

Assignment 4: Mode choice modeling: Multinomial logit model

Logistics

- **Prepare a 1-to-2-page** (Font size: 10 to 12 point, single spacing) **report in Microsoft Word.**
- Please note that you can work in a group of 2 members for the assignment.
- You can divide the work among yourselves. *But the assignment should clearly identify which portion has been written and analyzed by whom. Without a clear statement about the member contribution the assignment will not be graded.*
- For analysis I highly recommend that you use some programming language and not rely on Excel, I will provide some help on R – but you will need to work on your own if you choose other languages such as Python or Matlab.

Submission

1. Develop a mode choice model using the `apollo_modeChoiceData.csv` file uploaded in the `mode_choice_demonstration` folder of the Microsoft teams. For this part of the assignment you should use only the RP data. To subset the database for RP data only you can use the following command in R.

`database = subset(database,database$RP==1)`

The utility specification of the multinomial logit model should be

Your model should have the following variables in the utility of the four modes (car, bus, rail, and air)

- (i) Travel time: Please assume alternative specific travel time parameters
- (ii) Travel cost: Please assume alternative specific travel cost parameters
- (iii) Access time: Please assume generic access time parameters

After the successful convergence of the model please report the following information

- (i) Report the estimates of the above mentioned parameters along with the alternative specific constants in a table (let's call it the result table). The result table should include the estimates, the standard errors and the robust t statistics value.
 - (ii) Comment on the sign of the estimated parameters – do you think the sign of the parameters are intuitive?
 - (iii) Comment on the relative magnitude of the parameters across different modes. For example, comment on the relative magnitude of the travel time parameters across car, bus, rail, and air. Please do the same for ASC, travel cost and access time parameters.
 - (iv) Calculate the value of travel time for the four modes in Euro per hour. Comment on the relative magnitude of the calculated value of travel time.
 - (v) Calculate the value of access time for the four modes in Euro per hour. Comment on the relative magnitude of the calculated value of access time.
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2. Develop a mode choice model using the `apollo_modeChoiceData.csv` file uploaded in the `mode_choice_demonstration` folder of the Microsoft teams. For this part of the assignment you should use only the **SP data**. To subset the database for SP data only you can use the following command in R.

`database = subset(database,database$SP==1)`

The utility specification of the multinomial logit model should be

Your model should have the following variables in the utility of the four modes (car, bus, rail, and air)

- (iv) Travel time: Please assume alternative specific travel time parameters
- (v) Travel cost: Please assume generic travel cost parameter
- (vi) Access time: Please assume generic access time parameter
- (vii) Female dummy: Please use alternative specific female dummy – please assume car mode to be the baseline for the female dummy

After the successful convergence of the model please report the following information

- (i) Report the estimates of the above mentioned parameters along with the alternative specific constants in a table (let's call it the result table). The result table should include the estimates, the standard errors and the robust t statistics value.
- (ii) Comment on the sign of the estimated parameters – do you think the sign of the parameters are intuitive?
- (iii) Comment on the relative magnitude of the parameters across different modes. For example, comment on the relative magnitude of the travel time parameters across car, bus, rail, and air. Please do the same for ASC, travel cost and access time parameters.
- (iv) Calculate the value of travel time for the four modes in Euro per hour. Comment on the relative magnitude of the calculated value of travel time.
- (v) Calculate the value of access time for the four modes in Euro per hour. Comment on the relative magnitude of the calculated value of access time.