

Contents

List of Figures	xvii
List of Tables	xix
List of Symbols	xx
1 Introduction	1
1.1 Motivation and Aims of the Thesis	1
1.2 Course of Investigation	6
2 Scientific Background	9
2.1 CAT Bonds	9
2.1.1 Definition and Functionality	9
2.1.2 Market Development	14
2.2 Machine Learning	19
2.2.1 Linear Regression Model	19
Variable Selection	20
Penalized Regression	22
2.2.2 Random Forest Model	24
2.2.3 Neural Network Model	30
3 Improving CAT Bond Pricing Models via Advanced Machine Learning in the Primary Market	35
3.1 Introduction	35
3.2 Data	42
3.2.1 Sample Selection	42
3.2.2 Variables	43
3.2.3 Descriptive Statistics	44
3.3 Empirical Analysis	46
3.3.1 Model Comparison Procedure	47
3.3.2 Hyperparameter Tuning	48
3.3.3 Out-of-Sample Results	52
3.3.4 Graphical Model Analysis	57
3.4 Interim Conclusion	63
4 Forecasting Accuracy of Advanced Machine Learning and Linear Regression – Evidence from the Secondary CAT Bond Market	65
4.1 Introduction	65

4.2	Data	69
4.2.1	Sample Selection	70
4.2.2	Variables	70
4.2.3	Descriptive Statistics	74
4.3	Empirical Analysis	76
4.3.1	Model Framework	76
4.3.2	Hyperparameter Tuning	78
4.3.3	Out-of-Sample Results and Performance Evaluation	83
4.3.4	Variable Importance	87
4.4	Interim Conclusion	95
5	Superior Forecasting with simple AR(1) Models in a low-volatility Environment: Evidence from the CAT Bond Market	99
5.1	Introduction	99
5.2	Procedure	101
5.3	Empirical Analysis	105
5.3.1	In-Sample Analysis	105
5.3.2	Out-of-Sample Analysis	110
5.3.3	Economic Evaluation	117
5.4	Interim Conclusion	119
6	Conclusion	121
	Bibliography	127