

TABLE OF CONTENTS

ACKNOWLEDGEMENT	II
LIST OF TABLES	VII
LIST OF FIGURES	IX
ACRONYMS AND ABBREVIATIONS	XI
ABSTRACT	1
1 INTRODUCTION.....	2
2 OBJECTIVES OF THE STUDY.....	4
3 RESEARCH QUESTIONS	5
4 STRUCTURE AND METHODOLOGY	6
5 PUBLIC WAREHOUSING AND FUTURE MARKET IN HUNGARY	7
5.1 PUBLIC WAREHOUSING IN HUNGARY	7
5.1.1 Brief History	7
5.1.2 Concept	9
5.1.3 The Whole Process at a Glance.....	10
5.1.4 Key Conditions for a Guaranteed Operation.....	11
5.1.5 Warehousing in Hungary	12
5.1.6 Risks Involved in Negotiating Warehouse Receipts	17
5.2 FUTURE MARKETS	18
5.2.1 Brief History	18
5.2.2 Basic Concepts.....	18
5.2.3 The Whole Process at a Glance.....	20
5.2.4 Key Conditions for a Successful Operation.....	23
5.2.5 Future Markets Within the EU With Special Focus on Hungary.....	25

6 RISK AND PRICE MANAGEMENT TOOLS IN THE EU	28
6.1 BACKGROUND	28
6.2 ORIGIN OF INCOME CRISIS MEASURES AT EU LEVEL.....	30
6.3 EXISTING TOOLS (CAP AND WITHIN THE EU) AND PROPOSED TOOLS (COM 74)	31
6.3.1 Single Farm Payment (SFP).....	32
6.3.2 Set Aside Within the SPS.....	33
6.3.3 Single Area Payment Scheme (SAPS).....	34
6.3.4 Help for Semi-Subsistence Farmers.....	35
6.3.5 Coverage Against Income Crisis – Liquidity Support Payments	36
6.3.6 Risk Management Tools	37
6.3.6.1 <i>Marketing techniques.</i>	37
6.3.6.2 <i>Hedging (futures and options)</i>	38
6.3.7 Crisis Management Tools	39
6.3.7.1 <i>Safety net provision of CMO (Cereal market)</i>	39
6.3.8 De Minimis. State aids	40
7 KOZÁR MODEL.....	40
7.1 FUNCTIONING IN BRIEF.....	41
7.2 STAGES OF THE MODEL.....	42
7.3 INPUTS OF THE MODEL.....	43
7.4 MODEL CALCULATIONS	44
7.5 KOZÁR RESULTS.....	48
8 EXTENDING THE KOZÁR MODEL	52
8.1 NEW ELEMENTS COMING FROM EU MEMBERSHIP (CAP IMPACT)52	52
8.1.1 Single Farm Payment (SFP).....	52
8.1.2 Set Aside Within the SFP.....	53
8.1.3 Single Area Payment Scheme (SAPS).....	53
8.1.4 Help for Semi-Subsistence Farmers.....	53

8.1.5	Coverage Against Income Crisis – Liquidity Support Payments	54
8.1.6	Safety net Provision of CMO (Cereal market).....	54
8.1.7	De Minimis: State aids	55
8.2	FINAL LIST OF ELEMENTS	56
9	EMPIRICAL RISK ANALYSIS BASED ON AN EXTENDED KOZÁR MODEL.....	57
9.1	BRIEF REVIEW OF DIFFERENT RISK ANALYSIS TOOLS	57
9.1.1	Risk Metrics	58
9.1.2	Historic Back Simulation	59
9.1.3	Monte Carlo Simulation Approach	60
9.1.3.1	<i>Fundamental mathematics of Monte Carlo simulation and VaR....</i>	62
9.1.3.2	<i>VaR Theory</i>	63
9.2	EQUATIONS OF NEW ELEMENTS AS A RESULT OF THE CAP	66
9.3	CONFIGURATION OF THE NEW SPREADSHEET	69
10	APPLICATIONS OF THE EXTENDED MODEL.....	71
10.1	STEPS TO GENERATE SIMULATIONS ACCORDING TO CRYSTAL BALL®	72
10.1.1	Defining Assumptions.....	73
10.1.2	Defining Probability Distributions.....	73
10.1.3	Defining Forecast Variables.....	75
10.1.4	Defining Decision Variables	77
10.1.5	Run Simulation	78
10.2	BASE SCENARIO	78
10.3	COMPILATION OF DATA	82
10.4	SIMULATIONS RESULTS WITH CRYSTAL BALL®	86
10.4.1	Results for Assumptions	86
10.4.2	Results for Forecast Variables	87
10.4.3	Business Decisions.....	90
10.4.4	Comparisons between the Kozár Model and the Extended Model.....	98

11	SUMMARY AND CONCLUSIONS	100
12	REFERENCES.....	107
13	APPENDICES	113

LIST OF TABLES

Table 1. Example of a transaction with future contracts	21
Table 2. Example of a transaction with future contracts	22
Table 3. Commodity information of a wheat future contract.....	27
Table 4. Inputs of the calculation. First stage.....	46
Table 5. Inputs of the calculation. Second stage.....	47
Table 6. Outputs of the calculation.....	49
Table 7. Results of stage 2. Prices in HUF/mt and €/mt. (Outputs of the calculation).....	50
Table 8. Elements (entries) of calculations	56
Table 9. New features of the extended Model.....	99
Table appendix B. Future daily statistics at the BET (17/02/2006)	116
Table appendix C. Monthly increases in the intervention price	117
Table Appendix D(b). Spreadsheet model in Microsoft Excel.....	121
Table Appendix E. New spreadsheet in Microsoft Excel with inclusions	122
Table Appendix G. Results of goodness-of-fit tests for lognormal distribution	126
Table Appendix H: Data series for each of the inputs with uncertainty	127
Table Appendix I(A): Variance-Covariance matrix Σ	130
Table Appendix I(B): Matrix A'	130
Table Appendix I(C): Matrix Y	130
Table Appendix I(D): Matrix Z	130
Table Appendix I(E): Matrix $\sigma^{\sqrt{t}}$	130
Table Appendix I(F): Matrix $\sigma^{\sqrt{t}}Z$	131
Table Appendix I(G): P1 simulated prices	131
Table Appendix J[B]: Descriptive statistics for selling price in HUF/mt	136
Table Appendix J[C]: Percentiles for selling price in HUF/mt	137
Table Appendix J[D]: Descriptive statistics for selling price in EUR/mt	138
Table Appendix J[E]: Percentiles for selling price in EUR/mt.....	139
Table Appendix J[F]: Descriptive statistic for VaR of May wheat futures in HUF/mt.....	140

Table Appendix J[G]: Percentiles for VaR of May wheat futures in HUF/mt .	141
Table Appendix K[B]: Trend chart data	143
Table Appendix K[C]: Combination of decision variables	144

LIST OF FIGURES

Figure 1: The warehouse receipts financing process	10
Figure 2a.Wheat and Corn prices 02 Jun,2005	14
Figure 2b. Wheat and Corn prices 11 Aug,2005	14
Figure 3. Wheat and Maize spot prices from 1990 to 2004	19
Figure 4. Development of public storage of cereals (Intervention stocks)	29
Figure 5. Daily future contract prices of May wheat 2002, from August 1, 2001 to April 30, 2002 in HUF/mt	45
Figure 6. The influence of exchange and interest rates on price	51
Figure 7. Prices of May wheat future contracts vs spot wheat market.....	80
Figure 8. Frequency distribution for interest rate (BUBOR-3 months)	84
Figure 9. Frequency distribution for exchange rate HUF/EUR	85
Figure 10. Frequency distribution for May wheat future contract price P₁.....	85
Figure 11. Frequency distribution for soft wheat average price P₁.....	86
Figure 12.Frequency chart of selling price in HUF/mt.....	88
Figure 13. Frequency chart – Forecast selling price in EUR/mt	89
Figure 14. Frequency chart of VaR for May future contract	89
Figure 15. Daily future contract prices of May wheat 2004, from August 1, 2003 to April 30, 2004 in HUF/mt.....	91
Figure 16. Frequency chart of VaR for selling price in HUF/mt.....	94
Figure 17. Frequency chart of VaR for selling price in EUR/mt.....	94
Figure 18. Frequency chart of VaR of May wheat future contract.....	96
Figure 19. March wheat price at the Budapest Stock Exchange in HUF/mt at 19:21 pm on February 8, 2006	97
Figure 20. Model sensitivity and assumption uncertainty affecting a forecast	97
Figure H1. Overlapping between a graph paper and May futures graph.....	128
Figure J[a1]. Probability distribution for interest rate -BUBOR 3 months.....	132
Figure J[a2]. Probability distribution for exchange rate.....	133
Figure J[a3]. Probability distribution for May wheat future contract.....	134
Figure J[a4]. Probability distribution for Wheat spot market price.....	135

Figure K[a1]. Certainty bands of multiple forecast for selling price in HUF/mt...	142
Figure L[a1]. Sensitivity Chart – Target forecast: selling price in HUF/mt	145
Figure L[a2]. Sensitivity Chart – Target forecast: selling price in EUR/mt	145
Figure L[a3]. Sensitivity Chart – Target forecast: VaR of wheat futures.....	146

ACRONYMS AND ABBREVIATIONS

€	Euro
BAT	Budapest Commodity Exchange
BET	Budapest Stock Exchange
CAP	Common Agricultural Policy
CMO	Common Market Organisation
EU	European Union
EUR	Euro
FM	Future Markets
HUF	Hungarian Forint
KSH	Hungarian Central Statistical Office
MNB	Hungarian National Bank
mt	Metric ton
NMS	New Members States
SAPS	Single Area Payment Scheme
SFP	Single Farm Payment
PW	Public Warehousing
WTO	World Trade Organisation