BAV Project

**Model estimation**

**Model from first-round paper**

**My suggestion for an MNL Market share model**

1. Following Cooper and Nakanishi (2010, p. 128), the attraction Abt for brand b in period t and its associated market share sbt in an MNL model are given by

(1)

and

(2)

where αby is brand- and year-specific intercept (set to zero in one year for one brand), *Xbkt* is the matrix of explanatory variables (price, promotion, distribution, and ad-stock) with heterogenous response coefficients, Wbl is the matrix of brands’ attribute levels with homogenous response coefficients, εbt is the error term, and m is the number of all available brands b in time period t.

1. Linearizing equation (1) yields

(3)

1. Introduction of endogeneity

Gaussian copulas are used to model the correlation between the potentially endogenous regressors contained in X (Pricebt, Promotionbt, Distributionbt, and AdStockbt), and the error term . Following Park and Gupta (2012), we compute control variables, and add them to the matrix X. We apply the following transformation (see footnote 3, p. 572 in Park and Gupta 2012): X\*bkt=, where is the inverse distribution function of the standard normal, and H(·) is the empirical cumulative distribution function of Xbk (or of Xk, discuss this with Harald).

1. We follow the base-brand approach (which yields the exact same coefficients as the log mean-centering approach advocated by Cooper and Nakanishi, 2010). We subtract an arbitrary base brand B (typically one that has maximum coverage in terms of number of observations), and transform

(4)

to:

(5)

or, equivalently

(6)

for all . Note that this sytem contains B-1 equations, and that is set to zero for identification.

Estimation either via SUR, or Maximum Likelihood (better for model extensions, see below).

**Extensions**

1. In a later stage, we can make and a function of CBBE instead of estimating dummy variables, e.g.

(7)

(9)

For identification, α0,b=1,y=1 and are set to zero.

1. Alternatively, a HLM model can be obtained by adding random components to and in (8) and (9)

(10)

(11)

where and