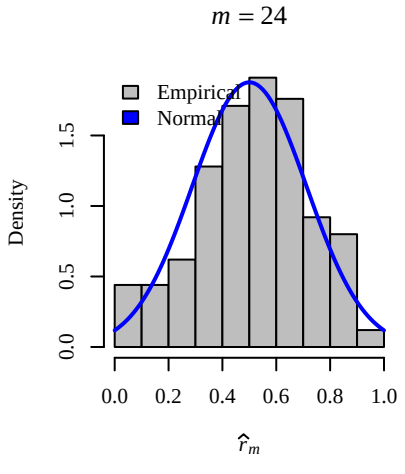
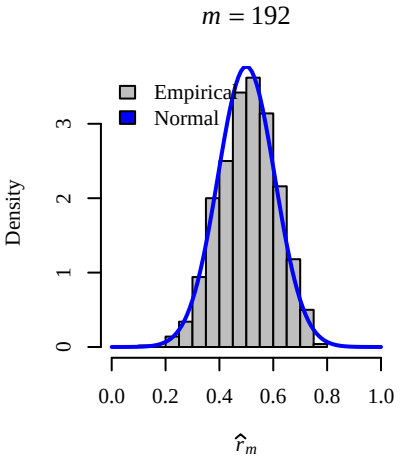
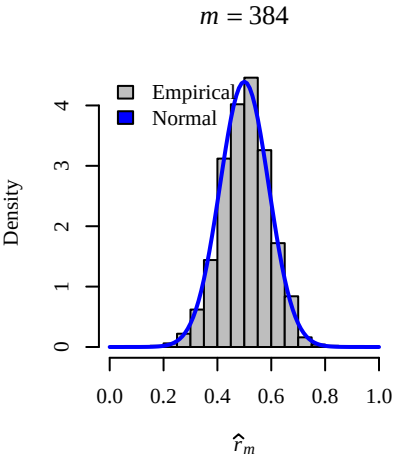
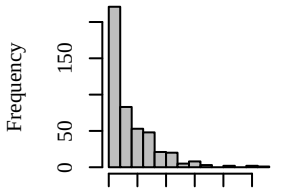
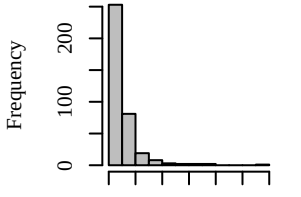
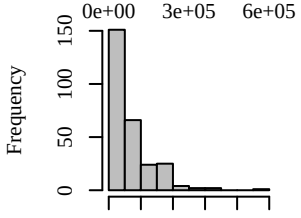

$m = 24$
Empirical
Normal
Density
0.0
0.5
1.0
1.5
0.0
0.2
0.4
0.6
0.8
1.0
$\hat{r}_m$

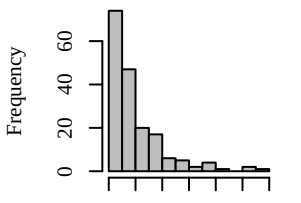

$m = 192$
Empirical
Normal
Density
0
1
2
3
0.0
0.2
0.4
0.6
0.8
1.0
$\hat{r}_m$

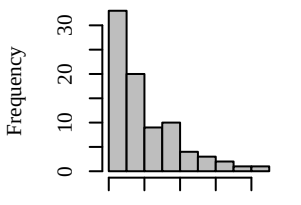

$m = 384$
Empirical
Normal
Density
0
1
2
3
4
0.0
0.2
0.4
0.6
0.8
1.0
$\hat{r}_m$

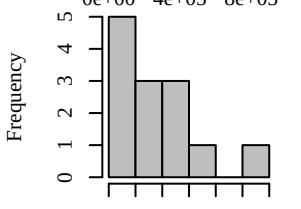

Frequency
0
50
150
0
100000
250000

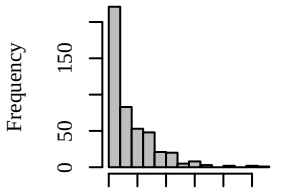

Frequency
0
100
200
0e+00
3e+05
6e+05

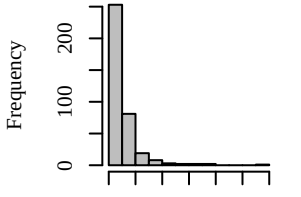

Frequency
0
50
100
150
0e+00
3e+05

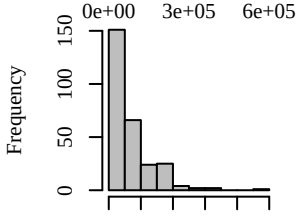

Frequency
0
20
40
60
0e+00
3e+05
6e+05

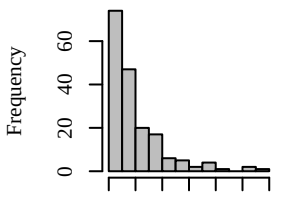

Frequency
0
10
20
30
0e+00
4e+05
8e+05

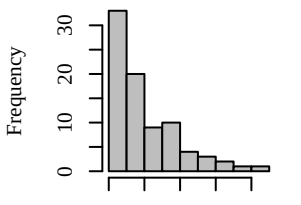

Frequency
0
1
2
3
4
5

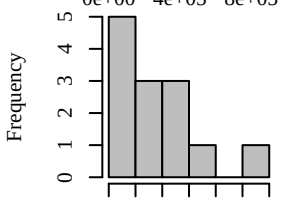

Frequency
0
50
150
0
100000
250000

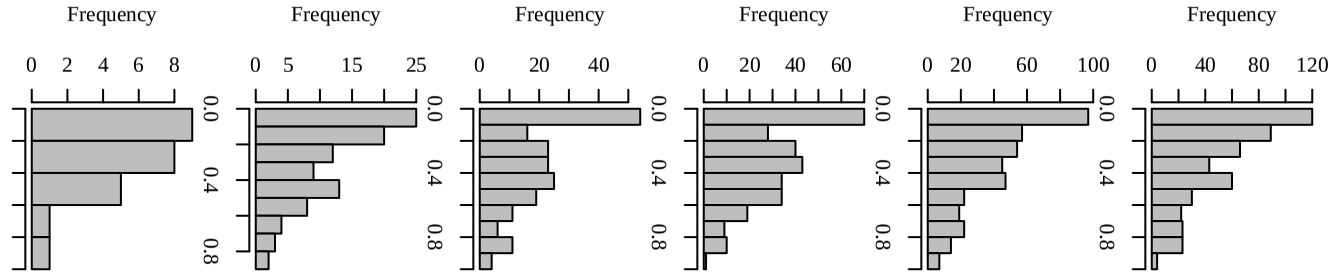

Frequency
0
100
200
0e+00
3e+05
6e+05

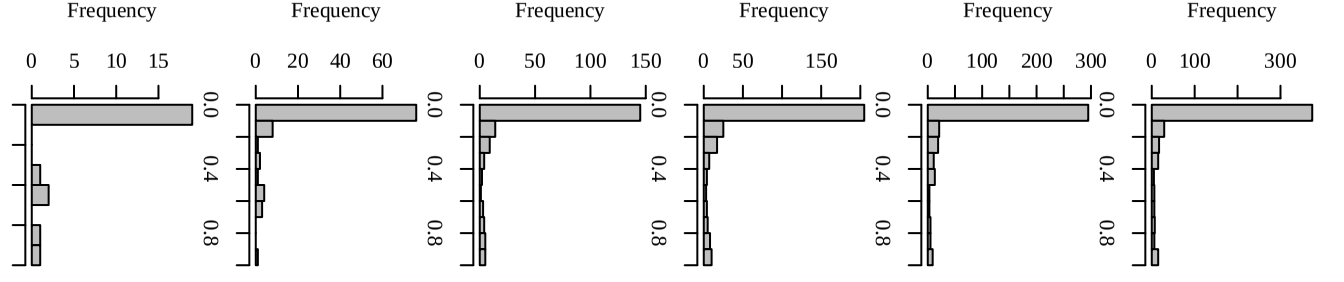

Frequency
0
50
100
150
0e+00
3e+05

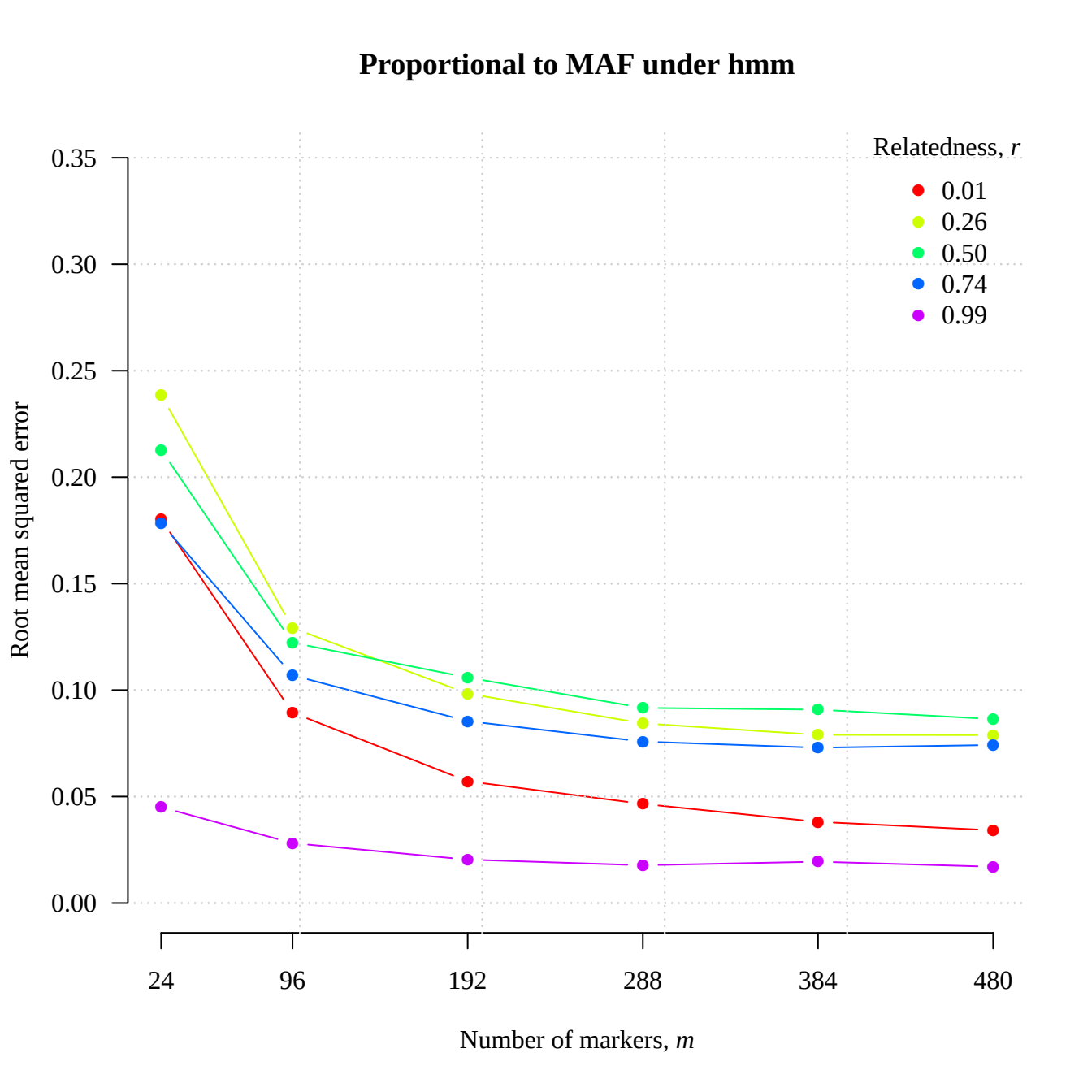

Frequency
0
20
40
60
0e+00
3e+05
6e+05

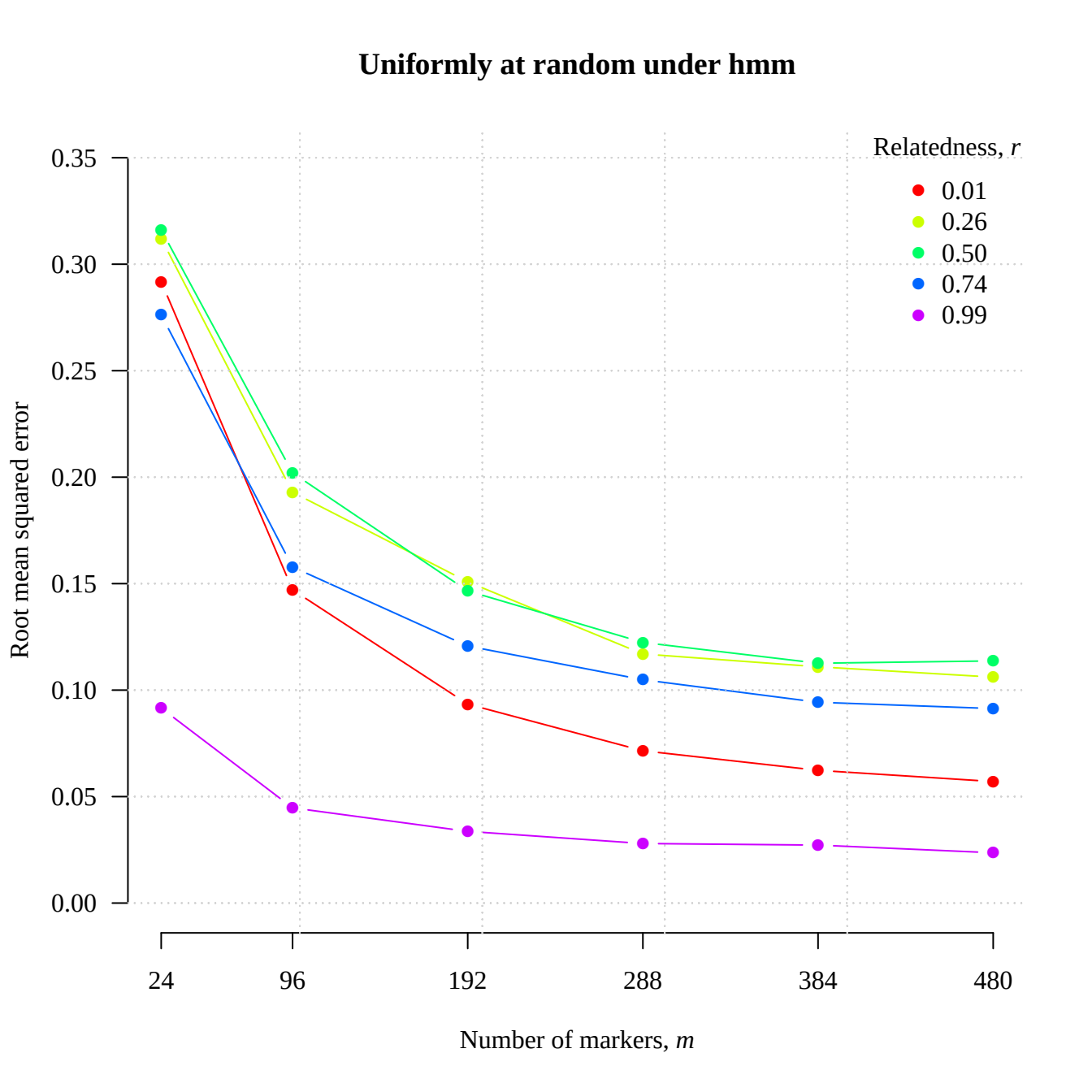

Frequency
0
10
20
30
0e+00
4e+05
8e+05

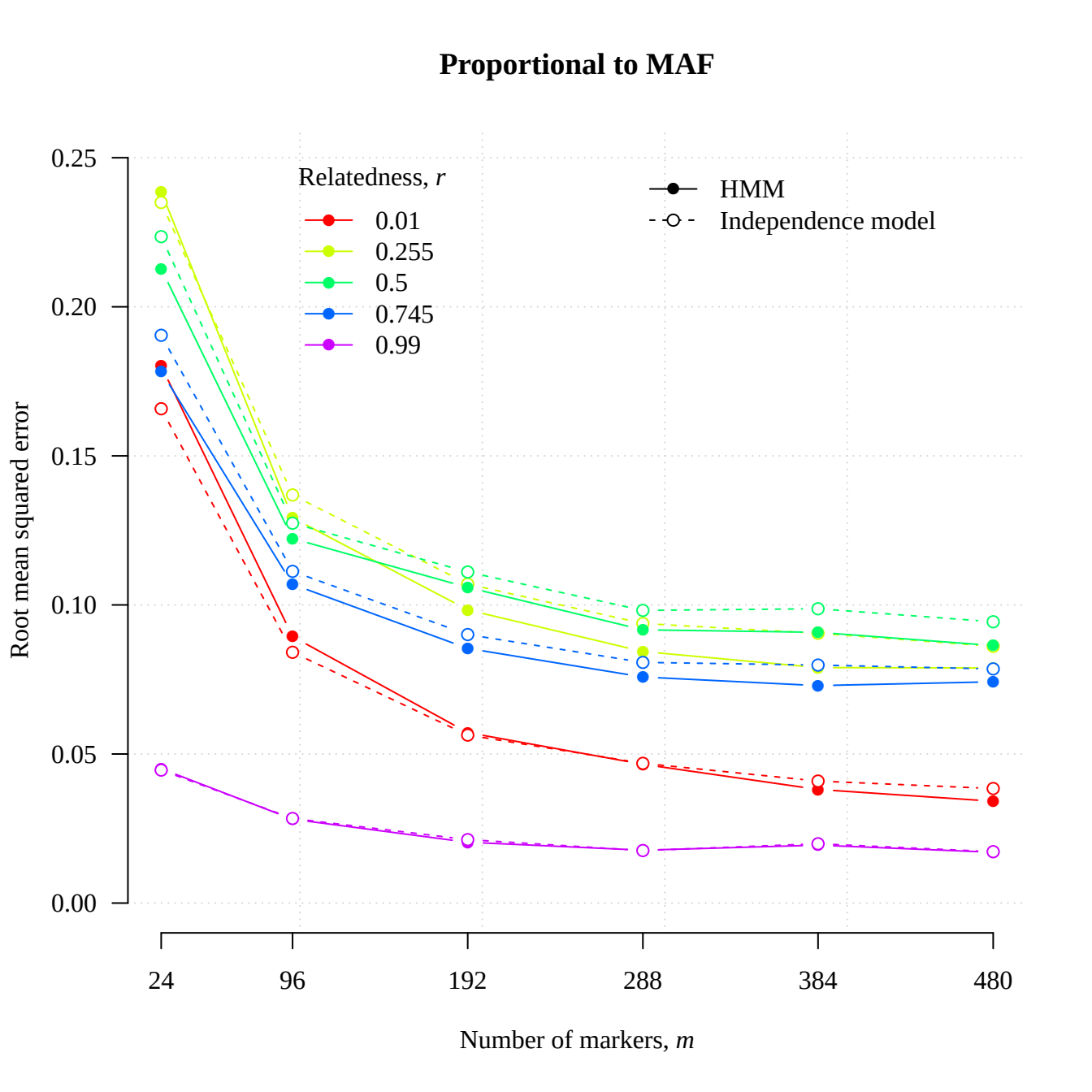

Frequency
0
1
2
3
4
5

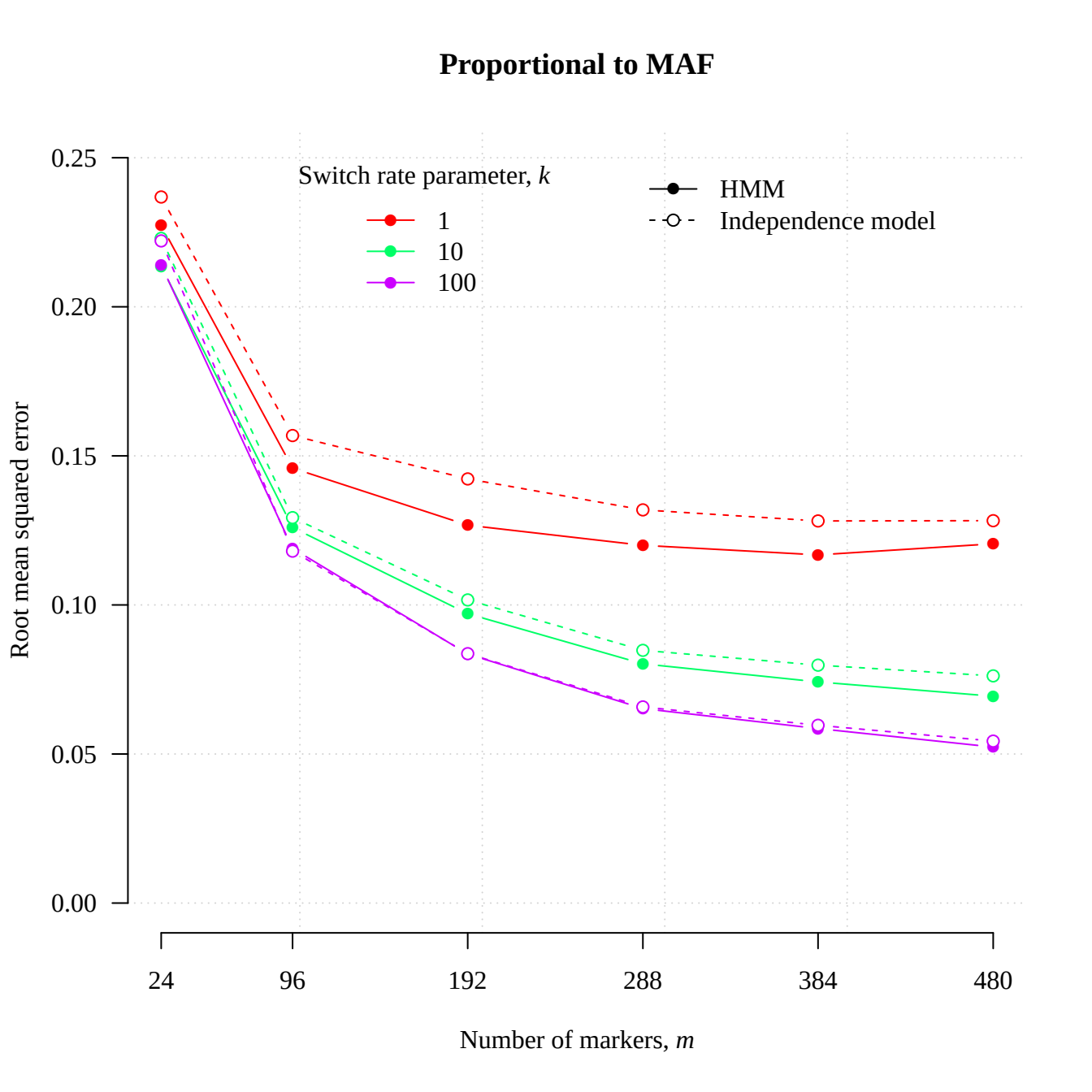

Frequency
0 2 4 6 8
0.0 0.4 0.8
Frequency
0 5 15 25
0.0 0.4 0.8
Frequency
0 20 40
0.0 0.4 0.8
Frequency
0 20 40 60
0.0 0.4 0.8
Frequency
0 20 60 100
0.0 0.4 0.8
Frequency
0 40 80 120
0.0 0.4 0.8


Frequency
0 5 10 15
0.0 0.4 0.8
Frequency
0 20 40 60
0.0 0.4 0.8
Frequency
0 50 100 150
0.0 0.4 0.8
Frequency
0 50 150
0.0 0.4 0.8
Frequency
0 100 200 300
0.0 0.4 0.8
Frequency
0 100 300
0.0 0.4 0.8


Proportional to MAF under hmm
Relatedness, r
0.01
0.26
0.50
0.74
0.99
Root mean squared error
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
24
96
192
288
384
480
Number of markers, m


Uniformly at random under hmm
Relatedness, r
0.01
0.26
0.50
0.74
0.99
Root mean squared error
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
24
96
192
288
384
480
Number of markers, m


Proportional to MAF
Relatedness, r
0.01
0.255
0.5
0.745
0.99
HMM
Independence model
Root mean squared error
0.25
0.20
0.15
0.10
0.05
0.00
24
96
192
288
384
480
Number of markers, m


Proportional to MAF
Switch rate parameter, k
1
10
100
HMM
Independence model
Root mean squared error
0.25
0.20
0.15
0.10
0.05
0.00
24
96
192
288
384
480
Number of markers, m