

Contents

1	Introduction	1
1.1	The Cramér–Lundberg Process	1
1.2	The Classical Problem of Ruin	3
1.3	Gerber–Shiu Expected Discounted Penalty Functions	4
1.4	Exotic Gerber–Shiu Theory	5
1.5	Comments	7
2	The Wald Martingale and the Maximum	9
2.1	Laplace Exponent	9
2.2	First Exponential Martingale	11
2.3	Esscher Transform	12
2.4	Distribution of the Maximum	14
2.5	Comments	15
3	The Kella–Whitt Martingale and the Minimum	17
3.1	The Cramér–Lundberg Process Reflected in Its Supremum	17
3.2	A Useful Poisson Integral	18
3.3	Second Exponential Martingale	21
3.4	Duality	22
3.5	Distribution of the Minimum	24
3.6	The Long-Term Behaviour	25
3.7	Comments	25
4	Scale Functions and Ruin Probabilities	27
4.1	Scale Functions and the Probability of Ruin	27
4.2	Connection with the Pollaczek–Khintchine Formula	30
4.3	Gambler’s Ruin	33
4.4	Comments	35
5	The Gerber–Shiu Measure	37
5.1	Decomposing Paths at the Minimum	37
5.2	Resolvent Densities	38

5.3	More on Poisson Integrals	40
5.4	Gerber–Shiu Measure and Gambler’s Ruin	41
5.5	Comments	43
6	Reflection Strategies	45
6.1	Perpetuities	46
6.2	Decomposing Paths at the Maximum	47
6.3	Derivative of the Scale Function	51
6.4	Present Value of Dividends Paid Until Ruin	53
6.5	Comments	54
7	Perturbation-at-Maximum Strategies	57
7.1	Rehung Excursions	57
7.2	Marked Poisson Process Revisited	59
7.3	Gambler’s Ruin for the Perturbed Process	61
7.4	Continuous Ruin with Heavy Perturbation	63
7.5	Expected Present Value of Tax at Ruin	64
7.6	Comments	65
8	Refraction Strategies	67
8.1	Pathwise Existence and Uniqueness	67
8.2	Gambler’s Ruin and Resolvent Density	70
8.3	Resolvent Density with Ruin	75
8.4	Comments	77
9	Concluding Discussion	79
9.1	Mixed-Exponential Claims	79
9.2	Spectrally Negative Lévy Processes	81
9.3	Analytic Properties of Scale Functions	84
9.4	Engineered Scale Functions	85
9.5	Comments	89
	References	91

Gerber-Shiu Risk Theory

Kyprianou, A.E.

2013, VIII, 93 p. 7 illus., 3 illus. in color., Softcover

ISBN: 978-3-319-02302-1