Two possible extensions for an economic re-valuation index: a case study on the Italian dry-cured ham

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Cibo e vino: Metodi e modelli statistici per classificare, scegliere e sperimentare

Conjoint Analysis

Conjoint analysis (CA) is a technique widely used to investigate consumer choice behaviour. In particular, in this study CA refers to the stated preference model used to obtain part-worth utilities. The aim of this model consists in estimating a utility function U_k for the characteristics describing several profiles. The U_k is defined as follow:

$$U_k = \sum_{s=0}^{n} \beta_s x_{sk} \tag{1}$$

where x_{0k} is equal to 1 and n is the number of all level of attributes which define the combination of a given profile, x_{sk} is the dummy variable that refers to the specific attribute level. As a result, the utility associated with k alternatives (U_k) is obtained by summing the terms $\beta_s x_{sk}$ over all attribute levels, where β_s is the partial change in U_k for the presence of the attribute level s, holding all other variable constants.

The economic re-valuation index

Part-worth utilities of levels obtained from CA represents the starting point to re-evaluate the proposed price of the dry-cured ham. Economic re-evaluation is carried out through relative importance of attributes in non-standard CA using Mariani-Mussini coefficient of economic valuation MI_{ij}. The general formulation of MI_{ij} is:

$$MI_{ij} = \frac{U_i - U_b}{U_b} * I_j \tag{2}$$

where U_i is the total utility associated with the profile i, U_b the total utility associated with a baseline profile and I_j is the relative importance for the attribute j. Given the price associated with the baseline profile π, the coefficient can be expressed, in monetary terms, as:

$$V_{ij} = MI_{ij} * \pi \tag{3}$$

Weaknesses of the index

- It is possible to measure monetary variations when only one quality is different from baseline profile
- It depends on the number of attributes
- Since it is sensible to number of attributes, survey was submitted 3 times in order to create 3 different models:
  - Model A: all n qualities are inserted in the model
  - Model B: $n-1$ qualities are inserted in the model
  - Model C: $n-2$ qualities are inserted in the model

Proposal 1

The first proposal consists in the introduction of F_j a multiplicative factor taking into account p the number of levels considered:

$$F_j = \frac{u_{ij} - u_{bj}}{p} \tag{4}$$

where $u_{ij} - u_{bj}$ is the difference in terms of part-worth utilities between the i profile and the b baseline one. The F_j factor is multiplied for the original Mariani-Mussini coefficient.

$$MI_{il} = M_i * I_j * F_j \tag{5}$$

The modified version of MI_{il} is multiplied for 3 different levels of price π

$$V_{il} = MI_{il} * \pi \tag{6}$$

Proposal 2

According to the second approach, a solution is to weigh the importance indexes by considering all n possible combinations keeping fixed only one of the attributes.

The arithmetic mean of all possible permutations I_k gives the correction factor I_n

$$\overline{I_n} = \frac{\sum_{k=0}^{n} I_k}{n} \tag{7}$$

$$MI_{in} = M_i * \overline{I_n} \tag{8}$$

The new coefficient MI_{in} is multiplied for 3 different levels of price π

$$V_{in} = MI_{in} * \pi \tag{9}$$

Data

Our experiment was run using a Paper and Pencil interviews. Respondents were 43 cured meats consumers. They have to express their preferences about 8 profiles of dry-cured ham containing a combination of attributes.

Attributes	Levels
Authentication	DOP/IGP
	None
Producer	Local
	Italian
Price (π)	20€/Kg
	25€/Kg
	30€/Kg
Taste	Sweet
	Salty
Aging	12 months
	16 months

Most appreciated dry-cured ham

Most desirable qualities and their importance indexes for dry-cured ham are shown.

Attributes	**Model A**	**Model B**	**Model C**
Authentication	DOP/IGP	DOP/IGP	None*
Producer	Italian	Local	Local
Price	25€/Kg	25€/Kg	20€/Kg
Taste	Salty	Sweet	-
Aging	12 months	-	-

Attributes	**Model A**	**Model B**	**Model C**
Authentication	20.41%	20.54%	26.48%
Producer	15.42%	22.19%	27.63%
Price	28.40%	36.15%	45.89%
Taste	19.17%	21.11%	-
Aging	16.59%	-	-

MI_{il} and MI_{in} coefficients for Model A, B, C

The case study on proposal 1 focuses the attention on the quality Producer, so here original M_{ij} and modified M_{il} version of the index are presented to compare results.

Attributes	**Model A**	**Model B**	**Model C**
MI_{ij}	0.928%	−1.415%	−2.616%
MI_{il}	0.024%	0.046%	1.652%

Otherwise, the application on proposal 2 focuses the attention on the quality Certification.

Attributes	**Model A**	**Model B**	**Model C**
MI_{ij}	−1.080%	−1.780%	0.075%
MI_{in}	−1.240%	−1.246%	0.090%

Conclusions and Future Research

- Conjoint Analysis helped to understand consumers' preferences about dry-cured ham
- The economic re-valuation index is sensible to the number of the attributes considered, so 3 different surveys with n , $n-1$ and $n-2$ attributes are submitted to consumers
- 2 new approaches are proposed to fix the weaknesses of the index
- Relevant differences about preferences are present when 3 models are presented but it is possible to reduce the bias using the 2 proposals