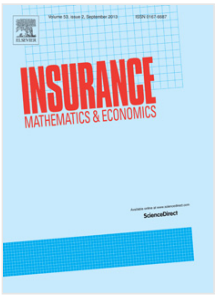

Evaluation and default time for companies with uncertain cash flows

Donatien Hainaut

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Evaluation and default time for companies with uncertain cash flows

Donatien Hainaut†

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† *ESC Rennes School of Business , CREST , France.*
Email: donatien.hainaut@esc-rennes.fr

Abstract

In this study, we propose a modelling framework for evaluating companies financed by random liabilities, such as insurance companies or commercial banks. In this approach, earnings and costs are driven by double exponential jump diffusion processes and bankruptcy is declared when the income falls below a default threshold, which is proportional to the charges. A change of numeraire, under the Esscher risk neutral measure, is used to reduce the dimension. A closed form expression for the value of equity is obtained in terms of the expected present value operators, with and without disinvestment delay. In both cases, we determine the default threshold that maximizes the shareholder's equity. Subsequently, the probabilities of default are obtained by inverting the Laplace transform of the bankruptcy time. In numerical applications of the proposed model, we apply a procedure for calibration based on market and accounting data to explain the behaviour of shares for two real-world examples of insurance companies.

Keywords: credit risk, expected present value operator, jump diffusion model, structural model, Wiener–Hopf factorization.
JEL classification: G32.

1 Introduction

Evaluations of companies and determining the optimal stopping time for an activity are both central issues in corporate finance. Leland (1994) and Leland and Toft (1996) investigated these topics for a company that maintains a constant debt profile and by adjusting the criteria for bankruptcy endogenously to maximize the value of the equity. They showed that a company's value depends greatly on its capital structure. This approach is related closely to the structural models of Merton (1974) and Black and Cox (1976), where default occurs when the assets first fall below a threshold. Other studies, including Longstaff and Schwartz (1995) and Collin-Dufresne and Goldstein (2001), used stochastic interest rates in their models. Duffie and Lando (2001) and Jarrow and Protter (2004) showed that structural models under incomplete information can be viewed as intensity models, which are competing approaches for default risk. Hilberink and Rogers (2002) extended the framework of Leland and Toft (1996) by including jumps in the dynamics of the assets. Similar models were considered by Le Courtois and Quittard-Pinon (2006) and by Dao and Jeanblanc (2012) where the assets return was driven by jump diffusion. Le Courtois and Quittard-Pinon (2008) later employed α-stable processes. Boyarchenko and Levendorskii (2007) also developed a general method based on expected present value operators to optimize the entry or exit times in a non-Brownian