UNIVERSITI TEKNOLOGI MARA

MODELLING CAPITAL ADEQUACY OF LIFE INSURERS

NORHANA BINTI ABD. RAHIM

This thesis is submitted in fulfillment
of the requirements for the degree of
Doctor of Philosophy in Science

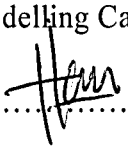
Faculty of Computer and Mathematical Sciences

July 2017

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of student	:	Norhana Binti Abd. Rahim
Student ID No.	:	2007131557
Programme	:	Doctor of Philosophy (CS990)
Faculty	:	Computer and Mathematical Sciences
Thesis Title	:	Modelling Capital Adequacy of Life Insurers
Signature of Student	:	
Date	:	July 2017

ABSTRACT

Insurance industry is a regulated industry. Capital adequacy requirement is the most important area in insurance regulation and supervision of an insurer's insolvency. It is meant to absorb the unexpected losses of an insurance company in order to remain solvent and competitive in the insurance market. In the last two decades, the capital adequacy determination approaches have changed from the traditional "one-size-fits all" approach to risk-based capital (RBC), which reflects insurer's risk profile. The risk-based capital model generally applies a fixed pre-determined percentage to the annual statement amount of an insurance company. The insurance regulator of each country fixes the pre-determined percentage. However, each risk-based capital model has different risks types and risk charges for determining the capital adequacy. Even though many risk-based capital models have been developed, these models fail to take into account the changing and volatile economic conditions. Therefore, the capital cannot be determined adequately and hence cannot provide safety for the insurers. Additionally, the insolvencies problems due to inadequate capital would also not be resolved. Thus, the question of how much capital is enough is still in doubt. In response to that, this study developed a simulation model for determining dynamic risk charges. This study also aimed to model capital adequacy for determining capital adequacy and capital adequacy ratio. Following that, this study investigated the effects of current economic condition towards dynamic risk charges, capital adequacy and capital adequacy ratio. Finally, this study aimed to identify which dynamic risk charge variables affects the capital adequacy and capital adequacy ratio. The data employed for this study were Kuala Lumpur Composite Index (KLCI), Malaysian Bond Index (MBI), Housing Price Index (HPI), currency rates, bond's yield, duration and mortality rate for the Malaysian population. Several risk measures were selected to determine the risk charges. Then, a simulation procedure was done to transform the risk charges into the dynamic risk charges. The results show that the dynamic risk charges changed over time and a higher risk charges were recorded during the crisis period. This higher dynamic risk charges led to a higher capital adequacy amount during the crisis period. This study also found that the capital adequacy ratio was lower during the crisis period and a higher ratio during the normal period. This study also found the most significant variables that affected capital adequacy and capital adequacy ratio are corporate conventional bond, MGS bond and stocks. Thus, it can be concluded that the new capital adequacy model is a better approach in determining the adequacy of capital as it reflects the ups and downs of the market conditions and helps in better risk management.

ACKNOWLEDGEMENTS

بسم الله الرحمن الرحيم

Alhamdulillah, thank you Allah SWT for lighting up my journey with excellent ideas and inspirations until the completion of my thesis. Thank you for giving me the strength to carry on my journey and overcome many challenges throughout the study. My graduate life at Universiti Teknologi MARA had been a very long but meaningful journey, which now has come to the end. Without guidance and help from extraordinary people, I would never be able to finish this study. First of all, I would like to express my sincere gratitude to my main supervisor, Dr. Fauziah Hanim Tafri of the Centre for Actuarial Studies, Faculty of Computer and Mathematical Sciences (FSKM), Universiti Teknologi MARA (UiTM) for her professional guidance, inspiration and support throughout this study. At all times, she had always been there whenever I needed help from the first day of my graduate study. Special appreciation is also expressed to Associate Prof. Azizah Murad for the encouragement and unwavering help in my journey as a graduate student. Many thanks also go to Dr Fuziyah Ishak, Head of Centre for Graduate Studies and also others at the faculty who have directly or indirectly assisted me in the completion of this thesis.

My special thank is dedicated to my family members, my mother, my in-laws for their endless prayers and support. Many thanks and love also dedicated to my beloved husband, Encik Salahuddin Safwan Mohd. Salleh and my children, Nabila Husna, Nabil Aiman and Najla' Tihany for their care, support, comfort and motivation throughout this journey.

Finally, I am grateful to all my colleagues and friends in UiTM. I thank them for their hospitality and sincerity to keep up me motivate while I was in difficulties. May Allah bless all of you.

TABLE OF CONTENTS