Hurdle models

Load packages

```
library(pscl)
```

```
## Classes and Methods for R developed in the
## Political Science Computational Laboratory
## Department of Political Science
## Stanford University
## Simon Jackman
## hurdle and zeroinfl functions by Achim Zeileis
```

```
library(PresenceAbsence)
library(memisc)
```

```
## Lade nötiges Paket: lattice
```

```
## Lade nötiges Paket: MASS
```

```
##
## Attache Paket: 'memisc'
```

```
## Die folgenden Objekte sind maskiert von 'package:stats':
##
##      contr.sum, contr.treatment, contrasts
```

```
## Das folgende Objekt ist maskiert 'package:base':
##
##      as.array
```

```
library(rms)
```

```
## Lade nötiges Paket: Hmisc
```

```
## Lade nötiges Paket: survival
```

```
## Lade nötiges Paket: Formula
```

```
## Lade nötiges Paket: ggplot2
```

```
##
## Attache Paket: 'ggplot2'
```

```
## Das folgende Objekt ist maskiert 'package:memisc':
##
##     syms


##
## Attache Paket: 'Hmisc'

## Die folgenden Objekte sind maskiert von 'package:memisc':
##
##     %nin%, html, Mean

## Die folgenden Objekte sind maskiert von 'package:base':
##
##     format.pval, units


## Lade nötiges Paket: SparseM


##
## Attache Paket: 'SparseM'

## Das folgende Objekt ist maskiert 'package:base':
##
##     backsolve
```

Import data

```r
tab<-read.table("Miguel_data2.txt",header=TRUE,sep="\t")
attach(tab)
```

Calculate full hurdle model with interactions (all PDOs)

```r
m<-hurdle(PDOS~MEDITERRANEAN*(scale(F1)+scale(F2)+scale(F3))|MEDITERRANEAN * (scale(F1) + scale(F2) + s
summary(m)
```

```
##
## Call:
## hurdle(formula = PDOS ~ MEDITERRANEAN * (scale(F1) + scale(F2) + scale(F3)) |
##     MEDITERRANEAN * (scale(F1) + scale(F2) + scale(F3)), data = tab,
##     dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -1.6461 -0.4909 -0.3608  0.2374  6.6837
##
## Count model coefficients (truncated negbin with log link):
##                     Estimate Std. Error z value Pr(>|z|)
## (Intercept)         -0.10570    0.09406  -1.124   0.2611
## MEDITERRANEAN        1.19199    0.11713  10.176  < 2e-16 ***
## scale(F1)            0.22862    0.10254   2.230   0.0258 *
## scale(F2)            0.04731    0.11271   0.420   0.6746
## scale(F3)            0.10736    0.07405   1.450   0.1471
```

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```
## MEDITERRANEAN:scale(F1)  0.10882    0.11907   0.914    0.3607
## MEDITERRANEAN:scale(F2)  0.07830    0.12946   0.605    0.5453
## MEDITERRANEAN:scale(F3) -0.02592    0.08652  -0.300    0.7645
## Log(theta)               1.69396    0.23363   7.251 4.15e-13 ***
## Zero hurdle model coefficients (binomial with logit link):
##                         Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -0.99701    0.08038 -12.404  < 2e-16 ***
## MEDITERRANEAN            3.33805    0.33251  10.039  < 2e-16 ***
## scale(F1)               0.75587    0.10064   7.511 5.88e-14 ***
## scale(F2)              -0.40775    0.08894  -4.585 4.55e-06 ***
## scale(F3)               0.23460    0.08131   2.885 0.003911 **
## MEDITERRANEAN:scale(F1) -0.16254    0.24387  -0.667 0.505073
## MEDITERRANEAN:scale(F2)  0.97846    0.25456   3.844 0.000121 ***
## MEDITERRANEAN:scale(F3)  0.40216    0.23279   1.728 0.084073 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 5.441
## Number of iterations in BFGS optimization: 20
## Log-likelihood: -1530 on 17 Df
```

Create matrix for results

```
results<-matrix(ncol=10,nrow=18)
rownames(results)<-c("Rsq c+z","RsqN z",names(coefficients(m)))
colnames(results)<-c("PDOS","pPDOS","MEAT-PDO","pMEAT_PDO","CHEESE_PDO","pCHEESE_PDO","OIL_PDO","pOIL_PI
results<-as.data.frame(results)
```

All PDOs Simplify full model by removing stepwise all insignificant variables/interactions

```
#remove interaction from zero model
m<-hurdle(PDOS~MEDITERRANEAN*(scale(F1)+scale(F2)+scale(F3))|scale(F1) + MEDITERRANEAN*scale(F2) +MEDITE
summary(m)
```

```
##
## Call:
## hurdle(formula = PDOS ~ MEDITERRANEAN * (scale(F1) + scale(F2) + scale(F3)) |
##     scale(F1) + MEDITERRANEAN * scale(F2) + MEDITERRANEAN * scale(F3),
##     data = tab, dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -1.6517 -0.4905 -0.3633  0.2273  6.6197
##
## Count model coefficients (truncated negbin with log link):
##                         Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -0.10570    0.09406  -1.124   0.2611
## MEDITERRANEAN            1.19199    0.11713  10.176  < 2e-16 ***
## scale(F1)               0.22862    0.10254   2.230   0.0258 *
## scale(F2)               0.04731    0.11271   0.420   0.6746
## scale(F3)               0.10736    0.07405   1.450   0.1471
## MEDITERRANEAN:scale(F1)  0.10882    0.11907   0.914   0.3607
## MEDITERRANEAN:scale(F2)  0.07830    0.12946   0.605   0.5453
```

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```
## MEDITERRANEAN:scale(F3) -0.02592    0.08652   -0.300    0.7645
## Log(theta)               1.69396    0.23363    7.251 4.15e-13 ***
## Zero hurdle model coefficients (binomial with logit link):
##                           Estimate Std. Error z value Pr(>|z|)
## (Intercept)               -1.00116    0.08003 -12.510  < 2e-16 ***
## scale(F1)                  0.72916    0.09158   7.962 1.69e-15 ***
## MEDITERRANEAN              3.23256    0.28578  11.311  < 2e-16 ***
## scale(F2)                 -0.40333    0.08816  -4.575 4.76e-06 ***
## scale(F3)                  0.23081    0.08090   2.853 0.004329 **
## MEDITERRANEAN:scale(F2)    0.94063    0.25406   3.702 0.000214 ***
## MEDITERRANEAN:scale(F3)    0.38652    0.23507   1.644 0.100116
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 5.441
## Number of iterations in BFGS optimization: 20
## Log-likelihood: -1530 on 16 Df
```

```
m<-hurdle(PDOS~MEDITERRANEAN*(scale(F1)+scale(F2)+scale(F3))|scale(F1) + MEDITERRANEAN*scale(F2),dist="r
summary(m)
```

```
##
## Call:
## hurdle(formula = PDOS ~ MEDITERRANEAN * (scale(F1) + scale(F2) + scale(F3)) |
##     scale(F1) + MEDITERRANEAN * scale(F2), data = tab, dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -1.5688 -0.5070 -0.3606  0.2422  6.5553
##
## Count model coefficients (truncated negbin with log link):
##                           Estimate Std. Error z value Pr(>|z|)
## (Intercept)               -0.10570    0.09406  -1.124   0.2611
## MEDITERRANEAN              1.19199    0.11713  10.176  < 2e-16 ***
## scale(F1)                  0.22862    0.10254   2.230   0.0258 *
## scale(F2)                  0.04731    0.11271   0.420   0.6746
## scale(F3)                  0.10736    0.07405   1.450   0.1471
## MEDITERRANEAN:scale(F1)    0.10882    0.11907   0.914   0.3607
## MEDITERRANEAN:scale(F2)    0.07830    0.12946   0.605   0.5453
## MEDITERRANEAN:scale(F3)   -0.02592    0.08652  -0.300   0.7645
## Log(theta)                 1.69396    0.23363   7.251 4.15e-13 ***
## Zero hurdle model coefficients (binomial with logit link):
##                           Estimate Std. Error z value Pr(>|z|)
## (Intercept)               -1.00755    0.07940 -12.689  < 2e-16 ***
## scale(F1)                  0.72471    0.08804   8.231  < 2e-16 ***
## MEDITERRANEAN              3.01869    0.25776  11.711  < 2e-16 ***
## scale(F2)                 -0.39488    0.08981  -4.397  1.1e-05 ***
## MEDITERRANEAN:scale(F2)    0.78926    0.21754   3.628 0.000285 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 5.441
## Number of iterations in BFGS optimization: 20
## Log-likelihood: -1539 on 14 Df
```

```
#remove interactions from count model
m<-hurdle(PDOS~MEDITERRANEAN*scale(F1)+MEDITERRANEAN*scale(F2)+scale(F3)|scale(F1) + MEDITERRANEAN*scale
summary(m)
```

```
##
## Call:
## hurdle(formula = PDOS ~ MEDITERRANEAN * scale(F1) + MEDITERRANEAN * scale(F2) +
##     scale(F3) | scale(F1) + MEDITERRANEAN * scale(F2) + scale(F3), data = tab,
##     dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -1.5981 -0.4851 -0.3629  0.2221  6.6796
##
## Count model coefficients (truncated negbin with log link):
##                         Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -0.10171    0.09294  -1.094   0.2738
## MEDITERRANEAN            1.18797    0.11627  10.218  < 2e-16 ***
## scale(F1)                0.22509    0.10148   2.218   0.0266 *
## scale(F2)                0.03863    0.10938   0.353   0.7240
## scale(F3)                0.08836    0.03844   2.298   0.0215 *
## MEDITERRANEAN:scale(F1)  0.11416    0.11744   0.972   0.3310
## MEDITERRANEAN:scale(F2)  0.09333    0.11983   0.779   0.4361
## Log(theta)               1.69215    0.23343   7.249  4.2e-13 ***
## Zero hurdle model coefficients (binomial with logit link):
##                         Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -0.99821    0.08036 -12.422  < 2e-16 ***
## scale(F1)                0.75166    0.09121   8.241  < 2e-16 ***
## MEDITERRANEAN            3.07810    0.26187  11.754  < 2e-16 ***
## scale(F2)               -0.41035    0.08825  -4.650 3.32e-06 ***
## scale(F3)                0.28639    0.07413   3.863 0.000112 ***
## MEDITERRANEAN:scale(F2)  0.89450    0.23870   3.747 0.000179 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 5.4311
## Number of iterations in BFGS optimization: 18
## Log-likelihood: -1532 on 14 Df
```

```
m<-hurdle(PDOS~MEDITERRANEAN*scale(F1)+scale(F2)+scale(F3)|scale(F1) + MEDITERRANEAN*scale(F2) + scale(F
summary(m)
```

```
##
## Call:
## hurdle(formula = PDOS ~ MEDITERRANEAN * scale(F1) + scale(F2) + scale(F3) |
##     scale(F1) + MEDITERRANEAN * scale(F2) + scale(F3), data = tab, dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -1.5973 -0.4854 -0.3619  0.2273  6.8620
##
## Count model coefficients (truncated negbin with log link):
```

```
##                          Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -0.10230    0.09298  -1.100   0.2712
## MEDITERRANEAN             1.18842    0.11622  10.225  < 2e-16 ***
## scale(F1)                 0.23454    0.10139   2.313   0.0207 *
## scale(F2)                 0.11257    0.05441   2.069   0.0386 *
## scale(F3)                 0.08379    0.03795   2.208   0.0273 *
## MEDITERRANEAN:scale(F1)   0.09796    0.11593   0.845   0.3981
## Log(theta)                1.69275    0.23346   7.251 4.15e-13 ***
## Zero hurdle model coefficients (binomial with logit link):
##                          Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -0.99821    0.08036 -12.422  < 2e-16 ***
## scale(F1)                 0.75166    0.09121   8.241  < 2e-16 ***
## MEDITERRANEAN             3.07810    0.26187  11.754  < 2e-16 ***
## scale(F2)                -0.41035    0.08825  -4.650 3.32e-06 ***
## scale(F3)                 0.28639    0.07413   3.863 0.000112 ***
## MEDITERRANEAN:scale(F2)   0.89450    0.23870   3.747 0.000179 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 5.4344
## Number of iterations in BFGS optimization: 17
## Log-likelihood: -1532 on 13 Df
```

```
m<-hurdle(PDOS~MEDITERRANEAN+scale(F1)+scale(F2)+scale(F3)|scale(F1) + MEDITERRANEAN*scale(F2) + scale(
summary(m)
```

```
##
## Call:
## hurdle(formula = PDOS ~ MEDITERRANEAN + scale(F1) + scale(F2) + scale(F3) |
##     scale(F1) + MEDITERRANEAN * scale(F2) + scale(F3), data = tab, dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -1.5965 -0.4860 -0.3631  0.2220  7.1693
##
## Count model coefficients (truncated negbin with log link):
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -0.11562    0.09218  -1.254   0.2097
## MEDITERRANEAN 1.22784    0.10647  11.532  < 2e-16 ***
## scale(F1)     0.30807    0.05153   5.978 2.25e-09 ***
## scale(F2)     0.11001    0.05424   2.028   0.0426 *
## scale(F3)     0.08449    0.03787   2.231   0.0257 *
## Log(theta)    1.69487    0.23346   7.260 3.88e-13 ***
## Zero hurdle model coefficients (binomial with logit link):
##                          Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -0.99821    0.08036 -12.422  < 2e-16 ***
## scale(F1)                 0.75166    0.09121   8.241  < 2e-16 ***
## MEDITERRANEAN             3.07810    0.26187  11.754  < 2e-16 ***
## scale(F2)                -0.41035    0.08825  -4.650 3.32e-06 ***
## scale(F3)                 0.28639    0.07413   3.863 0.000112 ***
## MEDITERRANEAN:scale(F2)   0.89450    0.23870   3.747 0.000179 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## Theta: count = 5.4459
## Number of iterations in BFGS optimization: 15
## Log-likelihood: -1532 on 12 Df
```

```r
#final model
#assign coefficients to results table
results[1,1]<-round(cor(PDOS,predict(m,type="resp"))^2,2)
results[2,1]<-round(pR2(m)[6],5)
```

```
## fitting null model for pseudo-r2
```

```r
results[names(coefficients(m)),1]<-round(coefficients(m),5)
results[paste("zero_",rownames(summary(m)$coefficients$zero),sep=""),2]<-
  round(summary(m)$coefficients$zero[,4],5)
results[paste("count_",rownames(summary(m)$coefficients$count),sep=""),2]<-
  round(summary(m)$coefficients$zero[,4],5)
```

Calculate full model for Meat_PDos and reduce model

```r
m<-hurdle(MEAT_PDO~MEDITERRANEAN*(scale(F1)+scale(F2)+scale(F3))|MEDITERRANEAN * (scale(F1) + scale(F2)
summary(m)
```

```
##
## Call:
## hurdle(formula = MEAT_PDO ~ MEDITERRANEAN * (scale(F1) + scale(F2) +
##     scale(F3)) | MEDITERRANEAN * (scale(F1) + scale(F2) + scale(F3)),
##     data = tab, dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -1.0517 -0.2987 -0.1763 -0.1319 12.7682
##
## Count model coefficients (truncated negbin with log link):
##                      Estimate Std. Error z value Pr(>|z|)
## (Intercept)           -1.5578     0.4797  -3.247  0.00116 **
## MEDITERRANEAN          1.4682     0.4983   2.946  0.00322 **
## scale(F1)             -0.3143     0.4884  -0.644  0.51986
## scale(F2)              0.1456     0.6406   0.227  0.82015
## scale(F3)              0.3977     0.3517   1.131  0.25814
## MEDITERRANEAN:scale(F1)  0.8058     0.5106   1.578  0.11453
## MEDITERRANEAN:scale(F2)  0.1017     0.6615   0.154  0.87782
## MEDITERRANEAN:scale(F3) -0.5586     0.3728  -1.498  0.13407
## Log(theta)             1.5346     0.8698   1.764  0.07769 .
## Zero hurdle model coefficients (binomial with logit link):
##                      Estimate Std. Error z value Pr(>|z|)
## (Intercept)          -2.89676    0.16192 -17.890  < 2e-16 ***
## MEDITERRANEAN         2.44876    0.25251   9.698  < 2e-16 ***
## scale(F1)             0.95774    0.17139   5.588  2.3e-08 ***
## scale(F2)             0.09803    0.18350   0.534 0.593195
## scale(F3)            -0.28234    0.15538  -1.817 0.069204 .
## MEDITERRANEAN:scale(F1) -0.70362    0.23860  -2.949 0.003189 **
## MEDITERRANEAN:scale(F2)  0.50947    0.25450   2.002 0.045295 *
```

```
## MEDITERRANEAN:scale(F3)  0.74948     0.19945    3.758 0.000172 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 4.6394
## Number of iterations in BFGS optimization: 20
## Log-likelihood: -616.3 on 17 Df
```

```
#keep zero model, at least all interactions significant
#reduce count model
m<-hurdle(MEAT_PDO~scale(F1)+scale(F2)|MEDITERRANEAN * (scale(F1) + scale(F2) + scale(F3)),dist="negbin
summary(m)
```

```
##
## Call:
## hurdle(formula = MEAT_PDO ~ scale(F1) + scale(F2) | MEDITERRANEAN * (scale(F1) +
##     scale(F2) + scale(F3)), data = tab, dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -0.9190 -0.2634 -0.1663 -0.1294  9.9648
##
## Count model coefficients (truncated negbin with log link):
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -0.8848     0.4264  -2.075 0.037987 *
## scale(F1)     0.5989     0.1640   3.652 0.000261 ***
## scale(F2)     0.2330     0.1591   1.465 0.142917
## Log(theta)   -0.1889     0.7573  -0.249 0.802987
## Zero hurdle model coefficients (binomial with logit link):
##                        Estimate Std. Error z value Pr(>|z|)
## (Intercept)            -2.89676    0.16192 -17.890  < 2e-16 ***
## MEDITERRANEAN           2.44876    0.25251   9.698  < 2e-16 ***
## scale(F1)               0.95774    0.17139   5.588  2.3e-08 ***
## scale(F2)               0.09803    0.18350   0.534 0.593195
## scale(F3)              -0.28234    0.15538  -1.817 0.069204 .
## MEDITERRANEAN:scale(F1) -0.70362   0.23860  -2.949 0.003189 **
## MEDITERRANEAN:scale(F2)  0.50947   0.25450   2.002 0.045295 *
## MEDITERRANEAN:scale(F3)  0.74948   0.19945   3.758 0.000172 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 0.8278
## Number of iterations in BFGS optimization: 16
## Log-likelihood: -636.9 on 12 Df
```

```
m<-hurdle(MEAT_PDO~scale(F1)|MEDITERRANEAN * (scale(F1) + scale(F2) + scale(F3)),dist="negbin",data=tab
summary(m)
```

```
##
## Call:
## hurdle(formula = MEAT_PDO ~ scale(F1) | MEDITERRANEAN * (scale(F1) +
##     scale(F2) + scale(F3)), data = tab, dist = "negbin")
##
```

```
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -0.8819 -0.2610 -0.1671 -0.1287  9.5953
##
## Count model coefficients (truncated negbin with log link):
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -0.9689     0.4869  -1.990  0.04663 *
## scale(F1)     0.5520     0.1645   3.356  0.00079 ***
## Log(theta)   -0.3834     0.8006  -0.479  0.63196
## Zero hurdle model coefficients (binomial with logit link):
##                         Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -2.89676    0.16192 -17.890  < 2e-16 ***
## MEDITERRANEAN            2.44876    0.25251   9.698  < 2e-16 ***
## scale(F1)                0.95774    0.17139   5.588  2.3e-08 ***
## scale(F2)                0.09803    0.18350   0.534 0.593195
## scale(F3)               -0.28234    0.15538  -1.817 0.069204 .
## MEDITERRANEAN:scale(F1) -0.70362    0.23860  -2.949 0.003189 **
## MEDITERRANEAN:scale(F2)  0.50947    0.25450   2.002 0.045295 *
## MEDITERRANEAN:scale(F3)  0.74948    0.19945   3.758 0.000172 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 0.6815
## Number of iterations in BFGS optimization: 13
## Log-likelihood: -637.9 on 11 Df
```

```
#assign coefficients to results table
results[1,3]<-round(cor(MEAT_PDO,predict(m,type="resp"))^2,5)
results[2,3]<-round(pR2(m)[6],5)
```

```
## fitting null model for pseudo-r2
```

```
results[names(coefficients(m)),3]<-round(coefficients(m),5)
results[paste("count_",rownames(summary(m)$coefficients$count),sep=""),4]<-
  round(summary(m)$coefficients$count[,4],5)
results[paste("zero_",rownames(summary(m)$coefficients$zero),sep=""),4]<-
  round(summary(m)$coefficients$zero[,4],5)
```

Calculate full model for Cheese_PDos and reduce model

```
m<-hurdle(CHEESE_PDO~MEDITERRANEAN*(scale(F1)+scale(F2)+scale(F3))|MEDITERRANEAN * (scale(F1) + scale(F
summary(m)
```

```
##
## Call:
## hurdle(formula = CHEESE_PDO ~ MEDITERRANEAN * (scale(F1) + scale(F2) +
##     scale(F3)) | MEDITERRANEAN * (scale(F1) + scale(F2) + scale(F3)),
##     data = tab, dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -1.2336 -0.2743 -0.2299 -0.2054  7.9047
```

```
## 
## Count model coefficients (truncated negbin with log link):
##                         Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -0.04058    0.18474  -0.220  0.82614
## MEDITERRANEAN            0.56488    0.20300   2.783  0.00539 **
## scale(F1)               -0.27309    0.20692  -1.320  0.18691
## scale(F2)               -0.01501    0.17080  -0.088  0.92998
## scale(F3)               -0.10384    0.16893  -0.615  0.53876
## MEDITERRANEAN:scale(F1)  0.35313    0.22486   1.570  0.11631
## MEDITERRANEAN:scale(F2)  0.10251    0.19682   0.521  0.60248
## MEDITERRANEAN:scale(F3)  0.14717    0.18398   0.800  0.42376
## Log(theta)               1.46240    0.49333   2.964  0.00303 **
## Zero hurdle model coefficients (binomial with logit link):
##                         Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -2.42029    0.12683 -19.083  < 2e-16 ***
## MEDITERRANEAN            3.45323    0.23844  14.482  < 2e-16 ***
## scale(F1)                0.18957    0.13530   1.401  0.16117
## scale(F2)               -0.24531    0.11164  -2.197  0.02799 *
## scale(F3)                0.34421    0.11151   3.087  0.00202 **
## MEDITERRANEAN:scale(F1) -0.06437    0.20098  -0.320  0.74876
## MEDITERRANEAN:scale(F2)  0.75097    0.18967   3.959 7.52e-05 ***
## MEDITERRANEAN:scale(F3) -0.16657    0.15930  -1.046  0.29572
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Theta: count = 4.3163
## Number of iterations in BFGS optimization: 22
## Log-likelihood: -942.7 on 17 Df
```

```r
m<-hurdle(CHEESE_PDO~MEDITERRANEAN*(scale(F1)+scale(F2)+scale(F3))| scale(F1) + MEDITERRANEAN*scale(F2)
summary(m)
```

```
## 
## Call:
## hurdle(formula = CHEESE_PDO ~ MEDITERRANEAN * (scale(F1) + scale(F2) +
##     scale(F3)) | scale(F1) + MEDITERRANEAN * scale(F2) + MEDITERRANEAN *
##     scale(F3), data = tab, dist = "negbin")
## 
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -1.2326 -0.2745 -0.2305 -0.2063  7.9370
## 
## Count model coefficients (truncated negbin with log link):
##                         Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -0.04058    0.18474  -0.220  0.82614
## MEDITERRANEAN            0.56488    0.20300   2.783  0.00539 **
## scale(F1)               -0.27309    0.20692  -1.320  0.18691
## scale(F2)               -0.01501    0.17080  -0.088  0.92998
## scale(F3)               -0.10384    0.16893  -0.615  0.53876
## MEDITERRANEAN:scale(F1)  0.35313    0.22486   1.570  0.11631
## MEDITERRANEAN:scale(F2)  0.10251    0.19682   0.521  0.60248
## MEDITERRANEAN:scale(F3)  0.14717    0.18398   0.800  0.42376
## Log(theta)               1.46240    0.49333   2.964  0.00303 **
## Zero hurdle model coefficients (binomial with logit link):
```

```
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)            -2.4284     0.1248 -19.455  < 2e-16 ***
## scale(F1)               0.1605     0.1003   1.600  0.10950
## MEDITERRANEAN           3.4286     0.2258  15.184  < 2e-16 ***
## scale(F2)              -0.2399     0.1097  -2.188  0.02869 *
## scale(F3)               0.3451     0.1117   3.088  0.00201 **
## MEDITERRANEAN:scale(F2) 0.7463     0.1895   3.938  8.2e-05 ***
## MEDITERRANEAN:scale(F3) -0.1716    0.1589  -1.080  0.28027
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 4.3163
## Number of iterations in BFGS optimization: 22
## Log-likelihood: -942.7 on 16 Df
```

```
m<-hurdle(CHEESE_PDO~MEDITERRANEAN*(scale(F1)+scale(F2)+scale(F3))| MEDITERRANEAN*scale(F2) + scale(F3)
summary(m)
```

```
##
## Call:
## hurdle(formula = CHEESE_PDO ~ MEDITERRANEAN * (scale(F1) + scale(F2) +
##     scale(F3)) | MEDITERRANEAN * scale(F2) + scale(F3), data = tab, dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -1.2504 -0.2705 -0.2382 -0.2146  8.3914
##
## Count model coefficients (truncated negbin with log link):
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)           -0.04058    0.18474  -0.220  0.82614
## MEDITERRANEAN          0.56488    0.20300   2.783  0.00539 **
## scale(F1)             -0.27309    0.20692  -1.320  0.18691
## scale(F2)             -0.01501    0.17080  -0.088  0.92998
## scale(F3)             -0.10384    0.16893  -0.615  0.53876
## MEDITERRANEAN:scale(F1) 0.35313   0.22486   1.570  0.11631
## MEDITERRANEAN:scale(F2) 0.10251   0.19682   0.521  0.60248
## MEDITERRANEAN:scale(F3) 0.14717   0.18398   0.800  0.42376
## Log(theta)             1.46240    0.49333   2.964  0.00303 **
## Zero hurdle model coefficients (binomial with logit link):
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)           -2.46476    0.11885 -20.738  < 2e-16 ***
## MEDITERRANEAN          3.64591    0.19027  19.162  < 2e-16 ***
## scale(F2)             -0.20372    0.10475  -1.945 0.051800 .
## scale(F3)              0.27177    0.08096   3.357 0.000788 ***
## MEDITERRANEAN:scale(F2) 0.75987   0.17900   4.245 2.19e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 4.3163
## Number of iterations in BFGS optimization: 22
## Log-likelihood: -944.5 on 14 Df
```

```
#reduce count model
m<-hurdle(CHEESE_PDO~MEDITERRANEAN| MEDITERRANEAN*scale(F2) + scale(F3),dist="negbin",data=tab)
summary(m)
```

```
##
## Call:
## hurdle(formula = CHEESE_PDO ~ MEDITERRANEAN | MEDITERRANEAN * scale(F2) +
##      scale(F3), data = tab, dist = "negbin")
##
## Pearson residuals:
##     Min     1Q  Median     3Q     Max
## -1.2521 -0.2700 -0.2394 -0.2137  7.6663
##
## Count model coefficients (truncated negbin with log link):
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)    0.02176    0.15882   0.137 0.891021
## MEDITERRANEAN  0.54464    0.15743   3.460 0.000541 ***
## Log(theta)     1.40004    0.48280   2.900 0.003734 **
## Zero hurdle model coefficients (binomial with logit link):
##                        Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -2.46476    0.11885 -20.738  < 2e-16 ***
## MEDITERRANEAN            3.64591    0.19027  19.162  < 2e-16 ***
## scale(F2)               -0.20372    0.10475  -1.945 0.051800 .
## scale(F3)                0.27177    0.08096   3.357 0.000788 ***
## MEDITERRANEAN:scale(F2)  0.75987    0.17900   4.245 2.19e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 4.0554
## Number of iterations in BFGS optimization: 14
## Log-likelihood: -946.7 on 8 Df
```

```
#assign coefficients to results table
results[1,5]<-round(cor(CHEESE_PDO,predict(m,type="resp"))^2,5)
results[2,5]<-round(pR2(m)[6],5)
```

```
## fitting null model for pseudo-r2
```

```
results[names(coefficients(m)),5]<-round(coefficients(m),5)
results[paste("count_",rownames(summary(m)$coefficients$count),sep=""),6]<-
  round(summary(m)$coefficients$count[,4],5)
results[paste("zero_",rownames(summary(m)$coefficients$zero),sep=""),6]<-
  round(summary(m)$coefficients$zero[,4],5)
```

Oil-PDOs

```
m<-hurdle(OIL_PDO~MEDITERRANEAN*(scale(F1)+scale(F2)+scale(F3))|MEDITERRANEAN * (scale(F1) + scale(F2) +
summary(m)
```

```
##
## Call:
```

```
## hurdle(formula = OIL_PDO ~ MEDITERRANEAN * (scale(F1) + scale(F2) + scale(F3)) |
##     MEDITERRANEAN * (scale(F1) + scale(F2) + scale(F3)), data = tab,
##     dist = "negbin")
##
## Pearson residuals:
##      Min      1Q  Median      3Q     Max
## -1.19131 -0.12627 -0.05937 -0.03172 13.41934
##
## Count model coefficients (truncated negbin with log link):
##                          Estimate Std. Error z value Pr(>|z|)
## (Intercept)               -5.1775    19.5062  -0.265    0.791
## MEDITERRANEAN              3.5815    19.6313   0.182    0.855
## scale(F1)                 -1.9973     9.5413  -0.209    0.834
## scale(F2)                  9.4335    40.0249   0.236    0.814
## scale(F3)                 10.0309    25.8803   0.388    0.698
## MEDITERRANEAN:scale(F1)    2.4589     9.5488   0.258    0.797
## MEDITERRANEAN:scale(F2)   -9.9866    40.0088  -0.250    0.803
## MEDITERRANEAN:scale(F3)  -10.2110    25.8812  -0.395    0.693
## Log(theta)                 0.6515     1.2569   0.518    0.604
## Zero hurdle model coefficients (binomial with logit link):
##                          Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -4.97852    0.44364 -11.222  < 2e-16 ***
## MEDITERRANEAN             3.38202    0.50151   6.744 1.54e-11 ***
## scale(F1)                 1.35751    0.30964   4.384 1.16e-05 ***
## scale(F2)                -1.05354    0.40017  -2.633  0.00847 **
## scale(F3)                 0.03421    0.28468   0.120  0.90436
## MEDITERRANEAN:scale(F1)  -0.43656    0.36222  -1.205  0.22811
## MEDITERRANEAN:scale(F2)   0.99054    0.43834   2.260  0.02384 *
## MEDITERRANEAN:scale(F3)   0.17751    0.31113   0.571  0.56832
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 1.9184
## Number of iterations in BFGS optimization: 59
## Log-likelihood: -355.1 on 17 Df
```

```r
#reduce zero model
m<-hurdle(OIL_PDO~MEDITERRANEAN*scale(F1)+MEDITERRANEAN*scale(F2)+MEDITERRANEAN*scale(F3)| scale(F1) +MI
summary(m)
```

```
##
## Call:
## hurdle(formula = OIL_PDO ~ MEDITERRANEAN * scale(F1) + MEDITERRANEAN *
##     scale(F2) + MEDITERRANEAN * scale(F3) | scale(F1) + MEDITERRANEAN *
##     scale(F2), data = tab, dist = "negbin")
##
## Pearson residuals:
##      Min      1Q  Median      3Q     Max
## -1.02273 -0.12959 -0.07305 -0.03835 12.72415
##
## Count model coefficients (truncated negbin with log link):
##                          Estimate Std. Error z value Pr(>|z|)
## (Intercept)               -5.1775    19.5062  -0.265    0.791
## MEDITERRANEAN              3.5815    19.6313   0.182    0.855
```

```
## scale(F1)                  -1.9973    9.5413  -0.209    0.834
## scale(F2)                   9.4335   40.0249   0.236    0.814
## scale(F3)                  10.0309   25.8803   0.388    0.698
## MEDITERRANEAN:scale(F1)     2.4589    9.5488   0.258    0.797
## MEDITERRANEAN:scale(F2)    -9.9866   40.0088  -0.250    0.803
## MEDITERRANEAN:scale(F3)   -10.2110   25.8812  -0.395    0.693
## Log(theta)                  0.6515    1.2569   0.518    0.604
## Zero hurdle model coefficients (binomial with logit link):
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)            -4.7913     0.3772 -12.703  < 2e-16 ***
## scale(F1)               1.0328     0.1557   6.634 3.26e-11 ***
## MEDITERRANEAN           3.0134     0.4024   7.489 6.94e-14 ***
## scale(F2)              -1.0620     0.2914  -3.644 0.000269 ***
## MEDITERRANEAN:scale(F2) 0.8603     0.3274   2.628 0.008599 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 1.9184
## Number of iterations in BFGS optimization: 59
## Log-likelihood: -357.4 on 14 Df
```

```r
#reduce count model
m<-hurdle(OIL_PDO~scale(F1)| scale(F1) +MEDITERRANEAN* scale(F2) ,dist="negbin",data=tab)
summary(m)
```

```
##
## Call:
## hurdle(formula = OIL_PDO ~ scale(F1) | scale(F1) + MEDITERRANEAN * scale(F2),
##     data = tab, dist = "negbin")
##
## Pearson residuals:
##      Min       1Q   Median       3Q      Max
## -1.00506 -0.12483 -0.07246 -0.04398 10.14847
##
## Count model coefficients (truncated negbin with log link):
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -1.9770     0.8310  -2.379  0.01735 *
## scale(F1)     0.8002     0.2888   2.771  0.00559 **
## Log(theta)   -0.0292     1.3003  -0.022  0.98208
## Zero hurdle model coefficients (binomial with logit link):
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)            -4.7913     0.3772 -12.703  < 2e-16 ***
## scale(F1)               1.0328     0.1557   6.634 3.26e-11 ***
## MEDITERRANEAN           3.0134     0.4024   7.489 6.94e-14 ***
## scale(F2)              -1.0620     0.2914  -3.644 0.000269 ***
## MEDITERRANEAN:scale(F2) 0.8603     0.3274   2.628 0.008599 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 0.9712
## Number of iterations in BFGS optimization: 13
## Log-likelihood: -362.1 on 8 Df
```

```
#assign coefficients to results table
results[1,7]<-round(cor(OIL_PDO,predict(m,type="resp"))^2,5)
results[2,7]<-round(pR2(m)[6],5)
```

fitting null model for pseudo-r2

```
results[names(coefficients(m)),7]<-round(coefficients(m),5)
results[paste("count_",rownames(summary(m)$coefficients$count),sep=""),8]<-
  round(summary(m)$coefficients$count[,4],5)
results[paste("zero_",rownames(summary(m)$coefficients$zero),sep=""),8]<-
  round(summary(m)$coefficients$zero[,4],5)
```

Crop-PDOs

```
m<-hurdle(CROP_PDO~MEDITERRANEAN*scale(F1)+MEDITERRANEAN*scale(F2)+MEDITERRANEAN*scale(F3)|MEDITERRANEA
summary(m)
```

```
##
## Call:
## hurdle(formula = CROP_PDO ~ MEDITERRANEAN * scale(F1) + MEDITERRANEAN *
##     scale(F2) + MEDITERRANEAN * scale(F3) | MEDITERRANEAN * scale(F1) +
##     MEDITERRANEAN * scale(F2) + MEDITERRANEAN * scale(F3), data = tab,
##     dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -1.0107 -0.2731 -0.1960 -0.1573  7.1876
##
## Count model coefficients (truncated negbin with log link):
##                          Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -3.04906    1.07614  -2.833  0.00461 **
## MEDITERRANEAN             0.88155    0.80690   1.093  0.27461
## scale(F1)                 0.01831    0.67970   0.027  0.97851
## scale(F2)                -0.91212    0.77911  -1.171  0.24171
## scale(F3)                -0.62948    0.67082  -0.938  0.34805
## MEDITERRANEAN:scale(F1)   0.78942    0.74680   1.057  0.29048
## MEDITERRANEAN:scale(F2)   0.78590    0.82484   0.953  0.34070
## MEDITERRANEAN:scale(F3)   0.59181    0.69611   0.850  0.39523
## Log(theta)               -0.40917    1.40576  -0.291  0.77100
## Zero hurdle model coefficients (binomial with logit link):
##                          Estimate Std. Error z value Pr(>|z|)
## (Intercept)              -2.84002    0.14812 -19.173  < 2e-16 ***
## MEDITERRANEAN             1.51380    0.26594   5.692 1.25e-08 ***
## scale(F1)                 0.68288    0.16343   4.178 2.93e-05 ***
## scale(F2)                -0.25788    0.16752  -1.539    0.124
## scale(F3)                -0.01459    0.14167  -0.103    0.918
## MEDITERRANEAN:scale(F1)   0.26640    0.24633   1.081    0.279
## MEDITERRANEAN:scale(F2)   0.34188    0.24190   1.413    0.158
## MEDITERRANEAN:scale(F3)   0.17611    0.18664   0.944    0.345
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

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```
## Theta: count = 0.6642
## Number of iterations in BFGS optimization: 16
## Log-likelihood: -537.8 on 17 Df
```

```
m<-hurdle(CROP_PDO~MEDITERRANEAN*scale(F1)+MEDITERRANEAN*scale(F2)+MEDITERRANEAN*scale(F3)|MEDITERRANEAN
summary(m)
```

```
##
## Call:
## hurdle(formula = CROP_PDO ~ MEDITERRANEAN * scale(F1) + MEDITERRANEAN *
##     scale(F2) + MEDITERRANEAN * scale(F3) | MEDITERRANEAN + scale(F1),
##     data = tab, dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -0.8777 -0.2709 -0.1978 -0.1482  7.7733
##
## Count model coefficients (truncated negbin with log link):
##                         Estimate Std. Error z value Pr(>|z|)
## (Intercept)             -3.04906    1.07614  -2.833  0.00461 **
## MEDITERRANEAN            0.88155    0.80690   1.093  0.27461
## scale(F1)                0.01831    0.67970   0.027  0.97851
## scale(F2)               -0.91212    0.77911  -1.171  0.24171
## scale(F3)               -0.62948    0.67082  -0.938  0.34805
## MEDITERRANEAN:scale(F1)  0.78942    0.74680   1.057  0.29048
## MEDITERRANEAN:scale(F2)  0.78590    0.82484   0.953  0.34070
## MEDITERRANEAN:scale(F3)  0.59181    0.69611   0.850  0.39523
## Log(theta)              -0.40917    1.40576  -0.291  0.77100
## Zero hurdle model coefficients (binomial with logit link):
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -2.8880     0.1489 -19.398  < 2e-16 ***
## MEDITERRANEAN   1.6687     0.2130   7.835 4.70e-15 ***
## scale(F1)       0.8192     0.1174   6.979 2.97e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Theta: count = 0.6642
## Number of iterations in BFGS optimization: 16
## Log-likelihood: -540.5 on 12 Df
```

```
m<-hurdle(CROP_PDO~scale(F1)|MEDITERRANEAN+scale(F1),dist="negbin",data=tab)
summary(m)
```

```
##
## Call:
## hurdle(formula = CROP_PDO ~ scale(F1) | MEDITERRANEAN + scale(F1), data = tab,
##     dist = "negbin")
##
## Pearson residuals:
##     Min      1Q  Median      3Q     Max
## -0.8495 -0.2623 -0.1952 -0.1509  8.8862
```

```
## 
## Count model coefficients (truncated negbin with log link):
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  -2.6797     1.2250  -2.188   0.0287 *
## scale(F1)     0.9905     0.2468   4.013 5.98e-05 ***
## Log(theta)   -0.8271     1.7059  -0.485   0.6278
## Zero hurdle model coefficients (binomial with logit link):
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)   -2.8880     0.1489 -19.398  < 2e-16 ***
## MEDITERRANEAN  1.6687     0.2130   7.835 4.70e-15 ***
## scale(F1)      0.8192     0.1174   6.979 2.97e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Theta: count = 0.4373
## Number of iterations in BFGS optimization: 14
## Log-likelihood: -543.2 on 6 Df
```

```r
#assign coefficients to results table
results[1,9]<-round(cor(CROP_PDO,predict(m,type="resp"))^2,5)
results[2,9]<-round(pR2(m)[6],5)
```

```
## fitting null model for pseudo-r2
```

```r
results[names(coefficients(m)),9]<-round(coefficients(m),5)
results[paste("count_",rownames(summary(m)$coefficients$count),sep=""),10]<-
  round(summary(m)$coefficients$count[,4],5)
results[paste("zero_",rownames(summary(m)$coefficients$zero),sep=""),10]<-
  round(summary(m)$coefficients$zero[,4],5)
```

```r
results
```

```
##                                   PDOS    pPDOS MEAT-PDO pMEAT_PDO CHEESE_PDO
## Rsq c+z                        0.55000       NA  0.20239        NA    0.34352
## RsqN z                         0.51804       NA  0.28083        NA    0.40248
## count_(Intercept)             -0.11562  0.00000 -0.96886   0.04663    0.02176
## count_MEDITERRANEAN            1.22784  0.00000       NA        NA    0.54464
## count_scale(F1)               0.30807  0.00000  0.55205   0.00079         NA
## count_scale(F2)               0.11001  0.00000       NA        NA         NA
## count_scale(F3)               0.08449  0.00011       NA        NA         NA
## count_MEDITERRANEAN:scale(F1)      NA       NA       NA        NA         NA
## count_MEDITERRANEAN:scale(F2)      NA       NA       NA        NA         NA
## count_MEDITERRANEAN:scale(F3)      NA       NA       NA        NA         NA
## zero_(Intercept)             -0.99821  0.00000 -2.89676   0.00000   -2.46476
## zero_MEDITERRANEAN            3.07810  0.00000  2.44876   0.00000    3.64591
## zero_scale(F1)               0.75166  0.00000  0.95774   0.00000         NA
## zero_scale(F2)              -0.41035  0.00000  0.09803   0.59319   -0.20372
## zero_scale(F3)               0.28639  0.00011 -0.28234   0.06920    0.27177
## zero_MEDITERRANEAN:scale(F1)      NA       NA -0.70362   0.00319         NA
## zero_MEDITERRANEAN:scale(F2)  0.89450  0.00018  0.50947   0.04530    0.75987
## zero_MEDITERRANEAN:scale(F3)      NA       NA  0.74948   0.00017         NA
## count_Log(theta)                  NA  0.00018       NA   0.63196         NA
```

```
##                                  pCHEESE_PDO  OIL_PDO pOIL_PDO CROP_PDO pCROP_PDO
## Rsq c+z                                   NA  0.27956       NA  0.23525        NA
## RsqN z                                    NA  0.43634       NA  0.31040        NA
## count_(Intercept)                    0.89102 -1.97705  0.01735 -2.67972   0.02870
## count_MEDITERRANEAN                   0.00054       NA       NA       NA        NA
## count_scale(F1)                           NA  0.80024  0.00559  0.99053   0.00006
## count_scale(F2)                           NA       NA       NA       NA        NA
## count_scale(F3)                           NA       NA       NA       NA        NA
## count_MEDITERRANEAN:scale(F1)             NA       NA       NA       NA        NA
## count_MEDITERRANEAN:scale(F2)             NA       NA       NA       NA        NA
## count_MEDITERRANEAN:scale(F3)             NA       NA       NA       NA        NA
## zero_(Intercept)                     0.00000 -4.79134  0.00000 -2.88797   0.00000
## zero_MEDITERRANEAN                    0.00000  3.01339  0.00000  1.66870   0.00000
## zero_scale(F1)                            NA  1.03282  0.00000  0.81918   0.00000
## zero_scale(F2)                       0.05180 -1.06202  0.00027       NA        NA
## zero_scale(F3)                       0.00079       NA       NA       NA        NA
## zero_MEDITERRANEAN:scale(F1)              NA       NA       NA       NA        NA
## zero_MEDITERRANEAN:scale(F2)         0.00002  0.86030  0.00860       NA        NA
## zero_MEDITERRANEAN:scale(F3)              NA       NA       NA       NA        NA
## count_Log(theta)                     0.00373       NA  0.98208       NA   0.62778
```

Write to file

```
write.table(results,"PDOS_hurdleModels_withInteractions_Results_incl_pvalues_negbin.txt",sep="\t")
```