

## Table of Contents

Table of Contents.....	3
List of Tables .....	5
List of Figures .....	6
List of Abbreviations and Acronyms .....	7
Acknowledgments.....	8
Abstract.....	9
1. Introduction.....	10
2. Overview of the World Sugar Market.....	11
2.1. Area under Sugar Cane and Sugar Beet.....	11
2.2. World Sugar Production .....	13
2.3. The World Sugar Consumption .....	17
2.4. The World Sugar Trade.....	19
2.5. World Sugar Prices .....	22
2.6. The Colombian Sugar Market.....	24
2.7. Brasil Sugar Market .....	32
3. Sugar Policies.....	34
3.1. Colombia Sugar Policies.....	37
3.2. Brazil Sugar Policies.....	39
4. Theoretical Framework .....	41
4.1. Market Integration Theory .....	41
4.2. Economic Time Series Analysis .....	42
4.3. Tests for Stationarity (Unit root test) .....	44
4.4. Cointegration Analysis.....	44
4.5. Vector Error Correction Models (VECMs).....	47

4.6.	Test for Market Integration .....	48
4.7.	Johansen Multivariate Cointegration Approach.....	49
5.	Results, Empirical Analysis .....	51
5.1.	Data.....	51
5.2.	Unit Root Test, Stationary Properties .....	52
5.3.	Johansen Cointegration Test .....	54
5.4.	Vector Error Correction Model Formulation .....	56
6.	Discussion and Conclusions.....	60
7.	References.....	62
8.	Appendices.....	67

## List of Tables

Table 1: Harvested Area by Countries and Geographical Groups. Marketing Year 2007.....	11
Table 2: Largest Cane and Beet Sugar Producing Countries. Marketing Year 2007.....	13
Table 3: Major Sugar Exporters, Importers, and Consumers. Marketing year 2007. ....	21
Table 4: Colombian Sugar Exports by Market, and Revenues. Period 1997- 2007. ....	29
Table 5: Raw Sugar Price Nomenclature for the Selected Markets.....	51
Table 6: Stationarity Test of Raw Sugar Price Series, Augmented Dickey-Fuller Test. ....	53
Table 7: Bivariate and Multivariate Cointegration Tests in Selected Sugar Markets. 1998 M70- 2007 M12.....	55
Table 8: Restricted Cointegration Vectors and Their Weights. ....	57
Table 9: Likelihood Ratio Test Results.....	57
Table 10: Sugar Production by Geographical and Income Groups. MY 2007. ....	67
Table 11: Sugar Consumption by Geographical and Income Groups. MY 2007. ....	67
Table 12: Sugar Exports by Geographical and Income Groups. MY 2007. ....	68
Table 13: Sugar Imports by Geographical and Income Groups. MY 2007. ....	68
Table 14: Tests for Residual Autocorrelation. ....	70
Table 15: Jarque Bera Test. ....	70
Table 16: Eigenvalue Stability Condition. ....	71

## List of Figures

Figure 1: Harvested Area for Sugar Production, Developments in the Period 1978-2007. ....	12
Figure 2: Top-ten Largest Sugar Producing Countries, Marketing Period 2006-08. ....	14
Figure 3: World Sugar Production, Beet Sugar and Cane Sugar. Period 1978-2008. ....	15
Figure 4: World Sugar Production, Consumption, and World Price. Period 1978-2007. ....	18
Figure 5: Global Sugar Trade Trends, in Terms of Exports. Period 1978-2007. ....	20
Figure 6: World Benchmark Sugar Prices, Yearly Average. Period 1970-2008. ....	24
Figure 7: Yield Developments of Selected Sugar Producing Countries. Period 2000-2007. ....	25
Figure 8: Colombia Sugar Production, and Domestic Consumption. Period 1980-2007. ....	26
Figure 9: Economic Growth of Colombia, and Domestic Sugar Consumption. 1980-2007. ....	27
Figure 10: Evolution of the Colombian Sugar Exports, Exchange Rate. Period 1980-2007. ....	28
Figure 11: Sugar Prices in Selected Sugar Markets. Period from Jun-96 to Oct-06. ....	31
Figure 12: Brazil Sugar Production, and Domestic Consumption. Period 1980-2007. ....	33
Figure 13: Evolution of the Brazilian Sugar Exports. Period 1980-2007. ....	34
Figure 14: Percentage PSE by Country, Transfers as a Share of Gross Farm Receipts. ....	36
Figure 15: Plot of Time Series 1998.01 – 2007.12. T=120. ....	52
Figure 16: Plot of Sugar Time series for the Three Markets, Levels and First Differences. ....	54
Figure 17: Geographical distribution of the world sugar production, sugar beet and sugar cane. ....	69

## List of Abbreviations and Acronyms

ADF:	Augmented Dickey-Fuller test.
AIC:	Akaike Information Criterion.
AoA:	Uruguay Round Agreement on Agriculture.
AR:	Autoregressive Process.
ASOCANA:	Colombian Association of Sugar Cane Growers.
CMO:	Common Market Organisation.
DGP:	Data Generation Process.
ECM:	Error Correction Model.
ERS:	Economic Research Service.
EU-27:	European Union.
FAS:	Foreign Agricultural Service, United States Department of Agriculture.
FOB:	Free on Board.
IMF:	International Monetary Fund.
LOP:	Law of One Price.
MDIC:	Ministry of Development, Industry and Trade of Brazil.
ML:	Maximum Likelihood.
OECD:	Organization for Economic Co-operation and Development.
OLS:	Ordinary Least Squares.
PS&D:	Production, Supply and Demand.
RWM:	Random Walk Model.
SECEX:	Foreign Trade Secretariat of Brazil.
USDA:	United States Department of Agriculture.
VECM:	Vector Error Correction Model.
WTO:	World Trade Organization.