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Module 2 Discussion Reply

1. OLS estimates:
    a. I agree largely with your initial statement. You mention that constant variance is required for the OLS estimates to provide an accurate model. I also think that the different parts of the textbook that you quote also seem to imply that constant variance is a prerequisite to using OLS to estimate the parameters.

       My interpretation of the problem I think is where our responses differ. I don't disagree with what you say, but I also think your quotes from the textbook give good weight towards your idea that it is not possible to construct OLS estimates unless there is constant variance. Instead, my understanding of the question is whether it is possible to construct the OLS estimates, or to put differently whether they can be calculated. I was thinking that based on how they are derived by optimizing some objective function to find the optimal β's, it is possible technically to construct them just by calculating these values.

       In my response, I tried to reproduce these steps carefully to check whether or not any of it required the assumption of constant variance. It didn't happen, so I concluded that the constant variance assumption is not required. It would however lead to the OLS estimates making possibly for some poor model choices, since there are assumptions about constant variance being violated.

    b. In this part of the question, I chose a similar method as I did in the previous part. My results also sort of disagree, in that I said it's possible for them to be unbiased, given that there is no constant variance. I tried to show that it's possible to calculate $E(\hat{\beta}_1) = \beta_1$ and $E(\hat{\beta}_0) = \beta_0$, despite there lacking the assumption of constant variance.

       I noticed also that you mention the Gauss-Markov theorem. My thinking was that without the constant variance assumption, then the OLS estimates constructed in part (a) would lack this property of "best linear unbiased estimators." I am not sure if my interpretation is correct, or whether it makes sense to try and show it that way. However, I think that the response that you provided to parts (a) and (b) are quite logical, and I am inclined to think that they are perhaps indeed correct.