

# Consumer Valuation of Food Attributes: A Comparison of Willingness to Pay Estimates from Choice Modelling and Contingency Valuation Methods

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# Outline

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- Background
- Objectives
- Survey
- CV estimates
- CM estimates
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- Conclusions

# Background

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- ❑ Several authors have used different stated preference methods to value the WTP for goods with various results.
- ❑ Stated preference methods are also used for ecosystem valuation such as wetland (Tkac and Thomassin 2002)
- ❑ Several studies (Hanley et al. 1998; Lockwood and Carberry, 1998; Cameron et al., 2002; Jin et al. 2006; and Christie and Azevedo, 2009) did not find a difference in WTP estimates from CV and CM estimates.
- ❑ Other authors (Boxall et al. 1996; Stevanet al, 1997; Foster and Mourato, 2003) found there were differences in the WTP estimates when using CV and CM methods. They also found that CM estimates of WTP were higher than CV estimates.

# Objectives

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- ❑ Estimate the value of food attributes with different environmental and health attributes.
- ❑ Estimate the WTP values from two stated preference approaches, CM and CV, for these food products.
- ❑ Compare the WTP values generated from the two methods.

# Survey

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- A split-sample survey was distributed to 1,014 households on the island of Montreal.
- Commodities included in the survey: tomatoes, milk and pork.
- Common attributes used to describe the commodities included health and environment.
- Response Rate:

Survey Method	Total Distribution	Returned	Useable
CV	507	375 (74%)	257 (51%)
CM	507	407 (80%)	388 (77%)

# Multiple Bounded Discrete Choice (CV)

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- The price of conventional tomatoes was \$4.00 per kg.
- The Tomato Scenario Attributes

Scen.	Product	Risk to Health	Environmental Impact	Appearance
1	GM	5% increase	5% increase	15% increase
2	GM	15% increase	No change	15% increase
3	EMS	15% decrease	No change	15% decrease
4	EMS	15% decrease	No change	No change

**12) Genetically Modified (GM) TOMATOES**

Currently, a kilogram (kg) of tomatoes produced using a conventional farming method costs \$4.00. Assume that you have the opportunity to purchase 1 kilogram of GENETICALLY MODIFIED tomatoes that is known to contain the following attributes:

- ◆ Risk to human health: *15% increase in the risk to your health, compared with conventional tomatoes*
- ◆ Impact on the environment: *same as conventional tomatoes*
- ◆ Appearance: *15% improvement in appearance, compared with conventional tomatoes*

**How much would you be willing to pay for 1 kilogram of GENETICALLY MODIFIED tomatoes?**

*Please check ONE box for each price.*

Price for 1 kg	Definitely Yes	Maybe Yes	Neutral	Maybe No	Definitely No
\$ 3.50	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ 3.75	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ 3.90	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ 4.00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ 4.10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ 4.25	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ 4.50	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ 5.00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ 6.00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$ 8.00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would not buy this product. Please specify reason: \_\_\_\_\_

# CV -Results

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## □ WTP for Tomatoes

Scen.	WTP	s.d.	Log likelihood	Wald Stat.
1	\$2.87	0.1172	512.934	70.04
2	\$2.70	0.1500	466.161	58.55
3	\$4.25	0.0379	1095.727	279.75
4	\$4.37	0.0446	1125.444	278.05

- A significant number of respondents opted not to purchase the scenario 1 and 2 GM tomatoes – 78% and 81% respectively.
- As the risk to human health increased (sc. 1 and 2) price decreased
- Largest WTP was for the EMS tomato that had the largest decrease in the risk to human health and no change in appearance.



# Choice Modelling





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- ❑ The implicit prices for attributes are estimated from the CM survey
- ❑ Similar survey to Straub (2004)
- ❑ Attributes given to respondents for tomatoes were: price, impact on health, impact on the environment, and appearance.
- ❑ Each choice exercise included the status quo good (conventional tomatoes) and three alternatives: GM tomatoes, EMS tomatoes, and Organic tomatoes.

## 12) Purchasing TOMATOES

If you were purchasing 1 kilogram (kg) of tomatoes, which of the following four options would you choose?

*Please check only ONE box.*

Important issues to consider when purchasing tomatoes					
	Price 	Risk to human health 	Impact on the environment from production 	Appearance 	<i>I would choose</i>
<b>Conventional</b>	\$4.00 for 1 kg	No change	No change	No change	<input type="checkbox"/>
<b>Genetically Modified</b>	\$2.50 for 1 kg	5% <b>increase</b> in the risk to your health	5% <b>decrease</b> in environmental impacts	No change in appearance	<input type="checkbox"/>
<b>Environmental Management System</b>	\$4.25 for 1 kg	5% <b>decrease</b> in the risk to your health	25% <b>decrease</b> in environmental impacts	15% <b>decrease</b> in appearance	<input type="checkbox"/>
<b>Organic</b>	\$5.50 for 1 kg	15% <b>decrease</b> in the risk to your health	5% <b>decrease</b> in environmental impacts	10% <b>decrease</b> in appearance	<input type="checkbox"/>

# CM -Results

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- Implicit prices for the attributes:

<b>Attribute</b>	<b>Label</b>	<b>Impl. Price</b>	<b>Label</b>	<b>Impl. Price</b>	<b>Label</b>	<b>Impl. Price</b>
Health	GM	0.18	EMS	0.12	Organic	0.06
Environment	GM	0.04	EMS	0.05	Organic	0.06
Appearance	GM	0.05	EMS	0.03	Organic	0.04

- The health attribute has the largest implicit price followed by the environment.
- WTP estimates from the CM survey were estimated using compensation variation.
- Only attribute variables that were statistically significant were used in the WTP estimates.

# Comparison of the WTP Estimates from the CV and CM Approaches

Scenario	CV		CM	
	Mean WTP	C.I.	Mean WTP	C.I.
Milk 1	2.41	2.24-2.54	2.11	2.00-2.22
Milk 2*	3.20	3.08-3.30	3.06	1.95-4.13
Milk 3*	3.51	3.39-3.63	3.50	2.92-4.12
Milk 4*	3.51	3.38-3.62	4.06	3.04-5.04
Tomato 1*	2.87	2.63-3.11	2.55	2.23-3.85
Tomato 2*	2.70	2.39-3.00	2.54	2.23-3.85
Tomato 3	4.25	4.17-4.32	6.22	5.16-7.38
Tomato 4	4.37	4.28-4.46	5.85	5.21-6.48
Pork 1	7.98	7.74-8.22	N.S.	N. S.
Pork 2	8.71	8.40-9.04	20.92	14.44-27.40
Pork 3	8.25	8.00-8.51	N.S.	N.S.
Pork 4	8.54	8.27-8.82	22.79	13.82-31.82 <sup>12</sup>

# Results

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- ❑ Three of the four milk scenarios provided WTP estimates that were not significantly different.
- ❑ Two of the four tomato scenarios provided WTP estimates that were not significantly different.
- ❑ Of the two scenarios that were estimated for pork, both were statistically different.
- ❑ Simulated WTP estimates from the CM method tended to be higher than those estimated by the CV method. This result has been reported in other studies and is the result of the assumed linear relationship between the implicit price and the attribute value.

# Conclusion

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- ❑ Of the 10 comparisons of WTP estimates from the two approaches; CV and CM, 5 of the WTP estimates were shown to be statistically different.
- ❑ The larger the change in attribute values the greater the chance that CM estimates will be larger than CV estimates.
- ❑ Additional research is needed on the impact of labels, attribute values, and the relationship between implicit prices and attribute values in the estimation of WTP from the CM method.