Polynomial regression

`mcycle` dataset from `MASS`

Fitted models

In-sample adjusted R^2 and BIC

Cross-validation: training and testing

Cross-validation: leave-one-out

Cross-validation: 10-fold

Bootstrap

mcyle dataset from MASS

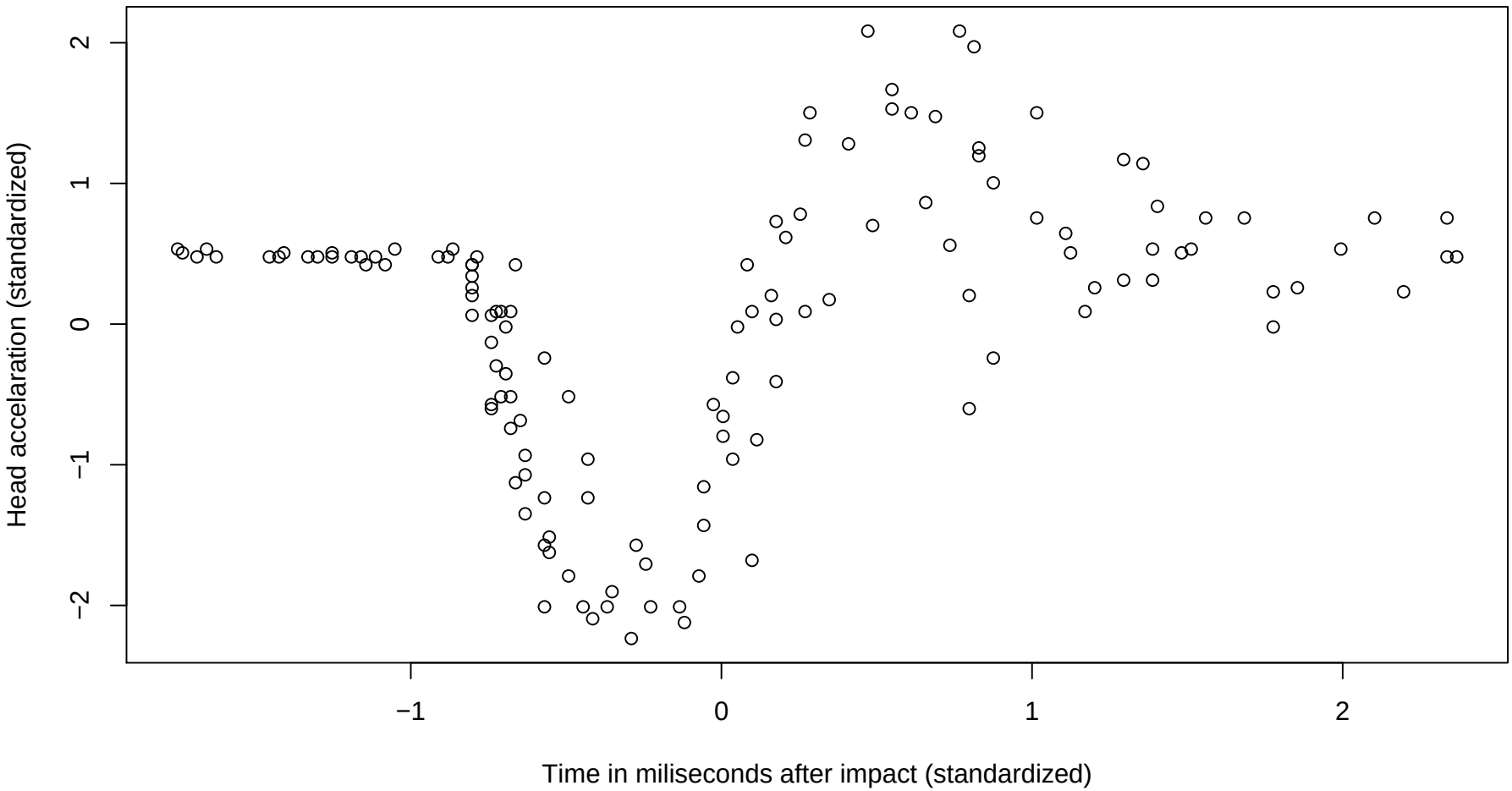
A data frame giving a series of measurements of head acceleration in a simulated motorcycle accident, used to test crash helmets.

x: time in miliseconds after impact
y: head accelaration (in g)

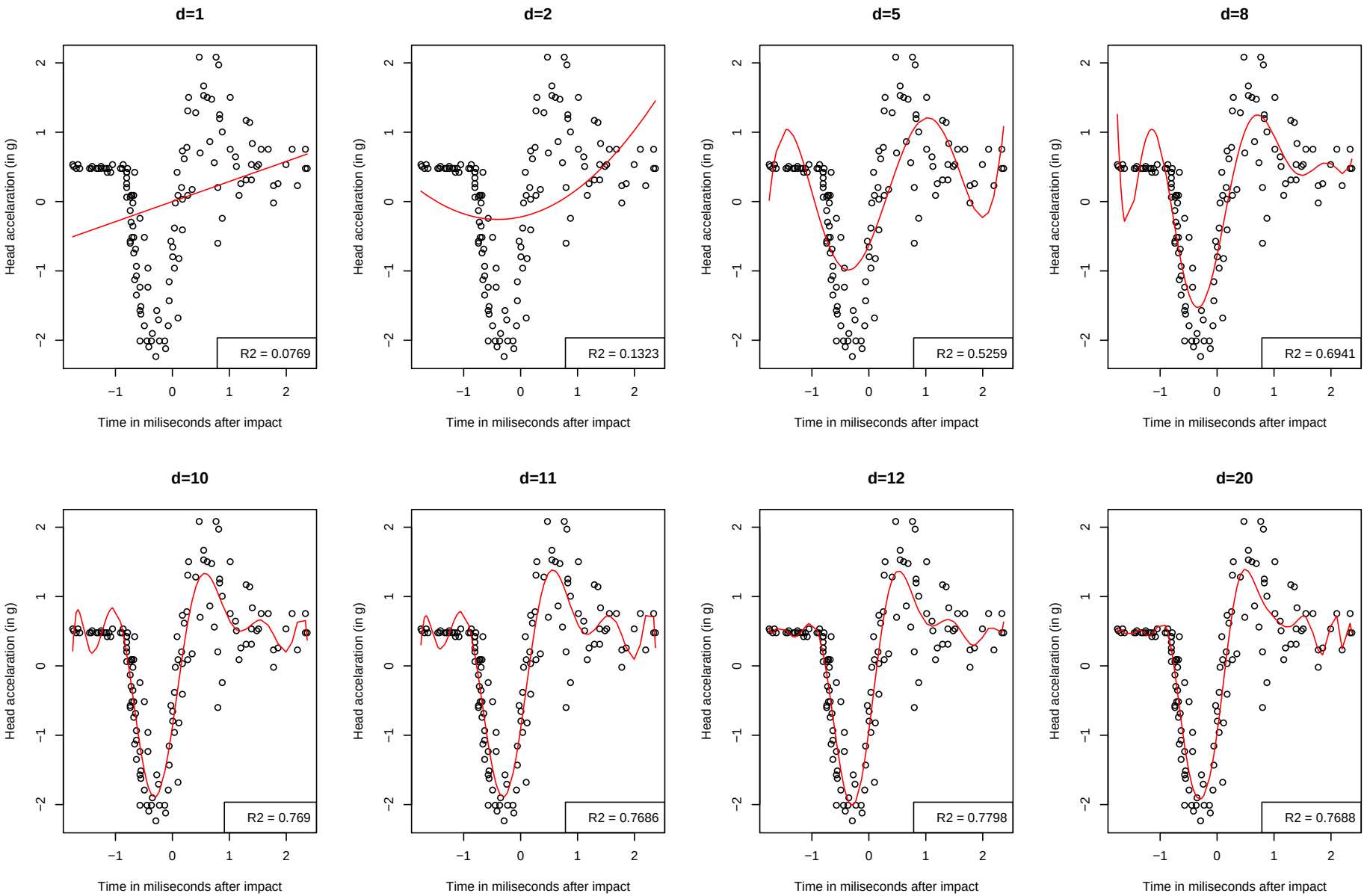
Silverman (1985) Some aspects of the spline smoothing approach to non-parametric curve fitting. *JRSS-B*, 47, 1-52.

```
library(MASS)
n = nrow(mcycle)
x = mcycle$times
y = mcycle$accel
x = x/max(x)
y = y/max(y)
x = -1+2*x
xt = x
yt = y
xt = x[1:132]
yt = y[1:132]
n = length(xt)
xt = (xt-mean(xt))/sqrt(var(xt))
yt = (yt-mean(yt))/sqrt(var(yt))
```

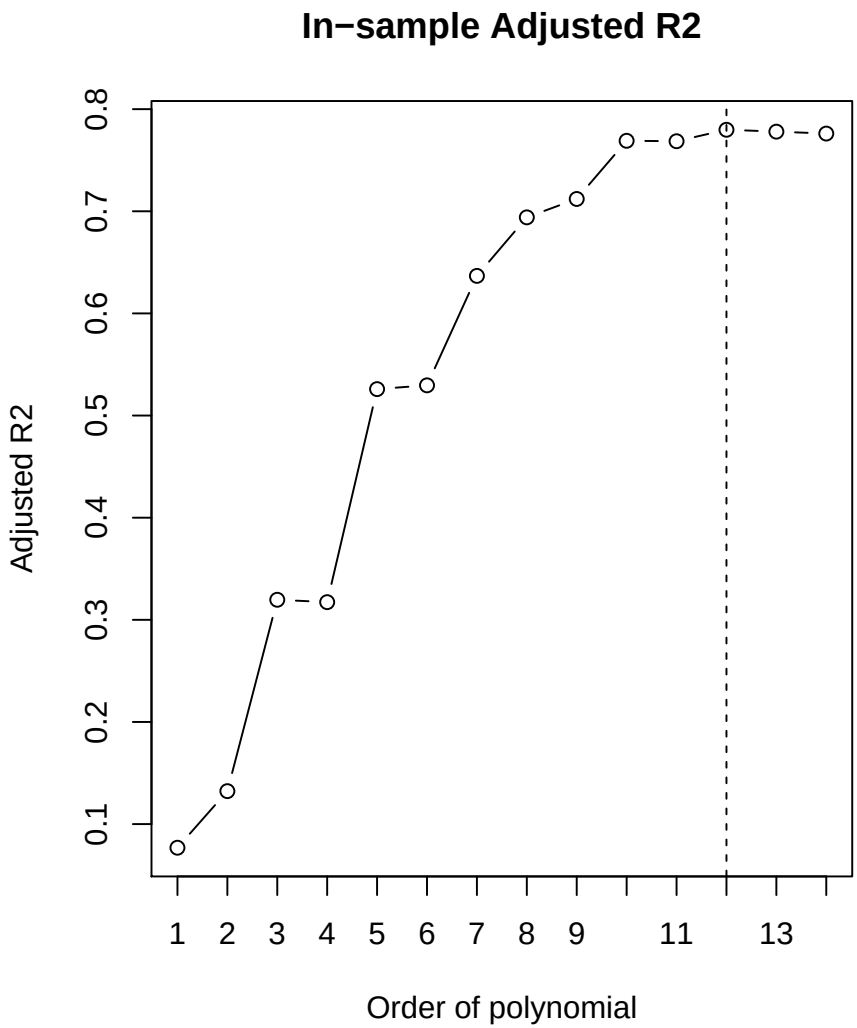
The data

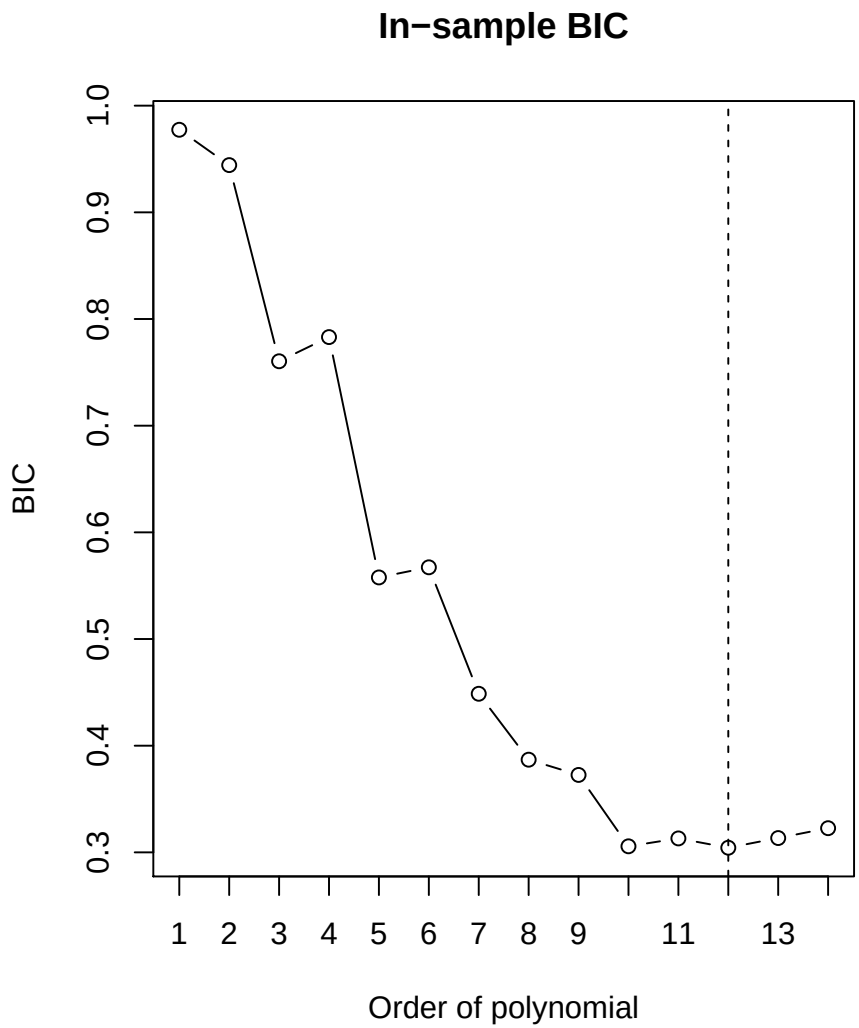

Head accelaration (standardized)
2
1
0
−1
−2
−1
0
1
2
Time in miliseconds after impact (standardized)

Polynomial regressions

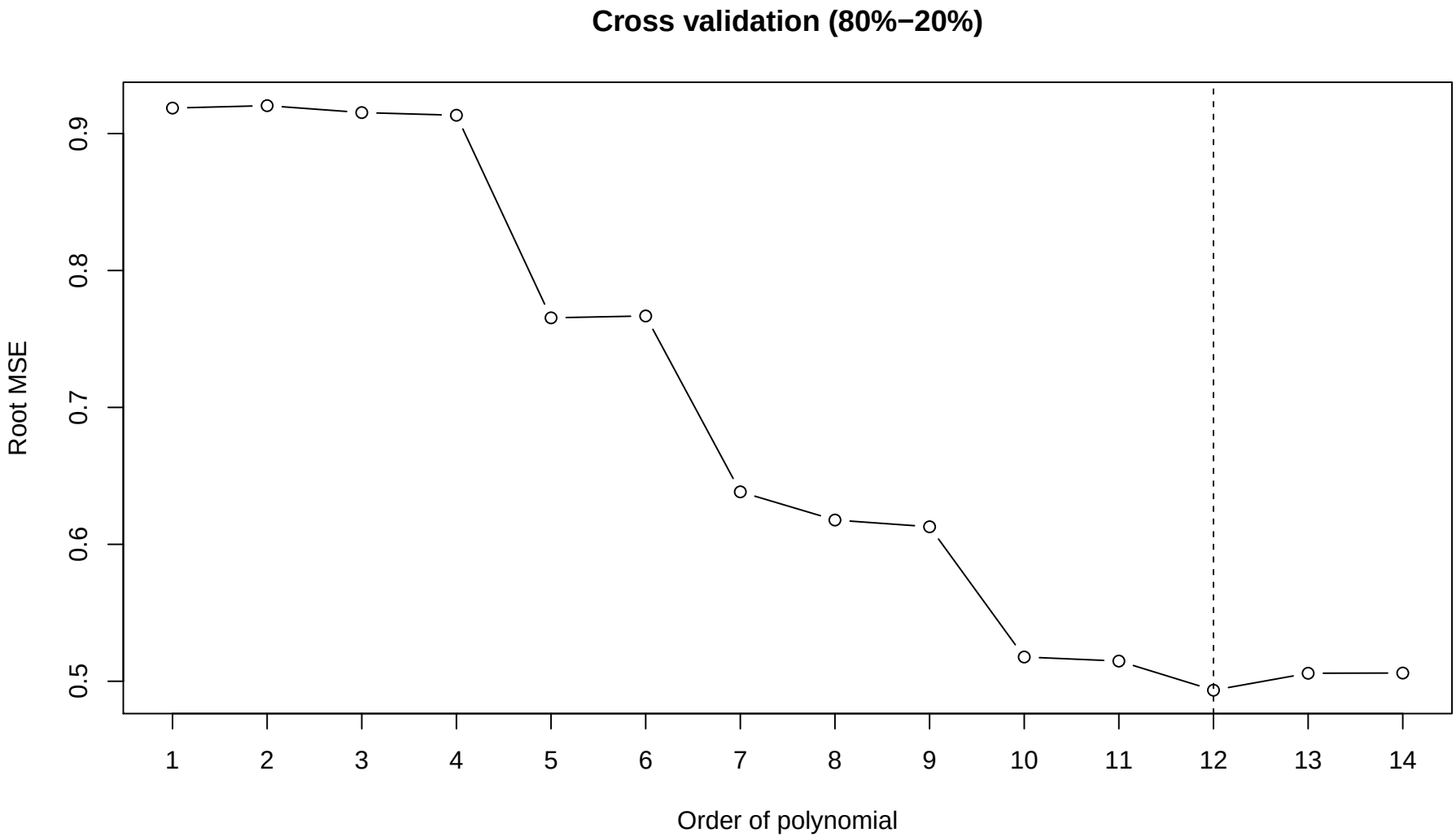


In-sample adjusted R^2 and BIC

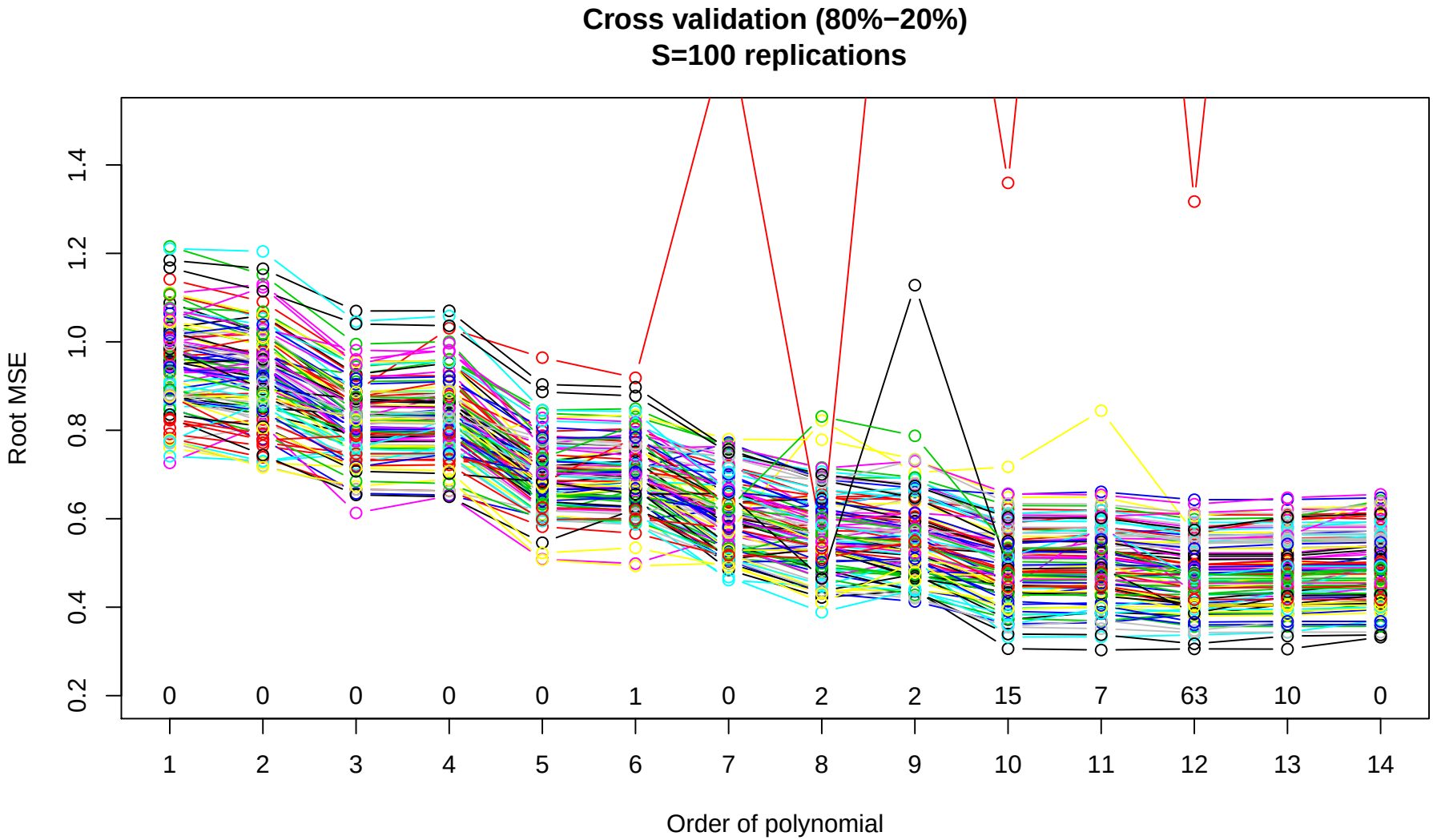




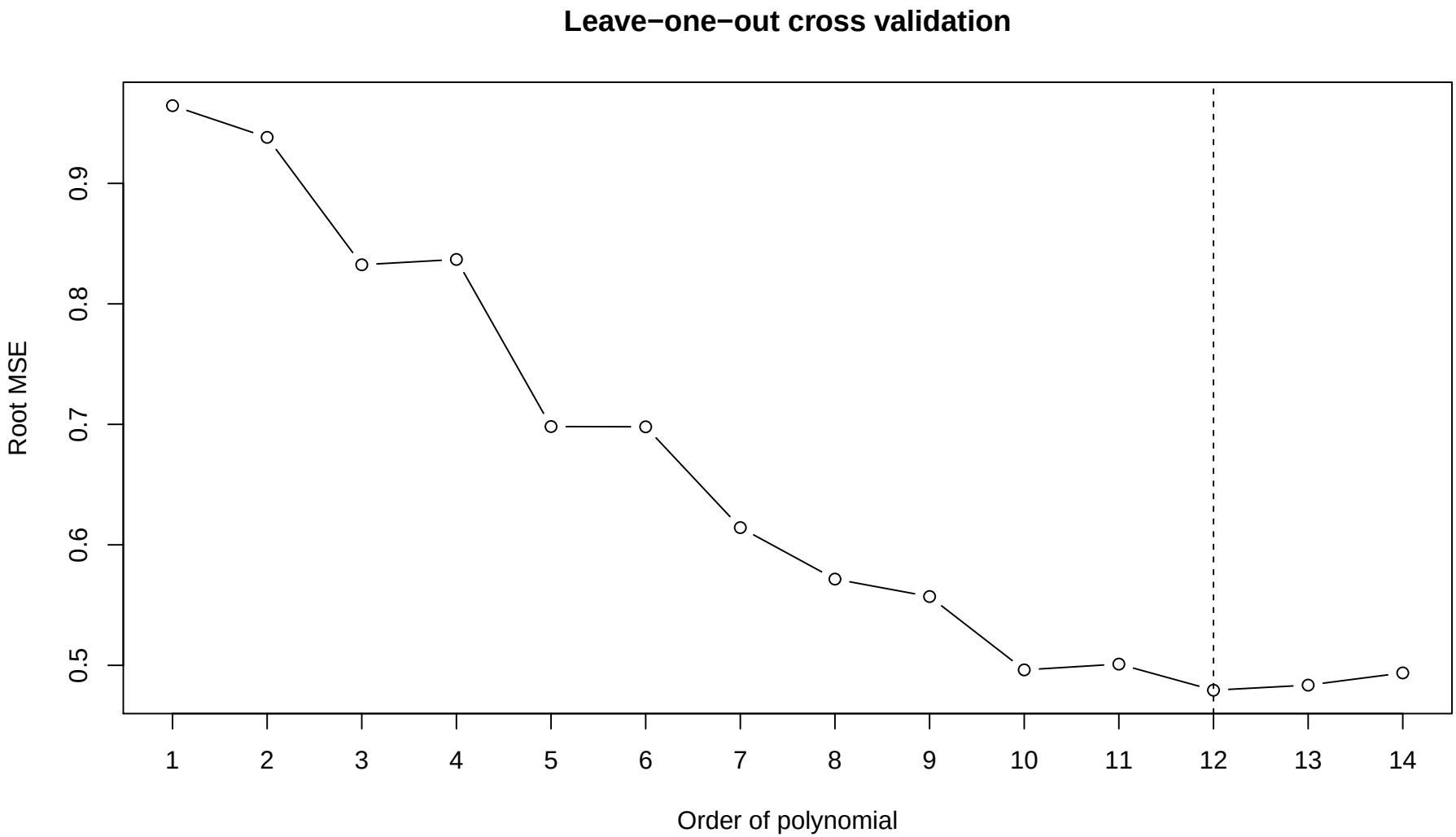
Cross-validation: training and testing



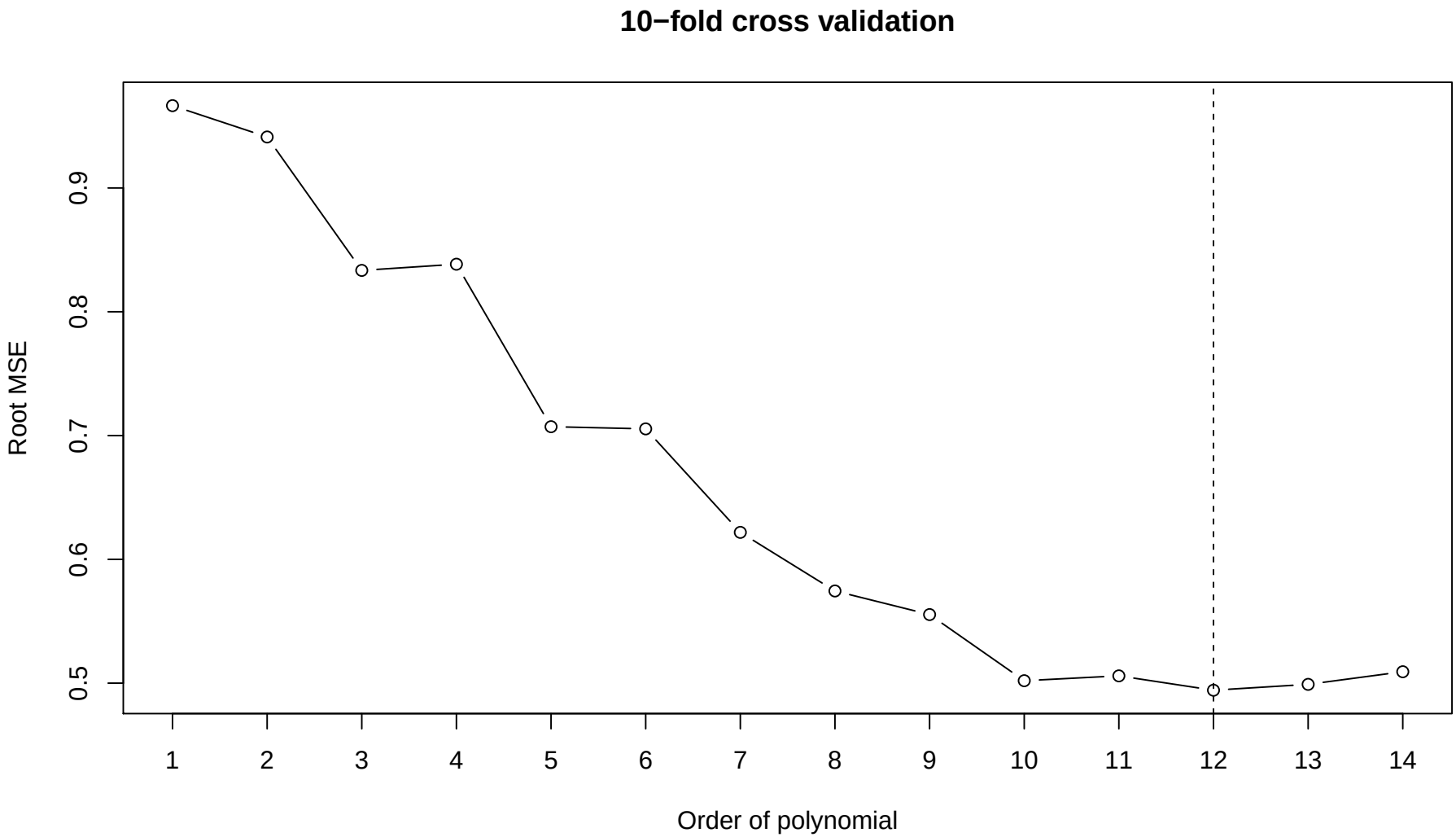
Cross-validation: training and testing - 100 replications



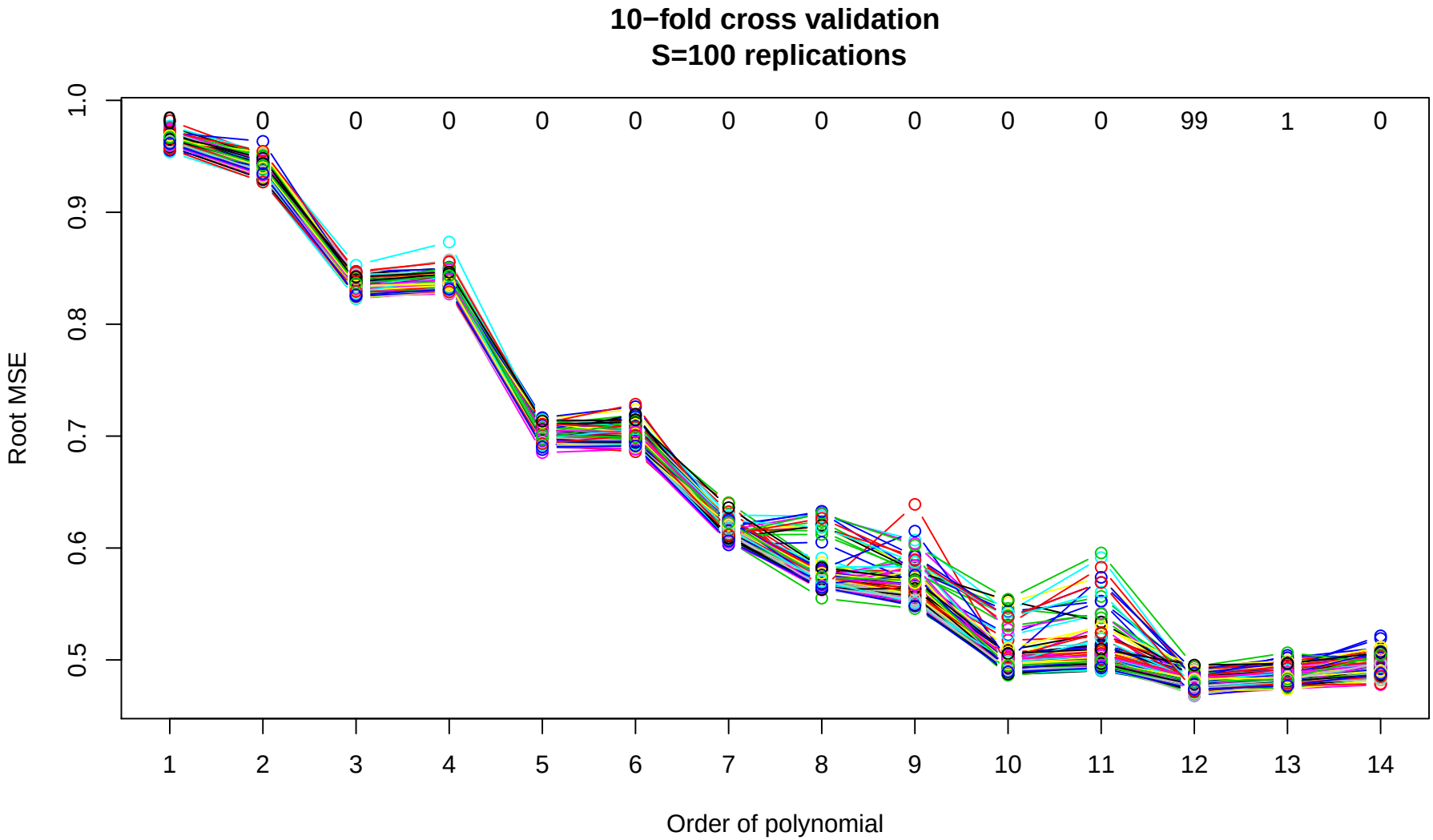
Cross-validation: leave-one-out



Cross-validation: 10-fold



Cross-validation: 10-fold - 100 replications



“Best” fitted model (and bootstrap replications)