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Pricing of Debt and Loan Guarantees using Stochastic Delay Differential Equations

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Most companies in the business world, use debt to operate. In addition to equity, corporate bonds (debt financing) are the main source of funds for many businesses. However, depending on the ability of the managers or other reason, a company may become insolvent. Company insolvency may lead to bankruptcy or company reorganization. When a company becomes insolvent, the stock value decreases to zero and the equity holders lose on their investment. Naturally, debtholders would like to make sure that their investments are secured. In order to support companies in this situation and encourage new investments, some government agencies provide loan guarantees. In this paper, we use delay equations to derive a formula for the price of an option used for the pricing of corporate debt and adopt this approach to the valuation of government loan guarantees for companies in financial distress. Overall, our analysis shows that loan guarantees may be an efficient way to protect debtholders' investments which may lead to company reorganization.