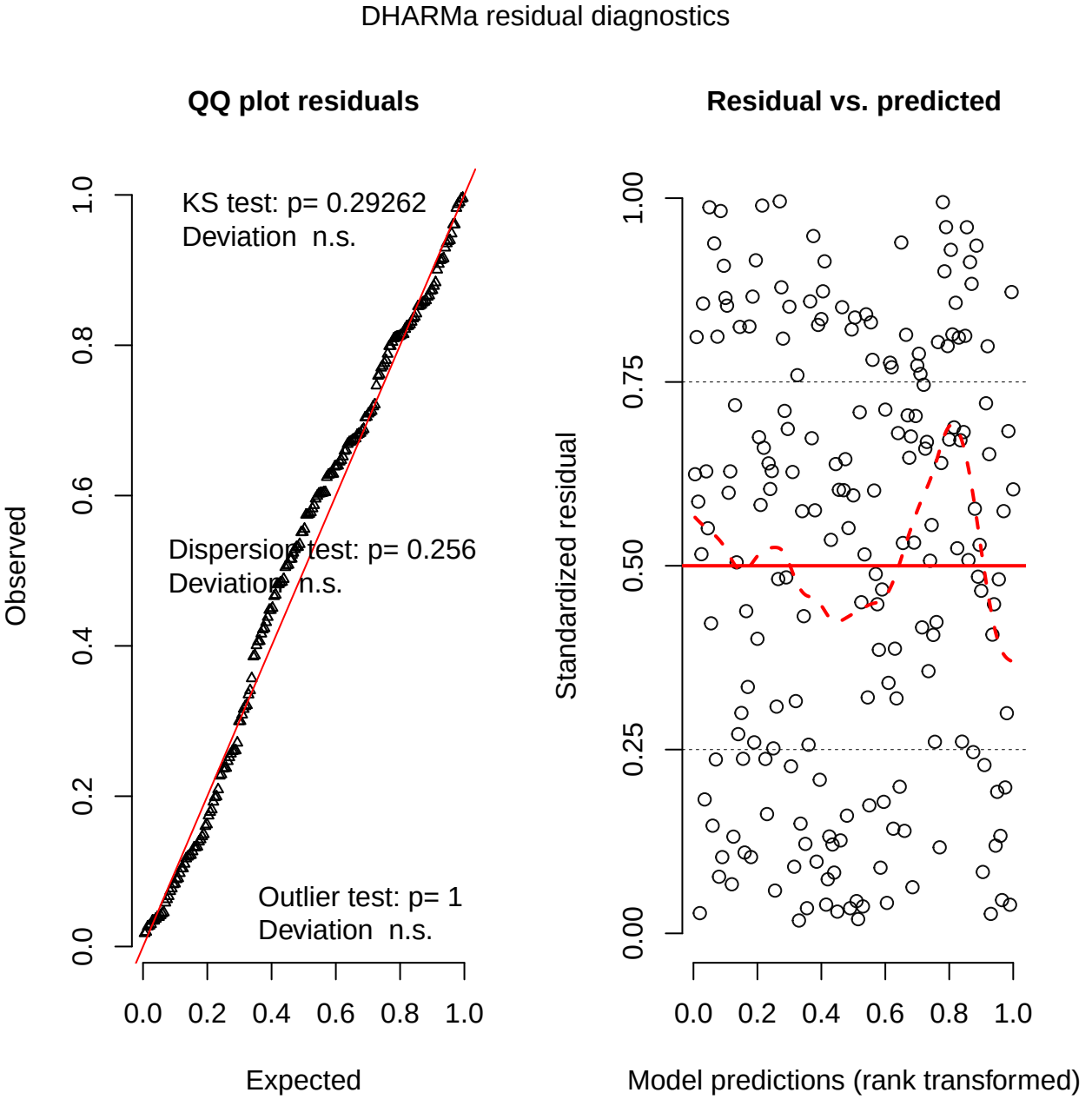
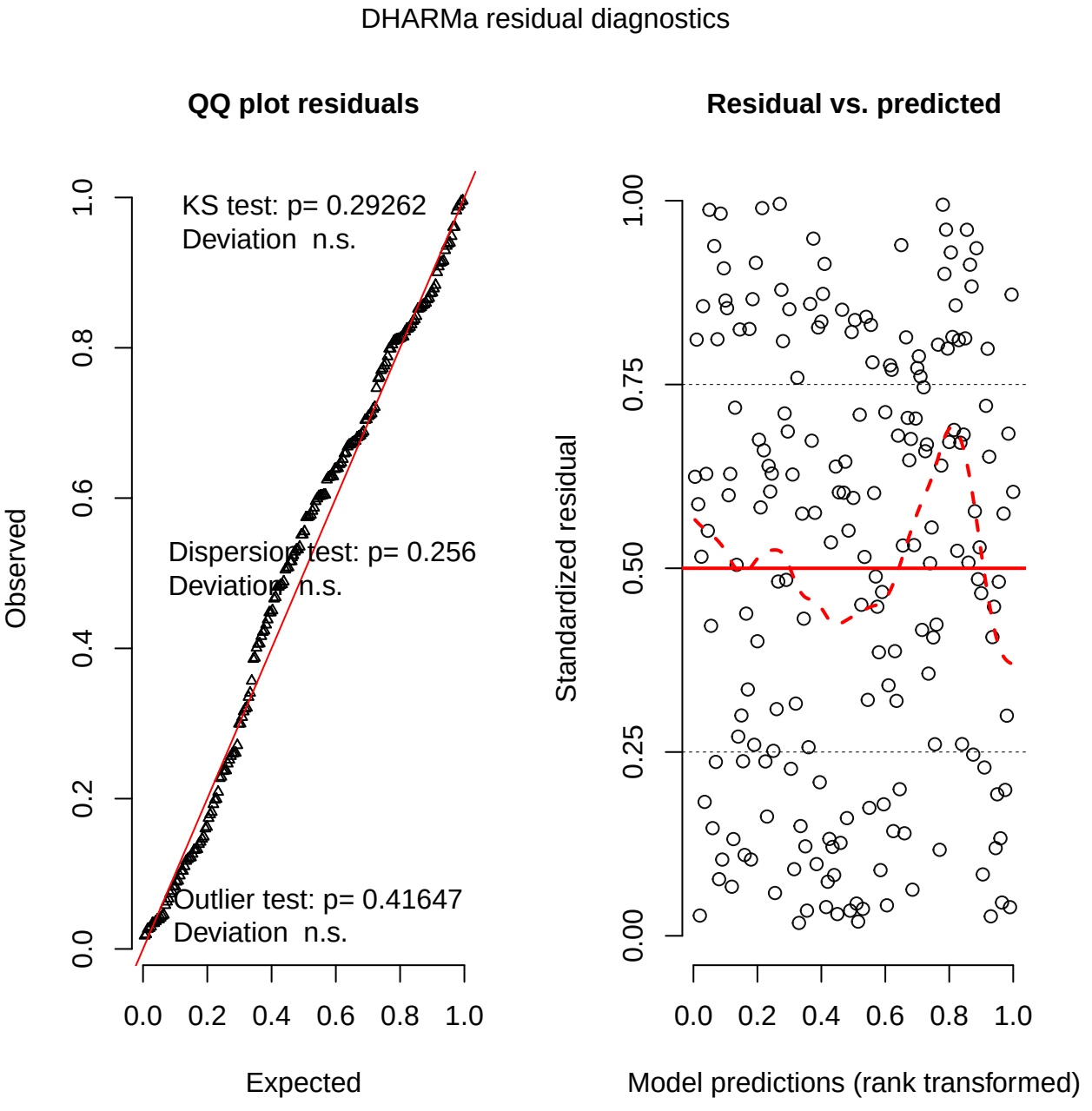
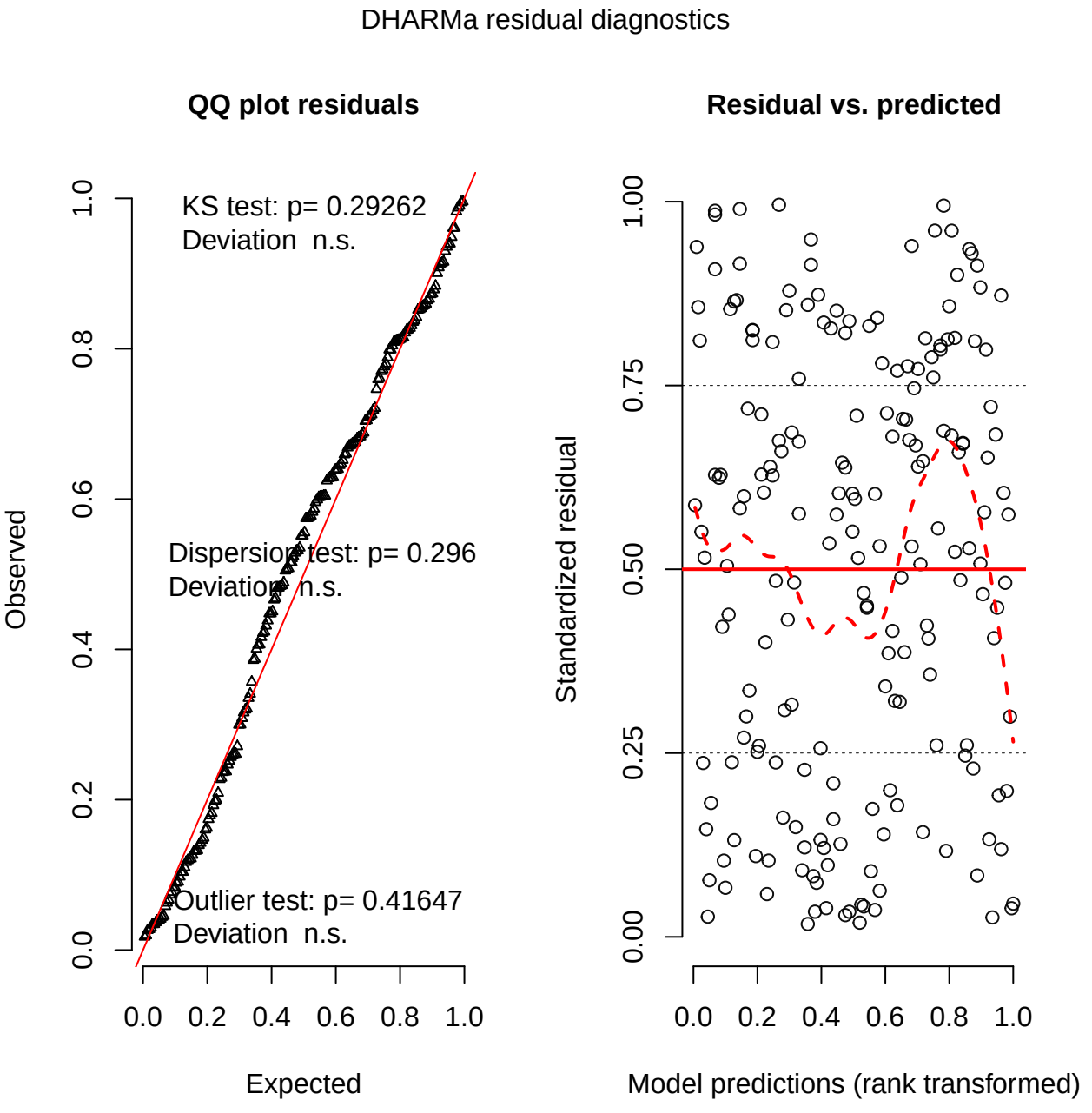
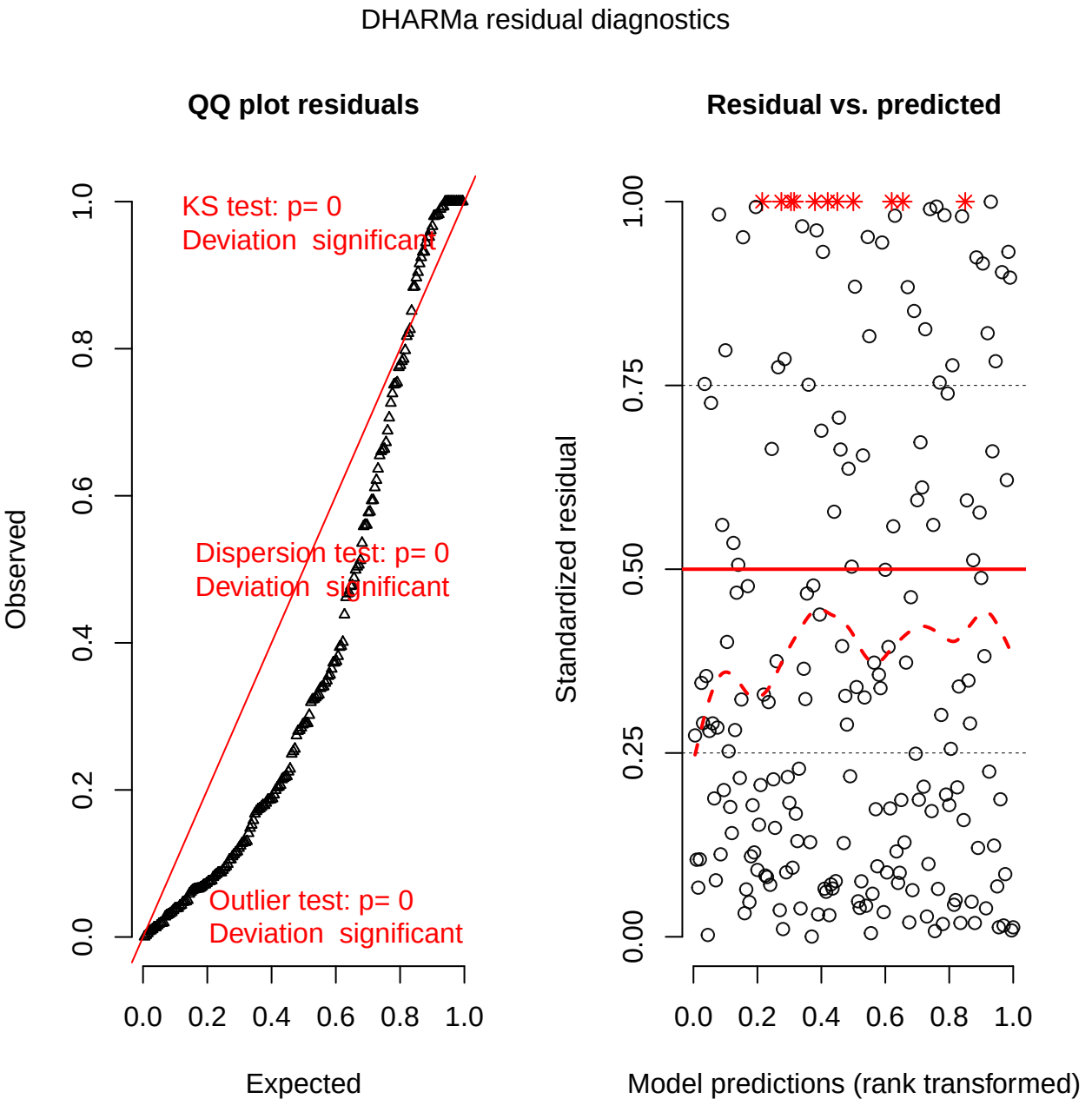
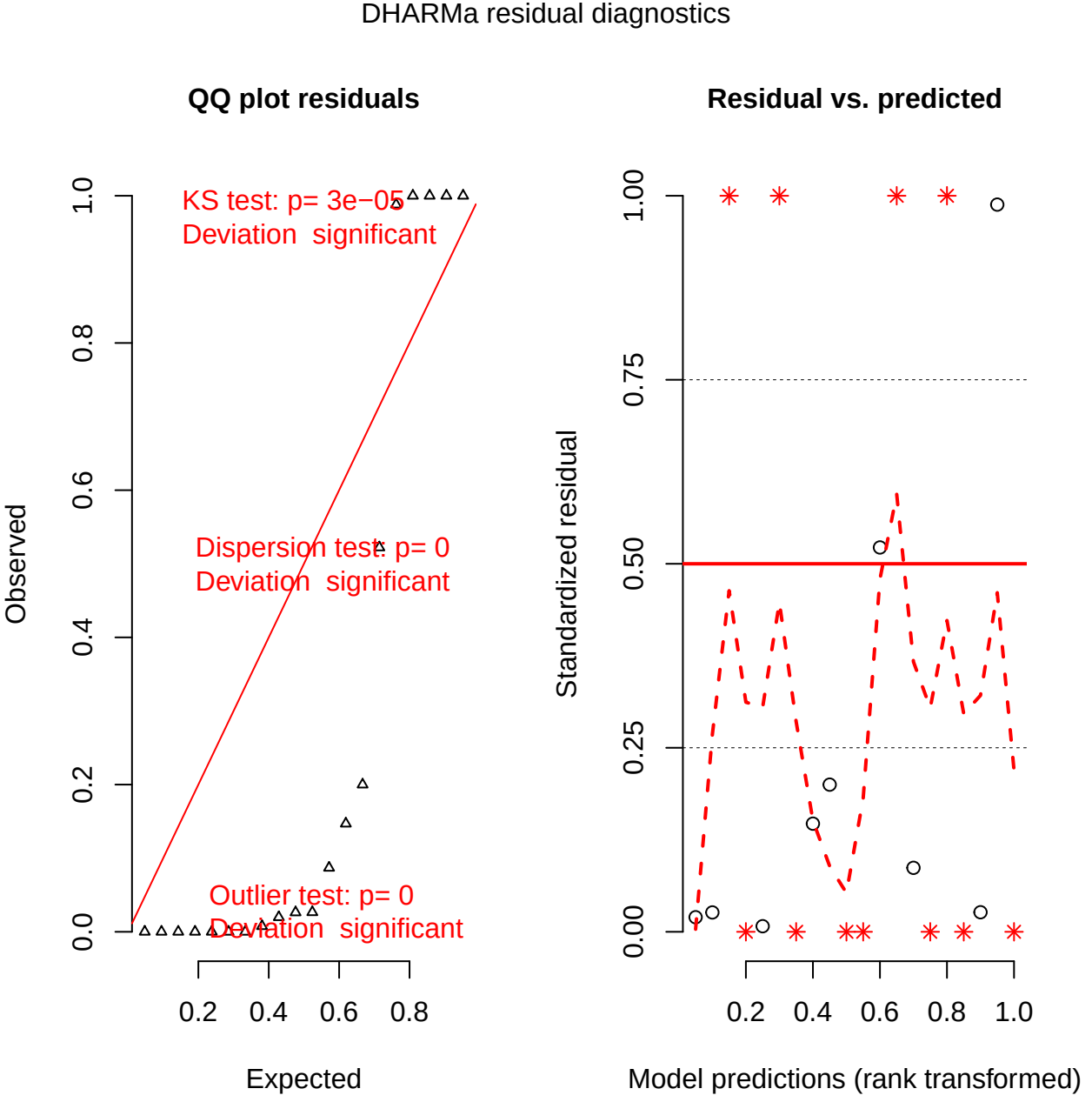
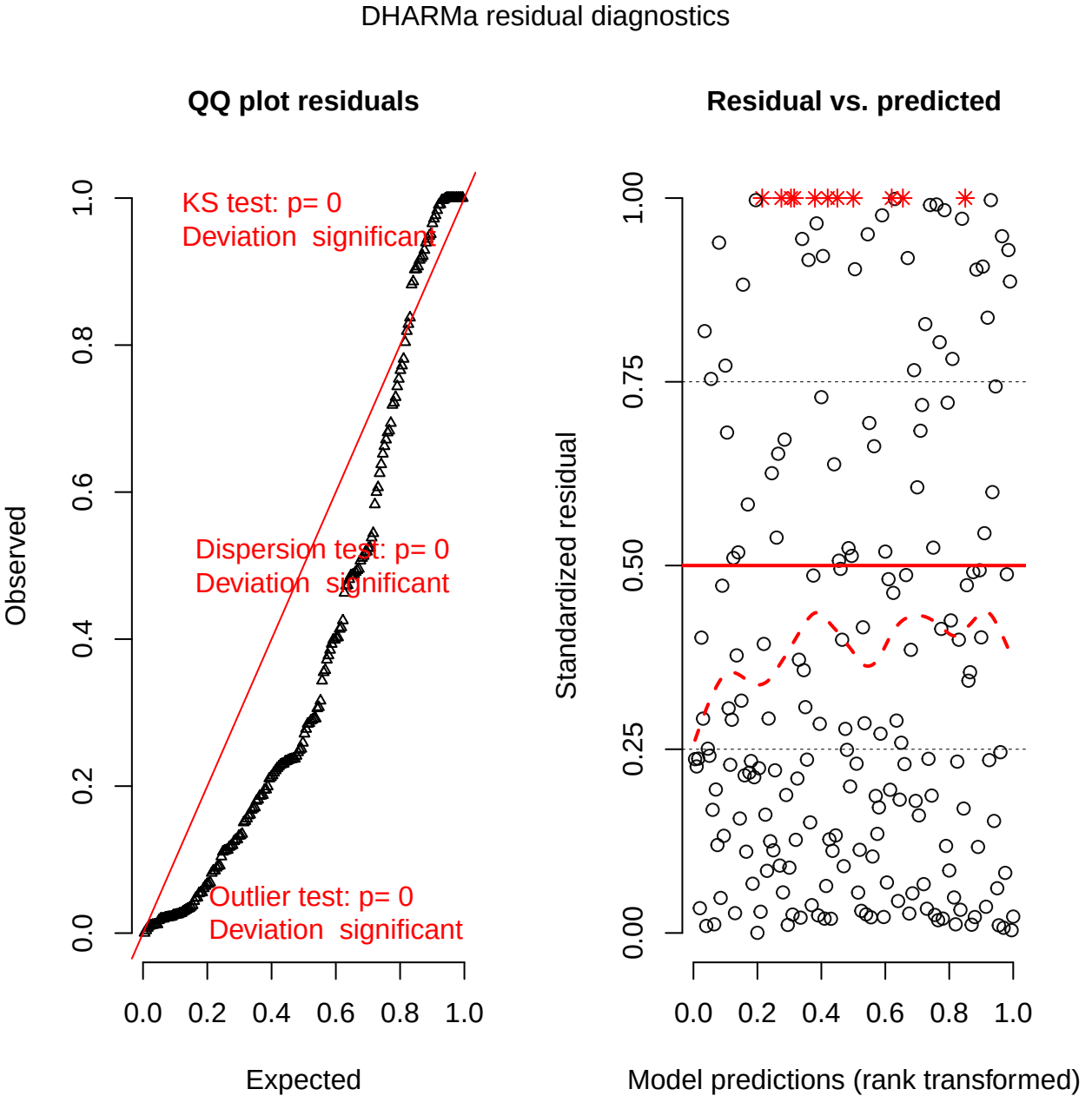

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0.29262
Deviation n.s.
Dispersion test: p= 0.256
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Residual vs. predicted
Standardized residual
Model predictions (rank transformed)
0.00
0.25
0.50
0.75
1.00

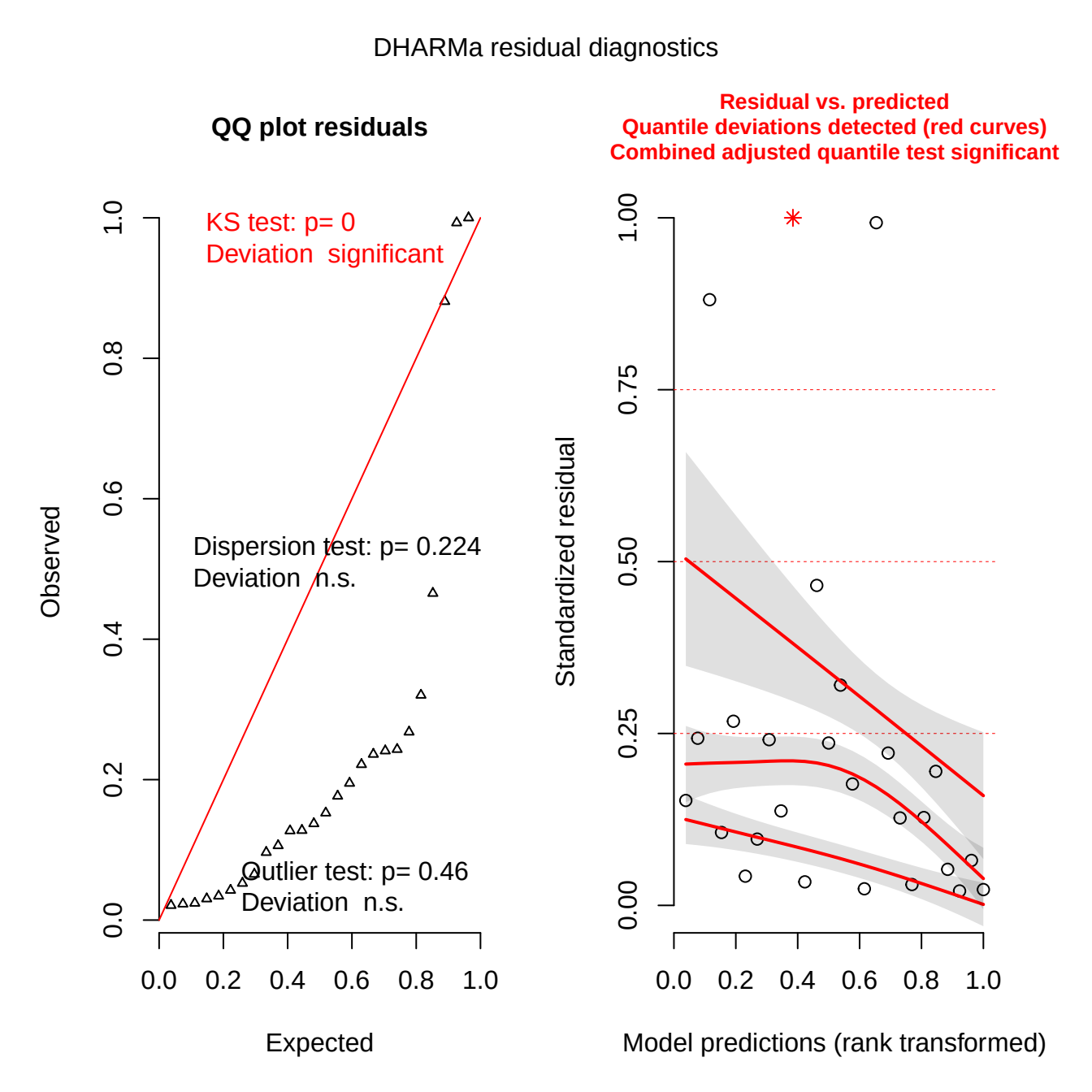

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0.29262
Deviation n.s.
Dispersion test: p= 0.256
Deviation n.s.
Outlier test: p= 0.41647
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Residual vs. predicted
Standardized residual
Model predictions (rank transformed)
0.00
0.25
0.50
0.75
1.00


DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0.29262
Deviation n.s.
Dispersion test: p= 0.296
Deviation n.s.
Outlier test: p= 0.41647
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Residual vs. predicted
Standardized residual
Model predictions (rank transformed)
0.00
0.25
0.50
0.75
1.00

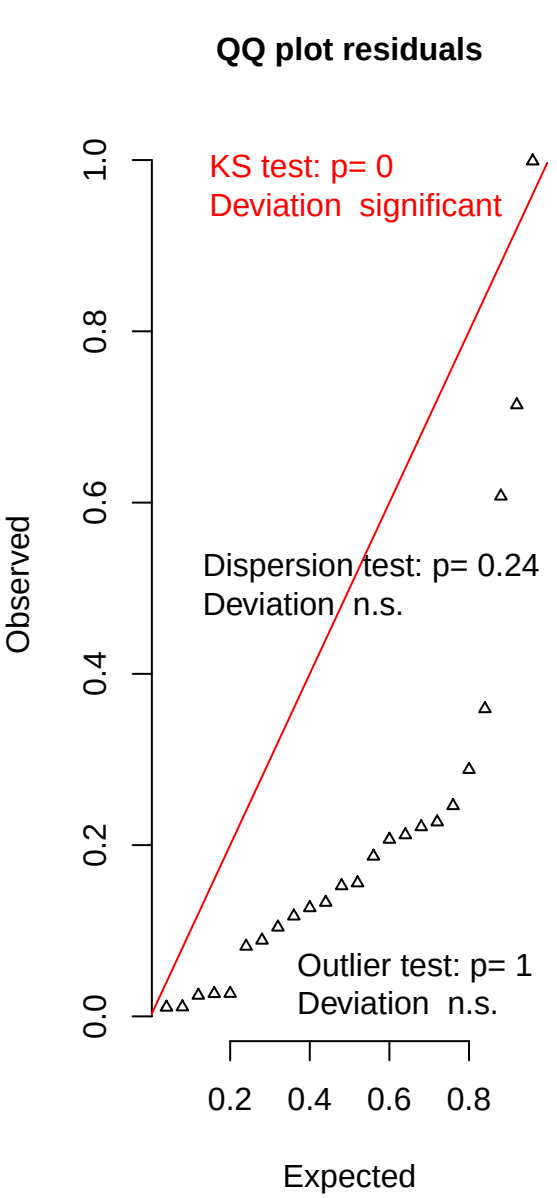

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0
Deviation significant
Dispersion test: p= 0
Deviation significant
Outlier test: p= 0
Deviation significant
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Residual vs. predicted
Standardized residual
Model predictions (rank transformed)
0.00
0.25
0.50
0.75
1.00

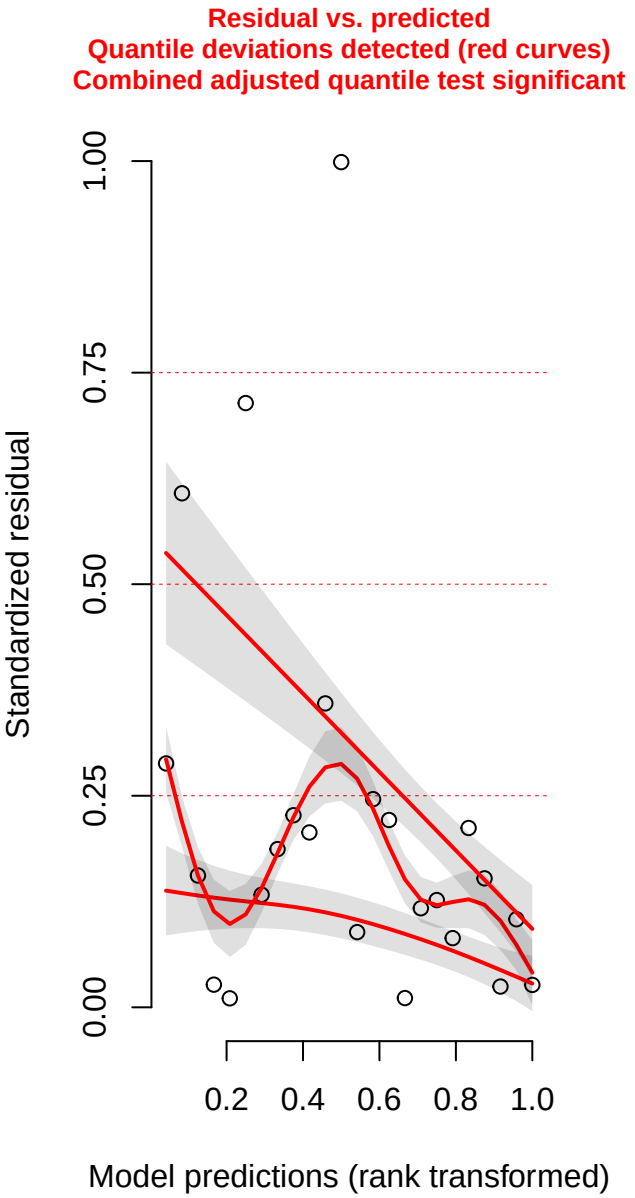

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 3e−05
Deviation significant
Dispersion test: p= 0
Deviation significant
Outlier test: p= 0
Deviation significant
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
0.2
0.4
0.6
0.8
Residual vs. predicted
Standardized residual
Model predictions (rank transformed)
0.00
0.25
0.50
0.75
1.00
0.2
0.4
0.6
0.8
1.0

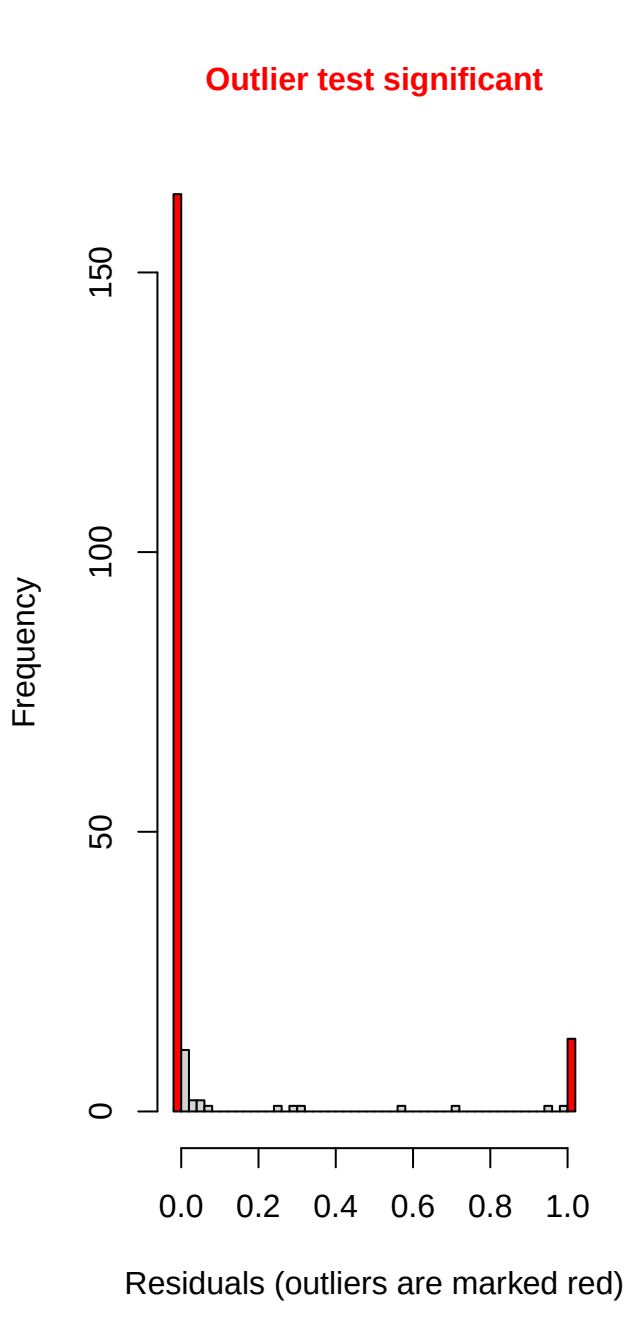

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0
Deviation significant
Dispersion test: p= 0
Deviation significant
Outlier test: p= 0
Deviation significant
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Residual vs. predicted
Standardized residual
Model predictions (rank transformed)
0.00
0.25
0.50
0.75
1.00

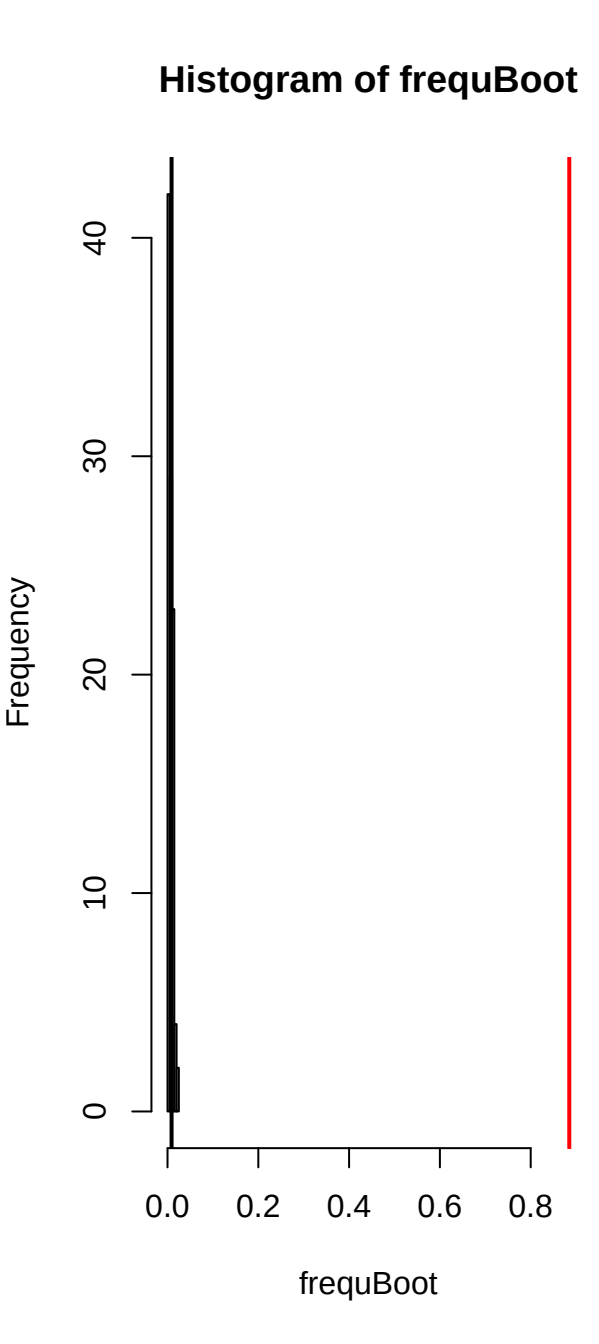

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0
Deviation significant
Dispersion test: p= 0.224
Deviation n.s.
Outlier test: p= 0.46
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Residual vs. predicted
Quantile deviations detected (red curves)
Combined adjusted quantile test significant
Standardized residual
Model predictions (rank transformed)
0.00
0.25
0.50
0.75
1.00

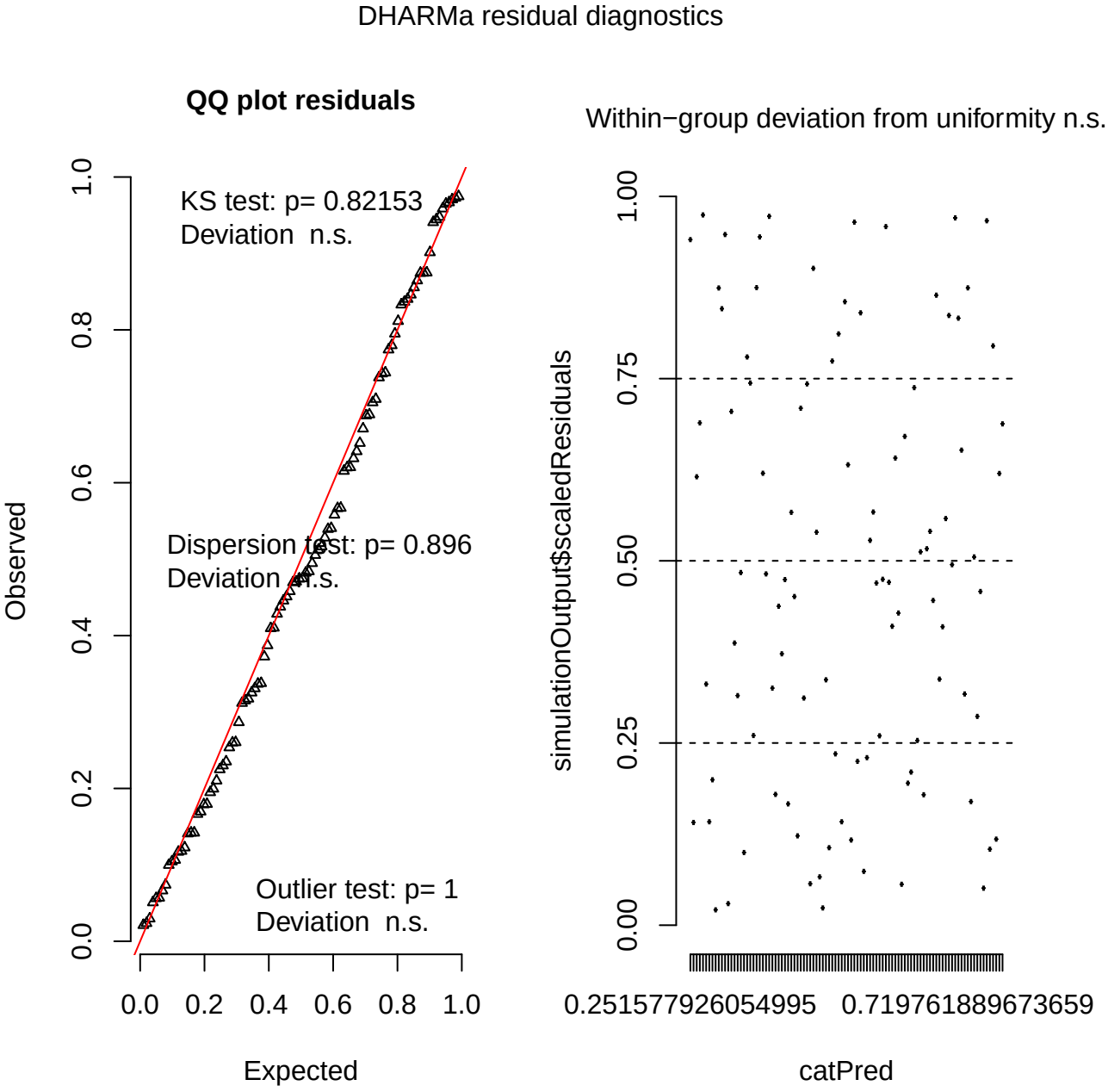
DHARMa residual diagnostics

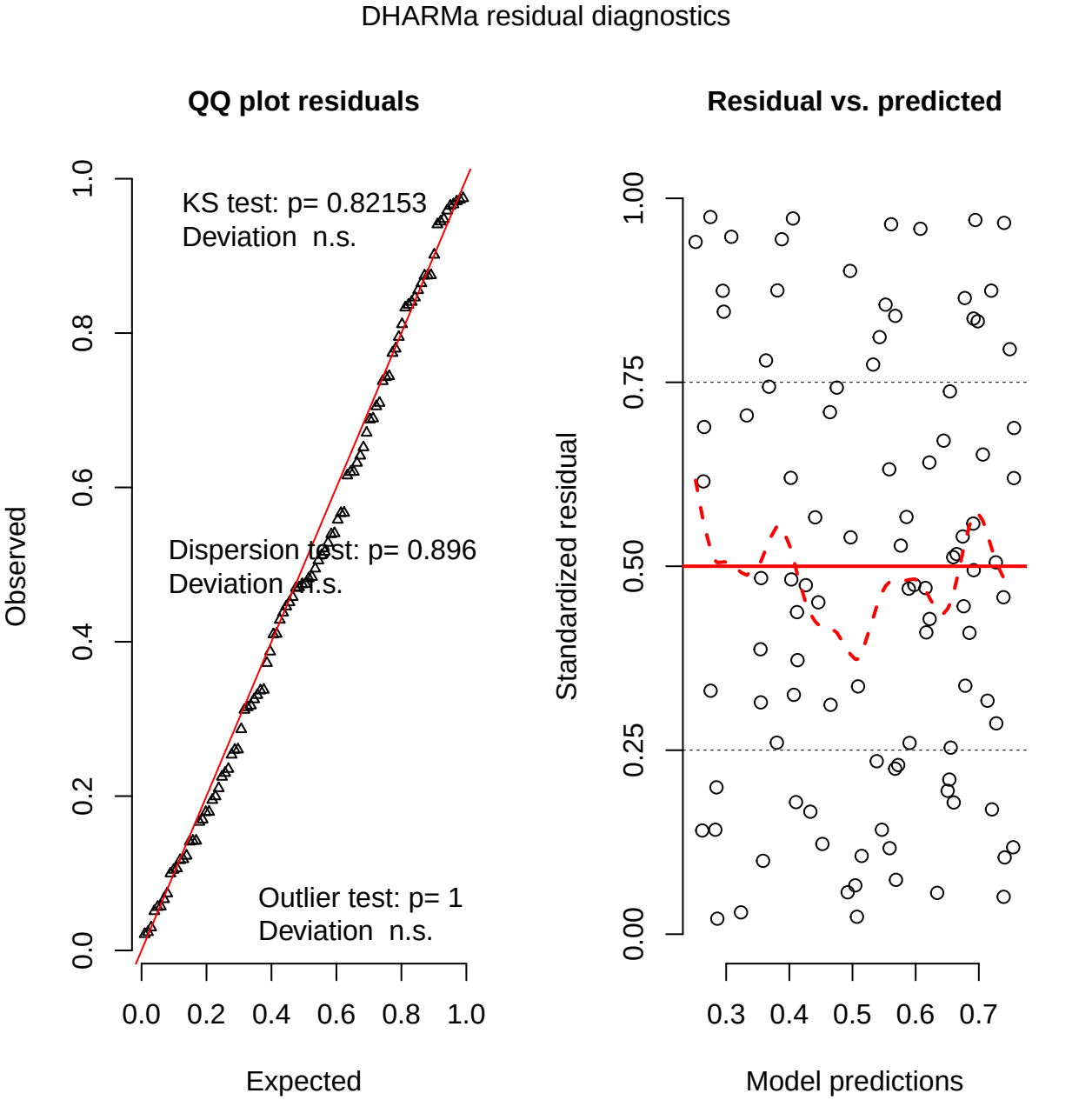


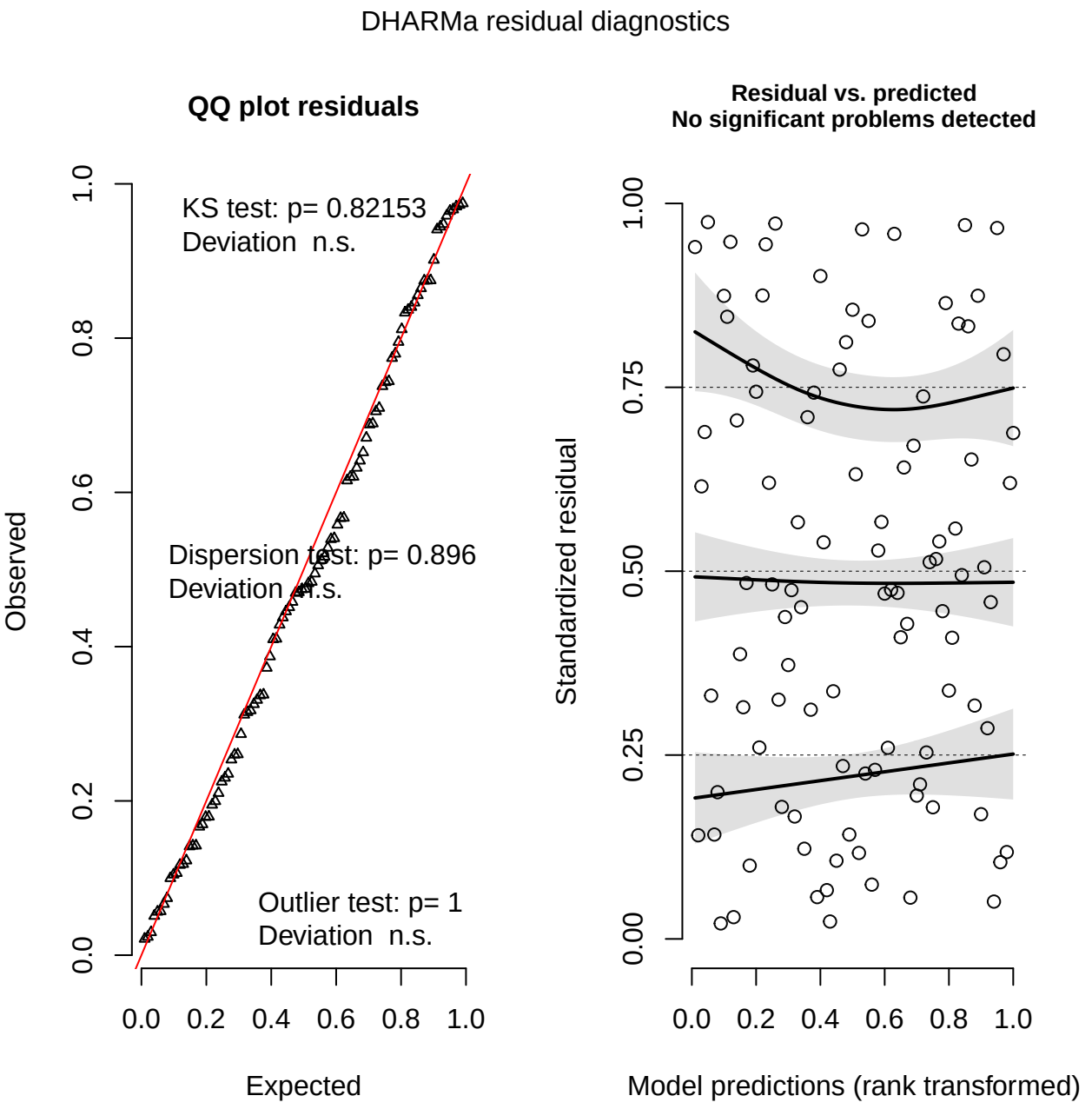


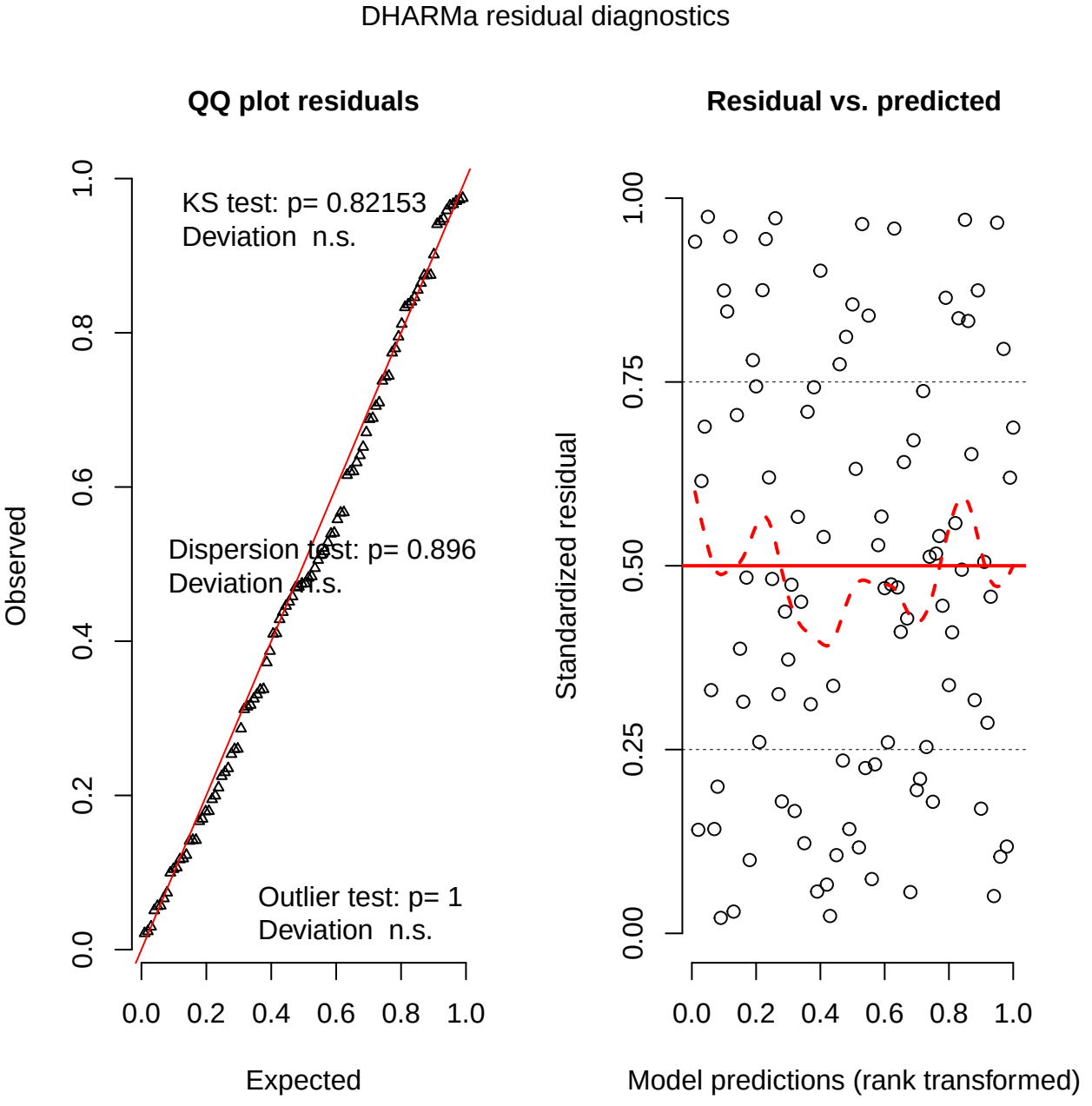

Outlier test significant
Frequency
0
50
100
150
0.0
0.2
0.4
0.6
0.8
1.0
Residuals (outliers are marked red)

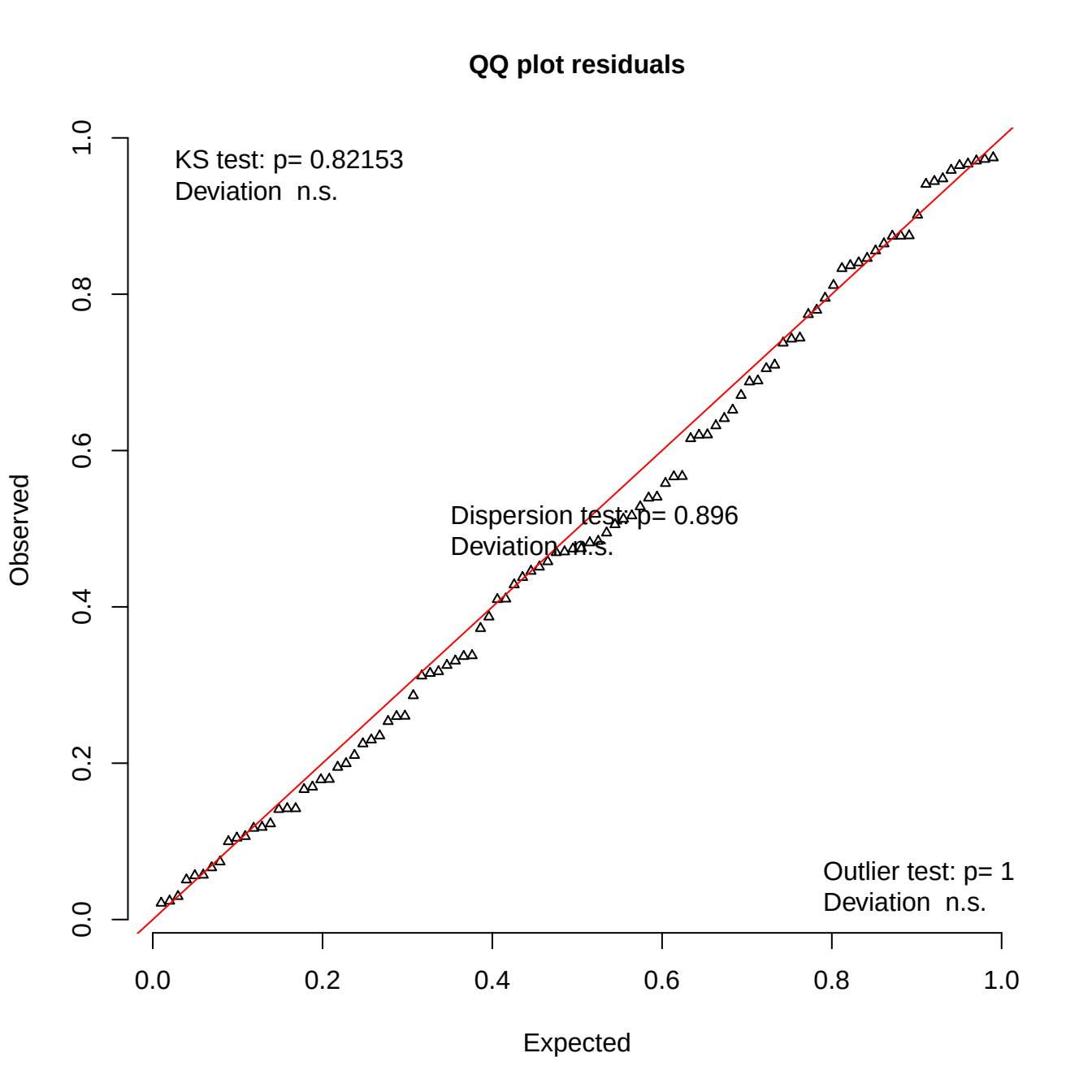

Histogram of frequBoot
Frequency
0
10
20
30
40
0.0
0.2
0.4
0.6
0.8
frequBoot

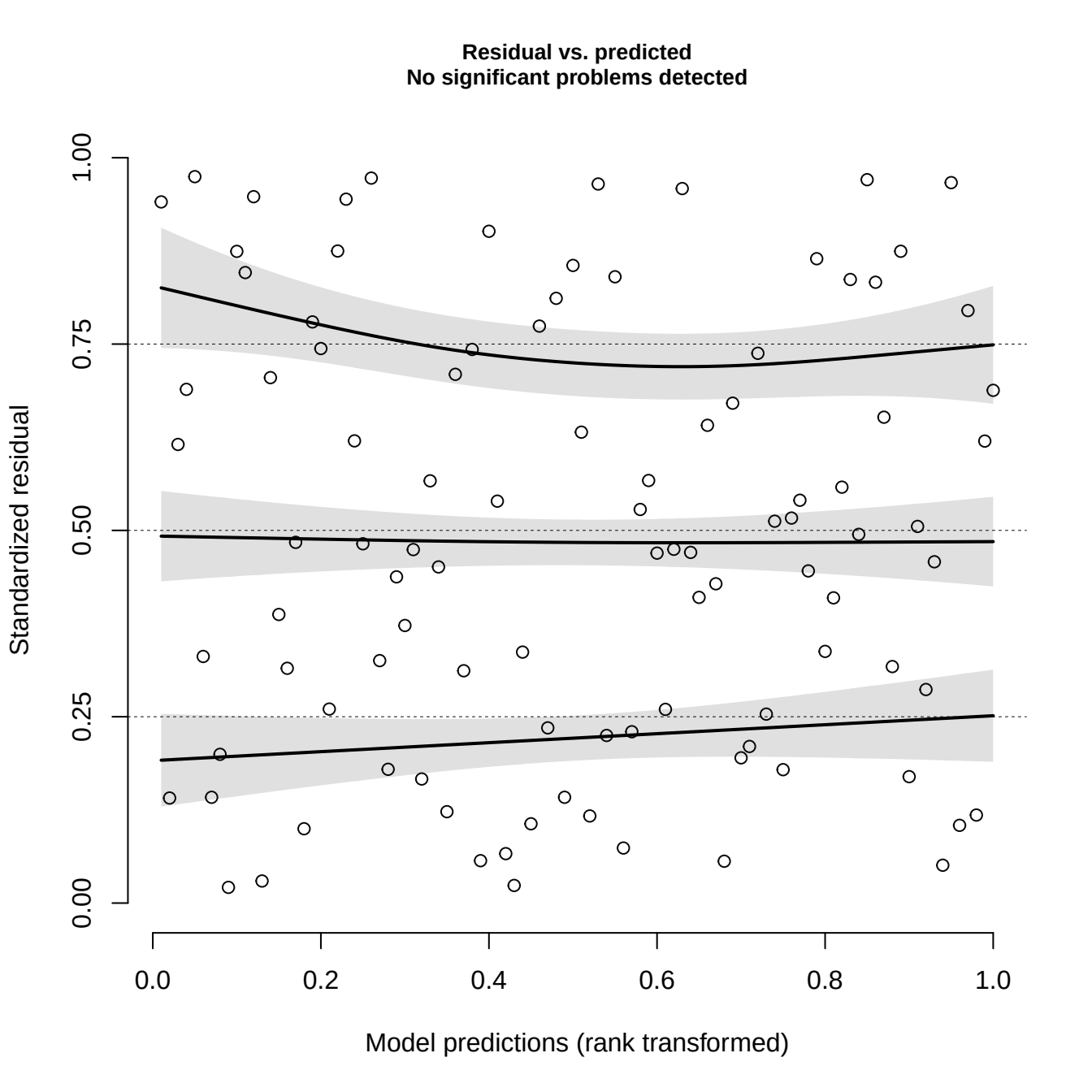

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0.82153
Deviation n.s.
Dispersion test: p= 0.896
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Within−group deviation from uniformity n.s.
simulationOutput$scaledResiduals
catPred
0.00
0.25
0.50
0.75
1.00
0.251577926054995
0.719761889673659

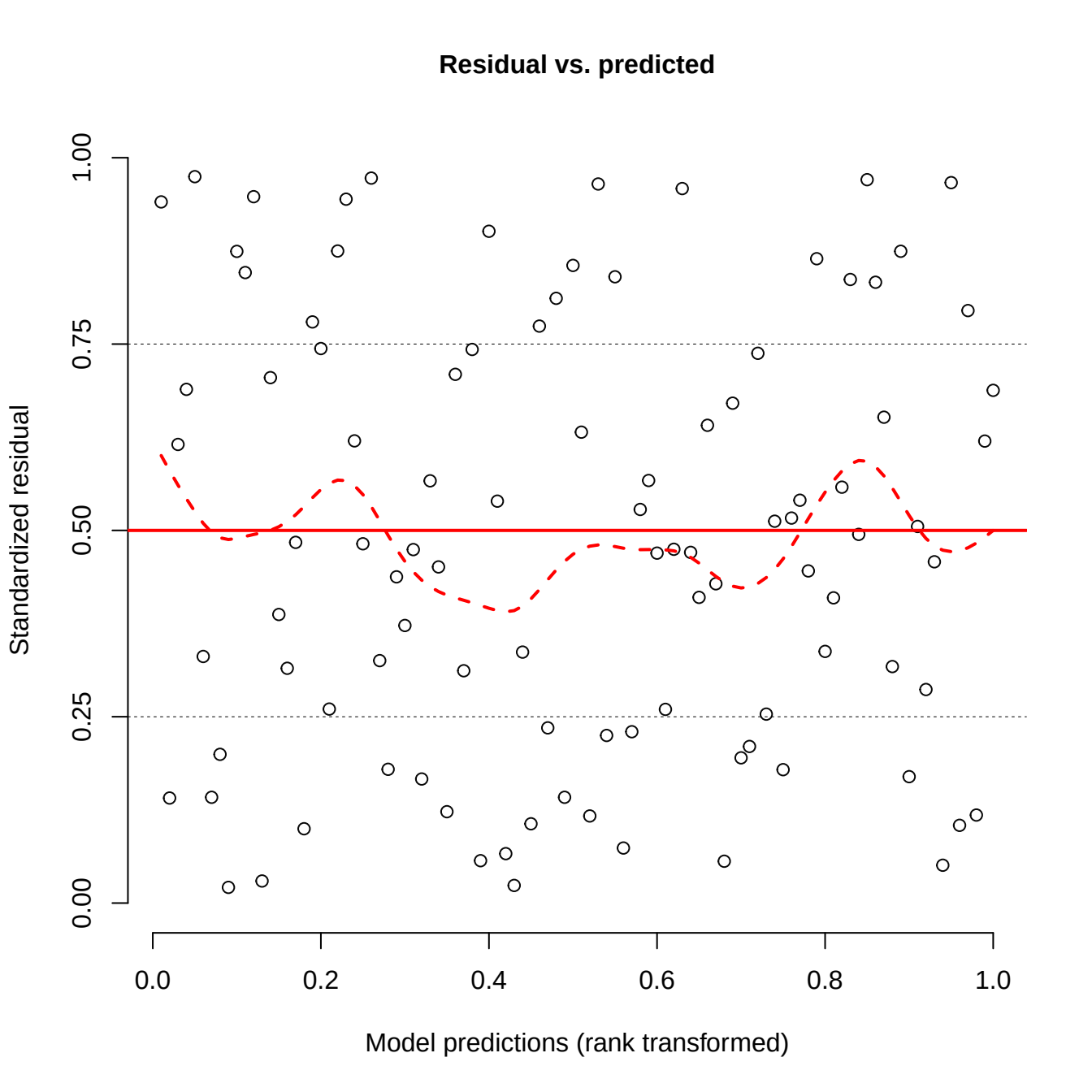

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0.82153
Deviation n.s.
Dispersion test: p= 0.896
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Residual vs. predicted
Standardized residual
Model predictions
0.00
0.25
0.50
0.75
1.00
0.3
0.4
0.5
0.6
0.7

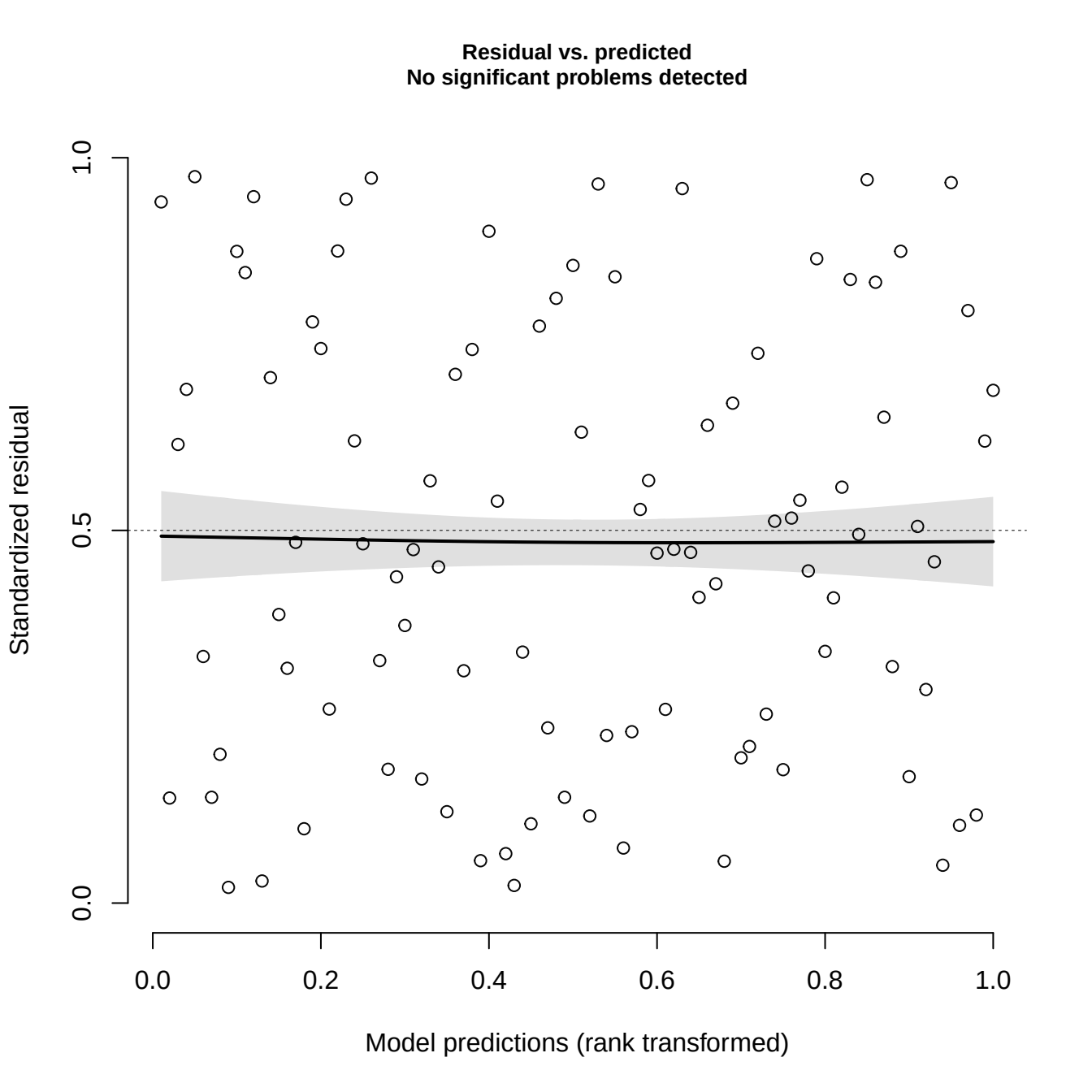

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0.82153
Deviation n.s.
Dispersion test: p= 0.896
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Residual vs. predicted
No significant problems detected
Standardized residual
Model predictions (rank transformed)
0.00
0.25
0.50
0.75
1.00

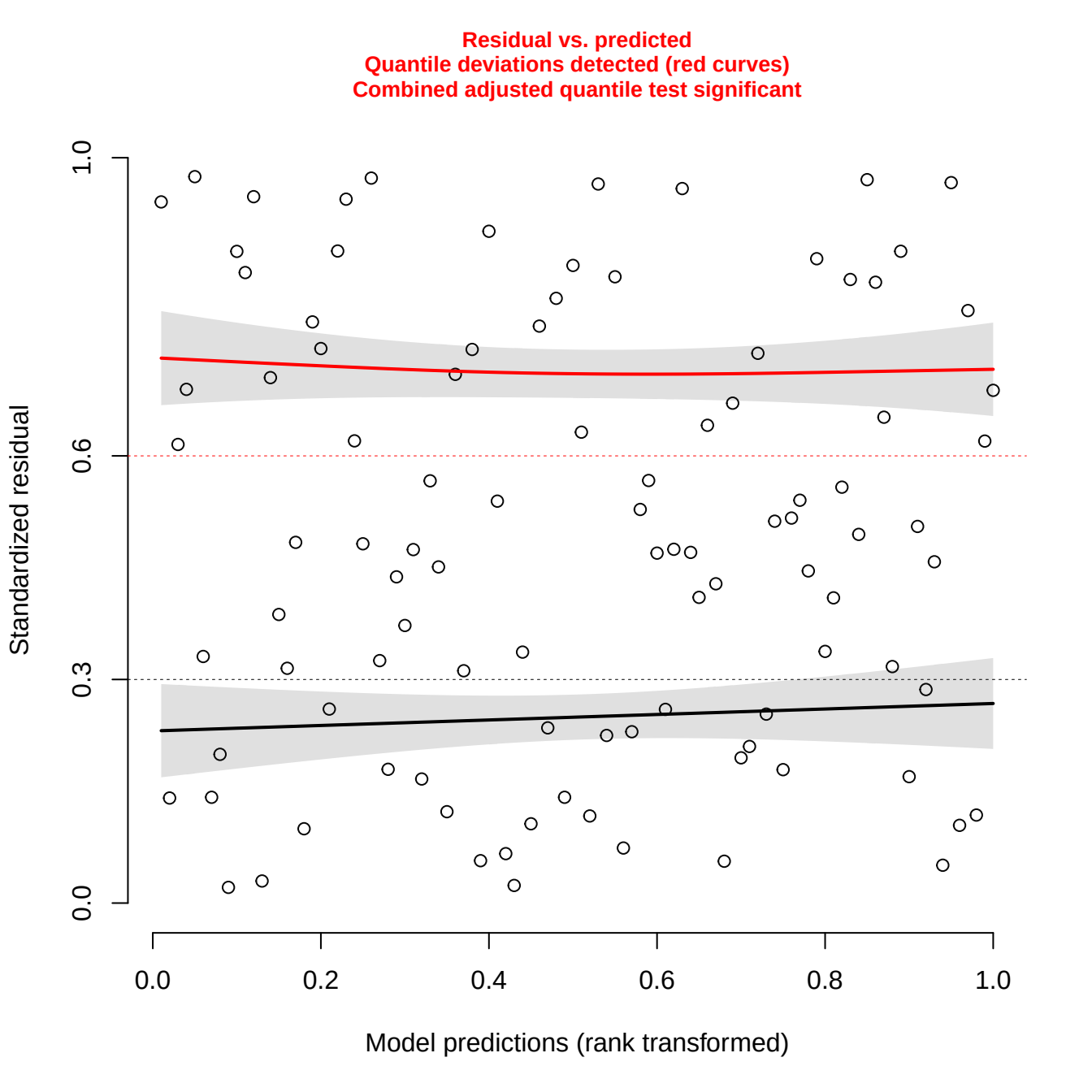

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0.82153
Deviation n.s.
Dispersion test: p= 0.896
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Residual vs. predicted
Standardized residual
Model predictions (rank transformed)
0.00
0.25
0.50
0.75
1.00

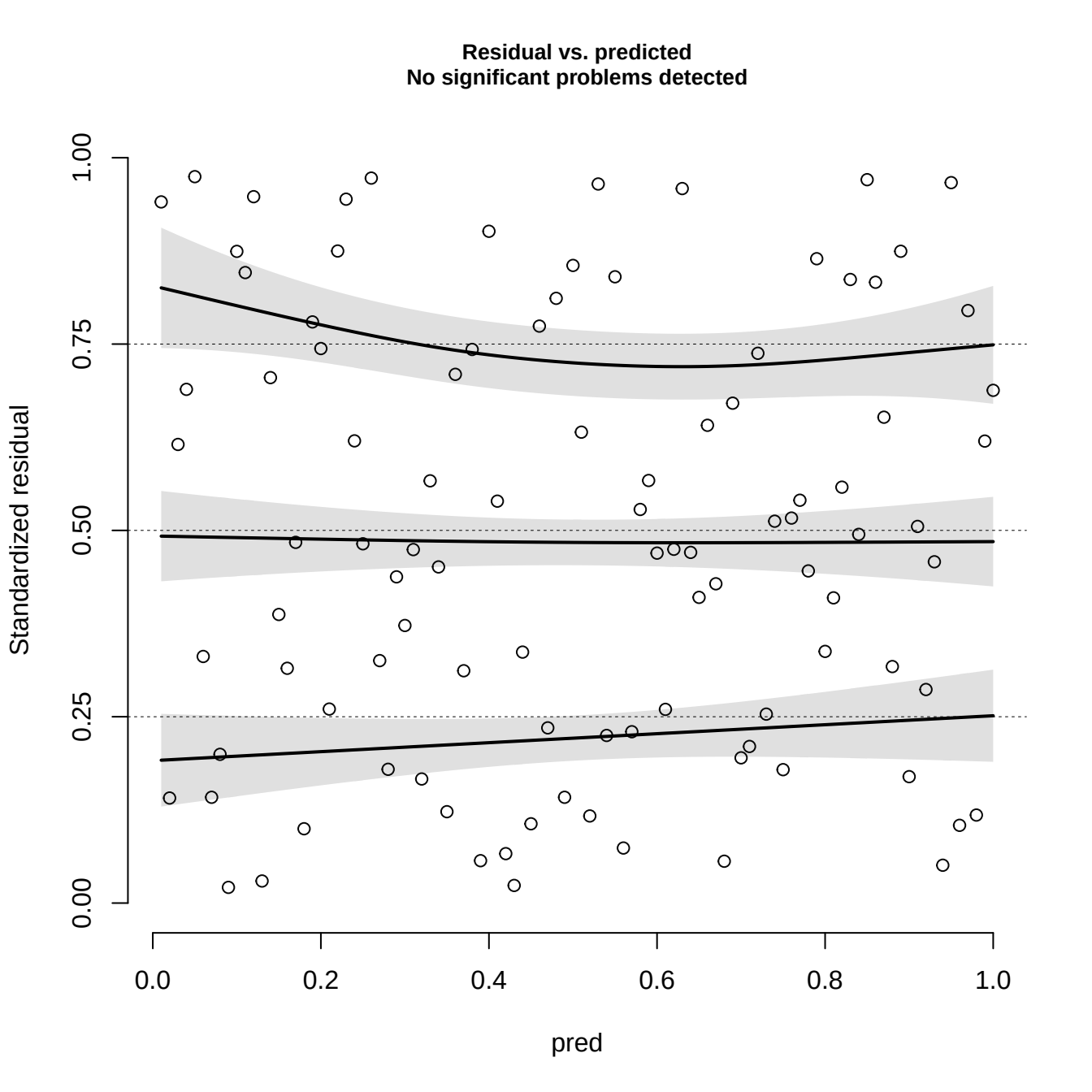

QQ plot residuals
KS test: p= 0.82153
Deviation n.s.
Dispersion test: p= 0.896
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0

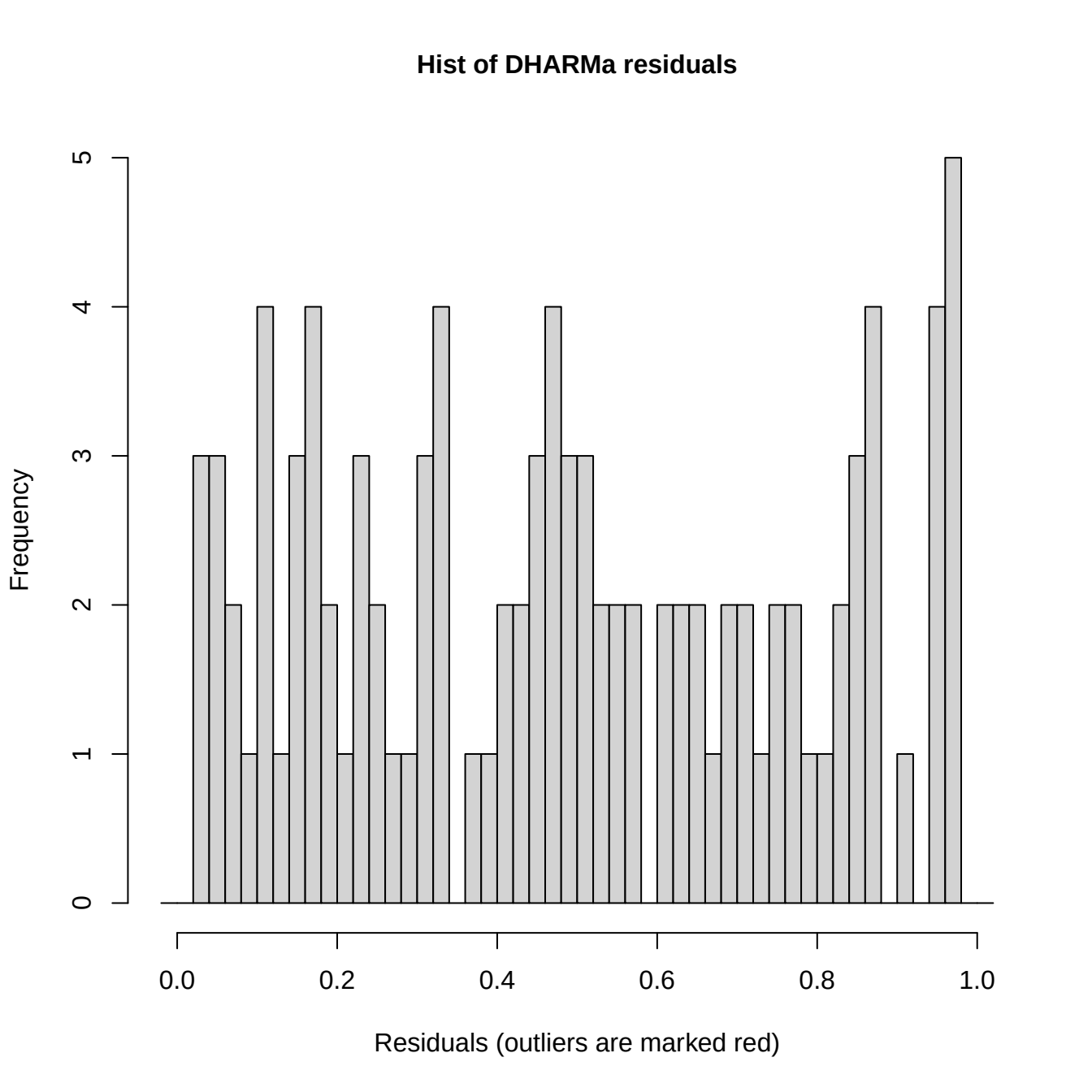

Residual vs. predicted
No significant problems detected
Standardized residual
1.00
0.75
0.50
0.25
0.00
0.0
0.2
0.4
0.6
0.8
1.0
Model predictions (rank transformed)

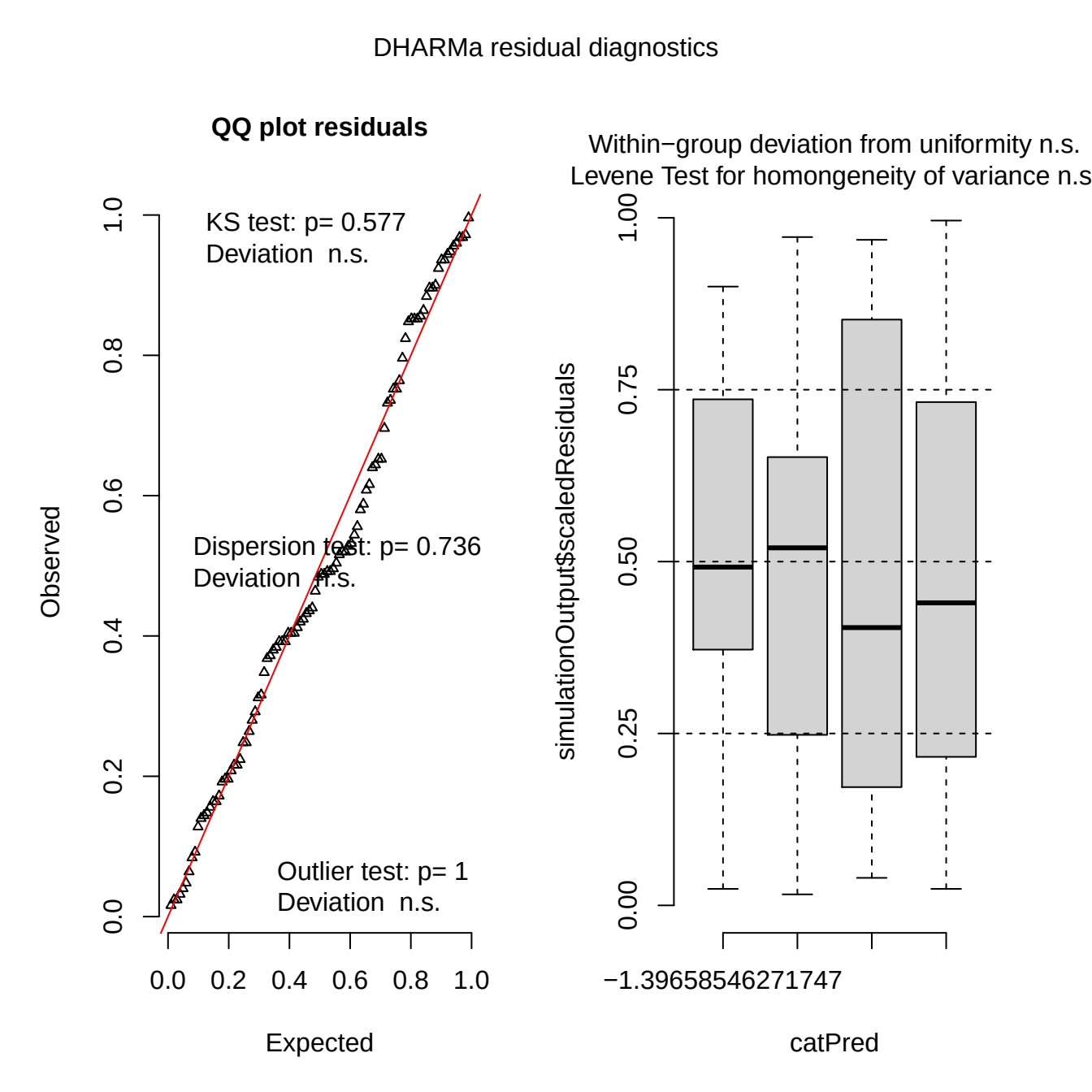

Residual vs. predicted
Standardized residual
0.00
0.25
0.50
0.75
1.00
0.0
0.2
0.4
0.6
0.8
1.0
Model predictions (rank transformed)

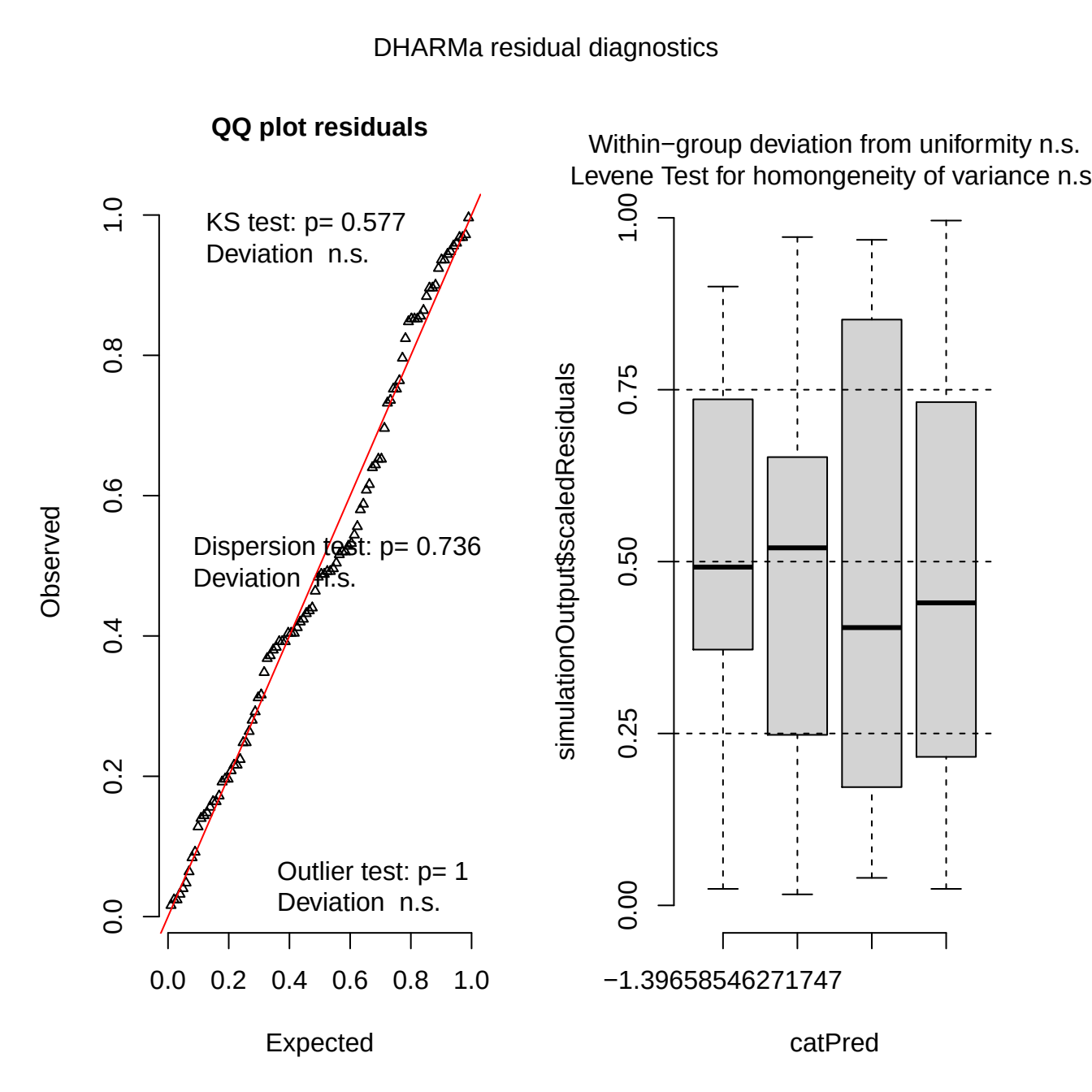

Residual vs. predicted
No significant problems detected
Standardized residual
1.0
0.5
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Model predictions (rank transformed)

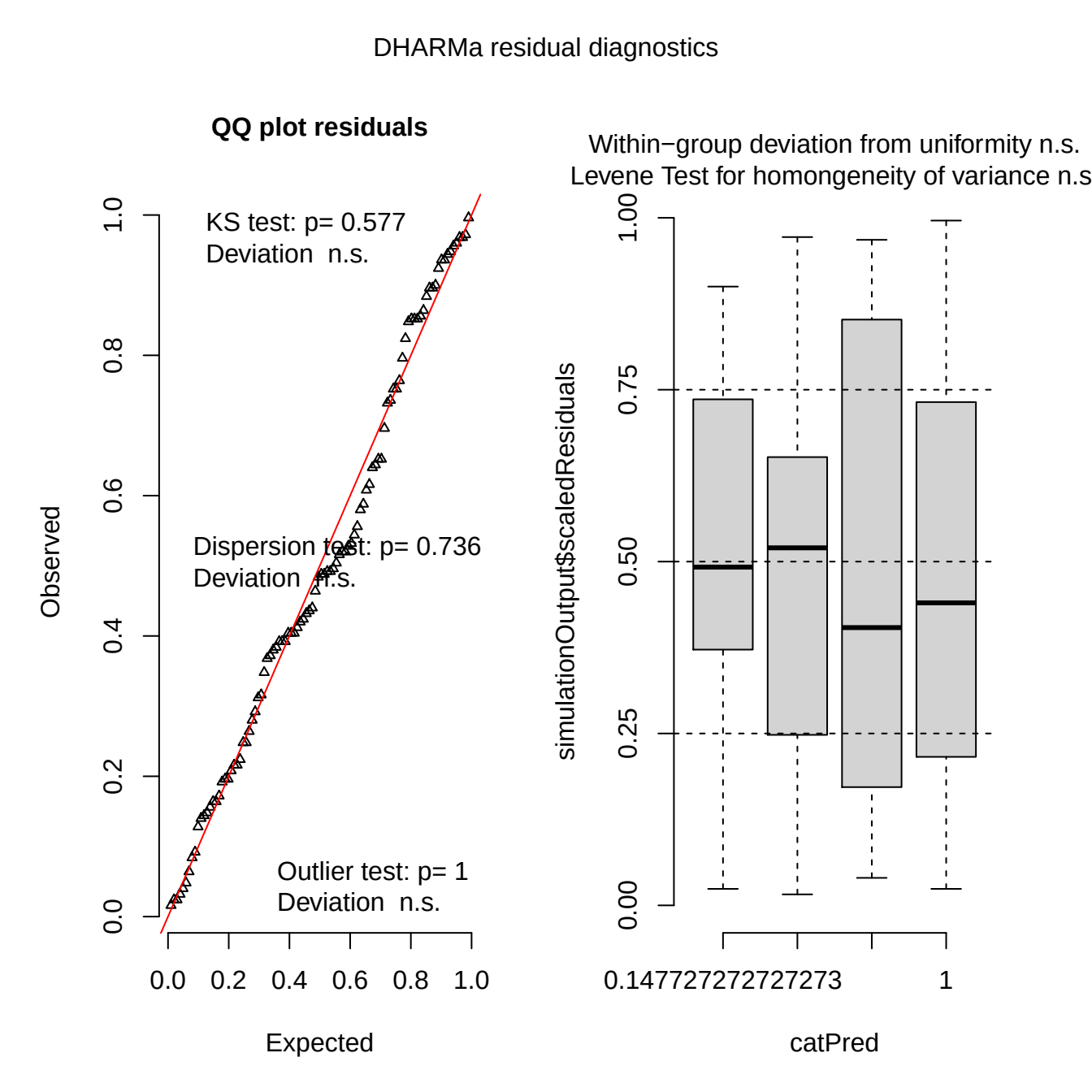

Residual vs. predicted
Quantile deviations detected (red curves)
Combined adjusted quantile test significant
Standardized residual
1.0
0.6
0.3
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Model predictions (rank transformed)

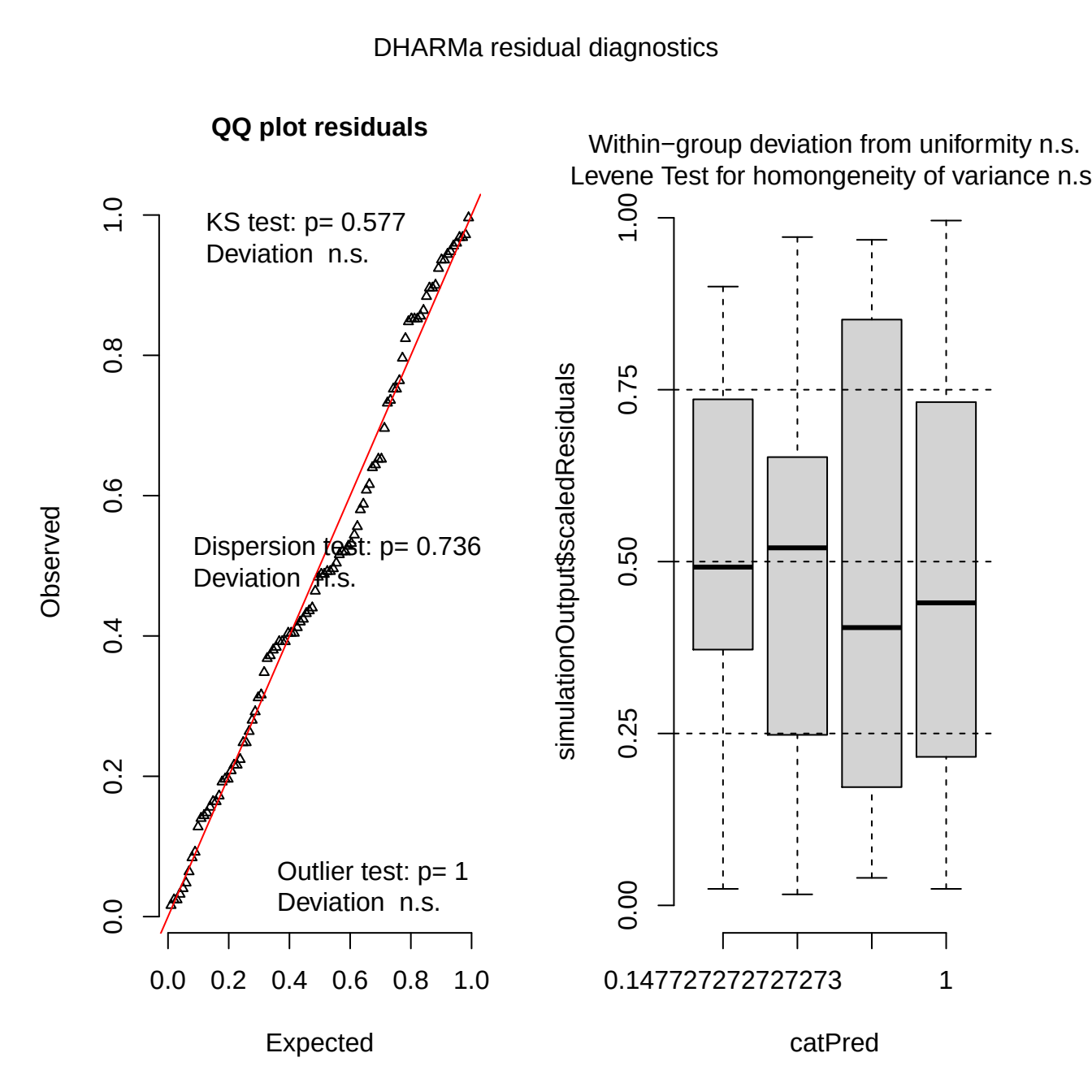

Residual vs. predicted
No significant problems detected
Standardized residual
1.00
0.75
0.50
0.25
0.00
0.0
0.2
0.4
0.6
0.8
1.0
pred

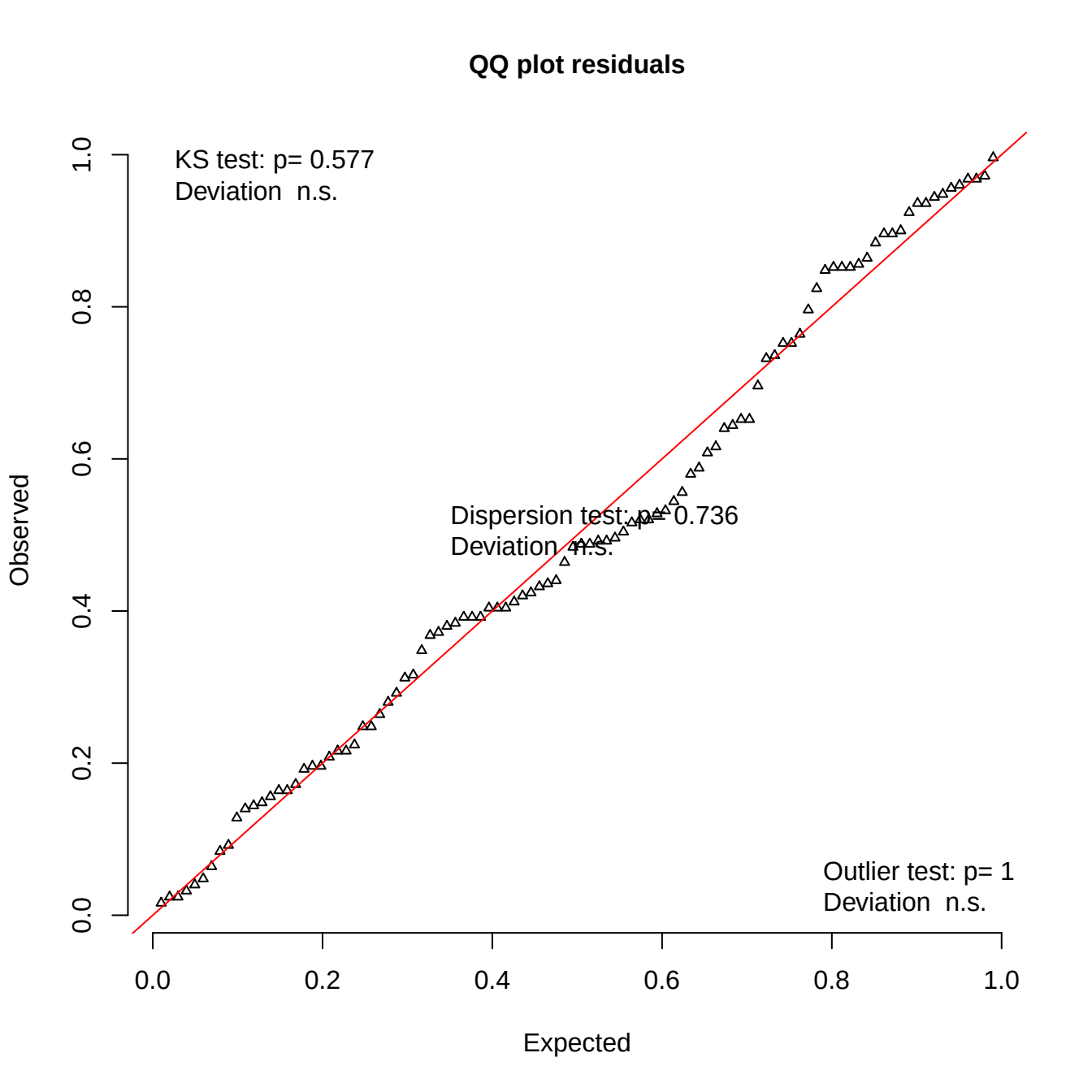

Hist of DHARMa residuals
Frequency
0
1
2
3
4
5
0.0
0.2
0.4
0.6
0.8
1.0
Residuals (outliers are marked red)

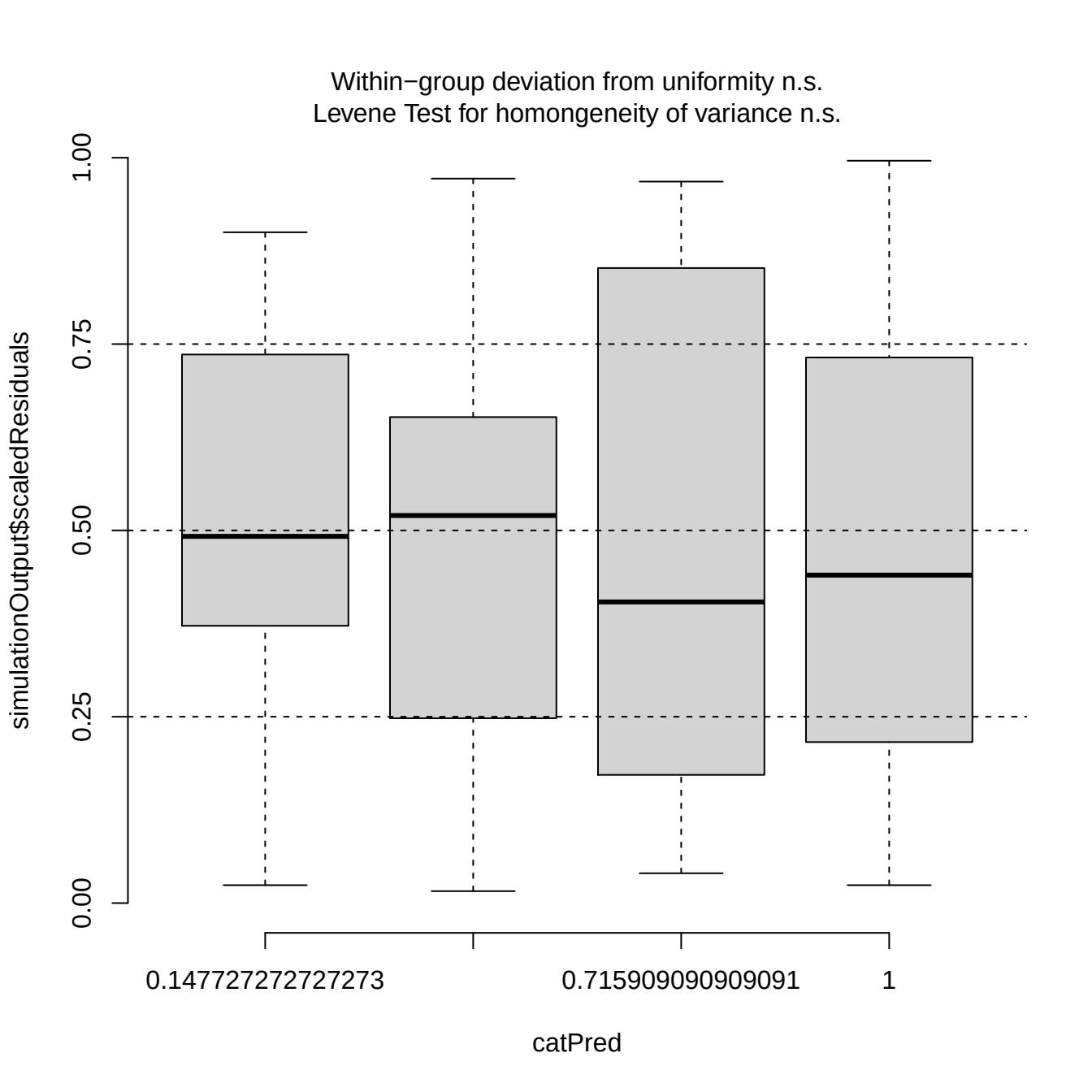

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0.577
Deviation n.s.
Dispersion test: p= 0.736
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Within−group deviation from uniformity n.s.
Levene Test for homongeneity of variance n.s
simulationOutput$scaledResiduals
0.00
0.25
0.50
0.75
1.00
−1.39658546271747
catPred

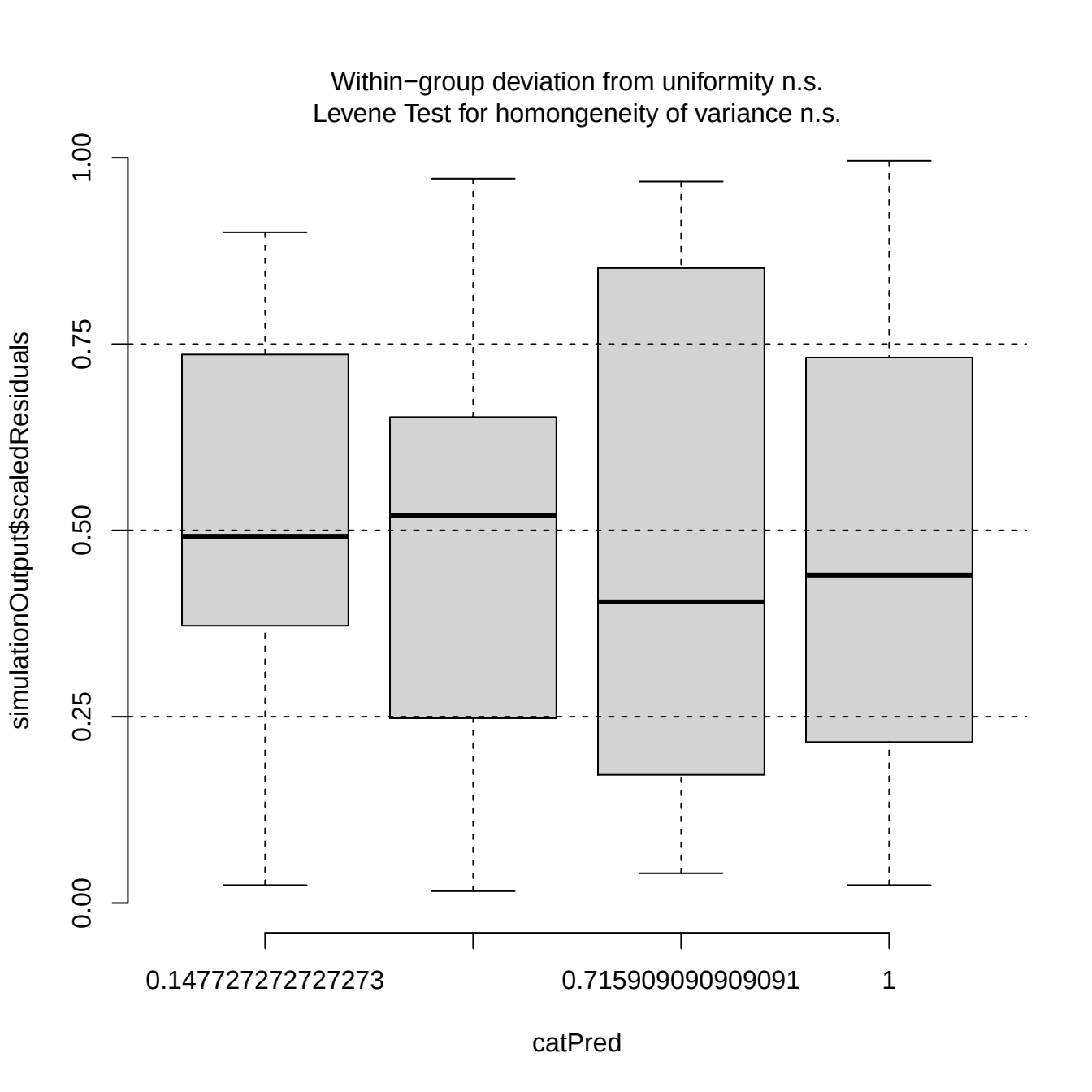

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0.577
Deviation n.s.
Dispersion test: p= 0.736
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Within−group deviation from uniformity n.s.
Levene Test for homongeneity of variance n.s
simulationOutput$scaledResiduals
0.00
0.25
0.50
0.75
1.00
−1.39658546271747
catPred

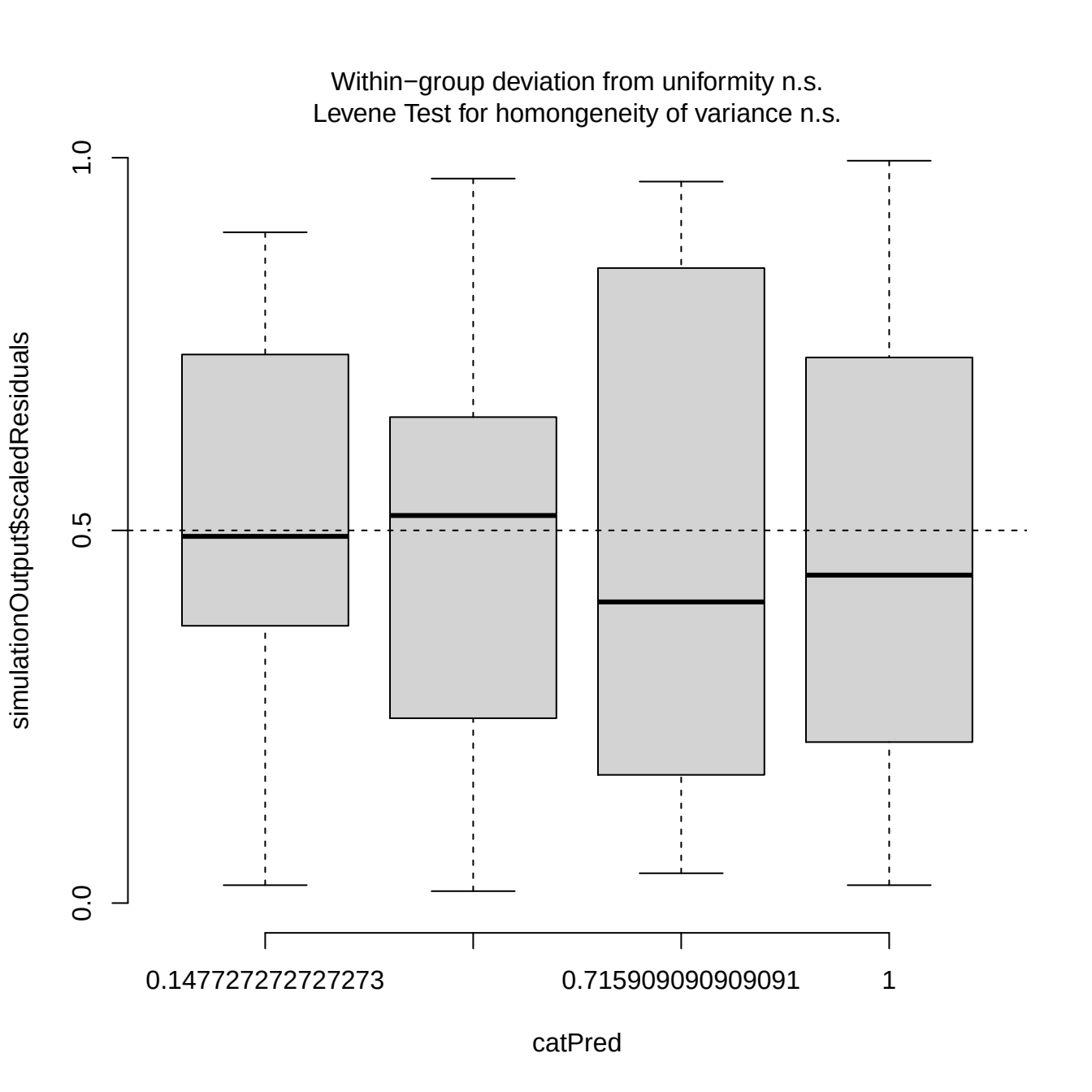

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0.577
Deviation n.s.
Dispersion test: p= 0.736
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Within−group deviation from uniformity n.s.
Levene Test for homongeneity of variance n.s
simulationOutput$scaledResiduals
catPred
0.00
0.25
0.50
0.75
1.00
0.147727272727273
1

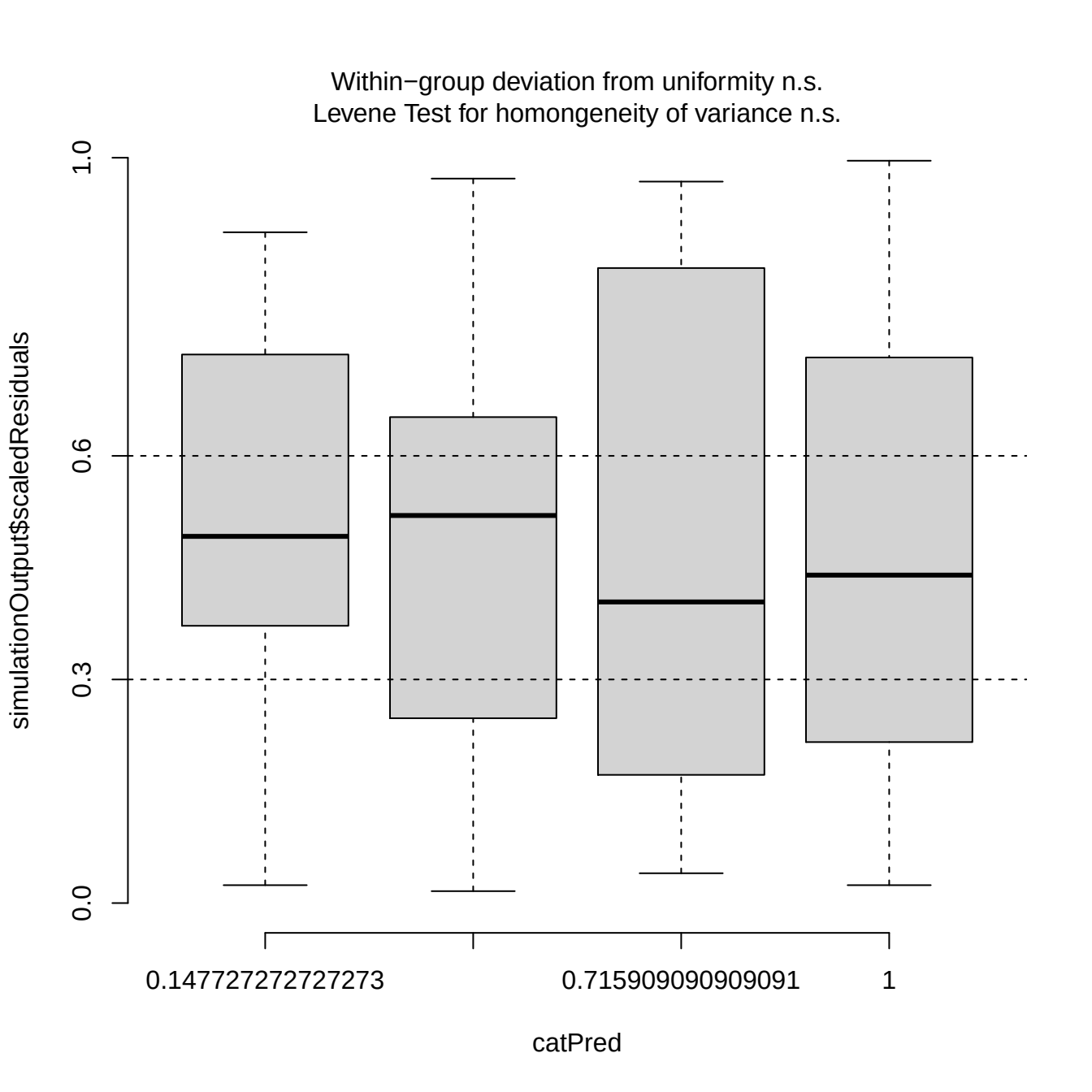

DHARMa residual diagnostics
QQ plot residuals
KS test: p= 0.577
Deviation n.s.
Dispersion test: p= 0.736
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
Within−group deviation from uniformity n.s.
Levene Test for homongeneity of variance n.s
simulationOutput$scaledResiduals
catPred
0.00
0.25
0.50
0.75
1.00
0.147727272727273
1

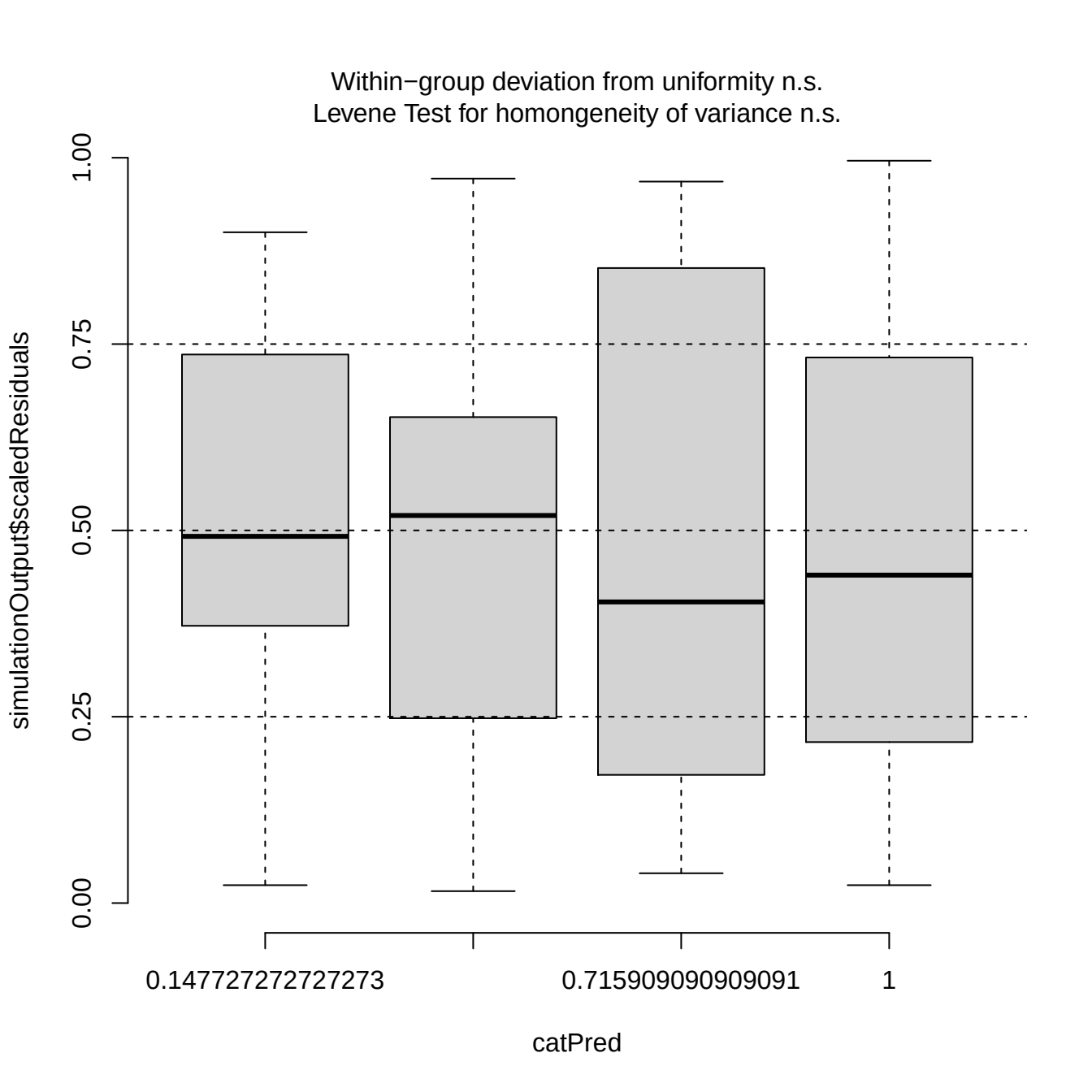

QQ plot residuals
KS test: p= 0.577
Deviation n.s.
Dispersion test: p= 0.736
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0

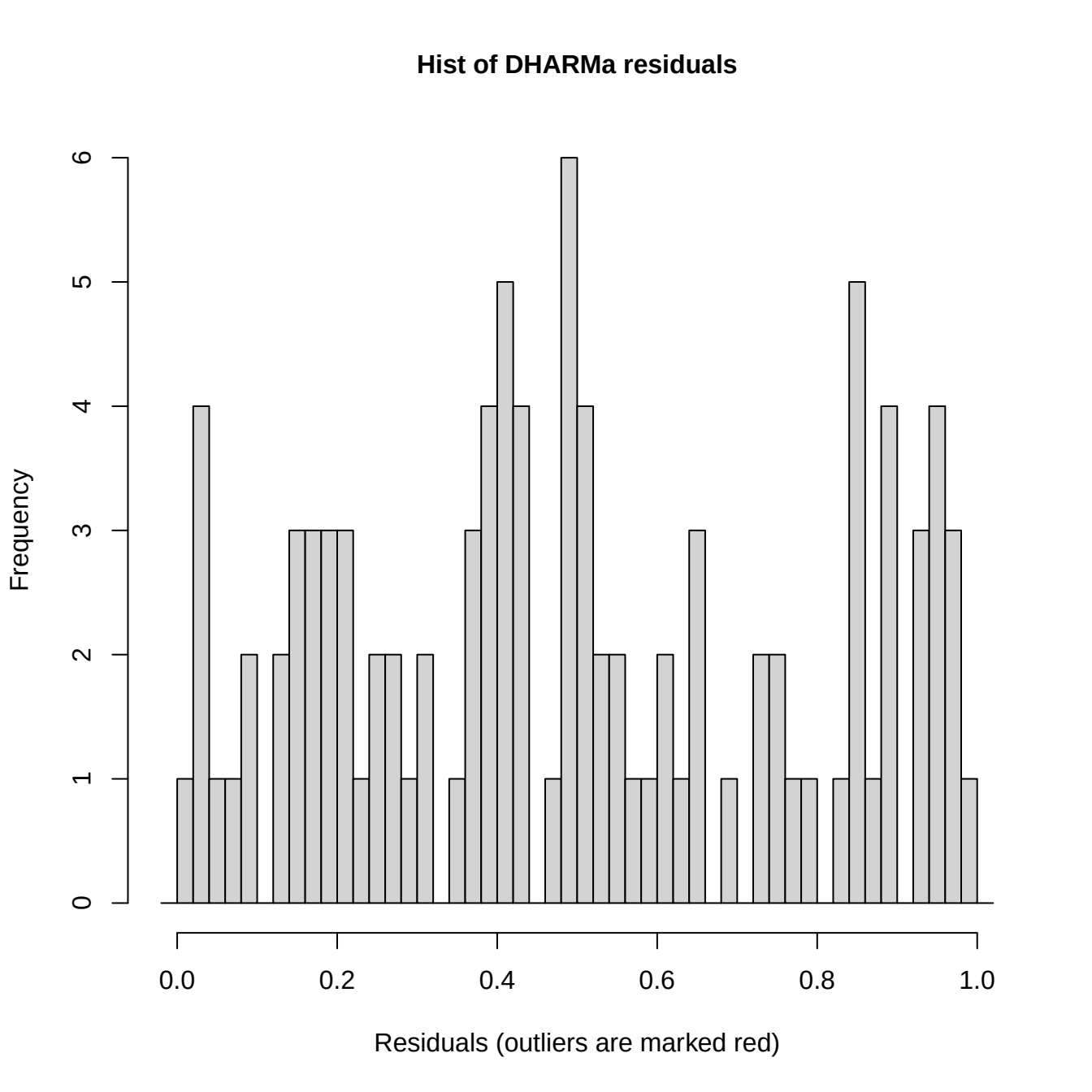

Within−group deviation from uniformity n.s.
Levene Test for homongeneity of variance n.s.
simulationOutput$scaledResiduals
0.00
0.25
0.50
0.75
1.00
0.147727272727273
0.715909090909091
1
catPred

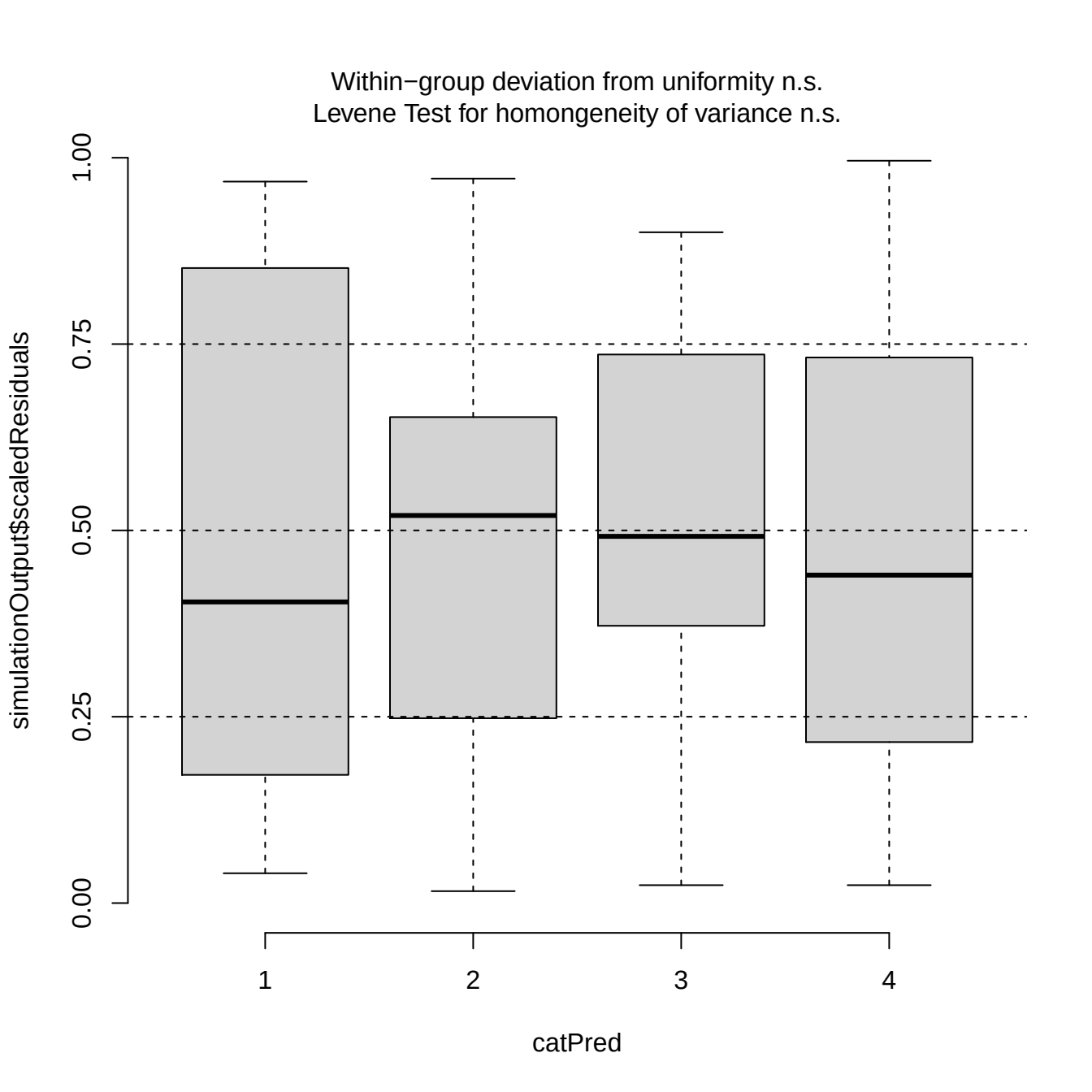

Within−group deviation from uniformity n.s.
Levene Test for homongeneity of variance n.s.
simulationOutput$scaledResiduals
0.00
0.25
0.50
0.75
1.00
0.147727272727273
0.715909090909091
1
catPred

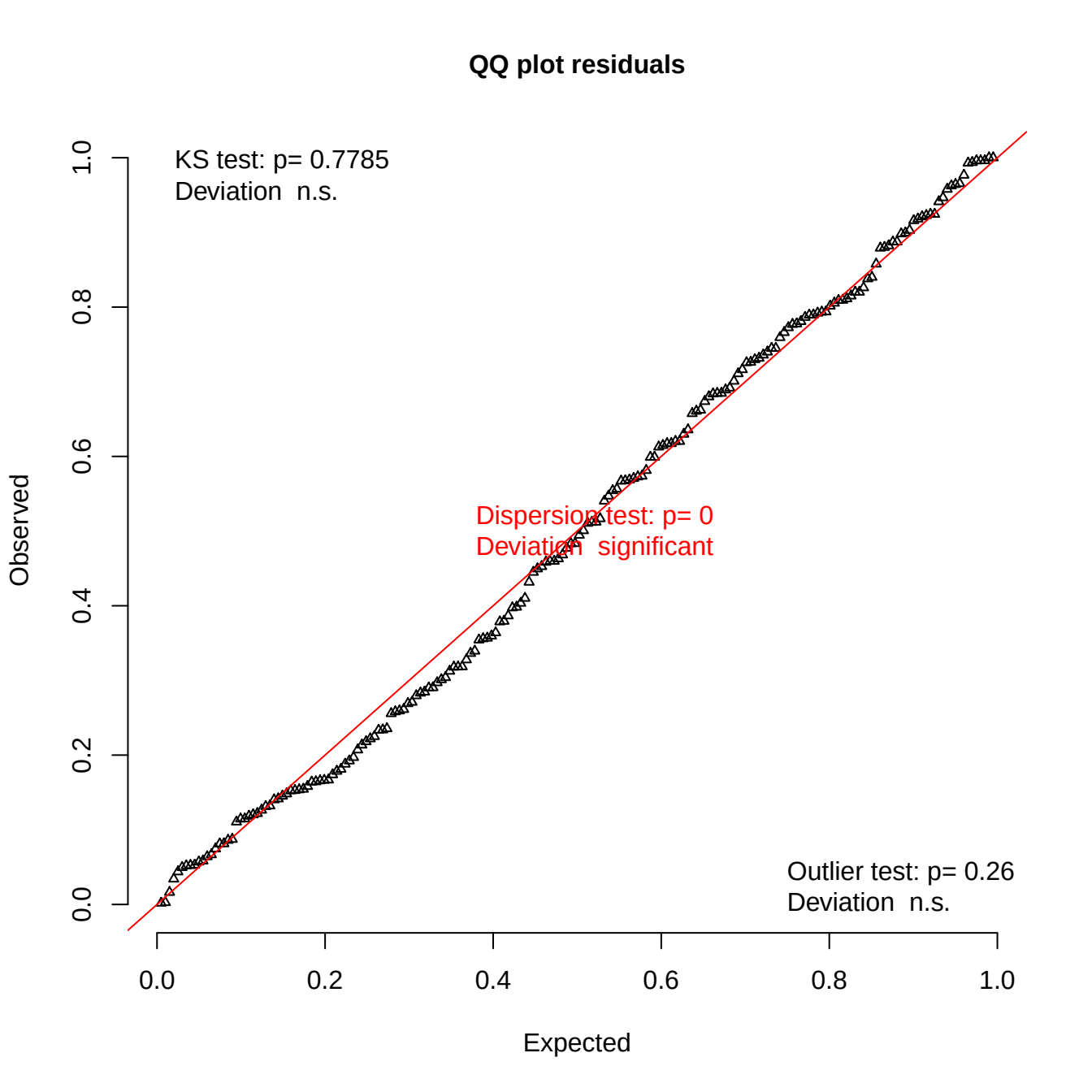

Within−group deviation from uniformity n.s.
Levene Test for homongeneity of variance n.s.
simulationOutput$scaledResiduals
1.0
0.5
0.0
0.147727272727273
0.715909090909091
1
catPred

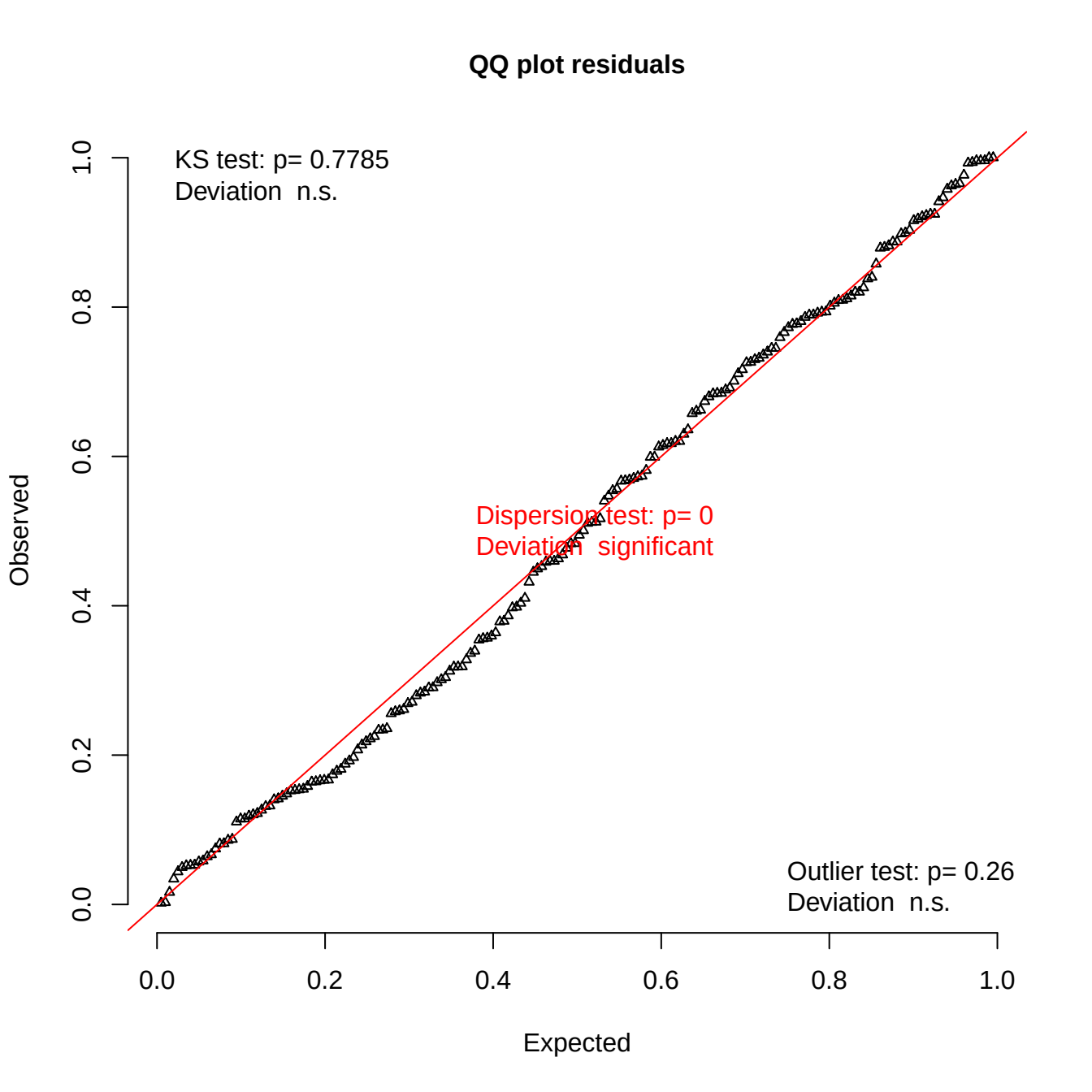

Within−group deviation from uniformity n.s.
Levene Test for homongeneity of variance n.s.
simulationOutput$scaledResiduals
0.0
0.3
0.6
1.0
0.147727272727273
0.715909090909091
1
catPred

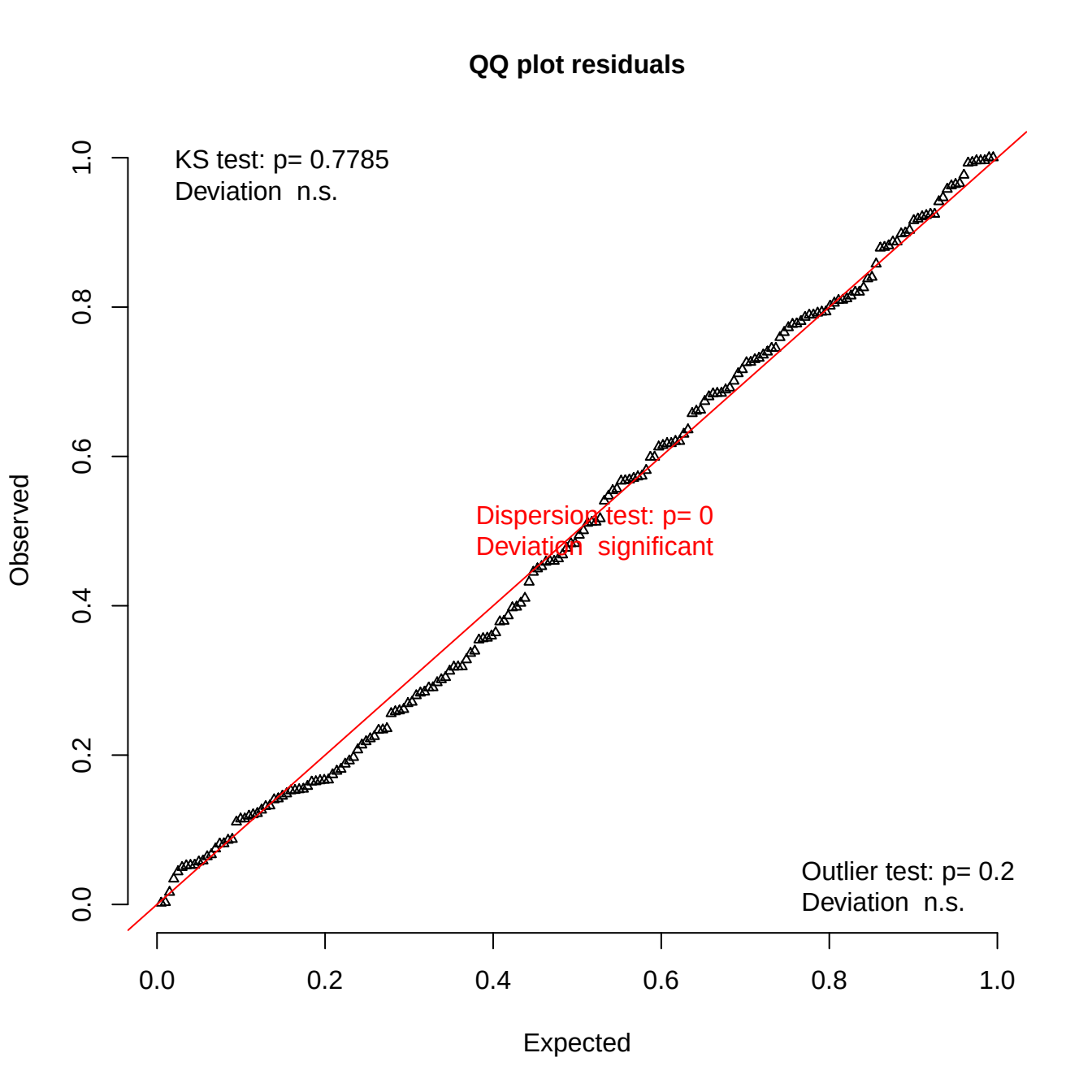

Within−group deviation from uniformity n.s.
Levene Test for homongeneity of variance n.s.
simulationOutput$scaledResiduals
0.00
0.25
0.50
0.75
1.00
0.147727272727273
0.715909090909091
1
catPred

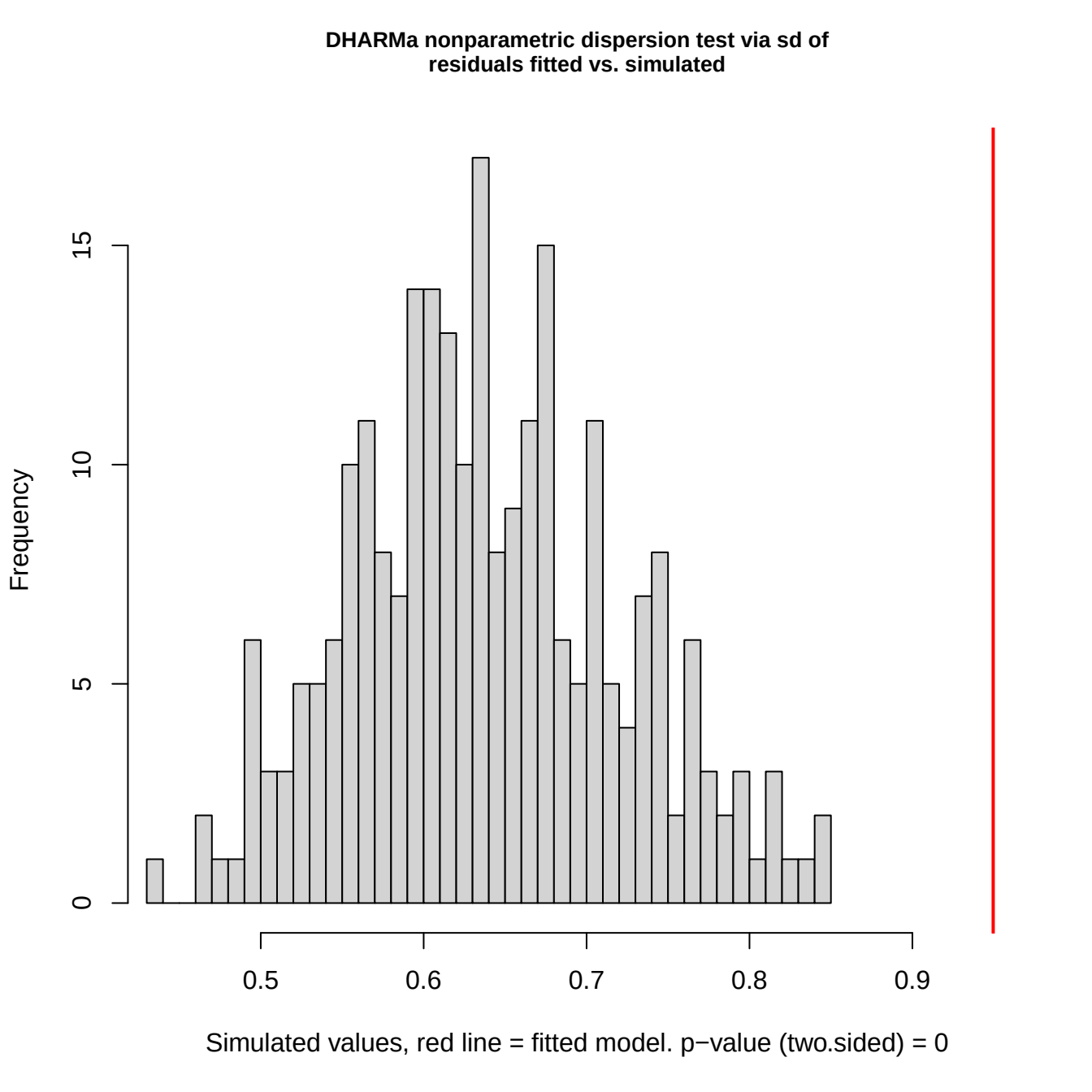

Hist of DHARMa residuals
Frequency
0
1
2
3
4
5
6
0.0
0.2
0.4
0.6
0.8
1.0
Residuals (outliers are marked red)

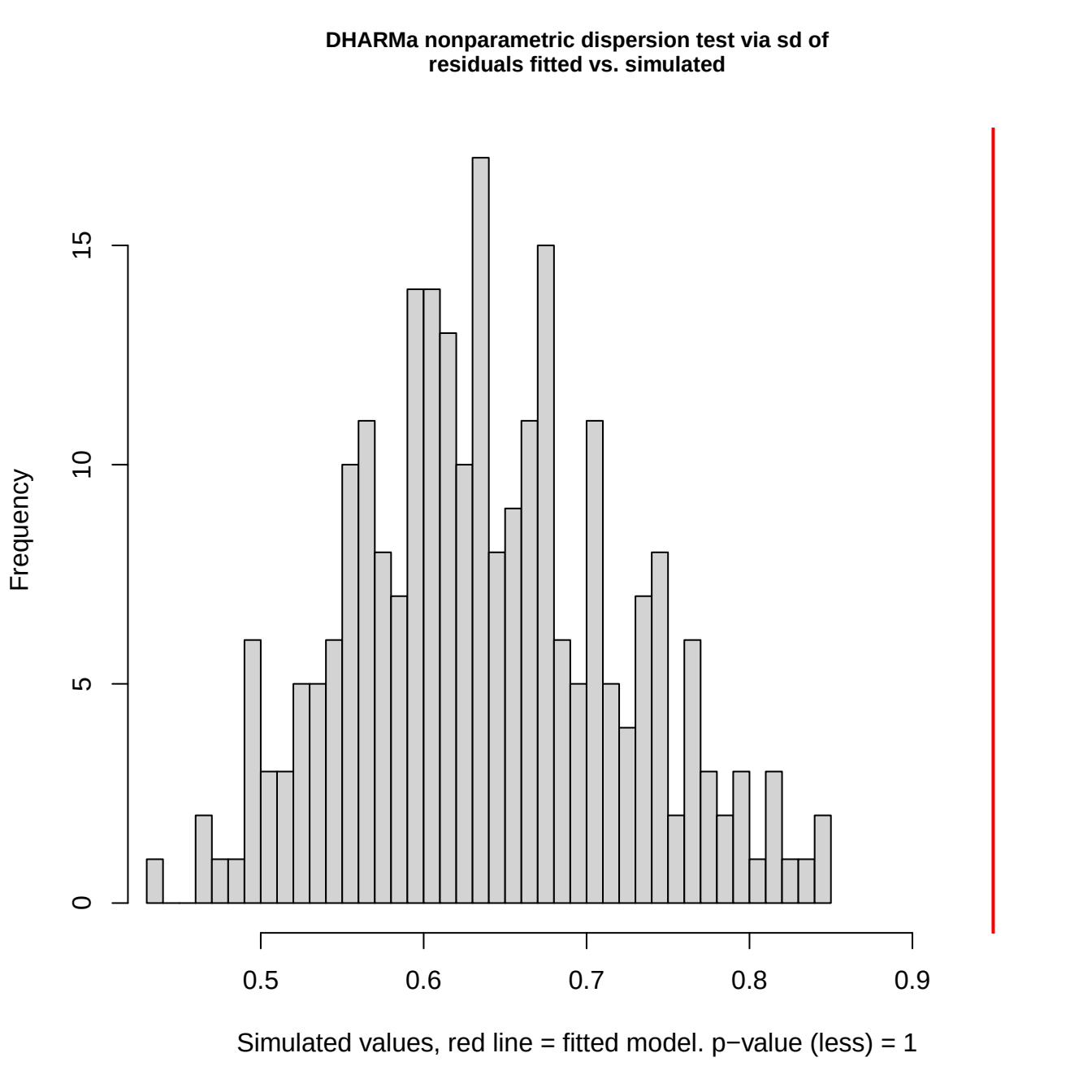

Within−group deviation from uniformity n.s.
Levene Test for homongeneity of variance n.s.
simulationOutput$scaledResiduals
0.00
0.25
0.50
0.75
1.00
1
2
3
4
catPred

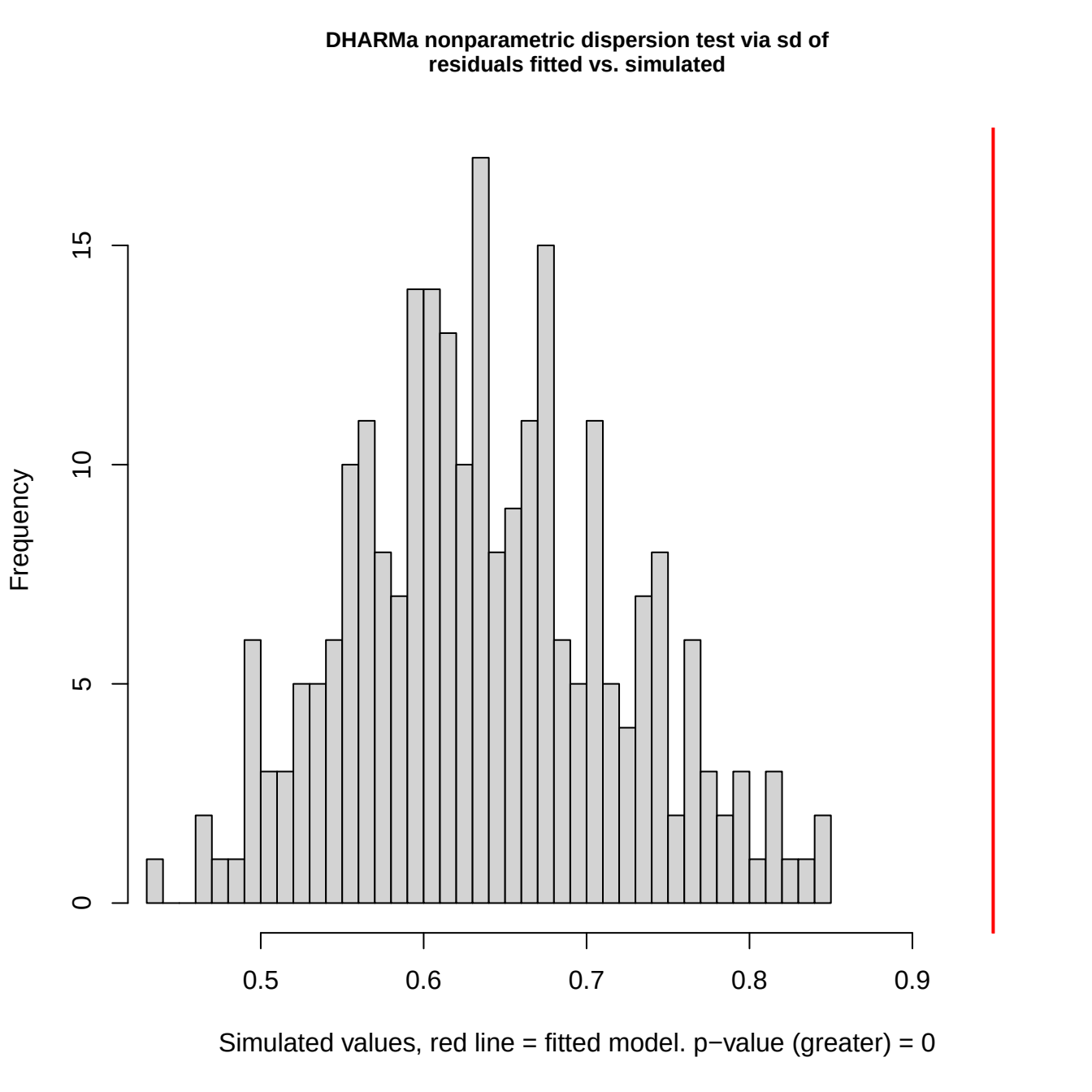

QQ plot residuals
KS test: p= 0.7785
Deviation n.s.
Dispersion test: p= 0
Deviation significant
Outlier test: p= 0.26
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0

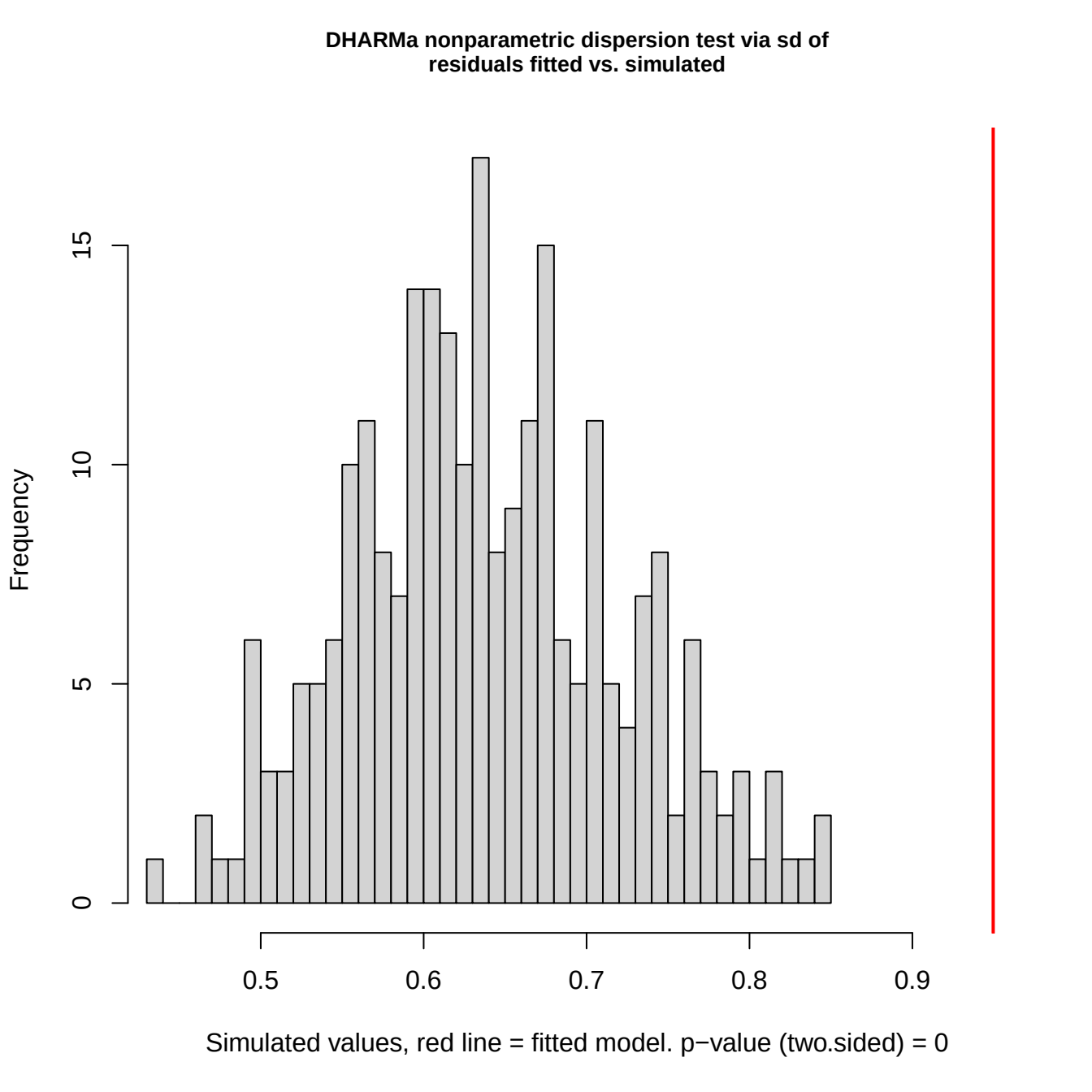

QQ plot residuals
KS test: p= 0.7785
Deviation n.s.
Dispersion test: p= 0
Deviation significant
Outlier test: p= 0.26
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0

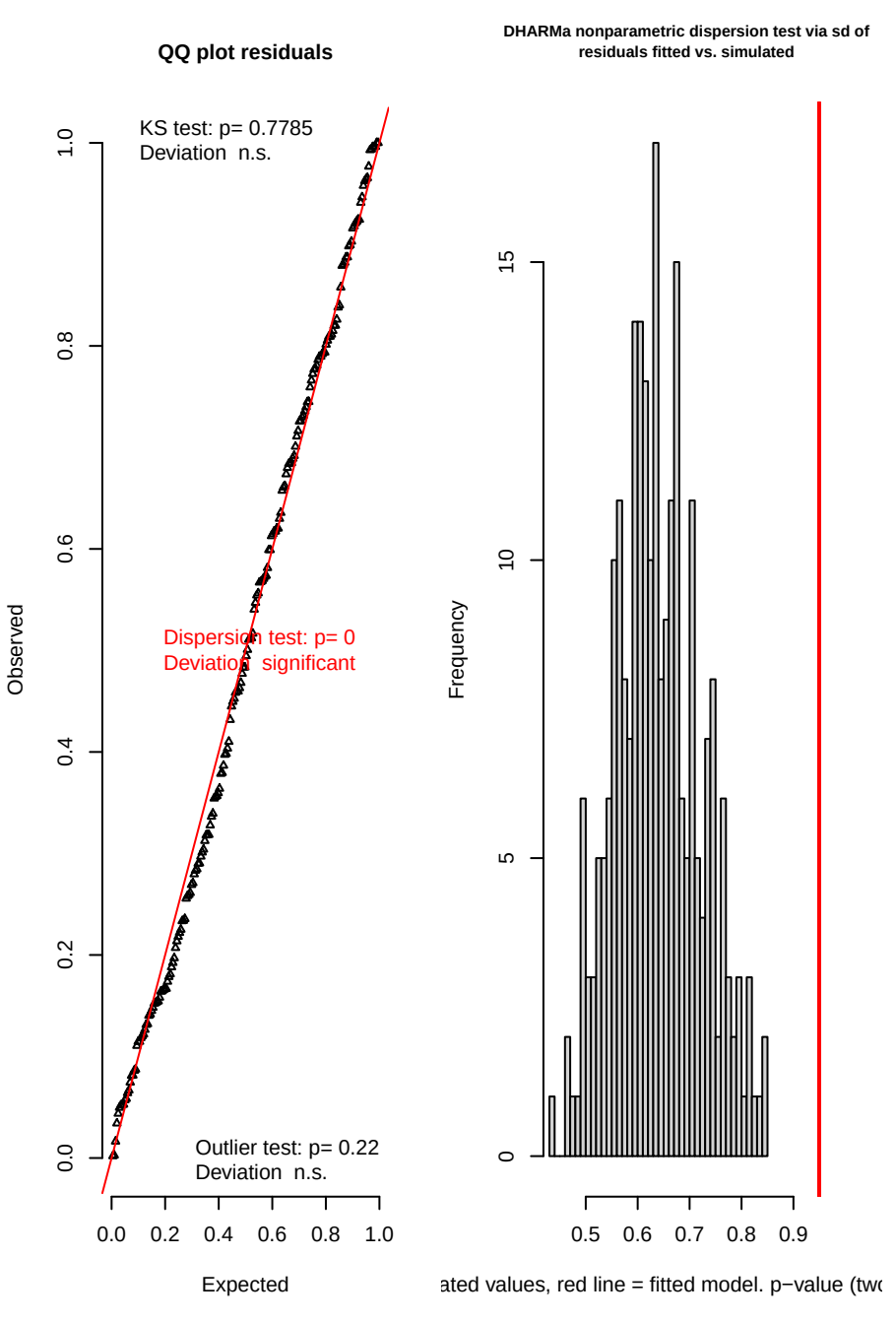

QQ plot residuals
KS test: p= 0.7785
Deviation n.s.
Dispersion test: p= 0
Deviation significant
Outlier test: p= 0.2
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0

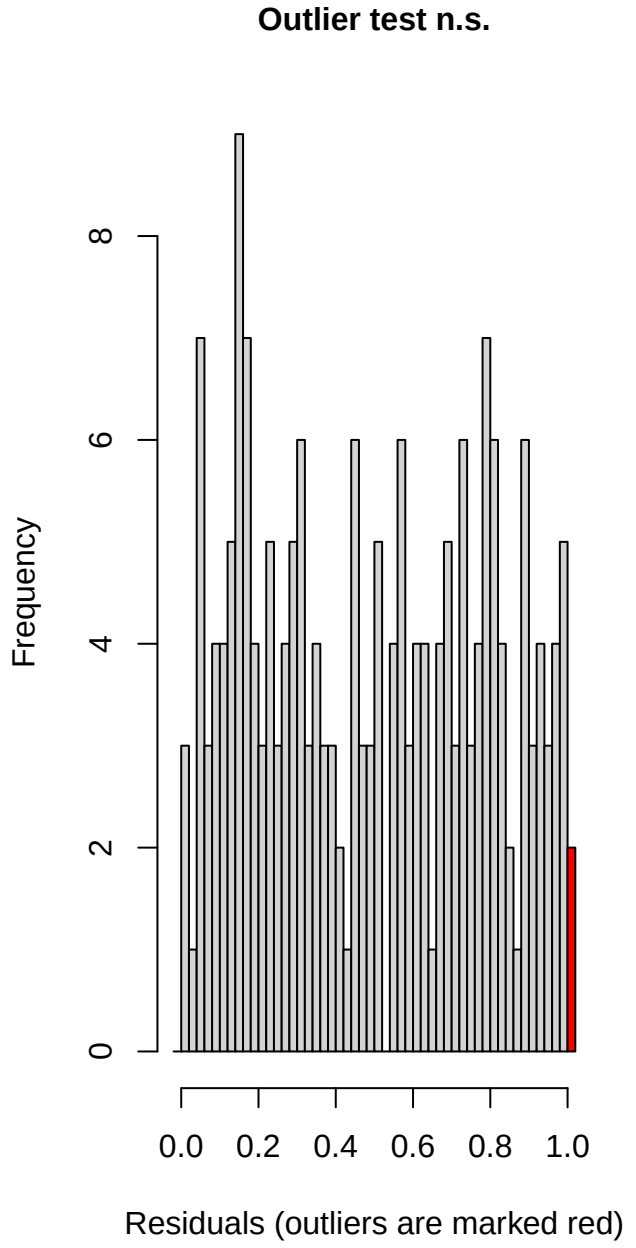

DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
0.5
0.6
0.7
0.8
0.9
Simulated values, red line = fitted model. p−value (two.sided) = 0

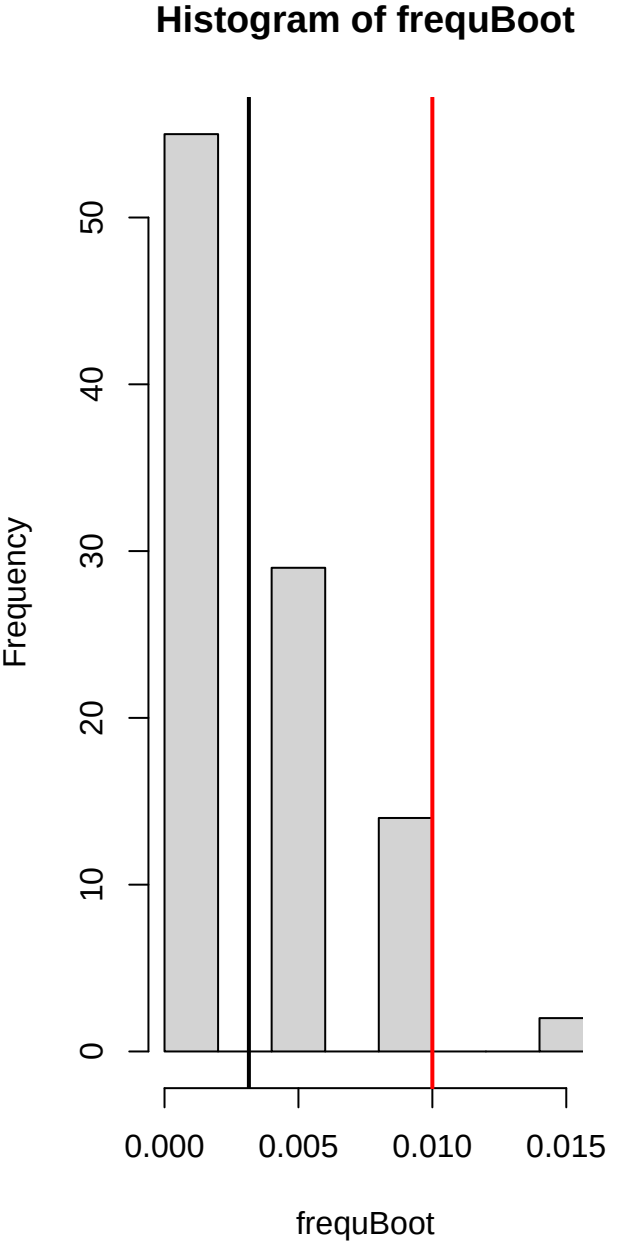

DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
0.5
0.6
0.7
0.8
0.9
Simulated values, red line = fitted model. p−value (less) = 1

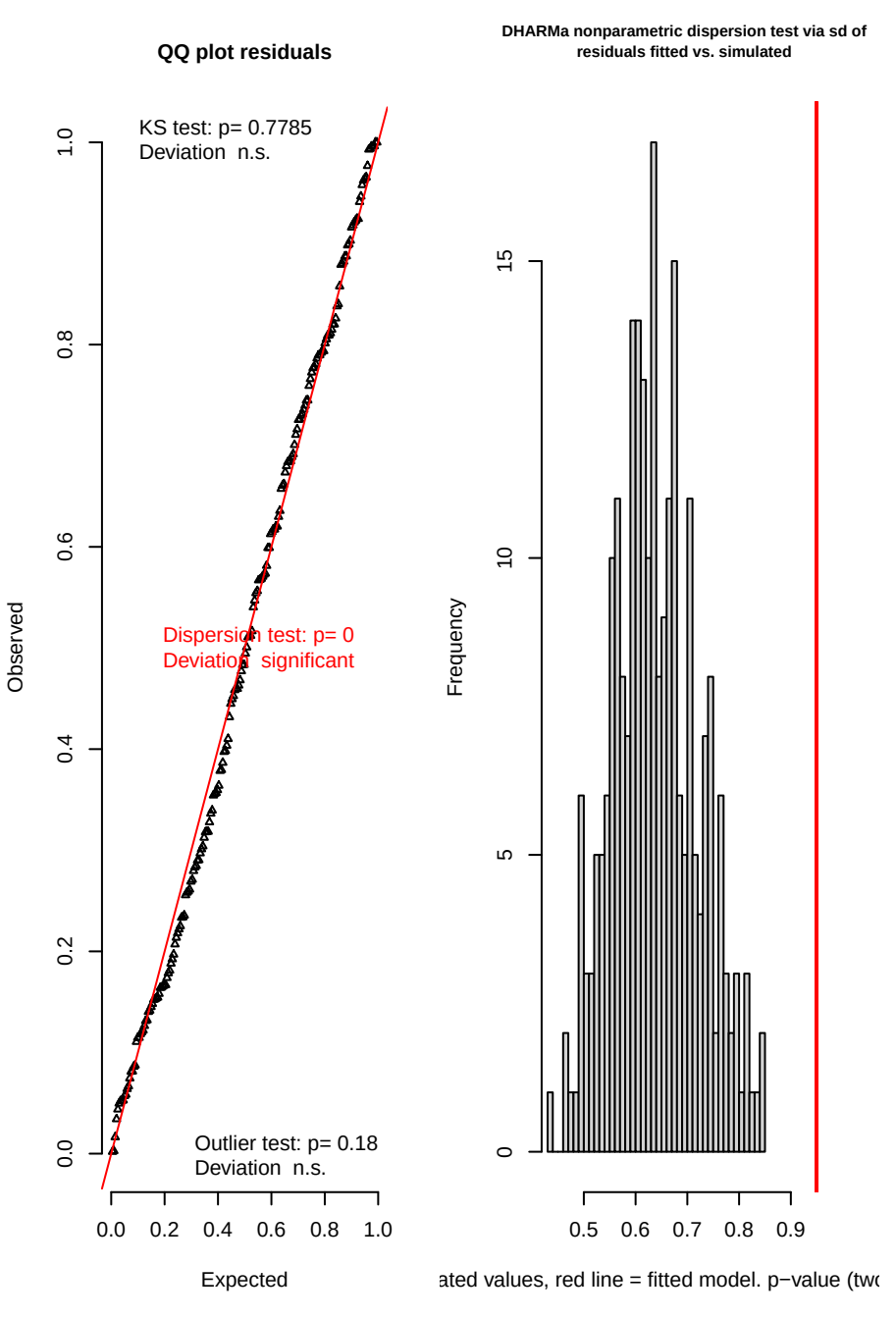

DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
0.5
0.6
0.7
0.8
0.9
Simulated values, red line = fitted model. p−value (greater) = 0

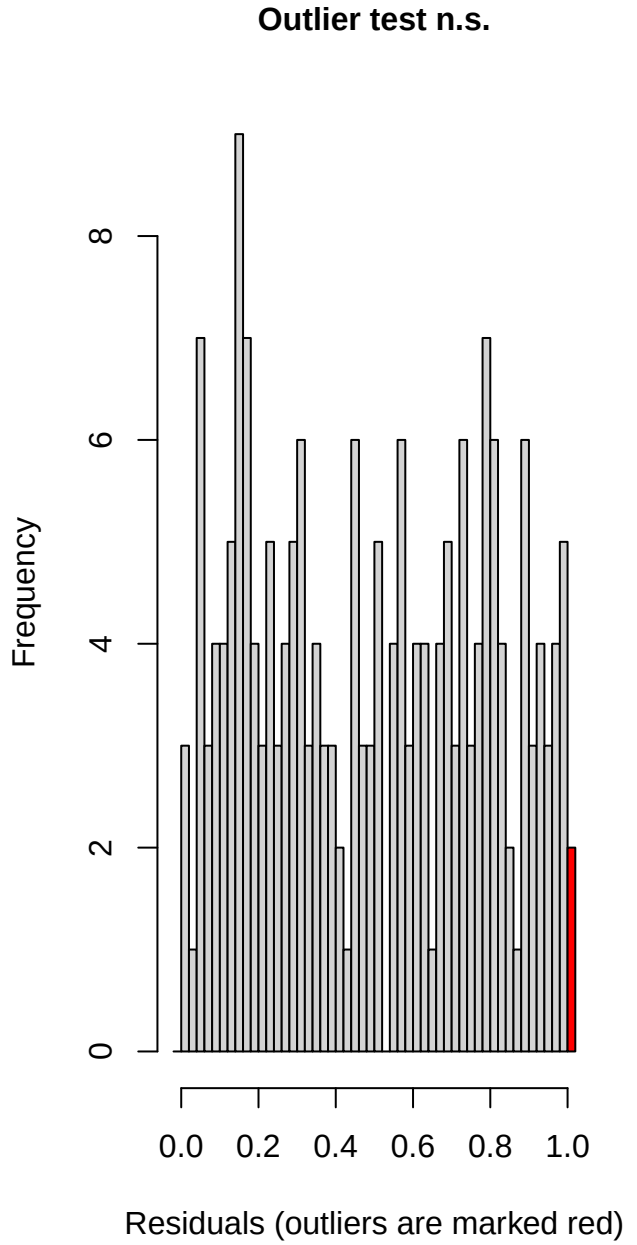

DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
0.5
0.6
0.7
0.8
0.9
Simulated values, red line = fitted model. p−value (two.sided) = 0

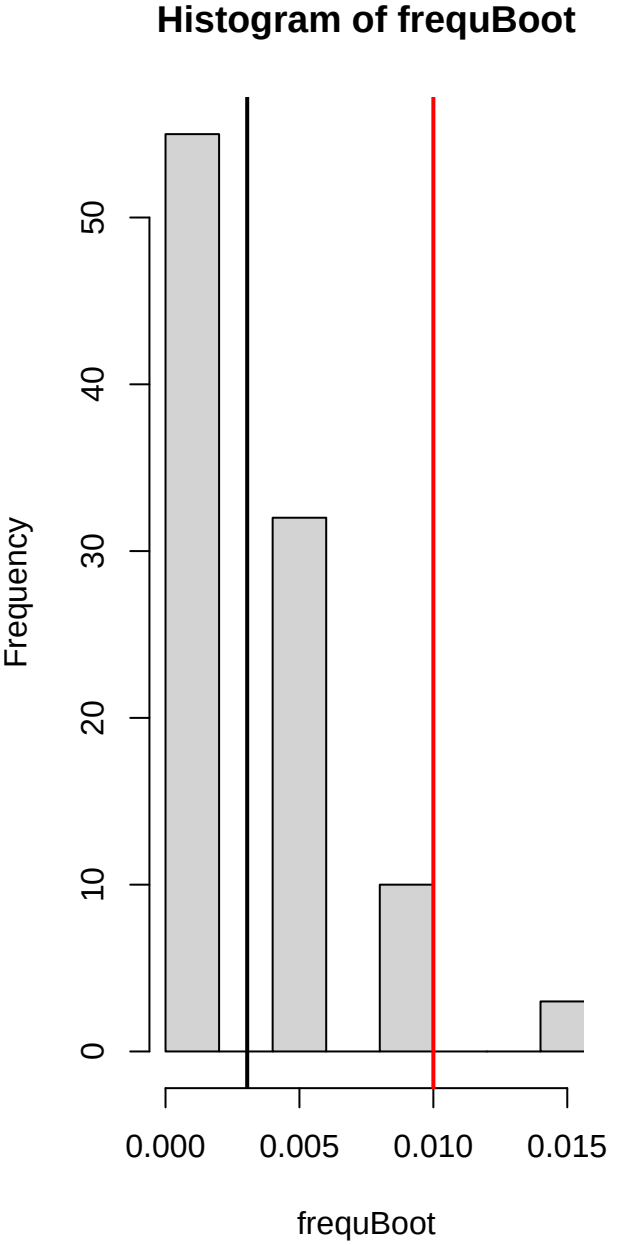

QQ plot residuals
KS test: p= 0.7785
Deviation n.s.
Dispersion test: p= 0
Deviation significant
Outlier test: p= 0.22
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
0.5
0.6
0.7
0.8
0.9
ated values, red line = fitted model. p−value (two

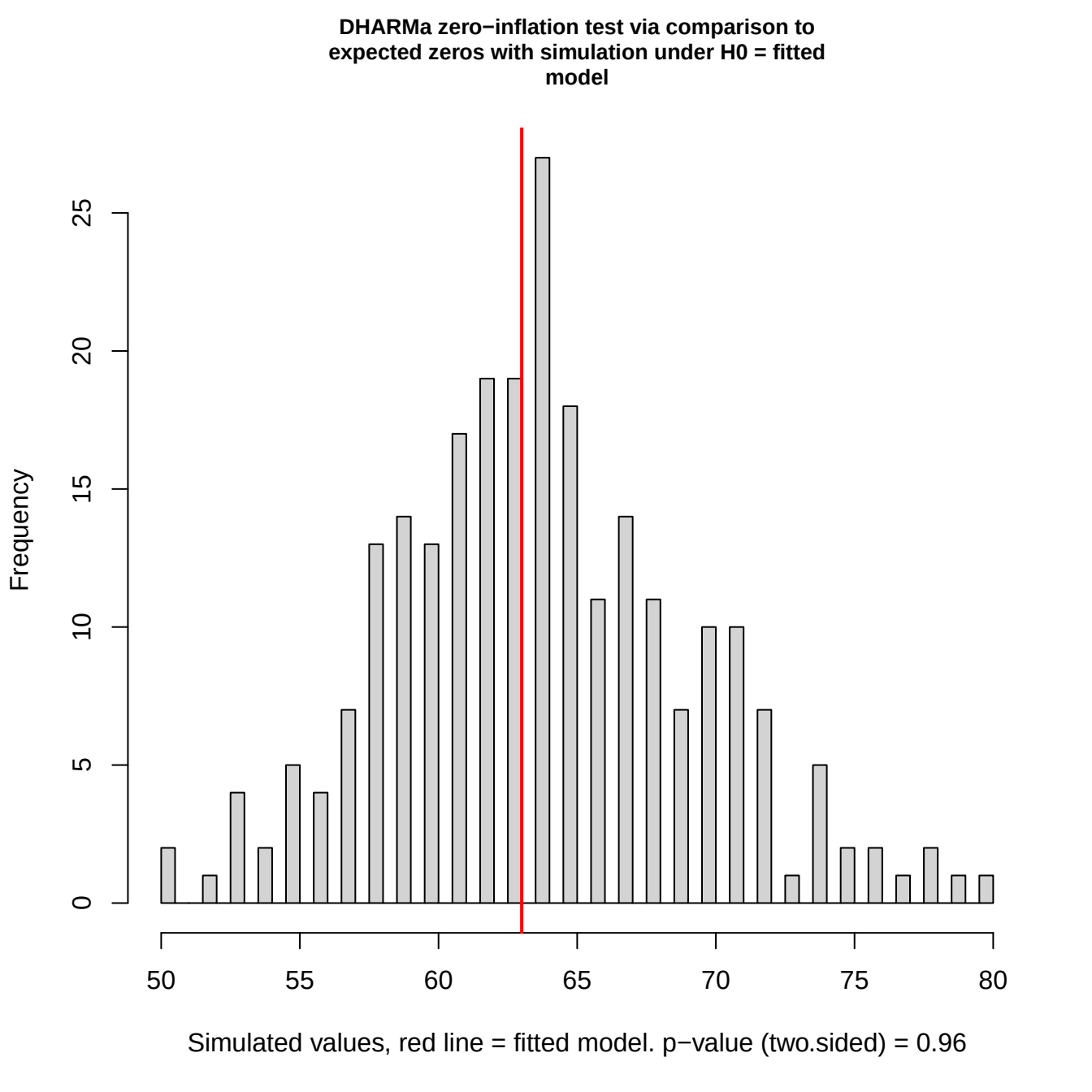

Outlier test n.s.
Frequency
0
2
4
6
8
0.0
0.2
0.4
0.6
0.8
1.0
Residuals (outliers are marked red)

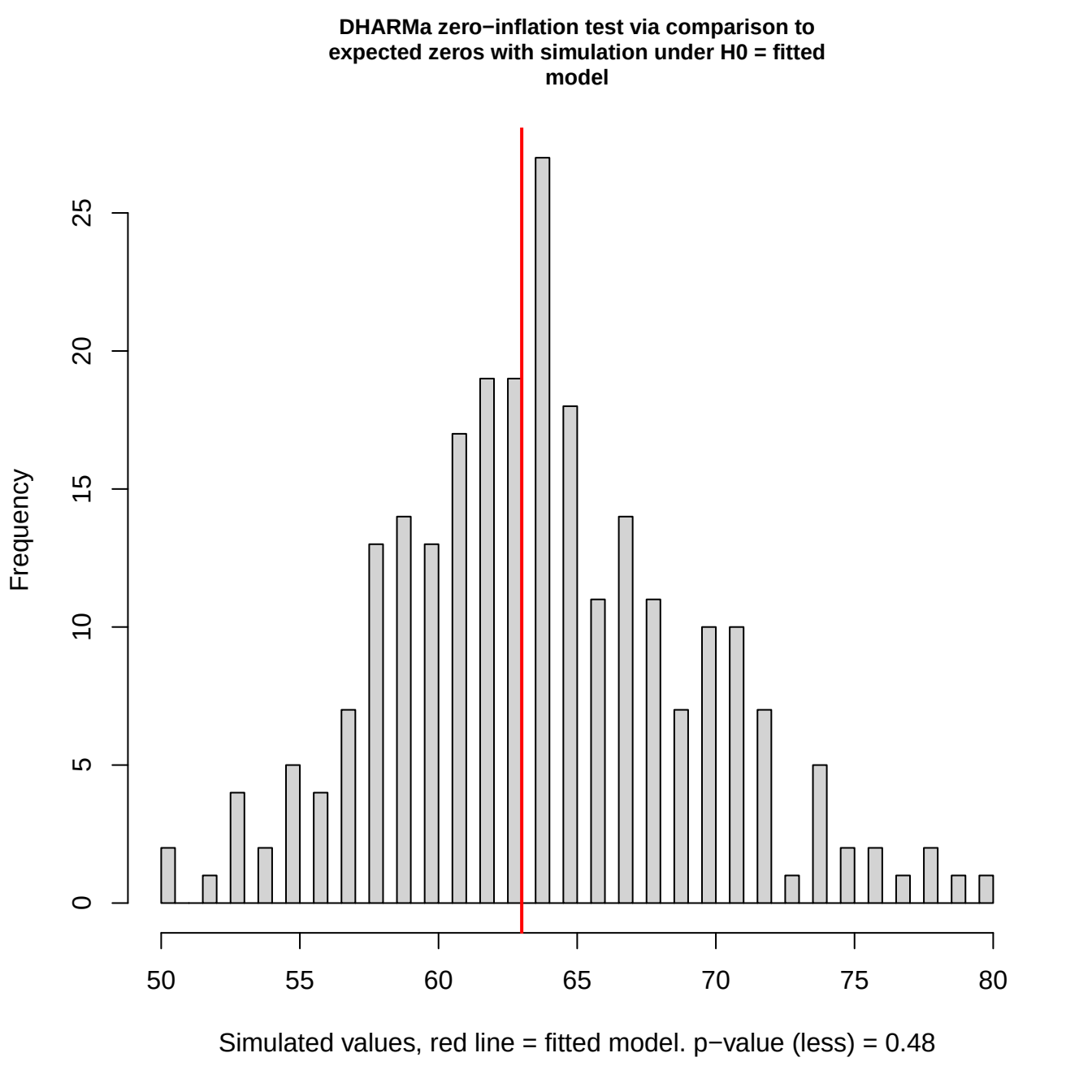

Histogram of frequBoot
Frequency
0
10
20
30
40
50
0.000
0.005
0.010
0.015
frequBoot

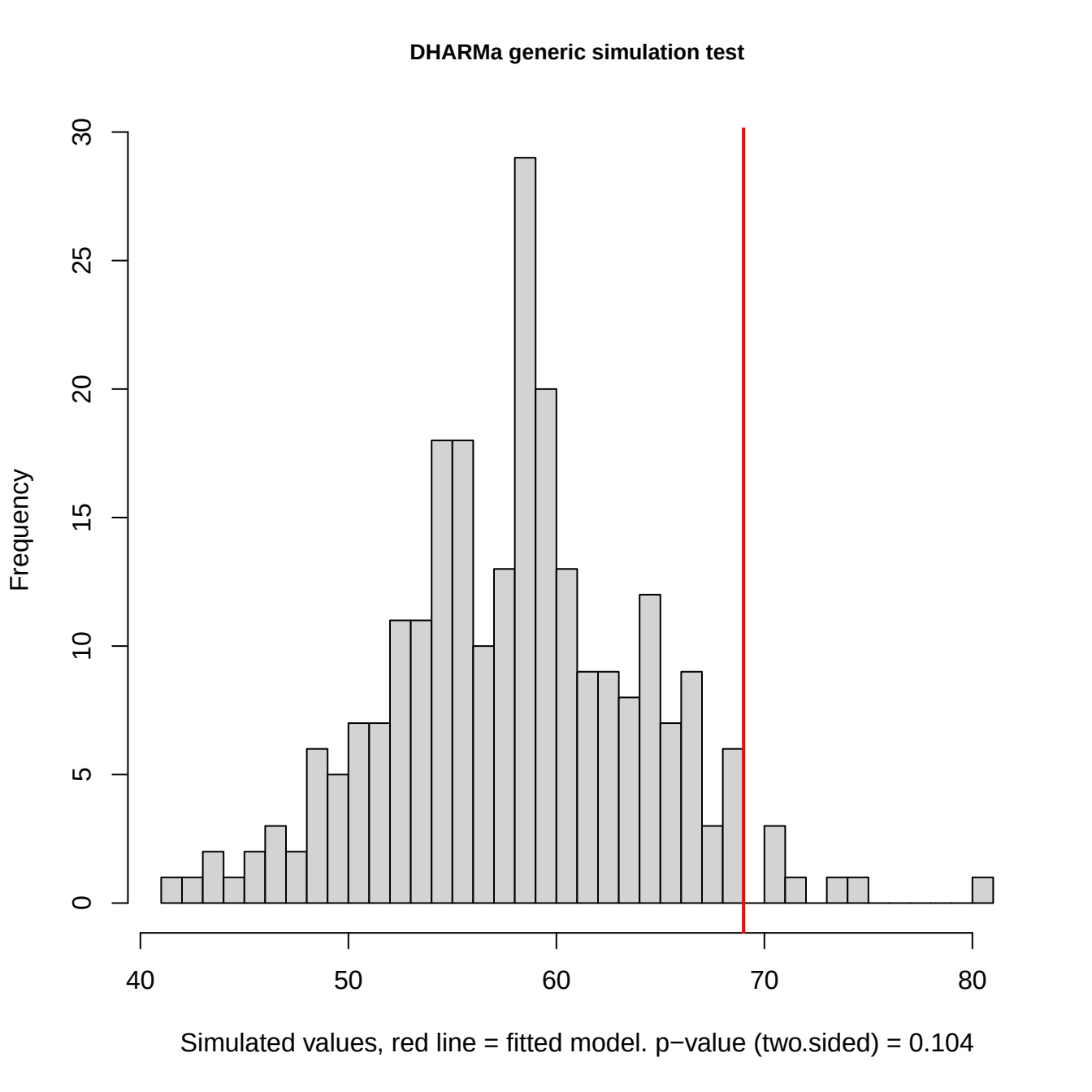

QQ plot residuals
KS test: p= 0.7785
Deviation n.s.
Dispersion test: p= 0
Deviation significant
Outlier test: p= 0.18
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
0.5
0.6
0.7
0.8
0.9
ated values, red line = fitted model. p−value (two

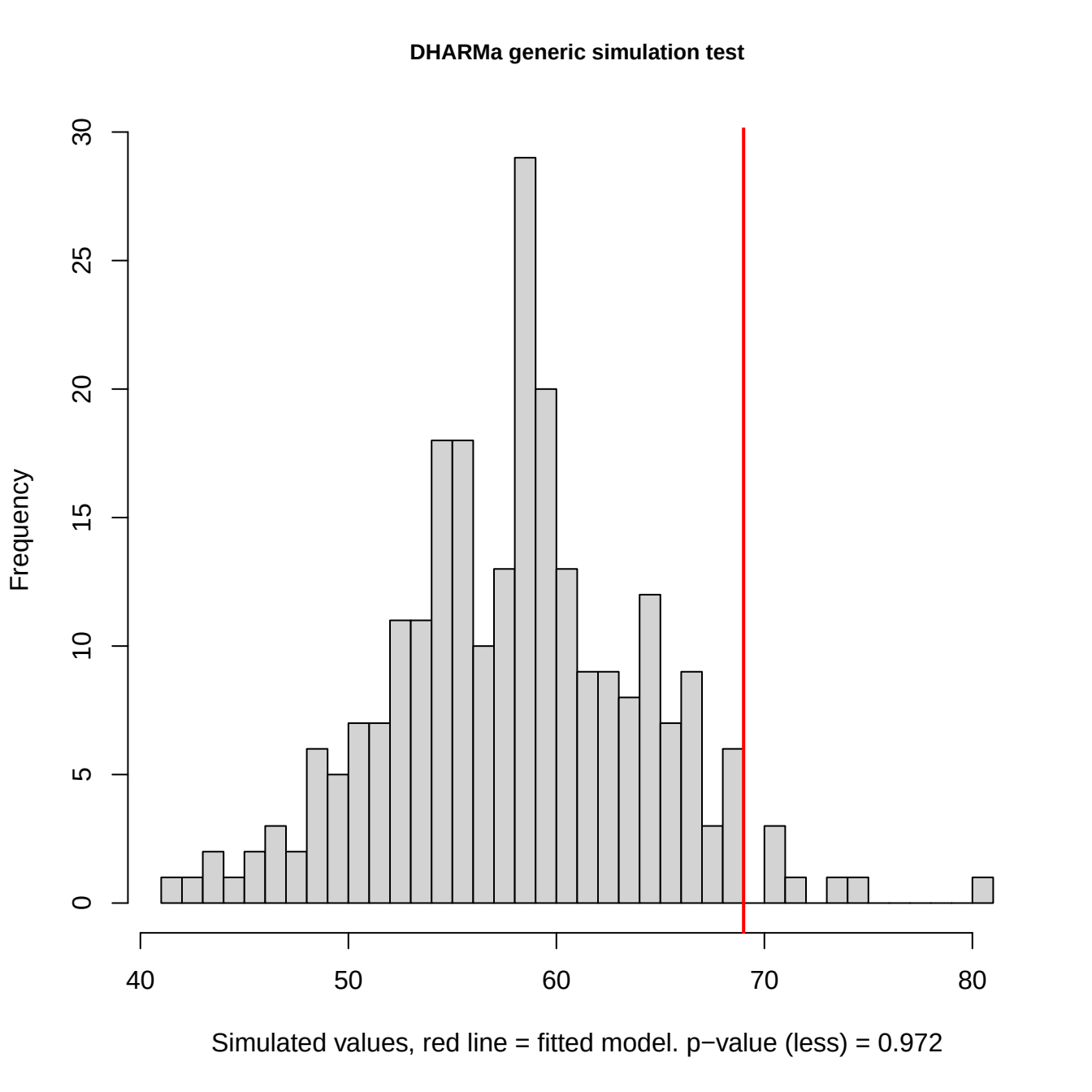

Outlier test n.s.
Frequency
0
2
4
6
8
0.0
0.2
0.4
0.6
0.8
1.0
Residuals (outliers are marked red)

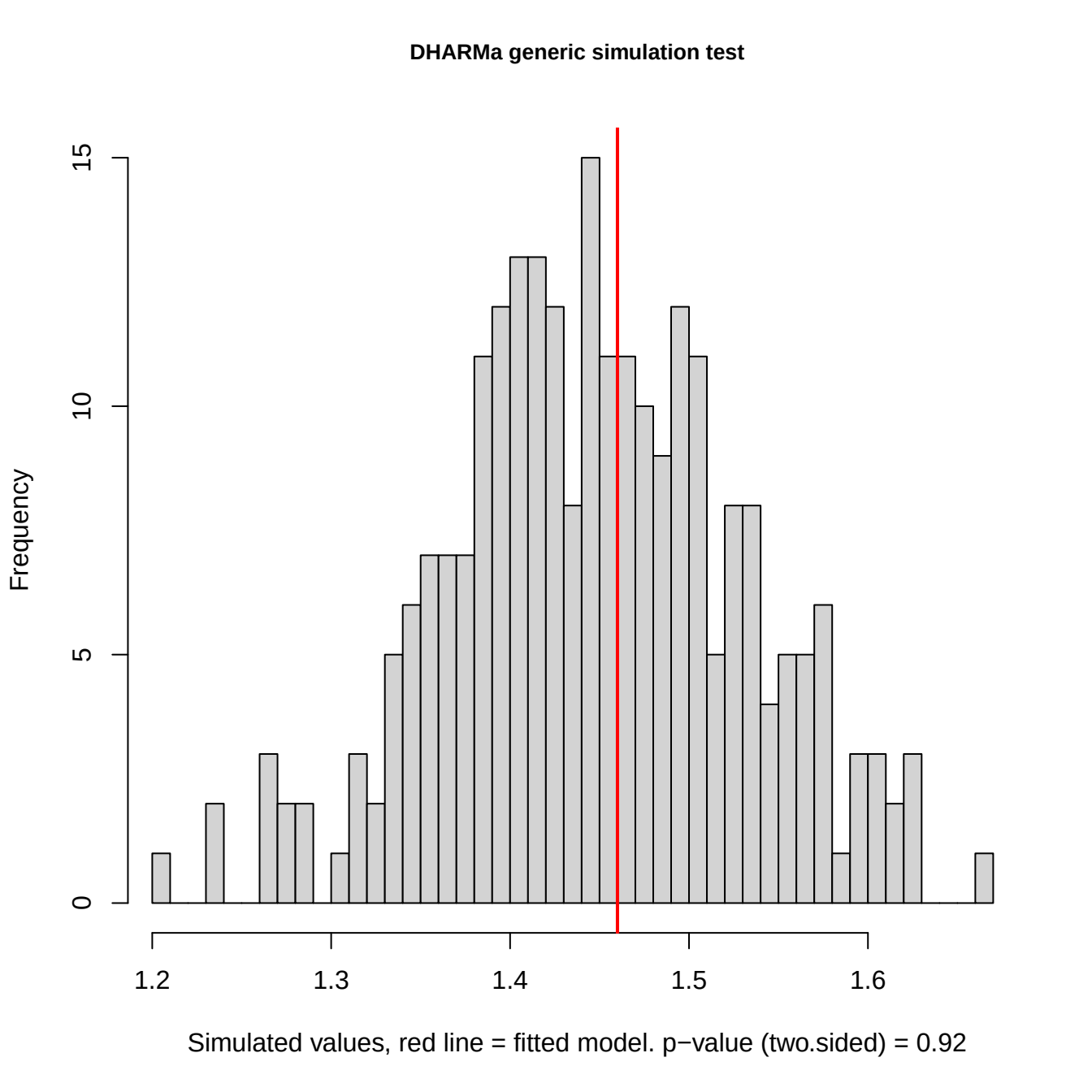

Histogram of frequBoot
Frequency
0
10
20
30
40
50
0.000
0.005
0.010
0.015
frequBoot

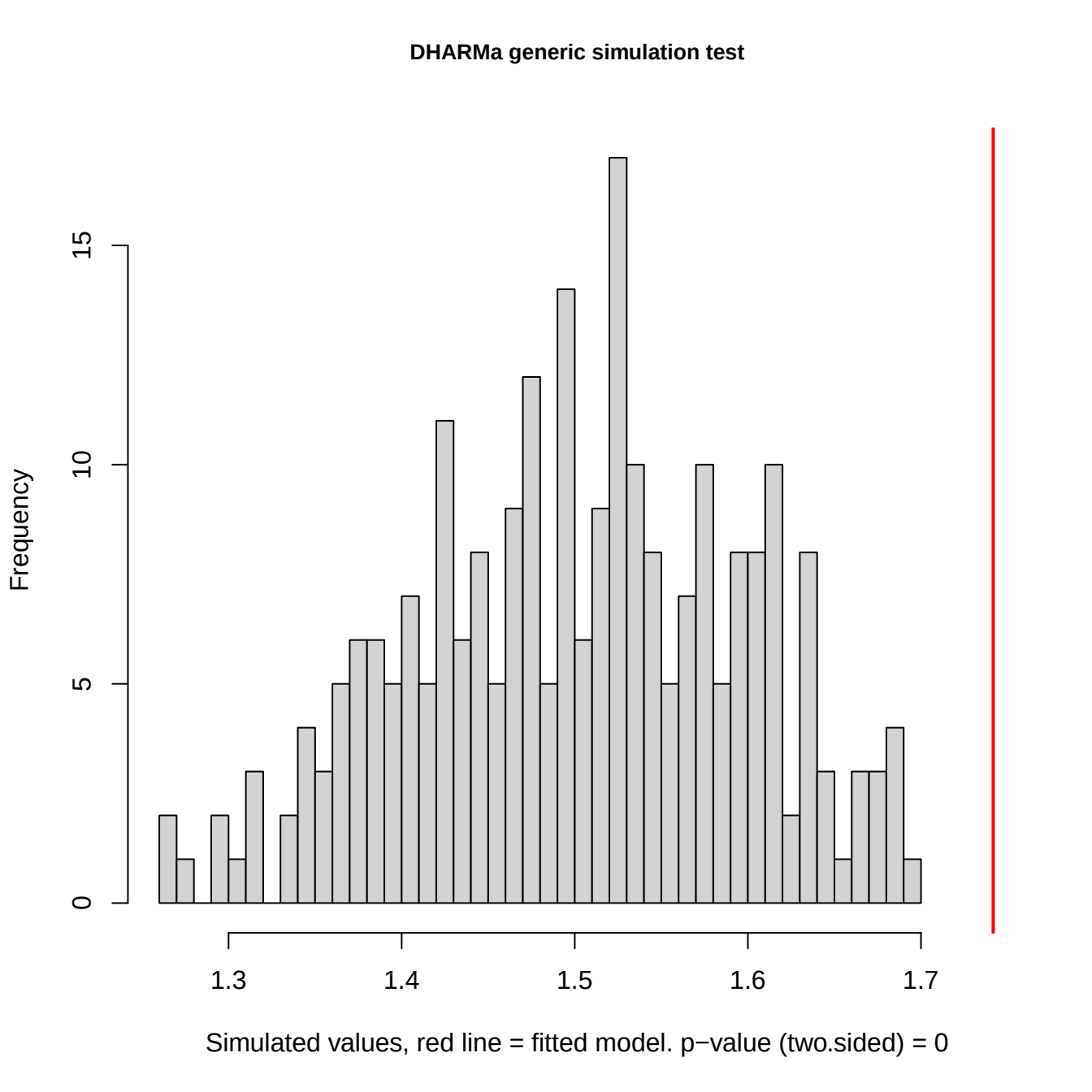

DHARMa zero−inflation test via comparison to expected zeros with simulation under H0 = fitted model
Frequency
0
5
10
15
20
25
50
55
60
65
70
75
80
Simulated values, red line = fitted model. p−value (two.sided) = 0.96

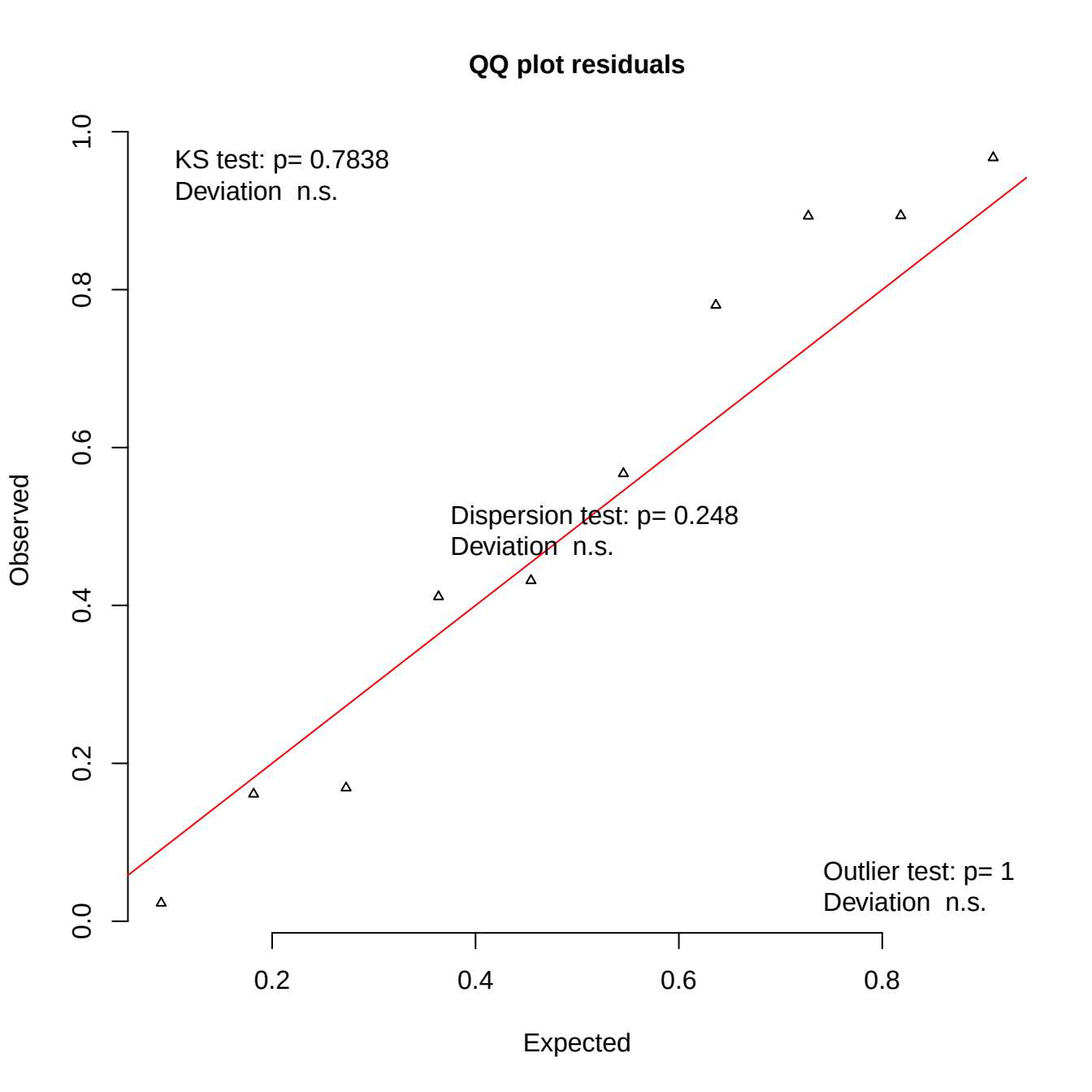

DHARMa zero−inflation test via comparison to expected zeros with simulation under H0 = fitted model
Frequency
0
5
10
15
20
25
50
55
60
65
70
75
80
Simulated values, red line = fitted model. p−value (less) = 0.48

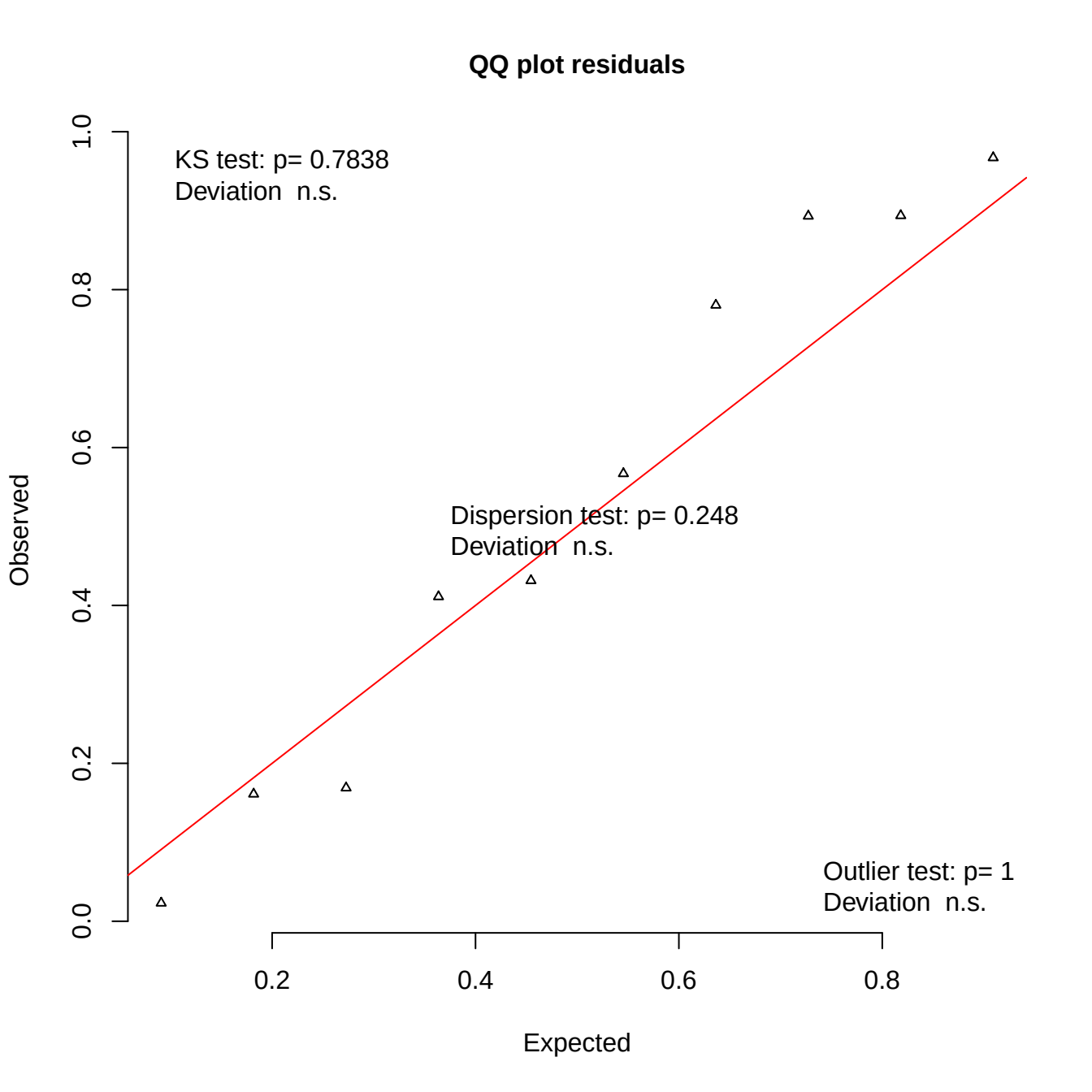

DHARMa generic simulation test
Frequency
0
5
10
15
20
25
30
40
50
60
70
80
Simulated values, red line = fitted model. p−value (two.sided) = 0.104

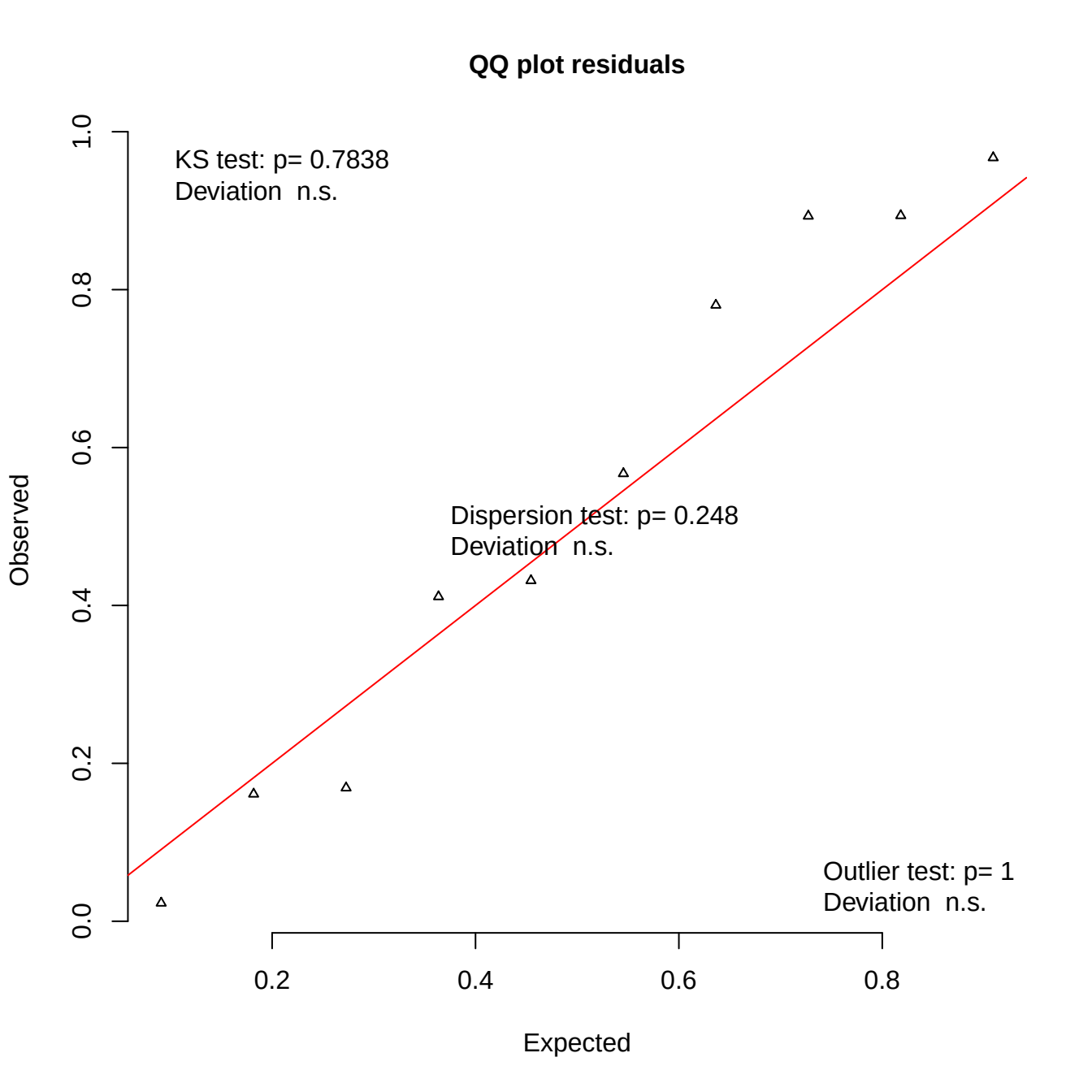

DHARMa generic simulation test
Frequency
0
5
10
15
20
25
30
40
50
60
70
80
Simulated values, red line = fitted model. p−value (less) = 0.972

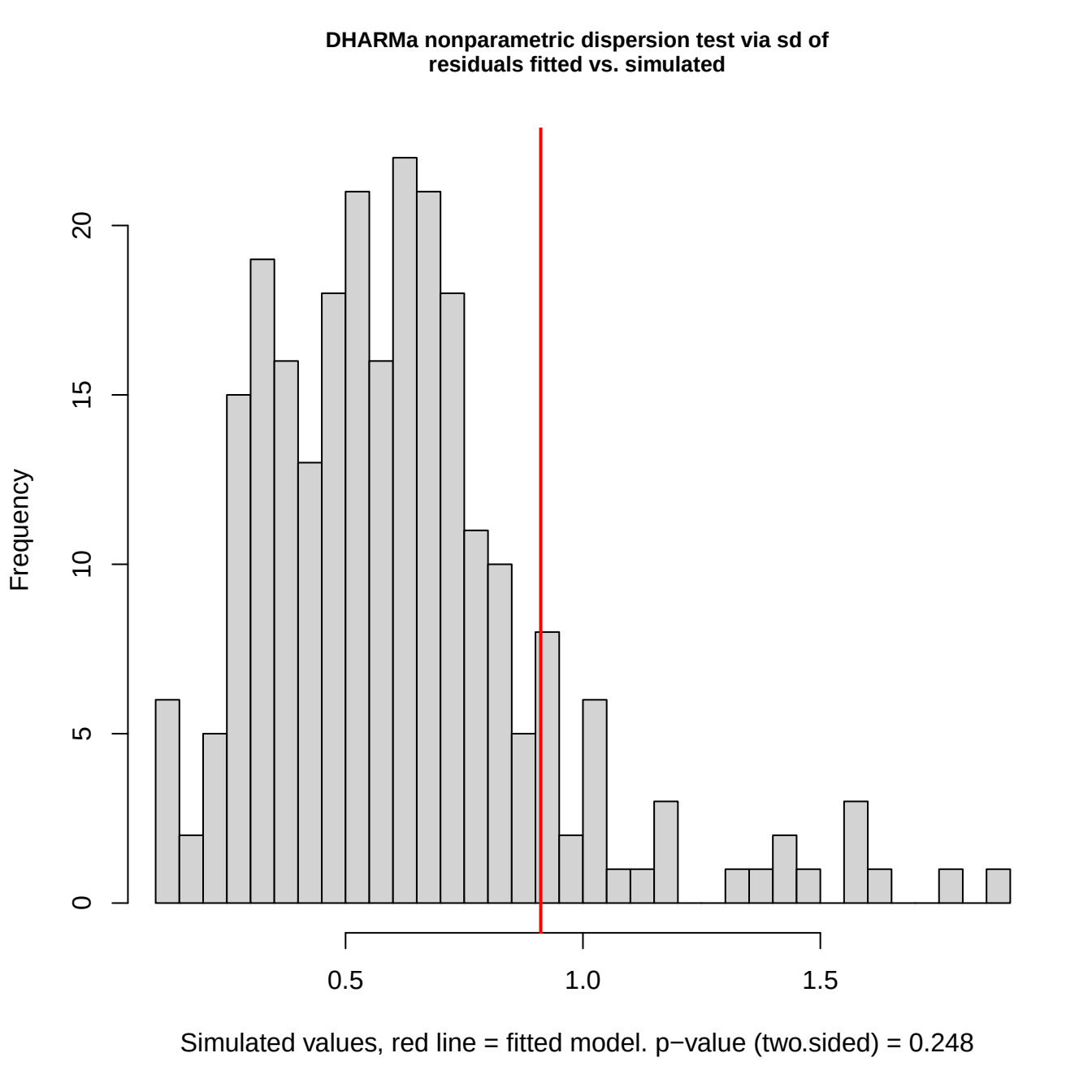

DHARMa generic simulation test
Frequency
0
5
10
15
1.2
1.3
1.4
1.5
1.6
Simulated values, red line = fitted model. p−value (two.sided) = 0.92

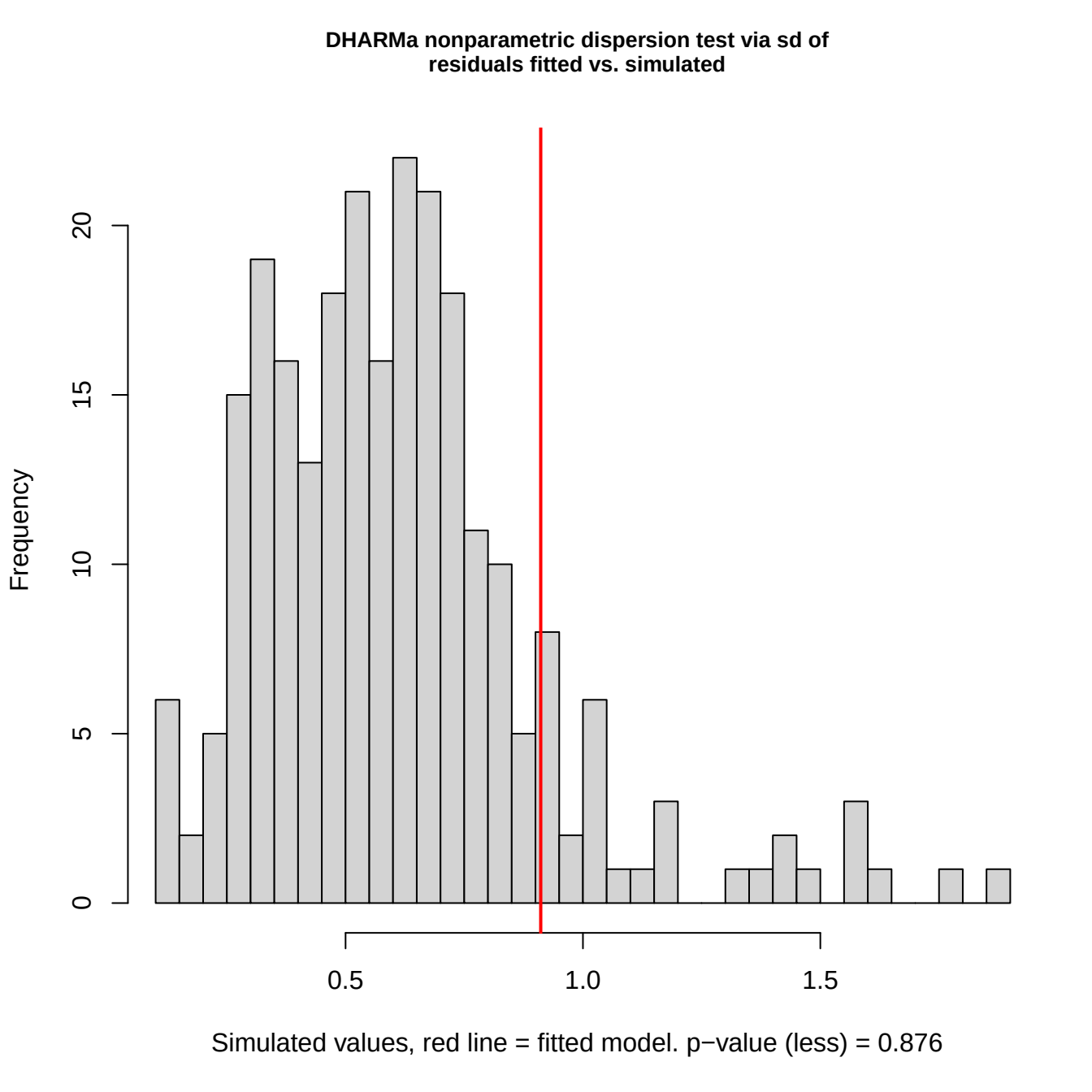

DHARMa generic simulation test
Frequency
0
5
10
15
1.3
1.4
1.5
1.6
1.7
Simulated values, red line = fitted model. p−value (two.sided) = 0

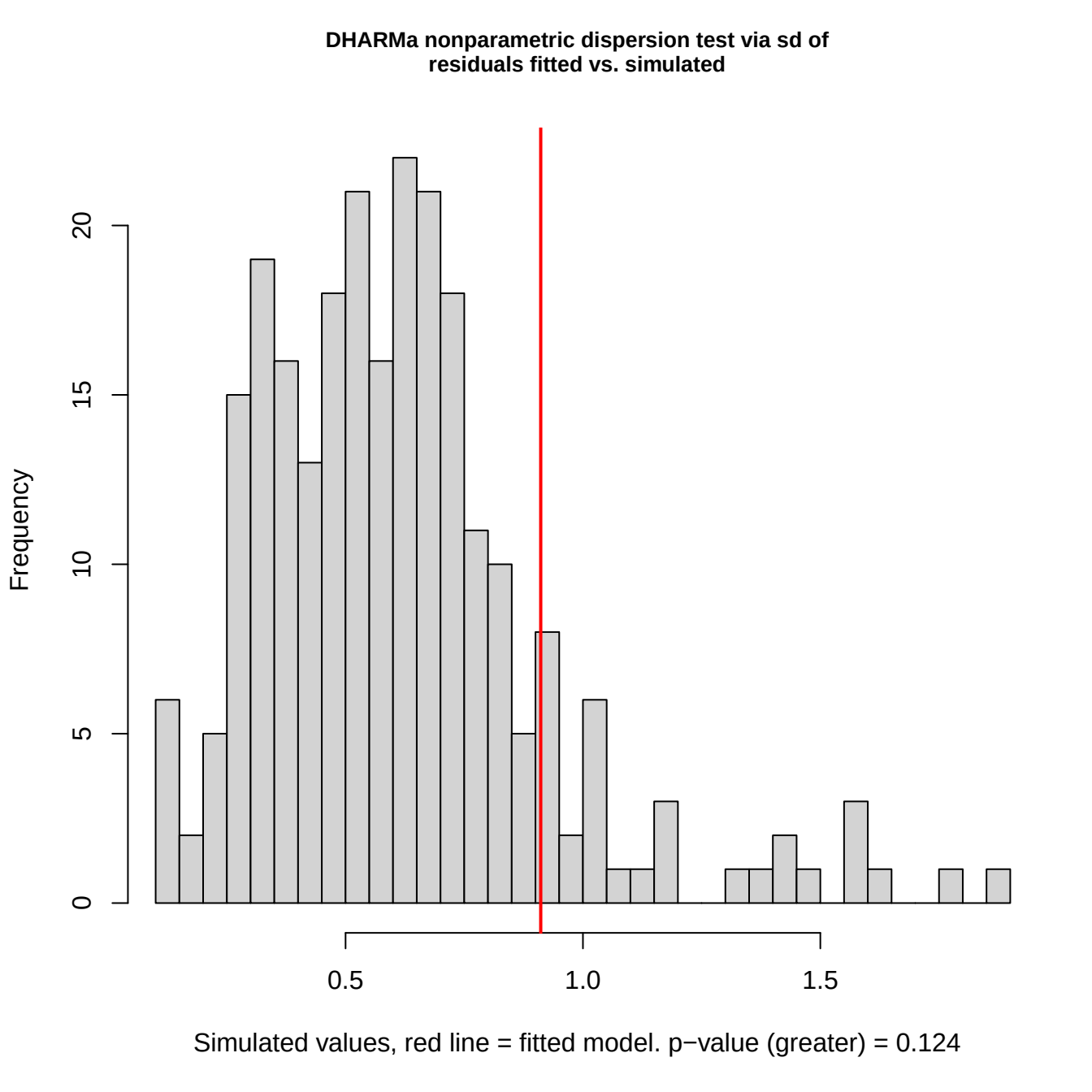

QQ plot residuals
KS test: p= 0.7838
Deviation n.s.
Dispersion test: p= 0.248
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
0.2
0.4
0.6
0.8

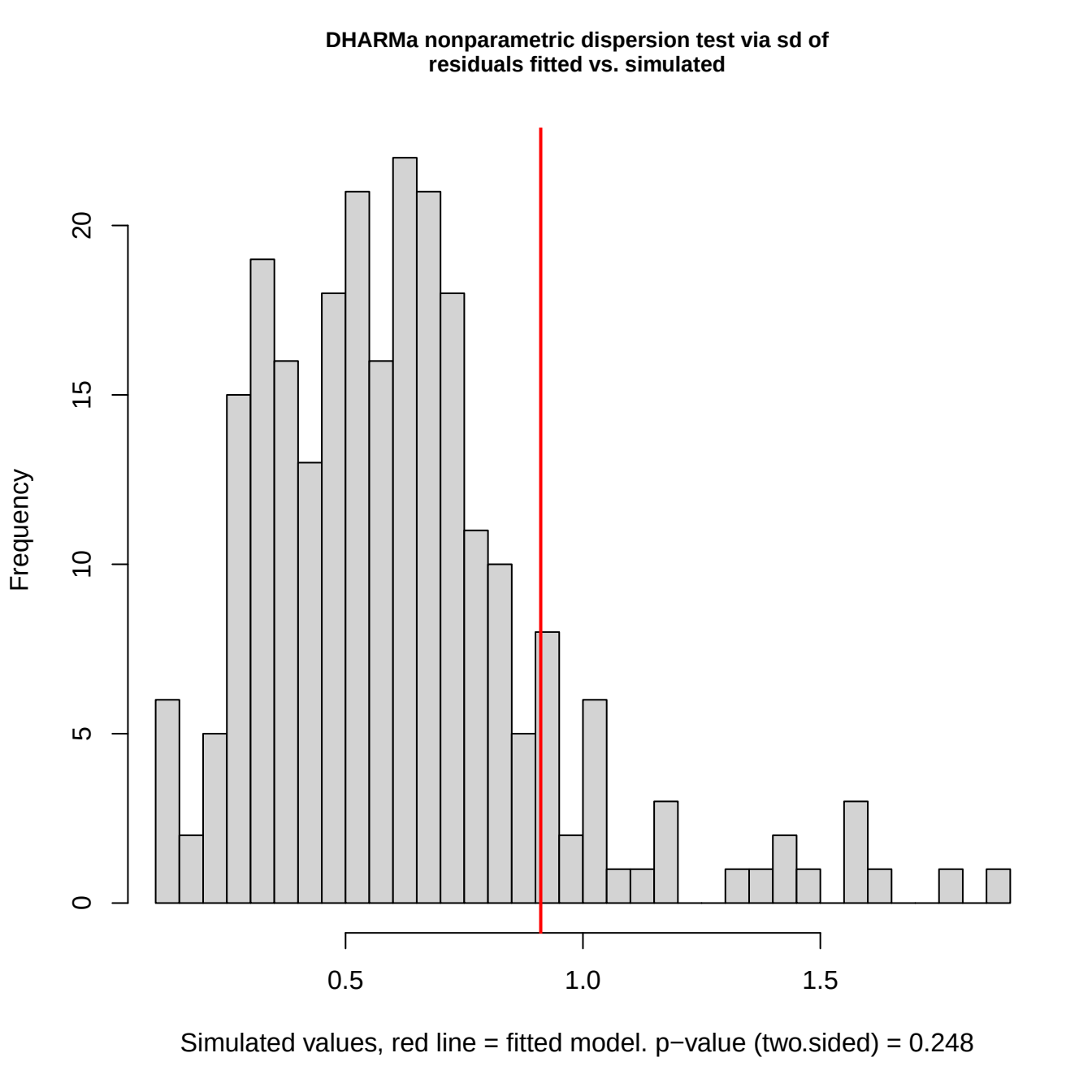

QQ plot residuals
KS test: p= 0.7838
Deviation n.s.
Dispersion test: p= 0.248
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
0.2
0.4
0.6
0.8

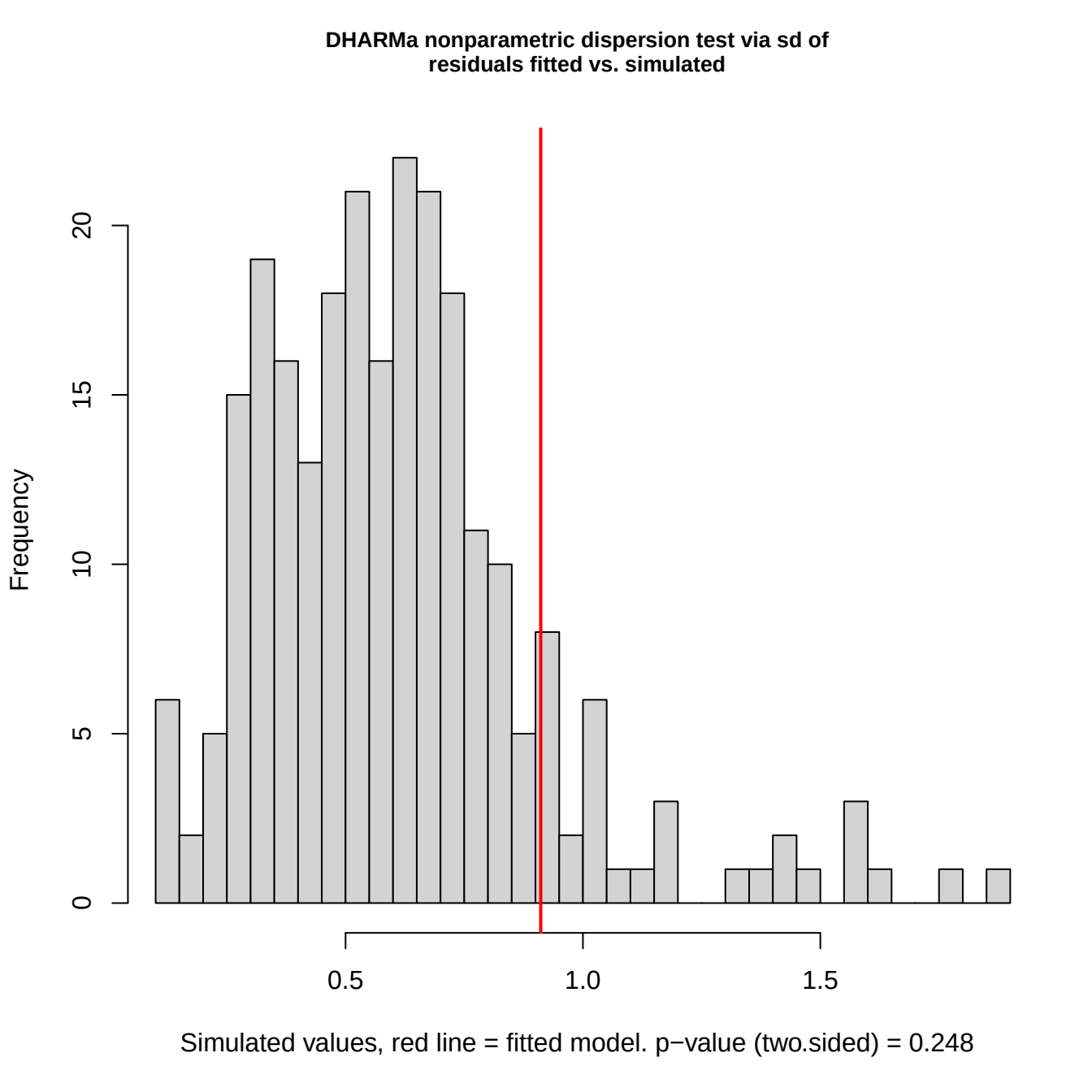

QQ plot residuals
KS test: p= 0.7838
Deviation n.s.
Dispersion test: p= 0.248
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
0.2
0.4
0.6
0.8

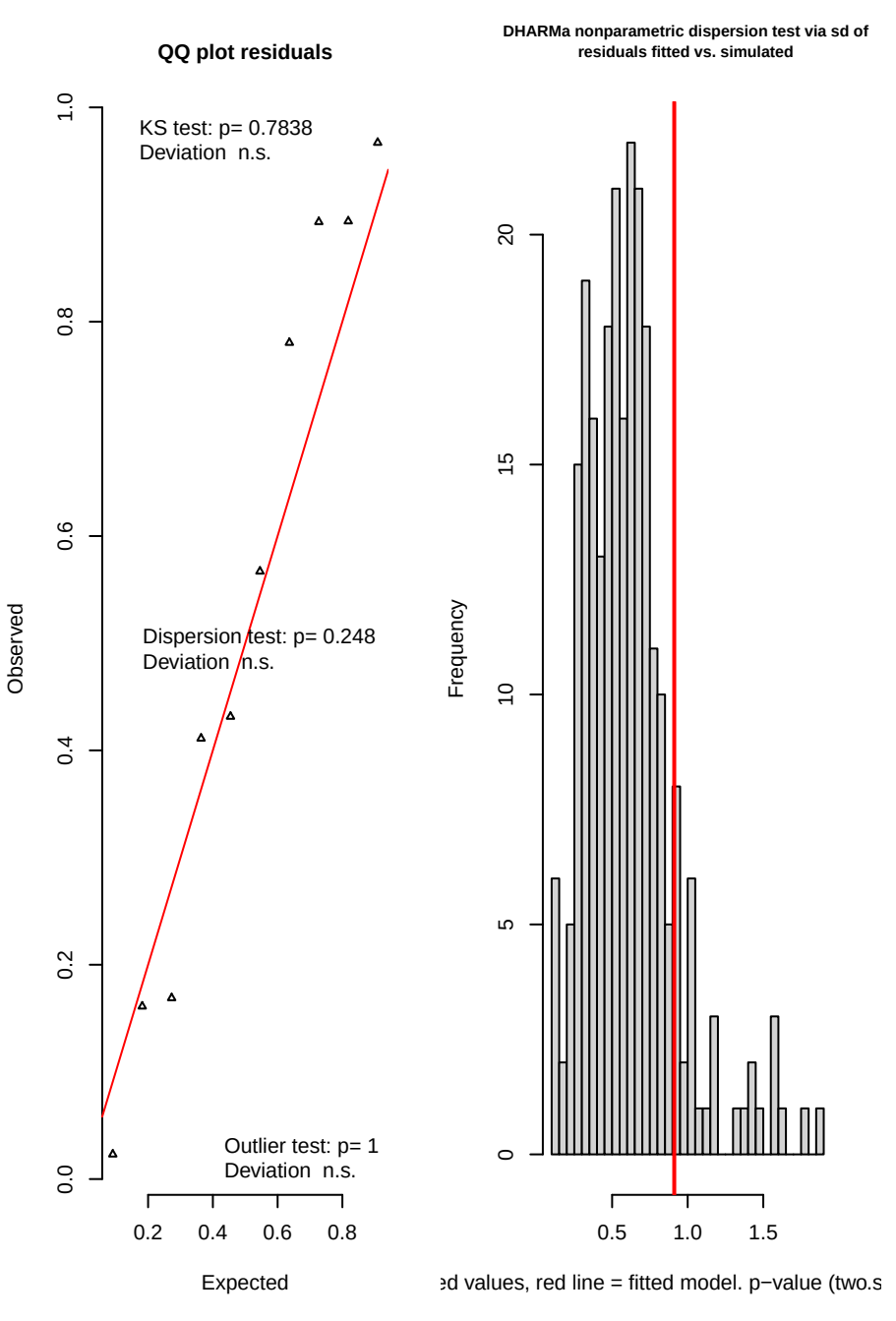

DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
20
0.5
1.0
1.5
Simulated values, red line = fitted model. p−value (two.sided) = 0.248

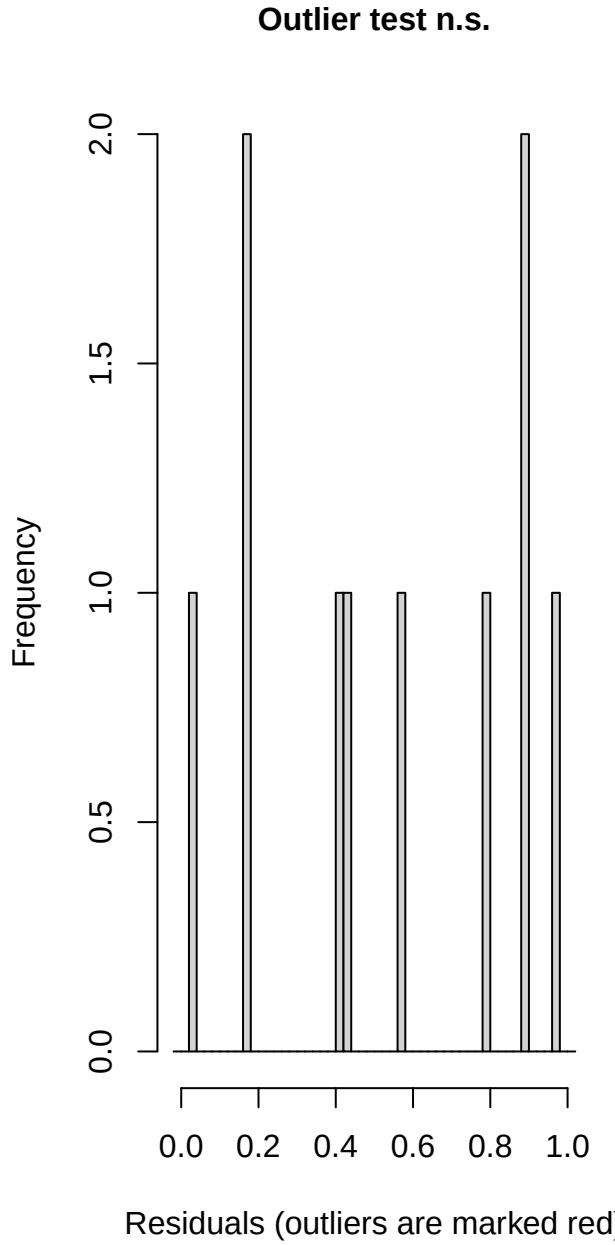

DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
20
0.5
1.0
1.5
Simulated values, red line = fitted model. p−value (less) = 0.876

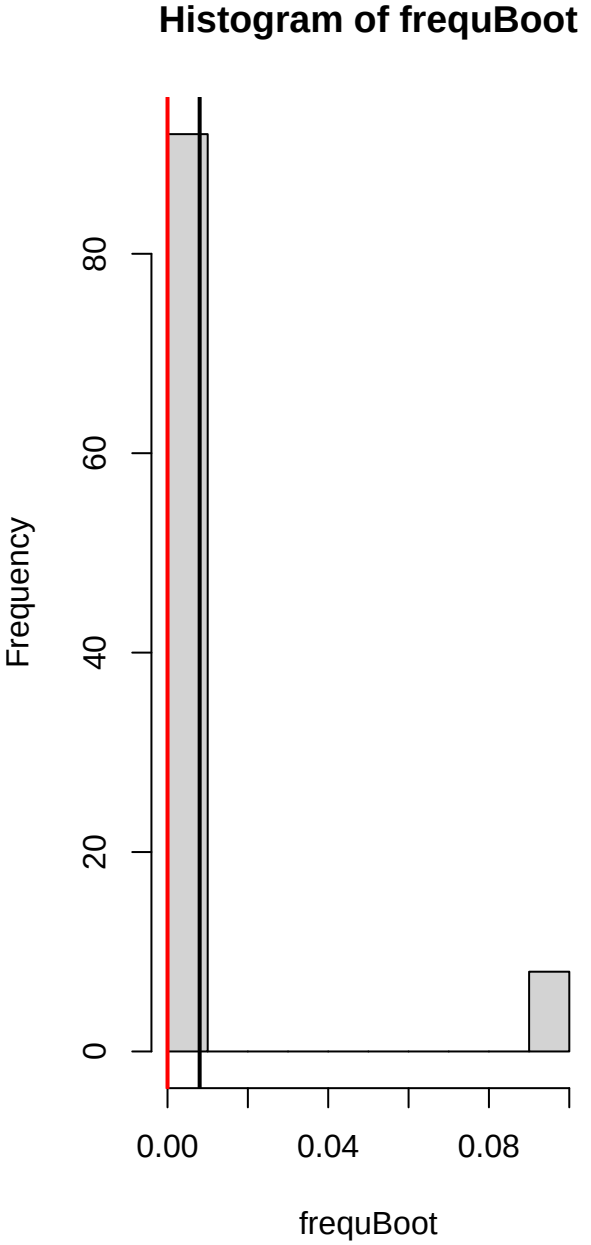

DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
20
0.5
1.0
1.5
Simulated values, red line = fitted model. p−value (greater) = 0.124

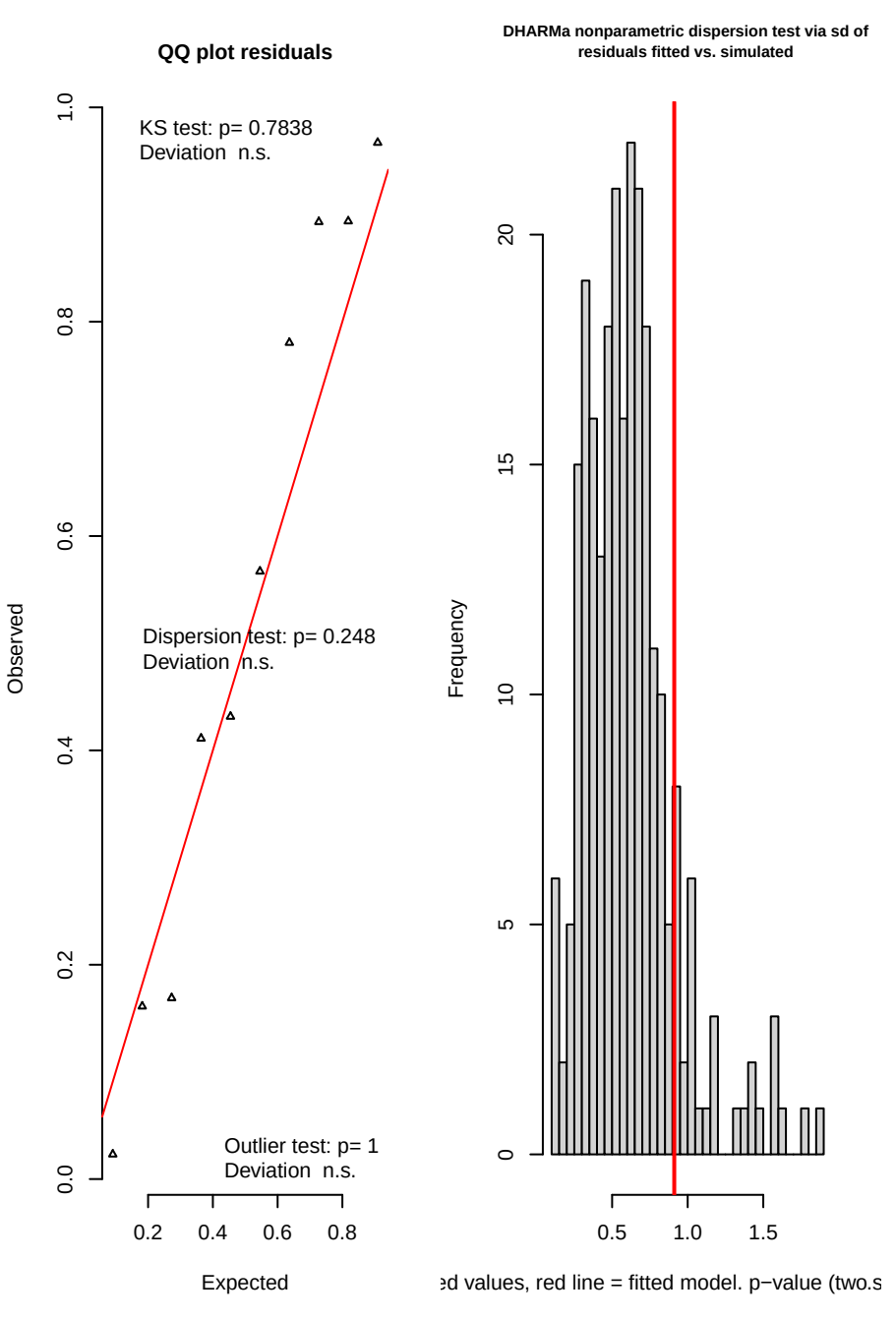

DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
20
0.5
1.0
1.5
Simulated values, red line = fitted model. p−value (two.sided) = 0.248

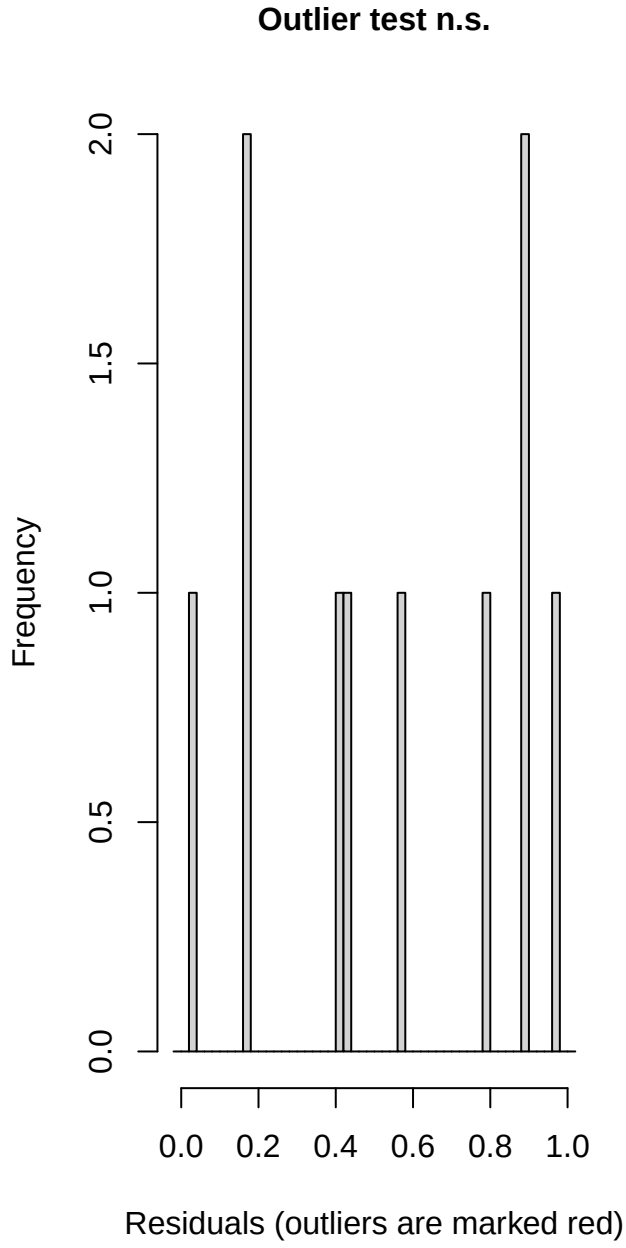

DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
20
0.5
1.0
1.5
Simulated values, red line = fitted model. p−value (two.sided) = 0.248

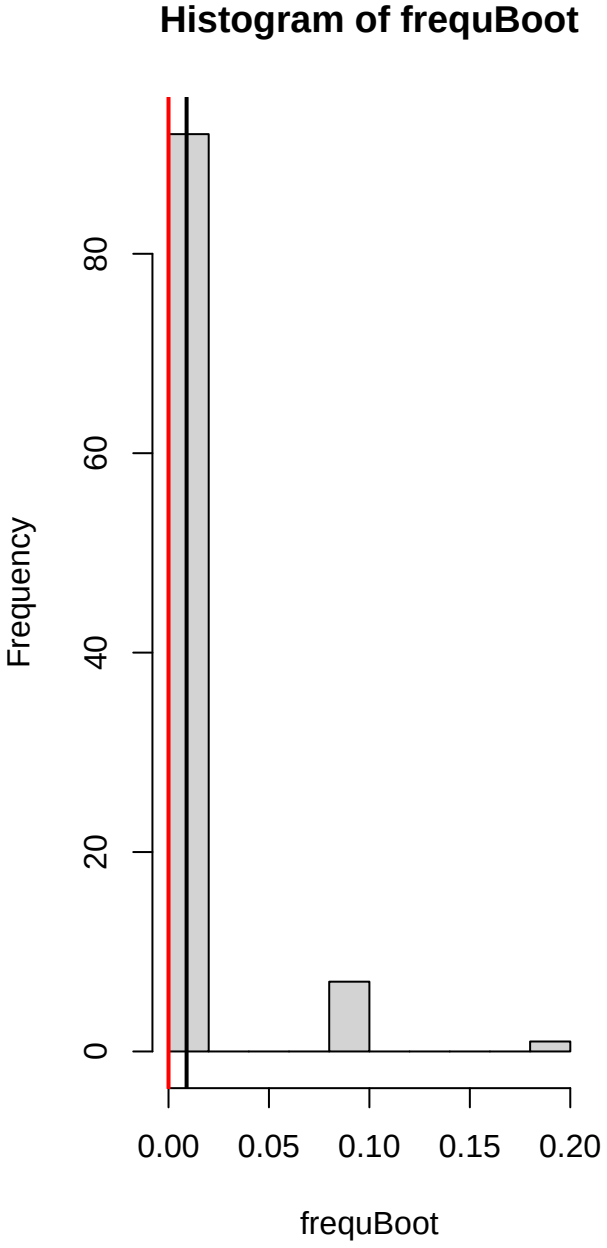

QQ plot residuals
KS test: p= 0.7838
Deviation n.s.
Dispersion test: p= 0.248
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
20
0.5
1.0
1.5
ed values, red line = fitted model. p−value (two.s

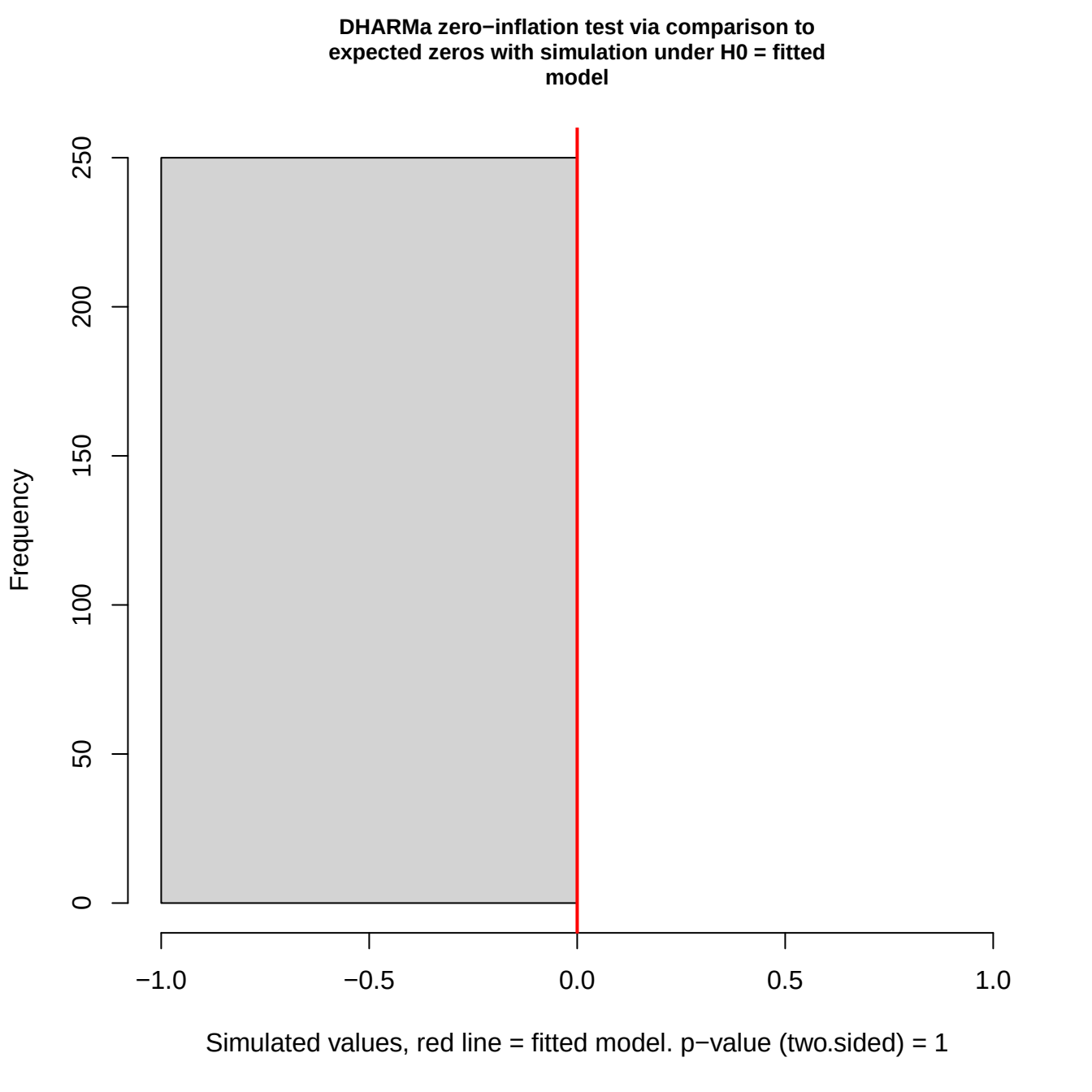

Outlier test n.s.
Frequency
0.0
0.5
1.0
1.5
2.0
0.0
0.2
0.4
0.6
0.8
1.0
Residuals (outliers are marked red)

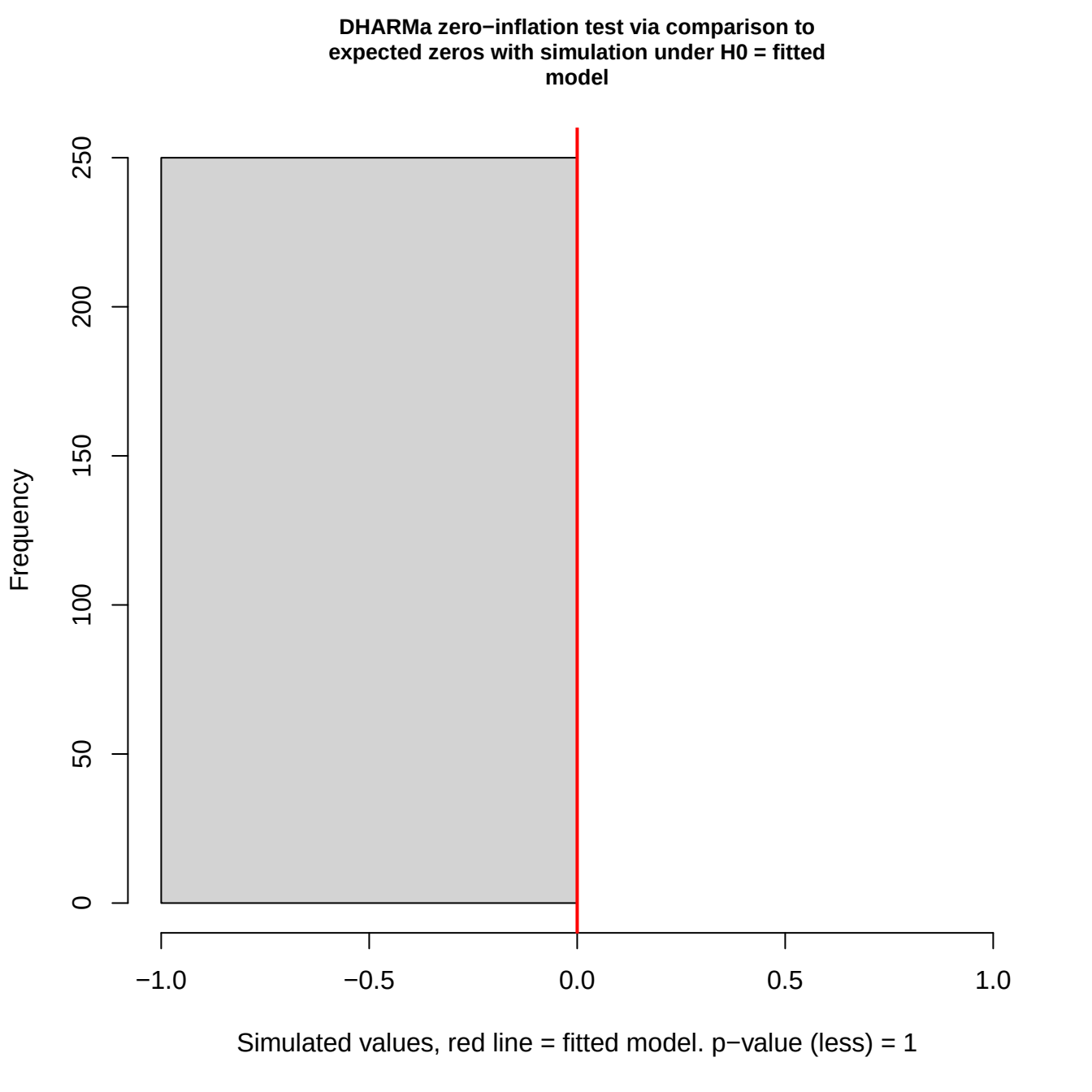

Histogram of frequBoot
Frequency
0
20
40
60
80
0.00
0.04
0.08
frequBoot

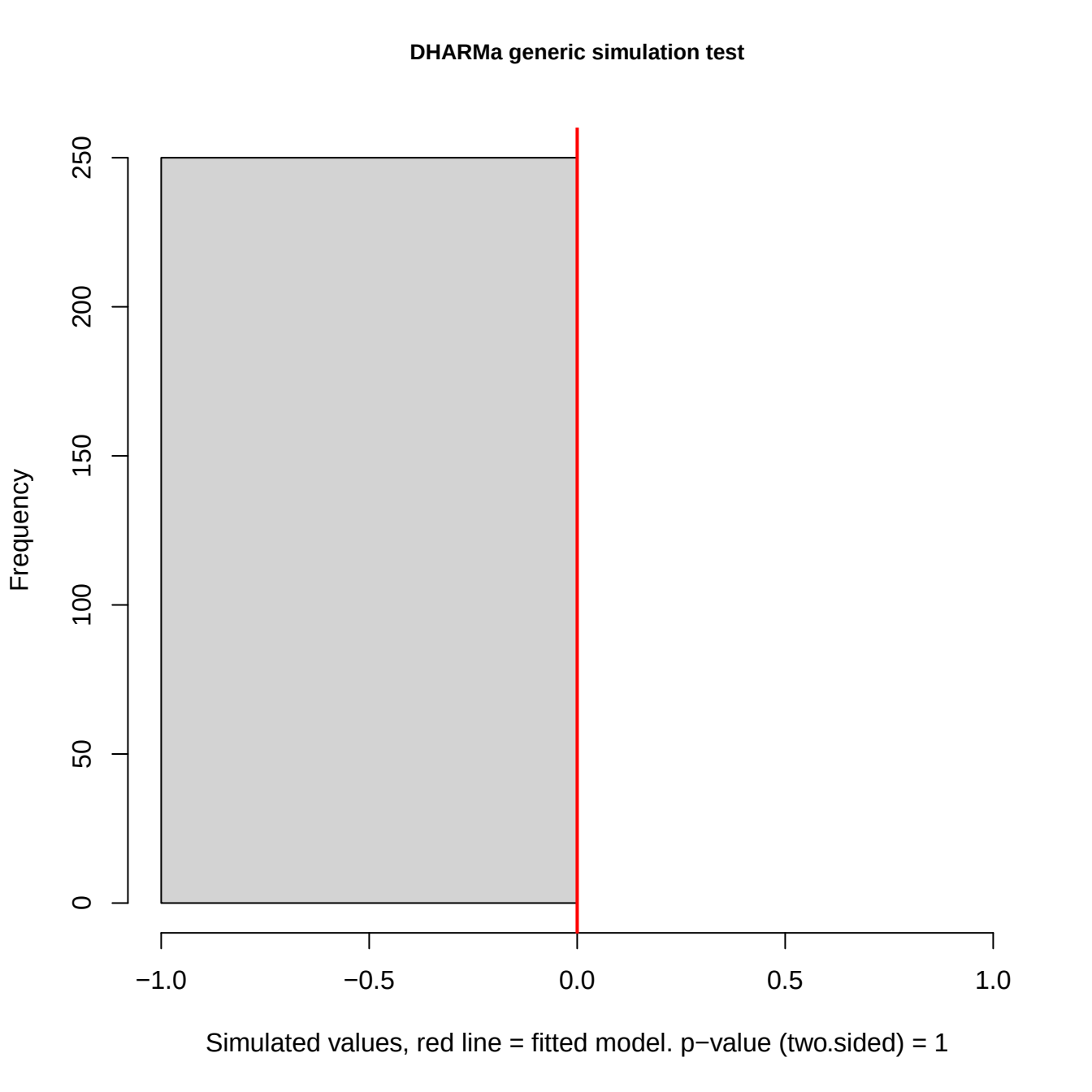

QQ plot residuals
KS test: p= 0.7838
Deviation n.s.
Dispersion test: p= 0.248
Deviation n.s.
Outlier test: p= 1
Deviation n.s.
Observed
Expected
0.0
0.2
0.4
0.6
0.8
1.0
DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated
Frequency
0
5
10
15
20
0.5
1.0
1.5
ed values, red line = fitted model. p−value (two.s

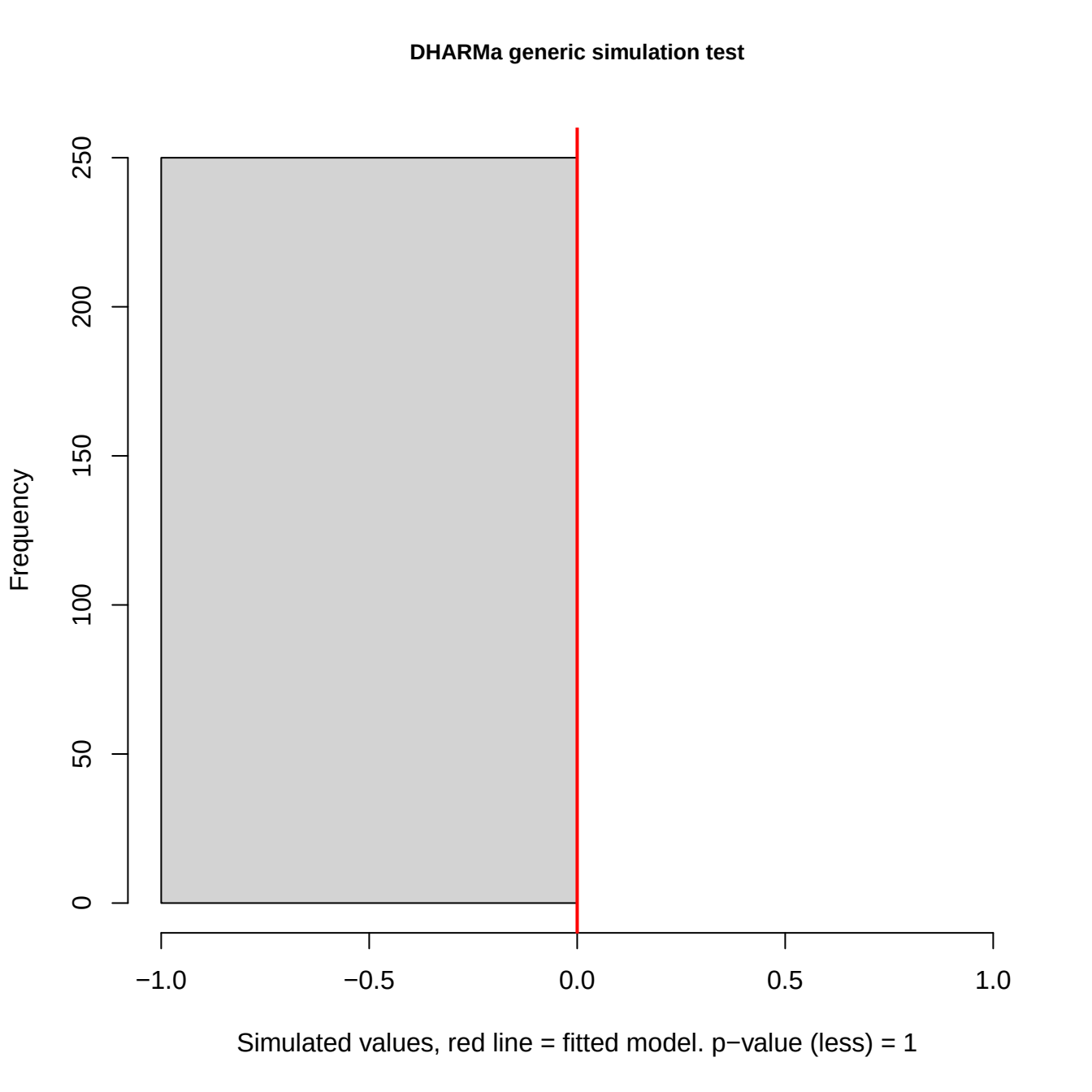

Outlier test n.s.
Frequency
0.0
0.5
1.0
1.5
2.0
0.0
0.2
0.4
0.6
0.8
1.0
Residuals (outliers are marked red)

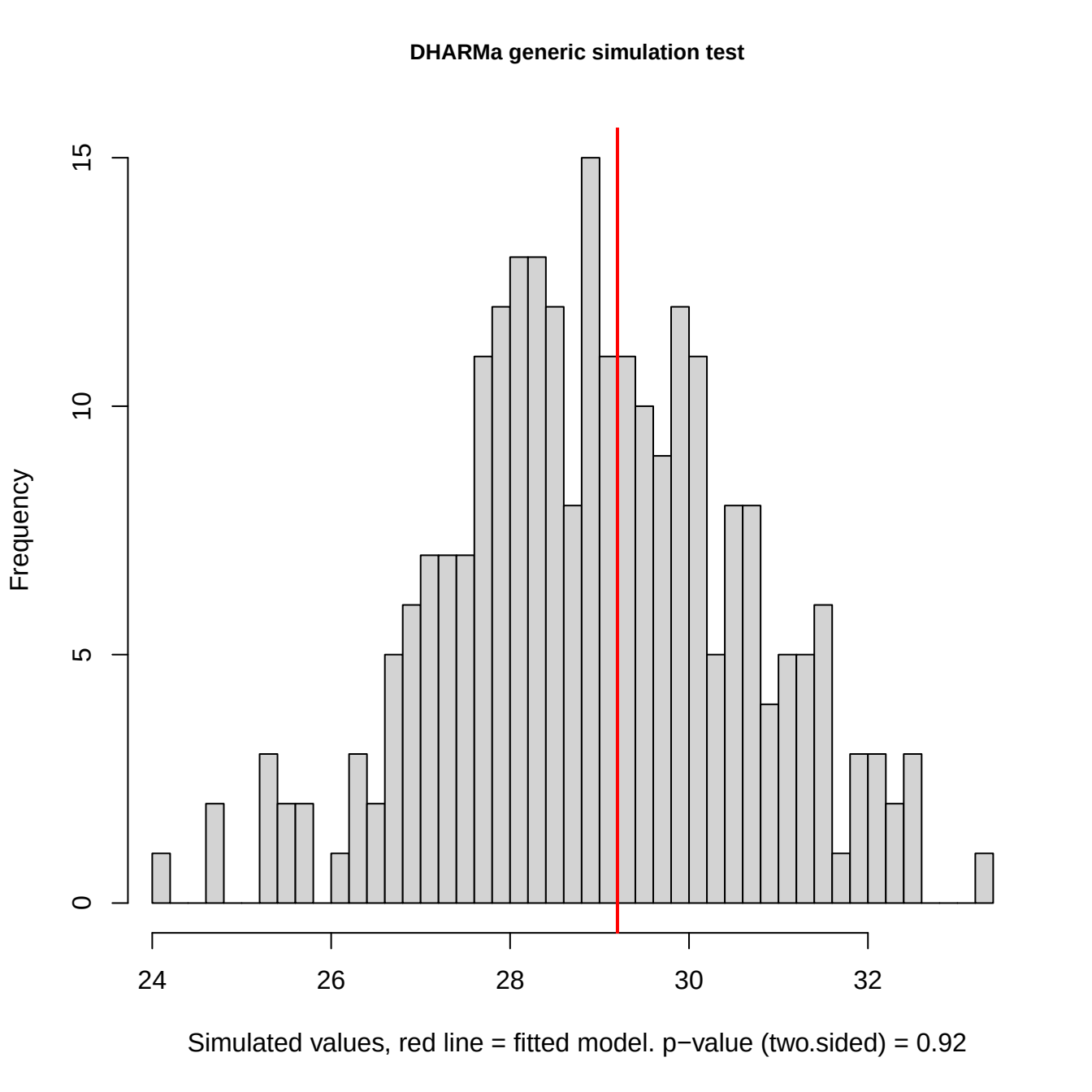

Histogram of frequBoot
Frequency
0
20
40
60
80
0.00
0.05
0.10
0.15
0.20
frequBoot

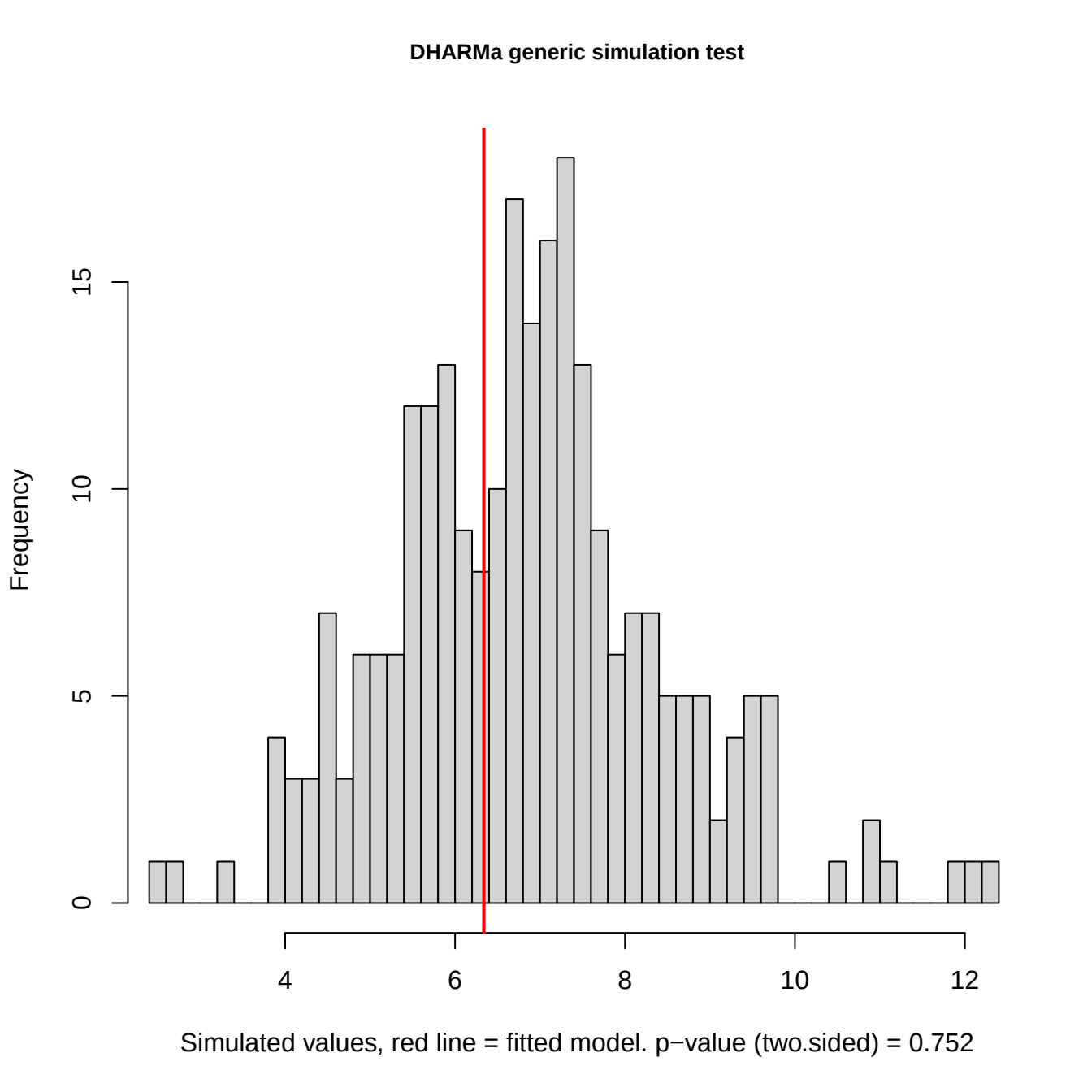

DHARMa zero−inflation test via comparison to expected zeros with simulation under H0 = fitted model
Frequency
0
50
100
150
200
250
−1.0
−0.5
0.0
0.5
1.0
Simulated values, red line = fitted model. p−value (two.sided) = 1

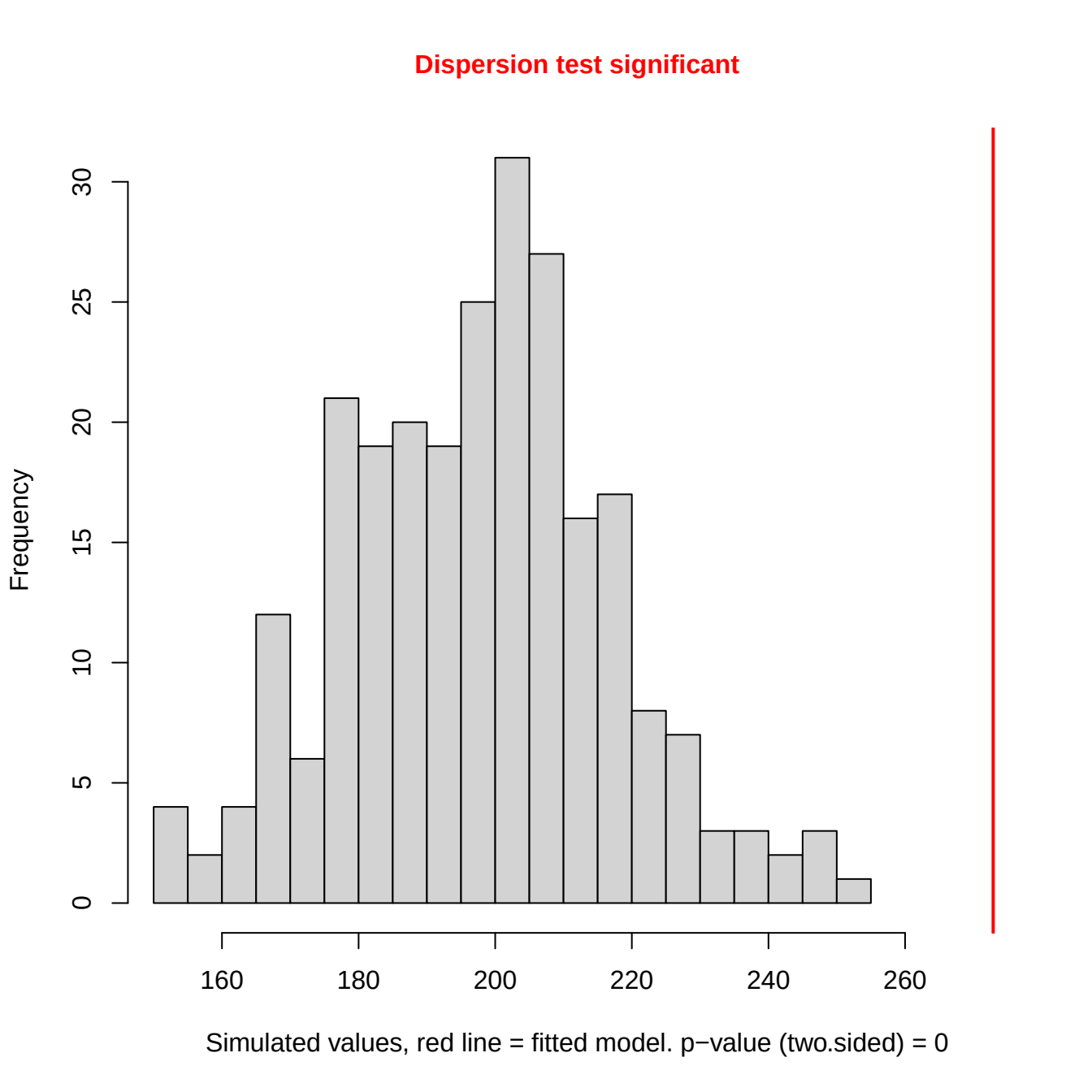

DHARMa zero−inflation test via comparison to expected zeros with simulation under H0 = fitted model
Frequency
0
50
100
150
200
250
−1.0
−0.5
0.0
0.5
1.0
Simulated values, red line = fitted model. p−value (less) = 1

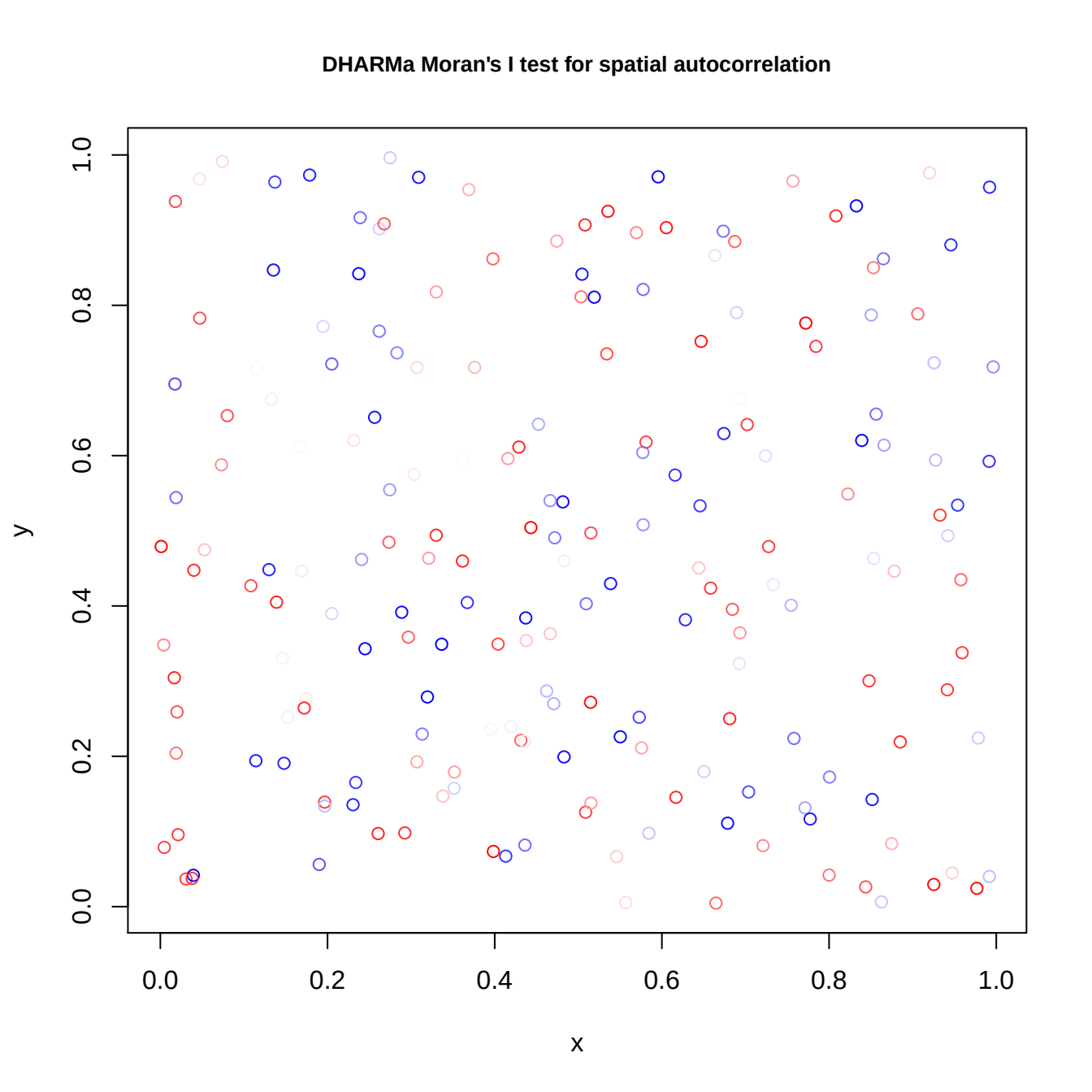

DHARMa generic simulation test
Frequency
0
50
100
150
200
250
−1.0
−0.5
0.0
0.5
1.0
Simulated values, red line = fitted model. p−value (two.sided) = 1

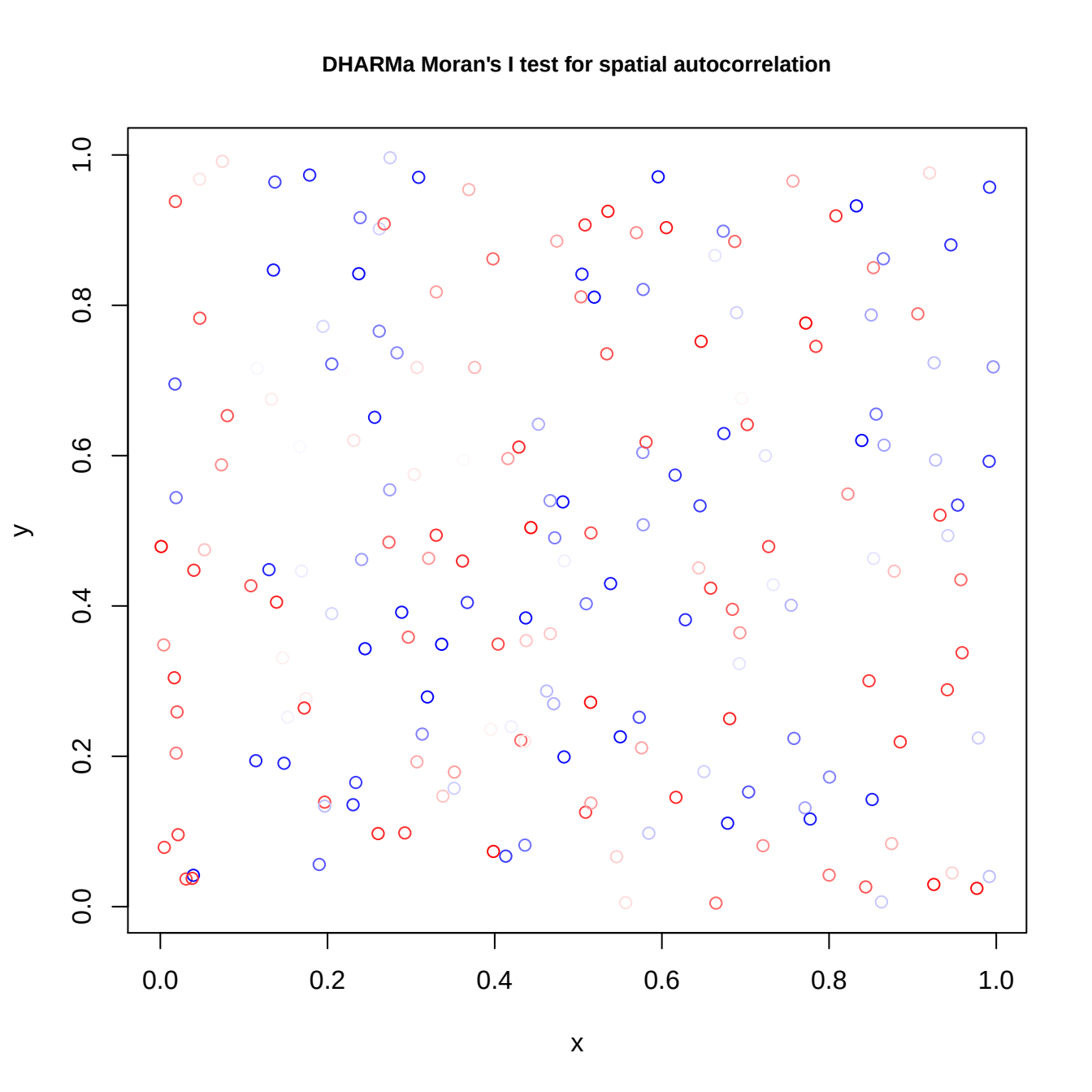

DHARMa generic simulation test
Frequency
0
50
100
150
200
250
−1.0
−0.5
0.0
0.5
1.0
Simulated values, red line = fitted model. p−value (less) = 1

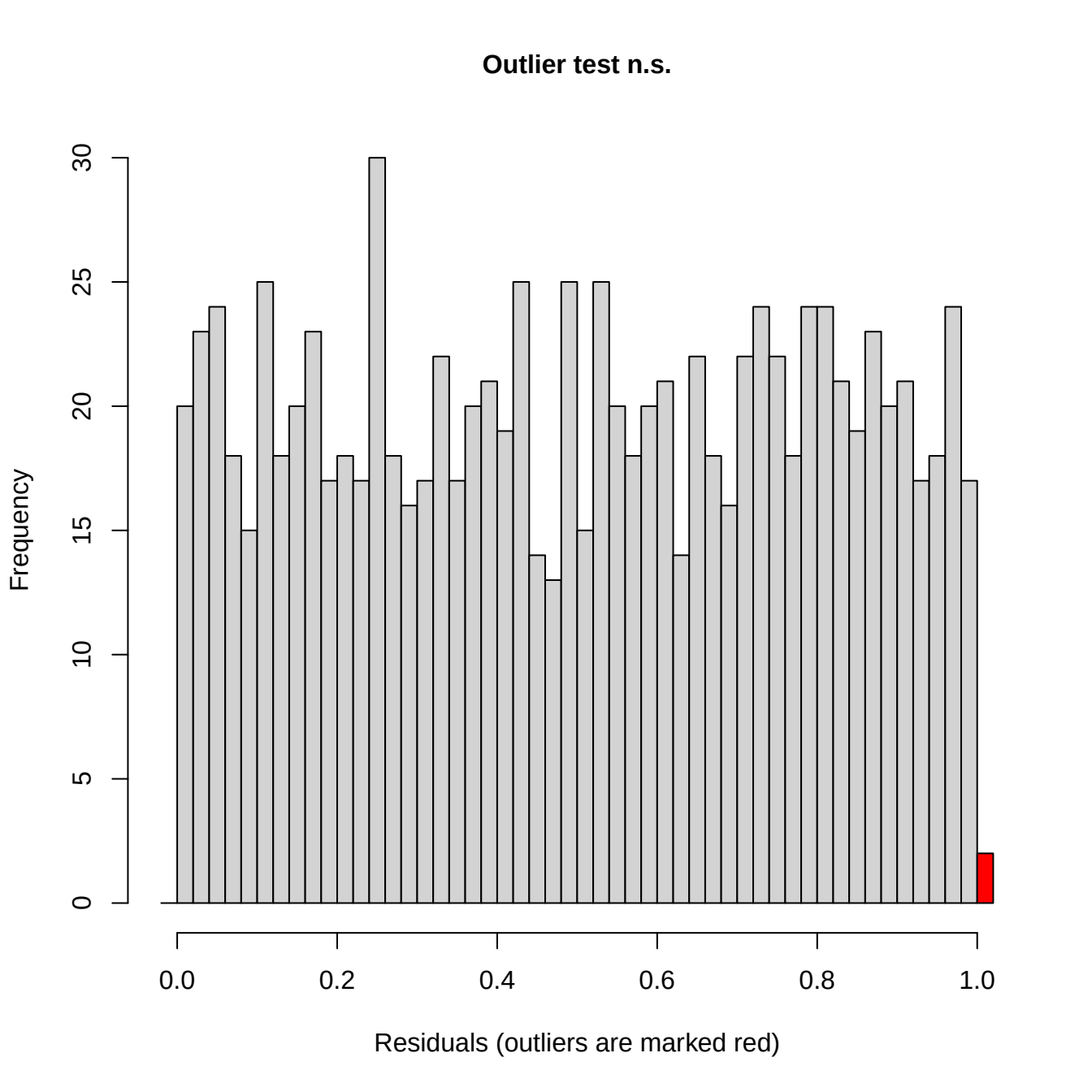

DHARMa generic simulation test
Frequency
0
5
10
15
24
26
28
30
32
Simulated values, red line = fitted model. p−value (two.sided) = 0.92

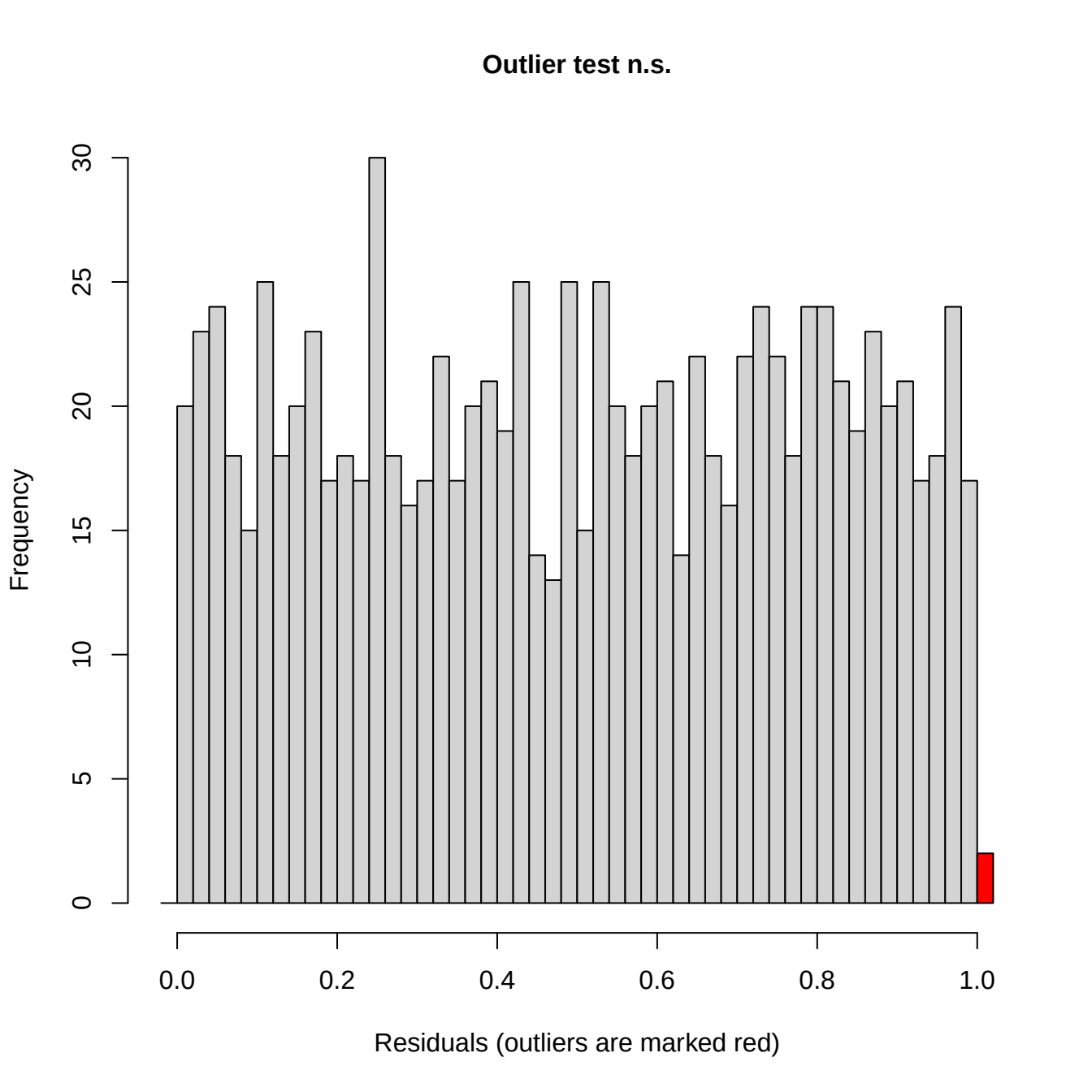

DHARMa generic simulation test
Frequency
0
5
10
15
4
6
8
10
12
Simulated values, red line = fitted model. p−value (two.sided) = 0.752

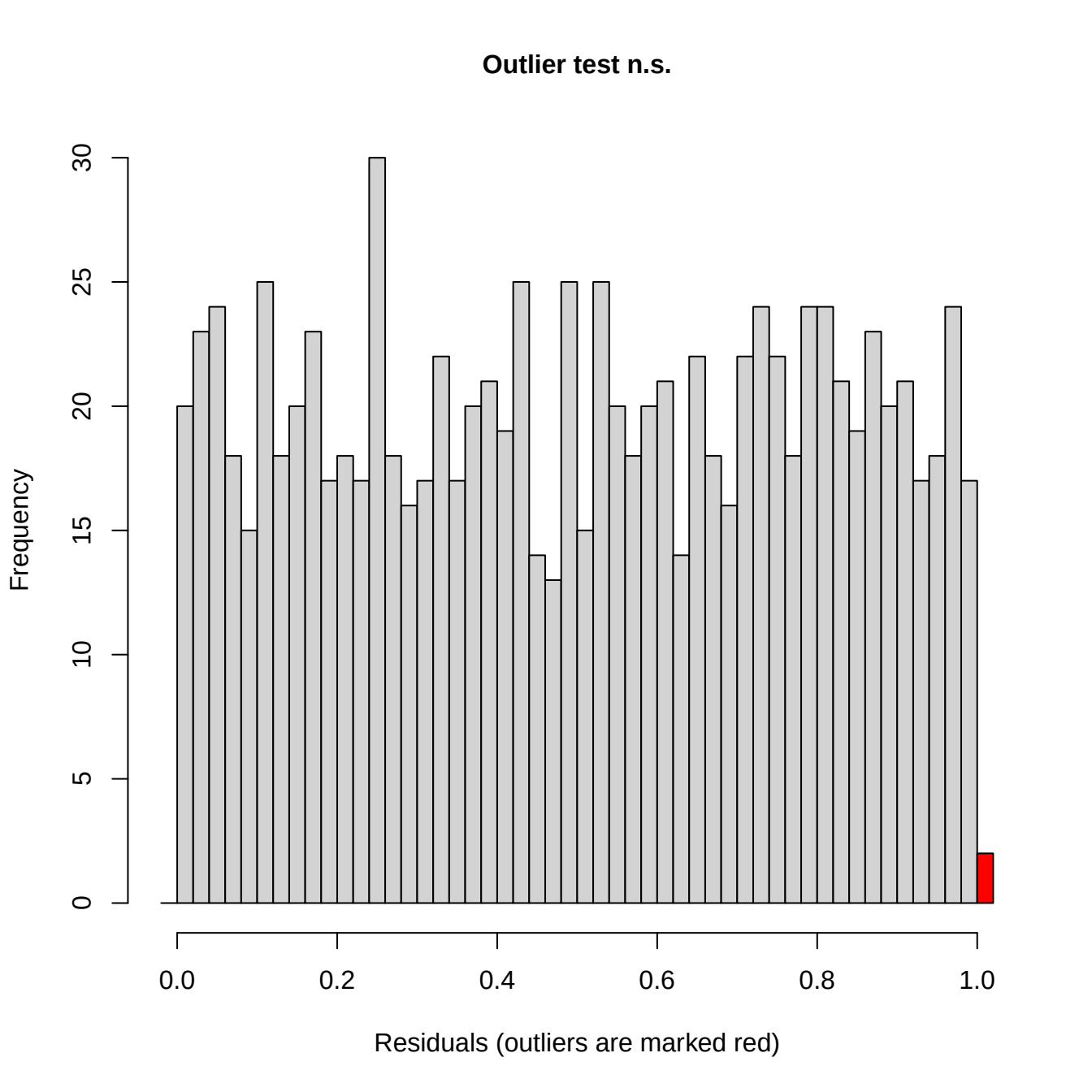

Dispersion test significant
Frequency
0
5
10
15
20
25
30
160
180
200
220
240
260
Simulated values, red line = fitted model. p−value (two.sided) = 0

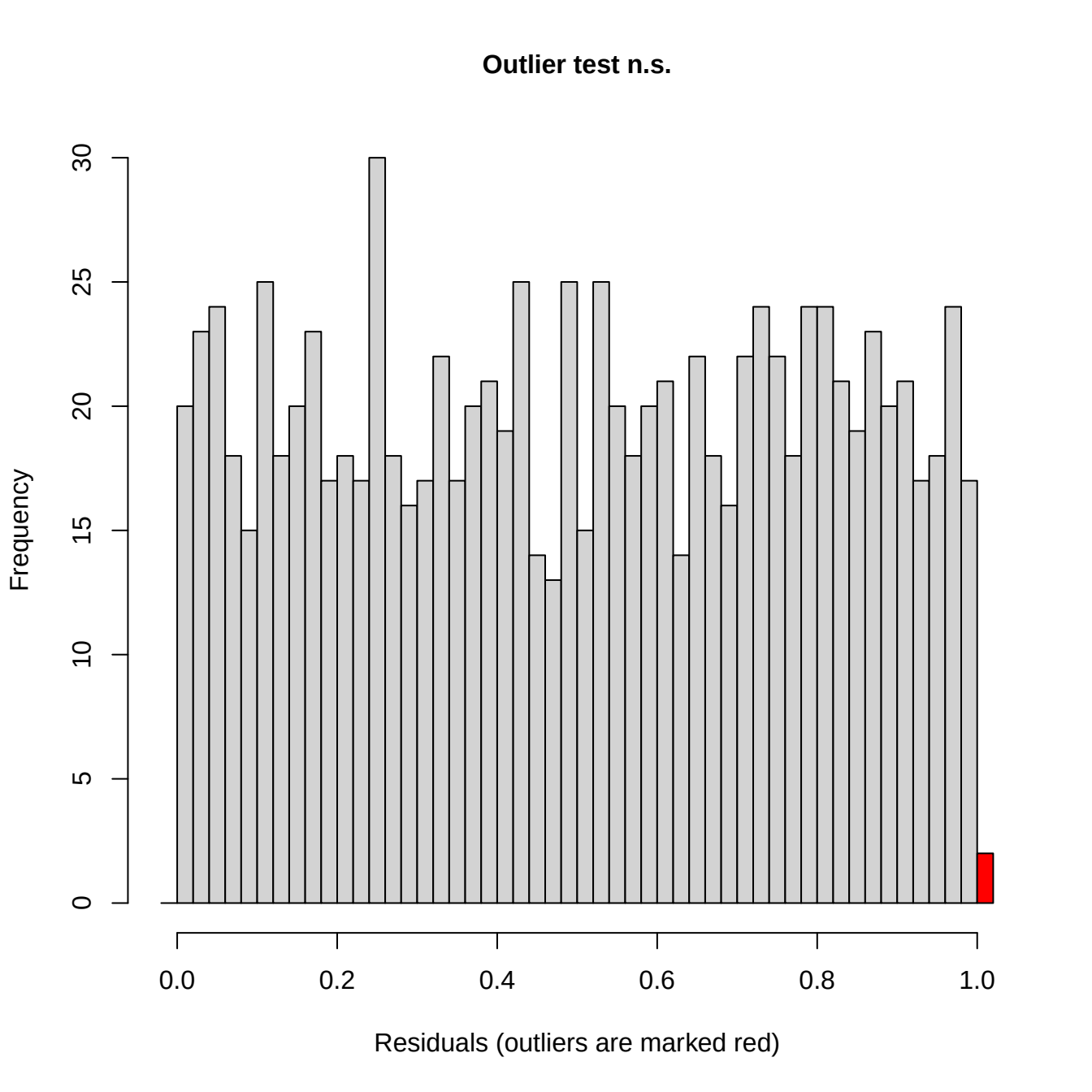

DHARMa Moran's I test for spatial autocorrelation
y
x
0.0
0.2
0.4
0.6
0.8
1.0


DHARMa Moran's I test for spatial autocorrelation
y
x
0.0
0.2
0.4
0.6
0.8
1.0


Outlier test n.s.
Frequency
0
5
10
15
20
25
30
0.0
0.2
0.4
0.6
0.8
1.0
Residuals (outliers are marked red)


Outlier test n.s.
Frequency
0
5
10
15
20
25
30
0.0
0.2
0.4
0.6
0.8
1.0
Residuals (outliers are marked red)


Outlier test n.s.
Frequency
0
5
10
15
20
25
30
0.0
0.2
0.4
0.6
0.8
1.0
Residuals (outliers are marked red)


Outlier test n.s.
Frequency
0
5
10
15
20
25
30
0.0
0.2
0.4
0.6
0.8
1.0
Residuals (outliers are marked red)