



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*

## **WILLINGNESS TO PAY AND FRAMING EFFECT: EVIDENCE FROM ORGANIC TOMATOES**

**Larice Simone de Oliveira Ferreira**

Center for Applied Economics, Agricultural and Environmental Research (CEA)  
University of Campinas – Unicamp, City: Campinas. State: São Paulo. Brazil  
ORCID: <https://orcid.org/0000-0002-6442-4529>

**Rodrigo Lanna Franco da Silveira**

Center for Applied Economics, Agricultural and Environmental Research (CEA)  
University of Campinas – Unicamp, City: Campinas. State: São Paulo. Brazil  
E-mail: [rlanna@unicamp.br](mailto:rlanna@unicamp.br), ORCID: <https://orcid.org/0000-0002-1208-5713>

**Alexandre Gori Maia**

Center for Applied Economics, Agricultural and Environmental Research (CEA)  
University of Campinas – Unicamp, City: Campinas. State: São Paulo. Brazil  
ORCID: <https://orcid.org/0000-0003-0075-5094>

### **Abstract**

*This study investigates the framing effect on the willingness to pay (WTP) for the consumption of organic foods, particularly organic tomatoes. In addition, we evaluated how other variables, such as the respondent's socioeconomic characteristics, as well as their organic consumption pattern and their perceptions about organic foods, impacted the WTP for organic tomatoes. Results are based on data from an online survey applied to 434 consumers and on estimates of regression models for the expected WTP with and without control for the selection of people willing to pay a price premium for organic tomatoes. Two framing effects are tested – one with positive information about organic tomatoes and a second with negative information about a conventional product. While both types of framing had significant effects, negative framing played a more important role in the willingness to pay for organic tomatoes. Results also highlighted how other variables, such as income, positive perception about organic products and production, and environmental and health concerns, impacted the WTP for organic tomatoes.*

**Keywords:** Willingness to pay; framing effect; organic food; organic food consumption.

**Jel Codes:** D91, D12, Q1

### **1. Introduction**

The growing concern about healthy food and environmental protection has contributed to the increase in organic food demand. Data from the Research Institute of Organic Agriculture FiBL and IFOAM – Organics International shows that the world trade of such products grew by about 10% per year between 2000 and 2021, reaching €125 billion in 2021 (Willer et al., 2021 and 2023).

Several studies have investigated the determinants of the purchase and the willingness to pay (WTP) for organic food. In general, the analysis has focused on how the socioeconomic characteristics of the consumers and their concern about the environment and health influence

the purchase decision for organic products. Results have shown that the main variables are income and education, consumers' information about organic products, and concern about the environment and health (Kabir and Islam, 2022; Katt and Meixner, 2020; Zhang et al. 2018; Schouteten et al. 2019; Gulseven 2018; Vapa-tankosić et al., 2017; Keizerwaard, 2017; Rödiger and Ham, 2015).

Particularly, recent research has evaluated the influence of behavioral aspects on consumption decisions for organic food. In this context, the factors that guide individuals' economic decision-making have been studied by behavioral economics research. Based on empirical analysis and a multidisciplinary view, behavioral economics studies have expanded since the 1970s. Tversky and Kahneman (1974) point to the existence of certain heuristics in decision-making, which consist of "rules of thumb" that simplify and help agents to choose. The presence of such mental shortcuts, in turn, can create cognitive biases. Such biases arise from the fact that human behavior processes a limited set of data and information, in which heuristics, habits, social norms, emotion, and personal experiences, among other elements, have potential influence, thus making it possible to obtain results that are not optimal in the decision-making process (Kahneman, 2011; Kahneman and Tversky, 1979; Reisch and Zhao, 2017).

The framing effect is placed in this context, given that the individual's decision-making can be affected by how the problem or object is presented. In other words, the decision is influenced by the way that information is presented (Kahneman, 2011; Tversky and Kahneman, 2000). Few studies have evaluated how the framing effect influences the purchase of organic food. Shan et al. (2020), for example, suggested that messages describing both the benefits of buying organic food and the loss of not buying organic food influence consumers' attitudes and purchase intentions. Kamran et al. (2023) showed that normative triggers and motivations positively influence the intention to purchase organic food.

The main objective of this study is to investigate the framing effect on the WTP for the consumption of organic foods, particularly organic tomatoes. In addition, this work also evaluated how other variables, such as the respondent's socioeconomic characteristics, as well as their organic consumption pattern and their perceptions about organic foods and their production system, impacted the WTP for organic tomatoes. The tomato was chosen because it is a popularly known and widely consumed food in the world. According to data from FAO (2022), it is also one of the main fruits (considered a vegetable by nutritionists) produced in the world. On the other hand, as it is quite difficult to control diseases and pests, chemical control – with pesticides, herbicides, fungicides, and fertilizers – in conventional production is intense (Fiorini et al., 2010; Mazzei et al., 2021).

## **2. Literature review**

Traditional factors influencing consumers' willingness to pay for organic food are the product brand, perception of price, and consumer attitudes (environmental concern and health awareness), in addition to socioeconomic variables. In general, studies have pointed to a greater willingness to pay for the consumption organic products when compared to conventional ones (Katt & Meixner, 2020; Gulseven, 2018; Keizerwaard, 2017; Vapa-Tankosić et al., 2017; Aschemann-Witzel & Zielke, 2015; Teles, 2021; Nassivera et al., 2017; Rosa et al., 2016; Santos & Silva Júnior, 2015, Bazoche, et al., 2013; Gil, 2000). Additionally, based on a literature review, Rödiger & Ham (2015) pointed out that consumers devoted to the organic movement and frequent buyers of organic products tend to be more willing to pay for organic products when compared to consumers not affiliated with the movement.

Zhang et al. (2018) analyzed the Chinese vegetable market and identified that food safety, rigorous production, and environmental sustainability are the elements most frequently observed by consumers. Among these, 93% indicated familiarity with the consumption of

organic vegetables, and 65.8% were willing to pay more for products that are considered safe for consumption. The authors also highlighted the importance of trust as a determinant of consumers' willingness to pay. Consumers who trust information about safe foods are willing to pay up to 12.9% more.

Keizerwaard (2017) conducted an experiment in the Netherlands using passion fruit and mango smoothies as reference products. The study shows that consumers are more willing to pay for products labeled as organic than for conventional products. On average, consumers were willing to pay up to 17.14% more to consume organic products than non-organic ones. Schouteten et al. (2018), based on a research conducted at Ghent University in Belgium, indicate that the presence of the organic certification label increased consumers' willingness to pay by up to 20%. Didier et al. (2008) also identified the importance of the organic product label as a determining factor in consumers' willingness to pay in France. The label had a positive impact on consumers' willingness to pay, ranging between 20% and 30%.

Using Behavioral Economics as a theoretical framework, focusing on the analysis of the framing effect, it is pertinent to also present an overview of the research conducted on the subject of the present study.

Jager and Weber (2020), for instance, analyzed 297 German consumers with the aim of identifying which type of framing would be most suitable for increasing consumers' purchase intention towards organic products. The researchers investigated whether framing focused on individual benefits (such as health) or framing related to the common good (environmental preservation and animal welfare) would be more effective. They found that advertisements highlighting the collective benefits related to environmental preservation, for example, are considered more reliable and capable of increasing consumers' purchase intention for organic products.

Anghelcev et al. (2020) contributed to this debate by pointing out evidence that minor alterations in the messages contained in advertisements can change consumers' perception of organic products. The online experiment (with 375 American consumers) also compared consumers' perceptions of organically and conventionally processed foods. Consumers exposed to advertisements emphasizing the benefits of organic and conventional products ended up considering organic products as healthier food choices. In the same line of analysis, Hilverda et al. (2017) examined how different contexts for presenting information can influence consumers' perceptions of an organic product. For this purpose, an experiment was conducted, via online chat, with 310 Dutch consumers, considering three types of framings: the first message emphasized the benefits of consuming organic products over conventional ones, the second presented an uncertain scenario regarding the advantages and disadvantages of consuming organic products, and the third emphasized that there was a certain disadvantage in consuming organic products because, although the organic production system was beneficial to the environment, their product could contain more bacteria in vegetables or more parasites in animals compared to products from the conventional production system. The presentation of messages was varied between experts and less experienced professionals. The aim of this procedure was to examine how participants' perceptions could be influenced by the individual mediating the message. The results revealed that when messages were presented by experts, the information was received with greater confidence and considered more reliable.

Additionally, Cucchiara et al. (2015) explored this theme by conducting a study with 1,698 American consumers regarding the framing effect on messages present on packaging of organic seafood. The results revealed that consumers more engaged with the organic production and consumption cause tend to be more detail-oriented in their analysis, and framing that emphasizes positive aspects (e.g., health benefits and environmental preservation) is more effective in impacting the purchase of organic products.

## **2. Data and Methods**

### **2.1. Sampling Design**

The study data comes from an online survey with 434 residents of São Paulo, Brazil. São Paulo is the leading producer and consumer market of tomatoes in Brazil. Between November and December 2020, we shared our survey link on Brazil's leading social media platforms, including Instagram, Facebook, Twitter, and WhatsApp. This approach enabled us to reach individuals from diverse socioeconomic backgrounds. The anonymity and ease of access provided by social media likely contributed to the reliability of participant responses. Nevertheless, a limitation is that we cannot necessarily infer causality in our analysis because of potential self-selection in the sample. Nonetheless, this sampling strategy provided a valuable opportunity to explore contemporary attitudes and behaviors related to the framing effect on purchasing organic food.

Structured questionnaires were used, in which the following information was obtained: i) socioeconomic characteristics of the individuals; ii) aspects of the respondents' consumption of organic food, assessing whether such demand occurs and how often; iii) interviewees' assessments of the characteristics of organic foods and their production system; iv) WTP of the participants for organic tomatoes, using different contexts.

Regarding the WTP for organic tomatoes, participants answered how much they would be WTP for 1 kg of organic tomato. In this step, three groups were randomly selected. Each one was exposed to a different context, characterized respectively by presenting: i) framing with a positive message about the organic product, with brief information considering the benefits of consuming organic foods for human health and sustainability; ii) framing with a negative message about the conventional product, with information about the harm that the conventional production system can generate to human health and the environment; iii) a neutral framing with only the image of a tomato. Next, for each group, participants were informed about the average price of 1 kg of conventional tomato on the market (\$ 5.00) and invited to indicate the maximum WTP for 1 kg of organic tomato.

### **2.2. Empirical Strategy**

#### **2.2.1. Factor Analysis**

In the first step, factor analysis was used to identify the latent attitudes related to organic products, organic production, environmental concerns, health concerns, and confidence in the certification seal of organic products. Nine statements (Table 1) were initially presented to the consumers, who evaluated their level of agreement with each one on a five-point Likert scale ranging from (1) completely disagree to (5) completely agree.

**Table 1. Statements to Analyze Participants' Latent Attitudes**

1. Organic products are delicious.
2. Organic products have quality
3. Organic products have a natural look.
4. Organic products are nutritious.
5. Organic production promotes the healthy use of soil and water.
6. The organic production method encourages small producers.
7. I consider myself concerned about the impact of food consumption on the environment.
8. I consider myself concerned about the impact food consumption can have on my health.
9. I consider the organic certification seal to be reliable.

The responses for these statements were used in the factor analysis to obtain two common factors  $F$  that better explained the total variability of the nine observable variables in Table 1. The use of latent factors  $F$  rather than the observable variables has two main advantages: i) to reduce the number of variables and eliminate redundant information; ii) to attenuate multicollinearity in regression models (next step in the analysis) since factors are independent while the observable variables tend to be strongly correlated.

### **2.2.2. Empirical Strategy**

In the second step, we estimated regression models to investigate the factors influencing the consumers' WTP for organic tomatoes. We compare the sensitivity of the results using three empirical strategies. The first is a traditional linear model for the expected log of WTP for organic tomatoes:

$$E(Y_i) = x_i\beta \quad (1)$$

Where  $Y_i$  is the open-ended WTP that participant  $i$  reported for the kilo of organic tomatoes. The vector  $x_i$  contains the explanatory variables (explained below) for participant  $i$  and the  $\beta$  is the vector of coefficients. The parameters of equation (1) are estimated by ordinary least squares (OLS).

The second empirical strategy is a probit model for the probability of paying a price premium for organic tomatoes, i.e., being willing to pay a higher price for organic than for conventional tomatoes (\$ 5/kilo) (equation 2).

$$\Pr(Y_i > 5) = \Phi(x_i\beta) \quad (2)$$

Where the parameters  $\beta$  in the probit function  $\Phi$  are estimated by maximum likelihood (ML). This model evaluates the factors influencing the decision to pay more for organic tomatoes.

Finally, our third empirical strategy uses a heckit model, assuming that the WTP for organic tomatoes is defined into two steps. The first step is a selection model for the probability of paying a premium for organic tomatoes (equation 2). The second step is a linear model for the expected WTP for organic tomatoes, conditioning the analysis on those who are willing to pay a price premium,  $Y_i > 5$  (equation 3).

$$E(Y_i | Y_i > 5) = x_i\beta \quad (3)$$

The OLS estimators for the coefficients in equation (3) will be inconsistent if the subgroup of people willing to pay a premium for organic tomatoes does not represent a random sample of the population. We use the two-step consistent estimators proposed by Heckman (1979).

### **2.2.3. Factors Explaining WTP for Organic Tomatoes**

Explanatory variables in vector  $\mathbf{x}$  are summarized in three categories: i) socioeconomic characteristics; ii) consumers' pattern and perception; iii) framing effect (Table 2). The first set includes four variables – age, educational level, income, and the number of children. In general, previous studies indicated that, as the individual's age, education, and income increase, the greater the chances of having a higher WTP for organic products (Kushwah et al., 2019; Ferreira and Coelho, 2017; Vapa-Tankosić et al., 2017; Irandoust, 2016). Considering that the concern with food increases with age and level of education, while higher

income allows the consumption of products with higher prices, it can be hypothesized that consumers with higher age, education, and income have a higher probability of presenting WTP. Regarding the number of children, it is assumed that individual with children has a greater tendency to acquire organic products due to the greater care of the family diet. Therefore, the expected relationship between WTP and such variables is positive (Chakrabarti, 2010).

**Table 2 - Variables Used in the Analyses.**

Variables	Description of Variables	Expected Sign
<b>Dependent Variable</b>		
Willingness to Pay - WTP (Y)	How much are you willing to pay for 1 kilo of organic tomatoes?	-
<b>Socioeconomic variables</b>		
Income	Monthly family income measured in (\$), in logarithm.	Positive
Age	Age of the participant	Positive
Education level	The number of years that the participant received formal education.	Positive
Number of Children	The number of children.	Positive
<b>Consumers' Patterns and Perception</b>		
Information	Dummy variable that assumes a value equal to 1 if the individual indicates having knowledge/information about organic products and their production system and 0 otherwise.	Positive
Trust in the certification seal	Dummy variable that assumes a value equal to 1 if the individual indicates having confidence in the organic certification seal and 0 otherwise.	Positive
Salad consumption	Dummy variable that takes on a value of 1 if the individual indicates frequent salad consumption and 0 otherwise.	Positive
Factor 1 - F1	Values obtained from the first common factor identified in the factoranalysis.	Positive
Factor 2 - F2	Values obtained from the second common factor identified in the factor analysis.	Positive
<b>Framing condition</b>		
Positive framing	Dummy variable that assumes a value equal to 1 if the individual was exposed to positive <i>framing</i> towards organic and 0 if he was exposed to negative <i>framing</i> towards the conventional and neutral product.	Positive
Negative framing	Dummy variable that assumes a value equal to 1 if the individual was exposed to negative <i>framing</i> about the conventional product and 0 if he was exposed to neutral and positive <i>framing</i> about organics.	Positive

The second set of variables is based on respondents' concerns about health and the environment, along with information about organic products, confidence in the certification seal, and salad consumption. Regarding the degree of information about organic products, it is considered that this knowledge can influence the consumer's purchase decision and increase the WTP for organic products. Thus, this relationship is expected to be positive (Dangi et al., 2020; Demirtas, 2018). In addition, previous studies showed that the higher the level of consumer trust in the organic certification seal, the greater their WTP for organic products (Kushwah et al., 2019). Therefore, the expected relationship is also positive. For the variable

salad consumption, it is expected that the relationship with the WTP for organic food is also positive since the consumption of salad is associated with health concerns (Irandoost, 2016).

Factors 1 and 2, which were created from the factor analysis, are also considered in this second group of variables. The descriptive statistics (presented in section 3.1) indicate that Factor 1 expresses the participants' perceptions about organic food characteristics and organic production system (Table 1). Recent research has pointed out the positive relationship between such variables and WTP (Kushwah et al., 2019; Irandoost, 2016). Thus, the expected relationship of Factor 1 is positive. Factor 2, on the other hand, is associated with participants' perceptions regarding their concern about the environment and their health. Some studies indicated that the greater the individual's attention to healthy eating, the higher the WTP for organic products, so the expected relationship in Factor 2 is positive (Kushwah et al., 2019; Irandoost, 2016).

Finally, the framing variables are expected to present a positive relationship with the WTP for organic food. It is assumed that the two different contexts – one highlighting the positive points of organic tomatoes and the other emphasizing the negative points of conventional tomatoes – influence consumers' WTP. That is, individuals may present different responses to the same problem, given the change in the presentation mode (Jager and Weber, 2020; Hilverda et al., 2017; Cucchiara et al., 2015).

### 3. Results

#### 3.1. Descriptive Analysis

The sample presented an average age of 38 years and 13.7 years of schooling – Table 3. The average family income was \$4,866 per month and a high standard deviation of \$ 6,648<sup>1</sup>. In addition, 75% of the respondents said they trust the organic certification seal, 55% indicated that they consume salad at home, and 54% of the participants indicated that they have information about the product and organic production. It is also observed a low average number of children (0.63 per respondent), with 66% of participants without children. Appendix I presents the correlation matrix for all explanatory variables.

**Table 3. Descriptive Statistics of The Explanatory Variables**

Variable	Mean	Std. dev.	Min	Max
WTP (Brazilian Reais)	7.17	3.38	2	27
<i>Socioeconomic factors</i>				
Age (years old)	38.011	17.354	18	75
Education (years)	13.666	5.857	0	23
Income (Brazilian Reais)	4,866.36	6,648.09	550.00	33,000.00
Number of children	0.629	1.011	0	4
<i>Consumers' Patterns and Perception</i>				
Information about organics (dummy)	0.542	0.499	0	1
Trust certification (dummy)	0.751	0.433	0	1
Salad consumption (dummy)	0.547	0.498	0	1

The level of consumer agreement to the nine statements presented in the survey can be seen in Table 4. Regarding the characteristics of organic products and the organic production system, the results show that the vast majority of consumers totally and partially agree with the following statements: organic products are tasty (Question 1, with 92% agreement),

organic products have quality (Question 2, with 94.5% agreement), and organic products have a natural aspect (Question 3, with 92.9% agreement). Respondents also agree that organic products are nutritious (Question 4, with 95.7% total and partial agreement) and that organic production promotes the healthy use of soil and water (Question 5, with 90.1% total and partial agreement). This last perception can generate advantages for the sales of organic food in comparison to conventional food.

In addition, 52% of the consumers of the sample totally and partially agreed that they consider themselves concerned about the impact of food consumption on the environment (Question 7). A portion of 54.5% totally and partially agree that they consider themselves concerned about the impact that food consumption can have on their health. Finally, 65.7% totally and partially agree that they consider the certification seal to be reliable.

**Table 4. Consumers' Level of Agreement (%) about the Statements Presented.**

Question	Totally Disagree	I disagree	Neutral	I agree	Totally agree
1. The organic products are tasty.	0.2	0.2	7.6	50.8	41.2
2. Organic products have quality.	0.2	0	5.3	54.9	39.6
3. Organic products have a natural appearance.	0.2	0	6.9	51.5	41.4
4. Organic products are nutritious.	0.2	0.2	3.9	53.8	41.9
5. Organic production promotes the healthy use of soil and water.	0.2	0.5	9.2	48.7	41.4
6. The organic production method encourages small producers.	0.2	1.1	6.4	48.7	43.5
7. I am concerned about the impact of food consumption on the environment.	0.7	6.2	40.7	16.7	35.7
8. I consider myself concerned about the impact food consumption can have on my health.	0.5	5.7	39.4	16.7	37.8
9. I consider the organic certification label reliable.	0.7	4.6	29.1	34.8	30.9

Two common factors were selected in the factor analysis, representing a considerable portion (79.22%) of the total variability of the nine original statements - Table 5.

**Table 5. Eigenvalues and Variance Explained by Each Common Factor.**

Factor	Total	% of variance	Cumulative %
1	6.365	70.718	70.718
2	0.766	8.507	79.225
3	0.526	5.847	85.072
4	0.417	4.633	89.705
5	0.321	3.562	93.267
6	0.244	2.715	95.982
7	0.137	1.526	97.507
8	0.127	1.413	98.920
9	0.097	1.080	100.000

All observable variables presented moderate or strong correlations (above 0.5) with at least one of the two common factors, as shown in the rotating component matrix – Table 6. In other words, the latent factors can reasonably represent the nine observable variables presented in

the questionnaire without relevant loss of information.

**Table 6. Rotating Component Matrix and the Commonality that Each Item Inherits from the Total Variance.**

Question	Factor 1	Factor 2	$h^2$
1. The organic products are tasty.	0.796	0.345	0.753
2. Organic products have quality.	0.836	0.406	0.864
3. Organic products have a natural appearance.	0.860	0.332	0.851
4. Organic products are nutritious.	0.833	0.432	0.880
5. Organic production promotes the healthy use of soil and water.	0.749	0.428	0.744
6. The organic production method encourages small producers.	0.773	0.260	0.665
7. I am concerned about the impact of food consumption on the environment.	0.330	0.896	0.912
8. I consider myself concerned about the impact food consumption can have on my health.	0.358	0.881	0.905
9. I consider the organic certification label reliable.	0.496	0.557	0.556

According to the values of the factorial loadings (correlation coefficients) rotated, each factor can be interpreted with the latent attitudes described below. Factor 1 represents most of the total variability of the observable variables (70.7%). It has a high factor loading in agreeing with the statement that organic products are nutritious (Question 4) and that organic products are tasty, have quality, and have a natural appearance (Questions 1 to 3). It also has a strong, positive relationship in agreeing that organic production promotes the healthy use of soil and water and encourages the small producer (Questions 5 and 6). Thus, the higher the value of this factor, the greater the positive perception of the interviewed consumers regarding organic products and the organic production system.

About Factor 2, it is observed that this represents 8.5% of the total variability of the observable variables. It shows a strong positive relationship with the statement that the participants consider themselves concerned about the impact of food consumption on the environment, with the impact that food consumption can have on their own health, and how reliable they consider the certification seal to be (Questions 7, 8 and 9). It can be assumed that the higher the value of this factor, the greater the perception of the interviewed consumers that they consider themselves concerned with the environmental and health impacts of food consumption and that they trust the organic certification seal.

Table 7 shows the descriptive statistics of WTP for organic food indicated by respondents, considering the three versions of questionnaires: i) positive framing about the organic product (Group 1); ii) negative framing about the traditional product (Group 2); iii) neutral framing (only tomato image - Group 3). Figure 1 shows the boxplot with the distribution of the values of WTP for each of these three groups. For the group exposed to the neutral framing, the median price was the closest to the price of the conventional product (equal to \$5.00/kg). The groups exposed to the other framings presented mean and median prices higher than the price of the conventional product. The group exposed to the positive (negative) framing had an average price of 54.6% (71.7%) higher than the neutral group, with the difference of the medians equal to 54.8%. When comparing Groups 1 and 2, exposed to negative framing and

positive framing, the mean difference was 11.13%.

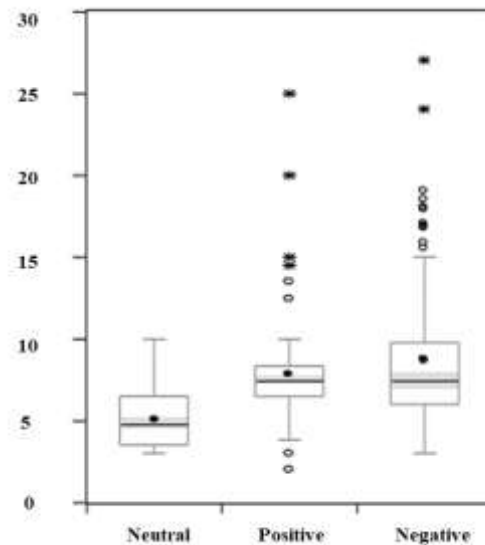


Figure 1. Boxplot of Willingness to Pay.

### 3.2. The Effects of Explanatory Variables

Table 7 shows the estimates using three empirical strategies: (1) OLS estimates for the expected WTP (equation 1); (2) average marginal effects of the probit estimates for the probability of paying a price premium for organic tomatoes (equation 2); (3) heckit estimates for expected WTP among those willing to pay a price premium for organic tomatoes (equation 3). The three strategies fitted well to the data, with (pseudo) coefficient of determination equal or higher than 0.43.

The estimates highlight that, when compared to the neutral framing, both the positive and negative framings have significant impacts on the average WTP and the probability of paying a price premium for organic tomatoes. The OLS (1) and heckit (3) estimates indicate that the effect of the negative framing on average WTP is higher than that of the positive framing. The OLS estimates indicate that the positive framing, when compared to the neutral framing, increases the average WTP by 49% ( $e^{0.399} - 1 = 0.49$ ), while the negative framing increases the average WTP by 60% ( $e^{0.469} - 1 = 0.598$ ). The heckit estimates indicate that, among those willing to pay a premium for organic tomatoes, the positive framing increases the average WTP by 75% ( $e^{0.561} - 1 = 0.752$ ), while the negative framing increases the average WTP by 90% ( $e^{0.640} - 1 = 0.896$ ), when compared to the neutral framing. Thus, the results of these models show that the negative framing had a higher influence on the WTP. In turn, the probit estimates indicate that the negative and positive framings have the same impact on the probability of paying a premium for organic tomatoes, increasing the probability of reporting a premium by 40.4 percentage points.

The findings related to the framing effect are consistent with the studies of Zhang et al. (2022), Anghelcev et al. (2020), Jager and Weber (2020), Hilverda et al. (2017), and Cucchiara et al. (2015). The study conducted by Anghelcev et al. (2020), for example, pointed out that small changes in the messages contained in advertisements can change US consumers' perception of organic products. Consumers exposed to the ads, which highlighted the benefits of organic and conventional products, ended up considering organic products as the healthiest

food. In addition, in line with our results, Chen (2016), Moon et al. (2016), and Shan et al. (2022) highlighted that negative framing presented in their experiments higher impact on purchase intention than a positive message. As cited by Moon et al. (2016), “loss aversion makes the negative frame more persuasive”.

**Table 7. Estimates Of OLS (1), Probit Model (2), and Heckit Model (3) for the WTP for Organic Tomatoes and the Probability of Willingness to Pay a Premium For Organic Tomatoes.**

Variable	Model 1. OLS		Model 2. Probit		Model 3. Heckit	
Framing effect						
Positive framing	0.399	***	0.404	***	0.561	***
	(0.035)		(0.057)		(0.123)	***
Negative framing	0.469	***	0.404	***	0.640	***
	(0.033)		(0.056)		(0.118)	
Socioeconomic factors						
Age	0.000		-0.001		0.003	
	(0.001)		(0.002)		(0.003)	
Education	0.002		-0.004		-0.005	
	(0.004)		(0.006)		(0.013)	
ln Income	0.100	***	0.132	***	0.050	
	(0.019)		(0.030)		(0.058)	
Number of children	0.027		0.009		0.088	
	(0.017)		(0.028)		(0.050)	
Health and environmental concerns						
Information about organics	0.057		0.047		0.057	
	(0.042)		(0.061)		(0.137)	
Trust certification	0.039		0.025		0.221	
	(0.035)		(0.046)		(0.117)	
Salad consumption	-0.243	***	-0.244	**	0.119	
	(0.060)		(0.086)		(0.190)	
Factor scores						
Factor 1	0.111	***	0.114	***	0.066	
	(0.016)		(0.023)		(0.054)	
Factor 2	0.116	***	0.115	***	0.069	
	(0.020)		(0.031)		(0.064)	
Sample size	434		434		434	
(Pseudo) R-squared	0.578		0.433		0.619	
AIC	109.0		307.4		972.4	
BIC	157.9		356.3		1078.3	

**Note:** \*\*\* p<0.001, \*\* p<0.01, \* p<0.05, +p<0.1

The estimates for the control variables also show that the probability of having low WTP over the base scenario was directly related to income, positive perception about organic products and production, environmental and health concerns, and inversely related to salad consumption habits. Similar results were found in previous research. For example, Vapa-tankosić et al. (2017) and Irandoust (2016) found evidence that income had an important influence on WTP among consumers. With respect to health and environmental concerns, our

findings are in line with Gil et al. (2000) and Zhang et al. (2018), who indicated that individuals with these attitudes are the most likely to pay a high premium for organic food. Finally, the variable salad consumption presented negative estimates in the two first models and an insignificant estimate in the third. This result may suggest that people with a higher consumption of tomatoes (one typical component in salads in Brazil) are less likely to pay a premium for organic tomatoes.

#### **4. Conclusions**

This study evaluated the influence of the framing effect on the WTP for organic tomatoes. An online survey with 434 residents of the state of São Paulo, Brazil, provided information for the analysis. We investigated the impact of two types of framing. The first one was based on positive information about organic tomatoes. The second one included negative information about conventional products.

Initial findings confirm the importance of the framing effect. The group exposed to negative information about conventional tomatoes had an average price 71.75% higher than the group exposed to neutral framing (a scenario containing only the tomato - without inserting messages and certification seal). In addition, the group exposed to positive framing regarding organic tomatoes had an average price 54.4% higher than the neutral framing group.

The estimates using different empirical strategies supported this result, i.e., the framing effect plays an important role in the WTP net of control variables. In addition, the probability of having WTP was, in general, directly related to income, positive perception regarding organic products and the organic production system, and environmental and health concerns. This result is consistent with the studies of Zhang et al. (2022), Shan et al. (2022), Jager and Weber (2020), Irandoust (2016), and Cucchiara et al. (2015), for example.

This research provides new insights into how variables influence the purchase decision-making for organic food. We highlighted the importance of considering behavioral variables when designing strategies for marketing the product. The findings of this study suggest that by considering specific messages to consumers, the WTP for organic food can be increased.

However, some limitations must be acknowledged. The study used a non-probabilistic convenience sampling procedure. So, the generalization of the findings may be limited. On the other hand, this type of sampling has the advantage of being highly operational and low-cost, given that individuals are selected based on their willingness to respond to the questionnaire. Future research should extend the participants, using random sampling in shopping malls, for example. In addition, it also leaves more research questions to be investigated in future research. This topic can be further explored by evaluating how other cognitive biases (such as anchoring and endowment effect) can impact consumers' WTP for organic food.

#### **Acknowledgements**

This work was supported by CAPES (Coordination for the Improvement of Higher Education Personnel – Brazil).

#### **References**

- Bazzani, C.; Caputo, V.; Nayga JR, R. M.; Canavarie, M. (2017). Revisiting consumers' valuation for local versus organic food using a non-hypothetical choice experiment: Does personality matter? *Food Quality and Preference*, 62, 144–154.
- Chakrabarti, S. (2010). Factors influencing organic food purchase in India—expert survey insights. *British Food Journal*, 112(8), 902-915.
- Chen, M. Y. (2016). Consumer response to health product communication: The role of

- perceived product efficacy. *Journal of Business Research*, 69(9), 3251-3260.
- Cucchiara, C., Kwon, S., & Ha, S. (2015). Message framing and consumer responses to organic seafood labeling. *British Food Journal*, 117(5), 1547-1563.
- Dangi, N., Gupta, S. K., & Narula, S. A. (2020). Consumer buying behaviour and purchase intention of organic food: A conceptual framework. *Management of Environmental Quality: An International Journal*, 31(6), 1515-1530.
- Demirtas, B. (2018). Assessment of the impacts of the consumers' awareness of organic food on consumption behavior. *Food Science and Technology*, 39, 881-888.
- FAO - Food and Agriculture Organization of the United Nations. (2022). FAOSTAT. Available at: <https://www.fao.org/faostat/en/#data/QCL>
- Ferreira, A. S., & Coelho, A. B. (2017). O papel dos preços e do dispêndio no consumo de alimentos orgânicos e convencionais no Brasil. *Revista de Economia e Sociologia Rural*, 55, 625-640.
- Fiorini, C. V., Silva, D. J. H. D., Mizubuti, E. S., Barros, J. D. S., da Silva, L. J., Milagres, C., & Zaparoli, M. R. (2010). Characterization of tomato lines originated of the interspecific cross with relationship to late blight resistance. *Horticultura Brasileira*, 28(2), 197-202.
- Gil, J. (2000). Market segmentation and willingness to pay for organic products in Spain. *The International Food and Agribusiness Management Review*, 3(2), 207-226.
- Gulseven, O. (2018). Estimating factors for the demand of organic milk in Turkey. *British Food Journal*, 120(9), 2005-2016.
- Heckman, J. J. (1979). Sample Selection Bias as a Specification Error. *Econometrica*, 47(1), 153-161.
- Hilverda, F., Kuttschreuter, M., & Giebels, E. (2017). Social media mediated interaction with peers, experts and anonymous authors: Conversation partner and message framing effects on risk perception and sense-making of organic food. *Food Quality and Preference*, 56, 107-118.
- IBGE – The Brazilian Institute of Geography and Statistics (2022). Censo Demográfico 2022. Brasília-DF, IBGE, 2022.
- Irandoost, M. (2016). Modelling consumers' demand for organic food products: the Swedish experience. *International Journal of Food and Agricultural Economics (IJFAEC)*, 4(1128-2016-92098), 77-89.
- Jaeger, A. K., & Weber, A. (2020). Can you believe it? The effects of benefit type versus construal level on advertisement credibility and purchase intention for organic food. *Journal of Cleaner Production*, 257, 120543.
- Kabir, M. R., & Islam, S. (2022). Behavioural intention to purchase organic food: Bangladeshi consumers' perspective. *British Food Journal*, 124, 3, 754-774.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 363-391.
- Kahneman, D. (2011). *Thinking, fast and slow*. Macmillan.
- Katt, F., & Meixner, O. (2020). A systematic review of drivers influencing consumer willingness to pay for organic food. *Trends in Food Science & Technology*, 100, 374-388.
- Keizerwaard, R. (2017). 50% or 100% organic? The effect of message framing and store-organic fit on consumers' willingness to pay for organic products. Master's thesis Communication and Information Sciences. Faculty of Humanities Tilburg University. 58f, Tilburg, 2017.
- Khan, K., Hameed, I., Akram, U., & Hussainy, S. K. (2023). Do normative triggers and motivations influence the intention to purchase organic food? An application of the goal-framing theory. *British Food Journal*, 125(3), 886-906.
- Kushwah, S., Dhir, A., Sagar, M., & Gupta, B. (2019). Determinants of organic food consumption. A systematic literature review on motives and barriers. *Appetite*, 143, 104402.

- Mazzei, J. R. F.; Cardoso, M. H. W. M.; Serra, E. G.; Macedo, J. R.; Oliveira, E. C.; BASTOS, L. H. P. (2021). Estudo comparativo das concentrações de agrotóxicos no solo provenientes dos métodos de plantio do tomate convencional, orgânico e sustentável. *Brazilian Journal of Development*, 7(3), 22981- 23000.
- Moon, S., Bergey, P. K., Bove, L. L., & Robinson, S. (2016). Message framing and individual traits in adopting innovative, sustainable products (ISPs): Evidence from biofuel adoption. *Journal of Business Research*, 69(9), 3553-3560.
- Reisch, L. A., & Zhao, M. (2017). Behavioural economics, consumer behaviour and consumer policy: state of the art. *Behavioural Public Policy*, 1(2), 190-206.
- Rödiger, M., & Hamm, U. (2015). How are organic food prices affecting consumer behaviour? A review. *Food Quality and Preference*, 43, 10-20.
- Schouteten, J. J., Gellynck, X., & Slabbinck, H. (2019). Influence of organic labels on consumer's flavor perception and emotional profiling: Comparison between a central location test and home-use-test. *Food Research International*, 116, 1000-1009.
- Shan, L., Diao, H., & Wu, L. (2020). Influence of the framing effect, anchoring effect, and knowledge on consumers' attitude and purchase intention of organic food. *Frontiers in Psychology*, 11, 2022.
- Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases: Biases in judgments reveal some heuristics of thinking under uncertainty. *Science*, 185(4157), 1124-1131.
- Tversky, A., & Kahneman, D. (Eds.). (2000). *Choices, values, and frames*. Cambridge University Press.
- Vapa-Tankosić, J., Ignjatijević, S., Kranjac, M., Lekić, S., & Prodanović, R. (2018). Willingness to pay for organic products on the Serbian market. *International Food and Agribusiness Management Review*, 21(6), 791-801.
- Willer, H.; Schlatter, B.; Trávnicek, J. (2023). *The World of Organic Agriculture Statistics and Emerging Trends 2023*. Research Institute of Organic Agriculture – FIBL and Organics International – IFOAM.
- Willer, H.; Trávnicek, J.; Meier, C.; Schlatter, B. (2021). *The World of Organic Agriculture Statistics and Emerging Trends 2021*. Research Institute of Organic Agriculture – FIBL and Organics International – IFOAM.
- Zhang, B., Fu, Z., Huang, J., Wang, J., Xu, S., & Zhang, L. (2018). Consumers' perceptions, purchase intention, and willingness to pay a premium price for safe vegetables: a case study of Beijing, China. *Journal of Cleaner Production*, 197, 1498-1507.
- Zhang, J., Shi, H., & Sheng, J. (2022). The effects of message framing on novel food introduction: Evidence from the artificial meat products in China. *Food Policy*, 112, 102361.

**Appendix**

Appendix 1. Correlation matrix of the explanatory variables.

	<i>AGE</i>	<i>EL</i>	<i>INC</i>	<i>NC</i>	<i>INFO</i>	<i>TR</i>	<i>F1</i>	<i>F2</i>	<i>SC</i>
<i>AGE</i>	1.0000	-0.1923	0.1335	0.5039	0.1068	0.1666	0.0372	0.1086	0.1319
<i>EL</i>		1.0000	0.5490	0.2328	0.6012	0.2730	-0.0043	0.4017	0.0651
<i>INC</i>			1.0000	0.4004	0.4489	0.2646	0.0877	0.2148	0.1466
<i>NC</i>				1.0000	0.3298	0.2403	0.0249	0.2420	0.1081
<i>INFO</i>					1.0000	0.4132	0.0828	0.4080	0.1899
<i>TR</i>						1.0000	0.1741	0.2556	0.1290
<i>F1</i>							1.0000	-0.2884	0.0020
<i>F2</i>								1.0000	0.1567
<i>SC</i>									1.0000

**Note:** *AGE* is age, *EL* is education level, *INC* is income, *NC* is number of children, *INFO* is information about organics, *TR* is trust in certification, *F1* is Factor 1, *F2* is Factor 2, and *FS* is salad consumption.

---

<sup>1</sup> According to data from IBGE (2022), the adult population in the state of São Paulo has, on average, an income of \$3,371, nine years of study and 37 years old. Thus, our sample has higher level of education and higher income.