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Title of Presentation: Cramér-von Mises Estimation Based on Probability Generating Functions and Box-Cox Transform for Count Data

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Abstract: In this paper, we consider an alternative way of estimating distribution parameters for nonnegative random variables. We use the Cramér-von Mises (CVM) distance based on the probability generating function (pgf). Whereas this paper focuses on count data, the method can also be applied to continuous data. Whatever the type of data, the key requirement is that the model Laplace transform have a closed form. When calculating the distance, we have to select points at which to compare the empirical pgf with its model counterpart. Our choice function calls for a finite number of points and is adaptive to data. This is simpler than using a continuum number of moments as Carrasco and Florens (2000) proposed doing with a generalized method of moments (GMM). It also avoids the arbitrariness of the choice of moments used in the k-L procedure proposed by Feuerverger and McDunnough (1981). Besides, as the number of points matches the size of the data set, the estimator is consistent. The adaptiveness of the method also comes from the fact that we apply the CVM method on a Box-Cox transformation of the pgf's. This introduces an extra parameter which can be viewed as a variance stabilizer. Even with the additional parameter, the numerical methods required to find the CVM estimator are relatively easy to implement. The resulting CVM estimator appears to have very good efficiency for the parameters of interest of the original model. That is, the method appears to be very efficient for a range of parameters commonly encountered in applied works and useful for a large class of parametric families used to model the frequency of count data encountered in actuarial studies. To illustrate this, we analyze the results of a limited simulation study with the discrete positive stable distribution.