Problem Set 1

Izabel Flores

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Question 1 (Forecasting GDP Growth - 150 points)

Table 1: (a) estimated coefficients, standard errors and p-values

	Dependent variable:							
	data_xts							
	MA(1)	MA(2)	AR(1)	ARMA(1,1)	ARMA(1,2)	AR(2)	ARMA(2,1)	ARMA(2,2)
ma1	0.238^{***}	0.222^{**}		-0.516	-0.719^{***}		-0.870^{***}	-1.059^{**}
	(0.086)	(0.094)		(0.375)	(0.119)		(0.102)	(0.495)
ma2		0.159			-0.119			0.156
		(0.103)			(0.097)			(0.410)
ar1			0.287^{***}	0.740^{***}	0.944^{***}	0.251^{***}	1.104^{***}	1.290^{***}
			(0.091)	(0.284)	(0.070)	(0.094)	(0.142)	(0.483)
ar2						0.122	-0.149	-0.324
						(0.095)	(0.110)	(0.453)
intercept	4.539^{***}	4.535^{***}	4.538^{***}	4.491^{***}	4.260^{***}	4.527^{***}	4.259^{***}	4.268^{***}
	(0.480)	(0.529)	(0.538)	(0.706)	(1.072)	(0.605)	(1.070)	(1.064)
Observations	120	120	120	120	120	120	120	120
Note:								*p<0.1; **p<0.05; ***p<0.01

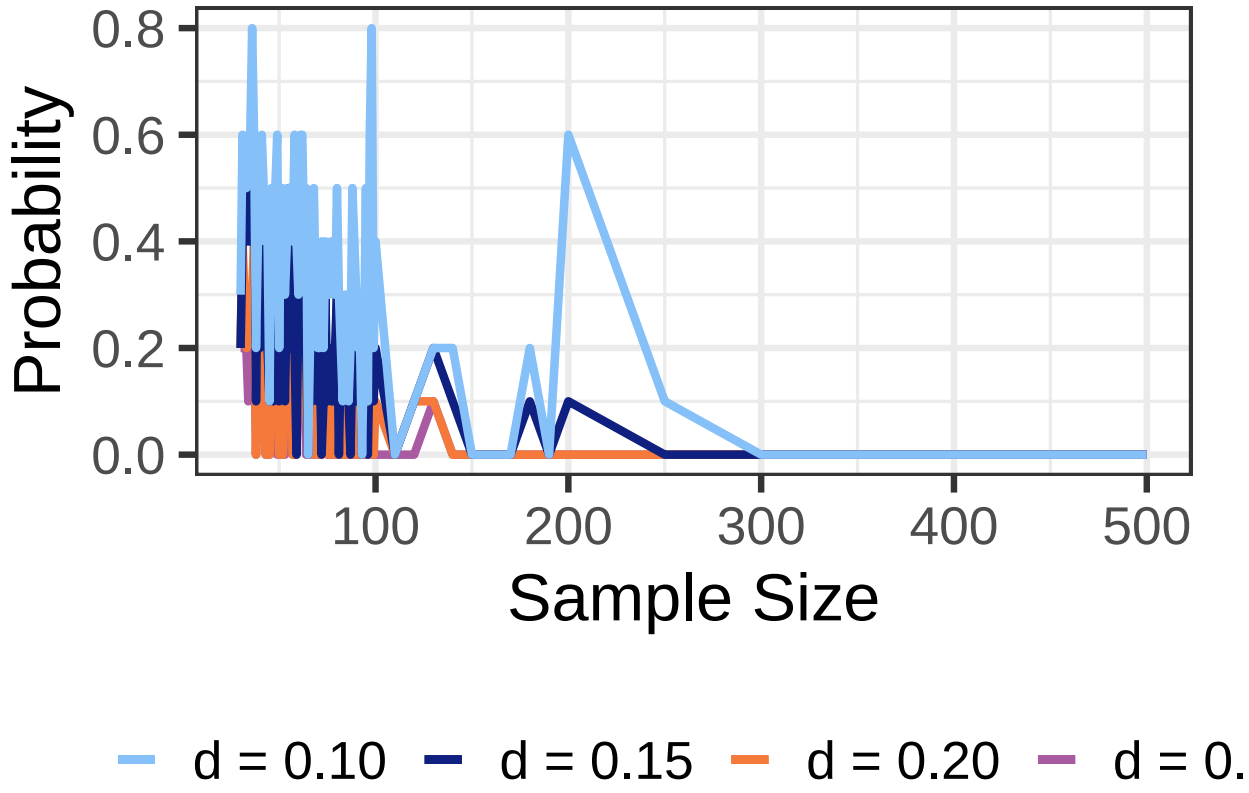
Table 2: (b) Estimated BIC and AIC

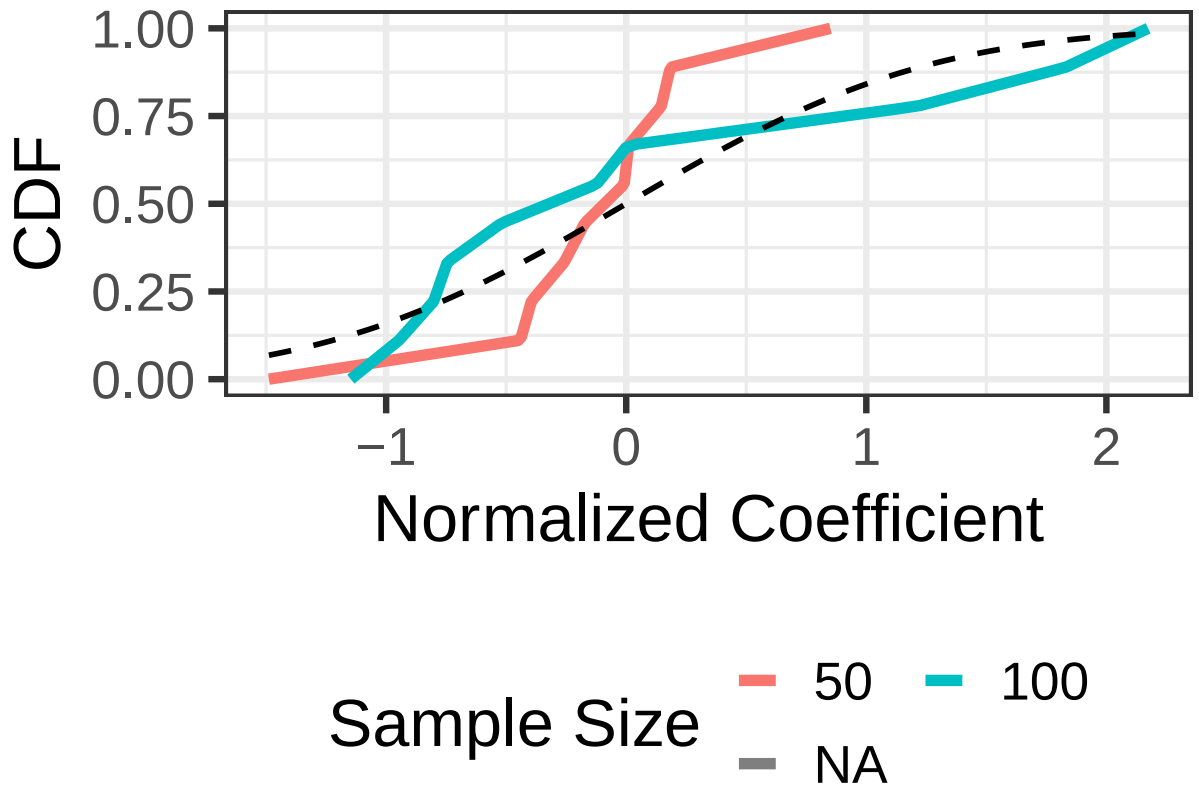
	MA(1)	MA(2)	AR(1)	ARMA(1,1)	ARMA(1,2)	AR(2)	ARMA(2,1)	ARMA(2,2)
AIC	693.979	693.718	691.990	691.809	692.729	692.349	692.548	694.424
BIC	702.341	704.868	700.352	702.959	706.666	703.499	706.485	711.149

Question 2 (ARMA(p,q) MLE Estimator's Asymptotic Behavior - 200 points

2.1 MA(1)

Nessa questão vamos estimar um modelo MA(1), sem constante e com theta = 0.5. primeiramente, com erros com distribuição normal padrão. em seguiida, com erros com distribuição exponencial.


0.8
0.6
0.4
0.2
0.0
Probability
100
200
300
400
500
Sample Size
d = 0.10
d = 0.15
d = 0.20
d = 0.


1.00
0.75
0.50
0.25
0.00
CDF
−1
0
1
2
Normalized Coefficient
Sample Size
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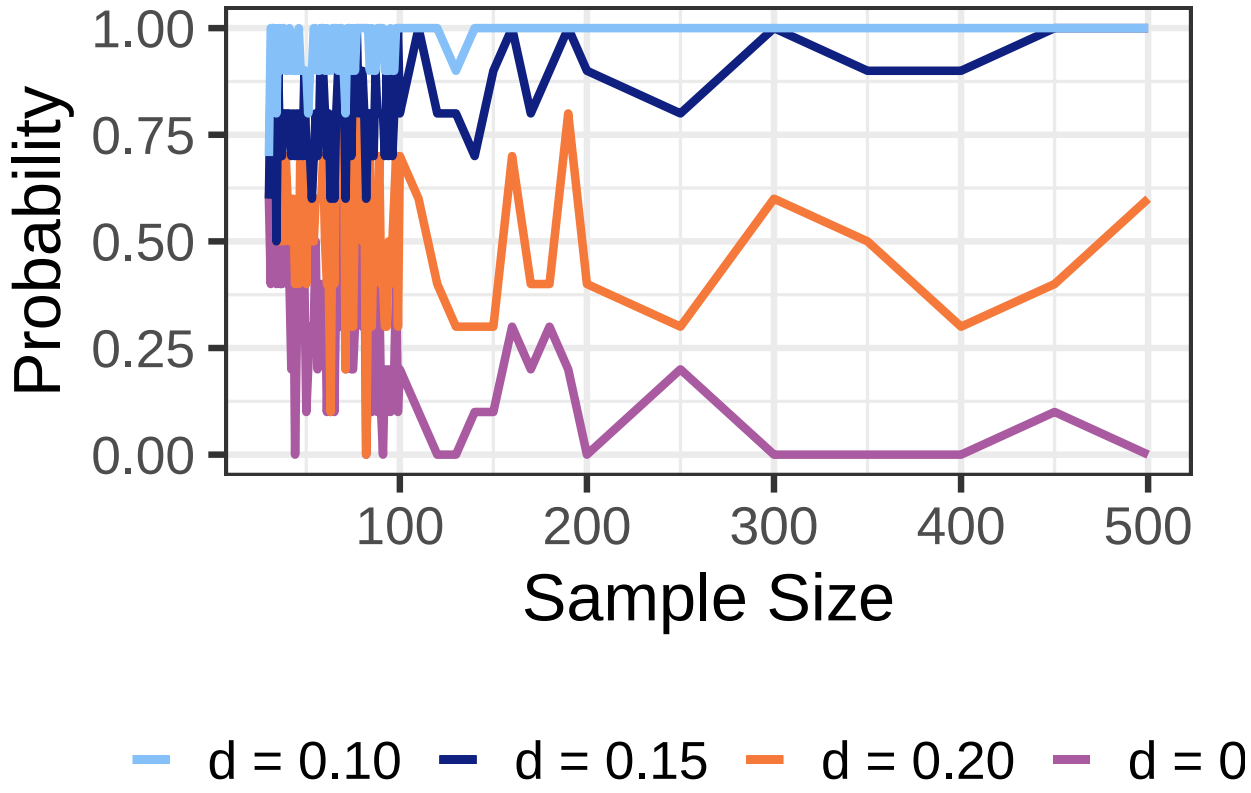
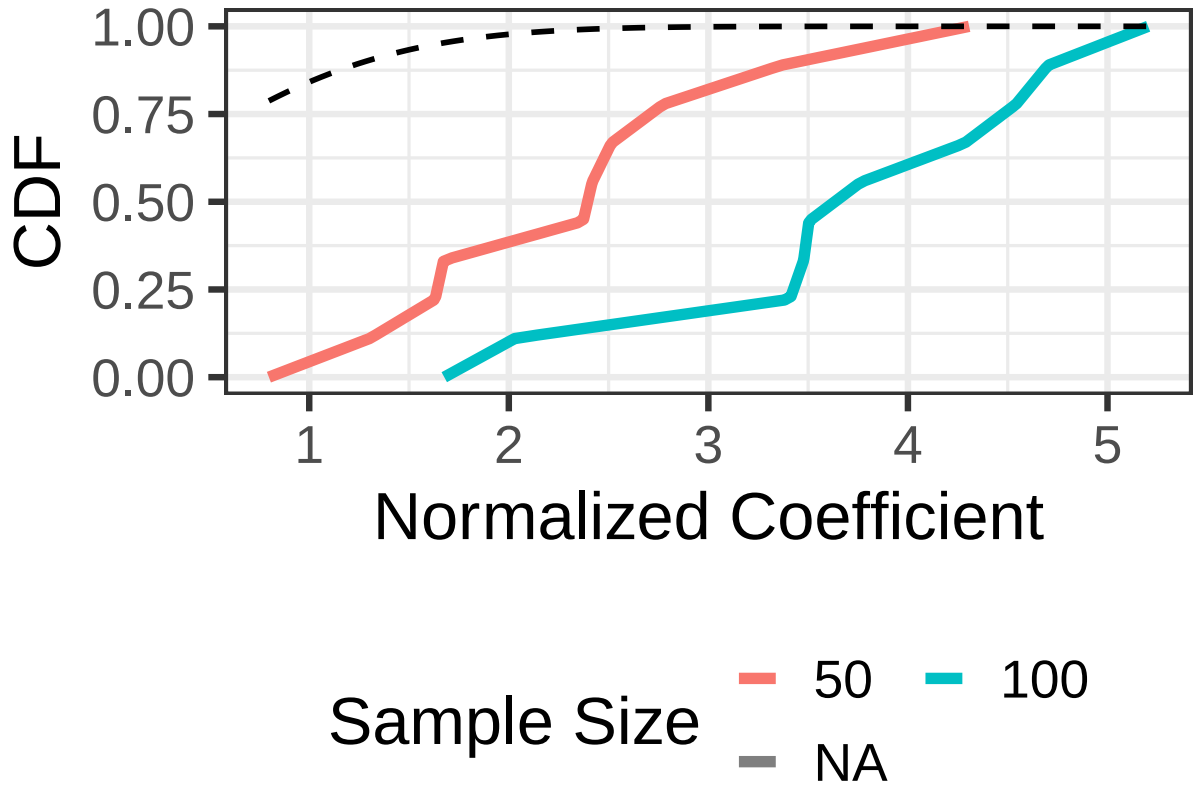
100
NA


1.00
0.75
0.50
0.25
0.00
Probability
100
200
300
400
500
Sample Size
d = 0.10
d = 0.15
d = 0.20
d = 0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0.25
0.00
CDF
1
2
3
4
5
Normalized Coefficient
Sample Size
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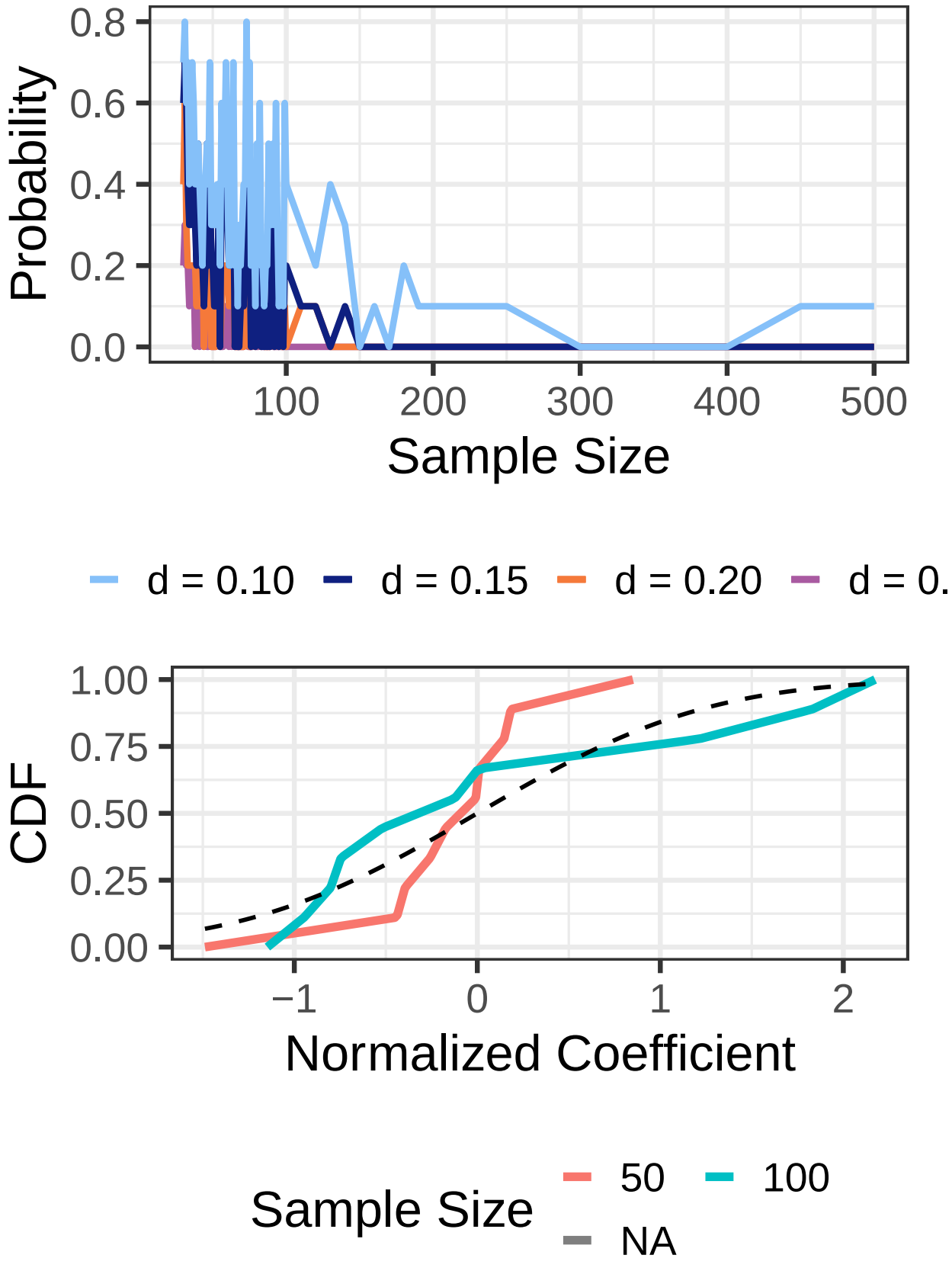
100
NA

2.2 AR(1)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0.6
0.4
0.2
0.0
100
200
300
400
500
Sample Size
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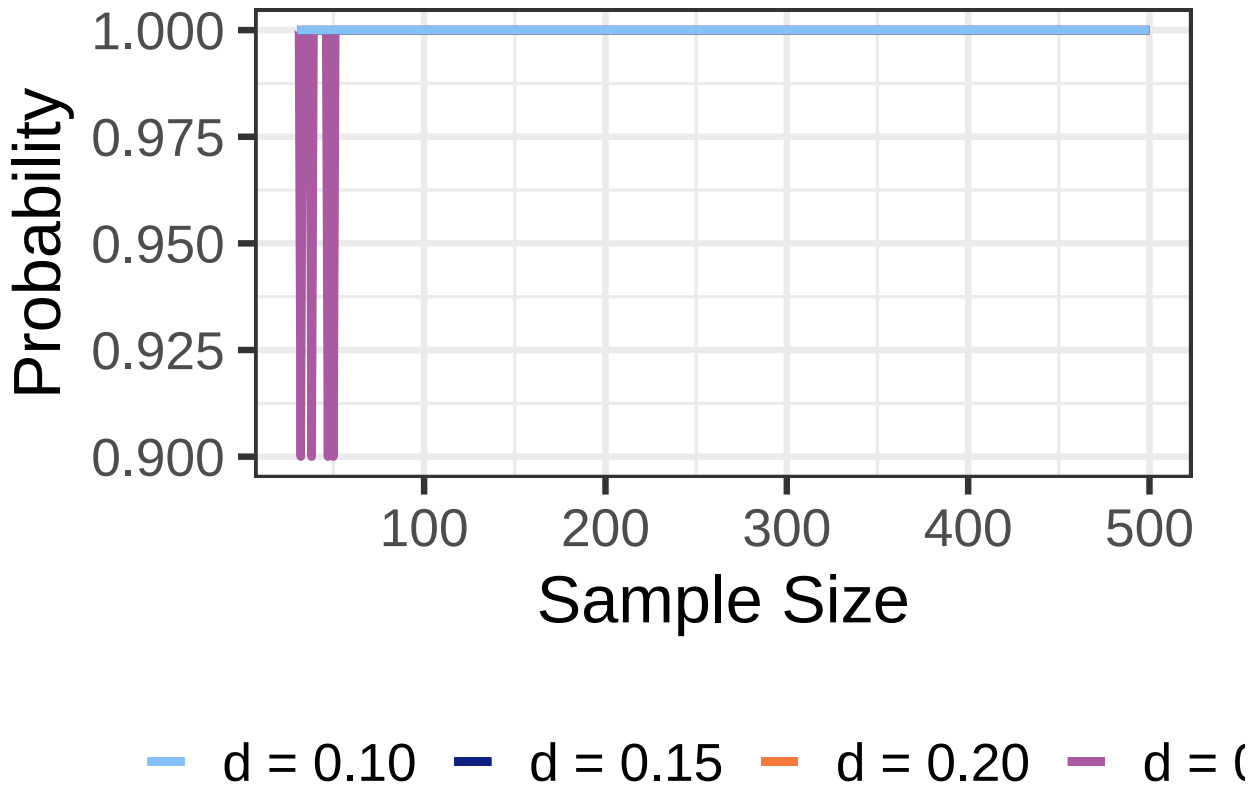
d = 0.15
d = 0.20
d = 0.
CDF
1.00
0.75
0.50
0.25
0.00
−1
0
1
2
Normalized Coefficient
Sample Size
50
100
NA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0.900
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400
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Sample Size
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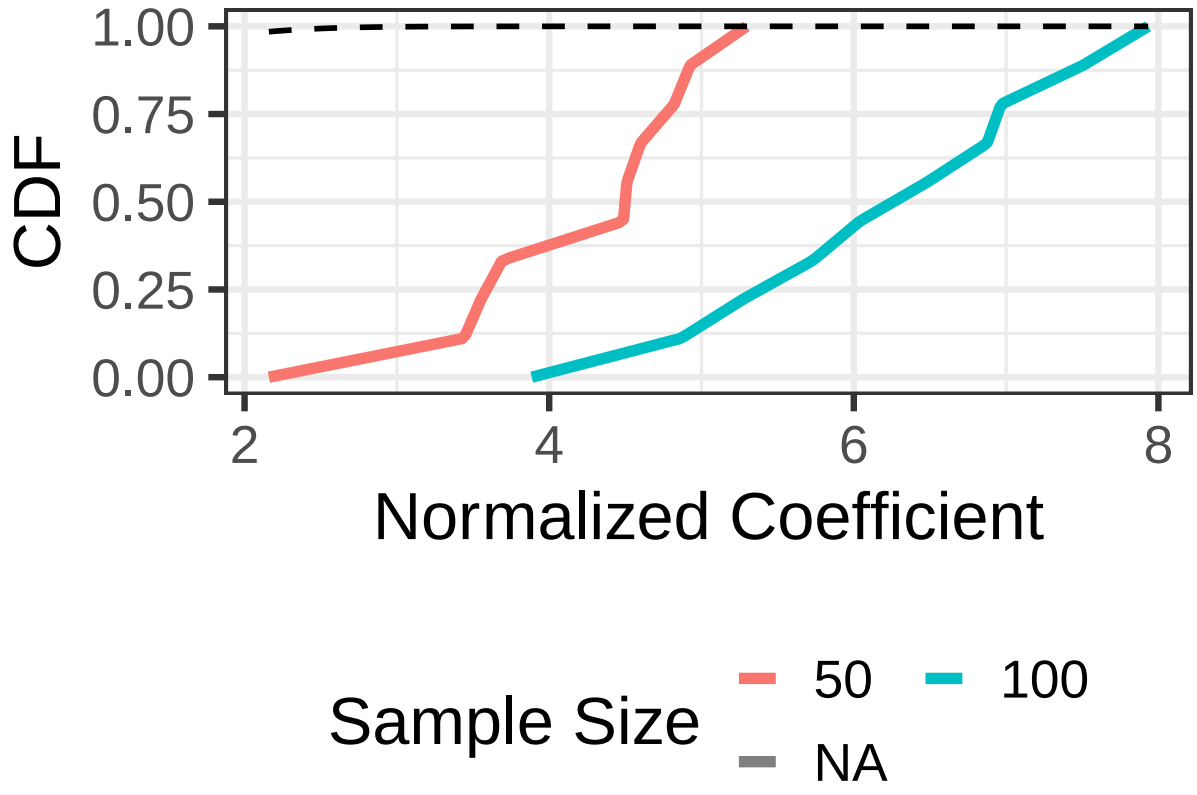
d = 0.20
d = (


1.00
0.75
0.50
0.25
0.00
CDF
2
4
6
8
Normalized Coefficient
Sample Size
50
100
NA