

Finite Mixture Model - Lognormal, zero inflated model

The FMM Procedure

Model Information	
Data Set	WORK.LOG_CLAIM
Response Variable	claimAmount
Type of Model	Regression (GLM) Mixture
Components	2
Link Function	Identity
Estimation Method	Maximum Likelihood

Class Level Information		
Class	Levels	Values
policy	3	PEC: OSHC PEC: OVC PEC: Resident
gender	2	F M
Diag	24	AcOrt Car Dent ENT EIOrt Endo Gastro GenMed GenSurg Gyn Inf LGIT Mal Neuro NeuroS Ob Ophth Plas Psych Resp Trauma UGIT Unknown Urol

Number of Observations Read	1000
Number of Observations Used	997

Optimization Information	
Optimization Technique	Dual Quasi-Newton
Parameters in Optimization	55
Mean Function Parameters	26
Scale Parameters	1
Mixing Prob Parameters	28
Lower Boundaries	1
Upper Boundaries	0
Number of Threads	2

Iteration History				
Iteration	Evaluations	Objective Function	Change	Max Gradient
0	5	57821.782744	.	55504.16
1	5	7708.7668935	50113.015850	706.6056
2	6	4521.564739	3187.2021545	219.1874
3	4	2453.3193218	2068.2454172	92.37058
4	2	1827.4410335	625.87828838	55.37911
5	2	1631.1983381	196.24269535	114.7111
6	2	1496.1546171	135.04372102	57.82876
7	3	1460.056355	36.09826208	30.46023
8	3	1449.6049831	10.45137189	20.54384

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Iteration	Evaluations	Objective Function	Change	Max Gradient
9	3	1443.5861041	6.01887902	10.10822
10	3	1442.2028322	1.38327189	6.354246
11	2	1441.8374946	0.36533762	8.595075
12	4	1440.973389	0.86410555	2.507207
13	3	1440.872596	0.10079300	1.713767
14	4	1440.6646889	0.20790715	2.14497
15	4	1440.2276831	0.43700578	5.520732
16	4	1439.2993019	0.92838121	5.59499
17	2	1438.341651	0.95765089	3.98501
18	2	1437.5003919	0.84125913	5.606013
19	2	1436.2801724	1.22021950	3.032175
20	4	1433.450974	2.82919833	15.69127
21	4	1423.8467405	9.60423351	13.03021
22	2	1417.8166203	6.03012026	7.484773
23	2	1407.0835159	10.73310434	6.574996
24	5	1401.9594698	5.12404614	8.034088
25	2	1393.5089343	8.45053551	10.62025
26	2	1389.1289529	4.37998140	46.17532
27	4	1377.4015927	11.72736020	13.12926
28	3	1373.3818538	4.01973884	9.142566
29	2	1367.2417252	6.14012862	12.79373
30	3	1362.5436355	4.69808973	12.89434
31	2	1354.8175291	7.72610640	10.7398
32	2	1348.5270227	6.29050642	16.87999
33	2	1344.2915161	4.23550658	9.53717
34	2	1337.0493797	7.24213641	7.180288
35	2	1330.4007443	6.64863539	12.40054
36	2	1321.2669947	9.13374958	7.95584
37	2	1312.3882628	8.87873192	25.64109
38	2	1304.7967505	7.59151232	20.85538
39	2	1300.1848195	4.61193099	15.40983
40	2	1293.2409166	6.94390288	11.83043
41	5	1290.7311146	2.50980196	4.980669
42	3	1289.908896	0.82221868	6.207047
43	3	1289.5616616	0.34723434	1.78918
44	3	1289.4575381	0.10412357	0.850103
45	3	1289.4273162	0.03022189	0.441974

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Iteration	Evaluations	Objective Function	Change	Max Gradient
46	3	1289.4195579	0.00775824	0.466846
47	2	1289.4088664	0.01069149	0.351207
48	2	1289.4042234	0.00464299	0.462528
49	2	1289.3991489	0.00507452	0.263237
50	3	1289.3981278	0.00102116	0.183847
51	2	1289.3969066	0.00122112	0.150672
52	3	1289.396414	0.00049262	0.04877
53	3	1289.3963599	0.00005407	0.011867
54	3	1289.3963558	0.00000418	0.004314
55	3	1289.3963549	0.00000087	0.002732
56	3	1289.3963547	0.00000020	0.002839
57	4	1289.396354	0.00000073	0.004324
58	4	1289.3963456	0.00000837	0.014746
59	4	1289.3962939	0.00005174	0.053197
60	4	1289.3960091	0.00028477	0.053356
61	2	1289.3957577	0.00025137	0.052544
62	3	1289.3956599	0.00009782	0.014315
63	3	1289.3956234	0.00003646	0.023879
64	2	1289.3956086	0.00001484	0.048592
65	2	1289.3955875	0.00002109	0.005581
66	3	1289.3955831	0.00000444	0.008421
67	2	1289.3955798	0.00000331	0.008426
68	3	1289.3955775	0.00000226	0.00172
69	3	1289.3955768	0.00000069	0.00271
70	2	1289.3955762	0.00000055	0.003155
71	3	1289.395576	0.00000025	0.000548
72	3	1289.3955759	0.00000007	0.000992
73	3	1289.3955759	0.00000005	0.000609
74	3	1289.3955759	0.00000001	0.000259
75	7	1289.3955759	0.00000000	0.000155
76	2	1289.3955759	0.00000000	0.000042
77	3	1289.3955759	0.00000000	0.000026
78	1	1289.3955759	-0.00000000	0.000026

Convergence criterion (FCONV=2.220446E-16) satisfied.

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Fit Statistics	
-2 Log Likelihood	2578.8
AIC (Smaller is Better)	2688.8
AICC (Smaller is Better)	2695.3
BIC (Smaller is Better)	2958.6
Pearson Statistic	840.2
Effective Parameters	55
Effective Components	2

Parameter Estimates for Lognormal Model								
Component	Effect	policy	gender	Diag	Estimate	Standard Error	z Value	Pr > z
1	Intercept				5.8376	0.4871	11.98	<.0001
1	age				0.02294	0.006791	3.38	0.0007
1	policy	PEC: OSHC			-1.0390	0.3493	-2.97	0.0029
1	policy	PEC: OVC			-0.1357	0.2503	-0.54	0.5878
1	policy	PEC: Resident			0	.	.	.
1	gender		F		0.1479	0.1983	0.75	0.4558
1	gender		M		0	.	.	.
1	Diag			AcOrt	-0.01523	0.5153	-0.03	0.9764
1	Diag			Car	0.6631	0.5060	1.31	0.1900
1	Diag			Dent	0.5413	0.5866	0.92	0.3561
1	Diag			ENT	1.0728	0.5014	2.14	0.0324
1	Diag			EIOrt	1.2169	0.4979	2.44	0.0145
1	Diag			Endo	0.1431	0.4788	0.30	0.7651
1	Diag			Gastro	0.7649	0.5037	1.52	0.1289
1	Diag			GenMed	0.5752	0.4632	1.24	0.2143
1	Diag			GenSurg	1.0281	0.5830	1.76	0.0778
1	Diag			Gyn	1.1712	0.4407	2.66	0.0079
1	Diag			Inf	-0.2661	0.7577	-0.35	0.7254
1	Diag			LGIT	-0.5006	0.5903	-0.85	0.3964
1	Diag			Mal	-0.3967	0.6010	-0.66	0.5091
1	Diag			Neuro	0.7296	0.5288	1.38	0.1677
1	Diag			NeuroS	-0.8019	0.9915	-0.81	0.4186
1	Diag			Ob	0.6697	1.0199	0.66	0.5114
1	Diag			Ophth	0.6935	0.7405	0.94	0.3490
1	Diag			Plas	0.4188	0.7665	0.55	0.5849
1	Diag			Psych	0	.	.	.
1	Diag			Resp	2.1476	1.0112	2.12	0.0337
1	Diag			Trauma	0	.	.	.

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Parameter Estimates for Lognormal Model								
Component	Effect	policy	gender	Diag	Estimate	Standard Error	z Value	Pr > z
1	Diag			UGIT	1.9657	1.0054	1.96	0.0506
1	Diag			Unknown	2.5445	0.9976	2.55	0.0107
1	Diag			Urol	0	.	.	.
1	Scale Parameter				0.8474	0.1132		

Parameter Estimates for Mixing Probabilities								
Component	Effect	policy	gender	Diag	Estimate	Standard Error	z Value	Pr > z
1	Intercept				-2.4652	0.5102	-4.83	<.0001
1	age				0.01135	0.006158	1.84	0.0652
1	policy	PEC: OSHC			-0.6440	0.3491	-1.84	0.0651
1	policy	PEC: OVC			-0.04746	0.2655	-0.18	0.8581
1	policy	PEC: Resident			0	.	.	.
1	gender		F		-0.06017	0.2269	-0.27	0.7909
1	gender		M		0	.	.	.
1	Diag			AcOrt	-0.4178	0.5835	-0.72	0.4740
1	Diag			Car	0.09255	0.5815	0.16	0.8736
1	Diag			Dent	1.3976	0.6888	2.03	0.0425
1	Diag			ENT	0.4451	0.5790	0.77	0.4421
1	Diag			EIOrt	0.1605	0.5752	0.28	0.7802
1	Diag			Endo	0.02499	0.5528	0.05	0.9639
1	Diag			Gastro	-0.05146	0.5664	-0.09	0.9276
1	Diag			GenMed	0.9991	0.5354	1.87	0.0620
1	Diag			GenSurg	0.7102	0.6968	1.02	0.3081
1	Diag			Gyn	1.2747	0.5158	2.47	0.0135
1	Diag			Inf	-0.7061	0.8324	-0.85	0.3963
1	Diag			LGIT	0.1061	0.6724	0.16	0.8746
1	Diag			Mal	0.4384	0.6977	0.63	0.5298
1	Diag			Neuro	-0.1136	0.5993	-0.19	0.8497
1	Diag			NeuroS	-0.00705	1.1392	-0.01	0.9951
1	Diag			Ob	-1.2099	1.1026	-1.10	0.2725
1	Diag			Ophth	-0.03697	0.8533	-0.04	0.9654
1	Diag			Plas	0.2616	0.8866	0.30	0.7679
1	Diag			Psych	-12.2711	1111.89	-0.01	0.9912
1	Diag			Resp	-1.4022	1.0931	-1.28	0.1996
1	Diag			Trauma	-18.6516	4246.95	-0.00	0.9965
1	Diag			UGIT	-0.1071	1.1366	-0.09	0.9249

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Parameter Estimates for Mixing Probabilities								
Component	Effect	policy	gender	Diag	Estimate	Standard Error	z Value	Pr > z
1	Diag			Unknown	0.1212	1.1513	0.11	0.9161
1	Diag			Urol	0	.	.	.