The effect of **number of clusters and cluster size** on statistical **power and Type I error rates**
when testing random effects variance components
in **multilevel linear and logistic regression models**

Journal of Statistical Computation and Simulation

Peter C. Austin & George Leckie (2018)

Method

- Use a series of **Monte Carlo** simulations to examine the effect of the number of subject per cluster on the statistical power and empirical type I error.

Scenarios

Inputs :

2 test : Likelihood Ratio Test & Wald Test
(for testing variance is different from zero or not.)

2 model : linear and logistic regression models

11 VPC : From 0 to 0.1 in increments of 0.01

19 number of clusters : 20 to 200 in increments of 10

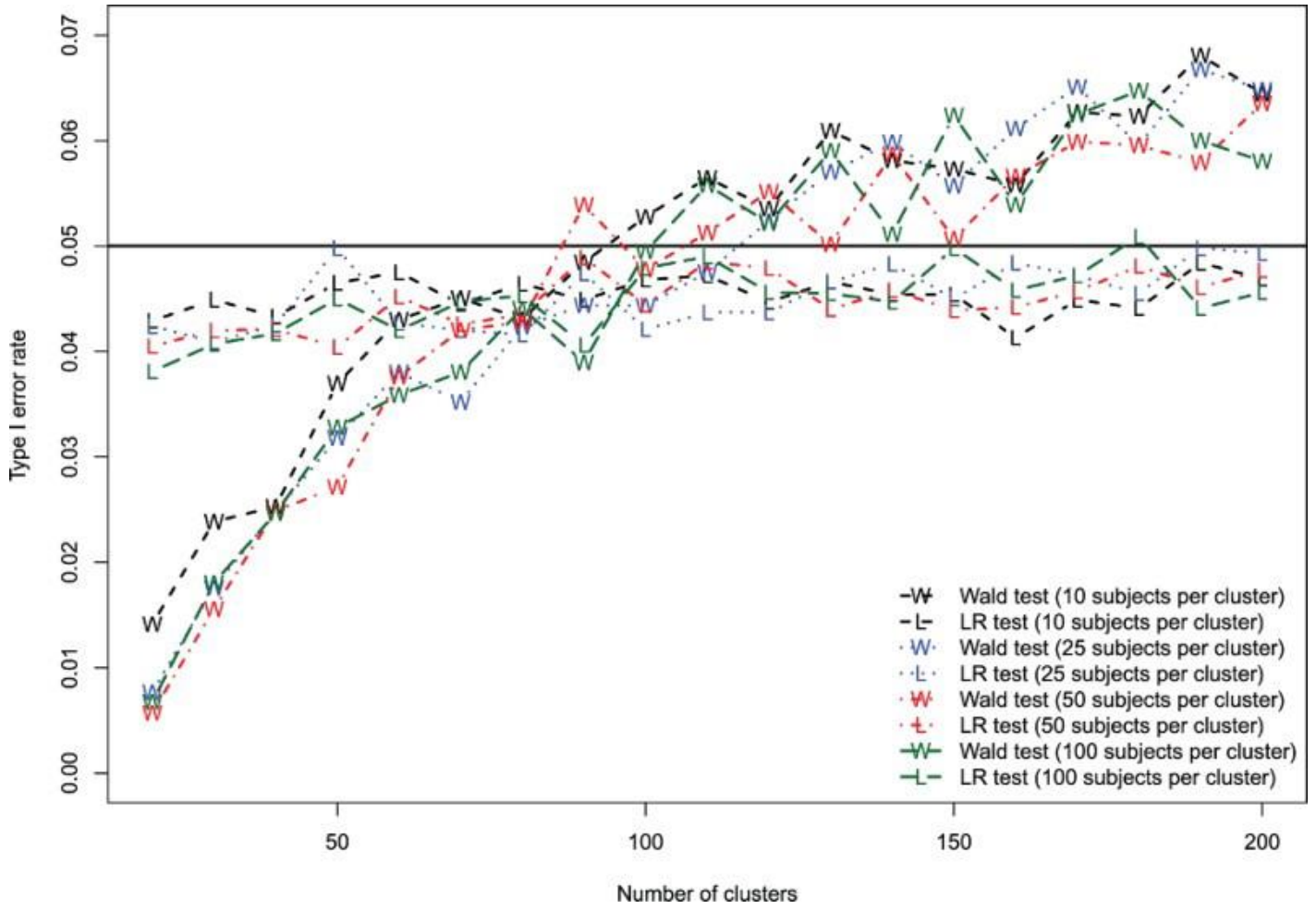
4 cluster size : 10, 25, 50, and 100

VPC = $\tau^2_{\text{continuous}} / \left(\tau^2_{\text{continuous}} + 1\right)$

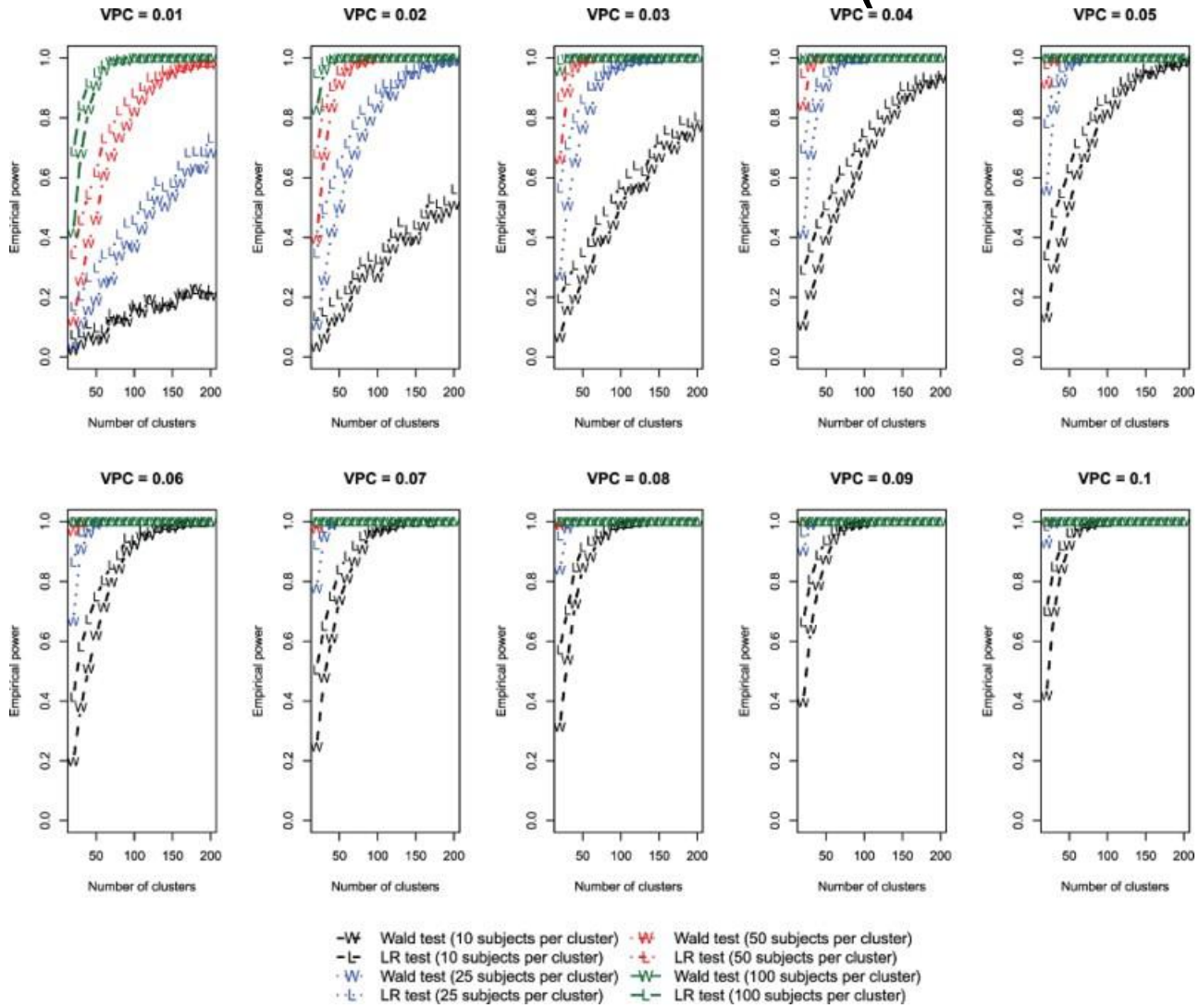
Scenarios

- Outputs graphs:
  - Type I error
  - Power

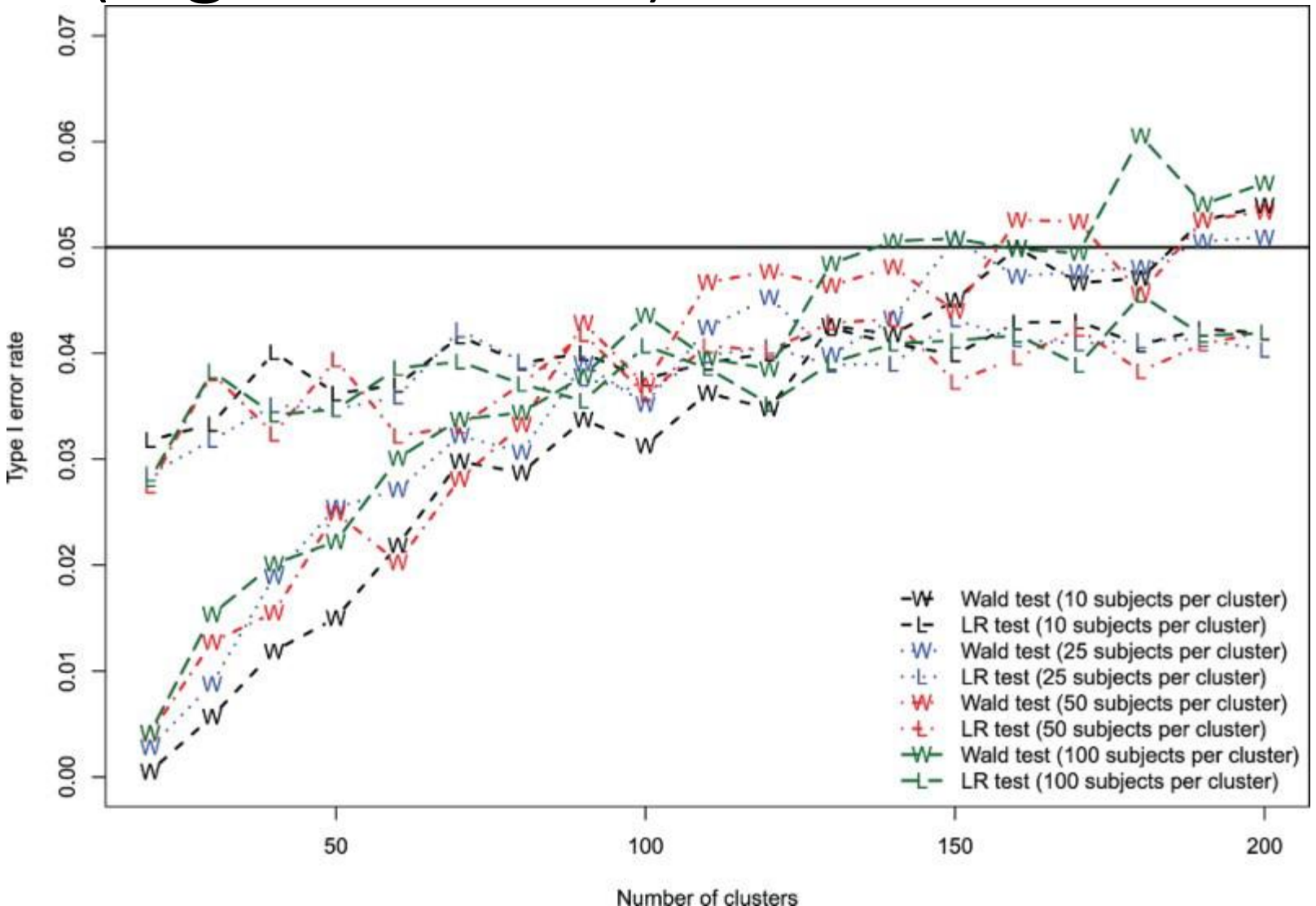
Effect of number of clusters on Type I error rate (linear model).



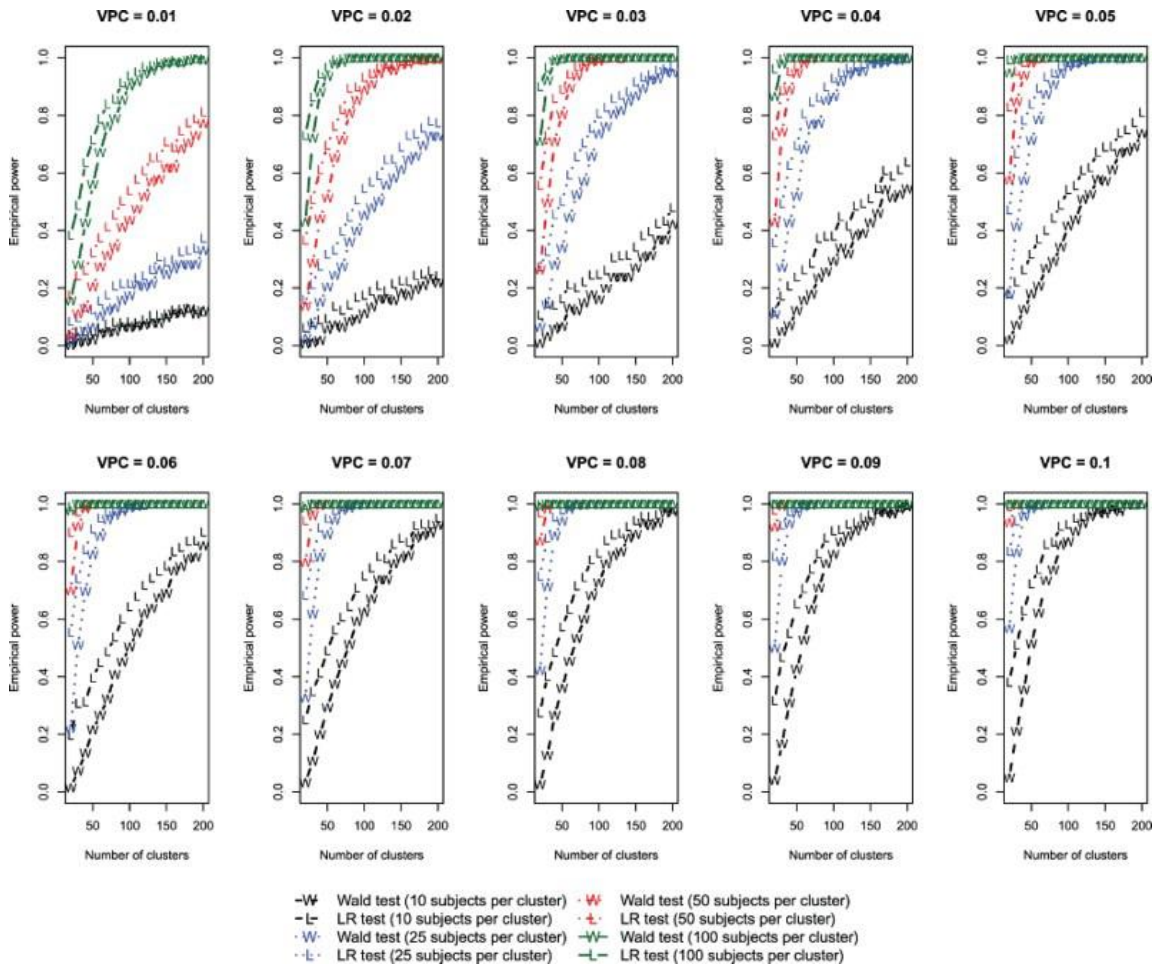
Effect of number of clusters on power to detect a non-zero variance (linear model).



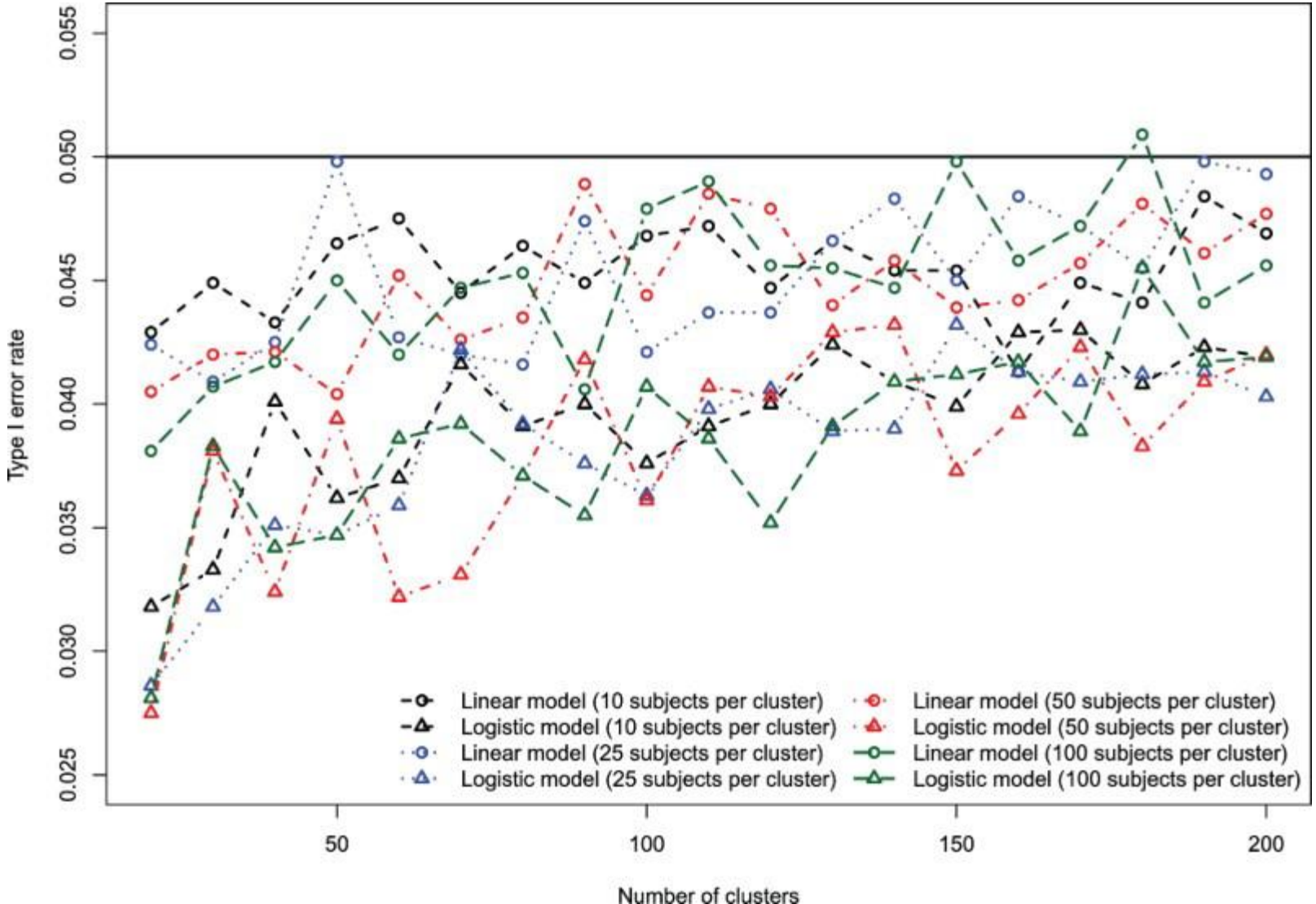
Effect of number of clusters on Type I error rate (logistic model).



Effect of number of clusters on power to detect a non-zero variance (logistic model).



Comparison of LRT type I error rate: linear vs. logistic models.



Comparison of LRT power for linear vs. logistic model.