

1 Numerical Result

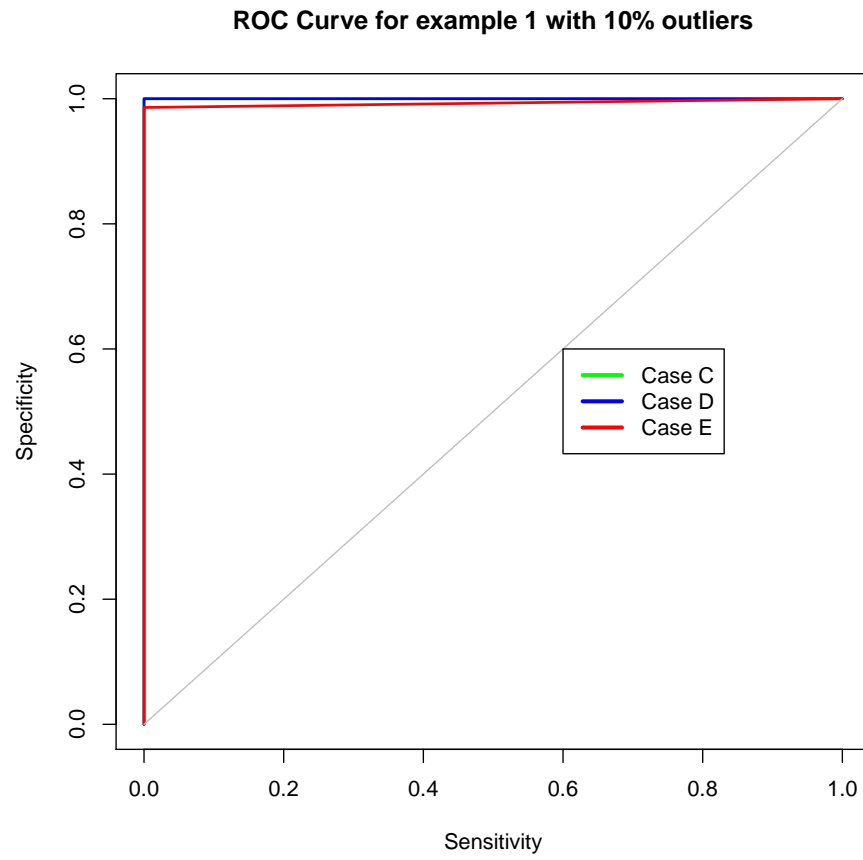


Table 1: Variable Selection Results for Example 1 ($\beta = (3, 2, 1.5, 0, 0, 0, 0, 0)'$ with 10% outliers)

Method	CFR (%)	OFR (%)	AN	TIME	CFR (%)	OFR (%)	AN	TIME
Case A					Case B			
ALasso	74	23	3.29	0.8	63	25	3.25	0.78
sLTS	9	89	6.19	358.85	14	86	5.92	357.24
MMNNG	68	25	3.25	691.33	88	12	3.13	682.07
SROS	21	76	4.31	56.67	31	69	4.24	51.79
PAMLS	46	53	3.66	570.67	67	33	3.38	563.12
APAMLS	72	23	3.23	586.28	87	13	3.14	590.15
PAWLS	38	56	3.68	16.41	64	36	3.42	19.32
APAWLS	61	28	3.27	20.04	89	11	3.11	20.18
Case C					Case D			
ALasso	3	2	1.94	0.73	0	19	2.52	0.99
sLTS	28	72	5.34	384.69	21	79	5.71	398.44
MMNNG	72	12	2.95	673.93	63	16	3.25	682.47
SROS	41	50	3.7	50.24	8	80	4.76	50.31
PAMLS	45	53	3.76	554.18	61	32	3.91	553.22
APAMLS	78	17	3.18	588.63	70	17	3.42	587.81
PAWLS	52	44	3.64	21.1	98	0	2.98	22.83
APAWLS	74	20	3.19	21.78	97	0	2.97	23.66
Case E								
ALasso	5	10	2.72	0.72				
sLTS	23	77	5.7	383.1				
MMNNG	73	10	3.04	675.46				
SROS	26	61	4.45	50.08				
PAMLS	29	40	3.91	553.78				
APAMLS	47	15	3.27	589.05				
PAWLS	55	39	3.48	21.01				
APAWLS	79	15	3.16	22.5				

Table 2: Variable Selection Results for Example 1 ($\beta = (3, 2, 1.5, 0, 0, 0, 0, 0)'$ with 20% outliers)

Method	CFR (%)	OFR (%)	AN	TIME	CFR (%)	OFR (%)	AN	TIME
Case C				Case D				
ALasso	1	2	1.22	0.7	1	4	1.68	1.19
sLTS	25	75	5.18	426.53	17	82	6.1	440.39
MMNNG	65	5	2.76	470.24	31	33	3.96	473.42
SROS	47	45	3.62	50.14	3	75	5.15	50.54
PAMLS	36	52	3.64	553.27	56	34	3.72	553.89
APAMLS	65	19	3.09	588.25	63	25	3.5	588.59
PAWLS	47	49	3.65	21.51	95	0	2.97	24.83
APAWLS	78	12	3.02	22.14	92	0	2.94	25.29
Case E								
ALasso	3	3	1.29	0.79				
sLTS	27	73	5.16	417.6				
MMNNG	54	3	3.06	688.65				
SROS	23	49	4.64	51.28				
PAMLS	21	43	3.95	554.87				
APAMLS	41	11	3.17	589.11				
PAWLS	53	42	3.52	21.57				
APAWLS	64	10	2.86	23.87				

Table 3: Variable Selection Results for Example 1 ($\beta = (3, 2, 1.5, 0, 0, 0, 0, 0)'$ with 30% outliers)

Method	CFR (%)	OFR (%)	AN	TIME	CFR (%)	OFR (%)	AN	TIME
Case C					Case D			
ALasso	2	0	0.68	0.78	0	3	0.96	1.34
sLTS	1	34	4.52	421.79	0	95	6.84	459.78
MMNNG	38	1	2.3	465.41	5	41	4.29	477.06
SROS	49	38	3.5	51.07	1	76	5.17	53.23
PAMLS	29	54	3.91	554.8	52	37	3.96	554.19
APAMLS	61	17	3.06	588.35	50	32	3.63	587.9
PAWLS	45	47	3.5	21.54	93	0	2.93	26.08
APAWLS	77	10	2.98	22.41	89	0	2.89	26.66
Case E								
ALasso	0	3	1.15	0.79				
sLTS	0	76	7.1	428.75				
MMNNG	6	21	3.97	704.12				
SROS	9	44	5.1	52.25				
PAMLS	9	37	4.29	554.21				
PAMLS	15	10	3.43	591.09				
PAWLS	54	21	3.06	21.85				
PAWLS	52	4	2.57	24.28				

Table 4: Variable Selection Results for Example 2 ($\beta = (\mathbf{2}'_{10}, \mathbf{0}'_{p-10})'$ with 10% outliers

Method	CFR (%)	OFR (%)	AN	TIME	CFR (%)	OFR (%)	AN	TIME
Case A					Case B			
ALasso	97	0	9.96	3.4	84	1	9.75	3.41
sLTS	0	84	61.38	3.16×10^4	0	93	58.23	3.03×10^4
PAMLS	46	53	3.66	570.67	67	33	3.38	563.12
APAMLS	72	23	3.23	586.28	87	13	3.14	590.15
PAWLS	6	94	15.65	348.92	5	95	14.29	356.33
APAWLS	94	1	9.89	399.08	91	0	9.5	421.68
Case C					Case D			
ALasso	0	0	6.25	4.07	0	1	6.89	4.07
sLTS	0	95	62.58	3.11×10^4	0	96	62.73	3.09×10^4
PAMLS	45	53	3.76	554.18	61	32	3.91	553.22
APAMLS	78	17	3.18	588.63	70	17	3.42	587.81
PAWLS	3	96	16.12	525.96	3	96	16.19	492.91
APAWLS	85	0	9.84	575.21	85	0	9.84	541.23
Case E								
ALasso	0	0	12.18	4.06				
sLTS	0	97	62.63	3.11×10^4				
PAMLS	29	40	3.91	553.78				
APAMLS	47	15	3.27	589.05				
PAWLS	4	96	16.35	524.59				
APAWLS	88	0	9.88	569.03				

Table 5: Variable Selection Results for Example 2 ($\beta = (\mathbf{2}'_{10}, \mathbf{0}'_{p-10})'$ with 20% outliers

Method	CFR (%)	OFR (%)	AN	TIME	CFR (%)	OFR (%)	AN	TIME
Case C					Case D			
ALasso	0	0	5.7	6.45	0	0	6.15	6.89
sLTS	0	69	65.89	3.17×10^4	0	96	63.61	3.15×10^4
PAMLS	36	52	3.64	553.27	56	34	3.72	553.89
APAMLS	65	19	3.09	588.25	63	25	3.5	588.59
PAWLS	1	98	16.67	633.1	1	98	17.23	588.62
APAWLS	79	0	9.6	670.79	82	0	9.73	624.28
Case E								
ALasso	0	0	17.41	6.3				
sLTS	0	68	66.41	3.18×10^4				
PAMLS	21	43	3.95	554.87				
APAMLS	41	11	3.17	589.11				
PAWLS	0	99	16.89	629.49				
APAWLS	78	0	9.62	665.07				

Table 6: Variable Selection Results for Example 2 ($\beta = (\mathbf{2}'_{10}, \mathbf{0}'_{p-10})'$ with 30% outliers

Method	CFR (%)	OFR (%)	AN	TIME	CFR (%)	OFR (%)	AN	TIME
Case C					Case D			
ALasso	0	0	6.26	7.26	0	0	7.03	7.28
sLTS	0	0	70.39	3.21×10^4	0	79	65	3.19×10^4
PAMLS	29	54	3.91	554.8	52	37	3.96	554.19
APAMLS	61	17	3.06	588.35	50	32	3.63	587.9
PAWLS	5	80	17.36	703.58	3	88	17.81	661.14
APAWLS	40	0	8.94	737.98	40	3	8.94	695.01
Case E								
ALasso	0	0	17.89	6.67				
sLTS	0	0	70.03	3.22×10^4				
PAMLS	9	37	4.29	554.21				
APAMLS	15	10	3.43	591.09				
PAWLS	3	81	17.36	715.17				
APAWLS	38	0	8.76	748.69				

Table 7: Outlier Detection Evaluation in Example 1 and 2 with 10% outliers

	Model	sLTS			PAWLS		
		M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case A	0	0.11	1	0	0.05	1
	Case B	0	0.15	1	0	0.06	1
	Case C	0	0.04	1	0	0	1
	Case D	0.08	0.06	0.8	0	2.22×10^{-4}	1
	Case E	0.03	0.05	0.94	0.01	4.44×10^{-4}	0.98
Example 2	Case A	0	0.25	1	0	0.01	1
	Case B	0	0.25	1	0	0.06	1
	Case C	0	0.17	0.99	0	0.01	1
	Case D	0	0.16	0.98	0	0.01	1
	Case E	0	0.17	0.99	0	0	1

Table 8: Outlier Detection Evaluation in Example 1 and 2 with 10% outliers

	Model	sLTS			PAMLS		
		M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case A	0	0.11	1	0	0.02	1
	Case B	0	0.15	1	0	0.08	1
	Case C	0	0.04	1	0	0	1
	Case D	0.08	0.06	0.8	0.2	4.44×10^{-4}	0.74
	Case E	0.03	0.05	0.94	0.14	0	0.78
Example 2	Case A	0	0.25	1	0	0.02	1
	Case B	0	0.25	1	0	0.08	1
	Case C	0	0.17	0.99	0	0	1
	Case D	0	0.16	0.98	0.2	4.44×10^{-4}	0.74
	Case E	0	0.17	0.99	0.14	0	0.78

Table 9: Outlier Detection Evaluation in Example 1 and 2 with 20% outliers

	Model	sLTS			PAWLS		
		M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case C	0	0.01	1	0	2.5×10^{-4}	1
	Case D	0.25	0.05	0.45	0.01	2.5×10^{-4}	0.99
	Case E	0.07	0.02	0.84	0.06	0	0.82
Example 2	Case C	0.06	0.08	0.56	0	0.01	0.99
	Case D	0.02	0.06	0.88	0.01	0.01	0.98
	Case E	0.06	0.08	0.49	0	0.01	0.99

Table 10: Outlier Detection Evaluation in Example 1 and 2 with 20% outliers

	Model	sLTS			PAMLS		
		M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case C	0	0.01	1	0	0	1
	Case D	0.25	0.05	0.45	0.21	2.5×10^{-4}	0.69
	Case E	0.07	0.02	0.84	0.14	2.5×10^{-4}	0.72
Example 2	Case C	0.06	0.08	0.56	0	0	1
	Case D	0.02	0.06	0.88	0.21	2.5×10^{-4}	0.69
	Case E	0.06	0.08	0.49	0.14	2.5×10^{-4}	0.72

Table 11: Outlier Detection Evaluation in Example 1 and 2 with 30% outliers

	Model	sLTS			PAWLS		
		M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case C	0.21	0	0	0	0	1
	Case D	0.46	0.04	0	0	0	1
	Case E	0.45	0.03	0	0.08	8.57×10^{-4}	0.77
Example 2	Case C	0.26	0.04	0	0.02	0.02	0.87
	Case D	0.33	0.07	0	0.05	0.01	0.86
	Case E	0.28	0.05	0	0.03	0.03	0.85

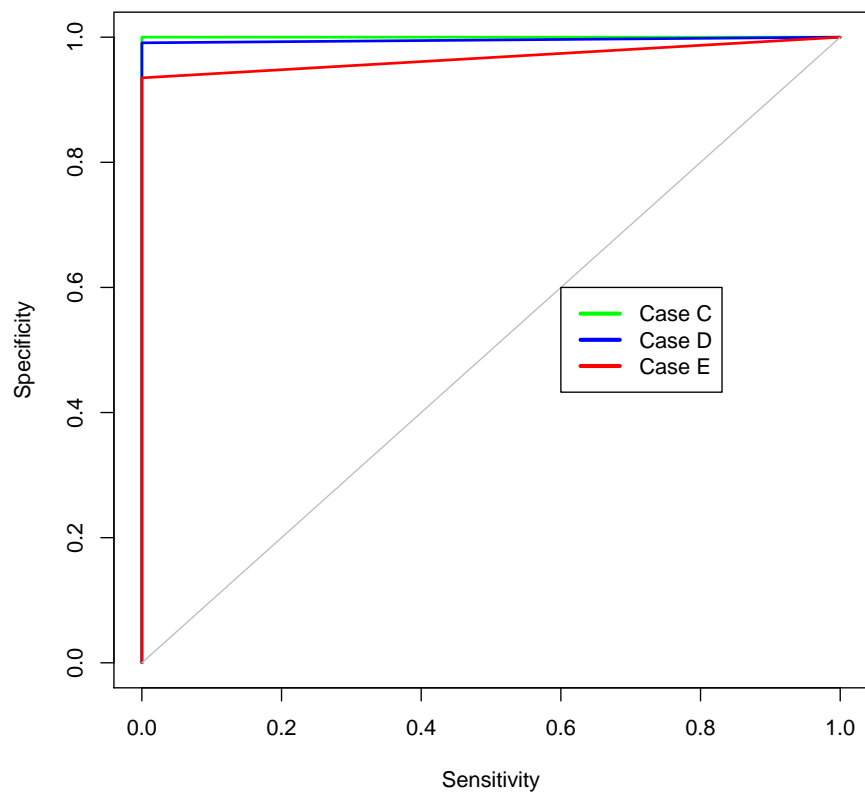
Table 12: Outlier Detection Evaluation in Example 1 and 2 with 30% outliers

	Model	sLTS			PAMLS		
		M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case C	0.21	0	0	6.67×10^{-4}	2.86×10^{-4}	0.99
	Case D	0.46	0.04	0	0.24	0	0.61
	Case E	0.45	0.03	0	0.26	0	0.44
Example 2	Case C	0.26	0.04	0	6.67×10^{-4}	2.86×10^{-4}	0.99
	Case D	0.33	0.07	0	0.24	0	0.61
	Case E	0.28	0.05	0	0.26	0	0.44

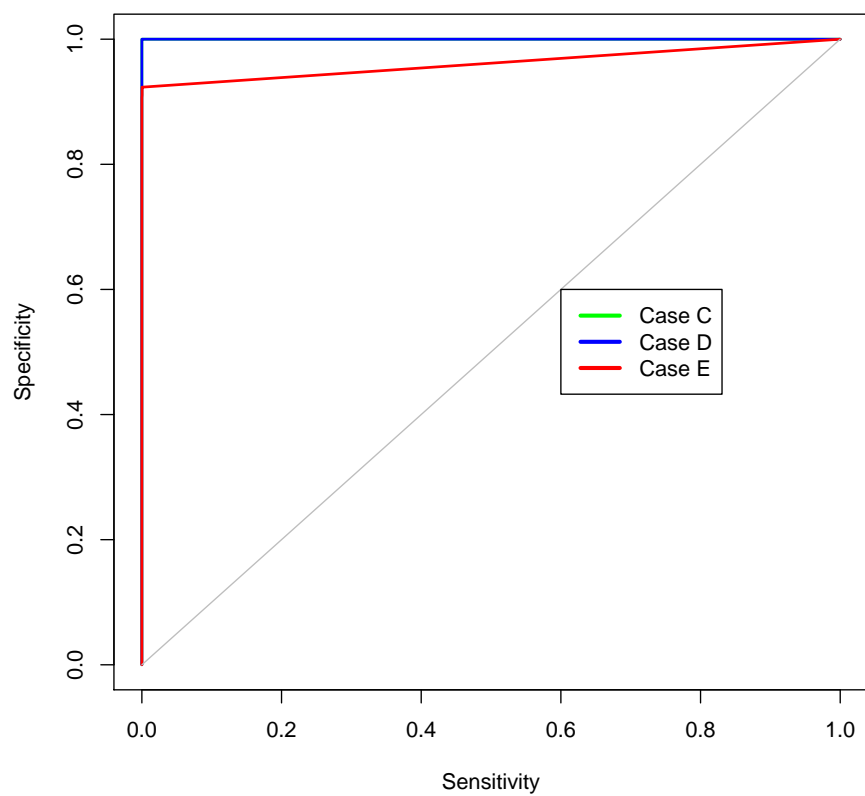
Table 13: Outlier Detection Evaluation in Example 1

	Model	IPOD			PAWLS		
		M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case A	0	0	1	0	0.05	1
	Case B	0	0.1	1	0	0.06	1
	Case C	0	0.08	1	0	0	1
	Case D	0.49	0.02	0.07	0	2.22×10^{-4}	1
	Case E	0.22	0.05	0.31	0.01	4.44×10^{-4}	0.98

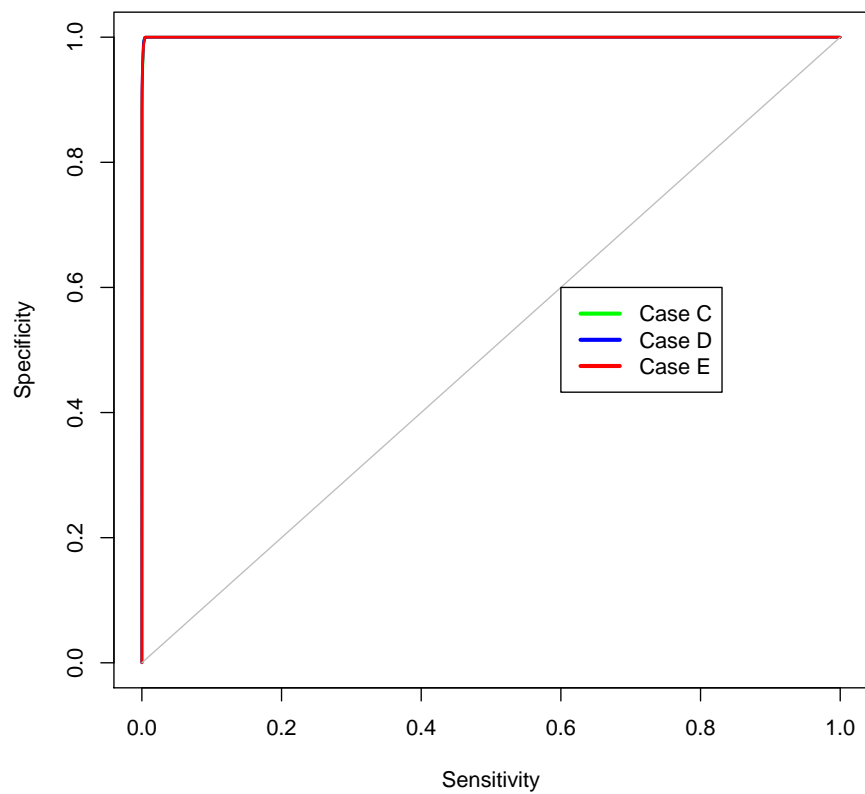
ROC Curve for example 1 with 20% outliers



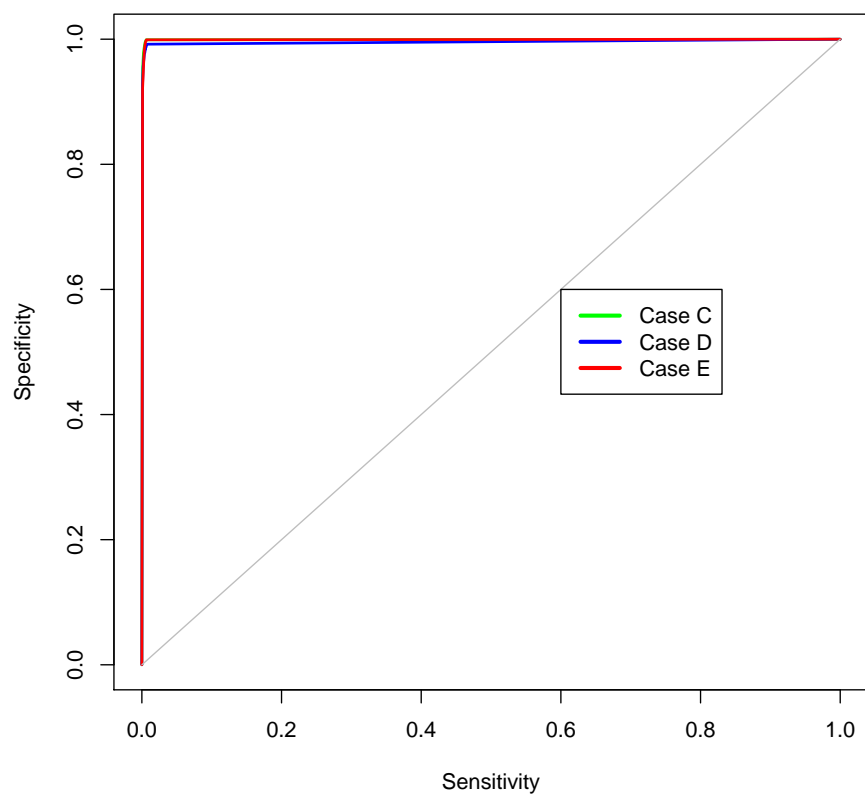
ROC Curve for example 1 with 30% outliers



ROC Curve for example 2 with 10% outliers



ROC Curve for example 2 with 20% outliers



ROC Curve for example 2 with 30% outliers

