

Parc Mediterrani de la Tecnologia
Edifici ESAB
Carrer Esteve Terradas, 8
08860 Castelldefels, Barcelona

**A DUAL RESPONSE CHOICE EXPERIMENTS (DRCE) DESIGN
TO ASSESS RABBIT MEAT PREFERENCE IN CATALONIA:
A HETEROOSCEDASTIC EXTREME-VALUE MODEL**

KALLAS, Z. & GIL, J.M.

**Center for Agro-food Economy and Development
(CREDA-UPC-IRTA)
Barcelona, Spain**

The EAAE 2011 Congress, Change and Uncertainty Challenges for Agriculture, Food and Natural Resources, August 30 to September 2, 2011, Zurich, Switzerland

Outline

1. INTRODUCTION

2. OBJECTIVE

3. METHODOLOGY

4. EMPIRICAL APPLICATION

5. RESULTS

6. CONCLUSIONS

1. INTRODUCTION

- ❑ **The Choice Experiments (CE) is a suitable method to analyze consumers' preferences for “complex” goods in order to evaluate simultaneously their descriptors (attributes & levels).**
- ❑ **It uses experimental design to create different hypothetical scenarios of a product (alternatives) by combining the attributes and their levels. These alternatives are later grouped in “choice sets” to be evaluated by respondent.**

1. INTRODUCTION

- ❑ **Researchers usually face two approaches in the construction of choice sets:**
 1. **Excluding the “opt-out” option from choice sets by forcing participants to select an alternative.**
 2. **Including in the choice set the “opt-out” option allowing for a non-forced choice task.**

- ❑ **The issue of including or excluding the opt-out alternative in CE has been addressed by several studies, from which we focus on the following question:**

1. INTRODUCTION

1. Why INCLUDING an opt-out option?

- To increase the realism of the hypothetical simulated market.
- Allow to be consistent with the demand theory and enhance the theoretical validity of the welfare estimates.
- When the researcher seeks to measure market penetration

1. INTRODUCTION

2. Why EXCLUDING an opt-out option?

- The interest of the study is to compare levels and attributes or alternatives.
- The procrastination of the choice is damaging, i.e. the cost of delay is high or the product is needs urgently.
- To avoid potential “greater easy way out”

2. OBJECTIVE

- ❑ **The objective of this research is:**
 - **To assess consumer preferences and willingness to pay obtained from forced and non-forced choice.**
 - **To use the Dual Response choice design as an alternative to the traditional CE design.**

3. METHODOLOGY:

3.1. The Experimental Design

- The traditional and common approach is to analyse forced versus non-forced choices is to realise two studies simultaneously

Sample 1

Choice set # 1	Alt. "A"	Alt. "B"	Alt. "C"
Attribute 1 (A ₁)	Level 1 (L _{1.1})	Level 2 (L _{1.2})	No-Choice
⋮	⋮	⋮	
Attribute n (A _n)	Level 3 (L _{4.3})	Level 1 (L _{4.1})	

1. Considering these available products "A" and "B", which product would you choose?
 "A" "B" Neither "C"

Sample 2

Choice set # 1	Alt. "A"	Alt. "B"
Attribute 1 (A ₁)	Level 1 (L _{1.1})	Level 2 (L _{1.2})
⋮	⋮	⋮
Attribute n (A _n)	Level 3 (L _{4.3})	Level 1 (L _{4.1})

1. Considering that "A" and "B" are the only available products, which product would you choose? "A" "B"

3. METHODOLOGY:

3.1. The Experimental Design

- The alternative approach is the Dual Response Choice Experiment design that we propose in our work.

Choice set # 1	Alt. "A"	Alt. "B"
Attribute 1 (A ₁)	Level 1 (L _{1.1})	Level 2 (L _{1.2})
⋮	⋮	⋮
Attribute n (A _n)	Level 3 (L _{4.3})	Level 1 (L _{4.1})
<p>1. Considering that "A" and "B" are the <u>only</u> available products, which product would you choose? "A" <input type="checkbox"/> "B" <input type="checkbox"/></p> <p>2. Would you purchase your chosen product? Yes <input type="checkbox"/> No <input type="checkbox"/></p>		

3. METHODOLOGY:

3.2. The Econometric modeling

- Independent of the decision to include or exclude an “opt-out option”, the usually applied model fall within the standard Multinomial Logit. The main assumption that underlie the formulation of this model is the IIA (Independence of Irrelevant Alternatives) constraint.
- Several models are defined to overcome this limitations → The HEV model relaxes the restrictive IIA property of the MNL model by allowing different scale parameters across alternatives

4. EMPIRICAL APPLICATION

4.1. Case study

- The rabbit meat preference in Catalonia has been used as a case study.
- One of the main identified weaknesses of its consumption is that the rabbit meat was defined as a homogenous product without differentiation for quality or geographical area.
- It has been considered the possibility of introducing a certified brand based on its region of origin (Catalonia) to provide a premium to its value → Will be analyzed by CE

4. EMPIRICAL APPLICATION

4.2. Sampling

- The data used in this analysis was obtained from a structured questionnaires.
- The questionnaire solicits extensive information on the socio-economic characteristics of consumers, attitudes, preferences and opinions toward rabbit meat.
- The Quota sampling procedure was used. The sample was stratified by age and gender. The final sample 114 individuals.

4. EMPIRICAL APPLICATION:





4.3. Attributes and levels & experimental design

Attributes	symbols	Levels
<i>Origin</i>	A_1	Catalonia (regional), Spain (national), Imported (international)
<i>Format</i>	A_2	Entire, Pieced, Boneless
<i>Brand</i>	A_3	Quality brand (PDO,...), Manufacturer brand, Generic brand
<i>Price</i>	A_4	€5.50 , €6.00, €6.50

- A full orthogonal factorial design → 81 hypothetical products can be generated from $3^4 \times 3^4$ (6,561) possible combinations.
- we used the orthogonal fractional factorial design → 9 choice sets

4. EMPIRICAL APPLICATION:

4.3. Attributes and levels & experimental design

ELECTION # 1		Option "A"	Option "B"
Origin		Catalonia	Spain
Format		Boneless	Entire
Brand		Non labelled	Quality brand
Price		€6.50	€5.50
<p>1. Considering that "A" and "B" are the <u>only</u> available products, which product would you <u>choose</u>? "A" <input type="checkbox"/> "B" <input type="checkbox"/></p> <p>2. Would you <u>purchase</u> your chosen product? Yes <input type="checkbox"/> No <input type="checkbox"/></p>			

5. RESULTS

5.1. HEV model results using the DRCE design

<i>Forced Choice (first step of DRCE)</i>				<i>Non-forced Choice (including the second step of DRCE)</i>			
<i>Variables</i>	<i>Coeff.</i>	<i>Std. error</i>	<i>p-value</i>	<i>Variables</i>	<i>Coeff.</i>	<i>Std. error.</i>	<i>p-value</i>
Spain (origin)	0.7118	0.1568	0.0000	Spain (origin)	0.3549	0.1141	0.0019
Catalonia (origin)	1.2338	0.1977	0.0000	Catalonia (origin)	0.5729	0.1605	0.0004
Pieced (format)	0.1508	0.0950	0.1124	Pieced (format)	0.0773	0.0602	0.1991
Entire (format)	-1.2195	0.4235	0.0040	Entire (format)	-0.6643	0.2490	0.0076
Quality (brand)	1.1522	0.3392	0.0007	Quality (brand)	0.6728	0.2206	0.0023
Commercial (brand)	0.1271	0.0756	0.0924	Commercial (brand)	0.1009	0.0492	0.0401
Price	-1.6784	0.6549	0.0104	Price	-0.9798	0.3755	0.0091
				No-choice option (C)	-6.4815	2.3546	0.0059
<i>Scale Parameters of Extreme Value Distribution</i>				<i>Scale Parameters of Extreme Value Distribution</i>			
θ_A	0.8780	0.1370	0.0000	θ_A	1.7683	3.316	0.0009
θ_B	1.0000	Fixed Parameter		θ_B	2.1848	3.132	0.0017
				θ_C	1.0000	Fixed Parameter	
<i>Std Dev for HEV distribution</i>				<i>Std Dev for HEV distribution</i>			
σ_A	1.4607	0.2278	0.0000	σ_A	0.7253	3.316	0.0009
σ_B	1.2825	Fixed Parameter		σ_B	0.5870	3.132	0.0017
				σ_C	1.2825	Fixed Parameter	
<i>N</i>	2,052 (114 consumers ×2 alternative × 9 choice sets)			<i>N</i>	3,078 (114 consumers ×3 alternative × 9 choice sets)		
<i>LL(0)</i>	-711.169	<i>LL(θ)</i>	-497.565	<i>LL(0)</i>	-1,127.176	<i>LL(θ)</i>	-987.938
<i>LLR</i>	427.20 (0.000)	<i>pseudo R²</i>	0.2944	<i>LLR</i>	278.475 (0.000)	<i>pseudo R²</i>	0.1208

- Overall, both models are highly significant and show a good fit with highly significant likelihood ratios.
- Results demonstrate that, in both models, all parameters (variables coefficients and scale parameters) are statistically significant with the exception of the level “pieced” of the “format” attribute, indicating that all the attributes considered are significant determinants of consumer welfare.

5. RESULTS

5.1. The economic interpretation: the Implicit Price-IP

<i>Attributes levels</i>	<i>Forced Choice (Step 1 of the DRCE)</i>	<i>Non-forced Choice (Step 2 of the DRCE)</i>	<i>% of IP difference from forced to non forced choice</i>	<i>P-value of IP difference</i>
	<i>Implicit Price</i>	<i>Implicit Price</i>		
Imported (origin)	-1.159***	-0.947***	-22.39%**	0.0203
Spain (origin)	0.424***	0.362***	-17.13%	0.6120
Catalonia (origin)	0.735***	0.585***	-25.64%*	0.0995
Boneless (format)	0.637**	0.599**	-6.34%	0.7925
Pieced (format)	0.090	0.079	-13.92%	0.4239
Entire (format)	-0.727***	-0.678***	-7.23%	0.7475
Generic (brand)	-0.762***	-0.790***	3.54%	0.8247
Quality (brand)	0.686***	0.687**	0.15%	0.8197
Commercial (brand)	0.076	0.103*	26.21%	0.2571

- Comparing results obtained from the step 1 of the DRCE (forced choice) and step 2 (non-forced choice), attributes have the same ranking score.
- In most cases IPs are relatively similar with the exception of two attribute' levels: the “imported” and the “Catalan” origin of the rabbit meat

6. CONCLUSIONS

6.1. Methodological results

- ❑ The DRCE design has showed its capacity to analyse in one experiment forced and non forced choice.
- ❑ Results show non significant difference between the implicit price values in our case study.
- ❑ The HEV model is shown to be a good alternative to the standard MNL by relaxin the IIA restriction.
- ❑ More empirical studies need to be done comparong the DRCE design with the traditional CE design.

6. CONCLUSIONS

6.2. Empirical results

- ❑ Consumers have a high preference for the local (Catalan) origin of rabbit meat, revealing the importance of the Catalonian identity in food consumer behaviour.
- ❑ The second highest preference refers to the “Certified Quality” brand.
- ❑ Consumers also revealed a higher preference for the “boneless” rabbit meat format showing their preference for convenience products.
- ❑ Marketing tools should be more focused on highlighting the origin of the product with an emphasis on regional quality brands