Table of contents

1. Introduction....8
2. NAFTA and Trade Liberalization in Agricultural Markets in Mexico....10
   2.1. Trade Liberalization in World Agricultural Markets and Mexico....10
   2.2. Agricultural Policy Mexico....11
   2.3. PSE in the NAFTA members....15
   2.4. Agricultural Trade in The NAFTA....16
   2.5. Agricultural Chapter in the NAFTA....18
3. Performance and characteristics of Maize Markets in Mexico and the USA....20
   3.1. World Maize Market....20
   3.2. Maize Mexican Market....21
   3.3. US Maize Market....26
   3.4. Bio-Ethanol Market....29
   3.5. Maize and Rural Areas in Mexico....32
4. Theoretical Background and Methods....37
   4.1. Background for analysis selection....37
   4.2. The Co-Integration Analysis....38
      4.2.1. Autoregressive Process....38
      4.2.2. Model Specification....39
      4.2.3. Unit Root Tests....41
      4.2.4. Co-integration Analysis....42
5. Data Analysis....47
   5.1. Basis for the Data Analysis....47
   5.2. The Models....49
      5.2.1. General Model....49
      5.2.2. Model with technology variable....55
      5.2.3. Model with the regional variable....57
6. Results & Discussion....60
   6.1. Discussion on the general model....60
   6.2. Discussion on the model with technology variable....62
   6.3. Discussion on the model with regional variable....63
   6.4. General shortcomings of the models....63
   6.5. Alternatives....65

7. Conclusions.....67
8. References.....68
9. Appendix.....76

List of Tables

Table 1: Major agricultural exporters in the world 17
Table 2: Agricultural products under TRQ system in 2007 19
Table 3: Major maize producers in the world 20
Table 4: Major maize exporters and importers in the world 21
Table 5: US maize market supply and use 29
Table 6: World ethanol production 30
Table 7 Ethanol Production Capacity in the USA 31
Table 8: Examples of social, economic, demographic and agriculture production indicators in Mexico by region 34
Table 9 Variables in the Time Series Analysis 47
Table 10: Results of the co-integration test using Johansen Approach for nominal prices 49
Table 11: Results of the co-integration test using Johansen Approach for deflated data 52
Table 12: Results of the stability test for break points (Chow test) 52
Table 13: Results of the causality tests 54
Table 14: Residuals analysis 55

List of Figures

Figure 1: PSE by country. Percent of value of gross farm receipts 12
Figure 2: Largest agricultural producers in the world per volume 16
Figure 3 Development of Agricultural trade between Mexico and USA 17
Figure 4: Performance of maize production in Mexico 22
Figure 5: Performance of maize harvested area in Mexico 23
Figure 6: Performance of Maize Yield in Mexico 23
Figure 7: Performance of maize Mexican imports from the US 24
Figure 8: Performance of US maize production and harvested area 26
Figure 9: Performance of maize US yield 27
Figure 10: Performance of maize US exports 28
Figure 11: Bio-ethanol production performance in the US 31
Figure 12: Bio-Ethanol production performance, and share of total maize production in the US 32
Figure 13: Regional Areas in Mexico 34
Figure 14: Monthly inflation in Mexico and USA for the period 07/1985-12/2006 49
Figure 15: Assumed relationships among the variables for the general model 50
Figure 16: Co-movement of bio-ethanol and maize FOB real prices in the US markets 51
Figure 17: Co-movement of bio-ethanol production and maize FOB real prices in the US 51
Figure 18: Co-movement of bio-ethanol and maize FOB real prices in the US markets 52
Figure 19: Assumed relationships among the variables for the model with technology variable 55
Figure 20: Co-movement of the US maize FOB real prices and Mexico maize prices by technology 56
Figure 21: Assumed relationships among the variables for the model by regions 57
Figure 22: Co-movement of the US maize FOB real prices and Mexico maize prices by technology 58
Figure 23: Performance of the p-value for the residuals (bootstrap method) 59

List of Appendices

1.1 Descriptive statistics of the time series 76
1.2 Exchange rate MXP/USD 76
1.3. Order selection criteria and unit root tests for the variables 77
1.4. Co-Integration test for all the proposed models using Johancen approach 78
1.5 Stability tests for the models using p-value for Chi square and the bootstrap method (model USA_R_1, MEX_R_1, constant, trend) 79
1.6 Stability tests for the models using p-value for Chi square and the bootstrap method (model USA_R_1, MEX_R_2, MEX_R_3, constant, trend) 79
1.7 Stability tests for the models using p-value for Chi square and the bootstrap method (model USA_R_1, USA_R_2, constant, trend) 80
1.8. Causality tests for the estimated models 81
1.9. Residuals analysis tests for the estimated models 82
1.10 VECM: USA_R_1, USA_R_2, constant, trend 82
1.11 VECM: USA_R_1, USA_R_2, constant, trend 82
1.12 VECM: USA_R_1, USA_R_2, EPACT_shift, EPACT_trend, constant, trend 82
1.13 VECM: USA_R_1, MEX_R_1, NAFTA_shift,NAFTA_trend, OP_shift, OP_trend, constant, trend 83
1.14 VECM: USA_R_1, MEX_R_1, OP_shift, OP_trend, constant, trend 83
1.15 VECM: USA_R_1, MEX_R_2, MEX_R_3, NAFTA_shift, NAFTA_trend, OP_shift, OP_trend, constant, trend 83
1.16 VECM: USA_R_1, MEX_R_2, MEX_R_3, NAFTA_trend, OP_trend, constant, trend 84
1.17 VECM: USA_R_1, MEX_R_2, MEX_R_3, constant, trend 84
1.18 VECM: USA_R_1, MEX_R_2, MEX_R_3, constant, trend 84
1.18 VECM: USA_R_1, MEX_R_2, MEX_R_3, constant, trend, NAFTA_shift, NAFTA_trend, OP_shift, OP_trend 84

List of abbreviations

AGY	Average Growth per Year
BANXICO	Mexican Central Bank
BLS	National Bureau for Labour and Statistics
CEDRSSA	Centre for Sustainable Rural Development and Food Security Studies
CONASUPO	National Company for People's Subsistence
EIA	Energy Information Administration
ENHRUM	National Survey in the Rural Households
ERS	Economic Research Services
FAO	Food and Agriculture Organization of the United Nations
GATT	General Agreement on Tariffs and Trade
IME	Institute of the Mexicans in Foreign Countries
INEGI	National Institute for Statistics, Geography and Informatics
MERCOSUR	Southern Common Market
NAFTA	North American Free Trade Agreement
OECD	Organization for Economic Co-operation and Development
PNUD	United Nations Development Programme
RFTA	Regional Free Trade Agreement
SAGARPA	Mexican Ministry of Agriculture, Livestock, Rural Development, Fishery and Food.
SEDESOL	Mexican Ministry of Social Development
SIACON	System for Agro-food Information
SIAP	Service of Information and Statistics for Agriculture and Fishery
SNIIM	National System for Markets Integration
SRE	Mexican Ministry of Foreign Relations
USDA	United States Department of Agriculture
USDE	United States Department of Energy
WTO	World Trade Organization