



# Put your Money where your Mouth is

How do ECO-labels and the perception of sustainability affect the value of a tomato?

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## **Abstract:**

This study attempts to estimate willingness to pay for organic tomatoes according to university students in Gothenburg, Sweden. Previous research on the willingness to pay for ECO-labeled grocery products has been conducted. However, this research has either only been conducted on other individual goods or in other parts of the world. Tomatoes are a frequently bought grocery item available everywhere and they are not excluded in any of the most common diets. Using the van Westendorp Price Sensitivity Meter, we conducted a survey to try and measure what an acceptable price range is for organic tomatoes among university students. We find that students are willing to pay a small premium for organic tomatoes, but that the current market premium is far too high for our sample to be willing to consider buying organic tomatoes instead of unlabeled tomatoes.

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# 1. Introduction

Sustainable consumption is a goal of both the Swedish government and the EU (Finansdepartementet, 2017). Changing consumption behavior to more sustainable options includes buying more organic produce. One of the central ideas behind ECO-labeling is that it gives consumers the required information to shop sustainably. However, this assumes that consumers value ECO-labeled products higher than non-ECO-labeled ones. This increased value can come from a possible perception of increased quality and the idea that they are better for the environment. This paper attempts to measure this value by studying the willingness to pay for an ECO-labeled product compared to a non-ECO-labeled counterpart.

This study is done with the goal of finding a price range in which university students will consume sustainably. We also want to determine what factors, if any, lead students to be willing to pay more for organic tomatoes. This paper uses survey data to estimate how much university students in Gothenburg are willing to pay for organic tomatoes when they know the value of non eco-labeled tomatoes. Tomatoes are a common grocery product that are not excluded by any diet that we know of. This made it easier to survey because very few people do not buy tomatoes at all. We have surveyed 253 students at Gothenburg University and Chalmers University of Technology following the van Westendorp pricing model. Our results suggest that students are willing to pay a premium for organic tomatoes but not at the current market rate. Further study on this subject should be done with a larger and more diverse sample since students are generally not the target of premium products.

## 1.1 Literature Review

Similar studies have been conducted. For example, Zainalabidin Mohamed et al's 2014 study looked at willingness to pay for ECO-labeled food products. Their study found that about 51% of respondents were willing to pay a 5%-30% premium for ECO-labeled food products. Their study also showed that knowledge of ECO-labels significantly increased WTP values (Mohamed et al., 2014, p. 69-72). Recently, the Swedish Consumer Agency conducted a survey study to analyze consumer attitudes towards organic grocery products. The study found that consumers were positively inclined towards organic food but were turned off by higher prices (Konsumentverket, 2021). Another study, written by Yuan Jiang and published

in 2016, analyzed willingness to pay for locally produced fresh tomatoes in Florida using the van Westendorp model. That study found that consumers were willing to pay a premium for locally produced tomatoes and that perceptions of quality and freshness, among others, positively affect willingness to pay (Jiang, 2016).

Also relevant to this paper, a 2000 report from the U.S. Department of Agriculture provides an overview of the economics of food labeling. The report found that while labels were helpful for consumers to distinguish between products, especially regarding politically divisive issues, they were rarely effective in increasing sustainable consumption (Golan et al., 2000). Another study analyzed the effect of hygiene certification on the quality of products provided by restaurants. The study found that hygiene certification improved quality because consumer demand became sensitive to the certification (Jin & Leslie, 2003, 409-451). These two papers provide a framework for how labeling can affect markets.

## 2. Background

Certified labeling allows consumers to distinguish between products according to the terms provided by the labeling, but this requires consumers to know these terms. There are many different ECO-labels for Swedish products. Among them are *Krav*, *Svanen*, *Bra Miljöval* and *EU organic*. Certification is provided by Swedish governmental organizations, the EU, and non governmental organizations. At the same time, some suppliers will put symbols that look like ECO-labels on their products to give the impression that they are sustainably produced. This practice, known as greenwashing, can confuse consumers as to what products are sustainable. It can also sow distrust in ECO-labeling in general if consumers have a difficult time telling the difference between official certification and greenwashing (Sveriges Riksdag, 2016).

To be able to present a product as “organic” in Sweden, suppliers have to follow the European union’s laws and regulations for organic products. This includes the prohibition of using GMOs and limiting the use of artificial fertilizers, herbicides and pesticides. For animal products, there are other prohibitions, such as limiting hormone and antibiotic use. Processed foods can only be labeled as “organic” if at least 95% of its content is classified as organic (Livsmedelsverket, 2021) (European Commission, 2018).

The two most common eco-labels in Sweden for organic products are EU Organic and the Swedish Krav label (picture 1). Krav products follow the same standards as EU Organic products with added regulations regarding animal welfare, pollution, health, climate impact, and working conditions (Krav, n.d.). Swedish grocery stores will sometimes use their own eco-labels for organic products, but they are only allowed to do this if the product follows the regulations for EU Organic.



*Picture 1: EU Organic logo to the left and Krav logo to the right*

Before the producers can label their products as organic, they have to register their operation at either Livsmedelsverket or Jordbruksverket. Then, they have to apply for the certification with a control agency that determines whether the producer fulfills the standards of the label (Livsmedelsverket, 2022). In 2017, there were a total of 216 tomato producers in Sweden (Jordbruksverket, n.d.), but only 3% of the total production of tomatoes in 2017 were classified as organic (Persson, 2020).

Organic farming is considered to have a positive effect on the environment. Research suggests that organic farming is the farming technique that has the most positive impact on biodiversity (Rahmann, 2011, p. 189). It also mitigates climate change. This is in part because it uses less non-reusable energy sources, and in part because it improves soil quality to the requisite level to enable carbon capture. Some governments, such as the French and German governments, encourage farmers to implement organic farming as a restorative solution for areas with groundwater pollution (Food and Agriculture Organization of the United Nations, 2022).

The nutritional value of organic products does not necessarily differ from non organic products (SLU ekologisk produktion och konsumtion, 2022). However, pesticides have been linked to increased risks of autism and ADHD, Parkinson's disease, infertility and cognitive disruptions. Some pesticides have even been classified as cancerous (Inserm, 2013).

Organic tomatoes are much more expensive than unlabeled tomatoes. At the time of writing (23 May 2022), Swedish grocery stores sell organic tomatoes on the vine at a premium of 100% or more as seen in table 1. High premiums are thematic for organic produce; one 2015 analysis of four Swedish grocery stores found an average premium of 30% for a mixed ECO-labeled grocery bag (Meyer von Bremen, 2015). This cost is a reflection of larger labor inputs per unit of output, smaller production scale, and regulations forcing separation of organic and non-organic foods. The latter greatly increases the cost of transportation and processing (Food and Agriculture Organizations of the United Nations, n.d.).

	Organic tomatoes	Country of origin	Unlabeled tomatoes	Country of origin
Coop	79.90 SEK/kg	Spain	37.95 SEK/kg	Spain
Hemköp	79.90 SEK/kg	Mixed incl. Spain	39.95 SEK/kg	Mixed incl. Spain
ICA	79.90 SEK/kg	Spain	39.95 SEK/kg	Spain
Willys	69.80 SEK/kg	Mixed incl. Spain	34.90 SEK/kg	Mixed incl. Spain

*Table 1: Prices for tomatoes on the vine as of May 23rd 2022. (Coop, n.d.) (Willys, n.d.) (ICA, n.d.) (Hemköp, n.d.)*

Most tomatoes sold in Swedish grocery stores are imported from the Netherlands and Spain. Swedish production represented about 17% of annual sales in 2019, dropping from about 28% in 2001 (Jordbruksverket, 2021). However, Swedish production is highly seasonal. In 2010, sales of locally grown tomatoes varied between 14% and 20% due to seasonality (Jordbruksverket, 2011).

We have chosen to narrow this paper down to only encompass university students in Gothenburg. This is in part because it is an easier population for us to generate a random sample from. It is possible that there is a difference between the students in the two schools, either through selection bias or effects of the curriculums on behavior. In addition, looking at their consumption behavior may be interesting because younger generations seem to care more about the environment and climate change than their older counterparts.

## 3. Empirical Background

### 3.1 Willingness to Pay

The primary variable of interest in this study is the consumer's willingness to pay. In economics, willingness to pay is the highest price at which the consumer will want to buy a product or service. A person's willingness to pay depends on what they can gauge is the total economic value for them. This consists of use value, non-use value and option value. In other words, what utility they gain themselves when consuming the product, the utility they gain for someone else consuming it and the utility to have the option to use the good in the future, respectively. There are several methods for estimating willingness to pay; they are generally categorized as stated preference or revealed preference. Revealed preferences use existing markets as an indicator while stated preferences use surveys (Breidert et al., 2006, 9).

Marginal willingness to pay is the value one is willing to pay for a positive change in a product. In this study the eco-label "organic" is the point of improvement and thus the marginal willingness to pay for that change is studied. The marginal willingness to pay for organic tomatoes in this case is the difference in willingness to pay between organic and unlabeled tomatoes. This is also called a premium.

### 3.2 Theoretical Framework

For firms, labeling is an advertising option like any other. If a firm is profit maximizing, it will add any information to the packaging that increases revenue more than costs. A label is intended to help consumers distinguish between products by certifying that a product has certain desirable attributes. However, consumers are generally skeptical towards firms' advertising. Labels provided and certified by third parties can minimize this and help firms strengthen claims of quality. Third parties can also increase market efficiency by reducing the cost of certification through the efficiency of outsourcing (Golan et al., 2000).

Labeling can also incentivize competitive improvements in product quality. If a new label is introduced and appears on certain products, the absence of that label on other products can negatively impact the perception of quality from consumers. This can incentivize competitors to improve the quality of their products to fit the requirements for a certain label. The size of

the incentive will be dependent on the demand for the certification (Jin & Leslie, 2003, 449-450).

An eco-label can affect the consumer's total economic valuation of a grocery product through both use and non-use values. Additional use value can be generated through a perception of improved taste, aesthetics, health benefits, etc. Non-use value can be generated by a perception of improved environmental impact. All consumers are not the same, however, and the values generated by these attributes will differ between consumers (Golan et al., 2000).

### 3.3 Van Westendorp Price Sensitivity Meter

The van Westendorp price sensitivity meter model (PSM) is a common stated preference method for determining consumers' willingness to pay and price sensitivity. Researchers use surveys to gather data. Respondents are given a hypothetical shopping scenario where they are asked what price they would consider a bargain, too cheap, expensive (but not out of the question) and too expensive. The model then outputs a range for acceptable pricing according to the consumers surveyed (van Westendorp, 1976).

Compiling data from the respondents generates a cumulative response line for each question asked. The price is represented in the x-axis. For the "bargain" and "too cheap" lines, the y-axis represents the percentage of respondents that have answered price  $x$  or higher in the respective questions. For the "expensive" and "too expensive" lines, the y-axis represents the percentage of respondents that have answered price  $x$  or lower. This creates four intersection points, generating the output of the model. The intersection between "too low" and "expensive" is called the point of marginal cheapness. This is the model's lowest acceptable price point. Below this price point the majority of consumers would find the product too cheap. Sales will decrease because they think something is wrong with the product. The intersection of "expensive" and "bargain" is called the indifference price point. It is generally the median price paid by the consumer or can be seen as the price that a market leader would set. The intersection point between "too cheap" and "too expensive" is called the optimal price point and where most consumers are finding the price acceptable. The last intersection, between "bargain" and "too expensive," is called the point of marginal expensiveness. This is the model's highest possible price point. Beyond this point more consumers find the price too expensive than merely expensive and sales will drop drastically. The price span between the

points of marginal expensiveness and marginal cheapness is the respondents' acceptable price range when buying the product in question (van Westendorp, 1976).

This is different from conventional demand models, which give a single willingness to pay value. The method is commonly used in product development to gauge an estimate of willingness to pay and price sensitivity for a hypothetical product. The method has been criticized for being too hypothetical and that it may require supplemental research. Another point of criticism is the fact that the model does not account for the cost of production (Sadwick, 2020). However, the method is much easier to execute well than methods such as contingent valuation and choice experiment. Those methods are also primarily designed to estimate the value of public goods (Weinrich & Gassler, 2021).

### 3.4 Biases

These types of surveys are subject to different types of biases. First and foremost, surveys are already affected by bias in the sampling stage. The survey will not be able to reach the whole of the target population equally, and different mediums of distribution will reach different types of audiences. For example, email based surveys are affected by the fact that people do not check their email equally (office workers may check it more often than others, for example) whereas survey distributors require signup from the respondents. This effect may lead to the sample not being representative of the population. These types of biases are known as sampling bias (Suchman, 1962, 102).

Due to the questions being hypothetical, the respondents are not obliged to actually buy the product at the price they are stating. They are also not bound by real life budget restrictions. Respondents will often be informed by their real life budget restrictions when responding to WTP questions, but it is not identical to the optimization of utility through weighing consumption options that is core to microeconomic theory. This is known as hypothetical bias. A survey can also accidentally give consumers an anchor to base their WTP response upon. This bias, known as anchoring bias, is a problem commonly caused by combining open ended and closed ended questioning in a single survey. If the survey gives respondents information, it needs to be careful that the information is not presented in a way that could affect how much respondents value the good in question (Bobinac, 2019, 76).

## 4. Survey Design & Method

To collect data, a survey was distributed to university students in Gothenburg. In the survey, we gave a short introduction to the purpose of the study, but we tried to make this as short as possible to attempt to minimize information bias.

The survey begins by asking about the respondents' attitudes on and knowledge regarding ECO-labels. These questions are intended to act partially as primers, setting respondents up to answer more honestly in later questions. They will also offer interesting data points in regression analysis.

We then stated how much non-organic tomatoes cost and asked for respondents' willingness to pay for the organic version (in accordance with the van Westendorp model). This creates some degree of anchoring bias, and the response can be somewhat inaccurate. Our goal, however, was to estimate a price for organic tomatoes in relation to non-organic tomatoes. Therefore, asking for the respondents acceptable price range for the improvement of adding an "organic" label is reasonable.

The last part of the survey contains questions regarding age, gender, and university program. Income was left out due to the population we wanted to sample being university students and the programs were included out of curiosity if the results would differ due to educational level. The full questionnaire is in the appendix.

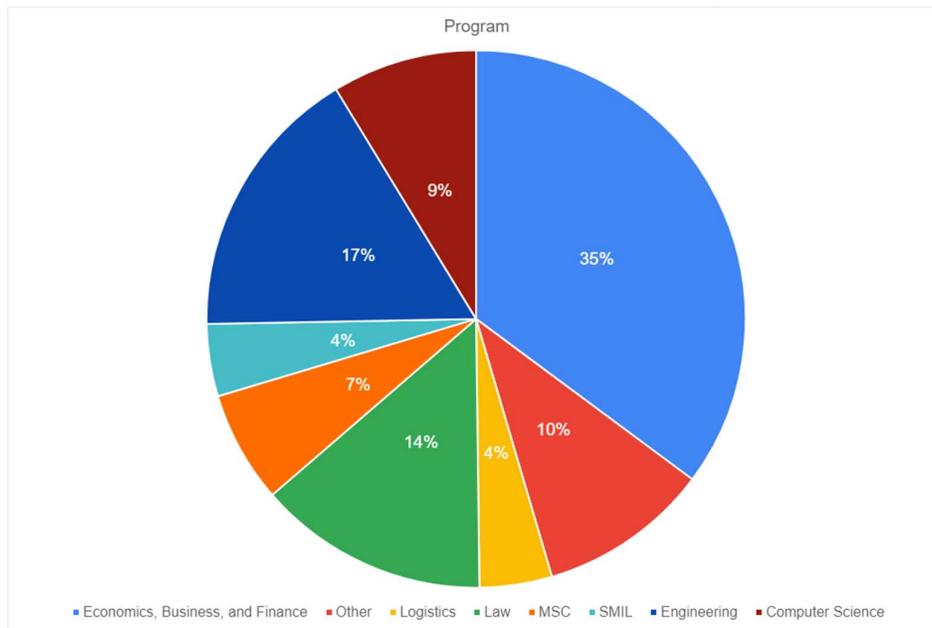
# 5. Data

## 5.1 Characteristics of Respondents

The characteristics of the respondents to the survey is summarized in table 2 and graph 1:

	Min	Max	Mean	Obs
Female = 1 <sup>1</sup>	0	1	.51	253
Age	18	41	23.64	253
Labels recognized	0	14	6.51	249
Labels known	0	12	.88	249
Shop = 1, do grocery shopping	0	1	.81	253
Opinion environmental impact	1	5	3.90	253
Opinion on quality	1	5	3.77	253
Chalmers = 1	0	1	0.34	253

Table 2: Summary of the characteristic of survey respondents<sup>2</sup>



Graph 1: Program distribution amongst the respondents.<sup>3</sup>

<sup>1</sup> The question asked whether people identify as male, female, or other, but nobody answered “other”. Therefore, female = 1 and male = 0.

<sup>2</sup> Descriptions of all variables are provided in the appendix.

<sup>3</sup>In later analysis, some of the dummy variables for each program are abbreviated. “EBF” for Economics, Business, and Finance, “Eng.” for Engineering, and “COS” for Computer Science. Logistics was categorized with “other” due to the low amount of observations. We preserve the dummy variable for the SMIL program despite the low sample size due to the program’s focus on sustainability and environmental policy. It is plausible

253 people replied to the survey that was sent out to students in Gothenburg, specifically Chalmers University of Technology and Gothenburg University. The program distribution of the respondents is shown in graph 1. The gender distribution in our sample of Chalmers students is 34% female and 66% male, compared to 39% female and 61% male for the population of 10 200 students (Chalmers, 2020). Our sample of GU was 60% female and 40% male, compared to 66% female and 34% male for the population of 55 900 students (Göteborgs universitet, 2022). Because the sample consists only of 34% Chalmers students, they are underrepresented in this paper.

The *Labels rec.* variable is how many of 14 presented labels that respondents recognized from the survey. *Labels known* stands for how many of the labels respondents knew the requirements for. Respondents were also asked whether they did a large amount of shopping for their household, represented in the *Shop* variable, where 1 = yes.

Respondents were asked to state their opinion on how they perceive organic products in relation to non ECO-labeled products. They were asked how they perceive organic products quality-wise (Variable *opqua*) and if they believed that organic products were better for the environment (Variable *openv*). For both of the variables the respondents thought that organic products were slightly better quality and slightly better for the environment.

It should be noted that about 50% of the MSC students were from a single program at Chalmers. They are therefore not necessarily representative of Masters of Science at large in the population.

Willingness to pay was asked in four different ways to measure the respondents price sensitivity on organic tomatoes. “Too low” is when the price is so low that the respondent doubts the quality. “Bargain” is when the price is considered a bargain by the respondent. “Expensive” is when the price starts to be expensive, but not enough to entirely rule out buying the good. Finally, “Too expensive” represents the price where they would not buy the product at all.

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that it will affect student responses. It will be difficult to make any conclusions about the larger population of SMIL students based off of this study, however.

## 5.2 Price Data

Summary of van Westendorp's Price Sensitivity meter questions:

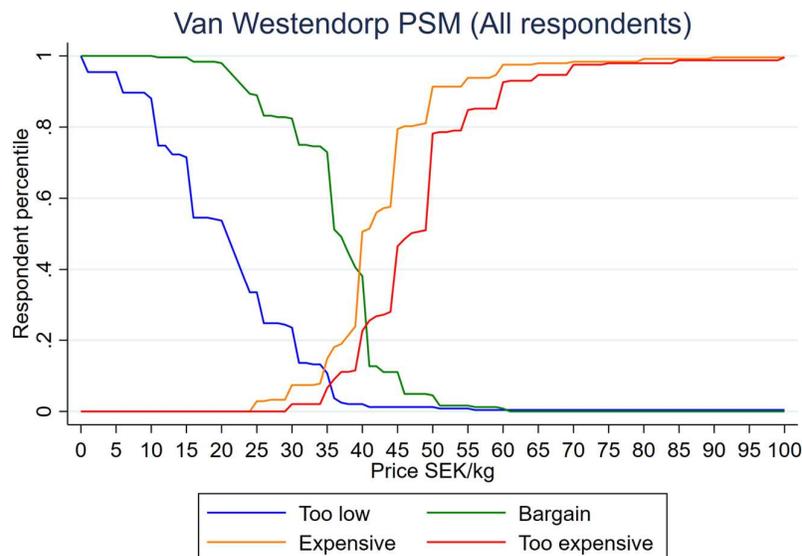
	Min	Max	Mean	Observations
Too low	0	60 (200)*	19.35 (20.04)*	242
Bargain	10	60	35.43	244
Expensive	25	90 (300)*	42.76 (43.82)*	243
Too expensive	30	100 (400)*	48.37 (49.81)*	243

Table 3: Values in SEK/kg (except for "observations") and values in parenthesis\* are including outlier responses.

## 6. Results and Discussion

### 6.1 PSM

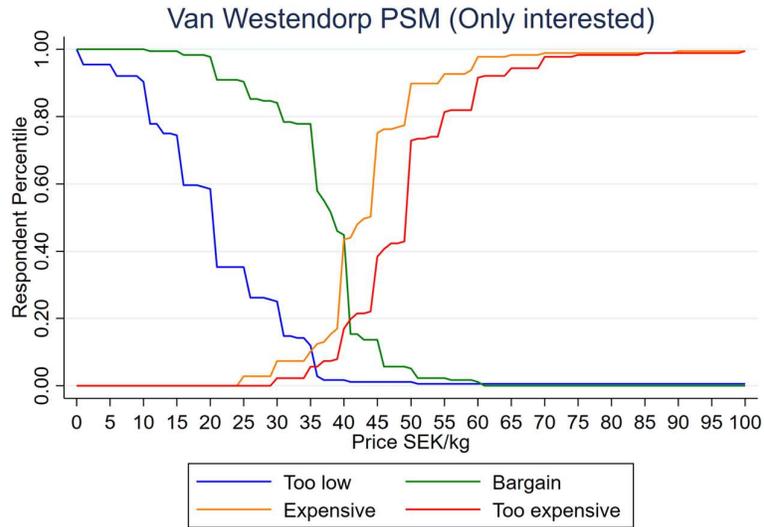
According to table 4, the acceptable price span between the points of marginal expensiveness and marginal cheapness is the respondents' possible price range when buying organic tomatoes, between 34.57 SEK/kg and 40.56 SEK/kg. This is a narrower range than the results from the Jiang study. That study found a range of \$0.9 and \$1.7 per unit for Florida fresh tomatoes (Jiang, 2016).



Graph 2: Van Westendorp's price sensitivity meter (all respondents).

Graph 2 includes all respondents, even those who said that they are not interested in buying organic tomatoes. If we isolate respondents who said that they were interested in the product

(70% of respondents), we get different results as shown in Graph 3. The intersection points in the two graphs are summarized in table 4.



Graph 3: Van Westendorp’s price sensitivity model (only the respondents that said that they were interested in buying organic tomatoes)

	All respondents (graph 2)	Only interested respondents (graph 3)
Point of marginal cheapness	34.57 SEK/kg	35.18 SEK/kg
Optimal price point	35.44 SEK/kg	35.67 SEK/kg
Indifference point	39.57 SEK/kg	40.03 SEK/kg
Point of marginal expensiveness	40.56 SEK/kg	40.85 SEK/kg

Table 4. Intersection points in PSM. The point of marginal cheapness is the intersection between “too low” and “expensive”. It is the lowest point in the price range given by the model. The optimal price point is the intersection between “too low” and “too expensive”. In theory, it is the point in which sales are at their highest. The indifference point is the intersection between “bargain” and “expensive”. The point of marginal expensiveness is the intersection between “too expensive” and “bargain”, and it is the highest point in the price range given by the model.

These price points are notably lower than that of the market. While the van Westendorp model does not give a single willingness to pay value, we can reasonably believe that it lies between the “too expensive” and “expensive” values (yellow and red lines in graph 3). This gives an average marginal willingness to pay between 8.65 SEK/kg and 14.54 SEK/kg among

interested respondents<sup>4</sup>. That corresponds to a price premium of between 24.7% and 41.5% compared to the 35 SEK/kg non eco-labeled tomatoes cost according to the survey. Thus, the data from this study indicates that students are willing to pay more for organic tomatoes but will not be willing to pay for organic tomatoes at the current price point that is a premium of 100%. However, it is higher than the premium consumers are willing to pay for organic grocery products overall according to Mohamed et al (2014, 69-72), but that study was done in another country where there are bound to be different consumption behaviors. The result of a too high premium lines up with the results from the study by the Swedish Consumer Agency, which also found that the premium for organic food is too high for most consumers to buy (Konsumentverket, 2021). It also reflects the results from analysis of sales data, which shows that organic products' market share in Sweden has been shrinking since 2016 (Jonasson & Åkesson, 2022).

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<sup>4</sup> Average value for “expensive” and “too expensive” are compared with the price of unlabeled tomatoes, 35 SEK/kg.

## 6.2 Regressions

The next part of the analysis consists of regressions that look for trends in respondent characteristics. Tables 5 and 6 look for trends in the opinion- and knowledge-based questions, using OLS regressions for variables 1 - 2, tobit regressions for 3 - 4 (this is done because the given range for the dependent variables is limited on either side; respondents could think the answer should be much higher or lower than the available answers) , and probit regressions for 5 - 6 (because the output variables are binary). Table 5 uses “chalmers” as one of the control variables whereas table 4 uses program dummy variables as controls. These regressions are done separately because there will be a strong correlation between the different program variables and the “chalmers” dummy variable.

	(1) labelknow	(2) labelrec	(3) openv	(4) opqua	(5) interested	(6) nointerest~y
<b>main</b>						
openv	0.226 (1.54)	0.0488 (0.24)			0.389*** (3.26)	-0.497*** (-3.92)
opqua	0.196 (1.43)	0.276 (1.46)			0.405*** (3.69)	-0.383*** (-3.39)
interested	0.124 (0.27)	-1.100* (-1.75)	-0.0173 (-0.09)	0.362* (1.73)		
nointerest~y	0.206 (0.42)	-1.331* (-1.96)	-0.499** (-2.35)	-0.116 (-0.52)		
shop	0.140 (0.50)	0.822** (2.12)	0.336*** (2.79)	0.142 (1.11)	-0.260 (-1.06)	0.424 (1.58)
age	-0.0408 (-1.32)	-0.0116 (-0.27)	-0.0177 (-1.32)	-0.00864 (-0.61)	0.0232 (0.89)	0.000156 (0.01)
female	0.646*** (2.88)	0.642** (2.07)	0.0165 (0.17)	0.0496 (0.47)	0.189 (1.00)	-0.101 (-0.50)
chalmers	0.0436 (0.18)	0.168 (0.52)	-0.101 (-1.00)	-0.0510 (-0.47)	0.0225 (0.12)	-0.0297 (-0.14)
labelrec			-0.00475 (-0.22)	0.0240 (1.06)	-0.0112 (-0.27)	-0.0435 (-1.00)
labelknow			0.0474 (1.62)	0.0341 (1.10)	0.00135 (0.02)	0.0340 (0.53)
_cons	-0.357 (-0.31)	5.593*** (3.52)	4.194*** (10.71)	3.429*** (8.24)	-2.821*** (-3.12)	2.526*** (2.72)
/						
var(e.openv)			0.518*** (11.16)			
var(e.opqua)				0.584*** (11.16)		
N	249	249	249	249	249	249

t statistics in parentheses  
 \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Table 5: Regressions with variable “chalmers” but without program variables.

	(1) labelknow	(2) labelrec	(3) openv	(4) opqua	(5) interested	(6) nointerest~y
<b>main</b>						
openv	0.177 (1.22)	0.0463 (0.24)			0.414*** (3.36)	-0.505*** (-3.88)
opqua	0.168 (1.24)	0.228 (1.24)			0.418*** (3.71)	-0.386*** (-3.33)
interested	0.136 (0.30)	-1.254** (-2.01)	0.0387 (0.19)	0.426** (1.99)		
nointerest~y	0.233 (0.47)	-1.330** (-1.99)	-0.445** (-2.06)	-0.0434 (-0.19)		
shop	0.133 (0.48)	0.748** (1.99)	0.341*** (2.84)	0.165 (1.30)	-0.295 (-1.19)	0.404 (1.49)
age	-0.0556* (-1.80)	-0.0269 (-0.64)	-0.0168 (-1.24)	-0.0105 (-0.73)	0.0122 (0.46)	0.0226 (0.76)
female	0.661*** (2.95)	0.486 (1.60)	0.0565 (0.57)	0.0623 (0.59)	0.0786 (0.40)	-0.0369 (-0.18)
progEBF	0.302 (0.92)	-0.776* (-1.74)	0.216 (1.50)	-0.129 (-0.84)	-0.244 (-0.85)	0.414 (1.30)
progSMIL	1.925*** (3.37)	2.155*** (2.77)	0.366 (1.43)	-0.00799 (-0.03)	0.307 (0.53)	0 (.)
progLAW	-0.0386 (-0.10)	-0.0269 (-0.05)	0.140 (0.81)	-0.210 (-1.14)	0.212 (0.59)	0.163 (0.43)
progMSC	-0.319 (-0.66)	-1.120* (-1.69)	0.0800 (0.38)	-0.288 (-1.27)	0.104 (0.25)	-0.0250 (-0.05)
progCOS	0.0692 (0.15)	-1.110* (-1.76)	0.323 (1.58)	-0.0327 (-0.15)	-0.775** (-1.98)	0.513 (1.17)
progENG	0.454 (1.19)	0.0326 (0.06)	0.0448 (0.27)	-0.262 (-1.47)	-0.142 (-0.44)	0.489 (1.37)
labelrec			-0.00190 (-0.09)	0.0219 (0.94)	-0.0290 (-0.67)	-0.0289 (-0.64)
labelknow			0.0380 (1.28)	0.0316 (1.00)	0.00420 (0.07)	0.0284 (0.42)
_cons	0.0474 (0.04)	6.805*** (4.38)	3.897*** (9.42)	3.526*** (8.01)	-2.359** (-2.47)	1.624 (1.62)
/						
var(e.openv)			0.509*** (11.16)			
var(e.opqua)				0.576*** (11.16)		
N	249	249	249	249	249	238

t statistics in parentheses  
\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Table 6: Regressions with program variables but without the “chalmers” dummy variable.

As seen in tables 5 and 6, gender is a significant indicator, where female respondents were more likely to know labels. There is also a positive correlation between students at the SMIL program and how many eco-labels they know and recognize. This could just be noise caused by a low sample size. However, it is plausible that students at the SMIL program behave differently due to the program’s focus on sustainability and environmentalism.

If a respondent does most of the household shopping, they are more likely to recognize an eco-label than those that do not. However, there does not seem to be any significant difference in students from Chalmers University of Technology and Gothenburg University in any of the regressions from table 6. This could be due to the schools having similar goals concerning sustainability education or be due to the majority being the same age and having similar upbringing and teachings previously. Tables 7 and 8 look for correlation between respondent characteristics and willingness to pay. Again, table 7 uses “chalmers” as a control and table 8 uses the program dummy variables as controls.

	(1) bargain	(2) toolow	(3) expensive	(4) tooexpensive
labelknow	0.313 (0.95)	0.257 (0.40)	0.341 (0.44)	0.508 (0.49)
labelrec	0.0108 (0.05)	-0.263 (-0.57)	-0.202 (-0.36)	-0.212 (-0.29)
interested	4.390* (1.68)	6.518 (1.22)	0.784 (0.12)	-0.900 (-0.10)
nointerest~y	2.689 (0.97)	3.918 (0.70)	-2.292 (-0.34)	-5.716 (-0.63)
openv	0.595 (0.85)	0.698 (0.51)	2.127 (1.29)	2.115 (0.96)
opqua	1.217* (1.85)	0.867 (0.67)	1.845 (1.19)	1.975 (0.96)
shop	-1.883 (-1.37)	-5.092* (-1.88)	-8.131** (-2.53)	-10.51** (-2.45)
age	0.229 (1.55)	-0.474 (-1.64)	0.0861 (0.25)	0.0516 (0.11)
female	1.924* (1.74)	-1.515 (-0.70)	2.825 (1.09)	4.301 (1.25)
chalmers	1.792 (1.56)	-3.241 (-1.44)	-0.130 (-0.05)	-0.143 (-0.04)
_cons	18.70*** (3.25)	27.30** (2.42)	32.76** (2.41)	42.29** (2.33)
N	241	239	240	240

t statistics in parentheses  
\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Table 7. WTP OLS regressions with the “chalmers” variable.

	(1) bargain	(2) toolow	(3) expensive	(4) tooexpensive
labelknow	0.496 (1.49)	0.350 (0.53)	0.208 (0.26)	0.273 (0.26)
labelrec	0.0476 (0.19)	-0.0525 (-0.11)	-0.169 (-0.29)	-0.193 (-0.25)
interested	3.542 (1.35)	5.589 (1.03)	1.098 (0.17)	-0.673 (-0.08)
nointerest~y	1.842 (0.66)	2.578 (0.45)	-2.132 (-0.31)	-5.740 (-0.62)
openv	0.823 (1.17)	0.766 (0.55)	2.025 (1.20)	1.916 (0.85)
opqua	1.363** (2.07)	1.039 (0.80)	1.888 (1.20)	2.089 (1.00)
shop	-2.289* (-1.67)	-5.080* (-1.86)	-8.156** (-2.49)	-10.64** (-2.44)
age	0.282* (1.88)	-0.366 (-1.23)	0.0388 (0.11)	-0.0101 (-0.02)
female	1.451 (1.30)	-1.348 (-0.61)	3.250 (1.21)	4.974 (1.40)
progEBF	-1.806 (-1.12)	4.326 (1.37)	2.903 (0.75)	5.424 (1.05)
progSMIL	-6.624** (-2.33)	-6.174 (-1.10)	3.838 (0.56)	8.287 (0.91)
progLAW	-0.190 (-0.10)	1.577 (0.41)	-0.211 (-0.05)	1.478 (0.24)
progMSC	1.575 (0.67)	1.604 (0.34)	2.043 (0.36)	4.077 (0.54)
progCOS	-1.724 (-0.71)	-0.533 (-0.11)	1.016 (0.17)	2.504 (0.32)
progENG	1.493 (0.80)	0.884 (0.24)	2.568 (0.57)	5.590 (0.93)
_cons	18.33*** (3.14)	20.42* (1.76)	31.69** (2.26)	39.80** (2.13)
N	241	239	240	240

t statistics in parentheses  
\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Table 8. WTP OLS regressions with program variables.

Even in the regressions from table 7, studying at Chalmers or Gothenburg University does not seem to have a significant effect on willingness to pay. This may be due to them all being students and having similar budget restrictions. As for the program variables in Table 8, only the SMIL variable is significant. However, due to the low sample of students from this program, this result should not be used to draw any definitive conclusions.

It is notable that the only consistently significant factor in tables 7 and 8 is whether respondents did a large amount of the grocery shopping for their household. There are several plausible causal mechanisms behind the negative effects. First, respondents who do not do a large amount of grocery shopping are likely to still live with their parents, increasing their disposable income since they likely pay less (if anything) for groceries and rent. Second, respondents who do buy groceries a lot may be more in tune with their own consumption behavior. Third, these respondents will naturally have more experience with market pricing. One would expect for this to lead their preferences to be closer to real pricing. Instead, the opposite is true, indicating that the first mechanism is more plausible. The variable is not significant when regressing the “bargain” variable when using “chalmers” as a control, but this is probably due to a small negative correlation between the two variables.

It is also notable that the opinion of quality affected students’ opinion on what they regarded as a bargain. This could be interesting for sellers, as it implies that successfully advertising organic tomatoes as higher quality leads to a higher price considered by consumers. This is similar to the findings in the Jiang study, where perception of quality was a significant and positive indicator of willingness to pay. Unlike this paper, that study provided different measurements of quality, such as taste, color and shape (Jiang, 2016).

### 6.3 Points of Improvement

There are several ways to potentially improve this study. Many of them would be difficult to execute given the time and resource constraints of a bachelor’s thesis. There are other improvements that we should have made during this project, but they were recognized too late. One of these is to ask whether students are working while studying. This would give some idea of how income affects willingness to pay. Students studying full time have up to 2772 SEK per week of disposable income (this includes loans and subsidy) from the Swedish Board of Student Finance (Centrala Studiestödsnämnden, 2022). An income on the side could greatly increase that. Additionally, we could have asked whether respondents still lived with their parents. Respondents who live with their parents could have a very different perception of the value of grocery products given that they probably do not pay at all, or not as much, rent and probably do not spend as much on groceries. However, we do ask whether respondents buy a large amount of the groceries for their household, which is probably an effective proxy for this. We could also have asked respondents what stores they tend to do

their grocery shopping at. This could have been interesting to look at and may explain some differences in willingness to pay. Some grocery stores try to niche themselves, for example by focusing on more cheap products or more sustainable products than their competitors.

Among the points of improvement that were more difficult to achieve are a larger and more diverse sample. 253 observations is a small sample, and responses from students in Gothenburg are not necessarily predictive of how students in other parts of Sweden would respond. For example, students in other locations may face a large difference in rent prices, changing their disposable income to a potentially significant degree. We chose to narrow our study to students in Gothenburg because we could find a large enough random sample via email. Conducting the survey via phone was impossible for us given the time frame and limited resources, and distributing the survey via social media would sacrifice randomness.

This survey was distributed at the end of April and in the beginning of May, when the price of tomatoes rose drastically for a short period of time (Statistiska Centralbyrån, 2022). We do not know to what degree this affected responses. It is possible that, since we provided an anchor by giving a price for unlabeled tomatoes, the effect of this volatility on responses was mitigated, but we have no way of knowing this.

Different models may also provide a more accurate estimate of consumer demand. We believe that the ideal method would be to use sales data from grocery stores to analyze consumer behavior. We attempted to do this but failed to find any stores that were willing to cooperate. This would give us more accurate data without hypothetical bias. In theory, one could regress sales quantities with pricing, label, and other independent variables to estimate the effect of labeling on sales. On the other hand, that methodology would not be able to study what could lead consumers to be willing to pay more for a product, as we do in section 6.2.

## 7. Conclusion

Our findings indicate that Gothenburg students will not consume organic tomatoes at the current market price. We also found that the students were very price sensitive, with a price range of 35.18 SEK/kg - 40.85 SEK/kg. We do not find any consistently significant factors that will increase students' willingness to pay. However, respondents' opinion on the quality

of organic tomatoes does heighten the prices they view as a bargain. This effect did not remain when it came to price ceilings, probably reflecting tighter budget restrictions.

Sellers attempting to increase their sales of organic tomatoes could take this into account by advertising their organic products as not only better for the environment but being of higher quality than unlabeled counterparts. Since students seem to have tight budget restrictions, stores could try a price discrimination scheme, where organic tomatoes are sold at a loss to students. The goal of this would be to create consumer habits where the students buy more organic food later in life at the full price. This strategy is more commonly employed by banks and telecom companies. The strategy makes more sense there, though, because they provide essential, subscription based, services, while grocery stores require active purchasing decisions every time. There are two grocery store chains in Sweden that already use a similar concept. ICA has weekly discounts for various products for its student members (ICA, n.d.). Hemköp uses a point system to reward consumption which is doubled when buying fresh fruits and vegetables (Hemköp, n.d.). These systems could be used to incentivize increased consumption of organic goods. Obviously, the government could always increase subsidies for organic farming to make it cheaper, but that is not necessarily the most efficient use of taxpayers' money.

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# Appendix

## Survey

### Chapter 1

This survey is done with the purpose of understanding consumer attitudes towards organic products. We also want to gauge interest in organic counterparts to common grocery store products. As a thank you for participating, we will randomly select five winners of two cinema tickets each.

How many of the 14 ECO-labels below do you recognize?



*(empty field answer)*

How many of the 14 ECO-labels do you know the requirements for?

*(empty field answer)*

On a scale of 1 to 5, where 1 is not at all and 5 is a large difference, to what degree do you believe that organic products have a different impact on the environment than their non-organic counterparts?

1. (much more negative impact)
- 2.
3. (no different in impact)
- 4.
5. (much more positive impact)

To what degree do you believe that organic products are different in quality than non-organic counterparts?

1. (much lower in quality)
- 2.
3. (no difference in quality)
- 4.
5. (much higher quality)

Do you do a large amount of grocery shopping for your household?

Yes

No

## *Chapter 2*

### **Value**

Imagine that you are in a grocery store and wish to buy tomatoes. The grocery store offers two types of tomatoes, one is labeled as organic and the other has no particular ECO-label. Both types are locally produced and seem otherwise similar.

Are you interested in buying organic tomatoes?

Yes

No, not interested

No, I don't buy tomatoes

The non-organic tomatoes cost 35 SEK/kilogram

What price would you consider a bargain for organic tomatoes?

*(empty field answer)*

At what price would you start to consider that the price is so low that the quality must not be good enough?

*(empty field answer)*

At what price would you consider organic tomatoes expensive but not so much that you would rule out buying them?

*(empty field answer)*

At what price would you start to consider them too expensive to buy?

*(empty field answer)*

### Chapter 3

#### **About you**

How old are you?

*(empty field answer)*

Gender

Female

Male

Other

What program are you studying?

*(empty field answer)*

## Survey Data

<https://drive.google.com/file/d/139HhrCm9wbGplP2ia8kCfPAYRKQI7FxX/view?usp=sharing>

## Data Variable Description

labelrec = Number of eco-labels that the respondents recognize from a picture out of 14 labels.

labelknow = Number of eco-labels that the respondents know the qualifications for from a picture out of 14 labels.

openv: A scale from 1 to 5 of how much they believe that organic products have a positive impact on the environment.

opqua: A scale from 1 to 5 of if the respondent thinks organic products are of a better quality.

shop: Dummy variable, =1 if the respondent does the majority of household shopping and = 0 if not.

Interested: A dummy variable, = 1 if the respondent is interested in buying organic tomatoes and =0 if not.

nointerestbutbuy: A dummy variable, = 1 if the respondent is not interested in organic tomatoes but still buys tomatoes. = 0 if not.<sup>5</sup>

bargain: At what price the respondent would consider the price for organic tomatoes in SEK/kg to be a bargain.

toolow: At what price the respondent would consider the price for organic tomatoes in SEK/kg to be so low that the quality must not be good enough.

expensive: At what price the respondent would consider the price for organic tomatoes in SEK/kg to be expensive but not expensive enough that they would not buy them.

toosexpensive: At what price the respondent would consider the price for organic tomatoes in SEK/kg to be too high to buy.

age: Respondent age

female: Dummy variable, =1 if respondent is female and =0 for male. While the survey gave an option for “other” when asking for respondent gender, nobody selected this option.

chalmers: Dummy variable = 1 if the respondent was part of the batch of surveys sent to students at Chalmers University. = 0 if the respondent was part of the batch of surveys sent to students at Gothenburg University.

The following variables are dummy variables for which program (or category of programs) the respondent attends. Some respondents do not fit into any of these (among these are, for example, social science programs and architecture. These fall into a “other” category).

progEBF: 1 = Economics, Business, and Finance

progSMIL: 1 = SMIL program

progLAW: 1 = Law program

proglogistics: 1 = Logistics program

progMSC: 1 = Masters programs

progENG: 1 = Engineering Programs

progCOS: 1 = Computer Science

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<sup>5</sup> If a respondent has a value of 0 on both the interested and nointerestbutbuy variables, it means that the respondent does not buy tomatoes at all