

R2MLWIN - Training

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1 Vorwort

Dieses Dokument dient dem Erlernen des Umgangs mit R2MLWIN. Zudem vergleiche ich die Syntax mit der von `runmlwin`. Weiteres zur Modellexplikation findet sich unter 10.3 `Random coefficients for area type` in (Browne and Rasbash 2016).

2 Model

$$\text{logit}(\pi_{ij}) = \beta_0 + \beta_1 \text{age}_{ij} + \beta_2 \text{lcOnechild}_{ij} + \beta_3 \text{lcTwochildren}_{ij} + \beta_4 \text{lcThreeplus}_{ij} + \beta_5 \text{urban}_{ij} + u_{0j} + u_{5j} \text{urban}_{ij}$$

3 R-Syntax

```
data("bang1")
F6 <- logit(use) ~ 1 + age + lc + urban + (1 + urban | district)

(binomialMCMC <- runMLwiN(Formula = F6, D = "Binomial", data = bang1,
                          estoptions = list(EstM = 1)))#, debugmode=T))

## MLwiN is running, please wait.....

##
## *****
## MLwiN (version: 2.36) multilevel model (Binomial)
##      N min      mean max N_complete min_complete mean_complete
## district 60   2 32.23333 118           60             2       32.23333
##      max_complete
## district      118
## Estimation algorithm: MCMC      Elapsed time : 33.26s
## Number of obs: 1934 (from total 1934)      Number of iter.: 5000  Chains: 1  Burn-in: 500
## Bayesian Deviance Information Criterion (DIC)
## Dbar      D(thetabar)      pD      DIC
## 2328.933    2272.311    56.622    2385.556
## -----
## The model formula:
## logit(use) ~ 1 + age + lc + urban + (1 + urban | district)
## Level 2: district      Level 1: l1id
## -----
## The fixed part estimates:
##      Coef.      Std. Err.      z      Pr(>|z|)      [95% Cred.      Interval]      ESS
## Intercept      -1.72354      0.15906     -10.84    2.332e-27    ***      -2.03039      -1.39442      61
## age             -0.02727      0.00786      -3.47    0.0005197   ***      -0.04282      -0.01122     203
## lcOne_child      1.15731      0.15738      7.35    1.928e-13    ***      0.83848       1.46651     229
## lcTwo_children    1.37595      0.17441      7.89    3.039e-15    ***      1.02279       1.70107     186
## lcThree_plus     1.38420      0.17993      7.69    1.439e-14    ***      1.00169       1.73599     102
```

```

useyj ~ Binomial(_denomyj, πyj)
logit(πyj) = β0jIntercept + -0.027(0.008)ageyj + 1.157(0.157)lcOne_childyj + 1.376(0.174)lcTwo_childrenyj + 1.384(0.180)lcThree_plusyj + β5jurbanUrbanyj
β0j = -1.724(0.159) + u0j
β5j = 0.805(0.189) + u5j

```

$$\begin{bmatrix} u_{0j} \\ u_{5j} \end{bmatrix} \sim N(0, \Omega_u) : \Omega_u = \begin{bmatrix} 0.418(0.137) & -0.432(0.176) \\ -0.432(0.176) & 0.738(0.303) \end{bmatrix}$$

$\text{var}(\text{use}_{yj}|\pi_{yj}) = \pi_{yj}(1 - \pi_{yj})/_\text{denom}_{yj}$

PRIOR SPECIFICATIONS

```

p(β0) ∝ 1
p(β1) ∝ 1
p(β2) ∝ 1
p(β3) ∝ 1
p(β4) ∝ 1
p(β5) ∝ 1
p(Ωu) ~ inverse Wishart2[2*Su, 2], Su =  $\begin{bmatrix} 0.323 & -0.338 \\ -0.338 & 0.564 \end{bmatrix}$ 

```

Figure 1:

```

## urbanUrban      0.80537      0.18896      4.26      2.025e-05 ***      0.42332      1.18309      110
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## -----
## The random part estimates at the district level:
##              Coef.   Std. Err.   [95% Cred.   Interval]   ESS
## var_Intercept      0.41802      0.13682      0.20269      0.73076      206
## cov_Intercept_urbanUrban -0.43246      0.17573     -0.83467     -0.15496      127
## var_urbanUrban      0.73806      0.30328      0.29716      1.45696      142
## -----
## The random part estimates at the llid level:
##              Coef.   Std. Err.   [95% Cred.   Interval]   ESS
## var_bcons_1      1.00000      1e-05      1.00000      1.00000      5000
## -----
## -----
#trajectories(binomialMCMC["chains"][, "FP_Intercept", drop = FALSE])

```

4 Ansicht in MLWIN

5 Syntax in Stata:

```

quietly runmlwin use cons age onekid twokids threepluskids urban, ///
    level2(district: cons urban) ///
    level1(woman:) ///
    discrete(distribution(binomial) link(logit) denom(cons)) nopause

runmlwin use cons age onekid twokids threepluskids urban, ///
    level2(district: cons urban) ///
    level1(woman:) ///
    discrete(distribution(binomial) link(logit) denom(cons)) ///
    mcmc(on) initsprevious pause

```

Literatur

Browne, William J., and Jon Rasbash. 2016. *MCMC Estimation in Mlwin*. Version 2.36. Bristol: Centre of Multilevel Modelling, University of Bristol.