

# CONTENTS

<b>PREFACE</b>	<b>11</b>
<b>AN OVERVIEW OF RISK MANAGEMENT, THE VALUE-AT-RISK APPROACH AND NOTES ON OPERATIONAL RISK</b>	<b>17</b>
<b>1. INTRODUCTION</b>	<b>18</b>
<b>2. METHODS TO MEASURE VALUE-AT- RISK</b>	<b>20</b>
2.1 DELTA-NORMAL METHOD	20
2.2 HISTORICAL-SIMULATION METHOD	20
2.3 MONTE CARLO METHOD	21
2.4 COMPARISON OF METHODS	21
<b>3. PITFALLS AND POTENTIAL DISASTERS WHEN DEALING WITH DERIVATIVES IN RISK MANAGEMENT FUNCTIONS</b>	<b>23</b>
<b>4. NOTES ON OPERATIONAL RISK</b>	<b>27</b>
<b>5. CONCLUSION</b>	<b>30</b>
<b>6. REFERENCES</b>	<b>32</b>
<b>VALUE-AT-RISK IN CENTRAL AND EASTERN EUROPEAN STOCK MARKETS: AN EMPIRICAL INVESTIGATION USING SYMMETRIC AND ASYMMETRIC GARCH MODELS</b>	<b>33</b>
<b>1. INTRODUCTION</b>	<b>34</b>
<b>2. DATA</b>	<b>36</b>
<b>3. ECONOMETRIC FRAMEWORK</b>	<b>41</b>
3.1 GENERAL GARCH AND EGARCH	41
3.2 EGARCH	43
3.3 APARCH	43
3.4 CALCULATION OF THE VAR	44
3.5 MODEL ESTIMATION	48
3.6 IN-SAMPLE AND OUT-OF-SAMPLE EVALUATION	48

<b>4. EMPIRICAL RESULTS</b>	<b>52</b>
<b>5. CONCLUSION</b>	<b>54</b>
<b>APPENDIX</b>	<b>56</b>
<b>6. REFERENCES</b>	<b>72</b>

**INTRADAY SEASONALITY AND INTRADAY VALUE-AT-RISK:  
A QUANTILE REGRESSION APPROACH** **75**

<b>1. INTRODUCTION</b>	<b>76</b>
<b>2. DATA</b>	<b>79</b>
<b>3. ECONOMETRIC FRAMEWORK</b>	<b>81</b>
3.1 QUANTILE REGRESSION	81
3.2 ACCOUNTING FOR INTRADAY SEASONALITY	82
3.3 COMPETING MODEL	83
3.4 CONSTRUCTION OF INTRADAY VAR	84
<b>4. INTRADAY SEASONALITY</b>	<b>86</b>
<b>5. INTRADAY VALUE-AT-RISK</b>	<b>90</b>
<b>6. CONCLUSION</b>	<b>93</b>
<b>7. REFERENCES</b>	<b>94</b>

**A COMPARISON OF SELECTED VALUE-AT-RISK MODELS USING RISK  
MANAGEMENT TECHNIQUES FOR DETERMINING MODEL ACCURACY** **97**

<b>1. INTRODUCTION</b>	<b>98</b>
<b>2. THE VAR CONCEPT</b>	<b>100</b>
<b>3. THE SECOND BASEL CAPITAL ACCORD</b>	<b>102</b>
3.1 STANDARDISED METHOD FOR MEASURING MARKET RISK	103
3.2 INTERNAL MODELS APPROACH TO MEASURING MARKET RISK	103
<b>4. VAR METHODOLOGIES</b>	<b>107</b>
4.1 NONPARAMETRIC MODELS	108
4.2 PARAMETRIC MODELS	111
4.3 SEMI-PARAMETRIC MODELS	120
<b>5. BACK-TESTS</b>	<b>124</b>
5.1 CONDITIONAL COVERAGE TEST	125

5.2	DYNAMIC QUANTILE TEST	127
5.3	DURATION-BASED TEST OF INDEPENDENCE	127
<b>6.</b>	<b>EMPIRICAL ANALYSIS</b>	<b>130</b>
6.1	DATA	130
6.2	SETUP	131
6.3	NONPARAMETRIC MODELS	132
6.4	PARAMETRIC MODELS	133
6.5	SEMI-PARAMETRIC MODELS	137
6.6	BACK-TESTING RESULTS	138
<b>7.</b>	<b>CONCLUSION</b>	<b>141</b>
<b>APPENDIX</b>		<b>142</b>
<b>8.</b>	<b>REFERENCES</b>	<b>152</b>
<b>OPERATIONAL RISK MANAGEMENT – STRESS TESTING AND SCENARIO ANALYSIS</b>		<b>155</b>
<b>1.</b>	<b>INTRODUCTION</b>	<b>156</b>
<b>2.</b>	<b>OPERATIONAL RISK &amp; BASEL II</b>	<b>157</b>
2.1	LITERATURE OVERVIEW	157
2.2	OPERATIONAL RISK	157
2.3	BASEL II	158
2.4	REGULATORY AND ECONOMIC CAPITAL	159
2.5	BASEL II OPERATIONAL RISK MEASUREMENT TECHNIQUES	159
2.6	COMMON OPERATIONAL RISK MANAGEMENT AND MEASUREMENT TECHNIQUES	162
<b>3.</b>	<b>LDA METHODOLOGY</b>	<b>163</b>
3.1	SPECIFICS OF OPERATIONAL RISK DATA	163
3.2	MODELS FOR OPERATIONAL RISK MEASUREMENT	164
3.3	FREQUENCY DISTRIBUTIONS	165
3.4	LOSS SEVERITY DISTRIBUTIONS	165
3.5	GOODNESS OF FIT TESTS	169
3.6	AGGREGATE LOSS DISTRIBUTION AND CAPITAL ESTIMATES	169
<b>4.</b>	<b>EMPIRICAL DATA SAMPLE ANALYSIS</b>	<b>172</b>

4.1 DATA CLASSIFICATION AND EMPIRICAL DISTRIBUTION	172
4.2 LDA RESULTS ON THE COMPANY LEVEL	174
<b>5. STRESS TESTING AND SCENARIO ANALYSIS</b>	<b>185</b>
5.1 STRESS TESTING METHODS	186
<b>6. APPLIED SCENARIO ANALYSIS</b>	<b>188</b>
6.1 SCENARIO ANALYSIS APPLICATION	188
6.2 TESTS – SCENARIO COMBINATIONS AND LOSS ESTIMATES	192
6.3 COMPARISON OF THE TEST RESULTS	195
<b>7. CONCLUSION</b>	<b>198</b>
<b>LIST OF ABBREVIATIONS</b>	<b>200</b>
<b>8. REFERENCES</b>	<b>201</b>
<b>BLACK SWANS AND OPERATIONAL RISK MANAGEMENT</b>	<b>203</b>
<b>1. INTRODUCTION</b>	<b>204</b>
<b>2. LITERATURE OVERVIEW</b>	<b>206</b>
<b>3. THEORETICAL BACKGROUND</b>	<b>208</b>
3.1 BASICS OF OPERATIONAL RISK	208
3.2 MODELLING OPERATIONAL RISK	209
<b>4. DATA ANALYSIS</b>	<b>212</b>
<b>5. METHODOLOGY</b>	<b>214</b>
5.1 CONCEPT OF VAR, MODELLING FREQUENCY AND AGGREGATION OF LOSSES	214
5.2 LOSS DISTRIBUTION APPROACH	215
5.3 EXTREME VALUE THEORY	216
<b>6. EMPIRICAL RESULTS</b>	<b>218</b>
6.1 LOSS DISTRIBUTION APPROACH	218
6.2 BLOCK MAXIMA MODELS	219
6.3 SUMMARY OF RESULTS	221
<b>7. CONCLUSION</b>	<b>223</b>
<b>8. REFERENCES</b>	<b>225</b>

<b>THE REAL OPTION MODEL – EVOLUTION AND APPLICATIONS</b>	<b>229</b>
<b>1. INTRODUCTION</b>	<b>230</b>
<b>2. OPTIONS VS REAL OPTIONS</b>	<b>231</b>
2.1 DEFINITION OF OPTIONS AND REAL OPTIONS	231
2.2 TYPES OF REAL OPTIONS	232
<b>3. REAL OPTION EVOLUTION</b>	<b>233</b>
<b>4. APPLICATION OF REAL OPTION</b>	<b>236</b>
4.1 GENERAL CONDITIONS OF REAL OPTION APPLICATION	236
4.2 AREAS OF REAL OPTION APPLICATION	237
4.3 APPLICATION OF REAL OPTION IN ENERGY SECTOR	238
<b>5. DEMONSTRATIONS</b>	<b>242</b>
5.1 STOCHASTIC EXAMPLE	242
5.2 NUMERICAL EXAMPLE	251
<b>6. CONCLUSION</b>	<b>259</b>
<b>7. REFERENCES</b>	<b>260</b>

In this project we have researched and analyzed the treatment of both risk exposure and the use of modern risk management tools in the financial and banking sectors. Both market risk and operational risk management approaches are analyzed and explained in the book. The most important risk management tools and measures are reviewed from a general point of view and not only from the risk management angle.

The opening chapter of the book is titled "An overview of risk management, the Value-at-Risk approach, and notes on operational risk". The article – essentially summarizing and recapitulating the risk management field, its functions and underlying approaches and methods – was written by Zdenek Sid Blaha.

It has been observed that the well-known and publicized financial disasters on different financial markets recently, as well as the emerging markets crises in the 1990s, have increased the importance of market, credit and operational risk management. Consequently, the question of how to better measure market risk has naturally emerged. The answer has been provided by the concept of Value-at-Risk (VaR) which has developed into a prominent quantitative tool for gauging the risk and has been accepted by government and private sector regulators, practitioners and academics.

The Value-at-Risk (VaR) measure is a fundamental tool within market risk management, and practitioners, traders, risk analysts and managers need to be familiar with it as a concept and its various measurement methodologies. Of course, we must remember that it should not be solely relied upon because it excludes extreme events, but used in conjunction with other tools when managing financial risk.