## Contents

Contents	
	Page
Acknowledgements	iii
Abstract in Thai	iv
Abstract in English	v
Chapter 1 Introduction	1
Chapter 2 Preliminaries	6
2.1 Interest rates and present value	6
2.2 Brownian motion and stochastic calculus	8
2.2.1 Definition of Brownian motion	8
2.2.2 Martingale property for Brownian motion	9
2.2.3 Stochastic calculus	10
2.2.4 Formula for Itô process	10
2.2.5 Formula for Brownian motion	11
2.2.6 Multiple Brownian motion	13
2.2.1 Itô-Doeblin formula for multiple processes	14
2.3 Risk neutral probability measures	16
2.3.1 Martingale representation, one dimension	16
2.4 Existence and uniqueness of the risk neutral measure	20
2.5 Multiple stock model or multiple asset model	21
2.6 Financial risk measures	23
2.6.1 Some popular risk measures	23
2.6.1.1 Value-at Risk	23

2.6.1.2 Tail Value-at Risk	23
2.6.2 Distortion risk measures	23
2.7 Desirable properties of risk measures	24
2.7.1 The Choquet integral	29
2.7.2 Comonotonicity	31
2.7.1 A characterization theorem	34
Chapter 3 Main results	35
3.1 General case for risk in Black-Scholes model	37
3.2 Value-at-Risk in Black-Scholes model	44
3.3 Tail Value-at-Risk in Black-Scholes model	47
3.4 Risks based on Wang's distortion function in Black-Scholes	
model	52
Chapter 4 Conclusions	56
Bibliography	57
Vita	59

## ลิ<mark>ปสิทธิ์มหาวิทยาลัยเชียงใหม่</mark> Copyright<sup>©</sup> by Chiang Mai University All rights reserved

Page