CONTENTS

		Page
Acknowledgements		c
Abstract in Thai		d
Abstract in English		e
Contents		f
List of Tables		h
List of Figures		i
Chapter 1 Introduction		
1.1	Principle and Rational of the Study	1
1.2	Purpose of the study	8
1.3	Advantages of the study	8
1.4	Definition	9
1.5	Research Designs, Scope and Methods	9
Chapter 2 Theory and Literature Review		
2.1	Theory	11
2.2	Literature Review	36
Chapter 3 Methodology		
3.1	Data Collection	40
3.2	Research Methodologies / Data Calculating Method	40
3.3	Simulation algorithm and Portfolio Risk analysis	45
3.4	Working Period	46

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

Chapter 4 Empirical Result

4.1 Descriptive Statistic 48
4.2 Unit Root Test Result 49
4.3 Marginal Distribution Result 49
4.4 Copula estimation result 56
4.5 Portfolio Risk Analysis 57

Chapter 5 Conclusions, Discussion, and Recommendation

5.1 Conclusion 62
5.2 Discussion 63
5.3 Recommendation 63

References 65

Appendix 71

Curriculum Vitae 72

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

LIST OF TABLES

		Page
Table 2.1	Literature Review Methodology	38
Table 3.1	Unit Root test	41
Table 3.2	Working Period	46
Table 4.1	Descriptive statistics on precious metal returns	47
Table 4.2	Augmented Dickey-Fuller test, Phillips and Perron test, and Kwiatkowski-Phillips-Schmidt-Shin test on precious metal returns	49
Table 4.3	Estimate of ARMA (q, p) GARCH (1, 1) in student-t distribution result	51
Table 4.4	Parameter estimation for each precious metal's residual	56
Table 4.5	Empirical GARCH EVT *t* copulas parameters	56
Table 4.6	Value at Risk based on Monte-Carlo simulation and GARCH EVT *t* Copula by using cumulative return	58
Table 4.7	Value at risk and expected shortfall equally weighted portfolios by using simulated return	59
Table 4.8	Optimal investment proportion of precious metal portfolio with minimum risk (ES 5%)	61

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

LIST OF FIGURES

Page

Figure 1.1 Overview of the different Commodity Types 1

Figure 1.2 Investment ratio of 4 main asset included gold 3

Figure 1.3 Precious metal prices 5

Figure 1.4 Conceptual framework 10

Figure 2.1 Efficient frontier 21

Figure 2.2 Block-maxima (left panel) and excesses over a threshold u (right panel) 25

Figure 2.3 Probability density functions and cumulative distribution function. $\xi = 0$ exponential, $\xi = -0.5$ Pareto type II and $\xi = 0.5$ Pareto distribution. In all case $\beta = 1$ and $\nu = 0$ 27

Figure 2.4 Gaussian and t-copula with $\rho = +/- 0.4$ and DoF = 1.5 34

Figure 4.1 Precious metal returns 48

Figure 4.2 The sample autocorrelation function of precious metal returns 50

Figure 4.3 The sample autocorrelation function of squared precious metal returns 50

Figure 4.4 The sample autocorrelation function of precious metal residuals 52

Figure 4.5 The sample autocorrelation function of precious metal residuals 53

Figure 4.6 Residuals and Conditional Standard Deviation of Precious Metals 53

Figure 4.7 Semi-parametric cumulative distribution functions 54

Figure 4.8 Fitted cumulative distribution functions for upper tail 55

Figure 4.9 Empirical cumulative distribution function of simulated returns 59

Figure 4.10 The efficient frontiers of CVaR under mean 60

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved