

0.1 Declaration

I, the undersigned, hereby declare that the dissertation submitted for review for the degree Magister Scientiae in the Faculty of Pretoria, is entirely my own independent work and has not been submitted for any degree at any other university.

Modelling default-risky bonds

By

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of the requirements

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I, the undersigned, hereby declare that the dissertation submitted herewith for the degree Magister Scientiae to the University of Pretoria contains my own, independent work and has not been submitted for any degree at any other university.

Signature of Candidate

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0.2 Acknowledgements

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0.3 Abstract

In this dissertation, we examine current models used to value default-risky bonds. These models include both the *structural* and the *reduced-form* approaches. We begin by examining various issues involved in modelling credit risk and pricing credit derivatives. We then explore the various dimensions of structural models and reduced-form models and we provide an overview of four models presented in the literature on credit risk modelling. Both the theoretical and empirical research on default-risky bond valuation is summarized. Finally, we make suggestions for improving on the credit risk models discussed.

0.4 Preface

Building and implementing a model of credit risk requires choices along a variety of dimensions. To clarify these dimensions, this dissertation will examine, in detail, several existing credit risk models.

This dissertation is divided into six chapters. The first presents an overview of credit risk and credit derivatives. The second chapter studies the fundamentals of credit modelling. In essence, this describes the various dimensions of a credit risk model and categorizes credit risk models into two groups: *traditional credit models* and *market based models*. Market based models are then further divided into two groups: *structural models* and *reduced-form models*. The third chapter presents the fundamentals of interest rate modelling. The fourth chapter studies two structural models in the area of default-risky bond pricing: Merton (1974) and Longstaff and Schwartz (1995). A special section in the fourth chapter provides a comparison of these two models. The fifth chapter studies two reduced-form models in the area of default-risky bond pricing: Jarrow, Lando and Turnbull (1997) and Duffie and Singleton (1999). A comparison of structural and reduced-form models is provided in Chapter 6. Finally, Chapter 7 gives conclusions and suggests a few directions for further research.

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Chapter 1

Introduction

1.1 Credit Risk

credit risk is the risk of non-payment or the possibility that the borrower will not be able to pay back the loan. It is a type of risk that is inherent in any lending activity. The risk is measured in terms of the probability of default. The risk is also measured in terms of the amount of loss that the lender will incur in the event of default.

The risk of default can be reduced by various means, such as collateral, covenants, and monitoring. However, the risk cannot be eliminated completely. The risk is also affected by the borrower's creditworthiness and the economic environment.

A credit risk model is a tool used to measure and manage credit risk. It is a mathematical model that takes into account the borrower's creditworthiness and the economic environment. The model is used to estimate the probability of default and the amount of loss that the lender will incur in the event of default.

The most commonly used credit risk model is the credit scoring model. This model uses a set of variables to estimate the probability of default. The variables are typically financial ratios and other indicators of creditworthiness. The model is used to assign a credit score to each borrower, which is then used to determine the interest rate and other terms of the loan.

Another type of credit risk model is the structural model. This model is based on the idea that the value of a firm's assets is related to the value of its debt. The model is used to estimate the probability of default and the amount of loss that the lender will incur in the event of default.