

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**PREDICTING DEFAULT RISK OF FIRMS USING
ITERATED MERTON'S MODEL WITH A MAPLE
PROGRAMMING**

**FARAH WAHIDA BINTI MOHD ISA – 2016707113
NURSAFIQAH BINTI MAZLAN – 2016707115
SITI NADIAH BINTI KHALIL – 2016707119**

P35/S18

**Bachelor of Science (Hons.) (Management Mathematics)
Faculty of Computer and Mathematical Sciences**

DECEMBER 2018

ACKNOWLEDGEMENTS

IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL.

Firstly, we are grateful to Allah S.W.T, whom with His willing giving me the opportunity to accomplish this Final Year Project which is entitled Enhancing the Iterated Merton's Model into a Maple programming for Default Risk Predictions.

We would like to express our deepest thanks to our supervisor, Madam Norliza Binti Muhamad Yusof who had guided and helped us during these two semesters in order to finish this Final Year Project. We also want to thanks to Sir Mohd Azdi Bin Maasar, Dr. Nor Azni Binti Shahari, Sir Muhamad Luqman Bin Sapini and other lecturers for the information and guidance.

An appreciation also goes to our families for the full support and encouragement. Deepest gratitude to group members that have given full commitment and cooperation from time to time and we finally completed this Final Year Project successfully.

Lastly, we would like to thanks to all people who contributes to our Final Year Project directly or indirectly.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	i
TABLE OF CONTENTS.....	ii
LIST OF TABLES.....	iii
LIST OF FIGURES.....	iii
ABSTRACT.....	iv
CHAPTER 1: INTRODUCTION.....	1
1.1 Problem Statement.....	2
1.2 Objectives.....	2
1.3 Scope of the study.....	3
1.4 Significances of the study.....	3
CHAPTER 2: BACKGROUND OF STUDY AND LITERATURE REVIEW.....	4
2.1 Default Risk.....	4
2.1.1 Methods to measure default risk.....	5
2.2 Merton's Model.....	6
2.2.1 Mathematical Structure of Merton Model.....	7
2.3 Iteration Approach.....	9
CHAPTER 3: METHODOLOGY AND DATA IMPLEMENTATION.....	12
3.1 The Iterated Merton Default Risk Model.....	13
3.2 Implementing the model into a Maple Program.....	15
3.3 Data Descriptions.....	17
3.4 Data Implementation.....	19
3.4.1 Iterating the market value of asset and its volatility.....	19
3.4.2 Predicting the probability of default.....	21
3.5 Implementing all data into Maple program.....	21
CHAPTER 4: RESULT AND DISCUSSION.....	22
CHAPTER 5: CONCLUSION AND RECOMMENDATION.....	31
REFERENCES.....	33
APPENDICES.....	35

LIST OF TABLES

Table 2.1.1: The Frisk® score	5
Table 4.1: The Iterated Market Value of Asset of Petronas Dagangan Berhad for the Year 2017 and 2018	26
Table 4.2: The Iterated Market Value of Asset of Alam Maritim Resources Berhad for the Year 2017 and 2018.....	26
Table 4.3: The Iterated Distance of Default of Petronas Dagangan Berhad and Alam Maritim Resources Berhad for the Year 2017 and 2018	28
Table 4.4: The Iterated Probability of Default of Petronas Dagangan Berhad for the Year 2017 and 2018	29
Table 4.5: The Iterated Probability of Default of and Alam Maritim Resources Berhad for the Year 2017 and 2018.....	29

LIST OF FIGURES

Figure 3.1: The flowchart of estimating default risk of companies.....	12
Figure 3.2: The Flowchart of Maple programming	15
Figure 3.3: Petronas Dagangan Berhad ratings by MARC.....	17
Figure 3.4: Alam Maritim Resouces Berhad ratings by MARC.....	18
Figure 4.1: Maple Command of Loading Package and Importing the Excel Data into Maple With Its Outputs	22
Figure 4.2: Maple Command of Defining variables and Calculating Time Maturity	23
Figure 4.3: Maple Command of The Iterations Process of Calculating Probability of Default	24
Figure 4.4: Maple Command of Exporting the Output Into Excel	25
Figure 4.5: The Line Graph of the Iterated Annual Volatility of Petronas.....	27

ABSTRACT

Our research referred to a few studies that conducted about how to estimate probability of default risk using Merton Model by applying iteration method. Based on our intensive reading, we found that Merton model are able to predict probability of default accurately by using iteration method. Our objectives of this studies are to implement the iterated Merton's model into a Maple programming and to generate the iterated market value of asset, asset volatility and probability of default. The result shows that the iterated market value of asset, asset volatility and probability of default converges at second iteration. In order to make sure the output that generated from the Maple programming are valid, we compare the output from Maple programming with the value that we obtained from excel calculation. By implementing the model into a Maple programming, it can reduce time calculated for default risk. Moreover, other people can make use of our Maple coding to predict the probability of default.