An MDS Approach

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Methodology

We are proposing a Market Structure Analysis approach. For this purpose, we are using an index of competition measurement with the following properties:

- it has distance properties
- it takes into account the different levels of loyalty (re-purchase) characterizing each brand
- it considers the asymmetrical characteristic of the switching matrix

On the other hand, we are proposing to compare this index with other indices existing in the literature. The proposed index of competition between two brands uses a comparison of switching profiles of those two brands with the others (see Aurier 1990, 1991a, 1991b 1991c). Let,

n_{ij}: number of switching from row i to column j

SR_i: sum of row i

SC_j: sum of column j

Index $PROF_{kl}$ (competition between k and l) is measured on the columns of the matrix, comparing the attractivity profiles of the brands

$$PROF_{kl} = \sum_{\substack{i=1 \\ i \neq k \\ i \neq l}}^{N} \left(\frac{n_{ik}}{SC_k - n_{kk}} - \frac{n_{il}}{SC_l - n_{ll}} \right)^2 \frac{1}{A}$$

We have compared three versions where A may have the following forms:

PROF1 $A = n_{ik} + n_{il}$

PROF2 $A = SR_i - n_{ii} - (n_{ik}+n_{il})$

PROF3 $A = SR_i - n_{ii}$

Index $TPROF_{kl}$ (competition between k and l) is measured on the rows of the matrix, comparing the receptivity profiles of the brands. The calculus is the same after transposition of the switching matrix. We obtain the three versions TPROF1, TPROF2 and TPROF3.

The other indexes for the comparison are those proposed by Lehmann (1972) and Rao and Sabavala (1981) (respectively named LEM1 and RAO1).

$$LEM1_{kl} = \frac{n_{kl} + n_{lk}}{SR_k + SR_l}$$

$$RAO1_{kl} = \frac{n_{kl}}{SR_k . SC_l}$$

We proposed another version of these two indexes where we take into account the levels of loyalty in the standardization terms (named LEM2 AND RAO2).

$$LEM2_{kl} = \frac{n_{kl} + n_{lk}}{\left(SR_l - n_{ll}\right) + \left(SR_k - n_{kk}\right)}$$

$$RAO2_{kl} = \frac{n_{kl}}{\left(SR_k - n_{kk}\right).\left(SC_l - n_{ll}\right)}$$

The indices RAO1 and RAO2 are made symmetric, as suggested by Rao and Sabavala (1981) using the mean of RAO_{kl} and RAO_{lk}.

The different matrices of competition were ALSCAL analyzed, in the same configuration:

Model = Euclid
Level = Ratio
Data = Symmetric

Similarity (S_{kl}) indices were put as dissimilarities (D_{kl}) using the transformation $D_{kl} = (S_{kl} - max S_{kl})/max S_{kl}$.

Results

Table 1 presents the comparative adequacy of the ALSCAL solutions obtained in 6 to 1 dimensions for the different indices. As suggested by Schiffman, Reynolds and Young (1981, p 175), we used the R square (and not the Stress) as the index of adequacy.

PROF1, PROF2, TPROF1 and TPROF2 gave dramatically better results (see Table 1). With these indices, the quality of representation is constant from 6 to 1 dimensions, suggesting the unidimensionality of the phenomenon (it is confirmed by the mapping). High quality and special positioning of foreign cars are opposed to the "common man's car" (large French product line).

With the other indices (LEM1, LEM2, RAO1 and RAO2) the representations are "loss or imposition structure" (see Shepard in Davies & Coxon 1981, Section 1): all the brands are focused round the same point.

Finally, we can observe that the versions RAO2 and LEM2, which are corrected by the level of loyalty, give substantially better representations than the original forms.

Table 1: Adequacy of the configurations (R SQUARE)

	6	5	4	3	2	1
PROF1	.41	.41	.41	.41	.41	.41
PROF2	.94	.94	.94	.94	.41	.93
PROF3	.95	.95	.95	.95	.93	.93
TPROF1	-	-	-	.44	.44	.44
TPROF2	.92	.92	.92	.92	.92	.92
TPROF3	.94	.94	.94	.94	.94	.94
LEM1	.24	.22	.07	.10	.07	.00
LEM2	.33	.32	.22	.21	.19	.05
RAO1	.39	.36	.32	.26	.07	.07
RAO2	.63	.58	.51	.38	.28	.11

Figure1: Representation 1x2 for PROF2 index

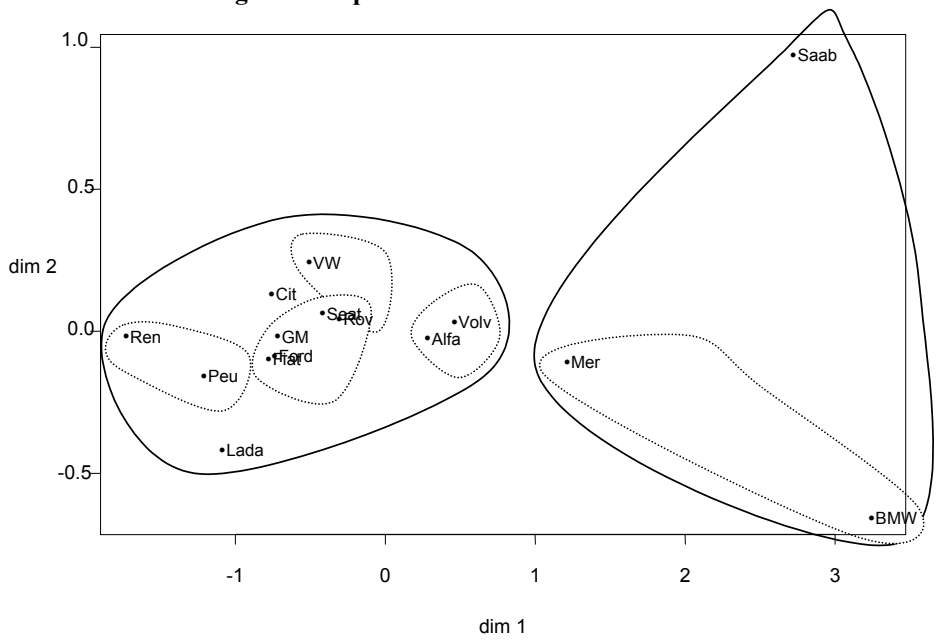

Figure2: Representation 1x2 for TPROF2 index