Author's response to reviews

Title: A Monte Carlo Simulation Study Comparing Linear Regression, Beta Regression and Variable-Dispersion Beta Regression at Recovering Average Difference Measures in a Two Sample Design

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Author's response to reviews: see over
Dear BMC Medical Research Methodology Editors:

I am writing this letter to express my interest in publishing the attached manuscript – A Monte Carlo Simulation Study Comparing Linear Regression, Beta Regression and Variable-Dispersion Beta Regression at Recovering Average Difference Measures in a Two Sample Design – in your journal.

My co-author and I believe that the findings of our simulation experiment are important to epidemiologists, biostatisticians and data analysts who conduct regression analysis in a biomedical setting. In biomedical research it is common that analysts are confronted with response variables which are proportions, percentages, rates and other fractions. Traditionally, researchers have employed linear regression to estimate covariate effects on response data encountered on the open unit interval. Recently, beta regression and variable-dispersion beta regression have been proposed as alternative methodologies for investigating covariate effects on response data which are observed on the open unit interval. This Monte Carlo simulation experiment was conducted to compare the statistical properties of linear regression, beta regression and variable-dispersion beta regression models at recovering common epidemiological/biostatistical quantities of interest, particularly, average differences in proportions/percentages/rates from a simple two sample design.

The study acts to introduce applied researchers to a pair of relatively novel regression methodologies – beta regression and variable-dispersion beta regression. The performance of these more novel methods are compared against the traditional linear regression model. The results suggest that the variable-dispersion beta regression model performs similarly to the linear regression model at recovering average differences in proportions/percentages/rates from a simple two sample design. The beta regression model occasionally struggles to recover unbiased estimates of effect. Specifically, the beta regression model struggles in cases where the dispersion sub-model is incorrectly specified. We do not believe that these findings have been uncovered by other authors. Again, these findings are important as they suggest that analysts should demonstrate caution in employing off the shelf beta regression models when estimating covariate effects on their response data observed on the open unit interval.

This manuscript is not under consideration by any other journal. My co-author and I have no conflicts of interest to declare.

We look forward to hearing from you.

Sincerely,

Christopher Meaney (Primary and Corresponding Author)  
Rahim Moineddin (Second Author)
This is a revised submission cover letter. We have revised the following sections:

i) We have declared we have no conflicts of interest

ii) We have added a textual description of the results of the Monte Carlo simulation experiments we have conducted to complement the tabular description given in Table 3–14.