

# STA 6360, Report 4.7

**Carson Slater** *Baylor University*

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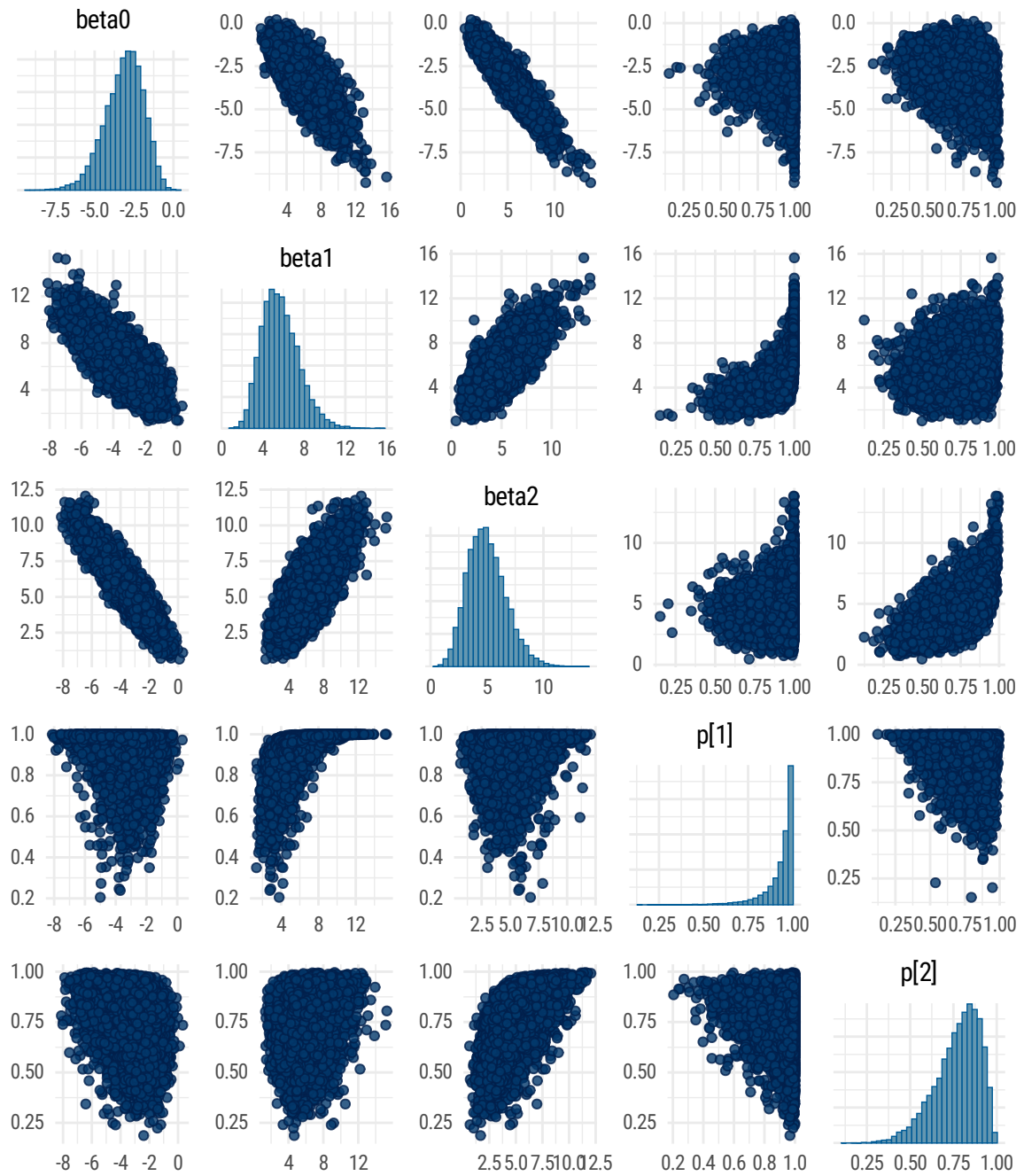
We will reproduce the results of Report 4.6.

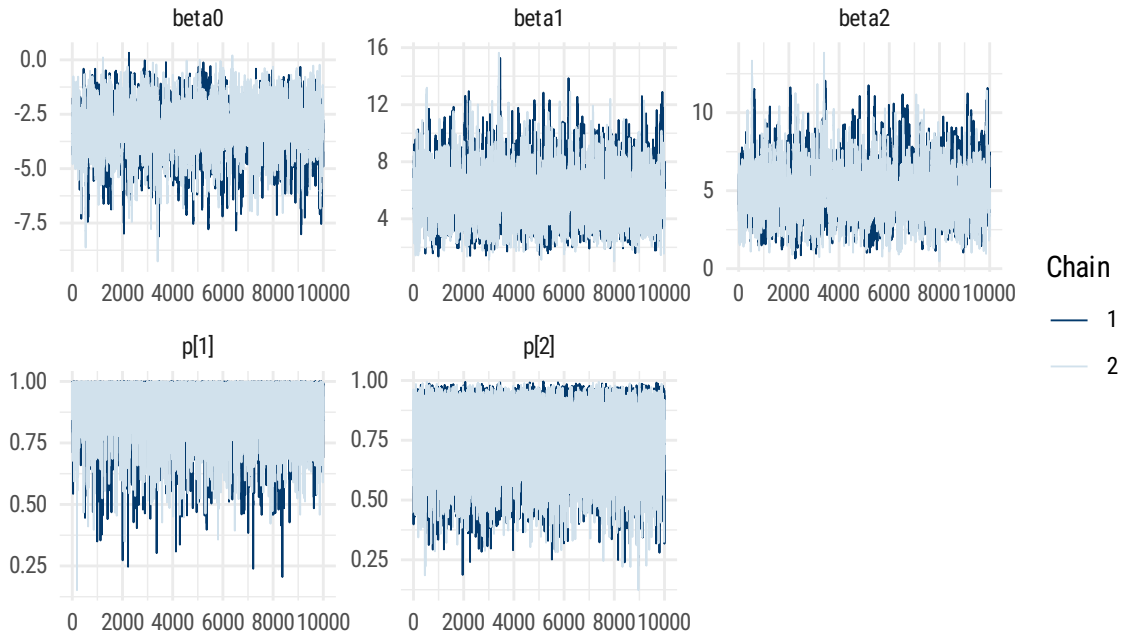
Table 1: Summary statistics for MCMC.

	Mean	SD	Naive SE	Time-series SE
beta0	-3.1332822	1.2244282	0.0086580	0.0401567
beta1	5.7177827	1.7982454	0.0127155	0.0514741
beta2	4.9912806	1.7090369	0.0120847	0.0560548
p1	0.9315754	0.0866215	0.0006125	0.0008766
p2	0.7731607	0.1294974	0.0009157	0.0019994

Table 2: 95% HPD interval for chain 2.

	lower	upper
beta0	-5.4329550	-0.8847122
beta1	2.3569263	8.9924914
beta2	1.7940466	8.2247430
p1	0.7439312	0.9999819
p2	0.5154903	0.9763938





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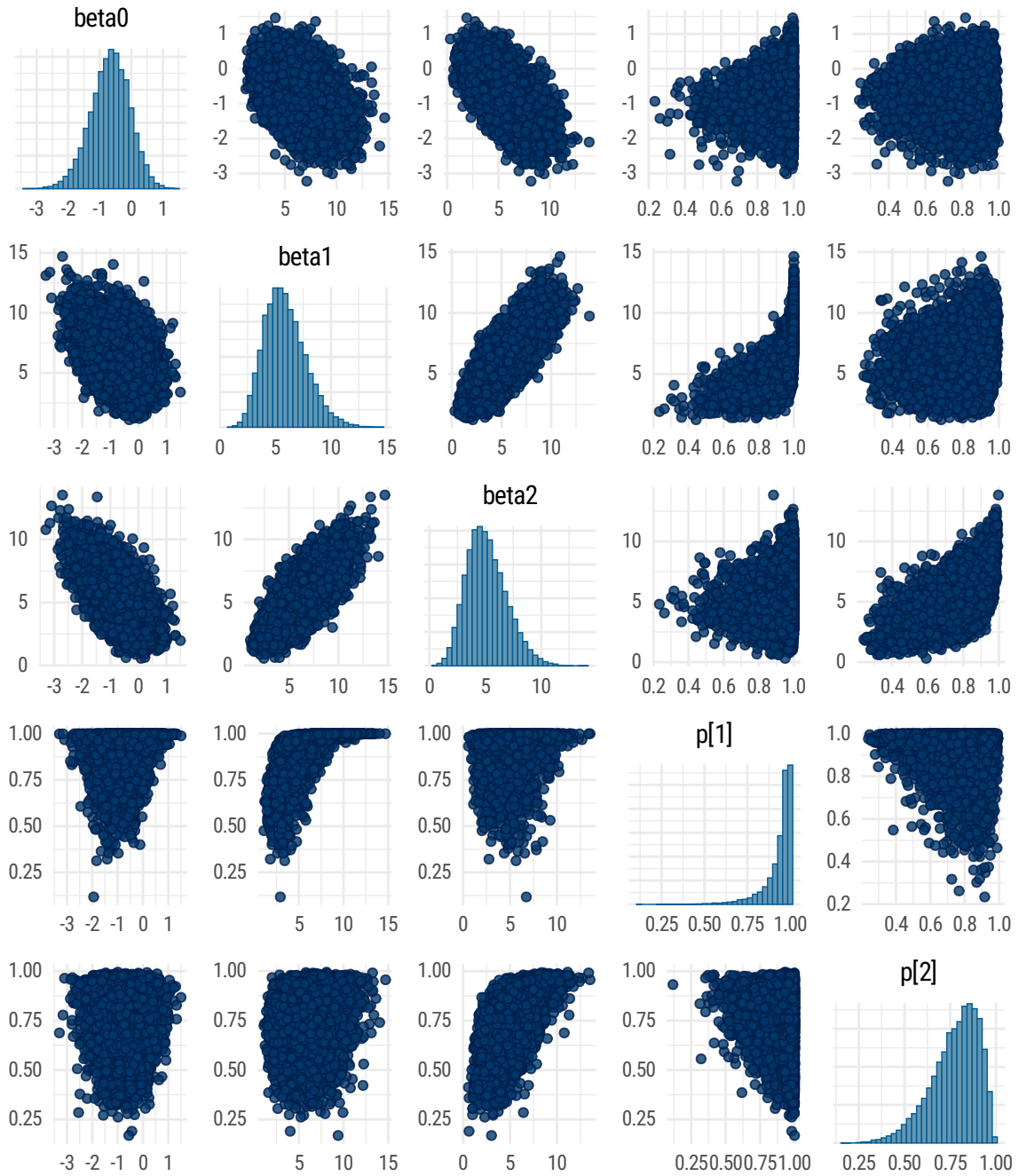
This time we will center the data and see what happens.

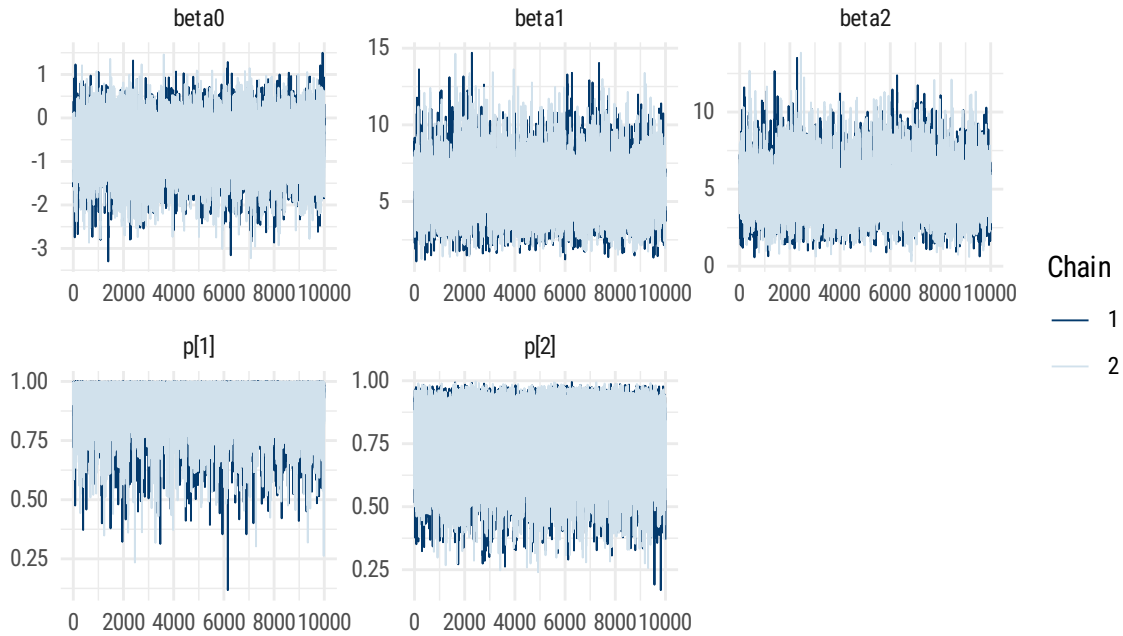
Table 3: Summary statistics for MCMC.

	Mean	SD	Naive SE	Time-series SE
beta0	-0.6728231	0.6168974	0.0043621	0.0105068
beta1	5.8772685	1.8738252	0.0132499	0.0386322
beta2	5.1320287	1.7900017	0.0126572	0.0388577
p1	0.9343998	0.0851149	0.0006019	0.0008185
p2	0.7756698	0.1295531	0.0009161	0.0014026

Table 4: 95% HPD interval for chain 2.

	lower	upper
beta0	-1.9588245	0.4907443
beta1	2.5071490	9.5888586
beta2	1.8927039	8.8173692
p1	0.7641326	0.9999823
p2	0.5180437	0.9785574





Here we see the most noticeable difference is regarding the standard errors (which changed marginally) and the estimate for the intercept.

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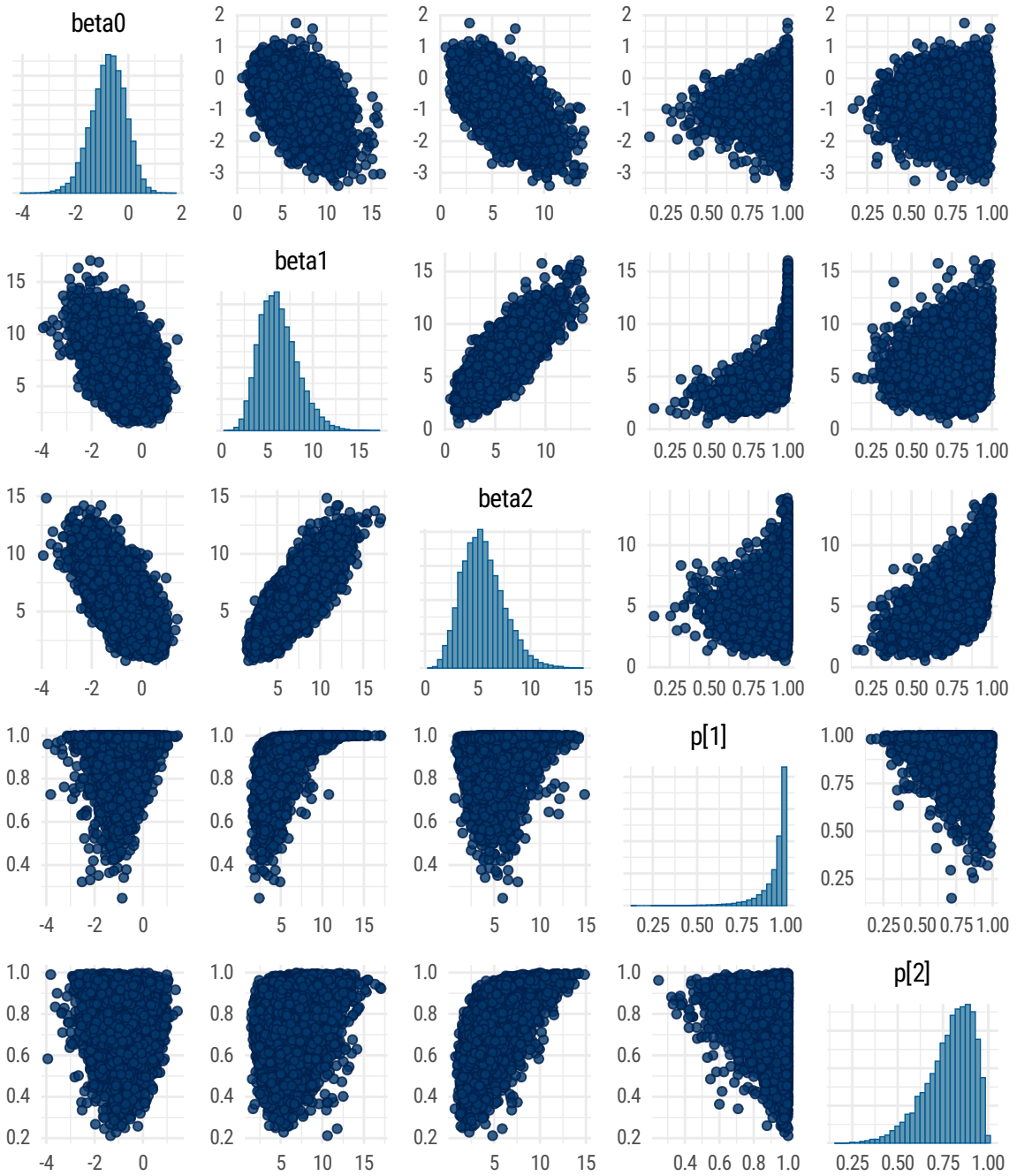
Now I will make the priors even more diffuse priors (not sure if that is against the rules, but we already used diffuse priors in the other problem.). Instead of using a  $\mathcal{N} \sim (0, 0.01)$ , I used a  $\mathcal{N} \sim (0, 0.001)$  prior, with 0.001 being the precision. Here are the results:

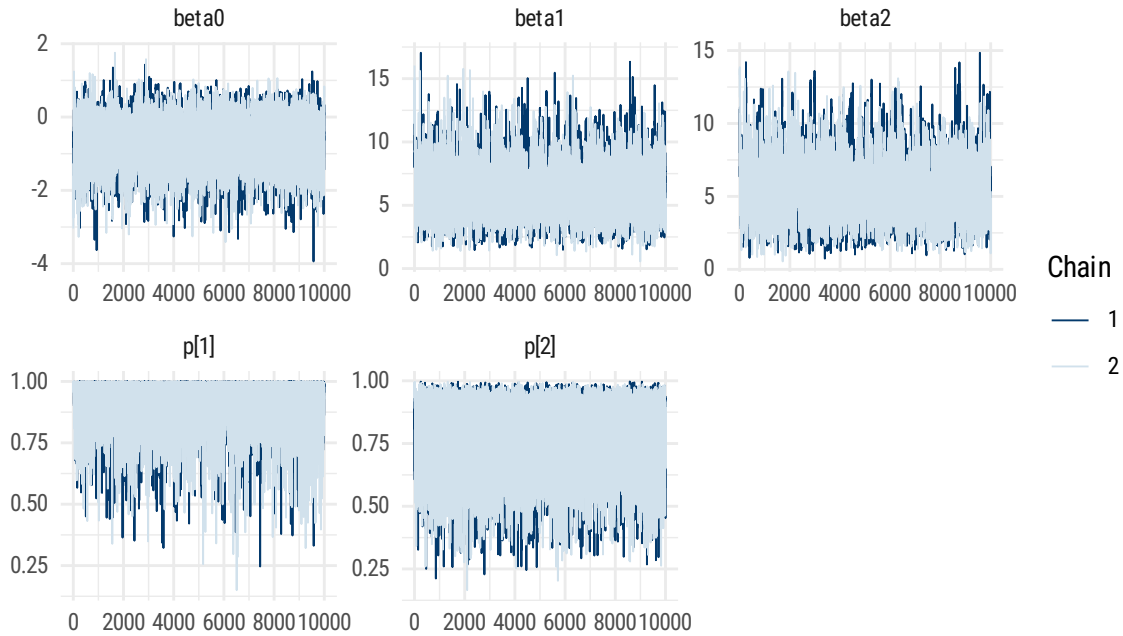
Table 5: Summary statistics for MCMC.

	Mean	SD	Naive SE	Time-series SE
beta0	-0.7564792	0.6468631	0.0045740	0.0118393
beta1	6.2585353	2.0867002	0.0147552	0.0462876
beta2	5.5165167	1.9950331	0.0141070	0.0471402
p1	0.9392607	0.0828691	0.0005860	0.0008296
p2	0.7871787	0.1304360	0.0009223	0.0014783

Table 6: 95% HPD interval for chain 2.

	lower	upper
beta0	-1.9855285	0.4915021
beta1	2.5010568	10.3360018
beta2	1.8310091	9.2724849
p1	0.7684081	0.9999924
p2	0.5320701	0.9876897





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Obtain MLE's and 95% confidence intervals corresponding to the parameters in Table 4.4. What assumptions are required for these frequentist C.I.'s to be valid? Compare your results to the posterior conclusions presented above.

	Estimate	Standard Error	z value	Pr(> z )
(Intercept)	-2.873	1.320	-2.176	0.0295 *
x1	5.177	1.864	2.777	0.0055 **
x2	4.559	1.837	2.482	0.0131 *

Signif. codes: 0 <= '\*\*\*\*' < 0.001 < '\*\*\*' < 0.01 < '\*\*' < 0.05

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 54.04 on 38 degrees of freedom

Residual deviance: 29.24 on 36 degrees of freedom

The coefficients from the MLE's seem to underestimate the change in log-odds, compared to the posterior estimates. Also, these C.I. estimates require a large enough sample size.