# Travel Mode - Multinomial Logit Model

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For multinomial models that include category–specific as well as global effects the function "mlogit" from the library "mlogit" can be used.

```
library(mlogit)
```

The "Travel Mode"–data are stored in the "Edcat"–package and can be loaded by the following command.

```
data(ModeChoice, package="Ecdat")
```

For the use of the function "mlogit" an appropriate data set has to be built. This is done by use of the function "mlogit.data".

```
travel.long <- mlogit.data(ModeChoice, choice="mode", shape="long", alt.levels=
c("air","train","bus","car"))
```

Now the model can be fitted. In the formula first the category–specific effects and then, separated by "—", the global effects are specified.

```
travel.kat.id <- mlogit(mode ~ invt + gc|hinc, data=travel.long)
summary(travel.kat.id)
```

Now the same model is fitted with the package "VGAM".

```
library(VGAM)
```

At first the data need to be prepared adequately to be ready for use with the function "vglm".

```
travelmode <- matrix(ModeChoice$mode, byrow = T, ncol = 4)
colnames(travelmode) <- c("air","train","bus","car")
travelhinc <- matrix(ModeChoice$hinc, byrow = T, ncol = 4)
travelhinc <- travelhinc[,1]
travelinvt <- matrix(ModeChoice$invt, byrow = T, ncol = 4)
colnames(travelinvt) <- c("invtair","invttrain","invtbus","invtcar")
travelgc <- matrix(ModeChoice$gc, byrow = T, ncol = 4)
colnames(travelgc) <- c("gcair","gctrain","gcbus","gccar")
```

```
travelinvt <- sweep(travelinvt[,-1], 1, travelinvt[,1])
travelgc <- sweep(travelgc[,-1], 1, travelgc[,1])


Invt <- travelinvt[,1]
Gc <- travelgc[,1]

traveldat <- cbind(travelhinc, travelinvt, Invt, travelgc, Gc)
traveldat <- as.data.frame(traveldat)
```

Now the model can be fitted.

```
fit <- vglm(travelmode ~ Invt + Gc + travelhinc,
            multinomial(parallel = FALSE ~ travelhinc, refLevel = 1),
            xij = list(Invt ~ invttrain + invtbus + invtcar,
                       Gc ~ gctrain + gcbus + gccar),
            form2 = ~ Invt + invttrain + invtbus + invtcar +
                      Gc + gctrain + gcbus + gccar + travelhinc,
            data = traveldat, trace = TRUE)

summary(fit)
summary(travel.kat.id)
```

At last we compare the coefficients of the two fitted models.

```
summary(travel.kat.id)$CoefTable
summary(fit)@coef3
```