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# Computing finite time non-ruin probability and some joint distributions in discrete time risk model with exchangeable claim occurrences

Serkan Eryilmaz[*] and Omer L. Gebizlioglu[†]

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**Abstract**

In this paper, we study a discrete time risk model based on exchangeable dependent claim occurrences. In particular, we obtain expressions for the finite time non-ruin probability, and the joint distribution of the time to ruin, the surplus immediately before ruin, and the deficit at ruin. An illustration of the results is given and some implications of the results are provided. Comparisons are made with the corresponding results for the classical compound binomial model of independent and identically distributed claim occurrences.

*Key words.* Compound binomial model; Dependence; Exchangeability; Ruin theory

## 1 Introduction

Binomial models are used in finance and insurance on many topics like stock price analysis, pricing of financial derivatives, credit risk assessments and solvency oriented bankruptcy studies. For the last two, loss causing default events are the main concern in the modeling where the commonly envisaged important components are risk capital, income generating cash inflows, and default driven cash outflows. A general view of risk modeling on these topics can be found in the works of Kijima (2003), Melnikov (2004) and Franke et al. (2011). On the finance side, the loan and debt security markets are the vast grounds to observe default losses of debtors upon their failures in upfront scheduled payments. In the insurance market, claims of insureds are default events that may create loss burdens on insurers. In either case, each individual loss

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