Maroufy Marriott Review

General Comments

This is an interesting topic and overall the presentation is clear. Some claims appear a bit strong; see specific comments for details.

Specific Comments

- p.1 In the abstract you say 'we examine if there is a cost to having the gamma as a default option…'. This could be examined in a simulation study that generated data using something other than the gamma. The simulation study generates data using the gamma and so shows the cost of using the LMM approach.
- p.1 Also in the abstract, 'We show that the gamma frailty assumption has the effect of considerably under-estimating standard errors…'. This would require examining a model where the frailty is not described by a gamma distribution.
- p.3, ¶ 1: 'which can be used as a bench-marking tool.' This is not clear. Just because a method makes fewer assumptions does not mean it is an appropriate benchmark. Parametric models continue to be useful even when assumptions do not hold exactly. Parametric models fail when there are egregious violations that are nevertheless of scientific/practical interest. Simulations using such models would be instructive.
- p.5 Definition 1
  – belongs to a ***one parameter*** exponential family, would be clearer
  – does this depend on the parameterization θ? If so, the definition should include the parameterization. If not, make it clear that this is a geometric quantity, i.e., parameter invariant.
  – Why $\geq$ and not $>$ in the definition of Λ_φ. For discrete spaces using $\geq$ means the support changes with some parameter values.
- p.5 $Example 1$. '… gives excellent L^1 approximations for all mixtures Q with support in [0.3,5].'
  – Quantifying this would be good.

- p.7 ¶ 1: 'we only make the comparison to a one component local mixture with k = 4.'
  – It would seem the claim of excellent L^1 approximations no longer applies. Please clarify.
- p.8 ¶ 1: '… illustrates the effect of making the gamma frailty assumption when compared to the much richer local mixture method.'
  – Typically, the gamma frailty is a one parameter family with mean fixed at 1 and the standard deviation varies; this is also reflected in the choice of models for your simulation study. This is not a one parameter exponential family; it is a one parameter curved exponential family. Please discuss how this fits with the assumptions of the LLM.
- p.8 ¶ 3: 'Second, our method automatically addresses the possibility of departures from the gamma assumption by doubling the standard errors.'
  – In this particular example, the standard errors ***happen*** to be about double.
  – You've not looked at non gamma frailty models. These methods may compare very differently across different frailty structures both in terms of standard error and bias.
- p.9 ¶ 2: 'Furthermore, $\hat{\lambda}$ lie in the relative interior of Λ_ν , indicating that the one component local mixture is adequate.'
  – More details would be helpful.
- p.9 ¶ 3:'It could be due to either misspecification bias or an under estimate of the standard error in the gamma frailty model.'
  – For these to be the only two options requires LMM to be unbiased. Simulation of 1 parameter regression with gamma frailty does not mean this holds more generally.
  – It would be illustrative to compare the two models in terms of goodness-of-fit analysis.
  – The variable sex is not significant; does the difference for the WBC coefficient hold after sex is removed?