

Slide 1:

We are going to present Problem 2C, and in this problem we are asked to consider the model that is fitted with code you can see on the slide.

Slide 2:

We want to compare this model to the model from problem 2a. First, we explain the mathematical differences between the models. Then, we look at the predictions from the models, and see if there are any significant differences. At last, we will try to explain the results we get.

Slide 3:

In the slide, we can see the mathematical formulation of the two models. We can see that we include an intercept term in the model. We use the default prior on the intercept term which is a Gaussian distribution with mean 0 and precision 0. The prior for sigma squared is set to be the same as in 2a. This means that we place loggamma with $\alpha=2$ and $\beta=0.05$ on the log-precision as we did in 2a. A difference from the model in 2a is that we use `constraint=True` instead of `constraint=False` as in 2a. This means that we have a sum-to-zero constraint. As you can see in the slide, this means that the sum of the tau-values is set to be zero.

Slide 4:

As you can see from the plot, the predicted tau-values are different for the two models. The model with the intercept and sum-to-zero constraint is supposed to have tau-values that sum to zero, and from the figure it seems like that could be the case. The model without intercept does not have tau-values that sum to zero as seen in the figure. Nevertheless, we can see that the two graphs have about the same shape.

Slide 5:

As seen in this figure, there are no significant differences of predicted values of π .

Slide 6:

If we also look at π_{201} and π_{366} we can't see any significant differences. The first difference can be seen in the fifth decimal.

Slide 7: Explanation

The reason for the different predicted tau-values is because of the different constraints. However, the intercept term in the model with the constraint shifts up the values such that the predicted values of π are almost identical for the two models. The intercept term makes the model as flexible as the model in 2a, and this leads to the same fitted values. If this intercept term wasn't included, the model would be constrained by the sum-to-zero constraint and we would get different predictions. This can also be shown more formally by looking at the marginal posterior distributions. Since it was not a requirement we haven't done that here, but can be done to get a better understanding.

Slide 8: Conclusion

So, in conclusion the model we consider in this task has an intercept term and sum-to-zero constraint which is different from the model in 2a. However, we can't see any significant differences between

the predictions of the two model, and the reasons for that is that the intercept term makes the model as flexible as the model in 2a, and this leads to the same predictions.

Slide 9:

Do you have any questions?