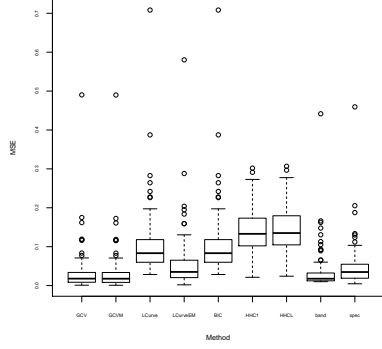


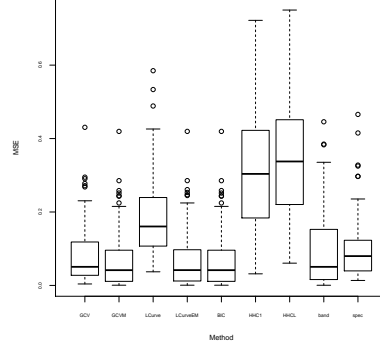
1 Supplementary simulations

We present the supplementary simulation results in this section for training and testing data.

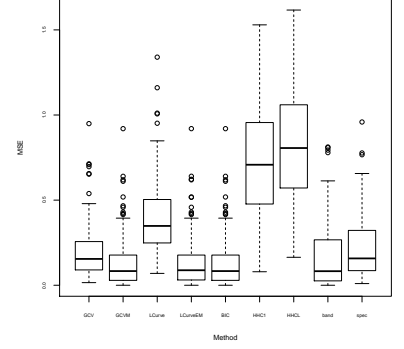
1.1 Training: Average MSE



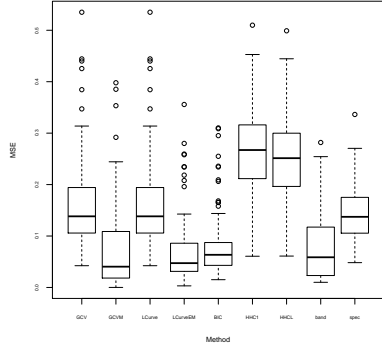
(a) MA(1): 0.1



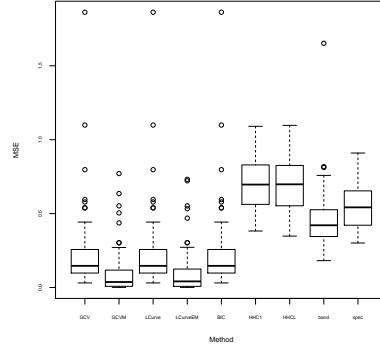
(b) MA(1): 0.5



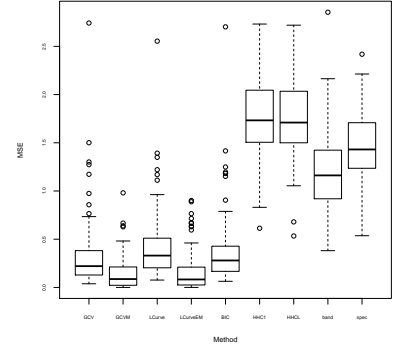
(c) MA(1): 0.9



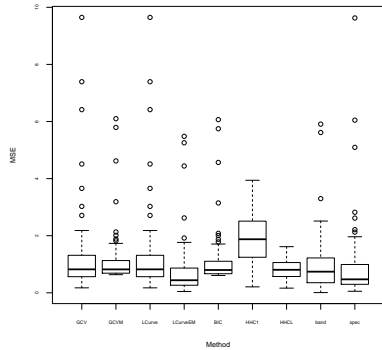
(d) $g+MA(1)$: 0.1



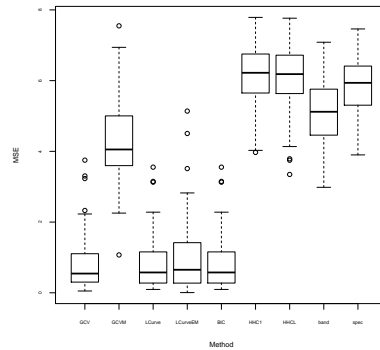
(e) $g+MA(1)$: 0.5



(f) $g+MA(1)$: 0.9

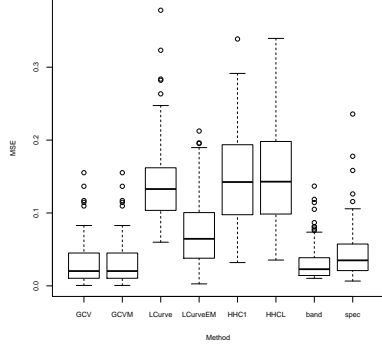


(g) MA(2): (0.9,0.8)

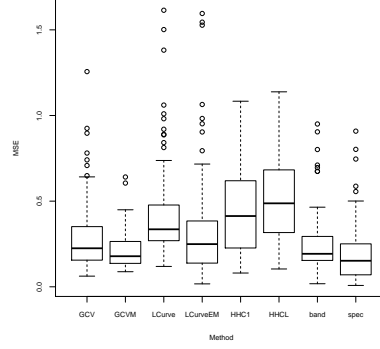


(h) $g+MA(2)$: (0.9,0.8)

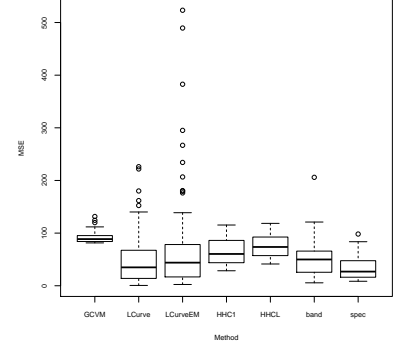
Figure 1: Boxplots of Average MSE for MA cases



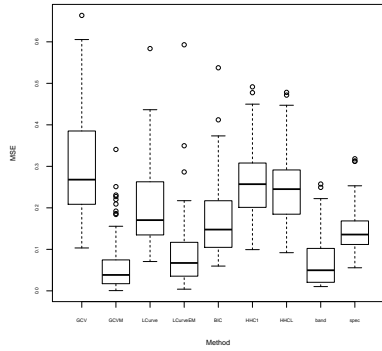
(a) AR(1): 0.1



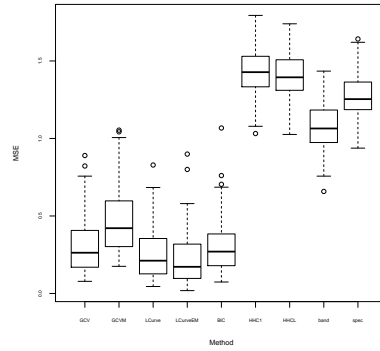
(b) AR(1): 0.5



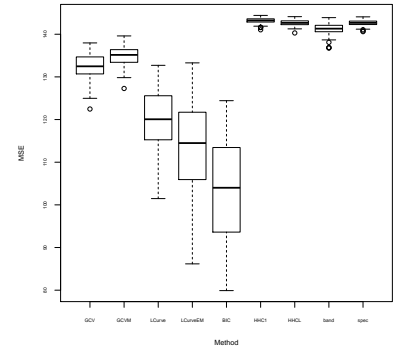
(c) AR(1): 0.9



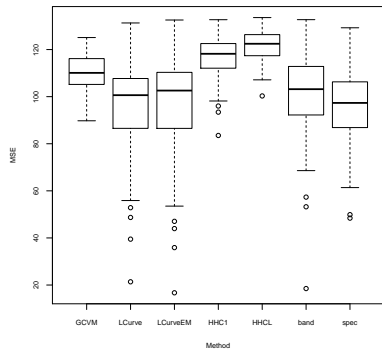
(d) $g + \text{AR}(1)$: 0.1



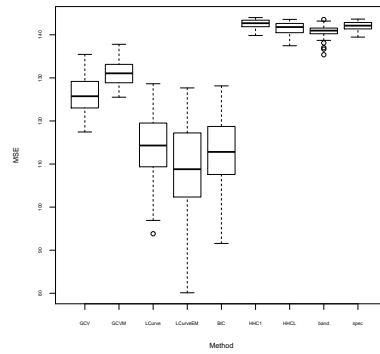
(e) $g + \text{AR}(1)$: 0.5



(f) $g + \text{AR}(1)$: 0.9



(g) AR(2): $(-0.9, 0.2)$



(h) $g + \text{AR}(2)$: $(-0.9, 0.2)$

Figure 2: Boxplots of Average MSE for AR cases. We exclude BIC for (a) and (b), and GCV and BIC for (c) due to their poor performance.

1.2 Training: Average Number of Negative Eigenvalues

Table 1: Average number of negative eigenvalues with standard error in parentheses for all methods for zero mean MA cases

Class	$MA(1) : 0.1$	$MA(1) : 0.5$	$MA(1) : 0.9$	$MA(2)$
GCV	0 (0)	0 (0)	1.64 (0.30)	0.02 (0.02)
GCVM	0 (0)	0.65 (0.24)	4.89 (0.68)	21.1 (0.41)
L-curve	0 (0)	0 (0)	0.86 (0.16)	0.02 (0.02)
L-curveEM	0 (0)	0.10 (0.08)	4.45 (0.62)	11.9 (0.97)
BIC	0 (0)	0.60 (0.23)	4.81 (0.67)	21.0 (0.42)
HHC1	0 (0)	0 (0)	0 (0)	0 (0)
HHCL	0 (0)	0 (0)	0 (0)	0 (0)
band	0 (0)	0.31 (0.16)	3.91 (0.59)	10.7 (0.87)
spec	0 (0)	0 (0)	0 (0)	0 (0)

Table 2: Average number of negative eigenvalues with standard error in parentheses for all methods for nonzero mean MA cases

Class	$g + MA(1) : 0.1$	$g + MA(1) : 0.5$	$g + MA(1) : 0.9$	$g + MA(2)$
GCV	0.02 (0.01)	0.05 (0.04)	0.41 (0.11)	0.02 (0.02)
GCVM	0.30 (0.22)	0 (0)	2.81 (0.39)	0 (0)
L-curve	0.02 (0.01)	0.05 (0.04)	0.54 (0.12)	0.08 (0.05)
L-curveEM	0.02 (0.02)	0 (0)	2.49 (0.33)	0.56 (0.19)
BIC	0 (0)	0.05 (0.04)	0.47 (0.11)	0.08 (0.05)
HHC1	0 (0)	0 (0)	0 (0)	0 (0)
HHCL	0 (0)	0 (0)	0 (0)	0 (0)
band	0.01 (0.01)	0.75 (0.19)	5.63 (0.45)	7.21 (0.59)
spec	0 (0)	0 (0)	0 (0)	0 (0)

Table 3: Average number of negative eigenvalues with standard error in parentheses for all methods for zero mean AR cases

Class	$AR(1) : 0.1$	$AR(1) : 0.5$	$AR(1) : 0.9$	$AR(2)$
GCV	0 (0)	0 (0)	23.1 (0.58)	12.0 (0.33)
GCVM	0 (0)	2.94 (0.55)	31.5 (0.16)	25.6 (0.31)
L-curve	0 (0)	0 (0)	0.13 (0.06)	0 (0)
L-curveEM	0 (0)	0.05 (0.03)	2.49 (0.32)	2.20 (0.28)
BIC	20.1 (0.31)	21.0 (0.28)	22.6 (0.68)	21.5 (0.43)
HHC1	0 (0)	0 (0)	0 (0)	0 (0)
HHCL	0 (0)	0 (0)	0 (0)	0 (0)
band	0 (0)	1.62 (0.41)	0.88 (0.16)	4.09 (0.69)
spec	0 (0)	0 (0)	0 (0)	0 (0)

Table 4: Average number of negative eigenvalues with standard error in parentheses for all methods for nonzero mean AR cases

Class	$g + AR(1) : 0.1$	$g + AR(1) : 0.5$	$g + AR(1) : 0.9$	$g + AR(2)$
GCV	0.42 (0.08)	0 (0)	0 (0)	0 (0)
GCVM	0 (0)	0 (0)	0 (0)	0 (0)
L-curve	0.02 (0.01)	0.05 (0.03)	0.06 (0.03)	0.02 (0.02)
L-curveEM	0.03 (0.02)	0.12 (0.05)	0.09 (0.05)	0.29 (0.10)
BIC	0.01 (0.01)	0.43 (0.09)	2.49 (0.21)	0.22 (0.06)
HHCl	0 (0)	0 (0)	0 (0)	0 (0)
HHCL	0 (0)	0 (0)	0 (0)	0 (0)
band	0.03 (0.03)	0.45 (0.13)	0.25 (0.10)	1.31 (0.20)
spec	0 (0)	0 (0)	0 (0)	0 (0)

Table 5: Comparison of average MSE and standard error for MA(1): 0.9

Class	Zero		Nonzero	
	Original	Revised	Original	Revised
GCV	0.21 (0.018)	0.21 (0.018)	0.33 (0.037)	0.33 (0.037)
GCVM	0.14 (0.017)	0.14 (0.017)	0.15 (0.018)	0.15 (0.018)
L-curve	0.42 (0.024)	0.42 (0.024)	0.42 (0.035)	0.42 (0.035)
L-curveEM	0.14 (0.017)	0.14 (0.017)	0.16 (0.021)	0.16 (0.021)
BIC	0.14 (0.017)	0.14 (0.017)	0.37 (0.036)	0.37 (0.036)

Table 6: Comparison of average MSE and standard error for AR(1):0.9

Class	Zero		Nonzero	
	Original	Revised	Original	Revised
GCV	495 (62.2)	455 (57.2)	132 (0.30)	132 (0.30)
GCVM	91.3 (0.96)	90.2 (0.95)	135 (0.23)	135 (0.23)
L-curve	46.2 (4.47)	46.2 (4.47)	120 (0.65)	120 (0.65)
L-curveEM	68.5 (9.03)	68.4 (8.99)	114 (1.04)	114 (1.04)
BIC	583 (75.2)	512 (66.2)	103 (1.21)	103 (1.21)