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# The Conway–Maxwell–Poisson-generalized gamma regression model with long-term survivors

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In this paper, we proposed a flexible cure rate survival model by assuming the number of competing causes of the event of interest following the Conway–Maxwell distribution and the time for the event to follow the generalized gamma distribution. This distribution can be used to model survival data when the hazard rate function is increasing, decreasing, bathtub and unimodal-shaped including some distributions commonly used in lifetime analysis as particular cases. Some appropriate matrices are derived in order to evaluate local influence on the estimates of the parameters by considering different perturbations, and some global influence measurements are also investigated. Finally, data set from the medical area is analysed.

**Keywords:** COM–Poisson distributions; cure fraction models; generalized gamma distributions; sensitivity analysis; lifetime data

## 1. Introduction

Models for survival data with a surviving fraction (also known as cure rate models or long-term survival models) occupy an outstanding place in reliability and survival analysis. Cure rate models cover the situations in which there are sampling units insusceptible to the occurrence of the event of interest. The proportion of such units is termed the cured fraction. In clinical studies, the event of interest can be the death of a patient (which can happen due to different competing causes) or a tumour recurrence (which can be attributed to metastasis-component tumour cells left active after an initial treatment). A metastasis-component tumour cell is a tumour cell having the potential of metastasizing [1]. The literature on the subject is by now rich and growing rapidly. The books by Maller and Zhou [2] and Ibrahim *et al.* [3], as well as the review article by Tsodikov *et al.* [4] and the article by Cooner *et al.* [5] could be mentioned as key references. Recently, Rodrigues *et al.* [6] extended the long-term survival models proposed by Berkson and Gage [7], Yakovlev & Tsodikov [1] and Chen *et al.* [8] through a special case of the weighted Poisson distribution.

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