A Note on the Connection Between Some Classical Mortality Laws and Proportional Frailty

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Abstract

We provide a simple frailty argument that produces the Gompertz-Makeham mortality law as the population hazard rate under the assumption of proportional frailty given a common exponential hazard rate. Further, based on the result for the Gompertz-Makeham law a heuristic argument provides a slight change of proof which immediately produces a version of Perks mortality law. Moreover, we give conditions for which functional forms of the baseline hazard that will yield proper frailty distributions given that we want to retrieve a certain overall population hazard within the proportional frailty framework.

Keywords: Survival analysis, Frailty, Makeham, Perks.

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