Instructions to Use the Transportation Modeling Package

MDCEV Estimation Model with No Outside Good

MDCEV Estimation Model with No Outside Good

- This is an addendum to help understand how to use the R script for running the MDCEV model with no outside good, and with no mixing. The input dataset specifications, a description of the test data, and the outputs from the test data are also provided in this documentation.
- For further details, please refer to Bhat (2007) "The Multiple Discrete-Continuous Extreme Value (MDCEV) Model: Role of Utility Function Parameters, Identification Considerations, and Model Extensions," Technical paper, Department of Civil Engineering, The University of Texas at Austin, available at http://www.caee.utexas.edu/prof/bhat/MDCEV.html

MDCEV Estimation Model with No Outside Good: R Scripts

- In the package, there are two scripts that are provided for estimating an MDCEV model with no outside good:
  - **mdcev_nooutside.r:** This is the script containing the actual MDCEV code. Please do not modify this script.
  - **Run_mdcev_nooutside.r:** This R script contains the settings and parameters that need to be specified for the MDCEV model. Users can update the model parameters and settings using this script.

MDCEV Estimation Model with No Outside Good: Preparing the Input Data

- The input data should be in the form of a Comma Separated Values (CSV) file. MS Excel is one of the good tools to create CSV files. The input data **should** include the following columns with the variable names given below:
  - A column of 1s with a variable name "uno" (Mandatory)
  - A column of 0s with a variable name "sero" (Mandatory)
  - Case ID: A column of observation numbers (or case numbers) from 1 to the number of observations in the data. The name of this column is "caseid" (Mandatory)

MDCEV Estimation Model with No Outside Good: Preparing the Input Data

- **Dependent variables:** As many columns as the number of alternatives, with each column containing the expenditure amount for each alternative. (Mandatory)
- **Price variables:** As many columns as the number of alternatives, with each column containing the price per unit consumption for each alternative. This data is required only when there is price variation across goods. (Optional)
- **Weights:** One column of estimation-weights to be applied to each decision-maker. This data is required only when weighting is required. (Optional)
- **Explanatory variables:** One column for each explanatory variable. (Mandatory)

MDCEV Estimation Model with No Outside Good: Running the Model

- **Step 1:** Open the R code "Run_mdcev_nooutside.r".
- **Step 2:** Update the path of the source code (mdcev_nooutside.r), and the path and name of the input data as required.
- **Step 3:** Change the settings of the MDCEV model in the R-code (Run_mdcev_nooutside.r) as required.
- The data dictionary for the datasets used here is as follows.

Data dictionary for "testnout.csv" data

Variable Name	Description
config	Utility specification configuration, possible values: 1, 4, 7
alp0to1	1 if you want the Alpha values to be constrained between 0 and 1; 0 otherwise
price	1 if there is price variation across goods; 0 otherwise
nc	Number of alternatives (in the universal choice set)
po	Position of pointer to case number in data set

MDCEV Estimation Model with No Outside Good: Running the Model

Data dictionary for "testnout.csv" data (Cont.)

Variable Name	Description
ivuno	Position of UNO variable (i.e., the column of ones) in data set
ivsero	Position of SERO variable (i.e., the column of zeros) in data set
wtind	Position of WEIGHT variable (i.e., the column of weights). If the data has weights, then the dataset should consist of a column of weights.
def	DEPENDENT variables (i.e., the consumption quantities for each alternative - NOT consumption expenditures for each alternative) (number of labels = number of alternatives).
fp	PRICE variables (number of labels = number of alternatives). Provide all UNO variables if there is no price variation
ivmt	• In the following specification, ivm1, ivm2, ivm3 contain independent variable specifications (on right hand side) for baseline utility (PSI) for alternatives 1, 2, and 3 • Add a row for ivm4 below if there is a 4th alternative, another additional row for ivm5 if there is a 5th alternative, ... (number of rows = number of alternatives) • Number of columns = Number of variables including alternative specific constant. Consider the first alternative as base

MDCEV Estimation Model with No Outside Good: Running the Model

Data dictionary for "testnout.csv" data (Cont.)

Variable Name	Description
ivdts	• In the following specification, ivdts[[1]], ivdts[[2]], ivdts[[3]] contain input data specifications (on right hand side) for satiation parameters (alphas) for alternatives 1, 2, and 3. • Add a row below for ivdts[[4]] if there is a 4th alternative, another additional row for ivdts[[5]] if there is a 5th alternative,.... (number of rows = number of alternatives). • Number of columns = Number of alternatives; Note that you can also add individual-specific variables below, so that satiation varies across individuals. • However, you will then have to translate outputs to compute actual alpha parameters. • This code is written to provide you with the alpha parameters directly for the case when there is no variation in alpha across individuals.
ivgts	• In the following specification, ivgts[[1]], ivgts[[2]], ivgts[[3]] contain input data specifications (on the right hand side) for translation parameters (gammas) for alternatives 1, 2, and 3. • Add a row for ivgts[[4]] if there is a 4th alternative, another additional row for ivgts[[5]] if there is a 5th alternative,....(number of rows = number of alternatives). • Number of columns = Number of alternatives; Note that you can also add individual-specific variables below, so that gamma varies across individuals. • However, you will then have to translate outputs to compute actual gamma parameters. • This code is written to provide you with the gamma parameters directly for the case when there is no variation in gamma across individuals.

MDCEV Model Estimation with No Outside Good: Running the Model

Data dictionary for "testnout.csv" data (Cont.)

Variable Name	Description
alpha_names	Satiation parameter names for labeling (number of labels = number of alternatives)
gamma_names	Translation parameter names for labeling (number of labels = number of alternatives)
maxlikmethod1	The method of maximum likelihood for initial estimation
maxlikmethod2	The method of maximum likelihood for final estimation

MDCEV Estimation Model with No Outside Good: Running the Model

- **Step 4:** Select all and run (Ctrl+A and Ctrl+R).

Note 1: Detailed information regarding the settings of MDCEV is available within the R code "Run_mdcev_nooutside.r".

Note 2: R Libraries needed to run this code are "miscTools" and "maxLik".

Note 3: For the case "no outside good", the last row in the variable specification (ivmt) should contain no variable, i.e. ivmt[[*n*]] <- c().

MDCEV Estimation Model with No Outside Good: Results from the Test Data – "testnout.csv"

- The following pages show the results for various configurations of the MDCEV model using "testnout.csv" data.

MDCEV Estimation Model with No Outside Good: Results from the Test Data – "testnout.csv"

```
> summary(result); # Show results from the MDCEV model with no outside good
--------------------------------------------
Maximum Likelihood estimation
BFGS maximisation, 0 iterations
Return code 0: successful convergence
Log-Likelihood: -3054.679
7  free parameters
Estimates:
                Std. error
uno      0.24899    0.13835  1.79967 0.072
hhsize -0.02989    0.04933 -0.60593 0.545
uno     -0.79710    0.16394 -4.86204 0.000
hhsize -0.02657    0.06051 -0.43904 0.661
D01      0.93384    0.01022 91.41043 0.000
D02      0.91044    0.01441 63.18718 0.000
D03      0.92597    0.01063 87.06888 0.000
G01      1.00000    0.00000       NA    NA
sigm     1.00000    0.00000       NA    NA
--------------------------------------------
>
```

Example Result of a MDCEV from R-Studio (config = 1)

MDCEV Estimation Model with No Outside Good: Results from the Test Data – "testnout.csv"

```
> summary(result); # Show results from the MDCEV model with no outside good
--------------------------------------------
Maximum Likelihood estimation
BFGS maximisation, 0 iterations
Return code 0: successful convergence
Log-Likelihood: -2862.736
7  free parameters
Estimates:
                Std. error
uno      0.31890    0.14532   2.19453 0.028
hhsize  -0.02948    0.05006  -0.58887 0.556
uno     -0.74753    0.16948  -4.41066 0.000
hhsize  -0.02540    0.06151  -0.41292 0.680
D01      0.00000    0.00000         NA    NA
G01    391.34361   75.62836   5.17456 0.000
G02    234.10091   42.41971   5.51868 0.000
G03    657.41173  165.22142   3.97897 0.000
sigm     1.00000    0.00000         NA    NA
--------------------------------------------
>
```

Example Result of a MDCEV from R-Studio (config = 4)

MDCEV Estimation Model with No Outside Good: Results from the Test Data – "testnout.csv"

```
> summary(result); # Show results from the MDCEV model with no outside good
--------------------------------------------
Maximum Likelihood estimation
BFGS maximization, 0 iterations
Return code 0: successful convergence
Log-Likelihood: -6764.623
4  free parameters
Estimates:
                Std. error
uno      1.59730    0.07356  21.71539 0.000
hhsize  -0.14021    0.02758  -5.08303 0.000
uno     -2.10527    0.09746 -21.60191 0.000
hhsize  -0.04952    0.03550  -1.39497 0.163
D01      0.00000    0.00000         NA    NA
G01      1.00000    0.00000         NA    NA
G02      1.00000    0.00000         NA    NA
G03      1.00000    0.00000         NA    NA
sigm     1.00000    0.00000         NA    NA
--------------------------------------------
>
```

Example Result of a MDCEV from R-Studio (config = 7)