each group were confronted successively with six different choice cards where each card offered two different grape sorts plus the no-buy option for choice.

| Option 1                                |               | Option 2                                |               | Option 3                |
|---|---------------|---|---------------|-------------------------|
| Thickness of skin                       | <i>thin</i>   | Thickness of skin                       | <i>thick</i>  | <i>I would buy none</i> |
| Size of grape                           | <i>medium</i> | Size of grape                           | <i>small</i>  |                         |
| Number of seeds                         | <i>2</i>      | Number of seeds                         | <i>0</i>      |                         |
| Content of resveratrol                  | <i>small</i>  | Content of resveratrol                  | <i>high</i>   |                         |
| Number of pesticide treatments per year | <i>1</i>      | Number of pesticide treatments per year | <i>5</i>      |                         |
| Price per kilogram                      | <i>1.99 €</i> | Price per kilogram                      | <i>3.99 €</i> |                         |

- Table 2: Example of a choice card -

### 3. Theory

Stated preference methods, such as discrete choice experiments and contingent valuation studies, necessarily require interviewees to make a choice in a hypothetical situation. This procedure is in danger of producing biased results if respondents do not behave as they are expected to. Bateman et al. (2002) argue that choice experiments are less prone to biasing behaviour than contingent valuation studies, e.g. that the pressure to behave in line with norms of social desirability (Börger 2012) is smaller and that ethical protesting is less common. However, some problems remain.

Like in real life it may happen that interviewees behave irrationally. This may be because they do not correctly understand the task they are given (Meyerhoff et al. 2014) or because they fail to anticipate their purchasing behaviour realistically in the hypothetical situation of the

interview. As a consequence, they might state wrong choices in the choice experiment, a phenomenon that is commonly described as “hypothetical bias” (Murphy et al. 2005, Loomis 2011). Further, it may happen that interviewees do not consider the trade-offs between different attributes as thoroughly as researchers want them to in a choice experiment, but instead always choose the same option. As already mentioned, this phenomenon is termed “non-trading” in the literature. Hess et al. (2010) argue that there are three possible reasons for non-trading: Firstly, non-trading might be the result of extreme preferences focussing exclusively on one specific attribute of the different choice options. They give an example of a labelled mode choice experiment regarding different transport options where some respondents will always choose the option that is labelled “car” or “fast”. However, they agree that non-trading also exists in unlabelled choice experiments. Secondly, they argue that non-trading may be the result of “heuristic”, non-utility-maximising behaviour of some respondents, e.g. because of boredom or fatigue. These respondents might aim at speeding up the choice experiment in order to get it over and done with as soon as possible. Hess et al. (2010) also argue that some respondents might reduce the number of attributes they consider in order to reduce the cognitive burden put upon them by the choice experiment. Another possibility is that respondents act strategically. Independently of its exact causes it is obvious that non-trading harms the validity of choice experiment results and therefore should be reduced as far as possible.

Before identifying non-traders we have to specify our understanding of non-trading. In our choice experiment, each respondent was confronted with altogether six choice cards where each choice card consisted of two alternative versions of grapes and one no-buy option, i.e. of three choice options altogether. We define as a “strong non-trader” a respondent who in all six choice cards always chooses the same option, e.g. the first one. Stochastically, under the assumption that all choices are equally likely to be chosen, the probability that a respondent selects a certain sequence of options if there are three options in each choice card and she is confronted with six choice cards is about 0,137%. Thus, with 929 participants, we would expect to find approximately four respondents who always choose the same option without being non-traders in the sense of Hess et al. (2010). In our survey, 52 non-traders were identified. Of these, three always chose the first option on the left, eight took the second option in the middle and the remaining 41 always selected the no-buy-option.

The interpretation of those always selecting the no-buy-option as being non-traders is problematic since this option is analogous to the zero-WTP statement in Contingent Valuation studies (which is the most frequently chosen option in most CVM studies) and for that choice there exist many different explanations which have nothing to do with non-trading. It is e.g. imaginable that respondents lacked information on certain attributes of the grapes that were not included in the choice set. Moreover, no-buy choices are not considered in the estimation model and thus cannot be a possible source of biased results. Therefore, we decided to identify as strong non-traders only those respondents who always chose one of the two grape options 1 or 2. Stochastically, again under the assumption that all choices are equally likely to



be chosen, we would expect around two to three respondents that qualify as strong non-traders. In our sample, however, there remain eleven respondents that can be identified as strong non-traders. This is more than four times the number that could be expected statistically.

We have three different hypotheses regarding the motivation of non-trading behaviour: Our first hypothesis is that respondents were not interested in the questionnaire but only participated for extrinsic reasons, e.g. to earn a reward, and therefore hurry through the questionnaire without deeper consideration. In a panel-administered survey such as ours, where respondents received a small incentive worth 1.50 € for participating, this might be a problem. Our second hypothesis is that respondents might have found the hypothetical situation they were confronted with not worthwhile considering, because they think that such surveys are of no consequence, anyway. Especially panel-recruited participants, which regularly participate in surveys that deal with a large variety of different topics, might develop the feeling that these typically have little or no effect. Our third hypothesis is that respondents might find the many different versions of the same commodity (grapes) they are confronted with, unrealistic. This can be especially problematic in choice experiments where respondents are asked to repeatedly choose between options that differ in a relatively large number of attributes and that are typically more diversified than those they could buy in a store or market.

To test the first hypothesis, our tool is to look at the time respondents took to finish the survey: When respondents are not engaging with the questionnaire but instead just try to finish as quickly as possible to earn their reward, this should be reflected by the answering time they took. To test the remaining two hypothesis, we included two follow-up questions in the questionnaire that were presented to respondents immediately after they had completed the choice experiment. Respondents were asked whether they agree on two statements which express protest beliefs with respect to the usefulness of such surveys and the credibility of the various grape options offered in the choice experiment, respectively. To test the second hypothesis, respondents were presented a statement that can be translated into: "All those surveys, that are conducted, do not lead anywhere." <sup>†</sup> To test the third hypothesis, the statement was "I could choose from so many different grape varieties. In reality, these do not exist" <sup>‡</sup>. They could choose between "fully agree", "partly agree", "do not agree at all" and "do not know" <sup>§</sup>.

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<sup>†</sup> In the German questionnaire this read: „Die vielen Befragungen, die dauernd durchgeführt werden, führen doch zu nichts“.

<sup>‡</sup> In the German questionnaire this read: „So viele Traubensorten, wie ich hier zur Auswahl hatte, gibt es in Wirklichkeit doch gar nicht.“

<sup>§</sup> In the German questionnaire this read: „stimme vollständig zu“, „teils teils“, „stimme überhaupt nicht zu“ and „weiß nicht“.

After having identified non-traders we want to learn more about their characteristic properties, i.e. about the determinants of non-trading. For this purpose we run a regression model with being a non-trader as dependent variable and several potential determinants of non-trading as independent variables. Kosenius (2013), in an article on the related topic of preference discontinuity in choice experiments, finds that female gender, young age, higher income and a less time spent on the survey as significant determinants. These variables will thus be included in our regression model, together with the education level of the respondents. Moreover, we include also "odd answers" as an independent variable. This is a dummy variable, which is equal to one if respondents give contradictory answers in other parts of the questionnaire and zero otherwise. The idea is that we can expect respondents who do not take the survey seriously to give also contradictory answers to questions outside the choice experiment.

Besides the case of strong non-traders who chose the same grape option in all six choice cards we define also a weak category of non-trading where respondents chose the same option over either six or five choice cards. This weakening of our definition increases the total number of non-traders to 55 and makes our analysis richer.

#### **4. Results and Discussion**

In this section we will first pursue the empirical goal of our study by analysing the attributes of grapes with respect to their effect of consumers' willingness to buy grapes with such properties. From the evaluation of our choice experiment we learn about the influence of the different attributes on consumers' WTP for a certain sort of grapes.

##### ***4.1 Which attributes of table grapes are appreciated most by consumers?***

This question can be answered on the basis of our choice experiment. The choice data was subsequently analysed using mixed logit with Hole's Module for STATA (Hole, 2007) with 2000 Halton draws. Effects coding was used. Thus, a hypothetical standard table grape had to be defined: We selected as our standard a table grape that has thin skin, is small, has no seeds, a medium level of resveratrol and to which pesticides are applied five times a year. The results are shown in table 3.

As we expected, there is a significantly lower WTP for table grapes with a thick skin relative to those with a thin skin and for table grapes that have a positive number of seed relative to those that contain no seeds. Here, it is interesting that the coefficients for table grapes with one and two seeds are almost the same. Medium-sized and large grapes are preferred to small grapes, while their coefficients are not significantly different from each other. There is a significantly lower WTP for grapes with no resveratrol relative to those with medium resveratrol. The WTP is also lower for grapes with low resveratrol, but this is only significant in certain specifications of the model. The marginal willingness to pay for other positive levels of resveratrol is not significantly different from zero. Lastly, respondents prefer grapes with

lower pesticide use (once or three times instead of five times per year). Moreover, there is significant heterogeneity in consumers' appreciation of the resveratrol level of grapes, their size and for one-time use of pesticides.

#### 4.2 Non-trading

Our main interest in this section is to identify the typical characteristics of strong as well as weak non-traders beyond the fact that they choose six or five times the same option in the choice experiment. This might be helpful in identifying true non-traders in future choice experiments and to distinguish them from "random" non-traders whose preferences are truthfully expressed by choosing the same option over all choice cards by hazard. As explained above we differentiate between strong and weak non-traders where strong non-traders chose the same option in all six choice cards while weak non-traders chose the same option in five or six choice cards, i.e. strong non-traders represent a subset of weak non-traders.

| Variable                            | Parameter | Value      | Std- Error |
|-------------------------------------|-----------|------------|------------|
| Dependent variable: decision to buy |           |            |            |
| price                               | Mean      | -0.4717*** | 0.0452     |
| thick_skin                          | Mean      | -0.5489*** | 0.0902     |
|                                     | Std. dev. | 0.0618     | 0.7511     |
| size_medium                         | Mean      | 0.7278***  | 0.1638     |
|                                     | Std. dev. | 0.1065     | 0.4795     |
| size_big                            | Mean      | 0.7813***  | 0.1248     |
|                                     | Std. dev. | 0.9067***  | 0.1773     |
| one_seed                            | Mean      | -0.6270*** | 0.1782     |
|                                     | Std. dev. | 0.3575     | 0.4496     |
| two_seed                            | Mean      | -0.6629*** | 0.1988     |
|                                     | Std. dev. | 0.2887     | 0.7385     |
| four_seed                           | Mean      | -1.6348*** | 0.1783     |
|                                     | Std. dev. | 1.1342***  | 0.1844     |
| no_resveratrol                      | Mean      | -0.4569*** | 0.1547     |
|                                     | Std. dev. | -0.8383*** | 0.3106     |
| low_resveratrol                     | Mean      | -0.3551*   | 0.2085     |
|                                     | Std. dev. | 0.6908***  | 0.2460     |
| high_resveratrol                    | Mean      | -0.1713    | 0.1902     |
|                                     | Std. dev. | 1.776***   | 0.22212    |

|                        |           |           |        |
|------------------------|-----------|-----------|--------|
| pesticides_once        | Mean      | 2.0205*** | 0.1908 |
|                        | Std. dev. | 1.072***  | 0.1954 |
| pesticides_thrice      | Mean      | 0.6741*** | 0.1901 |
|                        | Std. dev. | 0.0289    | 0.3899 |
| Likelihood ratio $X^2$ |           | 119.20    |        |

**- Table 3: Results of the model estimation with all participants - \*\***

Our probit regression shows that strong non-traders are significantly younger and less educated than respondents who do not qualify as strong non-traders (cf. table 4). Moreover, our second hypothesis, i.e. that strong non-traders have significant doubts regarding the question whether surveys have any real effect, could be confirmed: respondents that agreed to the statement "All those surveys, that are conducted, do not lead anywhere" were significantly more likely to be strong non-traders than other respondents (variable name: "protest\_nopoint"). From table 4 it can be seen that we cannot confirm our first hypothesis according to which non-traders take less time to answer the questionnaire than other respondents for strong non-traders. The respective variable ("true\_duration") is not significant in table 4. The same holds for our third hypothesis, that strong non-traders do not believe in the existence of such a variety of different sorts of grapes as suggested in the choice experiment (statement: "I could choose from so many different grape varieties. In reality, these do not exist"). The respective variable ("protest\_unrealistic") is not significant in table 4 too. Differently from Kosenius (2013), we do not find a significant effect of female gender or higher income. As expected, we find that respondents who give contradictory answers to our general questions regarding environmental attitudes and certain character traits, as indicated by the variable "answers\_odd", are more likely to be strong non-traders.

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\*\* Throughout this paper, significance levels are denoted as follows: \* stands for 10% significance level, \*\* stands for 5% significance level, \*\*\* stands for 1% significance level.

|   | Coefficient            | t-ratio |
|---|------------------------|---------|
| Dependent variable: <b>strong non-trading</b> |                        |         |
| age   | -0.7438***<br>(0.2374) | -3.13   |
| female  | -0.3615<br>(0.3448)    | -1.05   |
| education                                     | -0.2513*<br>(0.1365)   | -1.84   |
| income  | -0.0400<br>(0.1390)    | -0.29   |
| protest_unrealistic                           | -0.6256<br>(0.4927)    | -1.27   |
| protest_nopoint                               | 1.5617***<br>(0.4567)  | 3.42    |
| true_duration                                 | 0.00003<br>(0.0003)    | 0.10    |
| answers_odd                                   | 0.8899**<br>(0.3696)   | 2.41    |
| cons  | 0.5953<br>(0.8910)     | 0.67    |
| $\chi^2=$                                     | 0.0000                 |         |
| Pseudo R <sup>2</sup>                         | 0.3830                 |         |

**- Table 4: Determinants of strong non-trading -**

In a next step we analyse the group of weak non-traders, i.e. we included also those respondents in our analysis who chose the same option in five choice cards in our choice experiment in addition to the strong non-traders. The regression results can be seen in table 5. We now find that younger (variable: "age") men (variable: "female") who do not believe in the effect of such surveys (variable: "protest\_nopoint") and who give contradictory answers also to questions outside the choice experiment (variable: "answers\_odd") tend to be weak non-traders. It also shown that weak non-traders take less time to answer the questionnaire (variable: "true\_duration") which is immediately plausible. The divergent result in this last point relative to the strong non-traders may be due to the relatively small sample size in the latter case.

|   | Coefficient            | t-ratio |
|---|------------------------|---------|
| Dependent variable: <b>weak non-trading</b> |                        |         |
| age   | -0.2746***<br>(0.0543) | -5.06   |
| female                                      | -0.4894***<br>(0.1534) | -3.19   |
| education                                   | -0.0824<br>(0.0560)    | -1.47   |
| income                                      | 0.0820<br>(0.0602)     | 1.36    |
| protest_unrealistic                         | -1.1207<br>(0.2048)    | -0.59   |
| protest_nopoint                             | 0.5029*<br>(0.2803)    | 1.79    |
| true_duration                               | -0.0002*<br>(0.0001)   | -1.76   |
| answers_odd                                 | 0.3603**<br>(0.1621)   | 2.22    |
| cons  | -0.1375<br>(0.3547)    | -0.39   |
| X <sup>2</sup> =                            | 0.0000                 |         |
| Pseudo R <sup>2</sup>                       | 0.1302                 |         |

**- Table 5: Determinants of weak non-trading -**

If we eliminate these (strong or weak) non-traders from our survey sample we are able to improve the quality of our results as can be seen from tables 6 and 7. Table 6 shows a regression analysis analogous to the one in table 3, but after eliminating the strong non-traders from the sample. In table 7 we see the results of a regression analysis where all non-traders have been removed from the survey sample. Comparing the likelihood ratio chi-square values of tables 3, 6 and 7 we see that the fit of our regression model improves as the strong non-traders (table 6) and later the weak non-traders (table 7) are eliminated from the survey sample. This underlines the fact that it is useful to identify true non-traders in a choice experiment and to remove them from the survey sample in order to increase the significance of the regression results.

| Variable                            | Parameter | Value      | Std- Error |
|-------------------------------------|-----------|------------|------------|
| Dependent variable: decision to buy |           |            |            |
| price                               | Mean      | -0.4986*** | 0.0479     |
|                                     | Std. dev. |            |            |
| thick_skin                          | Mean      | -0.5552*** | 0.0940     |
|                                     | Std. dev. | -0.2980    | 0.3501     |
| size_medium                         | Mean      | 0.7372***  | 0.1678     |
|                                     | Std. dev. | 0.2086     | 0.5805     |
| size_big                            | Mean      | 0.8005***  | 0.1271     |
|                                     | Std. dev. | 0.9513***  | 0.1896     |
| one_seed                            | Mean      | -0.7155*** | 0.1829     |
|                                     | Std. dev. | 0.2040     | 0.4231     |
| two_seed                            | Mean      | -0.7040*** | 0.2027     |
|                                     | Std. dev. | 0.2523     | 0.5599     |
| four_seed                           | Mean      | -1.7596*** | 0.1875     |
|                                     | Std. dev. | 1.1525***  | 0.1887     |
| no_resveratrol                      | Mean      | -0.4783*** | 0.1578     |
|                                     | Std. dev. | 0.9122***  | 0.3174     |
| low_resveratrol                     | Mean      | -0.3423    | 0.2120     |
|                                     | Std. dev. | 0.6392**   | 0.2680     |
| high_resveratrol                    | Mean      | -0.1894    | 0.1959     |
|                                     | Std. dev. | 1.8551***  | 0.2272     |
| pesticides_once                     | Mean      | 2.0674***  | 0.1918     |
|                                     | Std. dev. | 1.064***   | 0.2002     |
| pesticides_thrice                   | Mean      | 0.6910***  | 0.1210     |
|                                     | Std. dev. | 0.0159     | 0.4368     |
| Likelihood ratio $X^2$              |           | 125.91     |            |

**- Table 6: Regression results without strong non-traders -**

| Variable                            | Parameter | Value      | Std- Error |
|-------------------------------------|-----------|------------|------------|
| Dependent variable: decision to buy |           |            |            |
| price                               | Mean      | -0.5152*** | 0.0503     |
|                                     | Std. dev. |            |            |
| thick_skin                          | Mean      | -0.6233*** | 0.1000     |
|                                     | Std. dev. | -0.3244    | 0.3945     |
| size_medium                         | Mean      | 0.7373***  | 0.1780     |
|                                     | Std. dev. | 0.3680     | 0.4769     |
| size_big                            | Mean      | 0.7618***  | 0.1316     |
|                                     | Std. dev. | 0.9876***  | 0.2009     |
| one_seed                            | Mean      | -0.7693*** | 0.1950     |
|                                     | Std. dev. | -0.0078    | 0.2993     |
| two_seed                            | Mean      | -0.7374*** | 0.2140     |
|                                     | Std. dev. | 0.0321     | 0.4127     |
| four_seed                           | Mean      | -1.8292*** | 0.1947     |
|                                     | Std. dev. | 1.1444***  | 0.2010     |
| no_resveratrol                      | Mean      | -0.5114*** | 0.1633     |
|                                     | Std. dev. | 0.7526**   | 0.3784     |
| low_resveratrol                     | Mean      | -0.3819*   | 0.2251     |
|                                     | Std. dev. | 0.5715*    | 0.3064     |
| high_resveratrol                    | Mean      | -0.2269    | 0.2094     |
|                                     | Std. dev. | 1.9933***  | 0.2360     |
| pesticides_once                     | Mean      | 2.2544***  | 0.2040     |
|                                     | Std. dev. | 1.750***   | 0.2123     |
| pesticides_thrice                   | Mean      | 0.7503***  | 0.1284     |
|                                     | Std. dev. | -0.0003    | 0.4537     |
| Likelihood ratio $X^2$              |           | 133.39     |            |

**- Table 7: Regression results without weak non-traders -**



## **5. Concluding remarks**

With the study presented in this paper we pursue two main goals, an empirical goal and a methodological one. The empirical goal of our study is to analyse consumers' preferences regarding the consumption of table. Based on a choice experiment we found that consumers prefer bigger or medium-sized grapes over smaller ones. They also appreciate seedless grapes with a thin skin and with a positive resveratrol content, which were treated with pesticides less frequently than a hypothetical standard grape.

The methodological objective of our study was to scrutinize the problem of non-trading in choice experiments. We tried to identify characteristic attributes of respondents who show a tendency of always choosing the same alternative in a series of choice cards they are confronted with, probably without considering thoroughly the implications of the different options they are offered in these choice cards. It is useful to identify such non-traders and to eliminate them from the sample of a choice experiment because their answers do not reflect their true preferences.

Since there is a certain probability that a respondent's true preferences lead her or him to always tick the same option in a series of choice cards, it is desirable to have additional indicators for non-trading behaviour. In our study we found that non-trading behaviour is more likely to occur among younger males with a low education level who show protest beliefs regarding the impact of surveys and who give contradictory answers also to questions outside the choice experiment. It also showed that they take less time to answer the questionnaire than the average respondent. These results help to distinguish non-traders from respondents whose true preferences lead them to always tick the same options in the choice cards. We ran the same regression model (for the identification of determinants of grape consumers' purchasing behaviour) over three different versions of our survey data set. The data set for the first regression analysis included all respondents of our survey, while for the second regression analysis the strong non-traders were removed from the survey sample, and for the third run of our regression model we eliminated the weak non-traders. A comparison of the likelihood ratio chi-square values of the three regression analyses showed that the significance of the regression results increased as the non-traders were eliminated from the survey sample. This underlines the usefulness of identifying non-traders in choice experiments.

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