

**MYANMAR RICE MARKET:
MARKET INTEGRATION AND PRICE CAUSALITY**

THEINGI MYINT

JANUARY 2007

MYANMAR RICE MARKET:
MARKET INTEGRATION AND PRICE CAUSALITY

A thesis presented by
THEINGI MYINT

To

The Postgraduate Committee of the Yezin Agricultural
University as a requirement for the degree of
Doctor of Philosophy in Agricultural Economics

Yezin Agricultural University

January 2007

Copyright © [2007 – by Theingi Myint]
All rights reserved

The thesis attached hereto, entitled "MYANMAR RICE MARKET: MARKET INTEGRATION AND PRICE CAUSALITY" was prepared under the direction of the chairman of the candidate supervisory committee and has been approved by all members of that committee and board of examiners as a requirement for the degree of Doctor of Philosophy.

Dr. Myint Thaung
Chairman, Board of Examiners
Rector
Yezin Agricultural University

Dr. Win Htut
External Examiner
Assistant Director
Settlement and Land Records Department

Dr. Cho Cho Myint
Vice Chairman, Board of Examiners
Pro-Rector (Academic)
Yezin Agricultural University

Dr. Dolly Kyaw
Supervisor, Supervisory Committee
Head & Associate Professor
Agricultural Economics Department,
Yezin Agricultural University

Dr. Thanda Kyi
Member, Supervisory Committee
Lecturer
Agricultural Economics Department,
Yezin Agricultural University



Dr. Siegfried Bauer
Member, Supervisory Committee
Professor
Project and Regional Planning
Justus-Liebig University, Giessen,
Germany

The thesis was submitted to the Rector of the Yezin Agricultural University and was accepted as a requirement for the degree of Doctor of Philosophy.

Rector
Yezin Agricultural University
Yezin

Date -----

DECLARATION OF ORIGINALITY

This thesis represents the original works of the author, except where otherwise stated. It has not been submitted previously for a degree at any other university.

Theingi Myint

Date -

ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to my supervisor Dr. Dolly Kyaw, Head of the Agricultural Economics Department, Yezin Agricultural University for her guidances and invaluable advices for this study. I would like to extend my deepest gratitude to my supervior Professor Dr. Siegfried Bauer, Department of Project and Regional Planning, Jutus-Liebig University, Giessen, Gernamy for his kind support of necessary facilities, encouragements and valuable supervisions during my study at Germany.

My sincere thanks are also extended to Dr. Thanda Kyi, for her very helpful commands, corrections and careful reading to improve this dissertation. My gratitude is also due to Dr. Win Htut, Assistant Director Settlement and Land Records Department for his kind help, cooperation and valuable suggestions for this manuscript.

My sincere gratitute go to Dr. Kyaw Than, former Rector, Yezin Agricultural University, for his permission to do this research under the supervision of Professor Dr. Siegfried Bauer, Department of Project and Regional Planning, Jutus-Liebig University, Giessen, Gernamy, and for all his scholarly guidance. I am indebted to Dr. Myint Thaug (Rector, Yezin Agricultural University) and Dr. Cho Cho Myint (Pro-rector, Yezin Agricultural University) for their valuable suggestions and guidences throughout the course of this research.

I am grateful to German Academic Exchange service (DAAD) for the financial support to study at German University within Sandwich Program. I am indebted to all my colleagues of Agricultural Economics Department, Yezin Agricultural University, and Project and Regional Planning Department, Justus-Liebig University, Giessen, for their valuable assistance from time to time, especially during my study period.

There is no match to encouragement given by my mother Daw Khin Shwe, and her constant supports and unconditional love is greatly acknowledged. My husband U Tin Ko Ko's care and support in the completion of this work is remarkable, without which this research work would not have been in reality. To my son Mg Thoon Nay Bala, I admire for his patience and understanding, and therefore dedicate this work to him.

**MYANMAR RICE MARKET:
MARKET INTEGRATION AND PRICE CAUSALITY**

Supervisor: Dolly Kyaw

Author: Theingi Myint

ABSTRACT

Rice plays an important role in Myanmar's economy as a staple food and high amount of foreign exchange earning comes through rice export. The agricultural economy of Myanmar has been under transition from a planned to a market system since late 1980s. Two liberalizations of rice marketing had been done in 1987 and 2003. The first liberalization was implemented by allowing free domestic marketing and private export of some agricultural products except rice. Rice procurement and rationing systems were abolished under the second liberalization. Actually, the government is still not undertaking full-scale rice export deregulation. Therefore, the rice marketing system in Myanmar works within the boundaries and limitations of a halfway-liberalized economy which triggers questions about the structure, conduct and performance of rice marketing system.

In this study, the general SCP (Structure, Conduct and Performance) approach is adopted, which allows for feedback relationships, competitive behaviour (conduct) of firms and performance (in terms of price, transaction cost, etc.) that might influence the market structure elements by analysing the secondary and primary market survey data of rice surplus and deficit regions. For the market integration and price causality, Yangon, Patheingyi, Pyaw (surplus markets), Mandalay, Magway and Taunggyi (deficit markets) and Thai rice (5 % broken, FOB) price series are tested by using the procedure of Engle and Granger two-step co-integration method and restructured Ravallion model of unrestricted Vector Auto-Regression (VAR) error correction form. All price series are weekly and monthly data in both nominal and real values from 2001 to 2004.

The result is evidence for the domestic market; integration was weak in real value of rice price and the supply side depended on the demand side in the long run. Price co integration did not exist between Yangon and Thai rice price in real value, and therefore, there was market segmentation. Consequently, Myanmar rice price movement could not receive accurate price information from international rice market price over time. Looking at the direction of price causality, deficit market prices were driving the

CPI and the CPI was forcing the Yangon market price and surplus rice market price. Therefore, deficit markets were the prime movers in rice price changes in Myanmar.

According to the results, the performance of the rice marketing system concerned is market integration and price causality. Based on the market performance, the government should give attention to manage the inflationary pressure instead of direct involvement in the rice marketing sector to control the domestic rice price stability in the long run. The result of the government monopoly in rice export has been the segmentation between domestic market and international market. Myanmar rice market could not get the correct price signal from the international market. If the private rice export was allowed through the trade policies, the marketing system would be able to transfer price signal from the world market to the producer, consumer, market participants and finally the government. Then, Myanmar rice market will no longer be isolated from the international market and getting the right price cointegration that may push the efficient market oriented economy to go on faster.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS.....	vi
ABSTRACT	vii
TABLE OF CONTENTS.....	ix
LIST OF TABLES.....	xiv
LIST OF FIGURES	xvii
LIST OF APPENDICES.....	xviii
LIST OF ABBREVIATIONS.....	xix
LIST OF CONVERSION FACTORS	xix
CHAPTER 1 INTRODUCTION	1
1.1 Country Profile and Background Information	1
1.2 The Problem Statements	7
1.2.1 Average Household Expenditure in Myanmar	7
1.2.2 Government Interventions in Rice Market Over Time	9
1.2.3 Condition under the Market Oriented Economy.....	12
1.2.4 New Rice Marketing Policy in 2003-2004	13
1.2.5 Trade Balance, Currency Issue and Rice Market Inefficiency	14
1.3 Research Questions.....	15
1.4 Objectives of the Study.....	16
1.5 Hypotheses of the Study	16
1.6 Significance of the Study.....	17
1.7 Organization of the Study.....	18
CHAPTER 2 CONCEPTUAL AND THEORETICAL FRAMEWORK	19
2.1 The Macroeconomic Policies and Myanmar Rice Market	19
2.2 Agricultural Marketing in Developing Countries.....	22
2.3 Market Structure and Performance	24

2.4 Marketing Channels, Costs and Margins.....	27
2.5 Spatial Efficiency and Market Integration.....	29
2.5.1 Concept of Market Integration.....	30
2.5.2 Spatial Price Equilibrium (SPE) Model.....	32
2.6 Review of Analyzing Spatial Market Efficiency Methods.....	35
2.6.1 Price Correlation.....	35
2.6.2 Variance Decomposition Approach.....	36
2.6.3 Ravallion's Method.....	36
2.6.4 Cointegration Analysis.....	37
2.6.5 Threshold Cointegration Test.....	38
2.6.6 Parity Bounds Model.....	38
2.6.7 Price Causality Analysis.....	39
 CHAPTER 3 RESEARCH METHODOLOGY.....	 41
3.1 The Sources of the data.....	41
3.1.1 Sampling Method and Primary Data Collection.....	41
3.1.2 Time Series Price Data Collection.....	42
3.1.3 Selected Markets for the Study.....	45
3.2. Method of Analysis on Market Structure and Performance.....	48
3.2.1 Analytical Framework.....	48
3.2.2 Empirical Analysis.....	48
3.3. Method of Marketing Cost and Margin Analysis.....	49
3.3.1 Analytical Framework.....	49
3.3.2 Empirical Analysis.....	50
3.4 Method of Market Integration and Causality Analysis.....	51
3.4.1 Analytical Framework.....	51
3.4.2 Empirical Analysis.....	54
 CHAPTER 4 MYANMAR RICE MARKET STRUCTURE.....	 59
4.1 Farm Structure.....	59
4.2 Market Intermediaries and Private Institutions.....	61
4.2.1 Primary Collector.....	61
4.2.2 Rice Miller.....	62
4.2.3 Rice Wholesaler.....	63
4.2.4 Rice Retailer.....	64

4.3 Public Institutions in Rice Marketing.....	65
4.3.1 Paddy Procurement System.....	65
4.3.2 Rice Rationing System.....	68
4.3.3 Rice Export System.....	70
4.4 Major Rice Flow in Myanmar.....	70
4.5 Overall Rice Sector Structure during One Decade (1994-2003).....	75
CHAPTER 5 DESCRIPTION OF THE RICE MARKET PARTICIPANTS.....	78
5.1 Demographic Characteristics of Sample Farmers.....	78
5.1.1 Age, Experience and Education Level of Sample Farmers.....	78
5.1.2 Family Size and Family Labor of Sample Farmers.....	80
5.2 Agricultural Characteristics of Sample Farmers.....	80
5.2.1 Land Holding and Cropping Patterns.....	80
5.2.2 Cultivated Area under Different Paddy Varieties.....	83
5.2.3 Average Total Production and Yield of Paddy.....	83
5.2.4 Total Variable Cost and Unit Cost of Paddy Production.....	86
5.3 Marketing Characteristics of Sample Farmers.....	89
5.3.1 Marketed Surplus.....	89
5.3.2 The Time of Selling and Storage of Marketed Surplus.....	89
5.3.3 Marketing Channels and Activities of the Sample Farmers.....	93
5.3.4 Credit Sources.....	95
5.3.5 Important Opinions of the Sample Farmers.....	97
5.4 General Characteristics and Marketing Activities of Primary Collector.....	101
5.4.1 General Characteristics and Competition Level of Primary Collectors.....	101
5.4.2 Marketing Activities of Primary Collectors.....	103
5.5 General Characteristics and Marketing Activities of Millers.....	103
5.5.1 General Characteristics of Millers.....	103
5.5.2 Milling Capacity and Competition Level of Millers.....	105
5.5.3 Marketing Activities of Millers.....	109
5.6 General Characteristics and Marketing Activities of Wholesalers.....	111
5.6.1 General Characteristics of Wholesalers.....	111
5.6.2 Competition Level and Marketing Activities of Wholesalers.....	111
5.7 General Characteristics and Marketing Activities of Retailers.....	116
5.7.1 General Characteristics and Competition Level of Retailers.....	116
5.7.2 Marketing Activities of Retailers.....	118

5.8 Opinions about Rice Marketing System of Market Participants	121
CHAPTER 6 RICE MARKETING CHANNELS, COSTS AND MARGINS	125
6.1 Rice Marketing Channels in Sample Markets	126
6.2 Marketing Profit of the Sample Farmers	128
6.3 Marketing Cost and Margin of Primary Collectors and Millers.....	129
6.4 Marketing Costs and Margin of Wholesalers	134
6.5 Marketing Costs and Profits of Retailers.....	136
6.6 Composition of Consumer Price in Sample Markets.....	136
CHAPTER 7 DESCRIPTION OF TIME SERIES PRICE DATA	144
7.1 Descriptive Statistics of Selected Price Series in Nominal and Real	144
7.2 Plotting of Selected Price Series in Nominal and Real Values	149
7.3 Seasonal Movement of Selected Rice Price Series	153
CHAPTER 8 ANALYSIS OF MARKET INTEGRATION AND PRICE	
CAUSALITY	155
8.1 Data Generating Process of Selected Rice Price Series	155
8.2 Cointegration Analysis of Selected Rice Price Series	158
8.2.1 Cointegration among Nominal Rice Price Series	159
8.2.2 Cointegration among Real Rice Price Series and Consumer Price Index ...	161
8.2.3 Cointegration between Myanmar and International Rice Price.....	164
8.3 Price Causality Analysis of Selected Rice Price Series.....	166
CHAPTER 9 SUMMARY, CONCLUSION AND POLICY IMPLICATIONS	173
9.1 Summary of Findings	173
9.1.1 Structure of the Rice Sector and Marketing	173
9.1.2 Description of Rice Marketing Participants	174
9.1.3 Rice Marketing Channels, Costs and Margins	176
9.1.4 Description of Time Series Price Data	178
9.1.5 Market Integration and Price Causality	179
9.2 Conclusions	180
9.3 Policy Implications.....	184

9.3.1 Competitive Rice Market Structure Overtime.....	184
9.3.2 Conducts of the Myanmar Rice Market for Future Perspective.....	185
9.3.3 Performance of the Myanmar Rice Market for Future Perspective.....	185
9.4 Limitations and Suggestions for Future Research.....	187
REFERENCES.....	189
APPENDICES.....	198

LIST OF TABLES

	Page
Table 1.1 Paddy productions of the top ten paddy-producing countries, 2003	6
Table 1.2 Rice consumption of the top ten countries and world average, 1999.....	6
Table 1.3 Changes of rice production and export in different government era.....	10
Table 3.1 Number of respondents from the different strata in each market.....	43
Table 3.2 Selected wholesale price series for market integration	43
Table 3.3 Descriptive characteristics of the study areas (2003)	47
Table 4.1 MAPT's procurement of paddy under the contract system.....	67
Table 4.2 Rationed rice and selling price by MAPT during 1988-2003	69
Table 4.3 Monthly rice supply flow to Yangon market in 2001-2004.....	74
Table 5.1 Average age, experience and education level of sample farmers	79
Table 5.2 Family size, of adult gender ratio and children, 2004	81
Table 5.3 Family labor and gender ratio of sample farmers, 2004.....	81
Table 5.4 Land holding of sample farmers, 2004.....	82
Table 5.5 General cropping pattern of sample farmers, 2004	82
Table 5.6 Cultivated area under different varieties of paddy, 2004 (%)	84
Table 5.7 Total variable cost of paddy production in kyat/ha and percentage.....	87
Table 5.8 Unit cost of paddy production of sample farmers, 2004	87
Table 5.9 Paddy production, consumption and marketed surplus.....	90
Table 5.10 First times of selling days after harvesting of sample farmers, 2004.....	92
Table 5.11 Different duration of paddy storage by sample farmers, 2004 (%).....	92
Table 5.12 Selling to different buyers of sample farmers, 2004 (%)	94
Table 5.13 Place of transaction of sample farmers, 2004 (%).....	94
Table 5.14 Mode of transportation of sample farmers, 2004 (%)	94
Table 5.15 Type of marketed surplus of sample farmers, 2004 (%)	96

Table 5.16 Price determination process (percentage of sample farmers), 2004.....	96
Table 5.17 Government credit support of the sample farmers, 2004	98
Table 5.18 Private credit source, 2004	98
Table 5.19 Some important opinions of sample farmers in percentage, 2004	99
Table 5.20 Age, experience and education level of primary collectors, 2004	102
Table 5.21 Competition level of primary collectors (PC), 2004	102
Table 5.22 Marketing activities of primary collectors in percentage, 2004.....	104
Table 5.23 Age, experience and education level of millers, 2004.....	106
Table 5.24 Milling capacity of sample mill in percentage	108
Table 5.25 Competition level of millers, 2004.....	108
Table 5.26 Marketing activities of millers in percentage, 2004	110
Table 5.27 Age, experience and education level of wholesalers, 2004.....	112
Table 5.28 Competition level of wholesalers, 2004	113
Table 5.29 Marketing activities of wholesalers in percentage, 2004	115
Table 5.30 Price determination process, 2004.....	117
Table 5.31 Source of capital investment (percentage of wholesalers), 2004	117
Table 5.32 Age, experience and education level of retailers, 2004.....	119
Table 5.33 Competition level of retailers, 2004	119
Table 5.34 Marketing activities of retailers in percentage, 2004	120
Table 5.35 Important opinions of market intermediaries by percentage, 2004	122
Table 6.1 Profit percentage of unit cost on farm gate price of paddy, 2004	130
Table 6.2 Margin percentage of unit cost on rice price, 2004	130
Table 6.3 Profit percentage of unit cost on rice price, 2004.....	130
Table 6.4 Average marketing cost and margin of primary collectors in 2004	132
Table 6.5 Average variable cost of milling in 2004 (kyat/ton)	132
Table 6.6 Average variable cost of milling (%), 2004	133

Table 6.7 Net profit over total variable cost of milling (kyat/ton), 2004	133
Table 6.8 Average variable cost of sample wholesalers (kyat/ton), 2004.....	135
Table 6.9 Average variable cost of sample wholesalers (%), 2004.....	135
Table 6.10 Cost, profit and volume of trade of sample wholesalers	135
Table 6.11 Average variable cost of sample retailers (kyat/ton), 2004.....	137
Table 6.12 Average variable cost of sample retailers (%), 2004.....	137
Table 6.13 Cost, profit and volume of trade of sample retailers	137
Table 6.14 Composition of consumer price (kyat/ton).....	139
Table 6.15 Percent composition of consumer price	140
Table 6.16 Composition of total gross marketing margin (%).....	142
Table 7.1 Descriptive statistics of weekly wholesale price series.....	145
Table 7.2 Descriptive statistics of monthly nominal wholesale price series.....	146
Table 7.3 Descriptive statistics of monthly real wholesale price series	148
Table 8.1 Coefficient of unit root test on selected rice price series and CPI.....	156
Table 8.2 ADF statistics of unit root test on selected rice price series.....	157
Table 8.3 Cointegration between Pawson nominal price series	160
Table 8.4 Cointegration among other varieties nominal price series	160
Table 8.5 Cointegration among Pawsan real price series and CPI	162
Table 8.6 Cointegration among other varieties real price series	162
Table 8.7 Cointegration between Yangon Pawsan and Thai rice price series.....	165
Table 8.8 Causality-F statistics of Pawson market pairs.....	168
Table 8.9 Causality-F statistics of other varieties market pairs.....	168
Table 8.10 Direction of price causality in significant market pairs.....	170

LIST OF FIGURES

	Page
Figure 1.1 Land utilization in Myanmar, 2003-2004	3
Figure 1.2 Gross domestic product compositions by sector, 2001-2002.....	3
Figure 1.3 Paddy production, sown area and yield in Myanmar, 1988-2004.....	5
Figure 1.4 Distribution of household expenditure in Myanmar, 1999	8
Figure 1.5 Proportion of total export earning and agricultural export earning of rice ..	11
Figure 2.1 The conceptual framework for Myanmar rice market	20
Figure 2.3 Two-regions spatial price equilibrium model	34
Figure 3.1 Location of selected markets in Myanmar	46
Figure 4.1 Marketed surplus percentages across the administrated regions, 2003.....	72
Figure 4.2 Overall rice sector structure during 1994-2003	77
Figure 5.1 Average total productions of sample farmers in studied areas, 2004	85
Figure 5.2 Average yields of sample farmers in studied areas, 2004.....	85
Figure 5.3 Ratio of different variable costs in studied areas, 2004	88
Figure 6.1 Marketing channels in sample surplus regions (2004).....	127
Figure 6.2 Marketing channels in sample deficit regions (2004).....	127
Figure 7.1 Plotting of weekly wholesale price series for Pawsan variety	150
Figure 7.2 Plotting of weekly wholesale price series for Yangon and Mandalay	150
Figure 7.3 Plotting of weekly wholesale price series for Pyay and Taunggyi	151
Figure 7.4 Plotting of weekly wholesale price series for Pathein and Mandalay	151
Figure 7.5 Plotting of monthly wholesale price series for Pawsan and Thai rice	152
Figure 7.6 Plotting of monthly wholesale price series for Pawsan and Thai rice	152
Figure 8.1 Rice price formation based on causality in Myanmar during 2001-2004..	171

LIST OF APPENDICES

	Page
Appendix 1 Market exchange rate in 2001-2004 (Kyats/dollar).....	198
Appendix 2 Consumer Price Index in 2001-2004	198
Appendix 3 Paddy sown area, total production, population, utilization and self sufficiency in different regions (2003).....	199
Appendix 4 Total production, utilization, marketable surplus and procured paddy volume (1994-2003).....	200
Appendix 5 Total utilization, marketable surplus and procurement percentage of total paddy production (1994-2003).....	201
Appendix 6 Distance of highway road between selected pairs of rice markets	202
Appendix 7 Figures for seasonal movement of nominal and real price series in each selected rice market.....	202
Appendix 8 Figures for first differences of weekly price series in selected rice markets (nominal value).....	206
Appendix 9 Figures for first differences of monthly price series in selected rice markets (real value).....	209
Appendix 10 Important statistical results of cointegration regressions (nominal price series).....	213
Appendix 11 Important statistical results of cointegration regressions (real price series of Pawson variety)	214
Appendix 12 Important statistical results of cointegration regressions (real price series of other varieties).....	215
Appendix 13 Important statistical results of causality model.....	216
(a) Dependent Variable: P =Yangon Pawson	216
(b) Dependent Variable: P =Pathein Pawson	216
(c) Dependent Variable: P =Mandalay Pawson.....	217
(d) Dependent Variable: P = Taunggyi Pawson	217
(e) Dependent Variable: P = Consumer Price Index (CPI)	218
(f) First markets is dependent variable (P) and second is independent variable (R) in each market pair.....	219

LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller test
AIC	Akaike Information Criterion
ASEAN	Association of South-East Asian Nations
CPI	Consumer Price Index
CSO	Central Statistical Organization
DAP	Department of Agricultural Planning
FAO	Food and Agriculture Organization
FOB	Free on Board
GDP	Gross Domestic Product
Ha	Hectare
HYV	High Yielding Variety
IRRI	International Rice Research Institute
Kg	Kilogram
Km	Kilometer
MAPT	Myanmar Agricultural Produce Trading
MAS	Myanmar Agricultural Service
Mil	Million
MIS	Market Information Service
MM	Millimeter
MOAI	Ministry of Agriculture and Irrigation
Mt	Metric ton
PBM	Parity Bound Model
PC	Primary Collector
PGMM	Farmer's Portion of Producer's Gross Marketing Margin
SCP	Structure, Conduct and Performance
TGMM	Total Gross Marketing Margin
TSP	Time Series Processor

LIST OF CONVERSION FACTORS

1 Basket of Paddy	= 20.86 Kilogram
1 Basket of Rice	= 34.01 Kilogram
1 Hectare	= 2.47 Acres
1 kilogram	= 2.20 Pounds
1 Viss	= 1.63 Kilogram

CHAPTER 1

INTRODUCTION

Myanmar, one of the ASEAN member countries, is endowed with rich natural resources, such as cultivable land, available water resource and favorable climate for agriculture. Rice is the staple food item as well as economically and politically important crop. Therefore, successive governments attempted to develop the country's rice economy to produce sufficient rice for domestic consumption, to maintain the stable rice price as a political reason, and at the same time to increase the rice surplus for exporting. However, rice export in Myanmar had a decreasing trend over time. Also Myanmar people were living at a very low-income level using the 79 percentage of their household expenditure only for food needs (CSO 2001). Kriesberg (1974) criticized that the consumer in developing countries frequently spends in excess of fifty percent of the household's income on basic foodstuffs. Moreover, paddy farmers were implicitly taxed because of the ban on private-sector export of rice. World Bank Report (2002) mentioned that the international price of rice was higher than domestic prices, because that of the price received by paddy farmers was about a third lower than they could export freely. Eventually, the rice production policy, land policy as well as rice pricing policy affected not only agricultural production but also the rice marketing in Myanmar.

1.1 Country Profile and Background Information

Myanmar is geographically located between 9.58° to 28.31° N and 92.9° to 101.10° E and is situated in South East Asia, sharing borders with Bangladesh, India, China, Laos and Thailand. The total area of the country is about 678,500 square kilometer, stretching for 2276 kilometer along the sea coasts of Bay of Bengal and the Andaman Sea. The western, northern and eastern parts of the country are hilly regions with altitude varying from 915 to 2134 meters above the sea level (MOAI 1998).

Myanmar possesses tropical and sub-tropical climates with three general seasons. There are three seasons in the country, (i) the raining season from middle of May to middle of October, (ii) the dry cold season from middle of October to middle of February and (iii) the hot season from middle of February to middle of May. The average annual rainfall varies over the country, ranging from 2480 mm to 5690 mm in

the coastal and hilly regions and 657 mm to 1220 mm in the central core of Myanmar. The temperature in the southern part of the country differs only a little during the different seasons. In the central plain of the country seasonal variation of the temperature lies in the magnitude of 34.1°- 40.2° C in hot season and 10° -13.2° C in cold season. It is considerably cooler in hilly regions where the average daily maximum temperature is 29.2° C and the minimum 7.9° C (CSO 2001).

As for water source, the south west monsoon is the major source of the rainfall for the country. For crop cultivation, the country's four prominent major rivers are important. Particularly, the major tributary many smaller rivers of the Ayeyarwaddy create a vast fertile region before flowing into the Andaman Sea. Thus, the delta region has better opportunity to cultivate crop with pump irrigation due to the abundance of water source.

Myanmar is unique for its forest-clad mountains, plateaus, valleys and vast plain. The total land area of Myanmar is 67.7 mil. ha of which 15 percent of the total land area is utilized for crop cultivation (Figure 1.1). The forest area contributes 49 percent of the country's total land area. Extendable land area is approximately 11 percent of the total land area, which could be brought under crop cultivation and livestock farming in 2003-2004.

In addition, Myanmar is a traditionally agricultural country, and its agricultural sector contributes to about 59% of the country's GDP (Figure 1.2), 65% of total employment, and 18 % of total export earning. The estimated total population in Myanmar was 53.22 millions with population density of 79 per square kilometre in 2003-2004 (MOAI 2005).

In Myanmar, more than 60 different crops are grown based on the prevalence of different agro-ecological zones due to the wide range of climatic zones in the country. The total area including both seasonal and perennial crops amounts to 15.85 mil. ha on net sown area and 10.61 mil. ha respectively in 2001-2002. Thus, the country's cropping intensity was about 149 percent (Settlement and Land Record Department, MOAI 2001-2002).

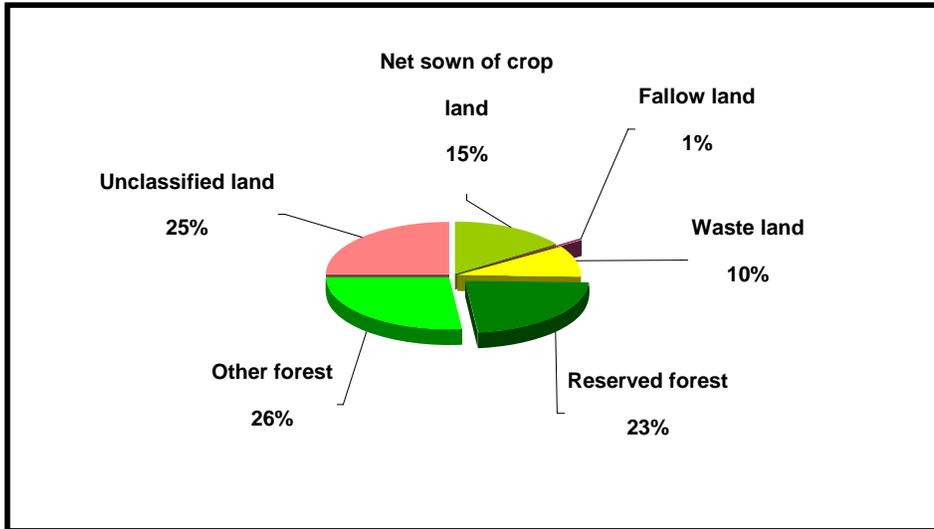


Figure 1.1 Land utilization in Myanmar, 2003-2004

Source: <http://www.myanmar.com/Ministry/agriculture/statistics>

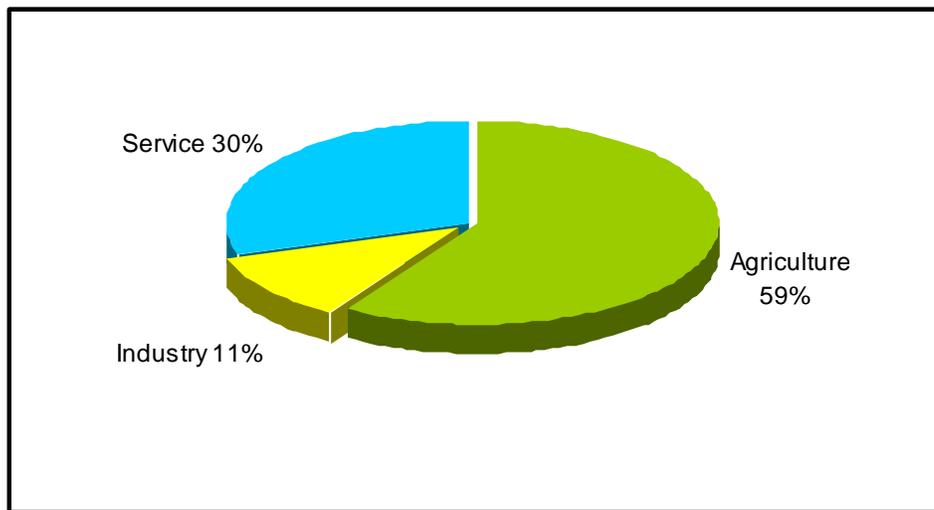


Figure 1.2 Gross domestic product compositions by sector, 2001-2002

Source: CSO (2001)

Myanmar is therefore trying to increase agricultural productivity especially of paddy through research and development in crop production technology coupled with cost minimization and increased marketing potential. The sown area of paddy was increasing from 4.78 mil. ha in 1988-89 to 6.54 mil. ha in 2003-04. The production level was also increasing from 13.2 mil tons in 1988-89 to 22.36 mil. tons in 2003-04. Therefore, the production and sown area of paddy have been increased due to the introduction of summer paddy program in 1992 and increasing irrigation facilities in Myanmar (Figure 1.3).

However, yield of the paddy was increasing at a low rate from 2.91 ton/ha to 3.54 ton/ha during the period of 1988-89 to 2003-04. Myanmar was one of the top ten paddy-producing countries all over the world in 2003 FAO (2004). Its paddy production level was at 7th position compared with other main paddy producing countries (Table 1.1).

Rice is not only a staple food in Myanmar diet but also used for different varieties of snack such as vermicelli, rice noodle, rice cake, etc. Due to the widespread utilization of rice, people in Myanmar consume relatively more rice in comparison with other countries. The average annual per capita consumption of rice is 211 kg which accounts for two thirds of calorie intake and 68% of daily protein consumption which is the highest one in 1999 (Table 1.2).

Therefore, rice is the most important crop for Myanmar people. Sustainable growth in paddy production is a key to economic growth and poverty alleviation. Because of this importance of rice, national planners have always given high priority to increasing its production. The major policy objectives are to increase production for self-sufficiency and to produce an exportable surplus to boost Myanmar's foreign exchange earnings.

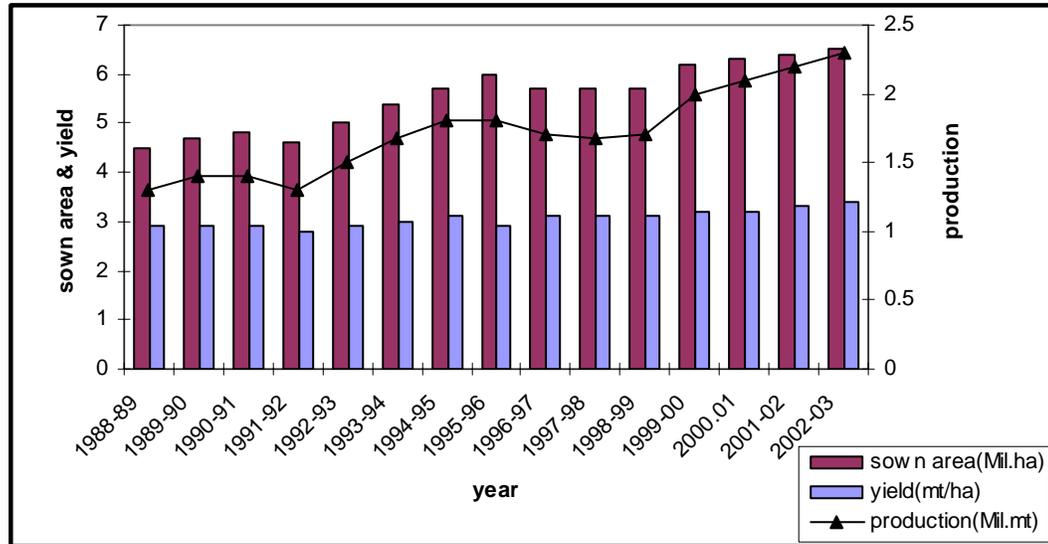


Figure 1.3 Paddy production, sown area and yield in Myanmar, 1988-2004

Source: CSO (2001) & DAP, MOAI (2003)

Table 1.1 Paddy productions of the top ten paddy-producing countries, 2003

Top ten countries of paddy production	Paddy production (1000 metric tonnes)
China	166, 000
India	133, 513
Indonesia	51, 849
Bangladesh	38, 060
Viet Nam	34, 605
Thailand	27, 000
Myanmar	21, 900
Philippines	13, 171
Brazil	10, 219
Japan	9, 863

Source: FAO (2004)

Table 1.2 Rice consumption of the top ten countries and world average, 1999

Country	Milled rice consumption (Kg/cap/year)	Total calories/cap/day	Rice calories/cap/day	% Calories from rice	% Protein from rice
Myanmar	211	2,803	2,050	73	68
Laos	171	2,152	1,506	70	65
Vietnam	170	2,564	1,676	65	57
Bangladesh	168	2,201	1,676	76	65
Cambodia	165	2,000	1,527	76	70
Indonesia	154	2,931	1,525	52	44
Thailand	101	2,411	1,004	42	34
Philippines	100	2,357	974	41	31
Korea	94	2,917	1,025	35	20
Madagascar	91	1,994	917	46	43
World	58	2808	577	21	15

Sources: FAO online database, FAO update 31 May 2001 & World Bank Report (2002)

1.2 The Problem Statements

This section provides the discussion about facing problems of the rice market under the different government's policies over time and at the present government era. The first problem is the high proportion of household expenditure on rice and food items especially for the low-income consumer. The second issue is the decreasing rate of rice export for a long time that is important one for country's economy and the condition under the halfway market oriented economy is the third problem of domestic rice market. Then, the new rice marketing policy is the fourth issue, and finally the fifth problem is the rice market under the condition of currency issue and infrastructure in Myanmar.

1.2.1 Average Household Expenditure in Myanmar

For the Myanmar people, rice is the most important food item. High percentage of household expenditure of the average family in Myanmar and rice forms the largest component in it. Share of household expenditure on food was about 79 percent and expenditure for rice was about 19 percent in 1999 (Figure 1.4).

Keeping the above issues in view, the income level of average Myanmar family can be estimated by using Engel's Law, which stated that when a family's income increases, the proportion of money they spend on food decreases. The high share of food in total expenditure and eating more cereals indicated a low living standard. The income level of the average household must be substantially increased so that the family has enough to spend on the other items that are considered desirable in any economic policy. Moreover, rice price stability is the important factor for the consumer's expenditure. Therefore it is needed to understand the current marketing efficiency such as market integration and price causality.

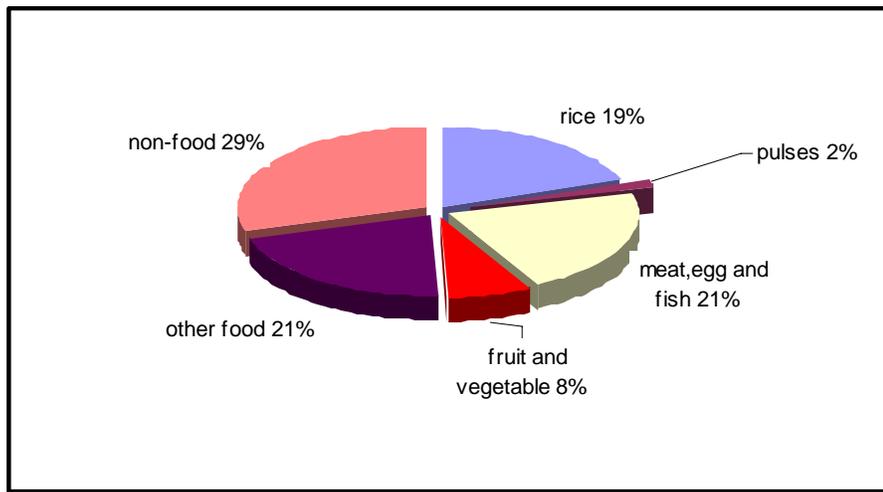


Figure 1.4 Distribution of household expenditure in Myanmar, 1999

Source: CSO (2001)

1.2.2 Government Interventions in Rice Market Over Time

In Myanmar, the relation between rice market and government has been evolving over time, developing from very heavy control of the rice sector to progressive liberalization by successive governments. Since its inception in 1945, the rice market system in Myanmar has evolved into a complex set of policies.

Initially, government nationalized both procurement and external trade of rice and purchased paddy at a low fixed price. During that time, the government also monopolized the supply of chemical fertilizers, which were distributed at subsidized price to farmers and fertilizers were obtainable from local plants and import. In return, government purchased the compulsory quota of paddy from farmers at low procurement fixed price. Reason for this system was essentially subsidizing food distribution to urban consumers and government employees under the rationing system to keep the prices of essential commodities at a low level and to alleviate regional disparities. Therefore, government procurement of paddy at low fixed price directed to a lack of price incentive to farmers.

From 1923-24 to 1939-40, Myanmar was recognized as one of the major exporting countries with annual rice export of around 3 million tons. This contributed about 46.7 percent to total export earning in those years. After that period, yield and paddy production level were increased by green revolution and introduction of summer paddy program. But rice export was far below the expectation and was reduced to 0.28 million tons as compare to the average of the present government (Table 1.3). Therefore, government interventions in both domestic and international markets over the past decades have negatively affected the rice exporting of the country.

Proportion of total export earning and agricultural export earning of rice in different years of the present government is shown in Figure 1.5. There was clearly a decreasing trend, and the export earning of rice and rice products was 18.85 percent of total export earning in 1985, and decreased to 0.48 percent in 2001. At the same time, about 66 percent of agricultural export earning in 1985, and continue to decline to 2.46 percent in 2001 because of the government monopolized rice export system. This is the important point for Myanmar economy which mainly relied on foreign exchange earning from agricultural export.

Table 1.3 Changes of mean rice production and export in different government era

Year	Government	Harvested area (1000 ha)	Yield (mt/ha)	Product. (1000 mt)	Export (1000.mt)
1924-41	British Gov.	4713	1.6	7415	2863
1942-45	Japanese Gov.	3495	1.3	4761	0
1946-61	Parliament	3667	1.5	5437	1404
1962-73	Revolutionary	4373	1.6	4715	629
1974-87	Socialist Gov.	4742	2.6	12141	483
1988-03	Present Gov.	5552	3.1	17632	280

Source: Kyaw Myint (1999) & MAPT (2003)

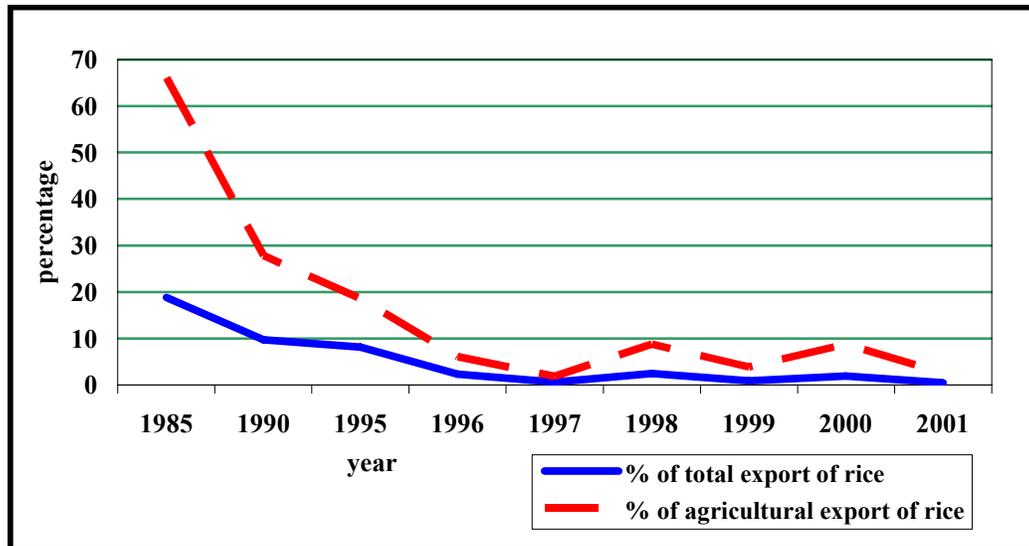


Figure 1.5 Proportion of total export earning and agricultural export earning of rice, 1985-2001

Source: CSO (1985-2002)

1.2.3 Condition under the Market Oriented Economy

The major economic changes including significant implications on Myanmar agriculture as the drastic political and economic transitions occurred in the later part of 1988. After that, there was a post-crisis year for agricultural commodity exporters and later with the establishment of World Trade Organization with Myanmar as a member. It was so called the first liberalization of the agriculture sector in Myanmar in 1987. The government had introduced the market economic system and allowed farmers to cultivate crops in accordance with their choice except paddy production.

The most important reform measures undertaken in the agricultural sector include:

- (a) Allowing farmers not only to cultivate crops of their choice but also to process, transport and trade freely with the exception of paddy,
- (b) Allowing state, cooperative and private enterprises to claim and utilize fallow and cultivable wasteland for the enhancement of agricultural production,
- (c) Diversifying exports through introduction of new products and emphasizing on semi-processed and processed goods,
- (d) Allowing foreign direct investment, and
- (e) Abolishing price controls and reducing subsidies.

Due to this condition, paddy was still purchased from farmers under a quota system through Myanma Agricultural Produce Trading (MAPT) under the Ministry of Commerce. This quota was applied to all monsoon paddy production at the rate of 10-12 baskets per acre, which went to government employees, police, army, hospitals, and other social welfare institutions at subsidized price as rationing system and the rest of the quota was for exports.

It was about 11% of paddy production at below-market prices, thereby reducing farm gate prices by about 8% (World Bank Report 2002). Since the quota did not respond to farmers' actual acreage under paddy or actual output of paddy, it looked like an implicit tax. The main policies of these implicit taxes were levied by the paddy procurement system and the ban on private sector paddy exports. The quality of rice in the public procurement was so low that it was not accepted in the foreign markets and local consumers except low-income groups and livestock feed dealers.

Therefore, government intervention in rice market had led to the emergence of the different prices of rice in the official and in parallel markets. The dual pricing system in the domestic market leads to inefficient allocation of resources in both production and marketing sectors.

Moreover, high-level State Trade Council oversees foreign trade. Myanmar had a history of abrupt changes in government policy. Such changes were highly disruptive for the marketing process. And, also the 10% export levy on all agricultural commodities, imposed on 01/01/1999 was being to be a big disincentive for foreign trade. Therefore, the agricultural marketing system in Myanmar works within the boundaries and limitations of a halfway-liberalized economic system.

1.2.4 New Rice Marketing Policy in 2003-2004

Starting from year 2003-04 cropping season, the government abolished the low price procurement system on rice. The new rice trading policy was adopted for ensuring free trade of the crop for helping to the market-oriented economy. It was the second liberalization for agricultural sector under the present government.

The new policy of rice had multiple objectives. The most interesting ones are;

- (1) To provide with price and market incentives in order to improve income and welfare of farmers.
- (2) To have reasonable retail rice price for consumer with full satisfaction.
- (3) To increase export earning by rice with the new export policy.
- (4) To enhance efficiency of private rice traders.
- (5) In connection with the paddy-purchase principle, all nationals have right to do the rice trading. The price will be according to the prevailing price and monopoly on rice trading will not be allowed to any one or any organization.

Regarding the sale principle of new policy, all nationals can trade rice freely at the domestic market. Rice export will be allowed only when there is surplus. However, export tax is fixed at ten percent of earnings and the rest value of export earning will be shared between the government and rice exporter that is 50 percent for each. The government will stand for the investment regarding 50 percent of its share (The Government of The Union of Myanmar 2003).

According to the new rice export policy, export tax is not transparent for private rice exporter. If private firms wish to conduct import/export operations, they must first register at the Registration Office for Export and Import at the Ministry of Trade, and receive an export/import license. Holders of an import license must receive permission for every import for which an application fee will be charged. On the other hand, state owned enterprises and the ministries are exempted from applying for the import license. Moreover, the aftermath of the second liberalization also shows that the government is still not ready to undertake full-scale rice export deregulation.

1.2.5 Trade Balance, Currency Issue and Rice Market Inefficiency

As the view of trade balance, Myanmar foreign trade was revitalized with increase both in import and in export by various policies changes. However, while the trade structure of exporting primary goods and importing intermediate goods and capital goods remained unchanged, the expansion of import excels that of export, expanding the trade deficit in every year.

Besides, Myanmar has been adopting the dual exchange rate system for a long time and as an example, the official exchange rate of the kyat was overvalued at over 150 times of the market exchange rate in June, 2004. Deterioration of export price competitiveness due to the dual exchange rate _ overvalues of kyat from the dual exchange system may cause Myanmar's export to be much less competitive. An unification of foreign exchange rate is essential for the promotion of export getting balance input-output price ratio.

The insufficient infrastructure facility in Myanmar is also a major obstruction to the progress of agricultural marketing, and it has become a substantial problem for the promotion of foreign trade when infrastructure such as harbour facilities and bonded warehouses are insufficient. However, the private sector is still operating under various controls and limitations and constraints by weak infrastructure facilities, capable manpower and financial as well as technical support and services, and its role in domestic and export trade for agricultural commodities is increasingly expanding.

Even the private sector is playing the dominant role in the marketing and distribution of rice in domestic market, the multi-layered structure of private

intermediaries such as small rural brokers, millers, wholesalers, traders, and retailers operating at various stages, coupled with poor information network have seriously constrained the competitiveness in agricultural markets. Also no standard measurement across the regions is one of the problems encountered in the rice market in Myanmar. As the commodities have to pass through many layers of intermediaries, not only the wastages and losses but also the marketing cost are high. Moreover, due to the poor transport and communication facilities and shortcoming energy sector, transport cost constitutes the largest share in the marketing cost of agricultural commodities.

In the policy reform, policy makers have given high priority to stable rice price and sufficient supply of affordable rice to consumer. However, under this situation higher nominal rice price may result from price deregulation, removal of subsidies, depreciation of an overvalued exchange rate, relaxation of compulsory government procurement policy, and on the other hand domestic rice price was less than international rice price. Higher nominal rice price almost certainly have negative impact on the urban poor, since they spend a relatively large share of their budgets on food. Also the effect of the less domestic rice price than international market price on the rural poor is ambiguous because they are both producers and consumer of rice. As other rice producing countries, Myanmar governments are often, therefore, confronted with the classic policy dilemma of keeping prices low for poor consumers, while keeping them attractive to producers.

1.3 Research Questions

The rice marketing system of Myanmar is an interesting title under such condition that is mentioned earlier to study for the following key research questions.

- (1) How does Myanmar rice marketing system operate under the present government era? What is the structure of rice market?
- (2) How are the cost and margin affected along the marketing channel, by the conduct of market intermediaries?
- (3) What is the relation between spatially separated rice markets in the long run?

(4) Does Myanmar rice market price have co integration with international rice price in the long run?

(5) What is the driving force for the rice price formation regarding the causality of the market mechanism in Myanmar?

1.4 Objectives of the Study

The main objective of this study is to investigate the structure, conduct and performance of rice market in the private sector within the context of the liberalization of rice market. For this purpose, this study was carried with the following specific objectives.

- (1) To assess the structure and conduct of the Myanmar rice marketing system,
- (2) To estimate the marketing costs and margins along the various marketing channels by observing the behavior and functions of market intermediaries,
- (3) To appraise the performance of the domestic rice market by evaluating the spatial market integration in the long run,
- (4) To investigate the price comovement between domestic rice price and international rice price in the long run;
- (5) To identify the driving force of the rice price formation and the price causality of market mechanism in the domestic market.

1.5 Hypotheses of the Study

Five hypotheses have been stated for this study, they are as follows:

- (1) The Myanmar rice market is an 'efficient competitive market' with public and private institutions.
- (2) The marketing margins are equal or very close to the level of additional marketing costs. Farmers gain the largest share of retail rice price in current market situation of Myanmar.
- (3) The rice marketing system shows an evidence of integrated markets; there is cointegration of price series in internal rice markets in the long term.

- (4) There is a price comovement between domestic rice price and international rice price since Myanmar is a rice exporter.
- (5) Price causality between integrated market pairs is bidirectional in Myanmar.

1.6 Significance of the Study

Since late 1988, Myanmar's market-oriented reform has drawn much attention. Consequently, however, decline in rice export, increase in rice price of nominal term, imposition of restriction on export of rice by private sector, and expansion of the domestic market have changed the marketing and pricing environment for the rice market in Myanmar. The implications of these changes on the performance of rice marketing system in the country in recent time have not been studied in depth.

Actually, the detail information about the structure, behaviour of market participants, costs and margins of marketing channels are essential tools for raising the efficiency of marketing system. Therefore, the descriptive analysis of this study can help to explore the current situation of rice marketing system of the studied areas covering the major surplus areas (Yangon, Patheingyi and Pyaw) and deficit areas (Mandalay, Magway and Taunggyi) of the country.

This study demonstrates the application of methods of analysing the agricultural product markets utilizing recent developments in econometric literature. The two-step, residual-based test has been used for cointegration analysis of the rice market comprising of a system of surplus and deficit markets. Ravallion model (Ravallion 1986) can be restructured in the form of unrestricted Vector Auto-Regression (VAR) of the error correction structure has been used to assess price causality in the rice marketing system.

The analysis results are interpreted in relation to the structural and behavioural characteristics of the market to infer on performance of the rice market system and to suggest the specific improvements for the future. In view of the government's emphasis on substantially moving to the market oriented economy under the current policies, this study will provide information on integration and price causality of the rice marketing system interpreted in relation to structural and behavioural attributes. Such information will be accommodating to the policy makers in appraising the functioning of the rice

market in the current perspective, and in taking corrective measures for improvement of performance of the marketing system in order that the market system supports increase in production envisaged under market oriented economy as a whole.

1.7 Organization of the Study

This study is organised in ten chapters. Chapter 1 provides general information and background problems of the rice market in Myanmar. It defines the research questions, objectives, hypotheses, and significance of the study. Chapter 2 presents the conceptual and theoretical framework for the analysis of market integration and pricing efficiency in rice market. Market integration and price causality are introduced as related concepts in the analysis of price relationships. The general Structure, Conduct and Performance (SCP) approach is presented as the framework for assessing the structure and conduct of the market influencing the spatial price relationships in the market system. Thereupon, development in the methods of measurement of market integration and pricing efficiency is reviewed.

Chapter 3 presents the detailed methodologies adopted in this study. The selected market centres, the study period considered, data collection and analysis procedures are also discussed. Chapter 4 provides descriptive assessment of organisation and operations of the rice marketing system in Myanmar. The focus is on describing the structure of rice trade, and on assessing the competitiveness of the marketing system. Description of rice market participants starting from farmers to retailers is given in Chapter 5. Likewise, Chapter 6 focuses the detailed marketing channel in surplus and deficit regions, cost and margin along the marketing channel of sample rice markets.

Descriptions of the time series data used for market integration and price causality are presented in Chapter 7. Subsequent to Chapter 8, it presents results and discussion on evaluation of market integration and price causality of the rice market. The estimated parameters of the models are interpreted in relation to structural and behavioural characteristics of the market system. The final chapter, Chapter 9, provides summary, conclusions, policy implications for the future perspective of the Myanmar rice market together with limitations and suggestions for future research.

CHAPTER 2

CONCEPTUAL AND THEORETICAL FRAMEWORK

This chapter presents the conceptual framework for the present rice market of the relation between the economic policies and the rice market, theoretical background of agricultural marketing in developing countries, some concepts of market structure and performance, spatial market efficiency, market integration and spatial equilibrium model. Also some relevant literatures and analyzing spatial market efficiency methods will be reviewed.

2.1 The Macroeconomic Policies and Myanmar Rice Market

Most of the developing countries maintained a heavy interventionist approach in their agricultural marketing policies during the 1970's to 1990's. The governments controlled the quantity of marketed grain and grain price and restricted private trader's participation in grain trade and interregional grain flow. Nevertheless, the governments in developing countries have got a hold on various market reform measures, which influenced grain market development in these countries. It is argued that the management of market reform requires an understanding of the operation of local markets, the strategies and responses of private traders and how both relate to changes in the institutional and policy environment of markets (Kherallah et al. 2002). This understanding is very important to design and achievement of effective marketing policies, institutions and marketing infrastructure required for the development of the grain markets.

The overall conceptual framework of the study therefore can be laid out as the Figure 2.1. Macroeconomic policies (monetary policy, pricing policy, trade and exchange rate policy) affect agricultural price through their effects on the real exchange rate, export and import of agricultural commodities. Agricultural price along with non-price factors including exogenous shocks determine agricultural production.

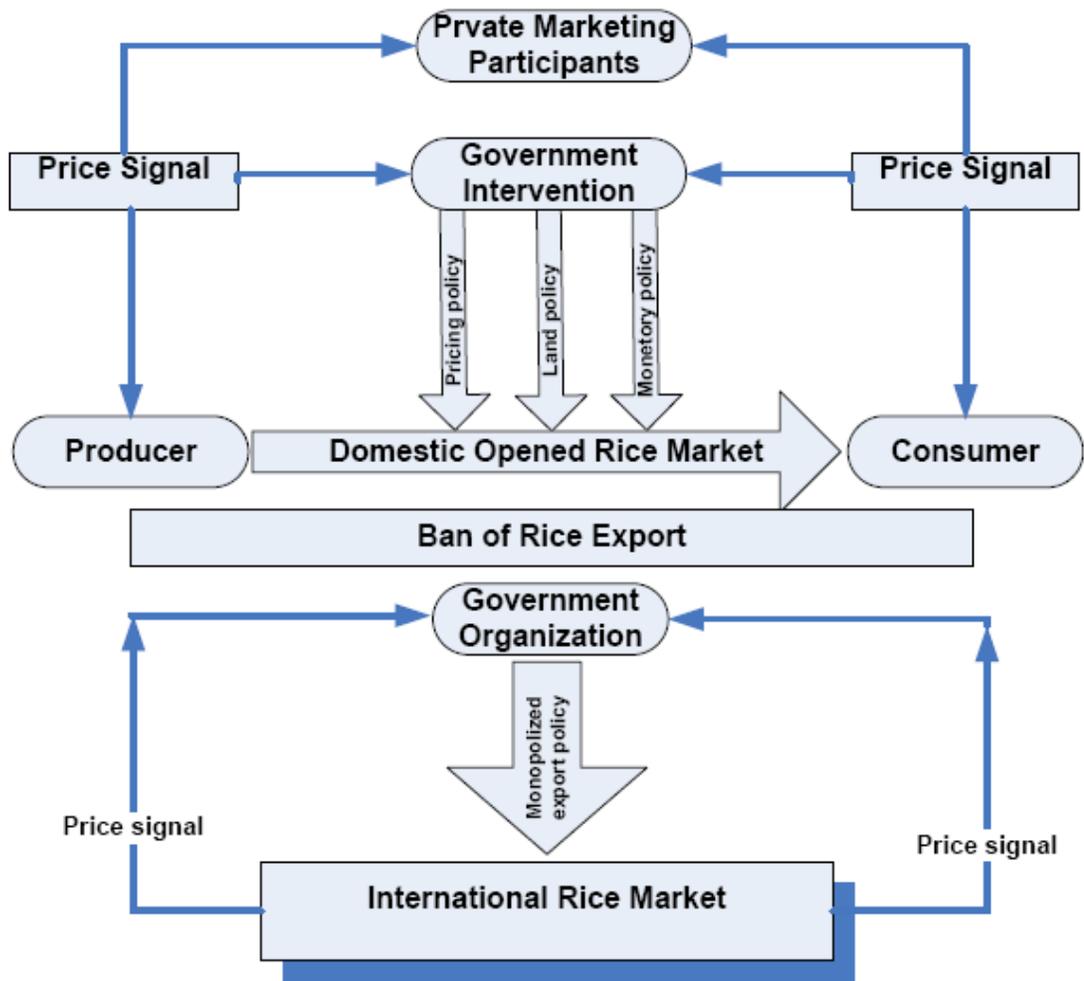


Figure 2.1 The conceptual framework for Myanmar rice market

Agricultural production is a very important one as it has an impact on growth, poverty and consumption as well. Therefore, the policies affect the farmer's income, and terms of trade between rural and urban as well as the terms of trade between tradable and non-tradable goods (Jaeger and Humphrey 1988).

In Myanmar, land policy for the paddy farmers is very restricted. Land belongs to the state, farmers have only land use right. Therefore, farmers must adopt the cropping system which is ordered by the state especially for the paddy land. Central of these policies is the dual exchange rates policy in Myanmar that is the ratio of prices of tradable to non-tradable goods (or vice versa). Indeed, macroeconomic policies generally result in the real exchange rate effect, which ultimately affect output price and hence agricultural supply. The behaviour of the real exchange rate is, in many developing countries rather harmful to agricultural incentives as exchange rates are overvalued. Indeed, overvalued exchange rates make local products, including agricultural products, less competitive with imports and less profitable as exports.

According to Pearce (1990), a typical situation in developing countries is the over valued exchange rate that tends to come out because of expansionary monetary and fiscal policies. If exchange rate is overvalued, agricultural exports are discouraged because the exporter receives less in local currency for any exports than would be the case with a lower exchange rate. Moreover, overvaluation makes imported commodities artificially cheap, so that domestic farmers find themselves competing with effectively subsidized foodstuffs.

In order to address the research issues on the market performance and prospect for price for long term, it is important to understand the links between private rice market and macroeconomic policies. The private marketing system has the main role of transferring rice from producers to consumers through transport, storage, and processing activities. If the rice trade is allowed, the marketing system would also transfer and receive price signal to the producer, consumer, market participants and government from the world market. However, present rice marketing system is limited to get the price signal from the international rice market due to the ban of the rice export by the state.

The macroeconomic policies are supposed to meet several goals of food policy; namely food security, price stabilization, price support for producers and poverty

alleviation whereas the goals of food self-sufficiency and productivity growth are the main objectives of land policy, input policy and research and extension policy. However, each policy has often multiple links and objectives. The overall performance of rice market in the long run is affected not only by the efficiency of marketing system but also the distorted macroeconomic policies indirectly. It therefore clearly depends on both the macroeconomic environment and the development of adequate infrastructure of Myanmar.

2.2 Agricultural Marketing in Developing Countries

Agriculture is a source of income, employment and export earnings and the livelihood of inhabitants as a central to the economic performance of developing countries. Rural societies in developing countries are directly dependent on the agricultural sector and urban dwellers rely mainly on agriculture to provide food security and sustainable economic growth (Goldin 1990). Therefore, Myanmar as many other developing countries heavily relies upon the export earning from agricultural sector.

Kuyvenhoven (2000) also indicated that in terms of income and employment, the agricultural chain from primary producers to final consumers makes up a substantial part of any economy, especially in developing countries. The agricultural policy is therefore highly relevant because it affects major markets and institutions. Hence many authors argued that the development of agriculture and the marketing systems, which impinge upon it, are at the heart of the economic growth process in developing countries.

Dixie (1989) highlighted the potential contribution of agricultural and food marketing, towards attempts to improve rural incomes in developing countries. He defined marketing, as “The series of services involved in moving a product from the point of production to the point of consumption.” This is a definition, which many organizations and governments would recognize as describing their own activities in commodity marketing. Indeed, in many developing countries it aptly described, or in some cases, did in the past describe, the functions carried out by marketing parastatals with respect to staple foods such as rice. However, as Dixie himself pointed out, the definition omits two key elements of any definition of marketing production to effuse the marketing concept, i.e. a customer orientation and inbuilt sustainability.

Marketing system comprising of markets in place-form-time and related institutions provides services such as transportation, storage and transfer of ownership, and price formation in guiding allocation of resources and of products. An efficient marketing system transmits wants and needs of consumers back to producers, and supply conditions forward to consumers with minimum of lags, imperfections, and distortions (Bressler and King 1978).

Agricultural marketing as the performance of all business activities involved in the flow of food products and services from the point of initial agricultural production until they are at the hands of consumers. All decisions and transactions from the farm until final sale to consumers can be considered as part of the marketing system. Agricultural marketing includes physical processes such as assembling the raw commodities, grading, packaging, transportation, preparation for use, storage, shifting and sharing risks, change in ownership, pricing and exchange, wholesaling and retailing as well as trade, finance and marketing infrastructure and the legal, administrative and macroeconomic policy framework.

The essential conditions for a perfect market are: perfect knowledge by all buyers and sellers, sufficiently large number of buyers and sellers so that no individual can perceptibly influence prices by his decision to buy or sell, and free entry in all directions (Bressler and King 1978). Competition among firms in the market is a key to the determination of efficiency of a market system (French 1977). According to classical school, it is the competitive process that determines actual price in the market place and aids achieve allocative efficiency by forcing successive transaction prices ever closer to equivalence with marginal cost (Reekie 1979). Therefore the intensity of competition in a market system is rooted in its underlying economic structure and institutions. The collective strength of the forces that determine the state of competition in a market ultimately determines the market performance.

However, Breimyer (1976) argued that agricultural product markets are imperfectly competitive, and therefore, generally fail to conform to be a perfect market. Imperfect competition comes about mainly because of the economies of scale of firms, where over a range the large firms have lower cost than the smaller ones that result from limited divisibility-mobility of resources and of limited substitutability among products

in consumer demand. Still, the concept of perfect market, having normative value associated with economic efficiency, is taken as a standard for studying imperfectly competitive agricultural products markets.

In addition, the major force that makes market efficient is the existence of competitive arbitrage which tends to bid away price movement that give rise to positive profits, and results in price reaching equilibrium across space, form, and time (Kohls and Uhl 1990). The basic requirements for an efficient price discovery system are many buyers and sellers, good communication, accurate description of product, and well-chosen trading rules that are enforced strictly. The importance of good marketing can be conveniently considered from perspectives of the national economy, the farmer, the product and the consumer.

2.3 Market Structure and Performance

Breimyer (1976) and Bressler and King (1978) guided for the estimates of econometric models in analyzing integration and pricing efficiency of market regions only provide the basic data for understanding how a specific product market had worked. It is important for the researcher to have a understanding of trade flow, market structure and institutions governing the price relationships in order to accurately interpret the econometric analysis results and avoid coming into misleading conclusions about market performance. This is particularly relevant for price relationship analysis of agricultural product markets.

The traditional structure, conduct and performance (SCP) approach developed by industrial economists has since long provided the theoretical framework for relating the structure and conduct of the market in interpreting its performance implied by the estimates of price relationships among market regions (Lele 1971). Bain (1956, 1959) postulated the traditional SCP approach that market structure strongly influences market conduct which, given basic conditions, determine market performance. Market structure expresses the environment and the characteristics of a market that exercise strategic influence on the nature of competition and pricing.

The traditional SCP approach implies that the fewer the firms in a market the more likely it is that they will tend to collude. Higher the degree of seller concentration,

prices will tend to be above the competitive level and entry prevention and other anti-competitive strategies will be more prevalent. Low concentration, on the other hand, implies competitive behavior and marginal cost pricing, the absence of supernormal profits. Market structure, therefore, determines conduct of firms and the performance of the market. Many empirical works (Bain 1951 & 1956, Stigler 1964, Mann 1966) were showing an association between structure (market concentration) and performance (high profit rates) points to the conclusion that such a relationship exists.

Williamson (1975) stated that transaction costs are the interplay of human attributes (rationality and opportunistic behavior) and environmental features (uncertainty, complexity, small number exchange and asset specificity). These effects create transaction costs that may lead firm to expand by vertical integration as well as number and size of distribution of firm in the market, finally it means market structure. But at the same time a more concentrated structure implies the existence of small number of firms, which coupled with information asymmetries, can induce opportunistic behavior and protected bargaining situation, creating substantial transaction costs. Therefore, structural feature affects the size of transaction costs, which in turn affects business behavior and market structure.

Furthermore, the institutional economics expand the scope of the transaction cost economics by relating it to the interpretation of market operations. The institutional economics viewed that the market mechanism can function effectively only if embedded into an appropriate social structure that solves the problem of the market order by ensuring low-cost enforcement of contracts (Platteau 1994). The formal and informal rules of the market (institutions) that evolve in order to reduce transaction costs are key factors determining economic performance of the market. A self-ordering market system, assumed in the traditional SCP approach and most other economic theories, is possible only when there is a total transparency of the whole economic system for each agent, i.e. by eliminating the coordination problem altogether.

Hubbard (1997) pointed out if markets become more economically integrated, unit production and distribution costs will reduce but at the same time unit transaction costs will increase, since face to face contact, knowledge and mutual interdependence of small community is lost, creating greater uncertainty, opportunities for deception and

reducing enforceability of contracts by reciprocal obligations. Therefore, intervention by third party (public or private institution) is needed to solve the problem of coordination, establishing and enforcing system (Plautteau 1994).

Koch (1980) defined market structure as relatively permanent strategic elements of the environment of the firms in the market that influence, and is influenced by, the conduct and performance of the firms. Thus, the general SCP approach may be adopted to incorporate the more complex linkages and the market dynamism as indicated in the criticisms to the traditional SCP approach, but the essential causation still to follow from structural criteria.

The general SCP approach which is adopted from Ferguson (1988), allows for feedback relationships, competitive behavior (conduct) of firms and performance (in terms of price, transaction cost, etc.) might determine the market structure elements in the following period. Normally, good performance of a market system is a consequence of its structure and the conduct, but this performance is not always guaranteed. The intervention of third party, therefore, requires in the form of public or private institutions to improve situation (Plautteau 1994, Viaene and Gellynck 1995, Greenwood and Carter 1997, Hubbard 1997).

The attractive feature of the general SCP approach is flexibility to accommodate interpretation of the distinct theories of market organization (Reid 1987). This allows for feedback relationships, include institutional infrastructure as a determinant of the structure and the conduct, and considers transaction cost along with price spread as the measure of economic performance of the market system.

The institutional infrastructures, in the form of formal and informal rules of market that reduce transaction costs, are keys to the determination of competitiveness and economic performance of the market system (Williamson 1985, Bardhan 1989, North 1990, Platteau 1994).

Bateman (1976) had emphasized on the role of the government in market engineering in the development and implementation of agricultural policies. The most common government policies in the food market used to be support and stabilization of prices for producers, suppression and stabilization of prices for consumers, and encouraging competitiveness in the market. This shift towards market-oriented policies

has come primarily because of the government's failure in market interventions, which were more serious than the market failure they were designed to correct (Timmer 1989). However, the government should play in providing appropriate institutional infrastructure to make the market more competitive, efficient and equitable (Jones 1995).

Jones (1995) has listed some of the basic institutional infrastructures to be provided by the government for proper market ordering. There should be legal and social conventions that define and allocate property right and entitlements, and delineate the legitimate scope of economic behavior. There should be rules about transaction between economic individuals that define rights to exchange property rights, define what may constitute legitimate contracts, permissible and non-permissible forms of cooperation and competition, and establish rules on liability. There should be a system of authority and legitimacy to enforce these rules, including penalties for delinquency. And, there should be a mechanism by which these rules can be adapted to changing economic and social circumstances while providing a predictable framework for market participants.

2.4 Marketing Channels, Costs and Margins

A marketing channel is 'an organized network of agencies and institutions which, in combination, perform all the activities required to link producers with users to accomplish the marketing task' (Bennett 1988). Marketing costs and margins are required to understand for all who involved with agricultural marketing. Farmers, who seek to produce a crop, need to be aware not only the production costs but also the cost of marketing and demand condition. Wholesalers, retailer and processors must be fully aware of their costs if they want to trade profitably. Also government officials should concern to have fully understood of marketing cost and margin to monitor the efficiency of agricultural marketing regularly for improvement (FAO 1993).

FAO (1993) assumes that harvesting of the crop and movement of that produce to the farm gate is part of the production cost. The first marketing cost is produce preparation including cleaning, sorting and grading. The second cost is usually faced by farmers or traders is packaging. Types of packaging may be different depending on the

product types and market condition. Then handling cost in all stages of marketing chain should be taken into account that will have the labor cost of packed, unpacked, loaded, and unloaded. Transportation cost will vary with distance between farmer or seller and market that will also depend on the quality of roads and mode of transport. If trader transports marketed product by own vehicle, one should calculate the opportunity cost of common rate in this region.

Another cost item is product loss that should be considered particularly for perishable crops. Storage is the important cost for many products. The assumption behind all commercial storage is that the price will rise sufficiently while the crop is in store to cover the cost of storage. Processing is important item for paddy that has to be milled, in for working out total marketing costs, it is necessary to consider the conversion factor from paddy to milled grain.

Next invisible cost is capital cost, but it is very important to count for the interest rate if traders run the business with loan money, if not, the opportunity cost should be taken into account. Finally, fees, taxes, commissions and unofficial payments are faced in agricultural marketing that all these costs have to be building into the calculations. Price incentives which is with marketing costs, affect the profits of marketing participants and their decision marking. The analyzing costs are useful to compare the relative efficiency of various marketing agents.

Marketing margin is examined for a common means of measuring market efficiency. This is an attempt to evaluate economic or price efficiency. The overall marketing margin is simply the difference between the farm-gate price and the price received on retail sale. That difference can then be considered to be the cost of marketing and all that is entailed in getting the product from the producer to the consumer in the desired form. The question to be evaluated is whether the marketing services being provided are "worth" the cost of this margin. Therefore, marketing margins are differences between different levels of marketing channels. They capture the proportion of final selling price that marketing agent provides services for getting the added value in various levels. Response of marketing margins to price changes at any level is also indicative of the efficiency of the channel (Guvheya 1998).

2.5 Spatial Efficiency and Market Integration

The aggregate efficiency of agricultural marketing in a potentially Pareto efficient sense can be expressed as the consumer surplus plus the agricultural producer surplus minus marketing costs. This implies that total surplus is largest when the consumer price is equal to the producer price plus marketing costs. There is no rent in trade and when unit marketing costs are minimized for the marketing chain as a whole (Takayama and Judge 1971, Gardner 1975, Dornbusch et al. 1977, Benischka and Binkley 1995).

In spatial price analysis, the terms “spatial market efficiency” and “spatial market integration” are very widely used. Spatial market efficiency is an equilibrium condition whereby all potential profitable spatial arbitrage. It requires spatial price differentials compared with transfer costs. If there is no trade, spatial price differential less than transfer cost is also consistent with market efficiency. However, if spatial price differential is greater than transfer cost, the market is inefficient with or without trade. Spatial market integration is defined as the extent to which demand and supply shocks arising in one location are transmitted to other locations (Fackler 1996, Mcnew 1996, Mcnew and Fackler 1997, Frckler and Goodwin 2001). Goodwin and Schroeder (1991) argued that markets that are not well integrated may transmit inaccurate price information that might distort producer’s marketing decisions and contribute to inefficient product movements.

Isard (1990) stated that the theory of market integration in its simplest form is distilled into the law of one price. That is, as inter-market trade commences, any observed differentials in the prices of commodities and services will tend to lessen and eventually disappear, given the absence of any abnormal shocks to the system and the existence of individuals capable and willing to engage in arbitrage. However, the law makes one further very strong assumption, in that the costs of transportation, or more generally, transactions costs are neglected. Therefore, only in a ‘wonderland of no dimensions’ that is, devoid of time and space _ would we expect that a single price would be obtaining.

Also the terminology of market integration involves testing for (econometric) ‘integration’ of the price series being studied and the level of ‘cointegration’ between

them in order to come to conclusions about the (economic) spatial ‘integration’ of the market. The price series are commonly integrated since they have inflation trends and sometimes, cyclical variations from the seasons. The econometric term ‘cointegration’ is a property of two or more variables which have already been shown to be integrated and which, though trending, can not drift too far apart. Since they are ‘tied together’ in some sense, a long-run equilibrium will exist in a model based on such variables. When two price series are cointegrated, it means that the markets are integrated in the long-run.

2.5.1 Concept of Market Integration

In integrated markets, an arbitrage process is limited by the price differences in time, form and space to the marketing costs. Markets that are not integrated may convey inaccurate price information, distorting the marketing decisions of rice producers and contributing to inefficient product movements (Tomek and Robinson 1990). Market integration can be observed from two aspects as vertical integration and horizontal integration. The first is in fact the industry integration, which reflects the nature of agribusiness, while the second mainly is spatial integration. Therefore, the integration includes spatial market integration, temporal market integration, integration across price form and integration across product form.

Vertical integration exists when successive stages of marketing are linked together through direct ownership or by contract, such that the transaction is internal. The alternate to an internal transaction is a market transaction. The incentives for integration of vertical transaction arises due to the inefficiency or inadequacy of market exchanges as a coordinating mechanism, and the desire of firms to reduce risk and transaction costs (Helmberger et al. 1981) and to enhance market power (Breimyer 1976).

Minimizing transaction costs is the main reason for vertical integration; lower are transactions costs, the less reason for vertical integration, and the greater the transaction costs, *ceteris paribus*, the more it pays the firms to go for vertical integration (Coase 1937, McFetridge 1994). Such integration can affect the conduct of firms in ways that have feedback effect on structure. Vertical integration can reduce marketing costs, but there is no assurance that such cost savings will be passed on to the upper and/or the

lower ends outside the vertical chain; indeed, it is often motivated by desire to enhance market power by increasing barriers to new entry. Once vertical integration becomes extensive, efficient markets are, in general, difficult to sustain (Breimyer 1976).

Spatial market integration reflects the effects of price change in one market on another market. Theoretically, under the assumption of competitive market, when two markets trade, the product price in the import market equals to the price of export market plus transportation cost. At this case, the price change in the export market will induce a price change in the import market in the same direction and of the same degree. Therefore, the two markets are completely integrated. Spatial market integration has long-run market integration and short-run market integration. The former refers to such cases in which there exists a long run and stable price relationship between two markets. Short-run integration shows that the price change in one market in some period will bring “in the next period” (i.e. immediately) the price change in another market (Mendoza and Rosegrant 1995).

Integration across marketing stages reflects the effects of price change in one marketing stage on the price change in next stage. If the prices in the different marketing stages meet the condition of “next stage price = current price + market charge”, there is existing integration between market stages. The integration between wholesale and retail market is the one of integration across marketing stages (Mendoza and Rosegrant 1995).

Temporal market integration is the effect of present price change on future prices. When prices meet the condition of “future price = present price + storage cost”, it is called temporal market integration (Mendoza and Rosegrant 1995).

Integration across product form represents the effect of price change of one product on change of other related product, which usually refers to the price relationship between a primary product and a processed product. If the condition that “processed product price = primary product price + processing cost” is met, the markets are integrated. This study will only cover the spatial integration for long term, although the other three types of integration are also important (Mendoza and Rosegrant, 1995).

An important factor affecting market integration is the transportation when the price of two markets is used to test and measure its extent. In addition, the spread of price formation, seasonal factors, inflation, the characteristics of different products, the

presence of monopoly power, the presence of self-sufficient production and intervention of governments are also factors affecting market integration (Gupta and Muller 1982).

Many studies claim for the policy intervention of government that government intervention leads to regional market blocks so as to reduce the degree of market integration and sometime to cut the price linkage among markets completely. However, government can also force the same price changes in regional markets, so that the degree of integration seems higher. In fact, it is not real market integration in an economic sense, but it can be regarded as “planned market integration”.

2.5.2 Spatial Price Equilibrium (SPE) Model

Prices of a commodity reflect information about demand and supply not only at the market to which they are identified but also at other spatially related markets for that commodity. Therefore, price relationships among spatial markets may indicate the nature of overall performance of the market system. Spatial price equilibrium (SPE) model of Takayama and Judge's (1971) provides the theoretical basis for analysis of spatial price relations. Under the SPE model, whenever trade takes place between two regions, competitive commodity arbitrage will lead to equilibrium where price differences will just equal transfer cost, and if price differences are less than transfer cost there will be no trade between the regions (Tomek and Robinson 1981).

If two or more surplus producing areas are linked in the supply of a product to a common central market, all the market regions engaged in trade with the central market will be united, even though there is no direct flow of the product between the surplus areas (Slade 1986). This will result in (a) price changes in one region to cause price changes in other regions as well, and (b) prices in each surplus region markets tend to differ from price in the central market due to the cost of transferring the product to the central market.

Marion (1985) and Cheung (1987) mentioned that the transfer costs that incurred in trade between the regional markets comprise of transportation cost and transaction cost. Transportation cost is the direct cost of haulage of goods from the supplying market to the consuming market while transaction costs may be viewed as a spectrum of institutional costs including cost of searching for alternatives, cost of negotiating the

exchange, cost added because of uncertainty associated with exchange and costs generated by government policies and their enforcement. The size of transfer costs in a competitive market depends on the quality of physical and facilitating marketing infrastructures, including market information and trading institutions.

Market integration concerns with the determination of market area. A number of marketing points in space-form-time dimensions interconnected by trade constitute a single market. Figure 2.4 illustrates the SPE model for price relationship between surplus region (A) and deficit region (B). The excess supply curve is derived as horizontal distance between the supply and demand curves of region (A). Similarly, the excess demand curve is horizontal distance between the demand and supply curves of region (B). The excess demand and supply curves intersect at a price, say US \$ 20 per unit. If no transfer costs exist between these two regions, a total of q_2 of the commodity would be traded from Region (A) to Region (B), and price in both regions would be the same, i.e. US \$ 20 per unit. The volume of trade between two regions will decline with the introduction of transfer costs. No trade would occur if it costs US \$ 10 or more per unit to transfer a unit of product from region (A) to region (B). Thus, if price differences were less than the transfer costs, demand and supply would be equated within each region independently, that means the regions are not integrated.

The volume of trade line, xy , which represents the vertical difference between the excess supply and excess demand curves, provides the effect of changes in transfer costs on the amount traded between regions. The transfer cost is measured along the vertical axis, and the quantity traded on the horizontal axis. A transfer cost of US \$ 5 per unit of product reduces the quantity traded from region (A) to region (B) from q_2 to q_1 , and the equilibrium prices per unit will be US \$ 22.5 in Region (B) and US \$ 17.5 in Region (A). A change in the volume of trade or in the price relationship between the regions in a market area may occur if transfer costs change and/or if regional demand/supply curves shift. Trade flows are more likely to be discontinuous for storable commodities like food grains (Wright and Williams 1991).

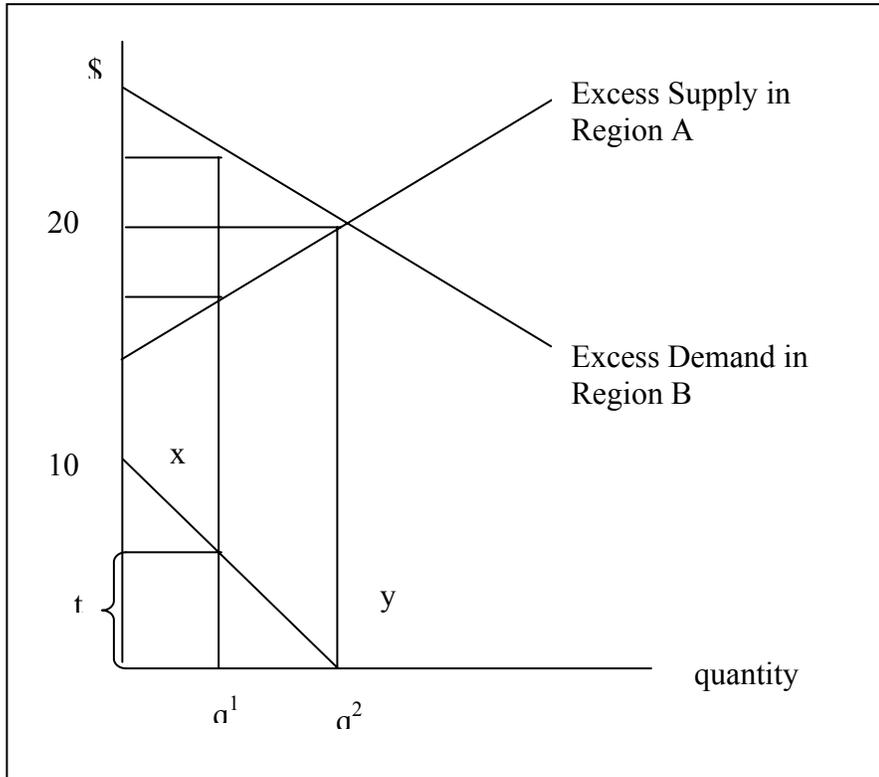


Figure 2.3 Two-regions spatial price equilibrium model

Source: Tomek and Robinson 1981

2.6 Review of Analyzing Spatial Market Efficiency Methods

Since prices are the only readily available and reliable information on developing countries' marketing systems, market integration studies have focused on analysis of price relationships in the spatially separated market regions. Such analysis have been based on the assertion of the SPE model (Takayama and Judge 1971) that prices are driven to equilibrium levels by arbitrageurs who profitably use information concerning regional price differences by trading up to a point where further profits from arbitrage cannot be made.

There have been many new innovations in methods of analyzing market integration and pricing efficiency due largely to rapidly emerging time series econometric literature. Most of the market integration analysis methods focus on interdependence of prices in different market regions. Recently, a method has been developed, which considers transfer costs and arbitrage conditions in the analysis of price relations to measure efficiency of integration of a market system. Following sections present and evaluate developments in methods of measuring nature and extent of market integration, and conclude with selection of the methods to be adopted in the study.

2.6.1 Price Correlation

Spatial price analysis methods require time series data either for price only, for price and transfer costs only, or for prices, transfer cost and trade flows (Fackler and Goodwin 2001). One simple way to study market integration is to consider correlation of price series at different markets. Price correlations are the easiest way to measure these co-movements. The traditional test of market integration, which is focused on correlation coefficients of spatial prices, ignores the presence of other factors, such as general price inflation, seasonality, population growth, and procurement policy (Minot 2000).

A price correlation is relatively simple but suffers from many weaknesses. First, price correlation can't capture the dynamic nature of a market system. Second, price correlation is possible to suggest spurious market integration because the prices may tend to move together for reasons other than market integration; such as common trends,

common seasonality, monopoly price fixing, etc. Third one is overestimation problem of correlation test due to the lack of market integration between two markets. Finally, it treats only a pair of markets at a time and can't be used for evaluating the market system as a whole (Harriss 1979, Delgado 1986, Ravallion 1986, Barrett 1996).

2.6.2 Variance Decomposition Approach

In order to overcome these weaknesses, various alternative methods have been adopted. Delgado's variance decomposition approach (Delgado 1986) tests the market integration for the whole marketing system with common trends and seasonality presents the price series before testing of integration. It assumes constant transport and transaction costs for any two markets within a market system for a given season. Then, the spatial integration between pairs of markets for a given season is indicated by the equality between the spatial price spread and constant transport and transaction costs during that season, subject to random noise. This approach does not allow for dynamic relationships between price and different market.

2.6.3 Ravallion's Method

The Ravallion (1986) developed the method that assumes a radial spatial market structure between a market group of local markets and major central markets and price formation of the local markets mainly influenced by trade with the central market. Ravallion method allows testing several hypotheses regarding spatial market integration such as market segmentation, short run market integration and long run market integration between local and central markets by the controlling for seasonality, common trend, and auto-correlation. However, the assumption of market structure does not always hold due to the inter-seasonal flows and direct trade links between regions. Second, the method assumes constant inter-market transfer cost and if transfer cost is time varying the test of market integration is biased (Barrett 1996). Third, the method also does not distinguish market integration due to non-competitive behaviour (Faminow and Benson 1990).

2.6.4 Cointegration Analysis

Cointegration test for spatial market integration is used to overcome the problem of spurious correlation of time series of price. This led to the application of cointegration analysis, which test for market integration by taking the presence of stochastic trends in the price series into account. Prices movement from time to time and their margins are subject to various shocks such as market mechanism and government intervention. When long run linear relation exists among different price series, these series are said to cointegrate. Moreover, price changes would eliminate common trends that introduce spurious correlation (Engle and Granger 1987).

Cointegration analysis involves several steps. The first, step is to determine the order of integration of the univariate price series using appropriate unit root tests. Second, if both prices are integrated of the same order, run a cointegrating regression of one series on the other. Third, apply unit root tests to the residuals from the co integration regression. The absence of a stochastic trend in the residual from the co integration regression indicates that there is a cointegrating (long-run equilibrium) relationship between the two price series. Fourth, if cointegration is accepted, error correlation models can be developed to study the short-run relationships (Engle and Granger 1987).

The Granger cointegration approach assumes a stationary marketing margin for markets to be integrated. However, Barrett (1996) has argued that if transaction costs are non-stationary lack of co integration can also be consistent with market integration. Also, if the markets are subject to cointegration supply and or demand shocks, macroeconomic shocks (for example, money supply or interest rates), speculation or overreaction, then price can be cointegrated without market integration or market efficiency (Pindyck and Rotemberg 1990).

Johansen (1988) developed a multivariate method of cointegration analysis, which uses maximum likelihood to test the hypothesis of cointegrating relationships among several economic time series. Generally speaking, the different methods for market integration discussed above depend on the assessment of the comovement of price series, or the long run relationship between prices, and were found to have several weaknesses (Barrett 1996).

2.6.5 Threshold Cointegration Test

Recently, two major developed methodologies were used to account for transaction costs in spatial price analysis- threshold co integration tests and the parity bound model (PBM). Threshold cointegration test is based on the presence of transaction cost creates a “neutral band” within which in different markets are not linked (Blake and Fomby 1997, Goodwin and Piggott 2001). The major advantage of threshold cointegration is that it does not require observations on transaction costs. However, it is highly parameterised and still assumes fixed transaction costs (Fackler and Goodwin 2001).

2.6.6 Parity Bounds Model

Spiller and Haung (1986) and Spiller and Wood (1988) have formulated the application of Parity Bounds Model (PBM). The PBM has been further developed and applied by several researchers. The PBM allows for transaction costs, trade reversals, and autarky. It measures the probabilities of being in different spatial market efficiency regimes over the sample period. The PBM can indicate not only whether the markets are efficient but also the extent to which the markets are efficient.

Furthermore, when data on prices, transaction costs and trade flow are simultaneously available, the PBM allows a clear distinction between spatial market efficiency and spatial market integration (Barrett and Li 2002). They identify six market conditions based on the relationship between spatial price differentials and transaction costs, and whether there is trade. This distinction is lacking in other studies that use only price or only prices and transaction costs.

Baulch (1994, 1997) pointed out the implicit parity bounds problem to occur when the two market regions trade with each other infrequently but have a third regular, mutual trading partner. He reformulated the Sexton et al. (1991) model to a Parity Bounds Model in which deviations of price spreads between regional markets from estimates of corresponding period’s transfer cost are evaluated to establish probabilistic limit within which the spatial arbitrage conditions are likely to bind.

However, the PBM has also been criticized on many grounds. Fackler (1996) provided three major points with regard to the PBM. First, he argued that there is no link

between economic theory and the distributional assumptions used in the switching regime models. Second, this model handles only a limited number of markets. Third, the result may be misleading because the approach considers short run deviations from equilibrium as inefficiency whereas it may actually represent traders' rational responses to lags in information and shipment flows.

In addition, Park et al. (2002) argue that, in well developed markets, profit seeking traders tend to exploit spatial price differences that exceed transaction costs quickly. Assuming fixed transaction costs between two locations, there are three possible trade and price outcomes; the difference between the two region's price is less than the transaction costs, in which case trade does not occur (autarky); trade does occur, and the price difference equals the transaction cost (arbitrage); and the price difference exceeds the transaction costs because trade does not occur.

In general, there have been continuous improvements in methods of spatial price analysis. However, regardless of the methodological refinement to overcome data limitations, the understanding of agricultural markets in developing countries is severely limited without direct monitoring of trading activities (Barrett 1996). This suggests complementarities between the time series econometric methods of spatial price analysis and the direct monitoring of the activities of various market participants in order to produce relevant policy recommendation.

2.6.7 Price Causality Analysis

Since the pioneer work by Granger (1969), test for the causality what is called now Granger causality have been applied to evaluate forecasting power of one time series variable by another. Therefore, the philosophical concept of causality is used to evaluate in so many data analysis.

The methodological and analytical problems associated with correlation coefficient as a test of market integration analysis gave rise to the popularity of regression based causality test methods. The series X_t is said to cause Y_t if it is possible to obtain better predictions of Y_t when using all available information than if only the information apart from X_t had been used (Granger 1969; 1988).

Further, X_t causes Y_t directly if the predictability of Y_t is improved by considering the current value of X_t in addition to all past Y_t and X_t . Granger causality may be unidirectional or bi-directional. If X_t Granger cause Y_t and Y_t Granger also cause X_t , then bi-directional Granger causality (a simultaneous feedback relationship) is said to exist. If the causality relation only runs in one direction, unidirectional Granger causality holds; and if the null hypothesis of no Granger causality cannot be rejected in both directions, the markets are said to be independent or segmented. Several causality test methods have been formulated (e.g. Sims 1972, Haugh 1976, Horowitz 1981, Geweke 1984, Wu 1983, Holmes and Hutton 1990).

If two market regions are integrated for a commodity, a disturbance in price in one region will spill over into the other and the interdependence of price formation should not be rejected by the data. In contrast, if the two regions are sufficiently distinct, there should be no feedback from price shocks across regions and the interdependence should be rejected by the data. The causality tests using regression formulations were very popular in early 1980s for testing of market integration (e.g. Bessler and Brandt 1982, Gupta and Muller 1982, Slade 1986).

A significant innovation in the application of the causality concept in the study of market integration came from Ravallion's (1986 1987) dynamic model. His formulation allows for long-run price adjustment between markets to take time but nests within it a test for short-run market integration. The Ravallion model postulates a radial configuration of markets in which each regional market is directly linked in trade with the central market. The Ravallion's dynamic model has all the property of the earlier developed causality models and at the same time is capable of distinguishing between different forms of market integration. Several application of this model has appeared in market integration literature (e. g. Heytens 1986, Timmer 1987, Faminow and Benson 1990, Arshad 1990). Faminow and Benson (1990) have provided an alternative interpretation of this model when markets are characterized by non-competitive pricing. Recently, the model has been applied in the cointegration framework to test for exogeneity as well as indicating the direction and strength of causality in price formation between markets. (Palaskas and Harriss 1993, Alexander and Wyeth 1994 & 1995; Dercon 1995, Mendoza and Rosegrant 1995)

CHAPTER 3 RESEARCH METHODOLOGY

This chapter presents the details of methodology being employed in the study. Data sources and collection of primary and secondary time series data, description of the market centres and the study period selected are provided. Moreover, methods of analysis on rice market structure and performance procedures are discussed.

3.1 The Sources of the data

Integrated approach is adopted for the analysis of market integration and price causality. Therefore, this study based on both primary data and secondary time series data.

3.1.1 Sampling Method and Primary Data Collection

Field study for collecting the primary data was carried out to access the current performance of the rice markets both in surplus and deficit regions from December 2003 to February 2004. The stratified random sampling procedure was employed in collecting the primary data. Rice farmer, primary collector, rice miller, wholesaler, and retailer were considered as different strata sampling units to understanding the nature of rice marketing system. Moreover, heads of the village and township managers were considered as the key persons to verify the data obtained.

The sample size was determined with three criteria such as level of precision, level of confidence or risk and degree of variability. Therefore, the sample size for stratum of market participants was taken at 90 % confidence interval by using the following equation.

$$\text{Sample size } (n) = (N) / 1 + N e^2 \quad (3.1.1)$$

Where, 'N' is the population and 'e' is the precision level (Miah 1993). However, the predetermined sample size of farmer could not be taken at the 90 % confidence interval because of the time constraint and other resource limitations. Also some market participants especially primary collectors were unable to get the required

sample size because they were far away from the survey area. The number of respondents from the different strata in each market is shown in Table 3.1.

First, the preliminary survey was done for verifying and administering the feasibility and consistency of the logical sequence of the questionnaire in the nearest market. Then, personal interviews were implemented with different structured questionnaires for each stratum. Besides, market operations were observed and informal discussion with concerned government officials and market functionaries were carried out to obtain the required data in the selected rice markets.

Both quantitative and qualitative primary data were collected to demonstrate the function of rice markets. The collected quantitative data were the respondent's age, working experience in year, family size, farm ownership, area planted, costs and returns of rice production, consumption and marketing amount of rice, cost of marketing, past rice prices, current rice prices, etc. In the qualitative data, the data related to the functioning of rice market and the market institutions such as education level, price determination, mode of transport, buying and selling methods, problems encountered in production and marketing of rice, other market related activities and comments of new rice policy, etc. were collected.

3.1.2 Time Series Price Data Collection

If the distance between markets is far, or for studies of long run integration, the seasonal, monthly or weekly price is appropriate. If the distance of markets is short or for studies of short run integration, daily price or weekly price are appropriate because the price information spreads quickly between two markets which are close to one another.

In order to know the long run performance of the rice market, weekly wholesale rice price data from 2001 to 2004 were analysed. The markets of Yangon, Patheingyi, Pyaw, Mandalay and Taunggyi were chosen with different rice varieties of Pawsan, Ngasein, Manawthukha and Inmayebaw to present the spatial market integration. The number of observation on 10 domestic rice markets, monthly consumer price Indies and Thai rice export prices for this study are presented in Table 3.2.

Table 3.1 Number of respondents from the different strata in each market

Sample of strata	Surplus Regions			Deficit Regions			Total
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.	
Farmer	34	33	33	25	22	23	170
Primary collector	4	4	4	3	3	3	21
Miller	8	8	6	4	3	4	33
Wholesaler	10	12	7	5	5	5	44
Retailer	10	11	10	8	5	7	51
Total	66	68	60	45	38	42	319

Notes: Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 3.2 Selected wholesale price series for market integration

No	Price series	Total observation
<i>Surplus Markets</i>		
1	Yangon-Pawsan	216
2	Pathein- Pawsan	216
3	Yangon-Ngasein	216
4	Pathein- Manaw	216
5	Pyay- Immayebaw	216
<i>Deficit Markets</i>		
6	Mandalay- Pawsan	216
7	Taunggyi- Pawsan	216
8	Mandalay- Ngasein	216
9	Mandalay- Manaw.	216
10	Taunggyi- Imma	216
11	Consumer Price Index (CPI)	48*
12	Thai Rice (5% broken)	48*

Note: Time duration: January 2001–December 2004, * = monthly data,

Source: Central Statistical Organization (2000-2004) and The Pink Sheet, World Bank, online

Among the selected rice varieties, Pawson variety is the most popular quality rice variety which is marketed from Patheingyi and Yangon to all other deficit markets. Mandalay and Taunggyi markets were emphasized deficit markets in this study. Ngasein is the coarse rice, and it is preferred by low income consumer especially in the rice deficit areas. It is mainly transported from Yangon to Mandalay market.

Next variety concerned is Manawhtukha, which has fair eating quality and reasonable price. It is the most preferred variety of middle class consumers. It is produced in all paddy grown areas as well as marketed across all regions in Myanmar. It is also interesting to know how to integrate the price series in surplus and deficit market as Patheingyi and Mandalay. The last variety is the Immayebaw, which is produced in surplus region of Pyaw, and it is mainly transported to Taunggyi market. The consumer from Shan state prefer their traditional variety, so called 'Shansan' which is of a little sticky quality and sold at high price because of inadequate supply. Immayebaw variety has more or less similar eating quality to that traditional variety and, it could be substituted for Shansan with lower price.

The price signal from the international market concerned is the FOB price of Thai rice (5 % broken). Because, Thailand is the neighbour country of Myanmar as well as the dominant world exporter, and the Thai export price is generally considered as the important indicator of the world price. Price of Pawson variety from Yangon market and Thai rice price were analyzed for the external market integration. All price series were monthly data for years 2001-2004. In addition, the monthly market exchange rates (Appendix 1) were used for conversion of the domestic currency. Monthly consumer price index (CPI) was applied for the calculation of real price for the selected rice price series (Appendix 2).

These time series data were obtained from Market Information Service (MIS) which is under the Ministry of Agriculture and Irrigation. Also other necessary secondary data was gathered from published documents and official records of Ministry of Agriculture and Irrigation (MOAI), Food and Agriculture Organization (FAO), Myanmar Agricultural Produce Trading (MAPT), Central Statistical Organization (CSO), Market Information Services (MIS), International Rice Research Institute (IRRI) and various companies in Yangon.

3.1.3 Selected Markets for the Study

The criteria for selecting study areas are the production level of paddy and the importance of rice markets both in surplus and deficit regions. The primary data for examining the performance of the rice market was collected in those selected markets. Among the rice surplus regions, two important rice markets were selected; they are 'Pathein' in Ayeyarwaddy Division and 'Pyay' in west of the Bago Division. Paddy was cultivated about 60 thousand hectares in 'Pathein township', which contributed about 4.4% of the total paddy area of Ayeyarwaddy division. The total population of 'Pathein' was estimated 0.35 millions, of which 63.05 % was the rice farmers. Their rice production was 215 thousand tons in 2003. 'Pyay' is the important transit market to the Rakhaing state and Shan state which are border of Bangladesh and Thailand respectively. The rice grown area was 26 thousand hectares and it accounted for 2.7 % of the Bago Division. Among the 0.25 millions of the total population, 51.12 % was the farmer who produced about 60 thousand tons of rice.

Another market, 'Kyaut Tang' in Yangon Division was selected as a surplus area. The surplus rice was transported from Kyaut Tang to central rice market in the Yangon city. It is in the vicinity of the Yangon market and rice can be easily transported by truck and boat. In 'Kyaut Tang', paddy planting area was 63 thousand hectares and total rice production was 191 thousand tons in 2003. The total population was 0.23 million and 50.42% of the total population was rice farmer in this township.

Among the rice deficit areas, three important rice markets were selected as 'Magway' in Magway Division, 'Madalay' in Madalay Division and 'Taunggyi' in Shan State. In this case, 'Mandalay' market which is the second largest rice market locates in central part of the Myanmar, and acts as the distributor for the upper Myanmar. 'Magway' is in dry zone which is not suitable to grow rice. Therefore, rice is critically needed for local consumption. Moreover, 'Magway' has strong relationship with rice surplus markets of Yangon, Pathein and Pyay. The last market is 'Taunggyi', which is situated in a mountainous region of the country. Taunggyi market has a link not only with surplus markets but also the border area of Thailand. All descriptive characteristics of those markets are stated in the Table 3.3. Figure 3.1 shows the location of selected market centres.

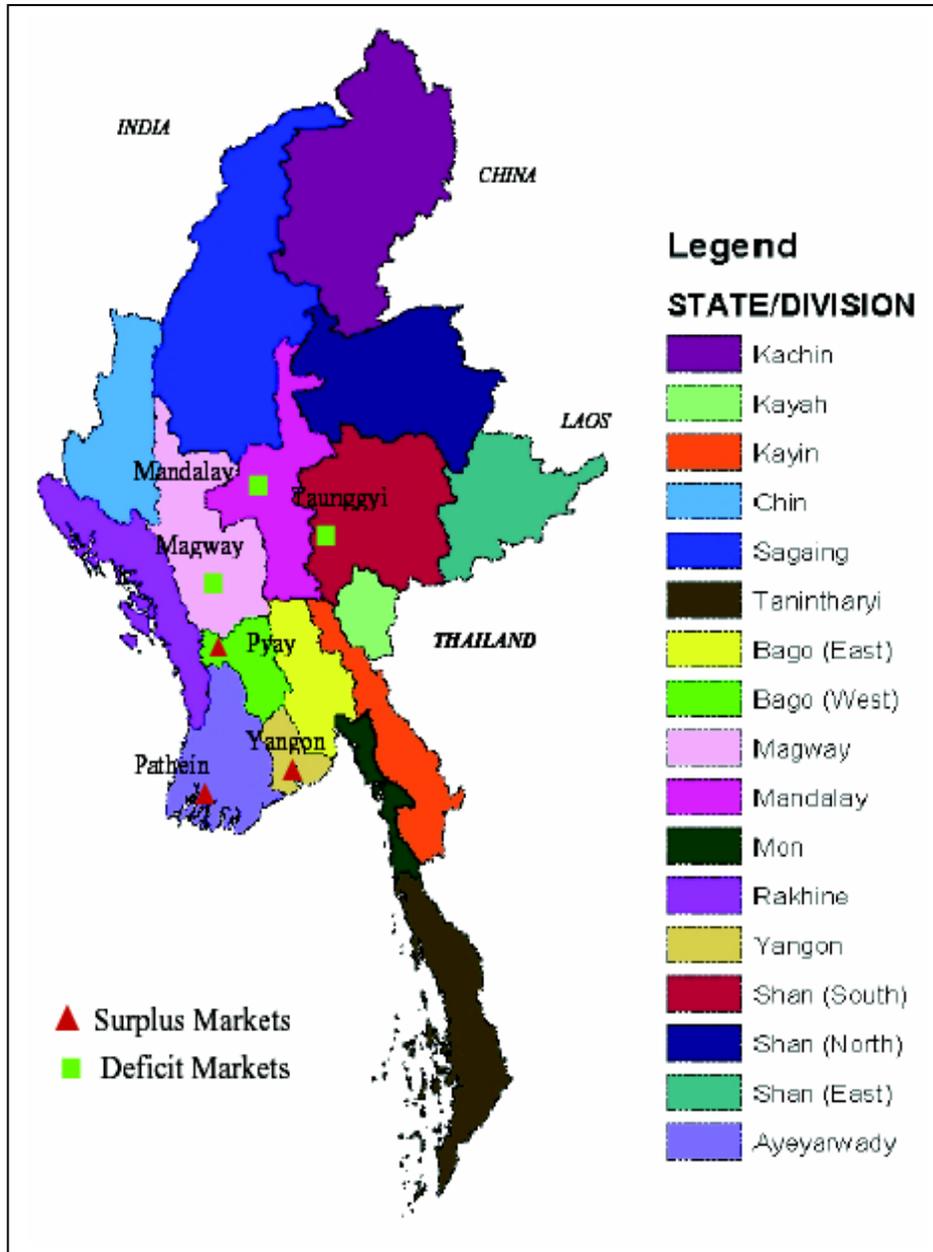


Figure 3.1 Location of selected markets in Myanmar

Table 3.3 Descriptive characteristics of the study areas (2003)

Characters of study areas	Surplus Areas			Deficit Areas		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Total paddy area of state/division (1000 ha)	474	1366	969	257	209	402
Paddy grown area of study Township (1000 ha)	63	60	26	1.4	0.22	0.96
Average yield of Township (ton/ha)	3	3.5	2.3	3.3	3.4	2.3
Total production (1000 ton)	191	215	60	4.6	0.75	2.2
Total Population (million)	0.23	0.35	0.25	0.45	0.26	0.30
Paddy farmer percentage	50.42	63.05	51.12	3.27	11.06	10.72
Major mode of transport for rice marketing	Truck, boat & railway	Truck & boat	Truck & boat	Truck, boat & railway	Truck & boat	Truck

Source: Own survey 2004

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

3.2. Method of Analysis on Market Structure and Performance

3.2.1 Analytical Framework

Market structure describes the environment and the characteristics of a market which exercise strategic influence on the nature of competition and pricing. The dimensions of market structure commonly considered are buyer and seller concentration, product differentiation, barriers to entry, economies of scale and vertical organization of firms. Conduct of the market refers to the behavioral pattern of the firms in the market: how firms set prices, whether independently or in collusion with others in the market, and the process or mechanism of interaction and coordination of firms in the market. The basic conditions are the non-choice variables (e.g. exogenous prices, fixed inputs and environmental variables) along with technological and demand characteristics (Scherer 1980).

As the adoption of general structure, conduct and performance (SCP) approach, competitive behavior of firms (conduct) and performance (in term of price, transaction cost etc.) might determine or influence the market structure with the improvement getting from public or private institutions (Plautteau 1994, Hubbard 1997, Viaene and Gellynck 1995, Greenwood and Carter 1997).

In Myanmar, rice marketing system has been intervened by public institution. Therefore, it is necessary to analyse whether present institutional infrastructure makes more competitive, efficient and equitable rice marketing system which comes as the first objective of this study.

3.2.2 Empirical Analysis

The description of structural and institutional factors affecting the conduct of the rice market system was followed by analysis of interrelations of rice prices in major market centers. Assessment of the structural and institutional characteristics of the market system would determine the strength of competitive and monopolistic forces operating in the market, which ultimately determine the pricing behavior in the market system. The evaluation of hypotheses required presentation of the descriptive account of the structure and conduct of the rice market to be followed by econometric analysis of price relations among the selected market regions in the framework of system of

markets. The first hypothesis relating to competitiveness of the market was evaluated by descriptive and qualitative analysis of information compiled from secondary sources and from the market survey. Accordingly, emphasis was given in providing descriptive account of institution of the market system, and on presentation of the trade and market characteristics that influencing the market price relationships between surplus and deficit markets. Such attempt was also made to assess the structural and institutional factors determining the extent of competitiveness of the rice market system. The assessment was based on first hand observation of market operations of private marketing system, public organization, and upon discussion with traders and millers during the field study in the selected market centers.

3.3. Method of Marketing Cost and Margin Analysis

3.3.1 Analytical Framework

Marketing margins reflect both the cost of marketing and the profits of marketing agents. Thus, marketing margins are differences between prices at different events in the marketing channel.

The price paid by the eventual consumer is thus made up of the amount of money paid to the farmer for his product plus all of the costs involved in getting it to the consumer in the form in which he or she purchases it and a reasonable return to those doing the rice marketing and processing. The percentage share of the final price that is taken up by the marketing function is known as the marketing margin.

As the theoretical concept of marketing margin, it may be defined in two ways: (1) as the differences between consumer retail price and what farmers receive and (2) as the price of marketing services provided. The difference between what the consumer pays for food and what the farmer receives i.e. a marketing margin is simply the difference between the primary and derived demand curves for a particular product.

They capture the proportion of final selling price that a particular agent adds, thus providing linkages between prices at various levels in the distribution system. Even though the magnitude of a margin is not indicative of operational efficiency, their variance across participants is usually suggestive of areas for consideration in improving efficiency. Margins that vary widely among participants at the same level often reflect

price inefficiency at that level. Response of marketing margins to price changes (at any level of the channel) is also indicative of the efficiency of the channel. Where middlemen are few and market information is not available at farm level, increases in consumer prices often take long to be transmitted to the farmer (Guvheya 1998). This phenomenon leads to the calculation of marketing margin, cost and profitability of agents along the rice marketing channel.

Kohls and Uhl (1980) clarified four of the widely held misconceptions about the food-marketing margin. First, the magnitude of the margin is not indicative of marketing efficiency. Though inefficiencies prevail in food marketing functions, “efficiency can not be judged solely by the size of a marketing margin”. Second, the size of margin does not depend on the number of middlemen, but instead of the number and cost of marketing services. Third, an adverse relationship between the size of margins and farm prices is not always the case (i.e., “large margin does not cause low farm prices”). Lastly, the size of margin is not a measure of additional profits that can be gained by farmers and consumers by assuming the role of middlemen. There is no guarantee that farmers and consumers will perform marketing functions as efficiently as middlemen and thus capture food marketing profits.

3.3.2 Empirical Analysis

In Myanmar rice market, competitive pressure as a result of half way liberalization of agricultural markets since 1988 can be expected to reduce profits and perhaps costs, resulting in lowering margins.

Marketing margin is calculated using the concurrent method (Market research and Planning Cell 1985) whereby prices at consecutive levels of the marketing channel are compared at the same point in time. Hence, a marketing margin is specified as

$$M_t^L = P_t^L - P_t^{L-1} \quad (3.3.1)$$

M_t^L = Margin between market level (L) and its preceding level (L-1) at time t

P_t^L = Price at market level (L) at time t

P_t^{L-1} = Price at market level (L-1) at time t

When marketing margins at different levels of the marketing chain are to be compared, it is common to use the consumer price as the common denominator for all

margins. The following are some commonly used indicators which are used in the analysis.

Total Gross Marketing Margin (TGMM)

$$TGMM = (Consumer Price - Farmer's Price) / Consumer Price * 100 \quad (3.3.2)$$

$$Margin\ of\ Primary\ Collector = (Consumer\ Price - PC's\ Price) / Consumer\ Price * 100$$

$$Margin\ of\ Miller = (Consumer\ Price - Miller's\ Price) / Consumer\ Price * 100$$

$$Margin\ of\ Wholesaler = (Consumer\ Price - Wholesale\ Price) / Consumer\ Price * 100$$

$$Margin\ of\ Retailer = (Consumer\ Price - Retail\ Price) / Consumer\ Price * 100$$

Farmer's Portion of Producer's Gross Marketing Margin (PGMM)

$$PGMM = (Consumer Price - Marketing Gross Margin) / Consumer Price * 100 \quad (3.3.3)$$

The magnitude of margins are considered as improving efficiency in the marketing channel which could go a long way in increasing income of farmers and/or ensuring affordable prices to the urban consumers.

3.4 Method of Market Integration and Causality Analysis

3.4.1 Analytical Framework

The background idea of the analysis of market integration is to study the degree of co-movement of price in spatially separated markets. The measure of price integration based on the time series data shows that the presence of connection of markets and changes in the degree of integration should reflect changes in efficiency or transportation cost or both.

Empirical work based on the time series data is stationary because auto-correlation results and random walk phenomenon underlying the non-stationary time series data. Moreover, the regressing a time series variable on another time series variable very often shows the problem of spurious or nonsense regression that can arise if time series are not stationary. The regression model for forecasting and causality test was also based on the stationary time series data.

Movement in time series are normally classified into three components: first is a secular trend over time, cyclical changes within the trend is the second and last, residual movements of individual elements in the series away from the trends and cycles. Cyclical variations are often caused by seasonal influences which may include just one

peak and through a year. Therefore, price series should be tested for its seasonal movement in the long run. Another fundamental distinction to make is whether the trends and whether the seasonal or other cycles within the series are ‘deterministically’ or ‘stochastically’ generated. A type of stochastic process is said to be stationary if its mean and variance are constant over time. The stochastic process is purely random or white noise process in which error term is independently and identically distributed as a normal distribution with zero mean and constant variance. Therefore, such a stochastic process is mentioned in the time series literature as weakly stationary or covariance stationary.

Alexander and Wyeth (1995) provided the implications of whether the processes are stochastically or deterministically generated in the long run trends and seasonality. They concluded that their using methodologies depend upon their result from the Indonesian rice market integration in which the trends are all different stationary (stochastic) process. This made it valid to apply the Engle and Granger two steps procedure for the testing cointegration between pairs of series.

Cointegration tests for spatial market integration therefore begin with the premise that for long run equilibrium relationships between two variables. It is necessary to have the same inter temporal characteristics in those variables. The first step, the time series properties of the variables are needed to examine. The variable should be stationary at the price level or after differencing each time series by using the stochastic trend. Most macroeconomic variables have been found to be non-stationary in their levels and stationary in the first differences. Most most of the price series have trends in them because of inflation, which means that they are stationary in the first differences.

Economic interest in the theory of testing for unit roots has led to the development of a variety of tests aimed at examining the order of integration and the presence of unit roots in time series data. The most widely applied unit root tests are: the Durbin-Watson test of Sargan and Bhagrava (CRDW); the Dickey-Fuller test (DF); and the Augmented Dickey Fuller test (ADF). Among these, the standard procedure for determining the order of integration of a time series is the Augmented Dickey Fuller test (ADF) (Dickey and Fuller 1979) which requires regression Δy_t on a constant, y_{t-1} and several lags of y_t (enough to avoid auto-correlated disturbances).

There are also a number of tests which could be used for testing co-integration as mentioned in Chapter 2. These can be briefly grouped into residual-based approach and the maximum likelihood approach. The residual based approach is easy to see whether two price series are cointegrated. Therefore, the two-step, residual-based test developed by Engle and Granger (1987) was adopted to test for co-integration. The integration analysis was done by using TSP-software.

As in the Granger representation theorem, if the pair of markets is cointegrated each other in long run in order to 1, price causality must have at least one direction of relation between two markets. The idea behind of the causality test is the information relevant to the prediction of the respective variables.

The background of the structure model for the causality between two markets and the effect of inflation on the rice price series assumed that the basis price formations of local markets are dominated by central or reference market price. The static form of the model is as follows:

$$P_i = f(R, X_i) \quad i = 1, \dots, N \quad (3.4.1)$$

$$R = f(P_1, \dots, P_N, X) \quad (3.4.2)$$

Where, P_i is local market price, R is the reference price, X_i is a vector of seasonal or other exogenous variables which might influence price formation in market i , X refers the equivalent variables for the central market. The dynamic factor can be set to this static form by using lagged variable of independent variable and express as a linear form as:

$$P_{it} = \rho_i P_{it-1} + \rho_{j0} R_t + \rho_{j1} R_{t-1} + \eta_t X_{it} + \xi_{it} \quad (3.4.3)$$

$$R_t = \alpha_j R_{t-1} + \beta_{i0} P_t + \beta_{i2} P_{2t} + \dots + \beta_{i1} P_{1t-1} + \beta_{i21} P_{2t-1} + \dots + cX_t + \xi_t \quad (3.4.4)$$

Also this can be rewritten as:

$$P_{it} = \sum_{i=1}^n \rho_i P_{it-1} + \sum_{j=0}^n \rho_j R_{t-1} + \eta_t X_{it} + \xi_{it} \quad (3.4.5)$$

$$R_t = \sum_{j=1}^n \alpha_j R_{t-1} + \sum_{i=0}^n \beta_i P_{it} + c_t X_t + \xi_t \quad (3.4.6)$$

where it is assumed that the disturbances ξ_{it} and ξ_t are not correlated. The postulates of the equation are the current price of market (P) is related to past value of itself and current and past value of price R. Therefore, the equation can extend through

the technique of Vector Auto-Regression (VAR). The VAR model was developed by simultaneous equations as each endogenous variable was explained by its lagged values and current and lagged values of other endogenous variables. The calculations in this study were carried out for the bivariate case, dealing with the price series in a pair based on their relationship of marketing functions.

Therefore, the equation (3.4.3) was estimated. The average price of the each variety was chosen for particular price series even though prices were differentiated between three levels of quality such as top, middle and low. In this model, the actual price series should be estimated rather than the log of the price value because of the nature of the transportation costs (Ravillion 1986). The consumer price index was used as a measure of inflation during the study period. And the international rice price particularly Thai rice price (FOB) was tested to evaluate whether Myanmar domestic rice market has integration with international rice market or not.

3.4.2 Empirical Analysis

3.4.2.a Time Series Data Generation Process

The cointegration method was used in the integration analysis of Myanmar rice market. Briefly, cointegration means that: (I) two variable series, say P_{it} and P_{jt} , are non-stationary in levels but stationary in first differences, that is, $P_{it} \sim I(1)$ and $P_{jt} \sim I(1)$; (II) a linear combination exists between these two series that are stationary, that is. So, the first step of cointegration is to test whether the series are stationary. If they are both $I(1)$, then the second step is to test for cointegration with the residual of the regression equation and causality test.

First step is to test for stationary or the order of integration of each variable by using the Augmented Dickey–Fuller (ADF) method (Dickey and Fuller 1979). The t statistic on the estimated coefficient of P_{t-1} is used to test from the based equation as follow;

$$P_t = \alpha + \rho P_{t-1} + \xi_t \quad (3.4.7)$$

This equation is the well known autoregressive AR(1) model, if $\rho = 1$, P_t is the a non-stationary series at random walk with drift and the variance of the price series may increase steadily with time from the starting point and violating the condition of weak

stationary. Price series is stationary only if $|\rho| < 1$, white noise error term and distributed normally with zero mean and unit variance. Then, the equation is subtracted by P_{t-1} using the lag operator from both sides,

$$\begin{aligned} P_t - P_{t-1} &= \alpha + \rho P_{t-1} - P_{t-1} + \xi_t \\ P_t - P_{t-1} &= \alpha + (\rho - 1) P_{t-1} + \xi_t \\ \Delta P_t &= \alpha + \beta P_{t-1} + \xi_t \end{aligned} \quad (3.4.8)$$

In this equation, $\beta = \rho - 1$, the coefficient to be tested for the hypotheses as

$$H_0: \beta = 0 \text{ vs } H_1: \beta < 0$$

If the coefficient of t-statistic on P_{t-1} (β) otherwise ADF statistic is not large and negative, the price series will not be stationary I(1). In this case, the test should repeat with ΔP_t as the dependent variable and so on, until the order of integration is determined. The ADF approach has a power over higher-order correlation of disturbances by including lagged difference terms of the dependent variable to the equation. If the price series include the trend, there will be fluctuation around a non-zero mean. The ADF regression should be taken as constant and time trend. Therefore, each of price series to be tested for null hypothesis is that $\beta = 0$ by using the following equation with constant and time trend.

$$\Delta P_t = \alpha + \beta P_{t-1} + \gamma t + \sum_{k=1}^n \delta \Delta P_{t-k} + \xi_t \quad (3.4.9)$$

Where $\Delta P_t = P_t - P_{t-1}$; $\Delta P_{t-k} = P_{t-k} - P_{t-k-1}$ (Δ is the difference prices);

$k = 2, 3 \dots n$ (K is the number of lagged differences);

P_t = the price at time t ;

α = vector of constants;

γ = trend coefficient;

β , and δ = parameters to be estimated;

and ξ_t = the white noise error term.

If the value of the ADF statistic is less (that is, more negative, because these values are always negative) than the critical values which are provided by Mackinnon (1990), it show that P_t is stationary, and it may be concluded that $P_t \sim I(1)$. If P_t is non-stationary, it should be determined whether P_t is stationary in the first difference (that is, to test $P_t - P_{t-1} \sim I(1)$) by repeating the above procedure. After that, the second step of

testing for cointegration can be taken by using the Engle and Granger two steps residual based test.

3.4.2.b Method of Market Integration

The first step procedure of Engle and Granger is the cointegrating regression of one I(1) price series (P_{it}), on another I(1) price series (P_{jt}) but there is some linear combinations of them which is I(0). This is the cointegration of order (1, 1) and the cointegration vector is the vector of coefficients of the linear combination of the series that is stationary.

The cointegration vector is a vector of constants such that $e_t = aP_{it} - bP_{jt}$ is I(0). In this case, the coefficient estimate of the price P_{jt} of the OLS regression of P_{it} on a constant is the ratio of a and b, therefore $\omega = b/a$. Then, it is needed to look for the cointegration vector of the form $(\omega, 1)$. The first step is to determine ω as the slope coefficient of cointegration regression plus a constant and time trend of price P_i .

$$P_{it} = \varphi + \omega P_{jt} + \eta_t + e_t \quad (3.4.10)$$

where P_{it} is the price in market i at time t,

P_{jt} is the price in market j at time t,

φ is constant,

ω is parameters to be estimated,

η is the time trend parameter,

and e_t is the error term.

The second step is to test whether the residuals, e_t , from the co-integrating regression are stationary by using the ADF test,

$$\Delta e_t = \lambda e_{t-1} + \sum_{k=1}^n \theta_k \Delta e_{t-k} + \mu_t \quad (3.4.11)$$

$$\Delta e_t = e_t - e_{t-1}; \quad \Delta e_{t-k} = e_{t-k} - e_{t-k-1};$$

Where e_t , e_{t-1} , e_{t-k} and e_{t-k-1} are the residuals at times t, t-1, t-k, and t-k-1, respectively; λ and θ_k are parameters to be estimated; and μ_t is the error term.

In this regression for the residual, the constant and time trend are not included because the residuals from the cointegrating regression will have a zero mean and be detrended. The null hypothesis that $\lambda=0$ is tested again, but this is a test of residual

stationary rather than original time series. If the ADF t-statistic value of the λ coefficient is less than the relevant critical value (Mackinnon 1990), the null hypothesis is rejected and two price series are cointegrated to order 1 – meaning two markets are integrated in the long run.

The serious problem in the Engle and Granger procedure is the small sample bias particularly when there are more than two variables in the cointegration regression. To overcome this problem, this study calculates ADF statistics twice for each pair of price series by using the dependent variable in turn. The intention is to seek whether the same level of significance will be obtained in either direction of the market or how much bias in the identification of the problem.

The presence of cointegration between two series is indicative of strong interdependence; its absence indicates market segmentation. Segmentation occurs when there is no cointegration. Perfect integration occurs if the price in one market is just a translation of the price in the other market, implying that price changes are the same. It means that two markets are economically integrated in the long run. After that, it is needed to look how the direction of price formation in pairs of market is.

3.4.2.c The Price Causality Model

Working for the causality of the price movement between two markets, basic equation (3.4.8) of Ravallion model can be restructured in the form of unrestricted Vector Auto-Regression (VAR) of the error correction form testing on the causality. The model can be presented as follows:

$$\Delta P_t = C_{it} + \rho_{i1}\Delta P_{t-1} + \dots + \rho_{in}\Delta P_{t-n} + \rho_{j1}\Delta R_{t-1} + \dots + \rho_{jn}\Delta R_{t-n} + \beta_1 P_{t-1} + \beta_2 R_{t-1} + \xi_{it} \quad (3.4.12)$$

$$\Delta R_t = C_t + \rho_{f1}\Delta P_{t-1} + \dots + \rho_{fn}\Delta P_{t-n} + \rho_{l1}\Delta R_{t-1} + \dots + \rho_{ln}\Delta R_{t-n} + \beta_3 P_{t-1} + \beta_4 R_{t-1} + \xi_t \quad (3.4.13)$$

The model can be written as:

$$\Delta P_t = C_{it} + \sum_{n=1}^k \rho_{in}\Delta P_{t-n} + \sum_{n=1}^k \rho_{jn}\Delta R_{t-n} + \beta_1 P_{t-1} + \beta_2 R_{t-1} + \xi_{it} \quad (3.4.14)$$

$$\Delta R_t = C_t + \sum_{n=1}^k \rho_{fn}\Delta P_{t-1} + \sum_{n=1}^k \rho_{ln}\Delta R_{t-n} + \beta_3 P_{t-1} + \beta_4 R_{t-1} + \xi_t \quad (3.4.15)$$

where Δ as usual denotes the first difference operator, k is the number of lag to be determined, ξ_{it} and ξ_t are random error terms and P_{t-1} and R_{t-1} are the one period lagged value of the respective price that are replaced by the single term of the residual from the

cointegration regression (usually in ECM model). The term of auto regression is due to the appearance of the lagged value of the dependent variable on the right hand side and the term of vector is due to the fact that dealing with a vector of two or more variables. These equations state that change in the price of market P at time t can be predicted by the past prices of itself and past prices of market R and it postulates a similar behavior for R. There is a strong connection between cointegration and causality in this procedure, and Granger causal relationship must exist at least once in a integrated system.

If the estimated coefficients on the lagged prices R (ρ_{j1} , ρ_{jn} and β_2) are statistically different from zero, these will be on unidirectional causality from R to P is indicated in equation (3.4.12). Conversely, unidirectional causality from P to R exists, the set of the lagged coefficients of P (ρ_{f1} , ρ_{fn} and β_3) should be significantly different from zero in equation (3.4.13). Because of lagged alternative prices provide a better prediction of current changes in one price. Bilateral causality is suggested when the sets of price P and R coefficients are statistically significantly different from zero in both regressions.

Therefore rejection of the joint hypothesis by using the standard F test is:

$$H_0 : \rho_{j1} = \dots \rho_{jn} = \beta_2 = 0 \text{ and } \rho_{f1} = \dots \rho_{fn} = \beta_3 = 0$$

The number lagged terms is an important point which should be considered for the testing of causality. The direction of causality may depend critically on the number of lagged terms applied. Therefore, the Akaike Information Criterion (AIC) will be used for the suitable lag length. The AIC can be defined as:

$$\ln AIC = \frac{2K}{n} + \ln\left(\frac{RSS}{n}\right) \quad (3.4.16)$$

where, $\ln AIC$ is natural log of AIC, K is the number of regressors including constant and n is the number of observations. In comparing two or more models, the model with the lowest value of AIC is preferred (Akaika 1969).

CHAPTER 4

MYANMAR RICE MARKET STRUCTURE

In order to understand the rice marketing structure in Myanmar, it is important to look into the general market conditions which determine the choice of conduct by firms and farmers in the rice sector and their ability to meet performance goals. Several factors influence the structure of competitiveness of rice marketing system in terms of pricing and marketing strategies. The market environment (structure) is a critical element of understanding and developing strategies. Therefore, this chapter presents the structure of rice market and overall condition of rice sector in Myanmar during ten years (1994-2004) of the present government era.

4.1 Farm Structure

As mentioned earlier, farms of competitive markets are small scale and price taker and they produce homogenous product. Myanmar farmer's condition seems to be in the competitive structure depending on these points. However, farmers could not easily enter into and exit out of the paddy production business because of existing land policy. According to the present land policy, paddy must be cultivated under the management of government authorities. If farmers refuse to grow paddy when they are facing disincentive price condition when compared with other crops, their land will be transferred to others who want to grow paddy because land is considered as the property of the state.

Government's regulations on limited choices of crops and land tenure status for the farmers are the important reasons for explaining why farmers are not in the real competitive marketing system in Myanmar. The major problem is the lack of institutional flexibility when a price incentive was not favorable for the paddy production.

Hossain and Oo (1995) pointed out that the changes in rice sown area and yield were not related with rice price. Moreover, according to the study of Nay Myo Aung (2005), the paddy production was significantly depended on lagged paddy sown area of farmers. This means that the production of paddy highly depended on the government's program of food security and it did not depend on the prevailing price of paddy or rice.

Therefore, paddy farmers faced the negative impact of paddy policies on farm income in the delta region and crop income was lower for farmers who grew more paddy using irrigation (Okamoto 2003). Also Garcia et al. (2000) reported that the average income was lower in the irrigated paddy farming. If farmers are allowed to have more freedom in making for cropping choices or to have access to market information price signal in particular, their farm income will go up similar to the income of other crop production particularly pulses crop (Okamoto 2004).

Moreover, rice farmers had a fixed quota for annual delivery to Myanmar Agricultural Produce Trading (MAPT), a government procurement agency, at government-determined prices before 2003. Therefore, all of farmers had to sell part of their paddy to MAPT, according to the paddy quota, which was fixed at 525-626 kg/ha (10-12 baskets/acre). The government authorities of MAPT decided the payable price which was usually less than the market price. After that, the small farmers sold urgently their paddy directly to local rice millers and primary collectors who purchase paddy for rice millers. The reason was that they need cash to pay for debts or to use it as working capital for next crop planting. Most of the small farmers store their paddy only for the purpose of home consumption and seed use.

The large farmers stored their surplus paddy not only for home consumption, and seed purpose but also for the expectation of a higher price later on. The period of storage is ranged from three to ten months, depending on the expected high price increase and also on the farmer's financial condition. Farmers traditionally stored their paddy in bulk in a circular bamboo bin called as "poke" which cemented with mixture of cow dung and mud. Milled rice is usually stored in 50 kg bags. Most farmers sold paddy. In some cases, they milled part of their paddy in the small rice mill of their own or neighboring village. They could sell the rest of the milled rice to millers or retailers or consumers in the nearest markets.

Actually, the low farm gate price discouraged the farmers who have worked under export restrictions and limitation on cropping choices. The economic disincentives resulting from the government's policies stress on food security. Because of keeping the domestic low price, there was a large difference between the state's targeted planned production and actual paddy production.

4.2 Market Intermediaries and Private Institutions

The unique situation in Myanmar is that the marketing of certain crops is completely handled by the open market; others are partially marketed through government organizations. In the case of rice, the domestic marketing is partially liberalized. The export is monopolized by the government and there might be illegal export of controlled commodities including rice to neighbouring countries through the border markets.

Rice marketing in Myanmar is operated by several intermediaries for moving paddy from farmer to ultimate rice consumer. Farmers generally sell their paddy to primary collectors or village millers. Otherwise they sell rice to local traders after milling for their home consumption. The detailed marketing channel from farmers to consumers will be discussed in the next chapter. In this section, general structures of market intermediaries are mentioned to exhibit the overall rice market structure in Myanmar.

4.2.1 Primary Collector

Primary collectors usually purchase paddy directly from farmers for millers and wholesalers with basket, the volume of which varies from region to region. Some collectors play as the brokers with their own capital and some are commission agents of big millers and town wholesalers. Mostly, farmers work as during their off-season. Therefore, they are very familiar with farmers and take the opportunity to get much more paddy for their profits. It is common practice that primary collectors offer money to farmers in advance to guarantee the purchase at the harvest time. During transaction time, farmer and broker are used to negotiate the price of paddy depending on the advance payment, quality, variety, moisture content, and size of the basket and so on.

In this stage of market participants, Myanmar has neither private and public institutions nor rules and regulations for their transactions. The primary collectors have opportunity to easily enter into and exit out of the rice marketing depending upon market condition. Their working capital is small and it is partly provided by millers or wholesalers. According to the personal discussions with primary collectors, there was no

evidence for the state's intervention in rice or paddy marketing activities except procurement low price.

4.2.2 Rice Miller

In Myanmar, there were many state owned and private owned rice mills. The state rice mills were controlled by MAPT. The total number of state-owned rice milled was 67, some of which have a milling capacity over 5,000 tons of paddy per day. The bigger mills are mostly located in the major surplus areas (MIS 2000). The procured paddy is collected from farmers, and paddy is milled at both state and contracted private mills in major surplus regions. Most of the state mills have a capacity of 100 tons per day which are under the management of MAPT. However, MAPT could not handle all procured paddy at their mills. Therefore, MAPT contracted with private sector to mill their procured paddy. The milling share of procured paddy for the private mills was 68 % on average during 1989 to 2001, indicating the government's dependency on private milling sector in Myanmar (Tin Htut Oo and Kudo 2003).

Private rice mills can be classified into three groups according to their milling capacity of small, medium and large. Most of them have the capacity of less than 15 tons of paddy per day. Commonly found in Myanmar is small village rice mill often called huller mill. Small village rice mills can be found in a large number of rural areas and they play important role. The owners of the small rice mills are often farmers because they have no sufficient capital to invest for medium or large mill. They milled their marketable surplus paddy and home consumption as well. The busiest time of rice mills began just after the paddy harvesting time. Some small millers bought the paddy during the harvesting season and stored for getting the high price. Nevertheless, some of the small millers could not buy the paddy by themselves. They usually mill the paddy and accept the milling charges which is called 'Nawali' in terms of Myanmar language.

Large commercial mills were generally constructed during the colonial period. Most of the large millers bought paddy from farmers/collectors through the commission and sold the milled rice to wholesalers and retailers. The large millers in surplus area played as wholesalers, and they sold their milled rice to wholesalers in the central markets in other regions.

At this stage, institutional function can be observed. Mostly large millers were the member of Rice Miller's Association which was organized under the control of Government's authority. However, most of the small millers were not the member of this association. The Association was not well organized especially in deficit regions. Based on the interview with rice millers, there was neither effective support nor restriction by the Rice Miller's Association.

However, some millers particularly large scale millers frankly pronounced their problems regarding the relationship with MAPT. The first problem was the milling charges of the procured paddy. The MAPT paid half of the market milling charges to contracted private millers. In addition, the millers have to store MAPT's paddy for long period without paying any charges. If MAPT got the regional target procured amount of paddy from farmers, milling for marketed paddy was not restricted for the private millers in particular region. If not, government authorities did not allow milling of the marketed paddy as well as of household consumption.

4.2.3 Rice Wholesaler

Wholesalers play an important role in the rice-marketing channel in Myanmar. They operate rice marketing with much more capital than other participants. They conduct their business in local market and inter-State/Division trade. Mostly, they are also rice millers especially in surplus regions. Some wholesalers buy the rice through their agents who are paid by a fixed salary or commission. They operate as the center point of the rice marketing in Myanmar. They have linkages not only with all layers of the marketing channel but also with government representatives. The market price information from the nearest market, supply/demand situation from focal point, and policy environment are important factors for wholesaler's decision making process.

At this stage of rice marketing, 'Myanmar Rice Wholesaler Association' was formed consisting of almost all of the wholesalers in each region. After abolishing the procurement system in 2003, rice wholesaler association became more organized under the guidance of government authorities and Myanmar Rice Trading Leading Committee in all regions. Rice wholesalers had to pay entrance and annual fees for registration as a

member of the rice wholesaler association. This organization was much more active especially in rice surplus regions and in Yangon rice market.

In Yangon rice market, the Myanmar Rice Wholesaler Association took over responsibility for organizing the Rice Trading Centre and helping the improvements of market efficiency and atmosphere of the rice marketing transactions. The Rice Trading Centre in Yangon was opened for every member; around 500 traders were visiting the centre and doing the transaction through negotiations with the rice samples on every morning. The responsible persons were taking the records for rice price, volume of rice transactions and these records were presented to the government organization and to the members of rice wholesalers as well. But the rice wholesaler association in any other rice market was not operating well in Myanmar.

The first agricultural market liberalization was implemented by allowing the free domestic marketing and private export of some agricultural products in 1988. In general, the first liberalization allowed rice wholesalers to trade freely in domestic rice market. However, some contradictory points from the competitive structure of domestic rice marketing were observed by the personal interview with wholesalers in different rice markets.

The government intervenes the rice marketing in border areas in order to prohibit illegal trade and to control the stable rice price for consumers. The wholesaler who wanted to trade rice in the border regions need to get the permission from the local government authorities. Mostly rice trading in these regions was allowed with the limited amount of marketed rice. Particularly these strict regulations created the high rice price in these regions and push the rice wholesalers to trade rice illegally for getting more profit.

4.2.4 Rice Retailer

Retailer is the last layer as the direct link to consumer in rice marketing channel. Of course, retailers of rice market are tightly close to consumers who have to buy rice everyday for their daily consumption. The relationship between retailer and consumer is much more complex compared to the relationship between other market participants. Because of the majority of consumers are low income consumers, and a large portion of

their budget is used for rice. Therefore, rice retailers understand well the customer budget and they adjust the time of payment for buying rice later on at least next transaction. Most of retailers purchased rice from wholesalers.

A few retailers bought rice from millers and directly from farmers. They mainly sold to consumers in retail markets which are the nearest to consumers. It is evident that rice retailers had no organizational action in all rice markets. They had much more freedom to enter into and exit out of the rice marketing system. Moreover, they represent a layer which has much more competitive structure in the rice marketing channel in Myanmar.

4.3 Public Institutions in Rice Marketing

During 1988 to 2003, Myanmar Agricultural Produce Trading (MAPT) under the Ministry of Commerce was the public institution for marketing and trade of rice and paddy. MAPT had the responsibility to undertake the following actions:

1. To make arrangements for selling rice to specific groups at reasonable prices,
2. To make arrangements to provide rice to victims of natural disasters free of charge,
3. To set aside reserve rice that may be needed in times of military, political and economic emergencies, and
4. To export surplus rice to earn foreign exchange (MAPT 2004).

In 2003, the Myanmar Rice Trading Leading Committee was formed with the government representatives and representatives of the private enterprises to smoothly implement the new rice policy to give necessary supervision, coordination and guideline. Export of rice can be carried out by private sector under the guidance of Myanmar Rice Trading Leading Committee.

4.3.1 Paddy Procurement System

The MAPT purchased about 4.24 percent of national production at the fixed price (Appendix.5). During the period from 1989 to 1996, MAPT prescribed the sale quota through local authorities at different levels in which each farmer had to sell 525-626 kg/ha (10-12 baskets/acre) of paddy to the state. Under this prescription, MAPT

purchased paddy from farmers with advance payments which were disbursed before harvest. Then, in 1996-97, paddy was purchased by cash down system. After that, paddy was purchased from millers and merchants through tender system in 1997-98. However, this system did not succeed due to the lack of experience and the instability in the domestic market. Therefore, paddy was directly bought from farmers as a common action of MAPT.

Based on the annual paddy production, the yearly consumption, and amount of purchased paddy in preceeding years, the government authorities from Trade Council set the purchased amount of paddy in the surplus regions. After getting the target approved from the Trade Council, the revised targets for respective townships were set and sale contacts were made with farmers. Advance payments were paid out to farmers under the supervision of local authorities. The payment was so called a cultivation loan which was distributed to farmers in July, August and September of each year for the convenience of farmers in the cultivation season.

Table 4.1 shows the amount of procured paddy under advance payment contract and the amount of actually received paddy during the period from 1989 to 2003. The procured price of paddy was less than the market price, MAPT set the prices for different varieties according to the quality, cost of paddy production and prevailing market price in each year. The predetermined price was approved by the Trade Council. In this Table, paddy price was calculated in average for all regions even though MAPT set the different prices in surplus regions and deficit regions. For example, price gap between Yangon and Mandalay markets was 10% (MAPT 2004).

The volume of procured paddy decreased after first liberalization. The procured paddy share of total production was 11.16% in 1994 and it was decreased to 0.89% in 2003 (Appendix 5). However, in some years particularly in 1995-96, MAPT received 194.9% of contracted amount of paddy from farmers.

Table 4.1 MAPT's procurement of paddy under the contract system (1988-2003)

Year	Contracted paddy (1000 mt)	Received (1000 mt)	Received % of contract	Price (kyat/ton)
1988-89	**	1792.67	**	879
1989-90	1385.17	1313.62	94.83	1262
1990-91	1368.46	1504.07	109.91	2357
1991-92	1609.97	1557.37	96.73	2357
1992-93	1618.36	1595.66	89.6	2357
1993-94	1984.77	1925.65	97.02	2357
1994-95	1851.53	2029.32	109.6	3795
1995-96	992.21	1933.83	194.9	4275
1996-97	**	1521.82	**	7191
1997-98	**	1023.79	**	17296
1998-99	194.11	219.56	113.11	17298
1999-2000	235.50	220.76	93.74	17298
2000-01	231.23	211.00	91.78	17298
2001-02	234.94	211.48	90.02	17298
2002-03	234.68	206.17	87.84	17298

Note: ** indicates that there was no contract system in this year

Source: MAPT (Myanmar Agricultural Produce Trading) 2004

4.3.2 Rice Rationing System

During the present government, rice rationing system is meant only for civil servants, army ration and family of the armed forces which are so called budget group or target group. There were three different groups which are provided with rationing rice at different low prices:

Group 1: Military rations for all military personnel,

Group 2: Civil service, families of defence services, projects, trainings, social welfare tasks, jails, hospitals, reserve rice for states and border area development task and Yangon Division special sales,

Group 3: Urban consumers especially for Yangon Division where Cooperatives are able to distribute rice with 5% commission from the sale price.

Under the rationing system, rationed rice for the budget group was 25 kg per month for single adult and 28 kg for a married adult. Assuming the per capita rice consumption is 180 kg per year, the amount of rationed rice is sufficient for individual adult. However, for married personnel if family size is large, the amount of ration rice will not be sufficient for the whole family. Price of the rationed rice was about 20% of prevailing market rice price during the period 1988 to 2003. Nevertheless, rationed rice was poor in quality in general because procured paddy was not properly managed during buying, storing, milling, transporting and distributing stages.

Total volume of rationed rice, ratio of procurement paddy and different prices for each target group during present government era are presented in Table 4.2. From 1988-89 to 1994-95, there was no record for different prices for each group so far. Although, selling prices were varied with different varieties and qualities as well as for different regions, the average price was presented in the table. Then, prices for rationed rice were fixed by dividing into three groups in 1994-95. Apart from these three prices, rice price was offered at 20% discount on the prevailing price by the head of the MAPT in the states and divisions.

Since the purchase price of paddy was raised in 1995-96, the new price of rationing rice was also increased in 1996-97. The prices of rice were increased again except the price for group 1 and civil servants in 1998-99.

Table 4.2 Rationed rice and selling price by MAPT during 1988-2003

Year	Rice (ton)	% of procurement	Price (kyat/ kg)		
			Group 1	Group 2	Group 3
1988-89	567855	63.35	1.98	1.98	1.98
1989-90	194724	29.65	1.98	1.98	1.98
1990-91	746616	99.28	1.98	1.98	1.98
1991-92	635370	81.60	1.98	1.98	1.98
1992-93	779137	97.66	1.98	1.98	1.98
1993-94	750573	77.96	1.98	1.98	1.98
1994-95	843082	83.09	6.32	7.22	11.90
1995-96	803985	83.15	6.32	7.22	11.90
1996-97	848351	111.49	6.32	7.34	12.14
1997-98	792726	154.86	6.32	7.88	12.14
1998-99	672250	612.37	6.32	25.57*	27.76
1999-00	685380	620.92	6.32	25.57*	27.76
2000-01	590248	511.04	6.32	25.57*	27.76
2001-02	577653	546.30	6.32	25.57*	27.76
2002-03	677570	657.28	6.32	25.57*	27.76

Note: * indicates this price is not for civil servants

Source: MAPT (Myanmar Agricultural Produce Trading) 2004

The amount of rice distributed to the target groups was allotted according to the number of staff of the ministries. Subsequently, forbidding the sale of reserve rice of states and divisions and rice of certain projects rendered the reduction in the sales of rice by MAPT. However, ratio of rationing rice to procured paddy was found surprisingly high, which means that the amount of the government distributed rice to target group was higher than the amount of procurement especially during 1996-97 to 2002-03. Therefore, the present government seems to use accumulative buffer stock for subsidized rationing rice to target group.

According to the rice distribution system for the target group 2 and 3, MAPT gave special attention to the urban consumers particularly in Yangon which has highest urban population. Even though sale price was raised during that period, it was less than the current market rice price. Therefore, Yangon urban consumers kept the benefit from the rationing system more frequently.

4.3.3 Rice Export System

Myanmar Agricultural Produce Trading (MAPT) under the Ministry of Commerce monopolized the rice export to fulfil the government's priority in securing rice for rationing and earning foreign exchange. Although the present government wanted to promote the rice export, comparatively smaller amount of rice than that of earlier time was exported. The absolute amount of rice export and percent of total production during one decade of current policy are reported in Appendix 4 and 5 respectively.

During late 1990s, rice export was considerably declined later because of low-quality rice automatically reduced the demand. The MAPT tried to regain old rice markets and looked for new ones with competitive quality and price as well as shipment of the cargo contracts. Therefore, rice export was raised up to 6.49% of total production again in 2001.

4.4 Major Rice Flow in Myanmar

For the country as a whole, rice production is higher than the domestic consumption. But, the central Myanmar, hilly regions and coastal regions were not self

sufficient. Rice from surplus area of lower Myanmar, therefore, was marketed to deficit area. So that, inter-state/division trade can be found in domestic marketing system.

According to the estimation of the amount of marketed surplus (Appendix 3 and Figure 4.1), Ayeyarwaddy and Bago Divisions were the most surplus regions and Mandalay, Magway and Chin State were the seriously deficit regions. Ayeyarwaddy Division produced 227% of the surplus paddy production. In Bago region, self sufficiency in paddy production was 197%. On the other hand, Chin, Mandalay and Magway regions required around 46%, 48% and 44% respectively of their production level in 2003. However, totally, marketed paddy surplus was 31% of the production of the country level in 2003.

Therefore, the biggest flow of rice was from the surplus areas in the lower part of the country (Ayeyarwaddy and Bago Division) to the rice deficit areas of the central part of the country (Magway and Mandalay Divisions) as well as via upper Myanmar to the hilly regions (Chin and Shan States). Also, rice flowed from the lower surplus areas to coastal areas (Tanintharyi Division). Among the rice markets, Yangon was the central marketing point. Rice assembled in Yangon and it was transported to the markets in upper Myanmar and coastal areas.

According to the own survey and the information from MIS project, the biggest inter-State/Division rice trade flows were:

1. From Ayeyarwaddy Division to Yangon, Mandalay, Pyay (western Bago) and Magway,
2. From Yangon market to Bago, Mandalay, Magway, Tanintharyi Divisions and Shan State,
3. From Pyay to Mandalay, Sagaing, Magway Division, Rakhaine and Taunggyi (Southern Shan State),
4. From Bago market to Mandalay, Magway Division and Shan State,
5. From Mon State to Meiktila and Myingyan (Mandalay Division),
6. From Mandalay market to Southern and Northern Shan State,
7. From Rakhine State to Chin State.

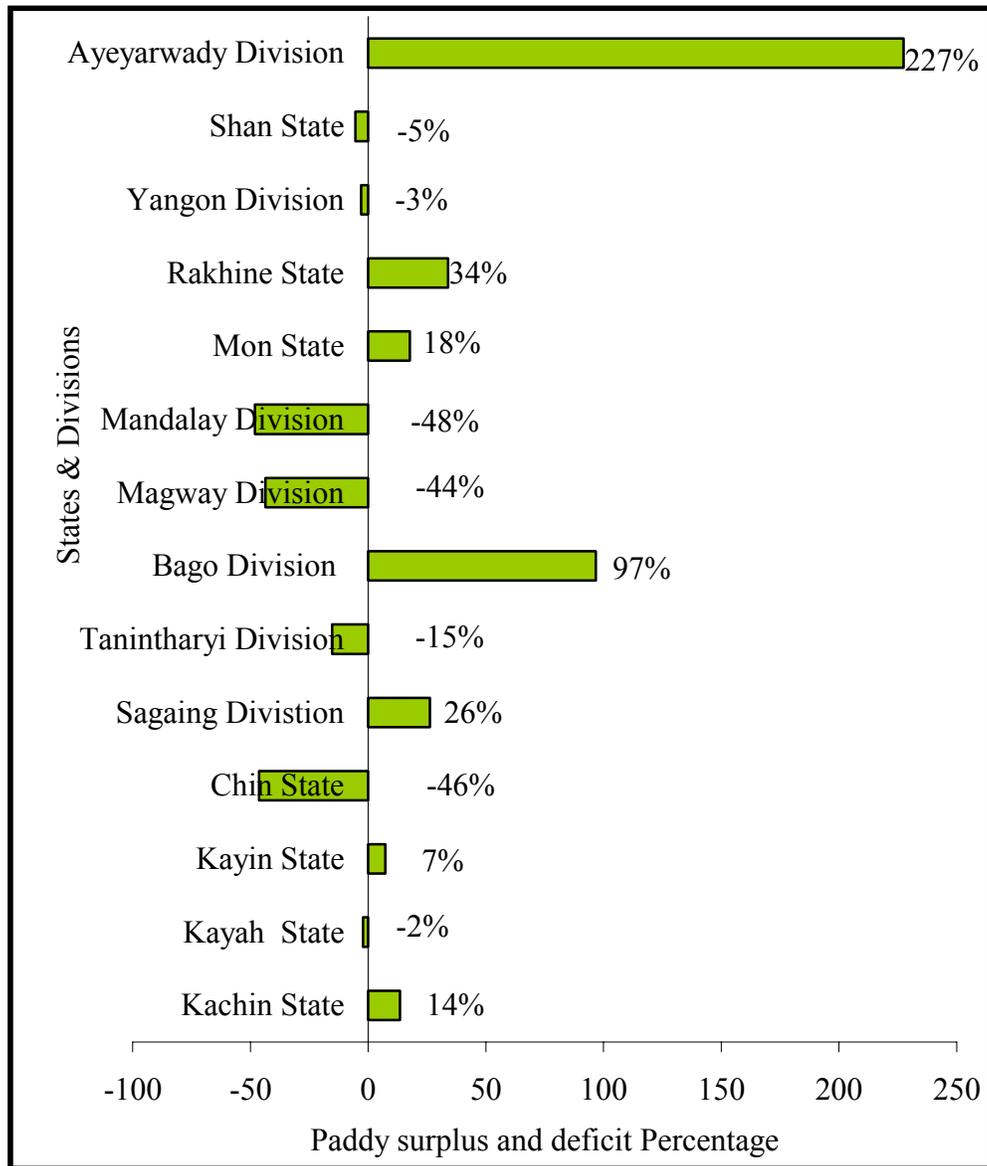


Figure 4.1 Marketed surplus percentages across the administrated regions, 2003

Source: Own estimation based on Appendix 3

Based on the major rice flows among the surplus and deficit market pairs, six sampled rice markets were selected for the further study of conducts, costs and margins along marketing channels of different levels of market participants under the current situation and for long run performance of private rice marketing in Myanmar.

In the midst of surplus regions, Yangon is not only the major paddy producing area but also the most crowded city located in the lower Myanmar. Therefore, rice was highly demanded for urban consumer. In addition, Yangon market plays as a transit focal rice market because rice is transported to other regional markets through Yangon market. Table 4.3 gives detail monthly flow of the rice volume to Yangon Market during 2001 to 2004. According to the seasonal movement of trade volume in Yangon, the highest rice flow was found in December and January and the lowest volume was found in October.

The market infrastructure in Myanmar appears to be generally adequate with the development during the present government era. The major roads in the Central Dry Zone and the Plains and Delta Region were paved and mostly in a reasonable situation of repair. However, road condition was less improved in the mountain regions. A variety of means of transport was used such as road, water and rail way. The overall systems of the flow of surplus production to deficit areas, especially to the major markets were fairly efficient. Consequently, the information about spatial rice marketing is important in Myanmar because it is needed to know not only the integration and price formation among important rice markets but also the factors which manipulate the rice price movement overtime under the present government.

Table 4.3 Monthly rice supply flow to Yangon market in 2001-2004 (tons/month)

Month	2001	2002	2003	2004	Average
Jan.	38350	29700	68450	66350	50713
Feb	32200	26900	60700	58900	44675
March	31950	25150	42750	58800	39663
April	22400	27450	43050	44950	34463
May	26650	36300	40850	70350	43538
June	31550	47500	40550	55850	43863
July	32100	37300	28450	51000	37213
Aug.	33500	31900	31900	55150	38113
Sept.	29700	32550	33350	47800	35850
Oct.	32650	34250	22850	47050	34200
Nov.	27250	28700	47400	54650	39500
Dec.	31500	50100	102400	98250	70563
Total	369800	407800	562700	709100	512350
Average	30817	33983	46892	59092	42696

Source: Market Information Service Project (2005)

4.5 Overall Rice Sector Structure during One Decade (1994-2003)

Since rice is the most important food for Myanmar people, food security and source of government revenue of foreign exchange earning from rice export have been major factors for the historical diplomatic priority given by successive governments in Myanmar. In 1988, the domestic agricultural market was liberalized for moving to the market economy. From 1988, prohibiting private export of agricultural products was done away with first liberalization whereas rice export was controlled by state institution until 2003. During this first liberalization period from 1988 to 2003, the state was carrying out the procurement system and rice rationing system as mentioned in the last sections. In April 2003, another liberalization of rice marketing was declared that the previous paddy procurement and rice rationing systems were abolished. Moreover, private sector rice export was also permitted in the announcement.

This section seeks the overall structure of rice sector during last decade of first liberalization (1994 to 2003) to bring into clear focus on volume of traded rice in Myanmar between private and public sectors. To overview the rice flow structure, total production of paddy, total local utilization and marketed surplus are calculated in volume of paddy equivalent during 1994 to 2003.

To estimate the total domestic utilization, this study finds out the utilization of the amount used for the seed purpose, waste and volume of consumption. The amount used for seed purpose is estimated as 103 kilogram paddy per hectare (2 baskets/acre) and waste during harvesting and marketing channel is assumed to be 155 kilogram paddy per hectare (3 baskets/acre). For this sense, post-harvest losses of paddy are often severe; therefore, the estimated loss per hectare is logically adopted from the official record of Myanmar Agriculture Service. Annual capita rice consumption level is estimated as 300 kilogram paddy (180 kilogram rice) per capita in Myanmar.

Based on the calculation in Appendix 5, the whole structure of paddy sector in Myanmar for 10 years period is formulated in Figure 4.2. As the official records, total paddy production was 19.58 million tons per year in average of ten years period, and it was produced by 4.7 million farm households. Total paddy utilization was the 83% of total production; therefore marketed surplus was 17% during this period in Myanmar. The government procured only 4.29% of the total production in line with the state's goal

of market-oriented economy. This amount of paddy was used for the consumption and export of the marketed surplus. From the procured volume of paddy, 'export rice was 2.96% of total production during one decade; therefore, the rest 1.33% of total production was used for consumption through rationing system. For this reason, the rest of consumption part 73.42 % of total production might be in the hand of farmers and private market sector.

The state exported 3% of total production from the amount of surplus paddy. The rest of surplus (14%) production would be accepted as the stock of paddy in the country; otherwise, it could be assumed as the amount which was traded illegally in border areas. This volume of rice may be kept as buffer stock by the state and also may be in the hand of the private rice traders since exact data was not available. According to the response of rice traders in 2004, they had often done marketing to border areas for getting the high profits if they had the opportunity to do so.

During the period of first liberalization, the government became more concerned the welfare of consumer rather than producer in rice sector and continued interventions with unwritten rules in the private rice marketing even though private rice marketing had much more share than public sector. The ban of rice export, lack of confidence of the private traders and restricted marketing in border trade had created inefficient competitive structure and non-transparent rice market in Myanmar. These consequences would generate the segmented markets and price distortions in rice market because domestic producers received 40-60% of international rice price including the inflationary effect.

Therefore, this study continued to analyse the conduct or behaviour of market participants and their detailed costs and margins along the rice marketing channels under the current structure for the particular surplus and deficit markets in Myanmar. In addition, study of the rice market performance in long term was extended by time series data analysis for the market integration and price causality among the selected surplus and deficit rice market pairs.

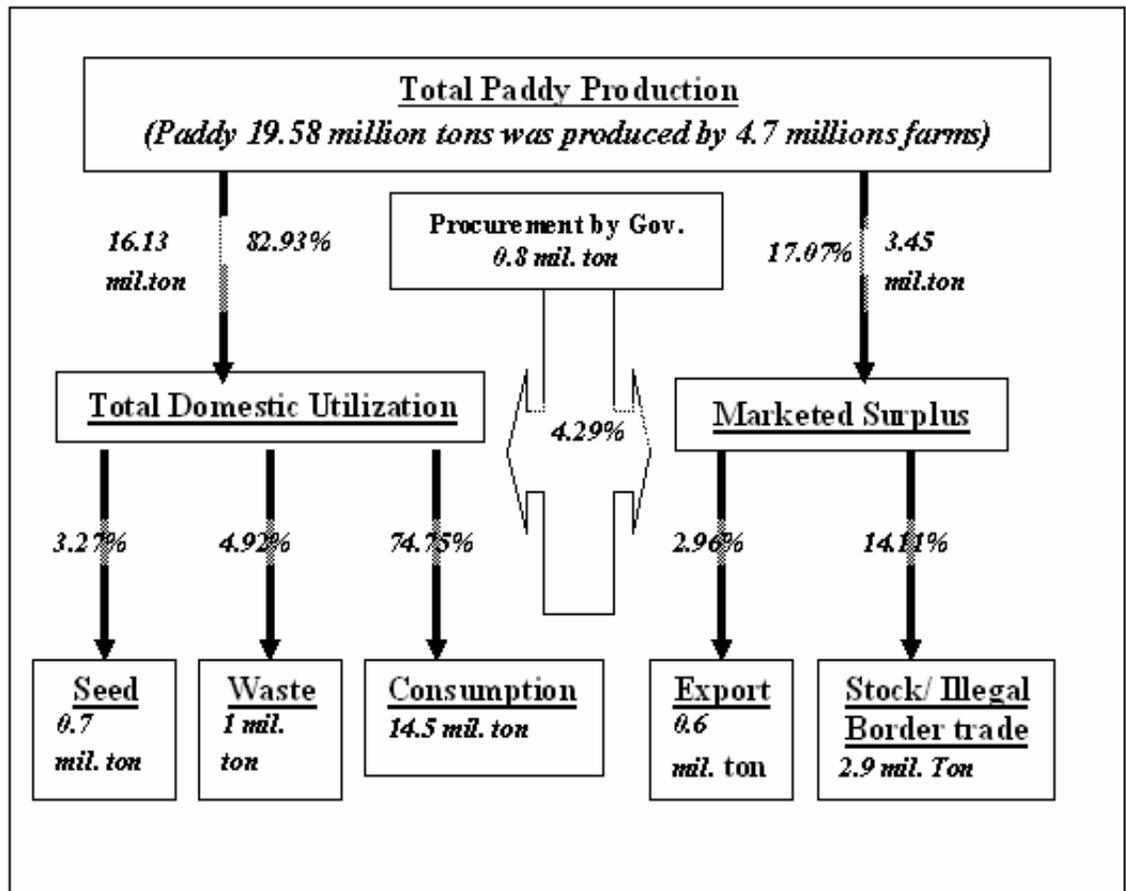


Figure 4.2 Overall rice sector structure during 1994-2003

Source: Based on Appendix 5

CHAPTER 5

DESCRIPTION OF THE RICE MARKET PARTICIPANTS

The rice marketing system in Myanmar has been involved by farmers, primary collectors, millers, wholesalers and retailers. It is the important business for people in Myanmar because rice is a source of the income of farm household, as it is a staple food for people and as it is an exportable crop. This section describes the socio-economic and demographic characteristics of the participants (farmers, primary collectors, millers, wholesalers and retailers) along the rice marketing channel according to the results of sample survey from January to February 2004. All these characters might influence the marketing practices, business behaviour of the sample farmers and market participants. The operations and conducts of rice marketing system are demonstrated in this chapter by the behaviour of participants, and the performance of market participants from farmers to retailers.

5.1 Demographic Characteristics of Sample Farmers

5.1.1 Age, Experience and Education Level of Sample Farmers

In the surveyed areas, average age of the sample farmers were around 50, ranging from the youngest 29 years to the eldest 70 years old (Table 5.1). There was not so much difference between regions. Experience of farming was around 20 years in average within the range between 2 years to 53 years in Yangon, Patheingyi and Mandalay. The average experience year was the highest in Pyaw and the lowest in Magway.

Education level in this study was categorized into four groups. “Primary level” referring to those, who can read and write, has attained primary level education from formal or informal school, “Secondary level” means formal schooling up to 8 years, “High school level” is formal schooling up to 10 years and “Graduate level” refers to those who got the degree from college or university. The level of education of the farmers is important for decision making of farming system and marketing practices. Most of the farmers can read and write in every studied area while the most educated farmers were found as 11.76% of graduate level in Yangon. Twenty three percent of sample farmers attaining the secondary education level in Mandalay, the second largest city of Myanmar.

Table 5.1 Average age, experience and education level of sample farmers in study areas, 2004

Characters	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Average age (year)</u>	43.71	49.18	49.06	45.26	44.87	44.58
Standard Deviation	11.26	10.70	8.69	10.18	6.43	7.59
Range	29-63	35-70	40-64	54-63	37-54	32-55
<u>Experience (year)</u>	19.76	20.64	24.85	19.68	12.67	23.44
Standard Deviation	9.00	10.80	6.67	11.87	3.19	9.86
Range	3-40	2-53	10-47	8-40	10-18	6-35
<u>Education level (%)</u>						
Primary level	47.06	63.64	60.61	48.00	81.82	52.17
Secondary level	41.18	36.36	27.27	28.00	18.18	34.78
High school level	0	0	12.12	24.00	0	13.05
Graduate level	11.76	0	0	0	0	0

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

5.1.2 Family Size and Family Labor of Sample Farmers

The average family size ranged from 2 to 10, in which the largest family size (7.67) was found in Magway, the rice deficit area in dry zone of Myanmar. Average family sizes in other areas were around 5 (Table 5.2). Adult male and female percentages were more or less the same in Pathein, Pyay and Mandalay. Higher female percentage was recorded in Magway and Taunggyi. The low children percentage was only 4.44% in Pyay while in other areas had on average of more than 10 %. The ratio of male, female and children of the family can affect the family labour in farm, consumption of rice and marketing surplus of rice from the production. According to the survey data, family labor and gender ratio in farming practices are mentioned in Table 5.3. There was not much difference in the family labor across the studied areas, on average 2 family members who were engaged in their farm production. However, majority of family labor in the farm was dominated by 80% of male. The child family labors were not found in farming practices in all regions.

5.2 Agricultural Characteristics of Sample Farmers

5.2.1 Land Holding and Cropping Patterns

Among the surveyed areas, the highest mean land holding was 10.71 hectares ranging from 4.05 to 20.24 hectare which was found in Pathein, the major paddy production area in delta region. The second largest land holding was 6.62 hectare in Yangon region and the smallest one was found in Magway, it was only 0.56 hectare in mean within the range from 0.06 to 1.01 hectare (Table 5.4). Land holding is the important factor for economy of scale production. If land holding is very small, crop production can not be done in economically efficient level.

General cropping patterns of the sample farmers are presented in Table 5.5. According to the land policy, monsoon paddy must be planted in all farm land; the second crop also must be grown as summer paddy if irrigation water for paddy is available in the region. In Yangon area, some farmers cultivated green gram after the monsoon paddy in part of their farm. However, Magway and Taunggyi had different cropping pattern in second crop because of insufficient irrigation facilities.

Table 5.2 Family size, of adult gender ratio and children, 2004

Family size	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Mean	4.24	4.91	5.45	5.65	7.67	4.39
Standard Deviation	1.07	2.18	0.75	0.95	1.77	1.29
Range	2-7	2-9	4-6	5-7	6-10	2-7
Adult Male (%)	45.83	37.04	47.78	39.43	29.57	36.71
Adult Female (%)	38.89	38.89	47.78	42.29	53.04	48.73
Children (<16 years) (%)	15.28	24.07	4.44	18.29	17.39	14.56

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.3 Family labor and gender ratio of sample farmers, 2004

Family labor in farm	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Mean	1.76	1.27	1.73	1.16	1.6	1.58
Standard Deviation	0.82	0.45	0.45	0.37	0.50	0.50
Range	1-4	1-2	1-2	1-2	1-2	1-2
Male (%)	80.00	78.57	85.96	88.89	79.17	75.44
Female (%)	20.00	21.43	14.04	11.11	20.83	24.56

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.4 Land holding of sample farmers, 2004

Land holding (<i>ha</i>)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Mean	6.62	10.71	2.62	1.96	0.56	1.44
Standard Deviation	2.62	5.50	0.47	1.49	0.26	1.36
Minimum	2.02	4.05	2.02	0.40	0.06	1.42
Maximum	11.34	20.24	3.24	6.07	1.01	6.07

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.5 General cropping pattern of sample farmers, 2004

Studied Areas		General cropping pattern of sample farmers
Surplus Regions	Yangon	Monsoon Paddy- Summer Paddy/ Green gram
	Pathein	Monsoon Paddy- Summer Paddy
	Pyay	Monsoon Paddy- Summer Paddy
Deficit Regions	Mandalay	Monsoon Paddy- Summer Paddy
	Magway	Monsoon paddy-Sesame/ groundnut
	Taunggyi	Monsoon Paddy- Garlic

Sample farmers from Magway area wanted to grow summer paddy if the irrigated water was available because they needed more rice than their production of monsoon paddy in 2004. However, farmers from Taunggyi area reaped the profit more from the garlic cultivation than from the summer paddy.

5.2.2 Cultivated Area under Different Paddy Varieties

According to the survey data, it was found that Manawthukha variety was grown in all regions particularly 100% of total area of sample farmers in Magway and Mandalay areas (Table 5.6). Most farmers from Yangon region grew four varieties, for which Pawsan was grown on 46% of total area and 29.89% was for Manawthukha. Also, Pawsan variety was grown mainly in Pathein on 89.69% of total area. Therefore, Pawsan variety was mainly traded from Yangon and Pathein to other deficit regions. Immayebaw was especially cultivated in Pyay, which is the major supplier for the Shan state. While farmers from Taunggyi grew their Shan traditional variety in 50 % of total farm area, also Basmati quality rice was cultivated in 6 % of area for getting the high price, and then the rest of the area was under the Manawthukha variety (Table 5.6).

5.2.3 Average Total Production and Yield of Paddy

Average total production was quite different in studied areas according to their different land holding size (Figure 5.1). The largest total paddy production of sample farmers was observed in Pathein, which was double of the second highest one in Yangon. The lowest total production was found in Magway. It was no doubt that average total production in surplus areas was higher than that in deficit areas. Although, Mandalay was one of the rice deficit areas, average total production of sample farmers was higher than the surplus area Pyay.

Yields of the commonly grown variety (Manawthukha) in different studied areas are compared in Figure 5.2. The highest yield was obtained by farmers from Pathein while the lowest yield was found in Pyay. The second highest yield was observed unexpectedly in Magway, rice deficit area with no favorable condition for paddy production. Also farmers from Mandalay attained relatively higher yield than other regions.

Table 5.6 Cultivated area under different varieties of paddy, 2004 (%)

Area under paddy varieties (%)	Surplus Regions			Deficit Regions		
	Yangon	Patheingyi	Pyaw	Mdy.	Mgy.	Tgy.
Manawthukha	29.86	10.31	9.08	100	100	40.99
Shwewartun	11.51	0	0	0	0	0
Ngasein	12.59	0	0	0	0	0
Pawsan	46.04	89.69	0	0	0	0
Immayebaw	0	0	90.02	0	0	0
Basmati	0	0	0	0	0	6.43
Shan traditional variety	0	0	0	0	0	49.63
Total	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

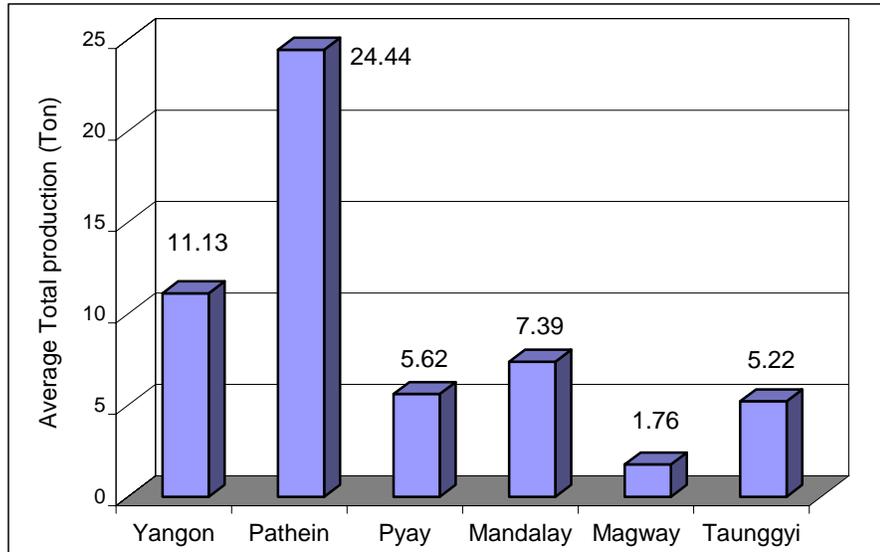


Figure 5.1 Average total productions of sample farmers in studied areas, 2004

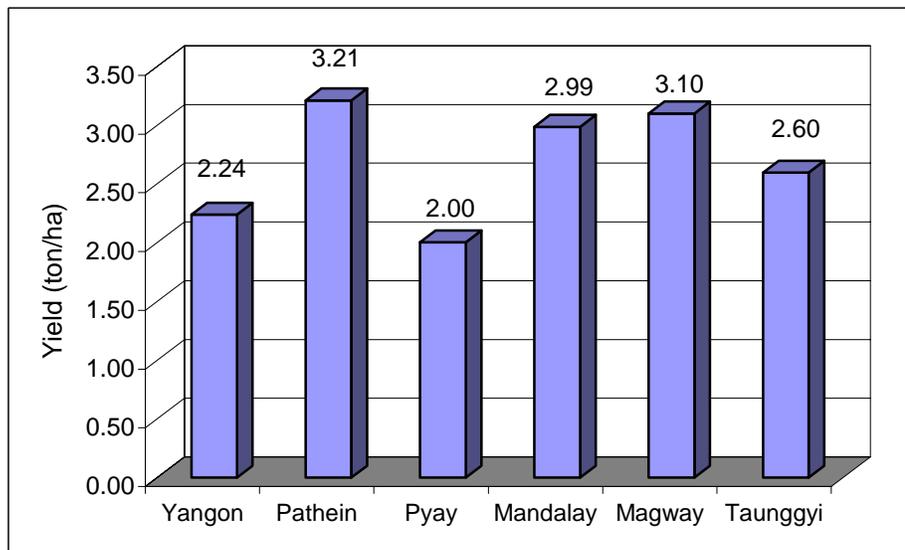


Figure 5.2 Average yields of sample farmers in studied areas, 2004

5.2.4 Total Variable Cost and Unit Cost of Paddy Production

Total variable cost of production is one of the important factors for unit cost of the production. As shown in Table 5.7, the highest total variable cost was found in Taunggyi and second one was in Pathein. The lowest variable cost was found in Pyay. However, looking at the ratio of different variable costs, there were differences between surplus and deficit regions particularly in Mandalay and Magway. In all surplus regions and Taunggyi, the highest ratio of cost was 'hired labour cost', and therefore the paddy production tended to be labor intensive (Figure 5.3).

Farmers from Mandalay and Magway spent around 50% of total cost for material cost because they used more fertilizers for paddy production than other regions. It raises the question for the yield attained by farmers whether ratio of material cost of the production can affect the yield even though total variable cost of production is low. On the other hand, sample farmers from Pathein obtained the highest yield because of their fertile land, favourable weather condition and more use of variable cost especially higher material cost ratio than other surplus regions in general.

The unit cost of the paddy is depending upon several factors. Farmer's cultural practices is one of the main factors, which is influenced by experiences and education level, current input and output price ratio, expected price of the product and market access. There were differences among the unit cost of the paddy in the studied areas. The lowest cost of the paddy (42039 kyat/ton) was found in Pyay and the highest one was 124329 kyat/ton in Taunggyi. Table 5.8 shows the range of the unit cost of the sample farmers. The difference between minimum and maximum unit cost of the farmers from Yangon region was 38370 kyat/ton ($111242 - 72872 = 38370$ kyat/ton), which was comparatively larger than other regions. It is the considerable point of the farmer's managerial skill in the paddy production in different regions. It would lead to the different profits of the production as well.

Table 5.7 Total variable cost of paddy production in kyat/ha and percentage, 2004

TVC of Production	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<i>In Kyat/ha</i>						
Family labour cost	21960	21125	15269	11438	9979	30906
Hired labour cost	102169	114401	59925	79748	78638	122004
Total labor cost	124129	135527	75194	91186	88617	152910
Material cost	29088	76130	26614	90039	88953	71843
Total Variable Cost	153217	211657	101808	181225	177570	224753
<i>In Percentage</i>						
Family labour cost	14.34	10.02	13.91	6.14	5.71	13.76
Hired labour cost	67.09	54.24	55.98	44.46	45.23	54.38
Material cost	18.56	35.74	30.11	49.15	49.06	31.86
Total Variable Cost	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.8 Unit cost of paddy production of sample farmers, 2004

Unit Cost (<i>Kyat/ton</i>)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Unit Cost	68400	65937	50904	60610	57228	86443
Standard Deviation	12966	6777	6658	6134	7859	8423
Minimum	72872	61122	42039	52453	49253	98411
Maximum	111242	76721	60082	70414	79607	124329

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

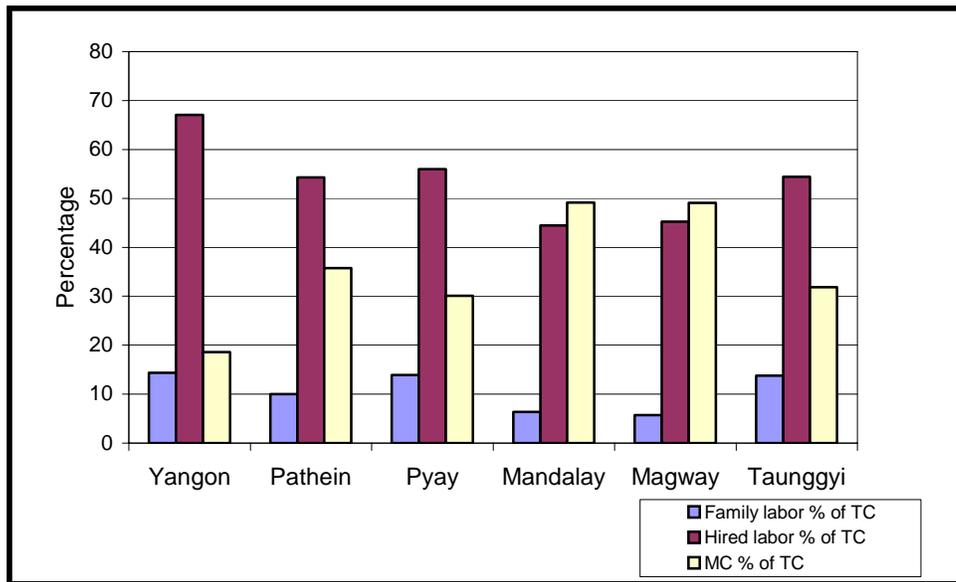


Figure 5.3 Ratio of different variable costs in studied areas, 2004

5.3 Marketing Characteristics of Sample Farmers

To assess the rice marketing system, it is fundamentally needed to know the interrelationship between farmers and the marketing system. Some farmers may sell their product immediately after harvest; they may keep it for a couple of months and sell it later when the price is higher. Also farmers may sell their product at the farm, in the village or near city market where wholesaler gave current market price of wholesale level. The questions of to whom to sell, what is the type of selling product, how much profit and margin are earned for their marketing activities are the key factors to appraise the rice marketing system in this portion.

5.3.1 Marketed Surplus

The marketed surplus is estimated by the deduction of the household consumption from the total production of the sample farmers. Household consumption includes the home consumption of rice for a year and storage for seed purpose for coming season.

In this study, it was expectedly found that marketed surplus of the farmers were relatively high in Patheingyi and Yangon areas which are surplus regions and major supply side of the country (Table 5.9). Marketed surplus of farmers in Mandalay was higher than that in Pyaw. Nevertheless, the range of the marketed surplus was quite large from zero to 18.77 tons in Mandalay, which means some farmers in this area could produce only for home consumption. Also some farmers from deficit regions (Magway and Taunggyi) could not produce sufficient amount for home consumption as their minimum of the marketed surpluses were minus values. On the other hand, all farmers from surplus regions had marketable paddy productions.

5.3.2 The Time of Selling and Storage of Marketed Surplus

The first time of selling after harvesting in studied areas are shown in Table 5.10. There were not so much differences in all regions except Magway. Mean of the selling days after harvesting was 14 in the range of 0-30 in Magway; which was shorter than that of other regions.

Table 5.9 Paddy production, consumption and marketed surplus of sample farmers, 2004 (ton)

Item	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Total Production</u>						
Mean	11.13	24.44	5.63	7.39	1.76	5.22
Standard Deviation	4.15	11.93	1.91	5.34	0.88	2.37
Minimum	2.92	8.76	3.02	1.15	0.17	1.56
Maximum	18.77	43.81	8.34	20.86	3.13	11.47
<u>Household Consumption</u>						
Mean	2.57	3.60	2.14	2.49	1.68	2.76
Standard Deviation	0.92	1.45	0.47	0.51	0.39	0.56
Minimum	1.04	2.09	1.56	1.04	1.29	0.83
Maximum	4.17	6.26	3.13	3.90	2.09	3.59
<u>Marketed Surplus</u>						
Mean	8.56	20.84	3.49	4.90	0.08	2.46
Standard Deviation	3.95	11.18	1.64	5.10	0.69	2.22
Minimum	1.67	5.63	0.94	0.00	-1.92	-0.52
Maximum	15.65	39.63	6.26	18.77	1.04	8.37
<u>Item (%)</u>						
Total Production	100	100	100	100	100	100
Household Consumption	23.09	14.73	38.01	33.69	95.45	52.87
Marketed Surplus	76.91	85.27	61.99	66.31	4.54	47.12

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Some farmers from deficit areas sold their paddy immediately after harvesting. Percentage of the sample farmers who sold immediately after harvesting can be seen in the Table 5.10. There was no farmer who sold on just after harvesting in surplus regions according to the surveyed data (Table 5.11).

It was not surprising as the majority of sample farmers in these areas were relatively large farmers. That was the reason why large ratio of farmers could store their paddy for a long time. About 55.89% and 60.61 % of the sample farmers stored paddy for more than 3 months in Yangon and Patheingyi respectively. In Magway, farmers could store their product no longer than two months. However, 16 % and 17.4 % of farmers from Mandalay and Taunggyi respectively sold their paddy after 3 months of the harvesting date. The storage duration was primarily influenced by the economic status of the farmers. Actually, every farmer wants to get the highest price for their paddy which was normally low at the harvesting time.

The farmers who had to return the loan money for the expenses of paddy production needed urgently to sell their paddy after harvesting. They were found as 4 % and 31.81 % of sample farmers in Mandalay and Magway, respectively. The most important reason was to pay for the cost of harvesting, and this was accounted for 63.64% of sample farmers from Magway and other regions. Most of the farmers were selling their paddy just after harvesting or within one month after harvesting due to this reason. Some farmers needed to do land preparation for coming crop after one month of harvesting. Therefore they had to sell their paddy to pay for the expenses and they could not wait any longer for getting higher price. The rich farmers were waiting to get higher price for their paddy. They stored for more than two months and some stored for more than three months. However, paddy price was decreasing during the surveyed period (January to February 2004). It was lucky for farmers who sold the paddy just after harvesting at high price.

Table 5.10 First times of selling days after harvesting of sample farmers, 2004

Selling time (<i>days</i>)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Mean of days after harvesting	38.24	38.18	37.27	35.16	14.00	34.17
Standard Deviation	13.48	9.99	10.69	14.11	12.21	10.25
Minimum	20	30	30	0	0	0
Maximum	60	60	60	60	30	60

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.11 Different duration of paddy storage by sample farmers, 2004 (%)

Duration of paddy storage (<i>days after harvesting</i>)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
No storage	0	0	0	4.00	63.64	4.34
Less than 30 days	5.88	3.03	21.87	12.00	31.81	17.39
Between 30 & 60 days	8.82	12.12	37.50	20.00	4.55	30.44
Between 60 & 90 days	29.41	24.24	31.25	48.00	0	30.44
More than 90 days	55.89	60.61	9.36	16.00	0	17.39
Total	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

5.3.3 Marketing Channels and Activities of the Sample Farmers

There were various categories of market participants in rice marketing channel of Myanmar (Table 5.12). Therefore, paddy flowed initially from farmers through different channel to ultimate consumer. Looking at the farmers first, the highest percentage of farmers (47.06%) in Yangon area sold their paddy to primary collector, the second highest percentage of farmers (39.39%) sold to primary collector in Pyay. The less ratio of farmers who sold to primary collector was in Patheingyi. According to the responses of farmers, Patheingyi farmers were likely to sell their paddy to miller and rice to wholesaler rather than selling to the primary collector. Another surprising point was found that farmers from Yangon and Patheingyi had no marketing link to the retailer and consumer. While farmers from other regions sold their paddy or rice to all groups of participants particularly in Mandalay and Taunggyi. Magway farmers sold their small amount of surplus to primary collector, miller and directly to consumer who were living in same village.

In Table 5.13, the place of the transaction is presented by percentage of farmers. Majority of farmer sold their product in nearest market with the exception of farmers from Magway. Price of the product and marketing cost were influenced by the location of place or the transaction costs. For example, if primary collector came directly to the farm and bought the paddy, there was no cost of transportation or nothing to do for marketing function by farmer. But, price of paddy, may be less than the price paying in other place by miller or wholesaler. According to the survey data, the small proportion of the farmers sold the crop at their farm in all regions. So, they needed to transport their product to the transaction place.

The modes of transport used by sample farmers are shown as percentage in Table 5.14. The most important mode of transport was by ship and truck in Yangon and Patheingyi regions because water way was the most convenient and cheapest system in the delta region. Then, different types of motor vehicles were used in all regions. The bullock cart is usually owned by farmers and used in the farming practices. Furthermore, 90.91% of sample farmers from Magway transported their paddy by cart.

Table 5.12 Selling to different buyers of sample farmers, 2004 (%)

Main buyer of Paddy/rice	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Primary Collector	47.06	9.09	39.39	20.00	18.18	17.39
Miller	29.41	54.55	36.36	20.00	54.54	21.73
Wholesaler	23.53	36.36	12.12	36.00	0	30.44
Retailer	0	0	12.12	16.00	0	13.04
Consumer	0	0	0	8.00	27.27	17.39
Total	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.13 Place of transaction of sample farmers, 2004 (%)

Transaction Place	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Farm	17.65	9.09	15.15	8.00	4.54	17.39
Local Villages	41.18	27.27	48.49	12.00	95.45	30.44
Nearest Town	41.18	63.64	36.36	80.00	0	52.17
Total	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.14 Mode of transportation of sample farmers, 2004 (%)

Mode of Transport	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
By Cart	0	0	58.59	32.00	90.91	30.44
By Ship	41.18	51.52	0	0	0	0
By Truck	41.18	39.39	26.26	60.00	0	52.17
Without Vehicle	17.65	9.09	15.15	8.00	9.09	17.39
Total	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Another piece of information was taken into account as type of the product sold by farmer, and that is the indicator for the farmers who not only produced paddy but also involved in the marketing functions. In average, paddy was marketed in large proportion of the total marketed surplus in all regions except Mandalay and Taunggyi (Table 5.15). However, farmers were participating in marketing process as selling the rice while they had to mill their paddy for home consumption.

The price determination of the paddy was mainly based on the quality of paddy especially the moisture contents of the paddy, foreign matters content and variety. According to the response of farmers, paddy that was sold at the farm just after harvesting usually contained much more moisture because of short drying time, and that was the reason why primary collector paid lower price than market price at the farm after harvesting. Nevertheless, farmers had to accept this price for money which they needed urgently for the household expenses. Other farmers would not like to accept the price that primary collector paid. Therefore, they personally investigated the price information from local millers or wholesaler in nearest markets and passed it on to the neighbouring farmers across.

Table 5.16 shows the percentage of the farmers who used different price determination approaches. Evidence of the data indicated wholesalers was the main source of the price information for farmers in all regions. It was unforeseen that the 73% of Magway farmers who did not sell their paddy to wholesalers, but they got the price information mainly from wholesalers to sell their paddy and rice to the local millers and consumers.

5.3.4 Credit Sources

In Myanmar, the government provided credit for paddy farmer with low interest rate through Myanmar Agriculture Development Bank. Almost farmers took the formal credit in all study areas while a few farmers did not take the credit in Pyay, Mandalay and Taunggyi. The interest rates were 1.25 to 1.7% per month, and it was lower than the interest rate of informal credit. After that, farmers needed to return their loan to the bank after harvesting. At the same time, they had to save some amount of their income in this bank.

Table 5.15 Type of marketed surplus of sample farmers, 2004 (%)

Marketed type of product	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Paddy	76.47	63.64	75.75	40.00	72.73	39.13
Rice	23.53	36.36	24.25	60.00	27.27	60.87
Total marketed surplus	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.16 Price determination process (percentage of sample farmers), 2004

Source of Farm Gate Price	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Accept the price given by P.C.	17.65	9.09	9.09	4.00	9.09	8.69
Inquiry from miller & Negotiation	23.53	24.24	21.21	12.00	18.18	13.04
Inquiry from wholesaler & Negotiation	58.82	66.67	69.70	84.00	72.73	78.27
Total	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway, Tgy. = Taunggyi, and
PC = primary collector

The amount of credit money was varied depending on the regions; the lowest amount was found in Pathein and Taunggyi and the highest was in Magway even though this amount of credit money covered only for 13.91 % of total variable cost of the paddy production per hectare (Table 5.17). As per responses of the farmers, taking the formal credit had some problems such as that a lot of paper processes and other transaction costs exceeded than the interest rate. However, they had to accept this support from government at all.

As the formal credit did not cover the variable cost, some farmers relied on informal credit, which was from relatives or friends or money lenders of the same village. In some places, money lenders were found to be millers or wholesaler. The interest rates varied in different regions, and it was really high rate for farmers. Most of the sample farmers who took the loan money from informal credit source were small farmers and the time of taking loan money were generally at harvesting time. The amount of loan taken was in the range of 16.48 to 32.27 percent of the total variable cost of the paddy (Table 5.18).

5.3.5 Important Opinions of the Sample Farmers

In this study, some opinions for the different point of views of sample farmers who had experiences in paddy production as well as marketing were taken into account for the current paddy and rice market situation (Table 5.19). From the production point of view, farmers from Yangon, Pathein and Taunggyi said the production of quality rice could get more profit in present situation in Myanmar because of the higher market demand and high price. However, most farmers were concerned about the cost of production and stable market demand.

As the land policy, farmers must grow paddy both in the monsoon and in the summer seasons whenever irrigation water was available. However, in some regions, farmers wanted to grow other cash crops after the monsoon paddy. Particularly Yangon (Kyauttang) farmers wanted to grow green gram and Taunggyi farmers wanted to grow garlic and other cash crops.

Table 5.17 Government credit support of the sample farmers, 2004

Item	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Percentage of farmer taken	100	100	93.94	80.00	100	86.96
Credit rate per hectare (kyat)	14820	4940	7410	12350	24700	4940
Interest rate/month (%)	1.25	1.25	1.25	1.5	1.7	1.25
Duration (months)	6	6	6	6	6	6
% of total variable cost/ha	9.67	2.33	7.28	6.81	13.91	2.20

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.18 Private credit source, 2004

Item	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Percentage of farmer	17.65	9.09	12.12	4.00	9.09	4.34
Interest rate/month (%)	5	10	10	5	10	10
Duration (months)	2-4	1-2	1-3	1-2	1-3	1-2
% of variable cost/ha	32.27	23.34	24.26	20.44	20.86	16.48

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.19 Some important opinions of sample farmers in percentage, 2004

Opinions	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>For Production</u>						
High quality paddy variety can earn more profit	29.41	33.33	0	0	0	43.47
Other crops are more preferred for second crop rather than paddy	29.41	0	0	0	0	100
Government should subsidize fertilizer	58.82	30.30	24.24	20.00	81.81	100
To get sufficient irrigated water for summer paddy	0	0	51.52	100	100	0
Want to get more formal credit	73.53	81.82	75.76	64.00	0	0
<u>For Marketing</u>						
Improved Milling system	58.82	45.45	15.15	24.00	0	65.22
Price instability is the risk	100	100	93.34	0	0	0
Prefer selling rice than paddy	0	90.91	75.75	100	81.81	65.22
Investment is urgently needed for storage and marketing	91.18	39.39	36.36	16.00	90.90	86.96
<u>For New Policy</u>						
Gov. should set the guarantee price	14.70	15.15	12.12	32.00	0	0
Like the new policy	82.35	65	51.52	64.00	90.90	52.17
Don't like the new policy	5.88	15.15	18.18	25.00	22.72	26.09
New policy is good but should be true in action	11.76	21.21	30.30	48.00	22.72	13.04

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

They commented that the choice of cropping system should be really free. Farmers should decide which crop should be grown depending on the profitability. Some farmers required the subsidized fertilizers from the government.

The government was subsidizing the fertilizer by selling at low fixed price through the Myanma Agriculture Service since 1960. When the government abolished the subsidized fertilizer system, farmers could not afford to apply the recommended rate of fertilizer due to the high price. Paddy price did not increase comparing with the increase of price of fertilizers.

Another problem for the paddy production was pointed out that irrigated water for summer paddy was insufficient in Pyay, Mandalay and Magway. Especially in Magway farmers wanted to grow summer paddy, but there was not enough pump irrigated water from Ayeyawaddy River. The last difficulty of farmers for production as well as marketing of paddy was formal credit provided by the government. They conversed formal credit should be increased to cover the production cost. Also, some other credit systems for farm mechanization and marketing should be easily accessible and more transparent for all farmers.

Some farmers pointed out the importance of milling quality. They noticed that milling quality was not so good; however, milling charges were high. Farmers had to pay not only the cost of milling but also the by-products of paddy such as broken rice and rice bran. Therefore, cost of total milling was high and paddy to rice conversion ratio was low. Especially during survey period, paddy and rice prices were in decreasing trend, and therefore, farmers faced the price instability. Farmers believed that it was the risk for losing money since they could not cultivate any other crop.

Most of the farmers aware the selling rice was more profitable than paddy in all regions. For this marketing purpose, they required investment money. Therefore, investment was the important factor for the storage and marketing for rice. Looking at the new rice policy, majority of the farmer preferred the new policy in which the government abolished the paddy procurement system. In this case, they pointed out that the government should set the guarantee price for paddy when paddy price was decreasing. And, some few farmers pronounced their feeling to the government that the policies should reflect the current situation. The reason of the decreasing paddy price in

2004 was the abolished procured paddy system which paid fixed price as the guarantee price and the procured amount of paddy as kept the stock. The amounts of procured paddy were surplus in the market in 2004 than previous years; also private rice export was not in function.

5.4 General Characteristics and Marketing Activities of Primary Collector

5.4.1 General Characteristics and Competition Level of Primary Collectors

Primary collector is the second group of rice marketing channel after farmer, and they are very familiar with farmers and take part dynamically in the rice marketing with this opportunity. In this study, mostly collectors were found in age of around 40 years while youngest collectors were in Yangon. Mean of the experience varied from 2 years to 15 years in different regions. Educational levels of primary collectors were mostly secondary level and high school level whereas some collectors obtained the university degrees in Pyay and Mandalay (Table 5.20). Almost half of primary collectors were farmers in all regions and some were millers in Yangon and Patheingyi.

Competition among the primary collectors depended not only on the business activities but also the social relationship between farmers and millers who were the paddy buyer from collectors. According to the response of primary collector, there were many primary collectors in recent years when paddy price was stable and increasing. But in 2004, paddy price decreased after their transaction causing them to lose money. Therefore, the number of primary collector was drastically reduced in the rice market during the monsoon harvesting season.

The highest competitive primary collectors were 24 persons within the range from 10 to 28 members in Patheingyi and the second one was in Yangon (Table 5.21). This study observes the contact farmers for each primary collector in different regions. It was clear that primary collectors from surplus regions had much more contact farmers as their business level was higher than that from the deficit regions. There were no difference in operational product types and buyers between surplus and deficit regions meaning that all primary collectors sold paddy to millers for processing and marketing.

Table 5.20 Age, experience and education level of primary collectors, 2004

Characters	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Age (year)</u>						
Mean	32.34	40.10	36.70	38.56	41.66	40.23
Standard Deviation	9.23	8.56	6.21	10.32	9.86	9.54
<u>Experience (year)</u>						
Mean	6.13	15.10	8.23	7.56	5.66	2.23
Standard Deviation	2.33	6.51	4.75	4.32	3.81	3.54
<u>Education level (%)</u>						
Primary level	25.00	25.00	0	0	33.33	33.33
Secondary level	50.00	25.00	50.00	0	33.33	66.66
High school level	25.00	50.00	0	66.67	33.33	0
Graduate level	0	0	25.00	33.33	0	0
<u>Other business</u>						
Farmers	50.00	50.00	50.00	50.00	66.67	50.00
Miller	25.00	25.00	0	0	0	0
Wholesaler	0	0	0	0	0	0
Retailer	0	0	0	0	0	0

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.21 Competition level of primary collectors (PC), 2004

Characters	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Competitive PC near by</u>						
Mean (member)	18.22	24.33	15.50	9.50	4.67	6.71
Standard Deviation	6.51	8.50	5.24	2.38	1.72	3.43
Minimum	7.00	10.00	6.00	2.00	2.00	3.00
Maximum	22.00	28.00	20.00	15.00	8.00	12.00
<u>Contact farmers</u>						
Mean (member)	18.49	22.89	17.83	13.33	2.57	4.43
Standard Deviation	7.36	9.66	5.96	4.17	1.13	1.27
Minimum	15.00	20.00	5.00	5.00	2.00	2.00
Maximum	30.00	35.00	25.00	20.00	6.00	10.00
<u>Main buyer & Product type</u>						
Buyer	Miller	Miller	Miller	Miller	Miller	Miller
Product type	Paddy	Paddy	Paddy	Paddy	Paddy	Paddy

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway, Tgy. = Taunggyi, and

PC = primary collector

5.4.2 Marketing Activities of Primary Collectors

Primary collectors were using different purchasing types depending upon the relationship with farmers. If farmers were close to collectors and they needed money during paddy cultivation, money was paid in advance which was less than the expected market price at harvesting time. Most of the farmers and collectors liked the cash down system transaction. Besides, primary collectors bought the paddy on credit from farmers, then payment money would be given on next transaction time, duration was not more than two weeks. Three types of purchasing were found by using collectors from Yangon. Some collectors from surplus regions employed advance payment while majority type was the cash down system purchasing in all regions. Credit system of purchasing type was used only in Yangon (Table 5.22).

Types of selling by primary collector were observed as commission and profit basis. Commission fee was given by millers to primary collector in term of purchased paddy volume. For this purpose, collectors used to buy paddy at the price determined by the millers. Other type was collector who bought paddy from farmers and sold to millers or others persons for getting the profit as their private business. During the survey season, most of the collectors in surplus regions liked the commission basis because of the paddy price fluctuation although collectors from deficit regions obtained profits from transaction.

Modes of transport and storage duration by collectors are presented in Table 5.22. As the main source of transportation system across the regions, Yangon and Patheingyi collectors transported by ship and by truck in other regions. Average storage duration that was also taken time for transaction were found around one month in Mandalay and Magway, and it was less than one month in other regions.

5.5 General Characteristics and Marketing Activities of Millers

5.5.1 General Characteristics of Millers

Rice mill was the most important industry in rural area of Myanmar. The rice milling sector in Myanmar was composed of private and state owned rice mills with a wide range of capacity. In this study, only private millers were interviewed to get their marketing functions, cost and margin.

Table 5.22 Marketing activities of primary collectors in percentage, 2004

Activities	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Types of purchasing</u>						
Advance payment	25.00	25.00	25.00	33.33	0	0
Cash down system	50.00	75.00	75.00	66.67	100	100
Credit system	25.00	0	0	0	0	0
<u>Types of selling</u>						
Commission basis	75.00	100	50.00	33.33	0	0
Create profit	25.00	0	50.00	66.67	100	100
<u>Mode of transport</u>						
By ship	100	100	0	0	0	0
By truck	0	0	100	100	100	100
<u>Storage duration</u>						
Average days	15	25	15	30	30	25

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.23 shows the characteristic of the sample millers. All millers were over 40 years old when they had years of experience from 5 to 20 years. Millers from surplus regions had at least 14 years (mean value) of experience. Millers from deficit regions started their business only after 1995. Fifty percent each miller obtained the bachelor degrees in Yangon and Patheingyi while only 16 percent and 12.25 percent of millers got the degrees in Pyaw and Mandalay regions respectively. As their alternative business, most of the millers from surplus regions were wholesalers as well as farmers. In deficit regions, all millers were farmers and some were primary collectors for alternative business. Some millers set up the shop for the farm input such as fertilizers, insecticides, other organic fertilizers and so on. Millers, farmers and primary collectors had sophisticated business links among each other especially in surplus areas.

5.5.2 Milling Capacity and Competition Level of Millers

Rice mills were categorized into three groups according to their milling capacity. The capacity of large mill was over 50 tons of paddy per day which were found as 50 percent, 25 percent and 16.67 percent of sample mills in Patheingyi, Yangon and Pyaw respectively. Mostly, large rice mills were established during British colonial time and played an important role when Myanmar was the top rice exporter of the world. After that, mostly large scale rice mills were required to mill the government procurement paddy with the contract via MAPT. Medium mills could operate the range of 15 to 50 tons of paddy per day. In this study, 50 percent each of sample mills in Yangon and Pyaw and 25 percent each of sample mills in Patheingyi and Mandalay were in this group. After first liberalization of agriculture sector, large and medium mills started operating in private rice market. However, their business was difficult to run nowadays because of their large capacity and generally located in city area. Therefore farmers or primary collectors needed to transport the paddy to distant mills from farm site or village.

Table 5.23 Age, experience and education level of millers, 2004

Characters	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Age (year)</u>						
Mean	55.43	47.22	52.67	43.83	42.33	44.86
Standard Deviation	9.80	9.80	8.09	11.37	6.71	9.06
<u>Experience (year)</u>						
Mean	14.14	18.11	20.67	8.50	5.17	5.14
Standard Deviation	6.84	10.23	6.98	2.66	2.79	2.34
<u>Education level(%)</u>						
Primary level	12.50	0	16.67	0	33.33	12.25
Secondary level	12.50	25.50	16.67	75.00	33.33	37.75
High school level	25.00	25.50	50.00	12.25	33.34	50.00
Graduate level	50.00	50.00	16.66	12.25	0	0
<u>Other business</u>						
Farmer	50.00	50.00	50.00	100	100	100
Primary collector	25.00	25.00	0	50.00	33.33	25.00
Wholesaler	50.00	75.00	50.00	25.00	0	0
Farm inputs shop	25.00	25.00	16.66	25.00	0	25.00

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

During 1990, the number of private rice mills increased across the rural areas particularly small mills often called huller mills which had a capacity below 15 tons per day. There were one to five of them in each village tract. All sample mills from Magway and Taunggyi and 75 percent of mills from Mandalay were small one (Table 5.24).

The competition levels among millers were presented in Table 5.25. The highest number of competitive mills was found in Patheingyi followed by Yangon and Pyaw. The numbers of competitive mills of sample millers between surplus regions and deficit regions were significantly different. Millers usually had primary collectors for getting enough paddy in order to operate the mills regularly for the whole season. The number of agents and primary collectors varied depending on their investment level. The highest numbers of primary collectors who were in contact with millers were found in Patheingyi and the lowest of that was in Magway.

The different destinations of rice from millers were observed in surplus and deficit regions. Most of the millers from surplus areas sold the rice to wholesalers from other markets despite the fact that millers from deficit regions sold in local markets as mentioned in Table 5.25. Therefore, millers in surplus regions were not only milling rice but also wholesaling rice in the spatial marketing. According to the responses of some millers, they started the business as wholesalers, and then extended to set up their own rice mills during the 1990s when rice market competition arose in the domestic market. Rice price fluctuated widely on the Yangon market, time of the transactions was a big impact on the profit. Therefore, they set up their own rice mills with low milling capacities to avoid the delay in waiting their turn to mill the paddy at the rice mills owned by other people.

Table 5.24 Milling capacity of sample mill in percentage

Types and Capacity	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Large mill</u>						
Capacity (50-100 ton/day)	25.00	50.00	16.67	0	0	0
<u>Medium mill</u>						
Capacity (15-50 ton/day)	50.00	25.00	50.00	25.00	0	0
<u>Small mill</u>						
Capacity (<15 ton/day)	25.00	25.00	33.33	75.00	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.25 Competition level of millers, 2004

Characters	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Competitive millers near by</u>						
Mean (member)	16.00	18.33	12.50	8.50	2.67	3.71
Standard Deviation	5.51	7.50	5.24	1.38	0.52	2.43
Minimum	7.00	10.00	5.00	2.00	2.00	5.00
Maximum	20.00	30.00	20.00	12.00	4.00	8.00
<u>Contacted PCs or agents</u>						
Mean (member)	8.29	15.89	10.83	3.83	1.17	3.43
Standard Deviation	2.36	6.66	4.92	1.17	1.17	1.27
Minimum	5.00	5.00	5.00	1.00	0.00	2.00
Maximum	14.00	35.00	20.00	6.00	3.00	5.00
<u>Main buyers from (%) of millers</u>						
Local wholesaler	12.50	12.50	16.66	50.00	0	50.00
Local retailer	12.50	12.50	16.67	25.00	33.33	25.00
Local consumer	0	0	16.67	25.00	66.67	25.00
Other market wholesalers	75.00	75.00	50.00	0	0	0

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway, Tgy. = Taunggyi and
PC = primary collector

5.5.3 Marketing Activities of Millers

Different payment types for transaction, being used by millers were advance payment, commission basis and cash down system. Advance payment was made through primary collectors, and sometimes it was given directly to farmers who were familiar with millers (Table 5.26). In Yangon area, 50 percent of millers gave money in advance to primary collector or directly to farmers to buy paddy. Also 25 percent of Pathein millers and 16.67 percent of Pyay millers used advance payment system. In this case, some millers sold the farm inputs with credit to farmers and then collected the paddy for this money which was paid in advance. Some transactions were done by primary collectors and sometime direct links with farmers. There were no miller who used for this type of payment in deficit regions.

Half of the millers from Pathein purchased paddy with commission basis from primary collectors. Generally, millers from all studied areas used this method except from Magway and Taunggyi. The reason of using different purchasing types by the millers from surplus areas was that they had more competition in buying the paddy to enable them to run their business regularly. All millers from Magway and Taunggyi were buying paddy from primary collector or farmers with cash down payment only.

Different types of selling rice could be found as cash down and credit system. Most of millers in all regions sold their rice by both systems although they preferred to sell by cash down system. Selling by credit in local market was usually done for one transaction ahead. Buyers had to pay the money back after the rice was sold out and could carry on to the next transaction. Most of the millers particularly in surplus areas did business with local wholesaler and retailer in this way with mutual trust. Millers used to transport paddy and rice by ship and truck both in Yangon and Pathein. In other areas millers were using only truck for transport. Average storage duration is also presented in this Table 5.26; they usually stored paddy as well as rice for some duration for the purpose of getting the higher price. Mostly, large millers could store more amounts of product and for longer duration.

Table 5.26 Marketing activities of millers in percentage, 2004

Activities	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Type of purchasing</u>						
Advance payment	50.00	25.00	16.67	0	0	0
Commission basis	25.00	50.00	16.67	25.00	0	0
Cash down system	25.00	25.00	66.66	75.00	100	100
<u>Type of selling</u>						
Only Cash down system	25.00	25.00	16.67	50.00	33.33	75.00
Only Credit system	0	0	0	0	0	0
Both	75.00	75.00	83.33	50.00	66.67	25.00
<u>Mode of transport</u>						
By ship	25.00	25.00	0	0	0	0
By truck	0	0	100	100	100	100
Both	75.00	75.00	0	0	0	0
<u>Storage duration</u>						
Average days	60	90	65	45	30	30

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

5.6 General Characteristics and Marketing Activities of Wholesalers

5.6.1 General Characteristics of Wholesalers

Dynamically wholesalers have been leading the spatial Myanmar rice marketing sector within the boundaries of the government through local authorities. They tend to be more specialized in rice trade than other participants and they operate on a much larger scale of business. After 1989, new rice market environment encouraged the emergence of new rice traders in domestic markets even though freedom of the rice marketing was only on the condition that the government intervened in different ways.

In this chapter, current working conditions of wholesalers in different regions are presented to depict the conduct of the rice marketing sectors. In general, mean of the age of wholesalers from surplus regions were older than those from deficit regions.

The education levels of wholesaler were high as most of them were graduates and some were of high school level (Table 5.27). Only few percentages of wholesalers in Pathein, Pyay and Mandalay were found to be of primary level. Secondary businesses were also mentioned. High ratio of wholesalers operated the business as millers in surplus regions and Mandalay. Some wholesalers in Magway and Taunggyi sold the rice directly to consumers and therefore they were retailer as well.

5.6.2 Competition Level and Marketing Activities of Wholesalers

According to the survey responses, competition level of wholesalers arose since late 1980's when government implemented the first liberalization in agricultural sector. There were large numbers of competitive wholesalers found as 22.8 members in mean value in Pathein ranging from 12 to 45 while the lowest number of mean was found in Taunggyi. In Table 6.28, levels of contacted sellers of wholesalers are mentioned. It may indicate the connection between market participants with each other in running business. Main buyers of wholesalers from surplus markets were wholesalers from other spatial markets. Majority of the buyers of deficit market wholesalers were local market retailers and consumers. Mandalay was a transit point of upper Myanmar, and therefore, rice was marketed to other deficit areas via Mandalay. Also Taunggyi wholesalers traded rice to other regional deficit markets up to the remote border areas.

Table 5.27 Age, experience and education level of wholesalers, 2004

Characters	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Age (year)</u>						
Mean	48.30	56.87	46.71	41.78	46.71	43.27
Standard Deviation	6.65	10.71	8.18	3.27	6.73	10.19
<u>Experience (year)</u>						
Mean	14.60	16.80	9.14	7.78	8.71	10.40
Standard Deviation	3.17	12.44	3.39	3.53	3.73	6.21
<u>Education level(%)</u>						
Primary level	0	16.67	14.29	20.00	0	0
Secondary level	0	16.67	0	20.00	20.00	20.00
High school level	40.00	33.33	28.57	20.00	40.00	20.00
Graduate level	60.00	33.33	57.14	40.00	40.00	60.00
<u>Other business</u>						
Farmer	0	0	0	20.00	0	0
Primary collector	30.00	0	14.28	20.00	0	20.00
Miller	50.00	75.00	57.14	40.00	20.00	20.00
Retailer	20.00	25.00	28.57	20.00	80.00	60.00

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.28 Competition level of wholesalers, 2004

Characters	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Competitive wholesalers</u>						
Mean (member)	15.90	22.80	13.57	15.33	14.86	10.27
Standard Deviation	5.15	4.32	4.76	3.57	5.84	3.17
Minimum	5.00	12.00	10.00	5.00	8.00	6.00
Maximum	25.00	45.00	20.00	23.00	21.00	16.00
<u>Contact sellers</u>						
Mean (member)	11.70	18.93	13.86	8.22	4.14	4.73
Standard Deviation	5.42	8.99	5.98	1.72	1.57	2.31
Minimum	2.00	5.00	4.00	3.00	2.00	2.00
Maximum	25.00	30.00	22.00	18.00	6.00	10.00
<u>Main buyers as (% of wholesalers</u>						
Local retailer	30.00	12.50	14.28	40.00	40.00	40.00
Local consumer	10.00	12.50	14.28	20.00	60.00	40.00
Other market wholesaler	60.00	75.00	71.42	40.00	0	20.00

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Purchasing types of the wholesalers were different as were of millers. Forty percent and 30 percent of wholesalers employed advance payment system via middlemen or directly to the farmers in Yangon and Patheingyi respectively (Table. 5.29). They were millers; therefore they milled the paddy by their own rice mills. It was also observed in Pyaw. It was noticeably found that high percentage of wholesalers used credit system to buy rice in deficit regions.

This credit system was an informal remittance system call “Hondi”. In this system the money for a transaction was not paid directly to the seller, and instead they paid to “Hondi agent” located in the buyer’s area. Agent of seller region paid the money to seller after receiving confirmation from agent of buyer’s area that the traded commodities had been received by the buyer. Usually, deficit market wholesalers used this type of payment which has accumulated from previous transactions. As their responses, major sources of supply were local millers in surplus regions. In deficit regions, there were different sources of supplier that are shown in Table 5.29.

Selling types of wholesalers were found as cash down system and credit system and most of the wholesalers usually used both types of selling. Some wholesalers sold their rice with only cash down system. Major modes of transport were ship and truck as mentioned earlier as millers and primary collectors. Destination of wholesaling from surplus regions were Yangon central markets from Yangon and Patheingyi regions and Magway was the major transported market from Pyaw. From Mandalay, the demand side was the Shan state and local markets. While Magway and Taunggyi wholesalers traded to local market as first destination and second from Taunggyi was the border area markets.

Table 5.29 Marketing activities of wholesalers in percentage, 2004

Activities	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Type of purchasing</u>						
Advance payment	40.00	30.00	14.28	0	0	0
Commission basis	20.00	20.00	14.28	0	0	0
Cash down system	10.00	0	0	20.00	20.00	20.00
Credit system	0	0	0	0	0	0
Both credit & cash down	30.00	50.00	71.42	80.00	80.00	80.00
<u>Source of purchasing</u>						
Major source	millar	millar	millar	wholesaler	wholesaler	wholesaler
Place of major source	local	local	local	Yangon	Pathein	Pyay
Percent of wholesaler	80.00	100	85.71	80.00	60.00	60.00
<u>Type of selling</u>						
Only cash down system	20.00	25.00	14.28	40.00	20.00	20.00
Only credit system	0	0	0	0	0	0
Both	80.00	75.00	85.72	60.00	80.00	80.00
<u>Mode of transport</u>						
By ship	30.00	25.00	0	0	0	0
By truck	0	0	100	100	100	100
Both	70.00	75.00	0	0	0	0
<u>Destination of selling</u>						
Major market	Yangon	Yangon	Magway	Shan State	Local	Local
Minor market	Mandalay	Mandalay	Taunggyi	Local	-	Border area
<u>Storage</u>						
Duration (average days)	60	45	60	90	60	90
Storage capacity (ton)	90.74	105.07	111.75	100.82	56.82	58.83

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

According to the wholesaler's interview, the channel started from the point of surplus area to Mandalay via the Yangon Central market, and to Shan state finally to the border areas of Shan State. Moreover, rice was traded from Pyay to Taunggyi especially Immayebaw variety which has similar eating quality of Shan traditional variety for local demand. Storage duration varied around three months by surplus regions wholesalers and around two months by Pyay and Taunggyi market wholesalers. The storage duration depended on the price fluctuation and market condition.

Table 5.30 demonstrates the price determination by wholesalers and communication systems used for price information pass through among wholesalers. According to their determination process, Yangon central market price was the important source of the price formation in local Yangon market and other market wholesalers except for Magway and Taunggyi where wholesalers adjusted the price with their specific sellers from the supply markets. Major communication system for the price transmission was the telephone as the telecommunication system has been fairly developed under the present government and personal contact was the second important one for the wholesalers who are close each other. Wholesalers of the rice market were operating rice marketing with much more capital investment among market participants. As presented in Table 5.31, mostly wholesalers run their business with their own fund in all regions except in Yangon. Some of those were relying on both own fund and loan money, at the same time, some wholesalers were operating by credit system in all markets.

5.7 General Characteristics and Marketing Activities of Retailers

5.7.1 General Characteristics and Competition Level of Retailers

Retailer is the market participant who is close to consumer in general. Rice retailers can be found in every formal or informal market, every village, every quarter of the towns and cities. Particularly every food stuff shop sells rice to consumer. Retailers are very familiar with consumer who eat rice at least twice a day and spend their income regularly for rice.

Table 5.30 Price determination process, 2004

Studied Areas	Price Determination by Wholesaler	Communication
Yangon	Adjusting with central wholesalers	Phone, personal contact
Surplus Pathein	Depend on the Yangon market price	Phone
Regions Pyay	Depend on Yangon market price	Phone
Mdy.	Bargaining with Yangon Wholesalers	Phone, personal contact
Deficit Mgy.	Bargaining with Sellers and inquiry	Phone, personal contact
Regions Tgy.	Bargaining with Sellers and inquiry	Phone, personal contact

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.31 Source of capital investment (percentage of wholesalers), 2004

Source of Capital	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Own fund	30.00	50.00	71.42	60.00	80.00	80.00
Loan Money	0	0	0	0	0	0
Both	70.00	50.00	28.58	40.00	20.00	20.00
Total	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

The rice income elasticity is close to zero and price elasticity of demand of rice is only -0.1 that indicates rice demand is more or less stable in all price fluctuations of rice and income levels of consumer (Nay Myo Aung 2005). Therefore, business of rice retailer seems to be stable in all situations of market.

Table 5.32 shows the general characteristics of sample retailers. Ages of retailers were found within the range of 38 to 47 years and they had more than 5 years experiences in rice marketing. Education level of retailer was found mostly of high school level while some retailers were graduates in all regions except Magway. There was no other business of retailers apart from some retailers from Mandalay who were farmers.

The highest mean number of competitive retailers (17) was observed in Taunggyi, however maximum number of competitive retailers was 30 in Yangon area. Most of the retailer bought rice from miller in surplus regions and from wholesaler in deficit regions. Some retailers purchased rice from farmer in all surplus regions and Mandalay as mentioned in Table 5.33.

5.7.2 Marketing Activities of Retailers

Marketing activities of sample retailers is presented in Table 5.34. Like other participants, retailer purchased rice by using both cash down and credit system in all regions. A small numbers of retailers could buy rice by cash down system and they also resold to consumers with same system. However, other retailers operated the business with credit system. These were small operators who were able to take advantage of consignment credit from wholesalers or millers. Generally, wholesalers needed to wait for the payment from retailer until another transaction was done. Average duration of one transaction was ranging from one week to two weeks in surplus regions and one week to three weeks in deficit regions. Most of the retailers also sold rice to consumer with both system while some were using only cash down system to avoid the risk of losing credit money. With regard to transportation, retailers generally used both bicycle and truck in all regions because the distance between buying and selling establishments were not far.

Table 5.32 Age, experience and education level of retailers, 2004

Characters	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Age (year)</u>						
Mean	38.00	44.07	44.50	40.80	47.00	39.40
Standard Deviation	7.38	4.33	15.19	7.61	5.93	4.80
<u>Experience (year)</u>						
Mean	6.91	5.50	6.60	6.00	7.40	6.60
Standard Deviation	2.51	3.44	3.81	3.20	4.40	3.63
<u>Education level(%)</u>						
Primary level	10.00	9.09	20.00	25.00	20.00	28.57
Secondary level	0	45.45	30.00	50.00	0	14.28
High school level	50.00	36.36	10.00	0	80.00	42.86
Graduate level	40.00	9.09	40.00	25.00	0	14.28
<u>Other business</u>						
Farmer	0	0	0	25.00	0	0
Primary collector	0	0	0	0	0	0
Miller	0	0	0	0	0	0
Wholesaler	0	0	0	0	0	0

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.33 Competition level of retailers, 2004

Characters	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Competitive retailers</u>						
Mean (member)	16.55	10.50	14.30	10.90	15.30	17.00
Standard Deviation	9.0	5.35	3.40	2.47	5.33	2.58
Minimum	6.00	3.00	10.00	5.00	7.00	15.00
Maximum	30.00	25.00	18.00	18.00	25.00	20.00
<u>Buying from (% of retailer)</u>						
Farmer	10.00	9.09	20.00	25.00	0	0
Miller	70.00	72.72	60.00	25.00	15.00	28.57
Wholesaler	20.00	18.18	10.00	50.00	85.00	71.43

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 5.34 Marketing activities of retailers in percentage, 2004

Activities	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Type of purchasing</u>						
Only cash down system	30.00	9.09	14.28	25.00	0	28.57
Only credit system	0	0	0	0	0	0
Both	70.00	90.91	85.72	75.00	100	71.43
<u>Type of selling</u>						
Only cash down system	30.00	9.09	14.28	25.00	20.00	14.28
Only credit system	0	0	0	0	0	0
Both	70.00	90.91	85.72	75.00	80.00	85.72
<u>Mode of transport</u>						
By bicycle	20.00	18.18	0	25.00	0	0
By truck	0	0	0	0	0	0
Both	70.00	81.82	100	75.00	100	100
<u>Duration of a transaction</u>						
Duration (average days)	7	13	15	8	18	20

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

5.8 Opinions about Rice Marketing System of Market Participants

For getting complete picture of Myanmar rice market, sample market participants were personally interviewed to find out the rice marketing system under the different policy environments. According to the discussions of rice traders, their rice trading working capital was shifted to informal methods of using formal institutions for raising capital and settling accounts. Previously, most rice traders depended on loans from relatives and friends for their working capital. However, after the government allowed the establishment of private banks in the early 1990s, around 20 private banks came into existence in the country. In addition, bank branch networks expanded even into some rural areas, and account settlement through banks increased quite dramatically. Private banks have provided some amount of credit to rice traders in a few regions. Government bank also have a number of schemes and policy to provide working capital to rice traders. Nevertheless, sample traders did not receive any formal support. There were 57% of primary collector, 30% of millers and 18% of wholesalers who expressed that formal support was needed for their rice marketing (Table 5.35).

If they want to get some loan money, borrowers have to provide title of immovable properties, taxation records, business licences, fire-risk insurance and other supporting evidence of business activities. Then, bank owner examine the purpose of loan amounts, repayment and security. After that the assessor estimates the value of properties based on the market price and then only borrowers can borrow up to about 50% of estimated value of their collateral in private banks.

Because of the decreasing export demand of rice, miller particularly large and medium ones had some problems to improve milling quality. It was pointed out earlier that there was a rapid increase in the number of small mills in the villages following the first liberalization. As per author's observation, some big rice mills in surplus regions closed down during the survey period. A few continue to operate, but they did not run their full capacity. A second problem for medium- and large-scale rice mills was that the milling of MAPT paddy often was a burden both financially and physically before the secondary liberalization policy applied in 2004.

Table 5.35 Important opinions of market intermediaries by percentage, 2004

Opinions	Market Intermediaries (%)			
	PC	Miller	Wholesaler	Retailer
<i>For marketing activities</i>				
Formal credit support for rice marketing	57.14	30.30	18.18	0
Improved Milling system needs export rice demand	0	45.45	11.36	0
Price instability is the risk of the rice marketing	85.71	36.36	34.09	19.61
Needs infrastructure development such as roads, communication, banking system etc.	23.80	36.36	68.18	0
Investment is high for rice marketing but profit is low	0	60.60	45.45	13.72
<i>For new policy</i>				
Gov. should allow actual free market in domestic remote areas	0	24.24	27.27	0
Like the new policy because of abolished rice export monopoly system	47.62	24.24	72.72	0
Don't like new policy because of abolished paddy procurement system	0	24.24	11.36	0
New policy is good but should be true in action	14.28	30.30	45.45	0

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway, Tgy. = Taunggyi and
PC = primary collector

From the big rice miller's point of view, investment to upgrade facilities and improve quality should not be done due to the fact that the market is still dominated by trading of medium and low quality rice. The limited supply of spare parts at reasonable cost has also detracted from the willingness of millers to carry out new investment. Forty five percent of medium and large millers and 11.36% of wholesalers responded that they are ready to start new investment once private rice export is allowed by the government and the market for high quality rice gets bigger. This opinion clearly indicated that the present condition of Myanmar's rice market, characterized by the government restrictions on rice export and the domination of low and medium quality rice demand in domestic market, has pointed out the business opportunities for big rice millers, and this in turn has narrowed their business perspective.

Most of the wholesalers (68.18%), 36.36% of millers and 23.80% of primary collector have noticed the role of infrastructure for the marketing system. Sample traders said their mode of transport was a substantial shift from water to land transportation because of gradual development of the high way system across the regions and increased number of truck in Myanmar during 1990's. They used waterway and railway transportation as the major means of rice transportation from surplus rice producing area Delta regions to Upper Myanmar before first liberalization. In Yangon Division, about 50% of all rice was also transported by waterways.

They knew the time of transportation was shorter than that of waterway. The advantage of shortened transportation time gave two benefits, the first one was less risk of deterioration in quality of rice during transportation time because of high temperature during longer transportation time may cause deterioration of rice quality. The second benefit was that trader can turnover traded rice quickly because of most of the traders arbitrates on credit system, which is the payment will be collected on next shipment of rice. Therefore, shorter time of transport could increase the volume of trade.

Improvement of communication system was also perceived by sample traders. They widely used to transmit price information by telephone which was better than conveying the price information through the truck driver. Other infrastructure development was banking service that was more convenient than 'Hondi' system for the payment of marketed rice especially for wholesalers who traded rice spatially.

Respondent traders hoped that rice marketing system might become more competitive along with all developments of infrastructure under the present government if laid down policy is fully implemented. One more argument from sample traders was the cost of rice marketing and profit. Sixty-one percent of millers and 45% of wholesalers argued that the overhead cost of the rice marketing such as tax, fee for civil services and donation for social affairs, resulted in high cost of rice marketing and low profit compared with other business.

As per rice trader's experiences, rice marketing was not free marketing in Myanmar because rice being considered as the political crop by the government. According to the regulation of first liberalization, rice could be marketed by every national freely in domestic market. However, transactions at some remote regions along the border areas were an exception. Transactions at border areas to the neighbouring countries required to get the permission from the local authorities. Of course, it caused high overhead cost of marketing and even sometimes they could not get permission easily if they thought that rice price was increasing in domestic markets. The reason for this regulation was to keep the stable rice price in domestic market. Therefore, 24% of millers and 27% rice wholesalers pointed out that the rice market should be really free in remote border areas.

The majority of wholesalers (73%), 48% of primary collectors and 24% of millers liked the new rice policy particularly for rice export. Traders hoped that the government wanted to earn more foreign exchange by increasing rice export via the private sector. Therefore, rice traders excitedly anticipated for rice export in 2004. There were 24% of rice millers and 11% of wholesalers who liked the paddy procurement system of the government which was abolished by new policy in 2004. There were some mills that got the benefit from contracting with MAPT to mill the procured paddy. Because of decreasing demand for medium and large rice mills, the contracting with MAPT was the best way to keep their mill under operation. Finally, opinions of market participants for new rice policy were similar the opinions of farmers. There were 45% of wholesalers, 30% of millers and 14% of primary collectors, who strongly wished that the new policy would be implemented effectively.

CHAPTER 6

RICE MARKETING CHANNELS, COSTS AND MARGINS

A common means of measuring market efficiency is to examine marketing margins. This is an attempt to evaluate economic or price efficiency. The overall marketing margin is simply the difference between the farm-gate price and the price received from retail sale. That difference can then be considered to be the cost of marketing and all that is entailed in getting the product from the producer to the consumer in the desired form. The question to be evaluated is whether the marketing services being provided are "worth" the cost of this margin.

Marketing channel is the group of individuals and organizations which directs the flow of product from producers to consumers. Marketing intermediaries link producers to other participants or to ultimate consumers. There is a role of channel to fulfil the gap between production to consumption specifically time, place, quantity and quality. Market intermediaries perform various functions in order to bridge these gaps.

The marketing chain is the sequence of stages involved in transferring produce from the farmers to consumers. Price of the product in a retail market is much higher than the price paid to farmers; therefore, marketing cost and margin involved are needed to be understood in the study of marketing. Sometime, costs of marketing are not fully visible, and therefore, traders are assumed as making high profits in marketing and exploiting. Unless they are making reasonable profits, they will not be eager to continue in business, and after that disadvantage will go to both farmers and consumers. Generally, marketing costs and margins are complex as it is in the length of the marketing chain.

This chapter attempts to find out the marketing channel of sample surplus and deficit markets for evaluating the role of the intermediaries, detail marketing cost and margin of the all market participants along the marketing channel of the selected markets. The objective of analysing costs and margins is to understand the relative efficiency and the performance of market participants from farmers to retailers. Marketing margin reflects the cost of the marketing and profits of market agents. In an efficiently operating market, the competitive environment should keep the marketing margin to a minimum.

6.1 Rice Marketing Channels in Sample Markets

The three rice surplus markets were combined to demonstrate the paddy flow from farmers to ultimate rice consumers in surplus regions (Figure 6.1). Farmers from surplus regions produced marketed paddy as 75% of their total production. Therefore 25% of production was used for household consumption and seed purpose. According to the farmer survey, millers had higher potential for getting paddy directly from farmers in surplus regions. Among the sample surplus farmers, 40% of sample farmers sold their paddy to millers in the same region, 32% of farmers sold paddy to primary collectors, 28% of farmers milled the paddy at local mills for their home consumption and 24% of farmers sold the rice to wholesalers and 4% to local retailers. There was no marketing link between farmer and consumer in surplus regions. Paddy from primary collectors flowed to millers mostly in surplus regions; therefore primary collector's action in rice marketing was just in the transaction of paddy.

Millers in surplus regions played an important role in rice marketing as they were wholesalers as well. In surplus regions, 67% of sample millers traded rice to spatial markets especially to central market 'Yangon' and to other deficit markets. Fourteen percent of miller's rice went to local wholesalers and 13% of millers sold to local retailers. Only 6% of millers retailed to consumers in local markets. Therefore, major clients of millers from surplus regions were the wholesalers of spatial markets. Sixty nine percent of wholesalers marketed to other spatial markets. Retailer purchased from 19% of sample wholesalers and 12% of wholesalers sold the rice to consumers in sample surplus market. According to the form of marketing channels in surplus markets, millers and wholesalers played a significant role in spatial rice marketing while retailers and primary collectors had more or less an important marketing role for consumers and millers respectively.

Then looking at the rice marketing channels in deficit regions, information from three deficit sample markets were put together in Figure 6.2. Sample farmers in the deficit regions cultivated less paddy than those in the surplus regions as their marketed surplus was only 39% of total production.

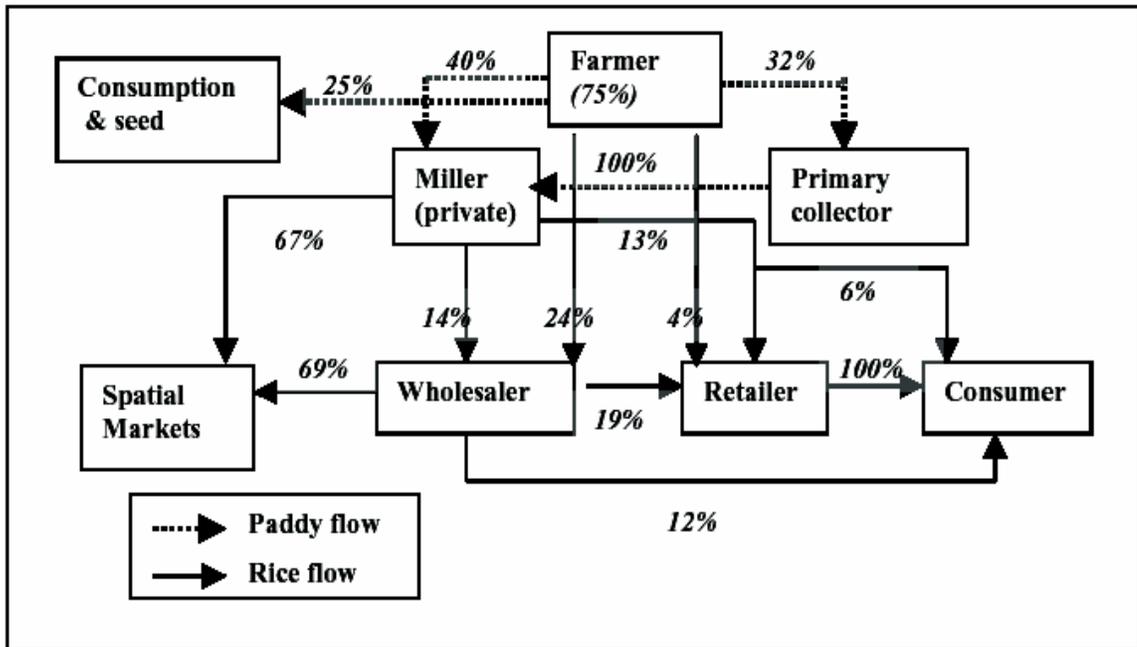


Figure 6.1 Marketing channels in sample surplus regions (2004)

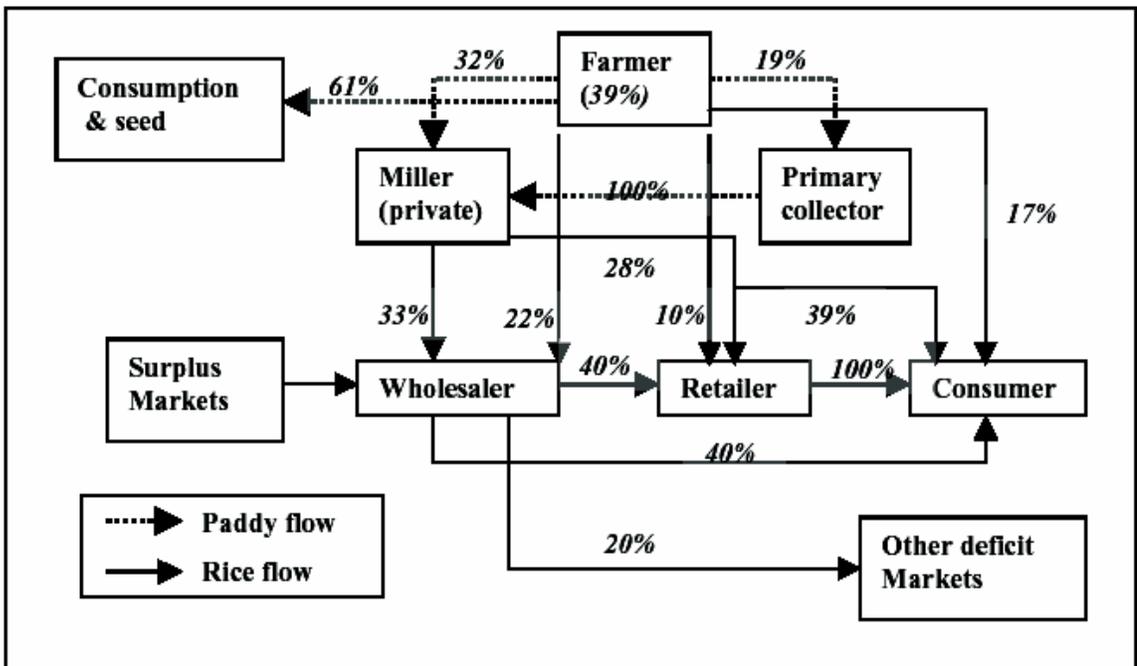


Figure 6.2 Marketing channels in sample deficit regions (2004)

For the marketed surplus, 32% of sample farmers sold paddy to local millers, 22% of sample farmer sold rice to local wholesalers. Primary collectors bought paddy from 19% of sample farmers, and 10% of farmers sold rice to retailers. Moreover, 17% of sample farmers directly sold rice to consumer in deficit region markets. For that reason, farmers from deficit markets involved in rice marketing more than farmers in surplus markets even though they produced less marketed surplus.

Primary collectors in deficit regions were same as in surplus markets as their action in marketing was found only in the paddy flow to millers. Millers in deficit regions were generally small scale and acting as retailer as well, and 39% of sample millers sold milled rice to consumers. Therefore, millers in the deficit markets had closer relationship with consumer than those in surplus markets. At that moment, 33% and 28% of millers sold rice to wholesaler and retailers respectively.

Rice flow from surplus regions to wholesalers of deficit region was the important spatial arbitrate of rice marketing in Myanmar. Wholesalers in deficit markets were playing a major role for spatial marketing to regional deficit markets, and 20% of wholesalers traded rice to other deficit markets. In average 40% of wholesalers in deficit market sold rice to consumers as the retailer and other 40% of wholesaler's rice flowed to retailers. As the result of the sample rice marketing channels, deficit markets had more complex marketing channels than surplus markets in Myanmar. Also direct marketing from production point to ultimate consumer was found in deficit markets even though small volume of trade was marketed. Millers of deficit markets played a less important role in marketing than millers from surplus regions as their working capacity. For a whole marketing channel, wholesalers were the major actors in the stream of the rice marketing spatially.

6.2 Marketing Profit of the Sample Farmers

Farmers are seek of not only their least production costs but also the low cost of marketing that principally determines the profit of their production. In this study, profit percentage of the unit cost of the paddy was calculated based on the farm gate price and the price of rice. Farmer who sold the product as paddy and got the 26.41 percent profit of unit cost in Magway as the highest one and lowest profit (0.02%) was got in Yangon

(Table 6.1). As the minimum of profit percentage, losses of the paddy production were found the minus value profit in Yangon, Pyay, Magway and Pathein. The farm gate price of paddy was less than the unit of variable cost of the farmer during survey period.

Marketing margins percentage between unit cost of the paddy and rice price are calculated in Table 6.2. The margin consists of not only the marketing costs such as handling cost, labour cost, transportation cost, milling cost and packaging cost but also the profit of the farmers who sell their product type as rice. It was found that the highest margin (79.31%) was in Mandalay and the lowest (13.9%) was in Yangon. The loss was observed as the -3% of the unit cost of paddy also in Yangon market.

The profit percentage of the unit cost can be observed in Table 6.3. It was the indication that the farmers were getting much more profit when they were engaged in the marketing process. Among the sample farmers, Mandalay farmers had the opportunity to get more profit (64.42% of unit cost) when they were involved in the marketing function than other farmers. Because Mandalay was the central market of deficit regions and farmers could get access easily to the wholesale market. The second highest profit ratio was received by the farmer from Magway which was also in the deficit regions. They were getting higher price from direct selling to the local consumers. However, the lowest profit was found in Taunggyi which was also in the deficit region but due to the observed variety Manawthukha, which was not a popular variety for local consumer as their preference to their Shan traditional variety was stronger. The profit of farmers from surplus regions was not so much different while Pathein farmers got a little more profit.

6.3 Marketing Cost and Margin of Primary Collectors and Millers

Average marketing costs by activities of primary collector were calculated in this study. Transportation cost was the largest portion of the total cost of a primary collector. Average costs among sample collectors in surplus regions were more or less the same, which was less than average costs in the deficit regions. The profit obtained by Mandalay primary collector was relatively higher than that obtained by agents from other regions. Because of the difference in average profit attained by primary collector, the margin of this level varied across the regions.

Table 6.1 Profit percentage of unit cost on farm gate price of paddy, 2004

Profit % of unit cost	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Mean	0.02	3.69	25.95	17.60	26.41	0.11
Standard Deviation	15.20	14.68	20.42	11.47	17.68	5.73
Minimum	-22.43	-0.02	-8.46	2.12	-5.99	2.22
Maximum	36.89	41.18	59.58	38.61	28.10	12.76

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 6.2 Margin percentage of unit cost on rice price, 2004

Margin % of unit cost	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Mean	13.90	34.72	35.05	79.31	48.62	17.27
Standard Deviation	12.87	10.21	14.90	20.43	23.29	10.15
Minimum	-3.04	26.53	14.10	50.04	1.17	8.5
Maximum	31.02	48.24	54.81	110.21	75.20	43.70

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 6.3 Profit percentage of unit cost on rice price, 2004

Profit % of unit cost	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Mean	11.19	18.31	14.38	64.42	42.68	7.40
Standard Deviation	12.51	7.78	8.72	18.00	22.76	9.14
Minimum	-5.19	12.27	2.13	35.88	-3.65	1.55
Maximum	27.90	28.63	28.66	91.93	67.41	31.52

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Detailed average marketing costs by activities of primary collector are presented in Table 6.4. All fixed costs of miller were not taken into account for calculation on the cost of millers. Variable cost of milling was categorized by cost of repairing, material cost, cost for electricity power, cost for fuel and oil, cost of labour and overhead cost which included tax, fee for civil service and donation to social institutions. Table 6.5 shows detail variable costs of milling in studied areas while percentages of that are in Table 6.6.

Total variable cost of milling was quite different between Pathein and other regions while the deficit regions had much more costs for a ton of paddy. According to the survey result, a large mill could operate at less cost than medium and small one. The highest variable cost item was fuel and oil in all millers. Variable costs of milling depended not only on the capacity of mill but also on the source of power; if electricity power was available for large and medium mill, the cost would be lower than the use of fuel. Small rice mill used only diesel, and that was the reason of high cost of milling of small mills. These costs were 81% and 74 % of total variable cost of milling in Magway and Taunggyi respectively.

The profits over variable cost of milling are compared in Table 6.7. There were two types of return obtained by millers as fee of milling and by-products of rice such as rice bran and broken rice which could be sold for animal feed. Fees of milling in all regions were the same but return from by-products was rather different across the regions. The highest profit was obtained by millers from Pathein while millers from Taunggyi were getting the lowest profit from milling rice. In this study, it became clear that the profit of millers in surplus regions was approximately twice that of miller's profit in deficit regions.

Table 6.4 Average marketing cost and margin of primary collectors in 2004 (kyat/ton)

Costs by activities (kyat/ton)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Cost of transport	1800	1700	2000	2100	2000	2200
Cost of labour	400	400	300	500	500	500
Cost of packaging	200	200	200	200	300	300
Total marketing cost	2400	2300	2500	2800	2800	3000
Average profit	2407	2899	3488	4269	2907	3595
Average margin of PC	4807	5199	5988	7069	5707	6595

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway, Tgy. = Taunggyi, and
PC = primary collector

Table 6.5 Average variable cost of milling in 2004 (kyat/ton)

Variable Cost (Kyat/ton)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Cost of repairing	257	189	270	501	148	193
Cost of material	351	138	397	484	161	415
Cost of electricity power	486	304	318	1073	0	0
Cost of fuel	1126	507	1493	1685	4763	4593
Cost of labour	730	443	635	639	688	856
Overhead cost	41	61	95	154	100	99
Other cost	13	22	32	57	27	27
Total Variable Cost	3004	1664	3240	4593	5887	6183

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 6.6 Average variable cost of milling (%), 2004

Variable Cost (%)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Cost of repairing	8.55	11.36	8.33	10.91	2.52	3.12
Cost of material	11.69	8.31	12.25	10.53	2.74	6.70
Cost of electricity power	16.19	18.28	9.80	23.36	0	0
Cost of fuel	37.48	30.47	46.08	36.69	80.91	74.28
Cost of labour	24.29	26.59	19.61	13.91	11.69	13.85
Overhead cost	1.38	3.66	2.94	3.35	1.70	1.61
Other cost	0.42	1.33	0.98	1.24	0.45	0.44
Total Variable Cost	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 6.7 Net profit over total variable cost of milling (kyat/ton), 2004

Net Profit (Kyat/ton)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Total Variable Cost	3004	1664	3240	4593	5887	6183
Return from milling fee	2397	2397	2397	2397	2397	2397
Return from by-product	6403	5992	5992	5833	6903	6603
Margin of miller	8800	8389	8389	8229	9300	9000
Profit over variable cost	5796	6725	5149	3636	3413	2817

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

6.4 Marketing Costs and Margin of Wholesalers

In this study, marketing costs of the wholesaler were observed in kyat per ton of traded rice by eight items (Table 6.8). Ratios by percentage of these costs were presented in Table 6.9. In this calculation, interest rate of the working capital was not included as the opportunity cost of the wholesalers. Other variable costs for wholesale marketing were considered to be total cost of wholesalers. The highest cost ratio was packaging cost which was found in surplus regions, but cost of transportation was highest in deficit regions. According to the survey, wholesalers in surplus regions needed to pay cost for packaging and transported with FOB system to trading partners. In deficit region, wholesalers did not need to pay more cost for packaging. The cost of the labour in Magway was moderately higher than those in other regions. The overhead cost included tax and fee for civil services that was the highest percentage ratio in Pyay followed by that in Taunggyi. Somewhat different cost between surplus and deficit regions was telephone charges which was highest in Taunggyi. It was evident that the average total marketing cost was lowest in Pathein and highest in Taunggyi whereas all deficit market wholesalers had to bear more costs than surplus market wholesalers to run their business in rice market.

Average profit per ton of the wholesalers from Taunggyi was highest as well as all wholesalers from deficit regions obtained higher profit than wholesalers from surplus regions even when marketing cost for rice transaction were higher. Also the volume of trade is shown in Table 6.10, which was commonly high in surplus regions than in deficit region except wholesalers from Mandalay where was higher volume traded than Yangon local wholesalers. Pathein wholesalers were the largest scale traders among all.

Table 6.8 Average variable cost of sample wholesalers (kyat/ton), 2004

Variable Cost (Kyat/ton)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Cost of packaging	362	300	343	111	103	103
Cost of transportation	121	100	68	1110	826	1142
Cost of labour	241	160	228	222	413	145
Cost of estimated loss	52	24	25	21	48	37
Cost of shop	58	21	107	113	216	84
Overhead cost	66	15	105	120	42	140
Cost of telephone	88	70	76	111	105	190
Other cost	25	21	24	36	52	50
Total Variable Cost	1012	711	976	1844	1805	1891

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 6.9 Average variable cost of sample wholesalers (%), 2004

Variable Cost (%)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Cost of packaging	35.75	42.20	35.11	6.02	5.72	5.47
Cost of transportation	11.92	14.07	7.02	60.20	45.74	60.38
Cost of labour	23.83	22.51	23.41	12.04	22.87	7.66
Cost of estimated loss	5.12	3.40	2.58	1.12	2.68	1.97
Cost of shop	5.75	2.87	11.01	6.13	11.97	4.42
Overhead cost	6.48	2.13	10.71	6.50	2.36	7.40
Cost of telephone	8.73	9.86	7.66	6.04	5.81	10.07
Other cost	2.43	2.96	2.50	1.95	2.86	2.63
Total Variable Cost	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 6.10 Cost, profit and volume of trade of sample wholesalers

Net Profit (Kyat/ton)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Average Variable Cost	1012	711	976	1844	1805	1891
Total margin	1940	1746	2171	3288	3743	3800
Profit over variable cost	928	1035	1195	1445	1938	1909
Av. volume of trade (ton/yr)	2645	5050	3885	3333	915	1500

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

6.5 Marketing Costs and Profits of Retailers

Average marketing costs of retailer are presented in Table 6.11 and Table 6.12 shows the percentage of total marketing costs. Costs of marketing functions were divided by eight types. The highest marketing cost was found in Taunggyi followed by Magway. Among these costs, packaging cost was the highest cost ratio in all regions. It was noticed that estimated loss ratios of retailers were relatively higher than wholesalers in all studied markets. Telephone was used by retailers from Yangon and Mandalay markets.

Average profits which were obtained by retailers in different regions are presented in Table 6.13. It was found that retailers earned the highest profit of the rice marketing than the profit of other market participants in all regions. The highest net profit over variable cost was received by Magway retailers even though the volume of trade was low. The highest volume of rice per year was marketed by Pyay retailers followed by Yangon and Mandalay. The lowest profit of retailer was observed in Yangon among the survey markets.

6.6 Composition of Consumer Price in Sample Markets

There were several types of marketing margins, based on the market level being considered. First consideration of the unit profit of the farmers was the difference between unit cost and farm gate price of paddy. Then, primary collector margin was the difference between farm gate price of paddy and price paid to primary collector, whoever sold paddy. This margin included the profit of primary collector and costs of the marketing functions made by primary collector. The miller's margin was the deduction of the paddy price paid by miller from obtained value of rice by miller. At this stage of marketing functions, the value of processing from paddy to rice has to be added.

The wholesale margin was the difference between the price paid by the wholesale trader and selling price to retailers or whoever of market participants. The retail margin was the difference between the retailer paid price and the consumer paid price.

Table 6.11 Average variable cost of sample retailers (kyat/ton), 2004

Variable Cost (Kyat/ton)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Cost of packaging	1040	1119	1518	1219	2736	1886
Cost of transportation	472	1141	586	1189	878	1016
Cost of labour	484	463	495	669	452	501
Cost of shop	355	755	983	1142	916	1528
Estimated loss	122	320	510	327	572	655
Overhead cost	68	199	79	119	87	142
Cost of telephone	33	0	0	36	0	0
Other cost	20	46	37.74	42	35	55
Total Variable Cost	2595	4043	4209	4743	5676	5783

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 6.12 Average variable cost of sample retailers (%), 2004

Variable Cost (%)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Cost of packaging	40.09	27.69	36.65	25.71	48.23	32.64
Cost of transportation	18.20	28.22	13.92	25.08	15.48	17.56
Cost of labour	18.65	11.44	11.77	14.11	7.96	8.67
Cost of shop	13.69	18.67	23.35	24.08	16.13	26.41
Estimated loss	4.71	7.93	12.14	6.9	10.08	11.32
Overhead cost	2.61	4.93	1.87	2.51	1.51	2.45
Cost of telephone	1.27	0	0	0.75	0	0
Other cost	0.78	1.13	0.90	0.88	0.6	0.94
Total Variable Cost	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

Table 6.13 Cost, profit and volume of trade of sample retailers

Net Profit (Kyat/ton)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Average variable cost	2595	4043	4209	4743	5676	5783
Total margin	8545	14786	14800	20000	21200	20400
Profit over variable cost	5950	10742	10590	15257	15526	14617
Av. volume of trade (ton/yr)	277	108	1425	200	186	101

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway and Tgy. = Taunggyi

When the margin is expressed in monetary terms, it is called the price spread or composition of consumer price. When it is expressed as a percentage, it is known as the percentage margin.

Table 6.14 shows the price spread of the consumer paid rice price in detail. The farmer's profit over the unit variable cost of paddy production was interesting to compare the profit of other market participants along the channel.

In this study, therefore, price spread was started from the farmer's unit cost of paddy. As per different unit costs and farm gate prices paid by primary collector, profits of farmers varied in sample markets. The highest profit obtained by Magway farmer followed by Pyay and Patheingyi. The lowest profit, because of high unit cost, was observed in Yangon, followed by Taunggyi farmers. Furthermore, price spread of the rice price paid by consumer in retail market was followed by different stages in the marketing system.

Paddy was sold and bought. Normally, at each successive stage, the price per unit bought/sold was higher and value was added. This referred to the fact that some marketing service was provided, whether transport, processing to rice and the value of that service was included in the product price.

In this study, there was higher price paid by consumer in deficit regions generally, and among the deficit regions, consumers from Mandalay market paid less price than others. Table 6.15 shows the percentage composition of consumer price as well as the percentage share of the consumer price at different stages of the marketing channel. The share of paddy unit cost was calculated by the equation for the farmer portion of producer gross marketing margin Equation 3.3.3.

In Yangon market, the percent share of farm gate price was the highest one even though profit of the farmer was the lowest one, because of absolute term of consumer rice price was the lowest and margin was also narrow in Yangon market. Also in other price shares of miller, wholesaler and retailer were higher in Yangon than other markets. At the same time, the lowest price shares in all price layers were observed in Magway market. Looking at the profit share of all participants, farmers obtained less profit share in Yangon and Taunggyi.

Table 6.14 Composition of consumer price (kyat/ton)

Composition of consumer price	Surplus Regions			Deficit Regions		
	Yangon	Patheingyi	Pyaw	Mdy.	Mgy.	Tgy.
<u>Unit cost of paddy</u>	68400	65937	50904	60610	57280	86443
Average profit of farmer	14	1114	13210	10667	15128	95
<u>Farm gate price</u>	68414	67051	64114	71277	72408	86538
Marketing cost of PC	2400	2300	2500	2800	2800	3000
Average profit of PC	2407	2899	3488	4269	2907	3595
Average margin of PC	4807	5199	5988	7069	5707	6595
<u>Price to miller</u>	73221	72250	70102	78346	78118	93133
Variable cost of miller	3004	1664	3240	4593	5887	6183
Average profit of miller	5796	6725	5149	3636	3413	2817
Average margin of miller	8800	8389	8389	8229	9300	9000
<u>Rice price to wholesaler</u>	82021	80639	78491	86575	87415	102133
TVC of wholesaler	1012	711	976	1844	1805	1891
Average profit of wholesaler	928	1035	1195	1445	1938	1909
Average margin of wholesaler	1940	1746	2171	3288	3743	3800
<u>Rice price to retailer</u>	83961	82385	80662	89863	91158	105933
Variable cost of retailer	2595	4043	4209	4743	5676	5783
Average profit of retailer	5950	10742	10590	15257	15526	14617
Average margin of retailer	8545	14786	14800	20000	21200	20400
<u>Consumer paid price</u>	92506	97171	95462	109863	112358	126333

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway, Tgy. = Taunggyi, and
PC = primary collector

Table 6.15 Percent composition of consumer price

Composition of consumer price (%)	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
<u>Share of paddy's unit cost</u>	73.94	67.86	53.32	55.17	50.98	68.42
Profit of farmer	0.02	1.15	13.84	9.71	13.46	0.08
<u>Share of farm gate price</u>	73.96	69.00	67.16	64.88	64.44	68.50
Marketing cost of PC	2.59	2.37	3.62	2.55	2.49	2.37
Average profit of PC	2.60	2.98	3.65	3.89	2.59	2.85
Average margin of PC	5.20	5.35	6.27	6.43	5.08	5.22
<u>Share of price to miller</u>	79.15	74.35	73.43	71.31	69.52	73.72
Variable cost of miller	3.25	1.71	3.39	4.18	5.24	4.89
Average profit of miller	6.27	6.92	5.39	3.31	3.04	2.23
Average margin of miller	9.51	8.63	8.79	7.49	8.28	7.12
<u>Share of rice price to wholesaler</u>	88.67	82.99	82.22	78.80	77.80	80.84
TVC of wholesaler	1.09	0.73	1.02	1.68	1.61	1.50
Average profit of wholesaler	1.00	1.07	1.25	1.32	1.72	1.51
Average margin of wholesaler	2.10	1.80	2.27	2.99	3.33	3.01
<u>Share of rice price to retailer</u>	90.76	84.78	84.50	81.80	81.13	83.85
Variable cost of retailer	2.81	4.16	4.41	4.32	5.05	4.58
Average profit of retailer	6.43	11.05	11.09	13.89	13.82	11.52
Average margin of retailer	9.24	15.22	15.50	18.20	18.87	10.15
<u>Consumer paid price</u>	100	100	100	100	100	100

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway, Tgy. = Taunggyi, and
PC = primary collector

If profits of market participants along the channel were compared, the lowest profit percentage was obtained by wholesalers in all market unexpectedly. The highest profit was received by retailers in all sample markets. Retailers in all sample markets obtained the profit about three folds of their marketing costs. In this case, retailers from Pathein and Pyay were getting the same profit shares of consumer prices and also in Mandalay and Magway. The marketing cost was dependent on the volume of trade by participants usually; the cost of wholesaler was the lowest as their volume of trade was the highest among the intermediaries. Much higher marketing costs were found in retailers and millers in all sample markets.

Based on the absolute value of cost and margin of each level, total gross marketing margin and margin percent for each level were calculated by Equation 3.3.2. Gross marketing margin of Yangon market was considered as much more competitive efficiency than other markets because it had the lowest gross marketing margin (26% of consumer price). All other sample markets have high gross marketing margin which was more than 32% of the consumer price (Table 6.16).

Magway market had the highest marketing margin which was 49% of the consumer price of rice. The high marketing margin means that the farmers were getting the low percentage of retail price while consumers needed to pay the high rice price. However, the farmers from Taunggyi market got the higher paddy price as well as higher ratio of consumer price while consumer paid the high rice price.

Nevertheless, to evaluate the market efficiency, reference standards should be used to set up a point at or beyond which performance is judged to be "satisfactory" or "unsatisfactory". Market margins of more than 20%, for example, could be considered unacceptable. However, there is no reference standard of marketing margin of rice marketing in Myanmar, as an indicator that more examination, using other measures of evaluation, is needed.

The marketing margin comparisons are valid only when production systems, marketing systems and consumer preferences are similar. Thus, comparisons between marketing channels can be useful.

Table 6.16 Composition of total gross marketing margin (%)

Composition of TGMM	Surplus Regions			Deficit Regions		
	Yangon	Pathein	Pyay	Mdy.	Mgy.	Tgy.
Total marketing cost of PC	2.59	2.37	3.62	2.55	2.49	2.37
Average profit of PC	2.60	2.98	3.65	3.89	2.59	2.85
<u>Average margin of PC</u>	5.20	5.35	6.27	6.43	5.08	5.22
Total variable cost of miller	3.25	1.71	3.39	4.18	5.24	4.89
Average profit of miller	6.27	6.92	5.39	3.31	3.04	2.23
<u>Average margin of miller</u>	9.51	8.63	8.79	7.49	8.28	7.12
TVC of wholesaler	1.09	0.73	1.02	1.68	1.61	1.50
Average profit of wholesaler	1.00	1.07	1.25	1.32	1.72	1.51
<u>Average margin of wholesaler</u>	2.10	1.80	2.27	2.99	3.33	3.01
Total variable cost of retailer	2.81	4.16	4.41	4.32	5.05	4.58
Average profit of retailer	6.43	11.05	11.09	13.89	13.82	11.52
<u>Average margin of retailer</u>	9.24	15.22	15.50	18.20	18.87	10.15
<u>Total Gross Marketing Margin</u>	26.06	32.14	46.68	44.83	49.02	31.58

Notes: Yangon = Kyaut Tang, Mdy. = Mandalay, Mgy. = Magway, Tgy. = Taunggyi, and
PC = primary collector

The existence of large differences in margins between marketing channels would justify further examination of services, costs and market conditions. Because there are no absolute indicators of efficiency, evaluation depends on comparisons between enterprises and between marketing channels. However, in just thinking about the farmer's unit profit share of retail price, farmers got profit 18% of retail price share in deficit region and 31% share in surplus region in Vietnam (Minot 2000). Therefore, Myanmar farmers received relatively less share of benefit especially in 2004 that meant they were suffering the effect of new rice policy.

Because economic conditions in general, and marketing systems in particular, tend to change rapidly their own harmony, while governments do not deliberately intervene, infrequent one-time evaluation may not be adequate. Thus, permanent monitoring systems for price, cost and margin collection at different levels of marketing channel, analysing and utilizing these data are required for evaluation of the market efficiency as a whole.

CHAPTER 7

DESCRIPTION OF TIME SERIES PRICE DATA

In market economy, prices are the main incentives for the agricultural production and marketing and the signal for decision making process of all participants. The study of price behaviour is, therefore, critical to understand the market performance. Price signals are transmitted over time and over space, also affect the allocation of resources, welfare of consumer, producer as well as market participants. If the transmission of price signal is imperfect, then the performance of marketing system will be inefficient. As a prelude to the econometric analysis for market integration and price causality, descriptive evaluations of the selected price series in nominal and real values are made by presenting descriptive statistics, plotting and seasonal movement.

7.1 Descriptive Statistics of Selected Price Series in Nominal and Real

The descriptive statistics of nominal weekly prices in domestic ten markets are presented in Table 7.1. Table 7.2 provides the descriptive statistics of monthly price series in nominal value. Higher mean prices in surplus areas and simultaneously lower prices in deficit areas for each rice variety with the deference of marketing margin between surplus and deficit markets were observed. This margin included mainly transportation cost due to the distance of the pairs of markets, profits of wholesalers and other costs of the marketing activities (Appendix 6).

The variability of weekly wholesale prices and monthly price series in nominal and real values are measured by coefficient of variation (CV %) and standard deviation (SD) measures. It was noticed that the CV% of Taunggyi-Pawsan and Taunggyi-Immayebaw price series were much higher than other price series in weekly data, because of Pawsan and Immayebaw prices were more volatile in Taunggyi market. In average, deficit market price series had much more variations than prices of surplus markets in both weekly and monthly data. The last row in Table 7.2 presents the mean value of monthly consumer price index (CPI) from 2001 to 2004 based on year 1997. The SD and CV% of CPI was the highest among the rice price sample series. Therefore consumer price index fluctuated much more than rice price series which indicates the severe inflation movement in the study period.

Table 7.1 Descriptive statistics of weekly wholesale price series

No	Price series	Mean	SD	CV%	Minimum	Maximum
<i>Surplus markets</i>		<i>Nominal Prices (kyats per kg)</i>				
1	Yangon-Pawsan	136.42	51.64	26.53	42.11	238.22
2	Pathein- Pawsan	113.81	38.61	15.73	40.83	204.13
3	Yangon-Ngasein	81.92	31.00	23.57	21.74	143.91
4	Pathein- Manaw.	95.45	36.86	11.17	20.41	158.20
5	Pyay- Immayebaw	89.71	34.33	13.52	26.54	149.69
<i>Deficit markets</i>						
6	Mandalay- Pawsan	172.04	65.93	19.57	57.50	286.35
7	Taunggyi- Pawsan	175.13	63.59	43.66	72.47	275.57
8	Mandalay- Ngasein	99.58	39.75	14.84	24.15	163.30
9	Mandalay- Manaw.	127.24	48.67	13.66	30.97	210.37
10	Taunggyi- Imma.	105.79	37.05	40.25	32.66	167.39

Note: Number of observations; 216 weekly data from Jan. 2001 to Dec. 2004
 Data source: Market Information Service Project (TCP/ MYA/ 882 -2000)

Table 7.2 Descriptive statistics of monthly nominal wholesale price series

No	Price series	Mean	SD	CV%	Minimum	Maximum
<i>Surplus markets</i>		<i>Nominal Prices (kyats per kg)</i>				
1	Yangon-Pawson	132.24	52.63	27.12	43.74	229.18
2	Pathein- Pawson	110.93	38.90	14.81	41.85	161.26
3	Yangon-Ngasein	79.77	31.58	9.76	22.17	137.34
4	Pathein- Manaw.	92.55	37.53	13.79	21.43	152.24
5	Pyay- Immayebaw	87.49	34.18	11.43	27.56	143.99
<i>Deficit markets</i>						
6	Mandalay- Pawson	165.80	66.76	43.64	58.58	275.82
7	Taunggyi- Pawson	169.30	64.68	40.96	74.92	264.35
8	Mandalay- Ngasein	96.40	40.21	15.83	25.50	157.48
9	Mandalay- Manaw.	123.07	49.08	23.58	31.50	189.88
10	Taunggyi- Imma.	102.83	38.15	14.24	36.74	165.34
11	Thai Rice	177.44	49.27	23.77	81.33	275.22
12	CPI*	319.70	96.49	91.15	148.78	428.55

Note: Number of observations; 48 monthly data from Jan. 2001 to Dec. 2004,

* indicates base year 1997,

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.

The CPI series was used to indicate inflation in the economy over the period for which price series were tested. If CPI is integrated with rice price series, then will analyse the causality between CPI and each rice price series. If causality is significant, it would be interpreted that inflation was driving the rice price series. The Thai rice price series was used to understand the link between domestic rice price and international rice price overtime. There was more or less similar variation in the Thai rice price series and domestic rice price series. In addition, the monthly market exchange rates were used for converting of the currency of Thai rice price.

In terms of deflated price series (Table 7.3) the variations were considerably less than nominal value in all price series. This finding indicates that the absolute price volatility of rice price series in all selected markets seems to be influenced by the inflation during 2001-2004. Therefore, the real rice price series were much more stable during this period. It is important to note that the price instability of rice price series was predictable and actually necessary, such as intra-seasonal price increases after the harvest to induce incentives for rice storage for consumption later in the year. Therefore, seasonal movement of price series in nominal and real values are presented in the next topic of this chapter (Section 7.2).

Table 7.3 Descriptive statistics of monthly real wholesale price series

No	Price series	Mean	SD	CV%	Minimum	Maximum
<i>Surplus markets</i>		<i>Real Prices (kyats per kg)</i>				
1	Yangon-Pawson	40.38	7.21	5.09	29.40	55.72
2	Pathein- Pawson	50.46	9.12	9.10	35.32	67.06
3	Yangon-Ngasein	24.75	5.95	3.46	14.90	37.08
4	Pathein- Manaw.	28.26	6.42	4.03	14.41	40.87
5	Pyay- Immayebaw	27.10	5.96	3.47	17.37	39.95
<i>Deficit markets</i>						
6	Mandalay- Pawson	34.24	4.05	8.14	26.04	41.21
7	Taunggyi- Pawson	52.01	8.35	6.83	38.73	66.87
8	Mandalay- Ngasein	29.46	6.98	4.77	17.14	42.56
9	Mandalay- Manaw.	37.64	7.99	6.25	21.17	65.03
10	Taunggyi- Imma.	32.01	6.44	4.06	20.23	44.83
11	Thai Rice	56.30	5.59	3.06	45.99	67.94

Note: Number of observations; 48 monthly data from Jan. 2001 to Dec. 2004

Data source: Market Information Service Project (TCP/MYA/ 882 -2000), Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank- online.

7.2 Plotting of Selected Price Series in Nominal and Real Values

The plotting of monthly wholesale prices of Pawsan variety in the four market centres, measured in kyats per kg, is presented in Figure 7.1. The graph suggests that the price series followed the deterministic pattern and exhibit a clear co-movement over time. The prices in Taunggyi and Mandalay were higher than prices in Patheingyi and Yangon markets, and these markets were the common deficit rice markets which were supplied by the surplus Yangon and Patheingyi markets. The prices in Taunggyi and Mandalay were moving close to each other and all prices being lower during 2004 which was the starting time of second liberalization of rice marketing policy in Myanmar. This figure illustrates that all price series were of more or less similar trend in general view of the plotting.

There are also obviously deterministic trend of price series in all Figures 7.2, 7.3 and 7.4 for other selected varieties such as Ngasein, Immayebaw and Manawthukha in dealing with the price in pair of markets. All price series were increasing from 2001 to end of 2003. Then, a declining rice price trend was found during 2004. Generally, these figures indicate that almost all pairs of price series were following the same pattern in nominal terms of price value.

Figure 7.5 illustrates the plotting of monthly nominal price series of Pawsan variety in studied markets and Thai rice. There were same pattern of price series of both Pawsan and Thai rice from 2001 to 2003, but after this period, price of Pawsan variety in domestic markets were declining and Thai rice price series moved up evidently. During 2003, domestic rice prices were more volatile apparently. All local market price series commonly showed same trend except Taunggyi market.

The real values of monthly price series are depicted in Figure 7.6. All real price series were relatively stable in plotting as well. However, it appears that the movement of price series were somehow different between Pawsan price and Thai price especially during 2004. The inflation have affected on the rice price in all selected markets which may be considered as the differentiation of price series patterns between Figure 7.5 and Figure 7.6.

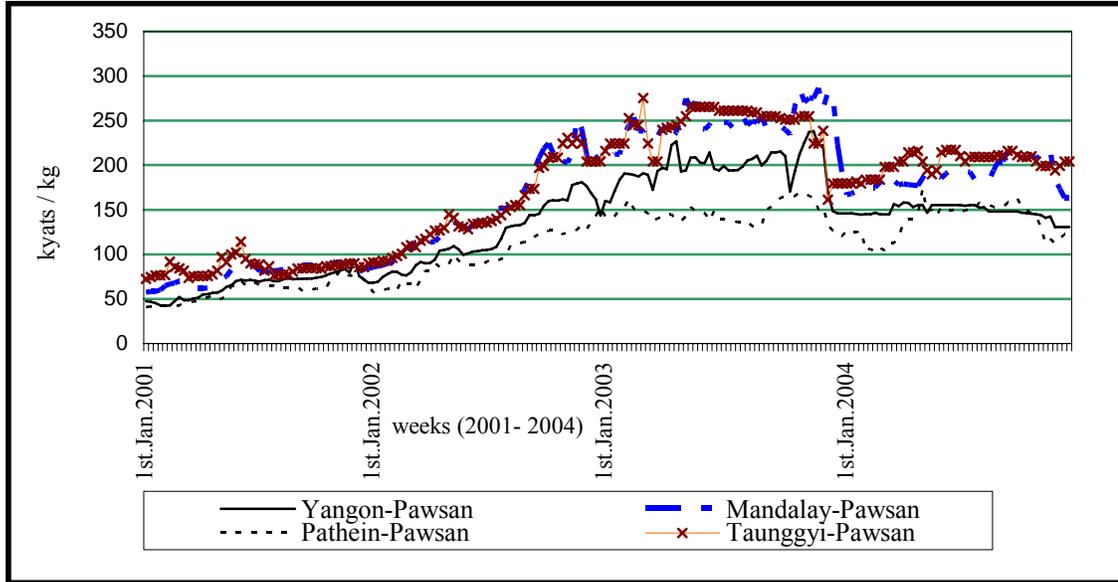


Figure 7.1 Plotting of weekly wholesale price series for Pawsan variety in selected markets

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004.

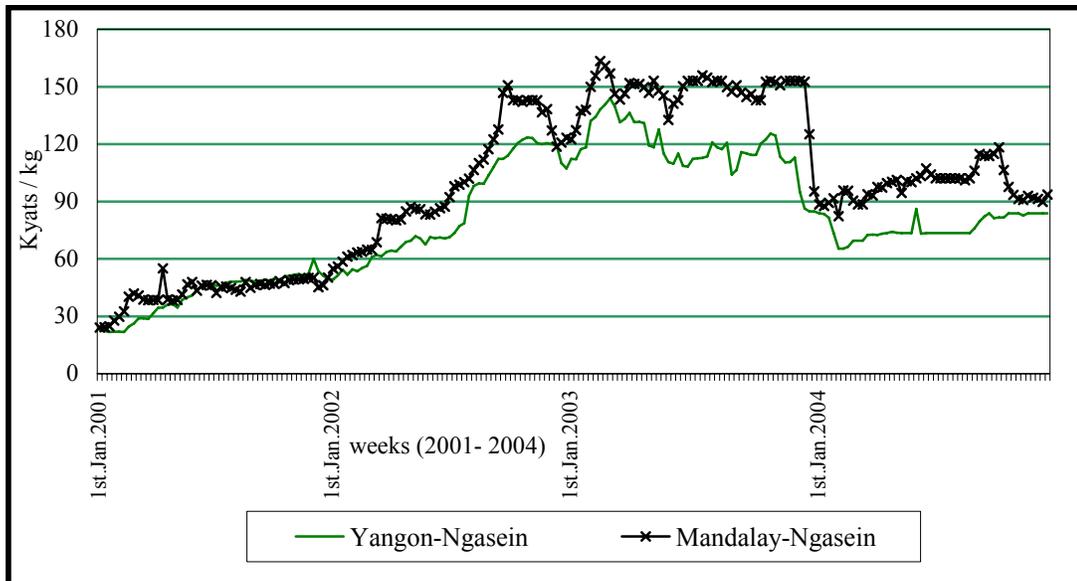


Figure 7.2 Plotting of weekly wholesale price series for Yangon and Mandalay Ngasein

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004.

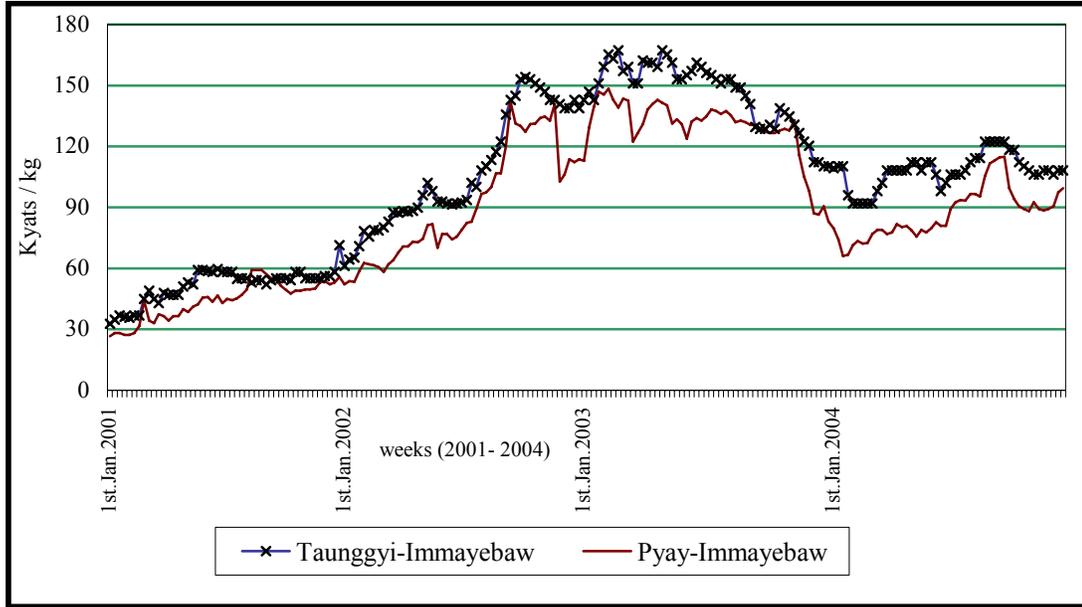


Figure 7.3 Plotting of weekly wholesale price series for Pyay and Taunggyi Immayebaw

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series

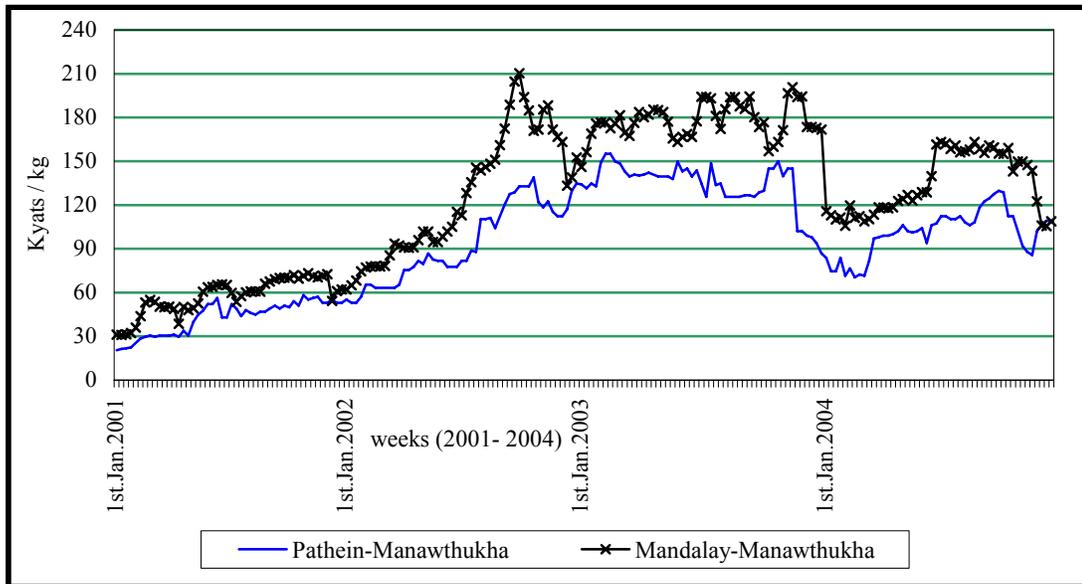


Figure 7.4 Plotting of weekly wholesale price series for Pathein and Mandalay Manawthukha

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004.

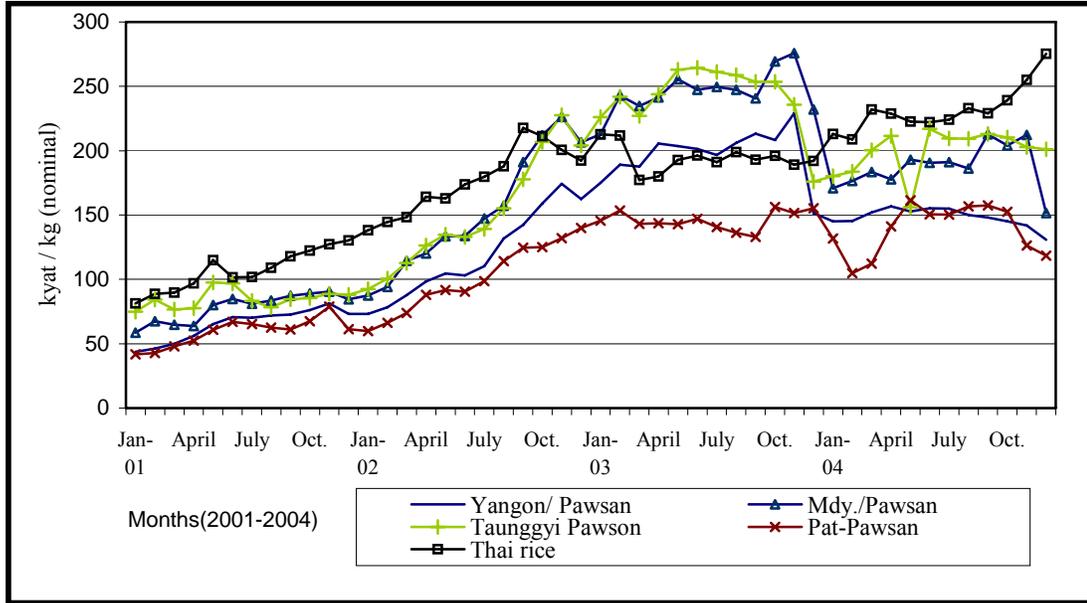


Figure 7.5 Plotting of monthly wholesale price series for Pawsan and Thai rice (Nominal value)

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004. Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.

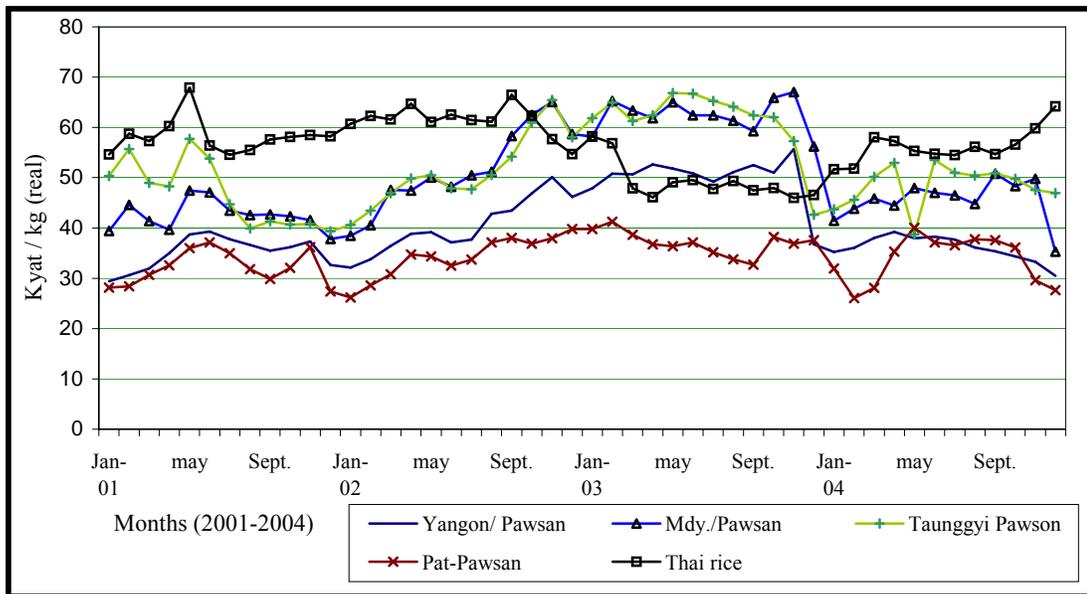


Figure 7.6 Plotting of monthly wholesale price series for Pawsan and Thai rice (Real value)

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004. Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.

7.3 Seasonal Movement of Selected Rice Price Series

In this study, seasonal movements of rice price series are demonstrated in both nominal and real value in Figure 7.8 and Figure 7.9 respectively. The average rice prices for the same month of every year during the years 2001 to 2004 were calculated and plotted. According to these figures, the seasonal movements in all rice price series were not so much pronounced.

However, seasonal movement can be seen as the production level in nominal price trend of rice markets. There were two typical seasons in the rice market. October through January can be considered as peak-season for supply of monsoon rice from new harvests which were available at lower prices. February to October was the post-season when prices in the market started increasing, and during November when supplies of rice in the market slowed down and prices reached the peak. The seasonal price movement indicated that the summer paddy production of Myanmar did not significantly influence the rice price movement in general.

Also similar movements were found in deflated price series as well but the movements were not so obvious. For real price movement by season, Taunggyi-Pawsan and Immayebaw price series were somehow different from other price series. The highest prices were observed in June and May for Taunggyi-Pawsan and Immayebaw respectively. Then, Immayebaw price rose again in October. The seasonal movement patterns of nominal and real value price series for each market are illustrated in Appendix. 7. In these figures, much more pronounced patterns of nominal rice price series could be observed for each variety in particular market although there was unclear pattern of seasonal movement in terms of real value of rice price in all markets. Therefore, rice price volatility by season may be influenced by dynamic inflation effect rather than seasonal production or marketed volume of rice.

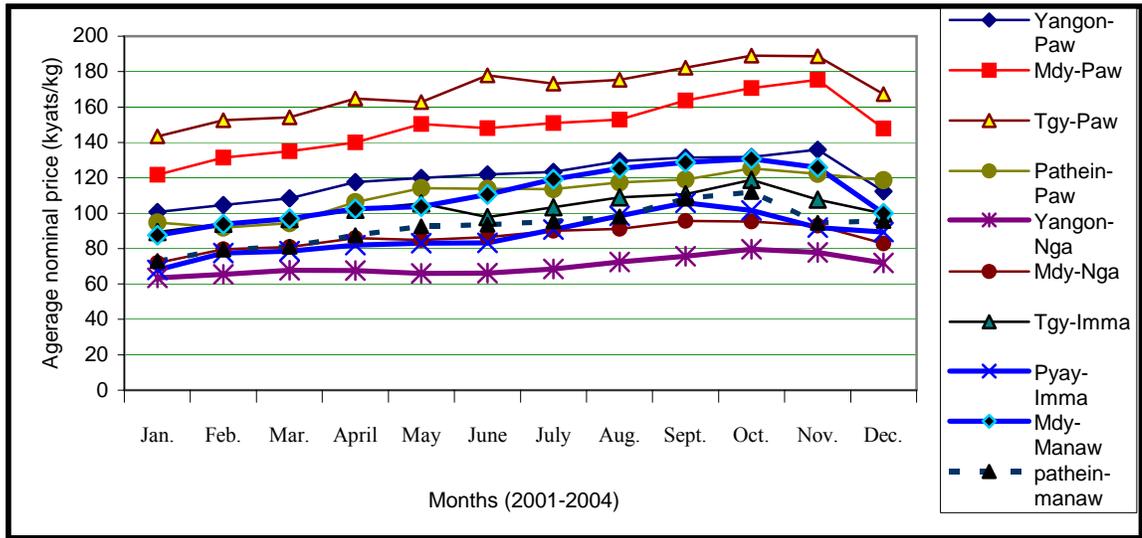


Figure 7.7 Seasonal movements of monthly wholesale price series (Nominal value)

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004.

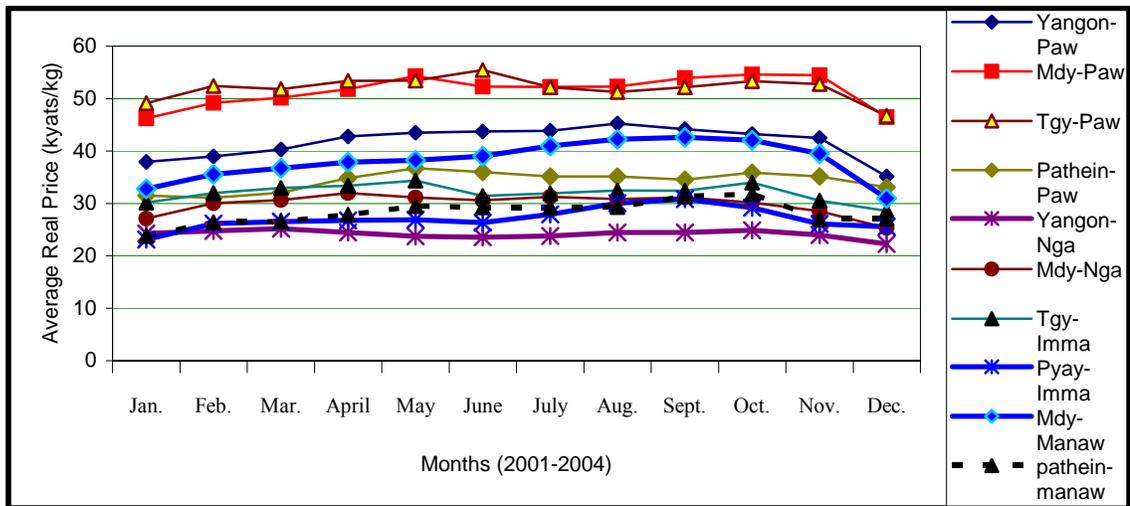


Figure 7.8 Seasonal movements of monthly wholesale price series (Real value)

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.

CHAPTER 8

ANALYSIS OF MARKET INTEGRATION AND PRICE CAUSALITY

The concept of market integration has retained and increased its importance in developing countries where it has potential application to policy questions regarding government intervention in markets although the measure of integration have not advanced much. The spatial structure of Myanmar rice market which is based on cointegration between market prices and places overtime is presented in this study. This chapter presents the market integration and price causality for the major surplus and deficit rice markets in Myanmar. In addition, this study focuses on the empirical investigation whether Myanmar rice market is cointegrated internally and externally within the boundaries and limitations of a halfway-liberalized economic system by using procedure of Engle and Granger two steps co-integration method. Moreover, the effect of inflation on rice market price signal spread and price causality between pairs of markets are explored. All price series are used as weekly and monthly data in both nominal and real value for the period of 2001 to 2004.

8.1 Data Generating Process of Selected Rice Price Series

According to the econometric methodology, one of the first steps in co-integration analysis is to test for the stationary properties of the univariate time series. The test of the stationarity is important because there is a one-to-one relationship between the number of stationary variable and number of co-integration relationships (Hansen and Juselius 1995). In this study, Augmented Dicky-Fuller method is used to test the order of integration by using the Equation 3.4.9 with the hypothesis of $H_0: \beta = 0$ vs $H_1: \beta < 0$. Optimum lag length is determined based on Akaike Information Criterion (AIC). Testing the price series in nominal value are weekly data and deflated, real value price series which are monthly data. Because of the consumer price index data is available only for monthly average during study period 2001-2004.

The results of unit root test (with intercept and trend) presented in Table 8.1, indicate that coefficients of P_{t-1} from all selected price series and CPI were not significantly different from zero in price level.

Table 8.1 Coefficient of unit root test on selected rice price series and CPI

No	Price series	β of P_t		β of P_{t-1}	
		(Price level)		(First differences)	
		<i>Nominal</i>	<i>Real*</i>	<i>Nominal</i>	<i>Real*</i>
<u>Surplus markets</u>					
1	Yangon-Pawsan	-0.0231	0.1009	-1.1434	-1.3067
2	Pathein- Pawsan	-0.0421	-0.3948	-0.8625	-1.4165
3	Yangon-Ngasein	-0.0128	-0.0827	-0.7490	-0.8318
4	Pathein- Manaw.	-0.0323	-0.1501	-0.9770	-1.3379
5	Pyay- Imma.	-0.0214	-0.1639	-0.8216	-1.4335
<u>Deficit markets</u>					
6	Mandalay- Pawsan	-0.0252	0.0836	-1.0165	-1.4271
7	Taunggyi- Pawsan	-0.0305	-0.1472	-1.3429	-1.2496
8	Mandalay- Ngasein	-0.0153	-0.0701	-0.7512	-1.4427
9	Mandalay- Manaw.	-0.0255	-0.1198	-0.9466	-1.0510
10	Taunggyi- Imma.	-0.0117	-0.1203	-0.7595	-1.2620
11	Thai Rice	-0.1864*	-0.2175	-1.2387*	-1.2713
12	CPI		0.0084		-0.6437

Note: 1. no of lag are 4 for weekly data and 2 for monthly data allowed by AIC.

2. * Monthly price series,

3. Augmented Dicky-Fuller (ADF) test the hypothesis of $H_0: \beta = 0$ vs $H_1: \beta < 0$.

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004. Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.

Table 8.2 ADF statistics of unit root test on selected rice price series

No	Price series	ADF-t value (Price level)		ADF-t value (First differences)	
		<i>Nominal</i>	<i>Real*</i>	<i>Nominal</i>	<i>Real*</i>
<u>Surplus markets</u>					
1	Yangon-Pawsan	-1.6012	-1.2517	-8.5972	-5.1348
2	Pathein- Pawsan	-1.9633	-2.7269	-6.4328	-5.4978
3	Yangon-Ngasein	-1.2584	-1.6866	-6.0511	-4.0452
4	Pathein- Manaw.	1.8101	-1.9491	-6.4414	-4.6072
5	Pyay- Imma.	-1.6594	-1.8551	-6.2647	-5.0937
<u>Deficit markets</u>					
6	Mandalay- Pawsan	-1.5227	-0.8626	-7.4922	-3.6088
7	Taunggyi- Pawsan	1.4415	-1.4272	-8.3228	-4.1876
8	Mandalay- Ngasein	-1.3942	-0.8527	-7.0536	-4.2377
9	Mandalay- Manaw.	-1.4035	-1.3972	-7.0741	-4.1330
10	Taunggyi- Imma.	-1.1345	-1.4649	-5.9037	-4.2078
11	Thai Rice	-2.099*	-2.1147	-5.5690*	-6.0047
12	CPI		0.3027		-4.5725

Note: 1. no of lag are 4 for weekly data and 2 for monthly data allowed by AIC.

2. * Monthly price series,

3. Mackinnon Critical Value: -4.1678 (1%) and -3.5088 (5%) for monthly data

4. Mackinnon critical value: -3.99 (1%) and -3.43 (5%) for weekly data

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004. Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.

The results of ADF-t statistics are presented in Table 8.2. It shows ADF values of all price series in level of both nominal and real value and CPI were not less than critical value of Mackinnon (1990).

Therefore, all price series were tested again on first differences. Then, results of coefficients were significantly different from zero, which means that null hypothesis was rejected. It is proved by Table 8.2; as all ADF values of price series and CPI were less than critical value (more negative). As a result, all nominal and real value price series were I(1), which means these series were integrated in order 1. That is the strong reason to take the first difference price series in real and nominal values and CPI for the testing of cointegration analysis. The figures for first differences of nominal weekly price series and real monthly price series are shown in Appendix 8 and Appendix 9 respectively.

8.2 Cointegration Analysis of Selected Rice Price Series

Next step after data generating process of each price series is to test for integration between them. Market integration is concerned with determination of a market area. In an integrated market system, prices are determined simultaneously within the system, and that a shock to the price in one market region should manifest in the other region's prices as well (Slade 1986). As already mentioned in Chapter 3, when two price series are cointegrated, they have already tied together in some way. In this study, the simple two steps procedure of Engle and Granger (1969) is used to test the cointegration of pair of rice price series.

The first of Engle and Granger's procedure is to determine the coefficient estimate from OLS regression of one price series on a constant and other price series by using the equation (3.4.10). After that, the residual from this cointegration regression is stationary. Therefore, ADF method is applied to test the ADF t statistics from regression equation of residual whether it is less than the critical value by employing equation (3.4.11). If the coefficient value of residual is different from 0, the ADF t statistics will be less than the relevant Mackinnon critical value; then null hypothesis is rejected and two price series are said to be co-integrated to order 1, which means that two markets are integrated in the long run.

8.2.1 Cointegration among Nominal Rice Price Series

For Myanmar rice market integration study, first consideration is testing the cointegration of rice price series in nominal value. The selected Pawson rice markets were Yangon, which was biggest market, Pathein, which was major supply market, Mandalay, which was main focal point of deficit area and Taunggyi, which was important transit market of deficit mountainous and border area. The results of the bivariate tests for Pawson variety in terms of nominal value are reported in Table 8.3. In order to check the small sample bias in the Engle-Granger procedure, this study calculates twice for each price series using each price series as dependent variable, and in turn it is accepted from the study of Alexander and Wyeth (1995).

The ADF t statistic results from both sets of regression are shown in Table 8.3. There were less negative ADF t values of residuals than critical values at 1% level which indicated all pairs of nominal rice price series were highly cointegrated in the long run. All price pairs of cointegration results were reasonably robust to trade off dependent and independent variables as their all estimated ADF t values were not so much different in turn of dependent and independent variables.

Other rice varieties concerned for cointegration analysis were Ngasein for Yangon and Mandalay market, Manawthukha for Pathein and Mandalay market and Immayebaw for Pyay and Taunggyi market. The results from integration regressions of nominal price series are presented in Table 8.4. According to ADF t values of the residuals, there were the long run rice market integration in Myanmar during 2001 to 2004. Because ADF t values of regressions were less than the critical t value at 1% significant level. Moreover, some other important statistical results from integration regressions are mentioned in Appendix 10.

According to the results of nominal price cointegration in Myanmar rice market, the question arises as whether inflation was driving the rice price cointegration during the study period. Because inflation rate in Myanmar was relatively high and volatile during the study period as mentioned already, this effect could move together with rice price from one market to another. That would be the reason why market integration was stronger in terms of nominal price series.

Table 8.3 Cointegration between Pawson nominal price series (ADF t statistics)

Price Series	Yangon	Pathein	Mandalay	Taunggyi
Yangon		-8.9575***	-8.4628***	-8.5830***
Pathein	-5.4875***		-5.2573***	-5.3482***
Mandalay	-6.6009***	-6.5092***		-6.6654***
Taunggyi	-7.3972***	-7.3511***	-7.3634***	

Notes: 1. Row variables are dependent variables in cointegrating regression.
 2. Mackinnon critical value: -4.4085 (1%), -3.8308 (5%) and -3.5343 (10%)
 3. ***, **, * and ^{ns} indicate market integration in 1%, 5%, 10% level and no integration respectively.

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004. Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.

Table 8.4 Cointegration among other varieties nominal price series (ADF t statistics)

Pairs of Price Series	Coef. of residual	Standard Error	ADF-t statistics
<u>Ngasein</u>			
Yangon- Mandalay	-0.9564	0.1341	-7.1332***
Mandalay -Yangon	-0.8839	0.1264	-6.9915***
<u>Manawthukha</u>			
Pathein- Mandalay	-1.0465	0.1699	-6.1575***
Mandalay- Pathein	-0.9564	0.1341	-7.1332***
<u>Immayebaw</u>			
Pyay- Tunggyi	-0.9331	0.1526	-6.1143***
Tunggyi- Pyay	-1.0222	0.1577	-6.4789***

Notes: 1. First variables are dependent variables in cointegrating regression.
 2. Mackinnon critical value: -4.4085 (1%), -3.8308 (5%) and -3.5343 (10%)
 3. ***, **, * and ^{ns} indicate market integration in 1%, 5%, 10% level and no integration respectively.

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004.

8.2.2 Cointegration among Real Rice Price Series and Consumer Price Index

To address above question, all price series were deflated and tested again with same procedure, whether there was actually still strong market integration in the real price series. Also integration analysis was carried out for the all Pawson price series with Consumer Price Index (CPI) which was the series used to indicate inflation in the country over the period for this study. The estimated cointegration results of real price series of Pawson rice prices in the study markets are shown in Table 8.5. Other statistical results from real price integration regression for Pawson and CPI are reported in Appendix. 11.

The ADF results of the integration regressions indicated that Yangon-Mandalay was integrated at 1% level and Yangon-Pathein and Yangon-Taunggyi market pairs were integrated at 5% level in real price value when Yangon was a dependent variable. However, there were no market integration between Mandalay-Yangon and Taunggyi-Yangon when Yangon was tested as an independent variable.

Among the pairs of markets, Yangon-Pathein (both surplus markets) and Mandalay-Taunggyi (both deficit markets) pairs were cointegrated in both regressions of dependent and independent variable in turn at 5% significant level. They was not cointegrated in deflated price series analysis for the market pairs of Mandalay-Yangon, Mandalay-Pathein, Taunggyi-Yangon and Taunggyi-Pathein. For these, regressions were analysed as surplus markets were independent variables. Therefore, the deficit rice markets seemed to be independent for the long run integration in real term. On the other hand, the surplus rice markets would depend on the deficit rice markets for the market integration over time in Myanmar.

In addition, more remarkable aspect of the result was that each rice price was consistently integrated with the CPI at 1% level and 5% level, while each of the rice prices was dependent variable. Therefore, with regard to the integration, CPI or inflation effect appeared to be independent on the rice price, at the same time, rice price would depend on the CPI overtime in Myanmar.

Table 8.5 Cointegration among Pawsan real price series and CPI (ADF t-statistics)

Price Series	Yangon	Pathein	Mandalay	Taunggyi	CPI
Yangon		-4.4326**	-5.1333***	-4.5561**	-5.1212***
Pathein	-4.4612**		-4.3459**	-4.3136**	-4.3707**
Mandalay	-2.5569 ^{ns}	-3.4128 ^{ns}		-4.6176**	-4.1755**
Taunggyi	-3.5061 ^{ns}	-3.6016 ^{ns}	-4.3287**		-4.1460**
CPI	-2.2812 ^{ns}	-2.1808 ^{ns}	-2.1955 ^{ns}	-2.3164 ^{ns}	

Notes: 1. Row variables are dependent variables in cointegrating regression
 2. Mackinnon Critical value: -4.6972(1%), -4.0028(5%) & -3.6617(10%)
 3. ***, **, * and ^{ns} indicate market integration in 1%, 5%, 10% level and no integration respectively.

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Monthly price series from January 2001 to December 2004. Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.

Table 8.6 Cointegration among other varieties real price series

Pairs of Price Series	Coef. of residual	Std. Error	ADF t-statistics
<u>Ngasein</u>			
Yangon-Mdy.	-1.3713	0.2668	-4.1310**
Mdy.-Yangon	-1.1024	0.4113	-3.3339 ^{ns}
<u>Manawthukha</u>			
Pathein-Mdy.	-1.9188	0.4312	-4.4995**
Mdy.-Pathein	-1.1397	0.3580	-3.1829 ^{ns}
<u>Immavebaw</u>			
Pyay-Tgy.	-1.8096	0.4096	-4.4175**
Tgy.-Pyay	-1.4870	0.4035	-3.6245 ^{ns}

Notes: 1. First variables are dependent variables in cointegrating regression.
 2. Mackinnon Critical value: -4.6972(1%), -4.0028(5%) & -3.6617(10%)
 3. ***, **, * and ^{ns} indicate market integration in 1%, 5%, 10% level and no integration respectively.

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Monthly price series from January 2001 to December 2004.

According to this result, apparent Myanmar rice market integration was due to the common inflationary trend of the CPI in particular. However, it was required to consider the causality between the CPI and each of the price series. If causality was significant again, it may possibly be concluded that inflation dominated the rice price series in Myanmar.

Table 8.6 shows the similar results of other chosen rice varieties. The detail statistical results of cointegration regressions are mentioned in Appendix 12. Market pairs of Ngasein, Manawthukha and Immayebaw varieties were integrated at 5% level whereas surplus markets (Yangon, Pathein and Pyay) were dependent variables of integration regressions. When the deficit rice markets (Mandalay and Taunggyi) were tested as dependent variables in regressions, null hypothesis of market integration test could not be rejected because these markets were not integrated for long run in real term. This may be a reason for the different results of nominal price series and real price series. The price co movement between pairs of markets in nominal value seemed to include inflation effect. Therefore, after deflated price series the integration was significant only at 5% level.

Therefore, this result provided evidence for the Myanmar rice market integration which was leading to lower degree of cointegration between pairs of price series in deflated value than nominal value price series, showing why inflation would be the driving factor for the rice market integration overtime. Furthermore, market integration still existed in turn of regressions between market pairs of both surplus-surplus market (Yangon-Pathein) and both deficit-deficit market (Mandalay-Taunggyi). On the other hand, movement of surplus rice market prices in supply side depended on the demand side which was deficit rice market price series concerning the market integration during the period of 2001 to 2004. These results of cointegration analysis lead to further analysis of the causal relation between rice price series of surplus and deficit markets to explore the direction and nature of price causality from one market to another when they were integrated for long run.

8.2.3 Cointegration between Myanmar and International Rice Price

Testing the cointegration between Myanmar rice and Thai rice was employed for investigating the link of Myanmar rice market price movement to the international rice price fluctuation. Assumption for this analysis was that Myanmar local rice price was supposed to get the signal from international rice market condition, subsequently these two prices would move together in long term when Myanmar was a rice exporter. Therefore, Myanmar rice market price and Thai rice price series could have cointegration for long run if Myanmar had good relationship with international rice market for getting price signal to local rice market.

The rice price signal from the international market concerned was the Thai rice (5 % broken) FOB price. Since Thailand is a neighbouring country of Myanmar as well as dominant world exporter, the Thai export price is generally regarded as the most important world price indicator. For the local market considered to analyse with Thai price was the price of Pawsan variety from Yangon market which was the focal point of the rice marketing in Myanmar. ADF t values of the residuals from integration analysis are addressed in Table 8.7 and detailed statistical results are shown in Appendix 10 and 11 for nominal and real terms respectively.

The result from the two-step Granger residual based test indicated that Yangon-Pawsan price was integrated with Thai rice price only in nominal value, at 10 % significant level while Yangon market price depended on the Thai rice price. According to the results of Table 8.7, Myanmar rice price movement did not cointegrate to Thai rice price in the deflated value during the study period. There was market segmentation between two markets in real value. The presence of co-integration between two series was indicative of strong interdependence. Market segmentation occurred when there was no co-integration. In this situation, the price signal in one market did not translate to the other market, implying that price changes were not the same in different markets. It means, two markets were economically segmented in the long run.

Table 8.7 Cointegration between Yangon Pawsan and Thai rice price series

Statistics	Nominal value		Real value	
	Y-P Vs Thai	Thai Vs Y-P	Y-P Vs Thai	Thai Vs Y-P
Coef. of residual	-1.2659	-1.0858	-1.4763	-0.7888
Standard error	0.3350	0.3819	0.4431	0.3387
ADF t-statistic	-3.7780*	-2.8427^{ns}	-3.3318^{ns}	-2.3285^{ns}
R ²	0.5650	0.5435	0.5832	0.5778
Durbin-Watson Stat.	1.9650	1.8654	1.9999	1.9289

Notes: 1. First variables are dependent variables in cointegrating regression.

2. Mackinnon Critical value: -4.6972(1%), -4.0028(5%) & -3.6617(10%)

3. ***, **, * and ^{ns} indicate market integration in 1%, 5%, 10% level and no integration respectively.

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Monthly price series from January 2001 to December 2004. Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.

Consequently, Myanmar rice price movement isolated between external rice market prices overtime. Myanmar rice market did not have good relationship with international rice market. Therefore, Myanmar rice market could not get the price signal from the international rice price for the reason that the domestic rice price movement was not cointegrated with the international rice price over time. Goodwin and Schroeder (1991) argued that markets which are not well integrated may transmit inaccurate price information that might distort producer's decisions and contribute to inefficient product movements. Therefore, the monopolized rice export and firmly limited rice marketing in the border area to concentrate on the stable rice price in Myanmar which would affect the local rice price in real term could not reflect the international rice price over time under the present government's policies in the Myanmar rice market.

8.3 Price Causality Analysis of Selected Rice Price Series

According to the background idea of Granger causality, the causal relationship between two price series can be determined by examining the way they move with respect to each other over time. In this sense, the first price series is said to cause the second price series if the forecast for the second price series movements when lagged values of the first price series are taken into account. Therefore, after testing the market integration between rice market pairs concerned, price causality between integrated market pairs is examined by the following equations (3.4.12) and (3.4.13) which are estimating with one lag price which is allowed by AIC minimum value.

$$\Delta P_t = C_{it} + \rho_{i1}\Delta P_{t-1} + \rho_{j1}\Delta R_{t-1} + \beta_1 P_{t-1} + \beta_2 R_{t-1} + \xi_{it} \quad (3.4.12)$$

$$\Delta R_t = C_t + \rho_{f1}\Delta P_{t-1} + \rho_{l1}\Delta R_{t-1} + \beta_3 P_{t-1} + \beta_4 R_{t-1} + \xi_t \quad (3.4.13)$$

These equations postulate that the price changes of one price series (ΔP_t) are related to changes of past price itself (ΔP_{t-1}), and one lag price of another integrated price series and their changes (R_{t-1} and ΔR_{t-1}). Because lagged alternative prices present a better forecast of current changes in one price. As a result, testing the null hypothesis is that the estimated coefficients on the lagged prices R (ρ_{j1} , and β_2) are equal to zero, then unidirectional causality from R to P is absent in Equation (3.4.12). If unidirectional causality from P to R exists, the set of the lagged coefficients of P (ρ_{f1} , and β_3) should be significantly different from zero. Feedback causality is suggested when the sets of price

P and R coefficients are significantly different from zero in both regressions by using the standard F test.

The results from the causality analysis of each market pairs for Pawsan variety and consumer price index (CPI) are presented in Table 8.8. Detailed statistical results are reported in Appendix 13 (a) to (e). The idea behind the causality test between rice price series and CPI was to explore the nature of causation between inflation and rice price series during the study period (2001-2004). Therefore, all rice price series were analysed as real value price series because of integration between real price series and CPI has been already tested in Section 8.2.2.

According to the causality F values, causality between Yangon and Pathein market was only unidirectional. Yangon was the major transit focal point and Pathein was the main supply side of Pawsan variety. Therefore, Pathein rice price changes were caused by Yangon at 1% level confidence interval. But, it was surprising that Yangon rice price changes were not caused by Pathein on the other hand. However, bilateral causality existed between Yangon and Mandalay which was focal transit market of deficit regions. Besides, Yangon rice price movement was caused by Mandalay market lag price at 1% level and Mandalay-Yangon feedback was found at 10% level. Also Yangon market rice price changes were caused by Taunggyi rice price changes at 10% significant level. Taunggyi was an important deficit market of mountainous area.

The price changes of major supply market of Pathein was caused by Yangon at 1% level and caused by Mandalay and Taunggyi rice price at 5% level. However, Pathein rice price could not lead to change rice price in any other selected market according to the causality result. Although the case was less strong, Mandalay price was changed by Yangon price, and at the same time, Taunggyi rice price could change the Mandalay rice price at 1% level. In this reason, Mandalay and Taunggyi market rice price movements were likely to be the source of rice price formation as the important centres of the demand side.

Causality directions between CPI and each rice price series were enlightening; CPI changes were caused by Mandalay and Taunggyi rice prices at 5% level. The CPI lag value caused to change the rice prices in Yangon market and in Pathein Market at 5 % level.

Table 8.8 Causality-F statistics of Pawson market pairs

Price Series	Yangon	Pathein	Mandalay	Taunggyi	CPI
Yangon		1.8626 ^{ns}	6.2609***	2.7321*	2.5518*
Pathein	6.7904***		3.1582**	3.3245**	2.7723**
Mandalay	2.2815*	1.3924 ^{ns}		6.0004***	0.9457 ^{ns}
Taunggyi	0.0082 ^{ns}	0.2033 ^{ns}	0.0044 ^{ns}		0.3530 ^{ns}
CPI	1.3995 ^{ns}	0.1722 ^{ns}	3.7983**	3.8105**	

Notes: 1. ***Null hypothesis: Row market is not caused by column market in each pair.***

2. ***, **, * and ^{ns} indicate significant F values at 1%, 5%, 10% and not significant

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Monthly price series from January 2001 to December 2004. Central Statistical Organization (CSO), Myanmar and the Pink Sheet. World Bank, online.

Table 8.9 Causality-F statistics of other varieties market pairs

Pairs of Markets	F-value	Decision for null hypothesis
<u>Ngasein</u>		
Yangon-Mandalay	7.2291	Reject null hypothesis at 1% level
Mandalay-Yangon	2.7035	Reject null hypothesis at 10% level
<u>Manawthukha</u>		
Pathein- Mandalay	8.1789	Reject null hypothesis at 1% level
Mandalay-Pathein	1.2705	Accept null hypothesis
<u>Immayebaw</u>		
Pyay-Taunggyi	2.2459	Reject null hypothesis at 10% level
Taunggyi-Pyay	0.1922	Accept null hypothesis

Notes: 1. ***Null hypothesis: First market is not caused by second market in each pair.***

2. Critical value 2.18 (10%), 2.76(5%), 4.13(1%)

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Monthly price series from January 2001 to December 2004.

The nature of price causality between market pairs of other selected rice varieties was observed as the same procedure of Pawsan variety by using the deflated price series. Results of the causality regression models are shown in Table 8.9 and Appendix 13 (f) in detail.

The causality F values were consistent with the integration result between market pairs so far. Bilateral causality could be seen in Yangon-Mandalay Ngasein market pairs even though in different significant level. There was strong causality from Mandalay rice price to Yangon focal market price at 1% level. It was expectedly found that Yangon market rice price could cause the changes of Mandalay rice price at 10% level as these two markets represented the major supply side and major demand side of the rice sector in Myanmar.

For the Manawthukha variety, considered supply source was Pathein and Mandalay was the main deficit market. There was the causality only on one side from Mandalay to Pathein market. Mandalay rice last price could control the variation of rice price in Pathein since the causality F value was significant at 1% level in regression model. As far as Immayebaw variety was concerned, Taunggyi was the most important demand side and Pyay was the major supply market centre. Indeed, it seemed to be a weak causality from Taunggyi to Pyay, null hypothesis was rejected at 10% level. However, Taunggyi rice price volatility was not caused by Pyay rice price as the result of causality analysis.

Summary of the causality result for significant market pairs is mentioned in Table 8.10. Among the significant market pairs, only Yongon and Mandalay rice price series were relating to change each other overtime by the two way causality. It was the reasonable result as focal market from supply side and largest market from the demand side.

Table 8.10 Direction of price causality in significant market pairs

Causality Direction	Description of Markets and Direction	Significant at
Yangon ← Mandalay	Capital Market ← Deficit Market	1% level
Yangon ← Taunggyi	Capital Market ← Deficit Market	10% level
Yangon ← CPI	Capital Market ← Consumer Price Index	10% level
Pathein ← Yangon	Surplus Market ← Capital Market	1% level
Pathein ← Mandalay	Surplus Market ← Capital Market	1 & 5% level
Pathein ← Taunggyi	Surplus Market ← Capital Market	5% level
Pathein ← CPI	Surplus Market ← Consumer Price Index	5% level
Mandalay ← Yangon	Deficit Market ← Capital Market	5 & 10% level
Mandalay ← Taunggyi	Deficit Market ← Deficit Index	1% level
Pyay ← Taunggyi	Surplus Market ← Deficit Index	10% level
CPI ← Mandalay	Consumer Price Index ← Deficit Market	5% level
CPI ← Taunggyi	Consumer Price Index ← Deficit Market	5% level

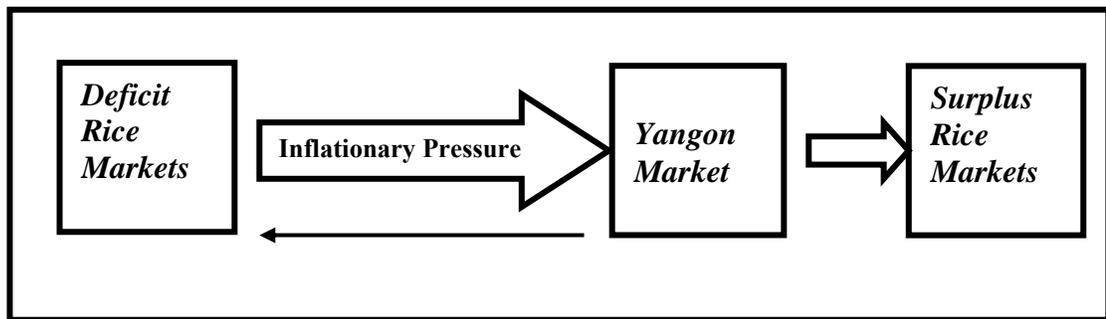


Figure 8.1 Rice price formation based on causality in Myanmar during 2001-2004 (real value)

Nevertheless, causal relations between other market pairs were found as no more than unidirectional cases. In this study, the most important sources of rice price formation seemed to be the deficit markets or demand side in particular rather than supply side of rice markets in Myanmar. Major supply markets of rice were observed as only dependent markets for the price causality, where the rice price changes were caused by demand side so far. According to the causality direction, Myanmar rice price formation was contradictory from the Indonesian rice price causality, there was surplus market driving the other rice prices (Alexander and Wyeth 1994).

Looking at the causality direction between inflation and rice price in Myanmar, CPI would lead the movement of rice price of surplus markets at the same time changes of deficit market rice price can cause the fluctuation of consumer price index according to the result of causality direction.

Finally, Figure 8.1 is developed to reveal clearly the rice price formation system in Myanmar under the present government. Myanmar rice market price formation was driven by the deficit markets through inflation factor in particular, and then rice price causality went to the capital market and supply side finally. The price signal from the capital market was back to the deficit market in turn even though the result of causality was slightly weak. Therefore, inflation effect and rice price relationship seemed to be apparent that rice price of major demand side was the source of inflation and inflation possibly would be the formation root of the rice price changes in capital market and major surplus markets.

CHAPTER 9

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

This chapter draws attention to the important findings of the study, brief conclusion based on the findings and states some policy implications for the Myanmar rice economy in the context of the private marketing sector to be much more competitive for getting the right price signal to the rice producer, consumer, market participants as well as policy makers for the future perspective.

9.1 Summary of Findings

9.1.1 Structure of the Rice Sector and Marketing

The status of the rice market is the major focus of interest in this study. Myanmar rice sector had 4.7 million small farms which produced 19.58 million tons of paddy during the last decade (1994-2003) of the present government era. Firm structures were more competitive in this sector as their number of firms and product differentiation factors.

The rice marketing sector had been intervened by the procurement system and the rice rationing system although it accounted only 4.29% of the total paddy production. Moreover, the procurement system discouraged not only farmer but also private millers who were burdened by the government intervention during the study period. For the rice wholesalers and traders, restricted trade to the border areas and ban of rice export were the observed facts which were opposite the competitive structure. Therefore, the rice wholesalers were operating business under the partially liberalized internal rice market in Myanmar.

Accordingly, the volume of procured paddy was decreasing after first liberalization in this era. The rice distribution system was giving special attention to the urban consumer especially in Yangon. Apart from the total paddy utilization, only 2.96% was exported by the state from the surplus paddy 17.07 % of total production. About 14 % of total production was unclear in the official secondary data sources. Therefore, it would be the stock of paddy in both private sector and public sector in the country. Otherwise, it might be the illegal trad volume in border areas.

This factor pointed out the information opaque of the rice sector and market structure for the public as well as the market participants. In the cropping season of 2003, Ayeyarwaddy and Bago Divisions produced more than self sufficiency level of 327% and 197% respectively. At the same time, Chin, Mandalay and Magway regions required the paddy amount equal to 46%, 48% and 44% of their production level respectively. Therefore important spatial trades were found within surplus regions and deficit regions in Myanmar.

9.1.2 Description of Rice Marketing Participants

Under the revealed structure of rice sector in Myanmar, the sample farmers were mostly in primary education level and some graduated farmers were observed only in Yangon area. The Largeland holding size was observed in rice surplus regions particularly in Pathein and Yangon while minimum holding size was in Magway. All farmers except from Mandalay and Magway produced paddy with labor intensive system as their hired labor cost was the highest ratio of the total variable cost. The farmers from Mandalay and Magway used much more ratio of material cost than other regions. For this reason, the highest yield of the paddy was obtained by Pathein and Magway farmers. Looking at the unit cost of the paddy, the highest unit cost was found in Taunggyi and the lowest was in Magway, both were in deficit regions.

Fortunately, marketed surplus was received by all sample farmers. In Pathein the surplus was 85% of total production but it was only 4.5% surplus in Magway. Mostly, farmers sold their paddy around 35 days after harvesting. However, Magway farmers sold their paddy just after 14 days. Also, farmers in surplus regions stored their paddy for longer time than farmers in deficit regions. For the selling product type, they sold paddy mostly in surplus regions and rice in deficit regions. Their transaction places were at the nearest town and local villages. Since all farmers received formal credit which covered only 2% to 14% of total variable cost of paddy production. Four percent to 10% of sample farmers took informal credit from the money lender.

From the farmer's point of view, they wanted to grow other cash crops after the monsoon paddy. They commented that cropping system should be free of choice. Some farmers noticed the milling quality was not so good although milling fee was high. Most

of the farmers became aware of the fact that selling rice was more profitable than selling the paddy in all regions. Investment was the important factor for the storage and marketing of the rice. Looking at the new rice policy, majority of the farmers liked the policy by which the government abolished the paddy procurement system.

Among the market participants, primary collectors and retailers had relatively less experiences than millers and wholesalers. Mostly, millers and wholesalers from surplus markets had more than 10 years of experience in rice marketing but millers and wholesalers from deficit markets had less experience around 10 years. The majority of market participants obtained high school education level and most of millers and wholesalers were graduates. Around 50% of primary collectors in all markets were farmers, some millers in surplus regions were wholesalers and millers in deficit markets were primary collectors at the same time. Moreover, wholesalers in surplus regions were millers, and wholesalers from deficits were doing business as retailer.

Competitive members of primary collectors and millers were found in large numbers in surplus markets than deficit markets. For the numbers of wholesalers and retailers, there was not much difference between surplus and deficit markets. Types of purchasing of primary collectors were mostly cash down system and advance payment was also used in surplus regions. Millers in surplus markets were using advance payment, commission basis and cash down systems for buying rice and cash down system was common in deficit markets. Wholesalers and retailers in all markets used to buy with both credit system and cash down system but wholesalers from surplus markets were using different types of purchasing. In addition, the types of selling of wholesalers and retailers were more or less similar in all markets.

Nearly all markets used truck for transportation of paddy and rice while water way was used by some participants in surplus markets. Primary collectors kept purchased product in hand for one month in deficit markets and for less than one month in surplus markets. Millers in surplus markets stored for longer time for example two to three months. While millers in deficit regions kept only one and half month to two months. However, wholesaler in deficit regions stored for two to three months while storage duration was around two months in surplus regions. Retailers in all markets kept the product not more than 20 days in hand.

Observation of the opinion of the market participants was essential to understand the current situation of the rice marketing system. First opinion of 57% of primary collector, 30% of millers and 18% of wholesalers were that the private rice marketing should be supported with formal credit by the government. The majority of mid- and large-scale millers, 45.45% of sample millers and 11.36% of wholesalers responded that they were ready to start new investment for rice milling to improve milled rice quality when private rice exporting is allowed by the government. Improvement of communication system was also perceived by sample traders as their positive response. Most of the wholesalers (68.18%), 36.36% of millers and 23.80% of primary collectors confirmed their desire for the development of the infrastructure in rice marketing system.

For the cost of marketing, 61% of millers and 45% of wholesalers argued that the overhead cost of the rice marketing such as tax, fee for civil services and donation for social affairs, it led to higher cost of rice marketing and decreased the profit of rice marketing.

For the intervention of local authority, 24% of millers and 27% of rice wholesalers pointed out to reduce the restrictions of internal rice marketing. The majority of wholesalers (73%), 48% of primary collectors and 24% of millers liked the new rice policy particularly for allowing private rice export. There were 24% of rice millers and 11% of wholesalers who preferred the paddy procurement system of government which was abolished by the new policy in 2004 because they got the benefit from contracting with MAPT to mill the procured paddy. Finally, 45% of wholesalers, 30% of millers and 14% of primary collectors strongly recommended to implement the new rice policy.

9.1.3 Rice Marketing Channels, Costs and Margins

Farmers from surplus regions sold 75% of the total production and the rest was consumed. Millers had higher potential for getting paddy directly from farmers in surplus regions. About 40% of sample farmers sold their paddy to millers, 32% of farmers sold to primary collectors, 24% of farmers sold to wholesalers and 4% of

farmers sold to local retailers. There was no link found between farmer and consumer as direct marketing in surplus regions.

In surplus regions, millers worked as wholesalers at the same time and therefore, they played as an important role in the rice marketing. Sixty seven percent of the sample millers, rice was traded to Yangon and other deficit markets. Fourteen percent of millers sold rice to local wholesalers and 13% of millers sold to local retailers. Only 6% of millers retailed to consumers in local markets. Wholesalers in surplus markets, 69% had major arbitrator from spatial markets. Retailer purchased from 19% of sample wholesalers and 12% of wholesalers sold the rice to consumers.

The sample farmers in deficit regions sold paddy about 39% of the total production. Thirty-two percent of sample farmers sold paddy to local millers, and 17% of them marketed directly to the consumer. About 39%, 33% and 28% of sample millers sold rice to consumers, wholesaler and retailers respectively. Moreover, 20% of wholesalers traded rice to other deficit markets. On average, 40% of wholesalers sold rice to consumers and other 40% of wholesaler's rice flowed to retailers.

For the cost and profit of marketing activities, farmer who sold the product as paddy received the profit as 26.41% of unit cost of production in Magway as the highest one and lowest profit was in Yangon. However, Mandalay farmers had the opportunity to get more profit as 64.42% of unit cost when they were involved in the marketing function than other farmers. Also, the profit obtained by Mandalay primary collector was relatively higher than that of agents from other regions. The highest profit was obtained by millers from Pathein but millers from Taunggyi got the lowest profit from milling rice.

The lowest marketing cost of wholesalers was found in Pathein and the highest was found in Taunggyi. Among the marketing cost, the packaging cost was the highest one in surplus regions while transportation cost was the highest in deficit areas. The highest overhead cost was found in Pyay followed by Taunggyi. Beside, the highest marketing cost of retailer was found in Taunggyi followed by Magway. Among these costs, cost of packaging was the highest cost ratio in all regions. The highest net profit over variable cost was received by retailers in Magway while the lowest profit of retailer was found in Yangon.

Looking at the composition of consumer price and margin in different market channels, the percent share of farm gate price was the highest one and price shares of miller, wholesaler and retailer were relatively higher in Yangon than in other markets. Among the market participants along the channels, the lowest percentage of profit was obtained by wholesalers and the highest profit was received by retailer in all markets. However, farmers from Yangon and Taunggyi received the lowest percentage of profit. In this case, retailers from Patheingyi and Pyaw Oo received the highest profit shares of consumer prices.

Exploration the gross marketing margin, Yangon market gross marketing margin was the lowest one since it was equal to 26% of consumer price. The highest marketing margin, which was equal to 49% of the consumer price of rice, was found in Magway market. All other sample markets also had high gross marketing margin which was accounted for more than 32% of the consumer price.

9.1.4 Description of Time Series Price Data

According to the descriptive statistics of the rice price series for 2001 to 2004, Taunggyi-Pawson and Taunggyi-Immayebaw price series had much more volatility in weekly wholesale prices than other markets. In average, deficit market price series had much more variations than prices series of surplus markets by the value of SD and CV% in both weekly and monthly data. Besides, the highest SD and CV% were found in CPI which means that consumer price index was much more fluctuated than rice price series. Therefore, the variations of deflated price series were notably less than that of nominal price series.

The plotting of the sample nominal price series suggested that all price series followed the deterministic pattern. There were same pattern of price movements in both Pawson and Thai rice prices from 2001 to 2003. After 2003, prices of Pawson variety in local markets were declining and Thai rice price series moved up significantly.

All real price series were found to be relatively stable. However, it appeared that the movements of price series were somehow different between Pawson price and Thai price during 2004 especially. Seasonal movement could be seen as the production level in nominal price trend of rice markets even though it was not much pronounced.

For the seasonal pattern, October to January was the peak-season when rice price went down and then during February to November, prices went up to the peak. Monthly price movement in real price series was not so obvious but the highest prices were observed in June and May for Pawson and Immayebaw in Taunggyi market respectively. Then Immayebaw price rose again in October and that was due to the higher price of supply market (Pyay) in September.

9.1.5 Market Integration and Price Causality

For the stationary test, all nominal and real value price series were not stationary in price level but all these series were stationary at the first difference level, which means all prices were integrated in order 1. In the testing of price cointegration, all pairs of nominal rice price series for Pawson and other varieties were highly cointegrated in the long run at 1% significant level.

However, the results of market integration for the some pairs of real price series were different from the nominal price series. For Pawson variety, Yangon-Mandalay market pair was integrated at 1% level and Yangon-Pathein and Yangon-Taunggyi market pairs were integrated at 5% level when Yangon was a dependent variable. However, there were no market integration between Mandalay-Yangon and Taunggyi-Yangon pair when Yangon was tested as an independent variable. Yangon-Pathein (both surplus markets) and Mandalay-Taunggyi (both deficit markets) pairs were integrated at 5 % level regardless Yangon or Mandalay was dependent or independent variable. No market integration was found for the market pairs of Mandalay-Yangon, Mandalay-Pathein, Taunggyi-Yangon and Taunggyi-Pathein at the real price value. In addition, each rice price series was consistently integrated with the CPI at 1% and 5% levels, when each of the rice prices was a dependent variable.

Market pairs of Ngasein, Manawthukha and Immayebaw varieties were integrated at 5% level when surplus markets (Yangon, Pathein and Pyay) were used as independent variables in the integration regressions. When the deficit rice markets (Mandalay and Taunggyi) were tested as independent variables in the regressions, these markets were not integrated for long run in real term. Furthermore, market integration

was still existed between market pairs of surplus-surplus markets (Yangon-Pathein) and deficit-deficit markets (Mandalay-Taunggyi).

Yangon-Pawsan price was integrated with Thai rice price in nominal value particularly at 10 % significant level while Yangon market price depended on the Thai rice price. But the Myanmar rice price movements were not cointegrated with Thai rice price in real value. Therefore, it was market segmentation between these two markets in real value.

Price causality between Yangon market and Pathein market was unidirectional because Pathein rice price changes were caused by Yangon market at 1% level. However, bilateral causality existed between Yangon and Mandalay markets. Also, Yangon market rice price changes were caused by Taunggyi rice price at 10% level. Pathein market price was changed by Yangon, Mandalay and Taunggyi rice prices. Mandalay rice price was moved by Yangon price at 10% level while Taunggyi rice price movements led the changes of Mandalay rice price at 1% level.

The changes of consumer price indices were caused by last rice prices of Mandalay and Taunggyi at 5% level. On the other hand, lag values of CPI caused the changes of the rice price in Yangon market and in Pathein Market at 5 % level. Bilateral causality could be seen between Yangon and Mandalay market for Ngasein variety. For the Manawthukha variety, the causality was only on one side from Mandalay to Pathein market at 1% significant level. Concerning with the Immayebaw variety, there was weak uni-causality from Taunggyi to Pyay at 10% level. Based on the finding of price causality, rice price formation was led by the rice in deficit markets along with the inflation factor.

9.2 Conclusions

Several structural conditions in the rice market of Myanmar have been changed over time. The brief description of the structure of the rice marketing system in Myanmar suggests that it has gradually increased role of private sector according to the internal market liberalization by the state. However, there were some basic factors which have been constraining competitiveness in the rice sector. These were the institutional rigidity of the paddy land tenure system and limitation of cropping choice by farmers.

Myanmar paddy farmers could not respond to the market price signal in their paddy production.

Domestic market has been expanded with the growth of urban population and the development of road network between the rice deficit areas and the rice surplus regions. Thousands of private market participants handled millions tons of rice every year. The marketing channels were numerous and it was differed from one region to another. The role of state institutions was the minimum in rice marketing system. Finally the government intervention of procurement and rice rationing systems were abolished in 2003. Nevertheless, there were some restrictions in rice trading near the border areas. The rice export was not allowed for the private sector in order to reach the national food security goal. Moreover, no transparent information system in rice market was evident in volume of trade during 10 years period. Therefore, there was no right price signal to the market intermediaries and policy makers.

Regarding the paddy farmers, paddy production in Myanmar was a labour intensive system by using low rate of inputs especially fertilizer besides insufficient formal credit support by the state. Farmers were taking part in the marketing activities to get more profit even though they needed capital investment for storage, processing and transportation activities. Amongst the market intermediaries, rice millers in surplus regions and wholesalers in all markets had more market power and led in spatial arbitrage of Myanmar rice marketing system.

Concerning the institution factor neither private nor public organization have been promoting competition in the market due to the lack of marketing laws and regulation which establish standard rules for market participants. The formal credit support for private marketing sector was also weak by the state. The most important factor that came from government authorities was their lack of confidence in the private rice marketing leading to the half-way market oriented economy.

The marketing margin analysis pointed out that more complex rice marketing channel was found in deficit markets, and more competitive signal was observed in the Yangon market. Nevertheless, overall margins were relatively high in all rice markets. Farmers received less profit share than market participants in Yangon and Taunggyi

markets. All retailers obtained the highest profit share. For this reason, farmers were not beneficiary group along the rice marketing channel in during 2004.

As regards the performance of the rice marketing system, weak macroeconomic stabilization caused high rice price volatility due to the high inflation rate. Variation of rice price series between nominal and real value during study period indicated that the lack of stability of macroeconomic condition in general. Moreover, seasonal movement pattern was not much pronounced than the inflation effect in the rice price series overtime.

Through out the analysis of the Myanmar rice market integration, sample pairs of markets were highly integrated in nominal terms of price series due to the reasonable development of the market infrastructure such as road net work and communication system for the price information conveyed during the present government era. However, market integration was weak in real term. Furthermore, all rice price series were integrated with consumer price index series because rice prices were depended on the changes of CPI which was used as a measure of inflation. Therefore, the inflation effect on rice market could be found noticeably. The difference between nominal and real value was around four times during the studied time. The integration of the rice markets in Myanmar might be influenced by high inflation.

Besides, the price of Myanmar rice was not integrated to Thai rice price in the deflated value. Consequently, Myanmar rice price movement could not be conveyed accurate price information from international rice market price overtime. According to the Tomek and Robinson (1990), inefficient product movements could happen in Myanmar rice market because of the distorting the marketing decisions making of rice producers.

Looking at the direction of price causality, it was clearly shown that from the rice deficit markets along with the CPI and then went to the surplus market finally. The prices of deficit markets were the most important determinants of rice price in Myanmar. On the other hand, rice prices in deficit markets drived the CPI and the CPI forced the higher price in Yangon and surplus markets. Therefore, deficit markets were the prime movers in rice price changes in Myanmar.

A similar result of price causality was found between Yangon market and Mandalay at 10% level. Yangon had a high rice demand for crowded urban peoples and it was a major transit focal point. The rice suppliers shipped rice through Yangon market to the other markets in the country. The sample rice deficit markets (Mandalay, Magway and Taunggyi) are far from the rice surplus area in the country. Since rice is the only one important staple food of Myanmar, it can be assumed that its demand is relatively constant throughout the year on one hand. Also the Myanmar government is trying to keep the stable price in domestic market through restriction in the rice marketing in deficit border area and monopolized rice export. However, worsen inflationary pressures would influence on the changes of rice prices in demand side due to the chronic macroeconomic imbalances.

On the other hand, paddy supply side in Myanmar is also essentially stable overtime due to the land policy limitation and restricted cropping choice. Price formation is consequently based on the demand supply relationship. If demand is less constant than supply, the changes in demand will affect on the changes in the demand supply relationship subsequently price formation is driven by demand side.

As the result of the rice price causality, rice price was driven by the inflationary pressure in deficit markets then this price signal was going to the supply side. This result suggested that demand side was much more fluctuated by the effect of inflation pressure than supply side over the course of the year which was the reason why price changes originated at the deficit markets in Myanmar.

As far as government interventions in the rice market concerned, stable rice price for domestic consumer was the main priority of the rice marketing policy. However, their attempts to maintain the stable rice price were failing under the inflationary pressure. Therefore, it would be noted that rice price signal was transmitted all the way through inflation from deficit market to surplus market overtime. Due to the high inflation, market integration and passing the rice price were not the correct signals to the producer, consumer, market participants and policy makers.

9.3 Policy Implications

The general Myanmar rice market structure and market performance were analyzed by the integration and price causality overtime. In order to get the efficient Myanmar rice market in the future, some policy implications are provided as follow.

9.3.1 Competitive Rice Market Structure Overtime

Regarding the market structure, Myanmar rice market needs to reform in each level of market layers. From the farmer's point of view, Myanmar farmers do not have much opportunity to respond to meaningful incentives of market price signal which would allow them to improve their production and income. For getting this opportunity, the state should relax the rigidity of the land policy and cropping choice for the paddy farmers.

In the market economy the price is the signal for all participants, and it should get the right reflection from the demand and supply condition of the market. In Myanmar rice market, domestic rice price was controlled by using the tools of limited deficit border area marketing and monopolized rice export. Moreover, the state interfered in private rice trading to decrease rice price by using unwritten rules of local authorities. These attempts should be released to get the correct price signal for all participants of the marketing system.

The government should pay attention to build up the information system of price and to create more transparent traded volume of rice market in Myanmar. Transparent markets can ensure traders to have complete and timely knowledge of quality, quantity and price information of commodities. Therefore, private or public organizations should put effort to record the volume of trade flow in each administrative regions and transportation cost of the spatial trade for every region regularly for the long time.

In addition, public or private institution would promote competitive structure with the standard marketing laws and regulations such as the quality control or grading system, standard measurement system and so on. Besides, there is a need to provide market information which is sufficiently accurate and sensitive to the need of market participants to make the entire market system work better.

9.3.2 Conducts of the Myanmar Rice Market for Future Perspective

The potential offered by market reform during the present government period, conducts and behaviours of market participants were generally in competitive composition. However, paddy farmers were cultivating with low rate of input and labour intensive because of their low capital investment. If the state provides more formal credit to practically cover the cost of production as well as marketing functions, paddy production and marketing activities of the farmer level will be much efficient for long-standing prospect of farmer profit share of consumer price.

For the conduct of the market intermediaries, rice millers and wholesalers in particular, were expecting the domestic rice market to be really free and waiting for the private rice export permission from the government. In Myanmar, it was very essentially required that much more mutual trust between state and private sector. The government intervention in markets generally exists in almost every country but means are different. In the view of guaranteeing highly efficient market, the best way is through imports, exports and storage to adjust commodity supply as to adjust indirect market price.

The development of infrastructure by the state plays a significant role in the conducts of market participants which led to the lower marketing costs and margins to be more efficient marketing system. It should be continued by public institution in the future rice marketing system. Market participants should have access not only to telephone communication but also to other advanced communication systems such as fax and electronic mail to convey price information to each other and for getting current international rice market condition and price information. Besides, both private and public institutions need to provide credit to marketing agents in order to facilitate procurement operations, storage activities and investment in processing and transportation.

9.3.3 Performance of the Myanmar Rice Market for Future Perspective

Based on the results of this study, the performance of the rice marketing system is concerned with market integration and price causality. The government should give attention to manage the inflationary pressure instead of direct involvement in the rice marketing sector to control the domestic rice price stability in the long run.

According to the price causality analysis, Mandalay, Yangon and deficit markets could be used as main object markets which determined price changes in Myanmar. Policy makers and market participants should pay attention to the fact that originated rice price in Myanmar is pulling inflation to the demand side. Also, supply side of the rice market should be given less pressure by the state for the bilateral price causality to be more balanced rice price formation in both sides of market mechanism.

As the conceptual background of this study, the overall performance of rice market in the long run is affected not only by the direct link of marketing system but also the microeconomic policies. The inflation problem became serious as a result of the macroeconomic imbalance during the study period. The rice prices changed from time to time including inflation, and this signal went to market participants, farmers, and finally to consumers. This price and integration may not be right signal for the government as well. Therefore, policy makers should consider the inflation effect on the rice market very carefully when new policy is implemented on the rice marketing in Myanmar.

More generally, it is clear that future growth in the rice sector depends on the export. The export oriented strategy should be consistent with food security and with small holder paddy production. Myanmar government's concern was that the liberalizing rice export would create food insecurity and would raise rice price for urban poor consumer. However, the result of the government monopoly in rice export has been the segmentation of domestic market and international markets. Myanmar rice market could not get the correct price signal from the international market. The state should concern seriously that price signal from the international rice market is very important for the farmers and market participants, and therefore, the state allow the international rice price signal to reach the farmers and market participants by releasing private rice export.

Moreover, the overvalued exchange rate; agricultural discouraged the agricultural exporters. Therefore, macroeconomic policies should be monitored with real exchange rate appreciation further reducing the difference between domestic and foreign inflation rates. Exchange rate depreciation and macroeconomic stabilization could reduce the high inflation rate.

Nevertheless, if the private rice export is allowed through the trade policies, the marketing system would transfer price signal from the world market to the producer,

consumer, market participants and finally the government. Then, Myanmar rice market will be no longer isolated from the international market and getting the right price cointegration that may push faster to go on the efficient market oriented economy as a whole.

The government of Myanmar was taking steps to go to the market oriented economy. In 2003, paddy procurement and rice rationing system were abolished. In addition, the monopolized export was relaxed; these were positive steps for the rice marketing efficiency and performance for future perspective in Myanmar. Nevertheless, it is still has no credibility of policy announcement and it a lack transparency. Therefore, successful market reform needs not only liberalization but also supporting market information, research and extension and developing the legal and financial infrastructure, which required promoting performance of competitive rice market in Myanmar.

9.4 Limitations and Suggestions for Future Research

The present study has a number of limitations in terms of data and scope of the work. These limitations offer areas where further research could be of substantial value. The suggestions made here are intended for the benefit of individuals considering the possibility of pursuing further investigation of the performance of agricultural product markets using methodology similar to the one used in this study.

The study used weekly price data for nominal price series, but for real value, only monthly CPI was available. Therefore, monthly real price data was used for analysis of price integration and causal relations. As data frequency is reduced, the result increasingly reflects contemporaneous adjustment instead of dynamic adjustment. Considering this, the use of weekly real price data would have been most appropriate in evaluating the real value price response relationships. In this study, seasonal pattern of arbitrage efficiency could not be evaluated because of limited number of observations resulting from monthly data series. If weekly data were available, the arbitrage relation analysis for the three distinct seasons, viz. peak-season, post-season and pre-season could be done.

There are possible to expand the investigation of Myanmar rice price data in other ways. The present study has considered only 10 market pairs in assessing the performance of rice market system. It is equally important to see market linkages involving supply of the paddy from the farmers to the rural-based consumer markets, and the linkages between farm and mill level markets in a particular region. Finally, much more complete picture could be obtained by using multivariate framework which can provide statistically more robust results and distinguish the different types of common trends and periodicities in the price data.

REFERENCES

- Akaiki, H. 1969.** Fitting autoregressive models for prediction. *Annals of the Institute of Statistical Mathematics* 21 (2): 243-248.
- Alexander, C., and J. Wyeth. 1994.** Cointegration and Market Integration: An Application to the Indonesian Rice Market. *Journal of Development Studies* 30(2): 303-28.
- Alexander, C., and J. Wyeth. 1995.** Seasonal Price Movements and Unit Roots in Indonesian Rice Market Integration: University of Sussex Discussion paper in Economics No.01/95
- Arshad, F. M. 1990.** The Integration of Palm Oil Market in Peninsular Malaysia. *Indian Journal of Agricultural Economics* 45(1): 21-30.
- Bain, J. S. 1951.** Relation of Profit rate to Industrial Concentration: American Manufacturing 1936-40. *Quarterly Journal of Economics* 65: 293-324.
- Bain, J. S. 1956.** Barriers to New Competition. Cambridge: Harvard University Press.
- Bain, J. S. 1959.** Industrial Organisation. New York: Wiley.
- Bardhan, P. 1989.** Alternative Approaches to the Theory of Institutions in Economic Development. In P. Bardhan (ed.), *The Economic Theory of Agrarian Institution*. Oxford: Oxford University Press, 3-17.
- Barrett, C.B. 1996.** Market analysis methods: Are our empirical toolkits well suited to enlivened markets? *American Journal of Agricultural Economics* 78: 825-829.
- Barrett, C.B., and J.tr Li. 2002.** Distinguishing between equilibrium and integration in spatial price analysis. *American Journal of Agricultural Economics* 84:292-307.
- Bateman, D. I. 1976.** Agricultural Marketing: A Review of the Literature of Marketing Theory and of Selected Applications. *Journal of Agricultural Economics* 27 (2): 171-226.
- Baulch, R. J. 1997.** Transfer Costs, Spatial Arbitrage, and Testing for Food Market Integration. *American Journal of Agricultural Economic* 79: 477-87.
- Baulch, R. J. 1994.** Spatial Equilibrium and Food Market Integration. Ph.D. Dissertation, Stanford University.
- Benischka, M., and J. K. Binkley. 1995.** Optimal Storage and marketing over Space and Time. *American Journal of Agricultural Economics* pp. 512-24.

- Bessler, D. A., and J. A. Brandt. 1982.** Causality Tests in Livestock Markets. *American Journal of Agricultural Economics* 64: 140-44.
- Breimyer, H. F. 1976.** *Economics of Product Markets of Agriculture*. Iowa: Iowa State University.
- Bressler, R. G., and R. A. King. 1970.** *Markets, price, and interregional trade*. John Wiley & Sons, Inc. New York.
- Bressler, R. G., and R. A. King. 1978.** *Markets, Prices and International Trade*, John Wiley & Sons, Inc. New York.
- Cheung, S. N. S. 1987.** Economic Organisation and Transaction Costs. In J. Eatwell, M. Milgate and P. Newman (eds.), *The New Palgrave: A Dictionary of Economics*, Vol. I pp. 55-7. London: Macmillan.
- Coase, R. 1937.** The Nature of the Firm. *Economica* 4: 386-405.
- CSO (Central Statistical Organization). 2001.** Myanmar Agricultural Statistics (1989-90 to 1999-2000). Central Statistical Organization, Ministry of Economic Development in collaboration with department of Agricultural Planning, MOAI, Yangon, Myanmar.
- CSO (Central Statistical Organization). 1994-2004.** Statistical Yearbook Various Issues. Yangon, Myanmar.
- CSO (Central Statistical Organization). 2001-2004.** Selected Monthly Economic Indicators Various Issues. Yangon, Myanmar.
- DAP (Department of Agricultural Planning), MOAI (Ministry of Agriculture and Irrigation). 2003.** Myanmar Agriculture at a Glance 2003. Ministry of Agriculture and Irrigation, Yangon, Myanmar.
- Delgado, C. 1986.** A variance component approach to food grain market integration in northern Nigeria. *American Journal of Agricultural Economics* 68: 970-979.
- Dercon, S. 1995.** On Market Integration and Liberalisation: Methods and Application to Ethiopia. *Journal of Development Studies* 32(1): 112-143.
- Dickey, D. A., and W. A. Fuller. 1979.** Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of American Statistical Association* 74: 427-432.

- Dixie, G. 1989.** Horticultural Marketing: A Resource And Training Manual For Extension Officers, FAO Agricultural Services Bulletin 76, Food and Agricultural Organization of the United Nations, Rome, pp. 1–5.
- Dornbusch, R., S. Fisher, and P. A. Samuelson. 1977.** Comparative Advantage, Trade, and Payments in a Ricardian Model with a Continuum of Goods. *American Journal of Agricultural Economics* 67(5): 823-39.
- Engle, R., and C.W.J. Granger. 1987.** Co-integration and error correction: representation estimation, and testing. *Econometrica* 55, 251-276.
- Fackler, P. 1996.** Spatial price analysis: A methodological review. Mimeo. North Carolina State University.
- Fackler, P. L., and B. K. Goodwin. 2001.** Spatial price analysis. *Handbook of Agricultural Economics*. Pp: 971-1024. B.L. Gardner and G. C. Rausser, eds. Amsterdam: Elsevier Science.
- Faminow, M. D., and B. Benson. 1990.** Integration of spatial markets. *American Journal of Agricultural Economics* 72: 49-62.
- FAO. 2004.** Rice and Us. Food and Agriculture Organization of the United Nations, Rome, Italy.
- FAO online database FAOSTAT. 2006.** Food and Agriculture Organization of the United Nations,
<http://faostat.fao.org/faostat/collections?version=ext&hasbulk=0&subset=agriculture>
- Ferguson, P. R. 1988.** *Industrial Economics: Issues and Perspectives*. Hong Kong: Macmillan.
- French, B. C. 1977.** The Analysis of Productive Efficiency in Agricultural Marketing: Models, Methods and Progress. In L. R. Martin (ed.), *A Survey of Agricultural Economics Literature* Volume 1. Minneapolis: University of Minnesota Press, 93-206.
- Gardner, B. 1975.** The Farm Retail Price in a Competitive Industry. *American Journal of Agricultural Economics* 57:399-409.

- Geweke, J. 1984.** Inferences and Causality in Economic Time Series Models. In Griliches, Z. and Intriligator, M. D. (eds.), *Handbook of Econometrics, Volume II*. Amsterdam: North-Holland.
- Goldin, Ian, and Odin Knudsen. 1990.** Agricultural trade liberalization. Organization for Economic Co-operation and Development, Paris.
- Goletti, Francesco, and Nicholas Minot. 1997.** Rice Markets, Agricultural Growth, and Policy Options in Vietnam. MSSD Discussion Paper no.14, International Food Policy Research Institute, USA.
- Goodwin, B. K., and T. C. Schroeder. 1991.** Cointegration tests and spatial price linkages in regional cattle markets. *American Journal of Agricultural Economics* 73:452-64.
- Goodwin, B. K., and N. E. Piggott. 2001.** Spatial Market Integration in the Presence of Threshold Effects. *American Journal of Agricultural Economics* Vol. 83 (2), 302-317.
- Granger, C. W. J. 1969.** Investigating Causal Relationship by Econometric Models and Cross Spectral Methods. *Econometrica* 37: 424-438.
- Granger, C. W. J. 1981.** Some Properties of Time Series Data and their Use in Econometric Model Specification. *Journal of Econometrics* 16: 121-30.
- Granger, C. W. J. 1988.** Some Recent Developments in a Concept of Causality. *Journal of Econometrics* 39: 199-211.
- Granger, C.W.J. 1988.** Causality, cointegration and control. *Journal of Economic Dynamics and Control* 2, 329-352.
- Greenwood, M. S., and M. J. Carter. 1997.** *Business Economics: Concepts and Cases*. London: International Thomson Business Press.
- Gupta, S, and R. A. G. Muller. 1982.** Analysing the Pricing Efficiency in Spatial Markets: Concepts and Application. *European Review of Agricultural Economics* 9: 301-12.
- Guvheya, G., E. Mabaya, and R. D. Christy. 1998.** Horticultural Marketing in Zimbabwe: Margins, Price Transmission and Spatial Market Integration. 57th European Association of Agricultural Economists Seminar, Wageningen, The Netherlands, September 23-26.

- Harriss, B. 1979.** There is method in my madness: Or is it vice versa? Measuring agricultural market performance. *Food Research institute Studies* 17: 179-218.
- Haugh, L. D. 1976.** Checking the Independence of two Covariance Stationary Time Series: A Univariate Residual Cross Correlation Approach. *Journal of American Statistical Association* 71: 378-85.
- Helmberger, P. G., G. R., Campbell, and W. D. Dobson. 1981.** Organisation and Performance of Agricultural Markets. In L. R. Martin (ed.), *A Survey of Agricultural Economics Literature Volume 3*. Minneapolis: University of Minnesota Press, 503-652.
- Heytens, P. J. 1986.** Testing Market Integration. *Food Research Institute Studies* 20: 25-41.
- Holmes, J. M., and P. A. Hutton. 1990.** On the Causal Relationship between Government Expenditures and National Income. *Review of Economics and Statistics* 72: 87-95.
- Hossain, Mahabub, and Marlar Oo. 1995.** "Myanmar Rice Economy: Policies, performances and prospects." Workshops on Projections and Policy Implications of Medium and Long-Term Rice Supply and Demand Project, Beijing, China.
- Horowitz, I. 1981.** Market Definition in Antitrust Analysis: A Regression-Based Approach. *Southern Economics Journal* 48: 1-16.
- Hubbard, M. 1997.** The New Industrial Economics in Agricultural Development: Insights and Challenges. *Journal of Agricultural Economics* 48(2): 239-249.
- Isard, W. 1990.** The General Theory of Location and Space-Economy,' in *Location Analysis and General Theory*. London, p28.
- Jaeger, W., and C. Humphreys. 1988.** The effect of policy reforms on agricultural incentives in Sub-Saharan Africa. *American Journal of Agricultural Economics*, 70: 1036-1043.
- Johansen, S. 1988.** Statistical Analysis of Cointegrated Vectors. *Journal of Economic Dynamics and Control* 12: 231-54.
- Jones, S. 1995.** Food Market Reform: the Changing Role of the State. *Food Policy* 20(6): 551-60.

- Kherallah, Mylenee, Christopher Delgado, Eleni Gabre-Madhin, Nicholas Minot and Michael Johnson. 2002.** Reforming Agricultural Markets in Africa, Baltimore and London: The Jones Hopkins University Press
- Koch, J.V. 1980.** Industrial Organisation and Prices. New Jersey: Prentice Hall.
- Kohls, R. L., and J. N. Uhl. 1980.** Marketing of Agricultural Products. 6th ed., New York; Macmillan Publishing Company. p 213.
- Kohls, R. L., and J. N. Uhl. 1990.** Marketing of Agricultural Products. London: Macmillan.
- Kriesberg, M. 1974.** Marketing Efficiency In Developing Countries. In: Marketing Systems for Developing Countries. (Eds.) Izraeli, D., Izraeli, D. and Dafna.
- Kuyvenhoven, A., H., A.J. Moll, and A. Van Tilburg. 2000.** Agricultural market beyond liberalization: Issues, Analysis and Findings. Kluwer Academic Publishers, U.S.A.
- Kyaw Myint. 1999.** Study on the changes of rice production in Myanmar, Myanma Agriculture Service, Yangon, Myanmar.
- Lele, U. J. 1971.** Food grain Marketing in India: Private Performance and Public Policy. Ithaca, Cornell University Press.
- MacKinnon, J. G. 1990.** Critical Values for Cointegration Tests. Department of Economics, Queen's University, Canada, Mimeo.
- Mann, H. M. 1966.** Seller Concentration, Barriers to Entry, and Rates of Return in Thirty Industries, 1950-60. Review of Economics and Statistics 48: 296-307.
- MAPT (Myanma Agricultural Produce Trading). 2003.** History of rice marketing in Myanmar (Myanmar version). Ministry of Commerce, Yangon, Myanmar.
- MAPT (Myanma Agricultural Produce Trading). 2004.** History of rice marketing in Myanmar (English version). Ministry of Commerce, Yangon, Myanmar.
- Marion, B. W. 1985.** The Organisation and Performance of the U.S. Food System. Massachusetts: Lexington.
- MIS (Market Information Service) Project. TCP/ MYA/ 882 -2000.** Agricultural Marketing in Myanmar. Department of Agricultural Planning, Ministry of Agriculture and Irrigation, Yangon.

- MIS (Market Information Service) Project. 2005.** Domestic and International Agricultural Commodity Price Information (in Myanmar language). Department of Agricultural Planning, Ministry of Agriculture and Irrigation, Yangon.
- Market Research, and Planning Cell. 1985.** Marketing Cost and Margins of Major Agricultural Commodities in India. A report by the Directorate of Marketing and Inspection; Ministry of Rural Development: Government of India, Faridabad.
- MAS (Myanmar Agriculture Service). 2002.** Information on Myanmar agriculture, 2002. Department of Agricultural Planning, Yangon, Myanmar (Unpublished).
- McFetridge, D. G. 1994.** The Economics of Vertical Integration. *Canadian Journal of Agricultural Economics* 42: 525-31.
- Mcnew, K. (1996).** Spatial market integration: Definition, Theory, and Evidence. *Agricultural Resource Economics Review* 25: 1-11.
- Mcnew, K., and P. L. Fackler. 1997.** Testing market equilibrium: Is cointegration informative? *Journal of Agricultural Resource Economics* 22:191-207.
- Mendoza, M. S., and M. W. Rosegrant. 1995.** Pricing Behaviour in Philippine Corn Markets: Implications for Market efficiency. Research Report 101, International Food Policy Research Institute, Washington, D.C.
- Miah, Md. Abdul Quader. 1993.** Applied statistics. HSD, AIT, p.369-370
- Minot, N. 2000.** Rice market liberalization and poverty in Viet Nam. International Food Policy Research Institute, Washington, D.C. Research Paper no. 114.
- MOAI (Ministry of Agriculture and Irrigation). 1998.** Agriculture, Food and Nutrition Situation in Myanmar 1998. Yangon, Myanmar.
- MOAI (Ministry of Agriculture and Irrigation). 2005.** Myanmar Agriculture at a glance 2005. Department of Agricultural planning, Yangon, Myanmar.
- Nay Myo Aung. 2005.** Evaluation of Pricing Policy in Myanmar Rice Economy. Laboratory of Agricultural and Development Economics, Department of Agricultural and Resource Economics, Graduate School of Agricultural and Life Science, The University of Tokyo.
- North, D. 1990.** Institutions, Institutional Change and Economic Performance. Cambridge: Cambridge University Press.

- Okamoto, Ikuko. 2004.** Agricultural Marketing Reform and Rural Economy in Myanmar The Successful Side of the Reform. Paper presented at the Parallel Session II, GDN the 5th Conference 28th jan.2004, Tokyo.
- Palaskas, T. B., and B. Harriss. 1993.** Testing Market Integration: New Approaches with Case Materials from West Bengal Food Economy. *Journal of Development Studies* 30(1): 1-57.
- Pearce D. W., and R. K. Turner. 1990.** Economics of natural resources environment. The Johns Hopkins University Press, Baltimore.
- Pindyck, R. S., and Rotemberg. 1990.** The excess comovement of commodity prices. *Economic journal* 100(403): 1173-1189.
- Platteau, J. P. 1994.** Behind the Market Stage where Real Societies Exist- Part I: The Role of Public and Private Order Institutions. *Journal of Development Studies* 30(3): 533-77.
- Ravallion, M. 1986.** Testing market integration. *American Journal of Agricultural Economics*. Vol.68: 102-109.
- Ravallion, M. 1987.** Markets and Famines. New York: Oxford University Press.
- Reekie, W. D. 1979.** *Industry, Prices and Markets*. Oxford: Philip Allan.
- Reid, G. C. 1987.** Theory of Industrial Organisation. Oxford: Basil Blackwell.
- Scherer, F. M. 1980.** Industrial Market Structure and Economic Performance. Boston: Houghton Mifflin.
- Settlement and Land Record Department, MOAI. 2001-2002.** Data Record of Office. 2001-2002. Ministry of Agriculture and Irrigation, Yangon, Myanmar.
- Sexton, R., Kling C. L., and H. F. Carman. 1991.** Market Integration, Efficiency of Arbitrage, and Imperfect Competition: Methodology and Application to U.S. Celery. *American Journal of Agricultural Economics* 73(3): 568-80.
- Sims, C. A. 1972.** Money, Income and Causality. *American Economic Review* 62: 540-52.
- Slade, M. E. 1986.** Exogeneity Tests of Market Boundaries Applied to Petroleum Products. *Journal of Industrial Economics* 3: 291-304.
- Spiller, P. T. and C. J. Huang. 1986.** On the Extent of the Market: Wholesale Gasoline in the Northern United States. *Journal of Industrial Economics* 35: 131-45.

- Spiller, P. T. and R. O. Wood. 1988.** The Estimation of Transportation Costs in Arbitrage Models. *Journal of Econometrics* 39: 309-26.
- Stigler, G.J. 1964.** A Theory of Oligopoly. *Journal of Political Economy* 72: 44-61.
- Takayama, T., and G.G.Judge. 1971.** Spatial and temporal price and allocation models. Amsterdam: North Holland.
- The Government of the Union of Myanmar. 2003.** New Rice Marketing Policy announce on 23. 04. 2003 (Myanmar version). Yangon, Myanmar.
- Timmer, C. P. 1987.** The Corn Economy of Indonesia. Ithaca: Cornell University Press.
- Timmer, C. P. 1989.** Food Price Policy: the Rationale for Government Intervention. *Food Policy* 14: 17-27.
- Tin Htut Oo and Kudo Toshihiro. 2003.** Agro-based Industry in Myanmar : Prospects and Challenges. Chiba: Institute of Developing Economies Japan External Trade Organization.
- Tomek, W. G. and K. L. Robinson. 1981.** Agricultural Product Prices. Ithaca. NY: Cornell University Press.
- Tomek, W. G., and K. L. Robinson. 1990.** Agricultural Product Prices. Ithaca. NY: Cornell University Press.
- Viaene, J., and X. Gellynck. 1995.** Structure, Conduct and Performance of the European Food Sector. *European Review of Agricultural Economics* 22 (3): 282-95.
- Weinschenk,G., W. Henrichsmeyer, and F. Aldinger. 1970.** The theory of spatial equilibrium and optimal location in agriculture: A survey. *Review of Marketing and Agricultural Economics*. Vol. 37 (1). pp 3-70.
- Williamson, O.E. 1975.** Markets and Hierarchies. New York: Free Press.
- World Bank. 2002.** World Development Report 2001. New York. Oxford University Press
- Wright, B. D. and J. C. Williams. 1982.** The Economic Role of Commodity Storage. *Economic Journal* 92: 596-614.
- Wu, D.M. 1983.** Tests of Causality, Predeterminedness, and Exogeneity. *International Economic Review* 24: 547-58.

APPENDICES

Appendix 1 Market exchange rate in 2001-2004 (Kyats/dollar)

Month	2001	2002	2003	2004
Jan.	442	720	1059	1000
Feb	480	741	1064	980
March	512	784	900	975
April	591	863	923	950
May	700	823	974	960
June	605	856	967	970
July	602	898	960	970
August	649	989	1020	975
Sept.	681	1164	975	975
Oct.	715	1136	1000	980
Nov.	732	1073	980	985
Dec.	728	1034	975	990

Source: Personal collection from various companies in Yangon, Myanmar

Appendix 2 Consumer Price Index in 2001-2004

Month	2001	2002	2003	2004
Jan.	149	228	366	412
Feb	151	232	373	403
March	156	240	370	400
April	161	253	391	400
May	169	267	393	403
June	180	278	396	406
July	186	292	400	411
August	196	307	403	415
Sept.	205	328	407	419
Oct.	210	339	409	423
Nov.	218	348	411	427
Dec.	224	352	413	429

Note: Base Year = 1997

Source: CSO (Central Statistical Organization), 2001-2004

Appendix 3 Paddy sown area, total production, population, utilization and self sufficiency in different regions (2003)

Sr.	State/Division	Sown Area (ha)	Harvested (ha)	Yield (t/ha)	Production (mt)	Population (1000)	Utilization (mt)				Balance (mt)	Sufficiency (%)
							Seed used	Waste	Consumpt.	Total		
1	Kachin State	166329	166266	3.14	522735	1392	17132	25781	417600	460513	62222	114
2	Kayah State	31793	31793	3.01	95791	299	3275	4928	89700	97903	-2111	98
3	Kayin State	194414	194414	2.94	571556	1607	20025	30134	482100	532259	39297	107
4	Chin State	44238	44238	1.97	87343	505	4557	6857	151500	162914	-75571	54
5	Sagaing Division	693674	693504	3.48	2412007	5769	71448	107519	1730700	1909668	502339	126
6	Tanintharyi Division	123169	122217	3.31	403984	1484	12686	19091	445200	476978	-72993	85
7	Bago Division	1087554	1087348	3.46	3759043	5435	112018	168571	1630500	1911089	1847954	197
8	Magway Division	435902	244424	3.69	903127	4971	44898	67565	1491300	1603763	-700635	56
9	Mandalay Division	244832	314056	3.77	1184596	7392	25218	37949	2217600	2280767	-1096170	52
10	Mon State	324068	312199	3.40	1061960	2726	33379	50231	817800	901410	160550	118
11	Rakhine State	313632	394217	3.31	1303111	2974	32304	48613	892200	973117	329993	134
12	Yangon Division	394227	565791	3.35	1896710	6178	40605	61105	1853400	1955110	-58400	97
13	Shan State	448614	448596	3.51	1575482	5163	46207	69535	1548900	1664642	-89161	95
14	Ayeyarwady Div.	181224	1911465	3.85	7352366	7329	18666	28090	2198700	2245456	5106910	327
UNION		6545588	6530529	3.54	23129810	53225	674196	1014566	15967500	17656262	5473549	131

Note: All amounts are paddy equivalent, assumed seeding rate is 103 kg/ha (2 baskets/acre), waste is 155 kg/ha (3 baskets/acre), paddy consumption per capita is 300 kg/year (180 kg rice/cap) (average consumption rate of rural and urban)

Source: FAO online database (FAOSTAT), 2006, Statistical Year book various issues, CSO, Myanmar and Own estimation

Appendix 4 Total production, utilization, marketable surplus and procured paddy volume (1994-2003)

Year	Production (mt)	Population (1000)	Total Utilization (mt)				Marketable Surplus(mt)			Procurement (mt)
			Seed used	Waste	Consumption	Total	Export	Do. Stock/ Border trade	Total	
1994	18190451	43922	610626	918918	13176600	14706154	1414868	2069429	3484297	2029323
1995	17948589	44744	632427	951710	13423200	15007337	536061	2405191	2941252	1933826
1996	17671681	45565	605427	911080	13669500	15186007	139897	2345778	2485675	1521820
1997	16650054	46402	596068	896996	13920600	15413665	42879	1193511	1236390	1023788
1998	17073220	48160	593390	892966	14448000	15934356	182424	956440	1138864	219556
1999	20120769	49133	647510	974408	14739900	16361818	82302	3676649	3758951	220763
2000	21318286	50125	655247	986052	15037500	16678799	380909	4258578	4639487	212225
2001	21909805	51138	664728	1000319	15341400	17006447	1422879	3480479	4903358	211479
2002	21799592	52171	668559	1006084	15651300	17325944	1202272	3271376	4473648	211479
2003	23129810	53225	674196	1014566	15967500	17656262	587879	4885669	5473548	206174
Ave.	19581225	48458	634818	955310	14537550	16127679	599237	2854310	3453547	779043

Note: All amounts are paddy equivalent, assumed seeding rate is 103 kg/ha (2 baskets/acre), waste is 155 kg/ha (3 baskets/acre), consumption per capita is 300 kg/year (180 kg rice/year) (average consumption rate of rural and urban)

Source: FAO online database (FAOSTAT), 2006, Statistical Year book various issues, CSO, Myanmar and Own estimation

Appendix 5 Total utilization, marketable surplus and procurement percentage of total paddy production (1994-2003)

Year	Total Production	Total Utilization				Marketable Surplus			Procurement
		Seed	Waste	Consumption	Total	Export	Do. stock/ border trade	Total	
1994	100	3.36	5.05	72.44	80.85	7.78	11.38	19.15	11.16
1995	100	3.52	5.30	74.79	83.61	2.99	13.40	16.39	10.77
1996	100	3.43	5.16	77.35	85.93	0.79	13.27	14.07	8.61
1997	100	3.58	5.39	83.61	92.57	0.26	7.17	7.43	6.15
1998	100	3.48	5.23	84.62	93.33	1.07	5.60	6.67	1.29
1999	100	3.22	4.84	73.26	81.32	0.41	18.27	18.68	1.10
2000	100	3.07	4.63	70.54	78.24	1.79	19.98	21.76	1.00
2001	100	3.03	4.57	70.02	77.67	6.49	15.89	22.38	0.97
2002	100	3.07	4.62	71.80	79.48	5.52	15.01	20.52	0.97
2003	100	2.91	4.39	69.03	76.34	2.54	21.13	23.66	0.89
Average	100	3.27	4.92	74.75	82.93	2.96	14.11	17.07	4.29

Note: Assumed seeding rate is 103 kg/ha (2 baskets/acre), waste is 155 kg/ha (3 baskets/acre), Paddy consumption per capita is 300 kg/year (Average consumption rate of rural and urban)

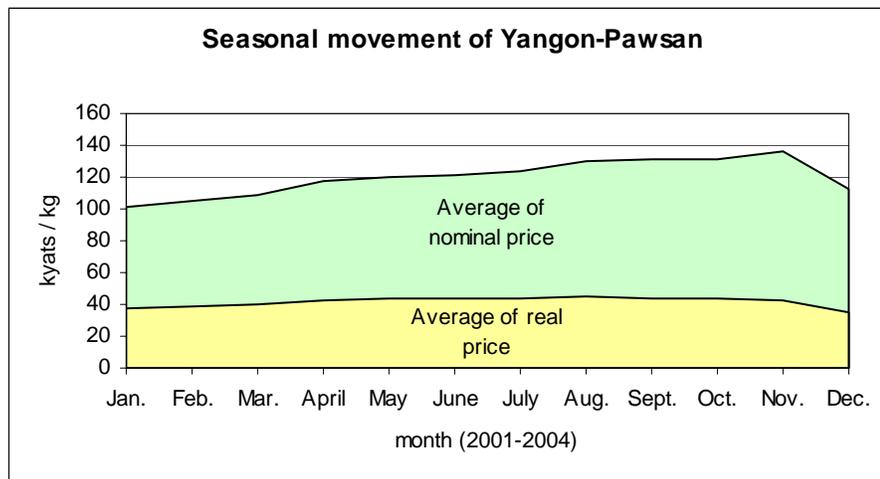
Source: FAO online database (FAOSTAT), 2006, Statistical Year book various issues, CSO, Myanmar and Own estimation

Appendix 6 Distance of highway road between selected pairs of rice markets

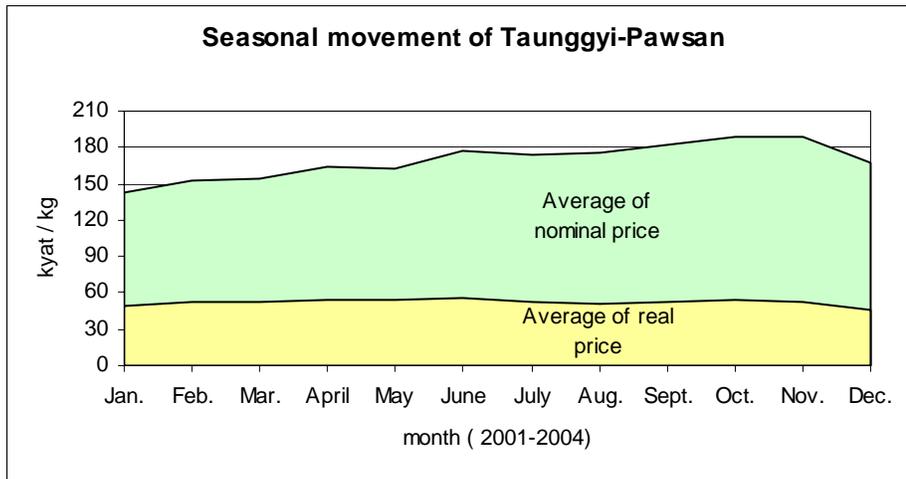
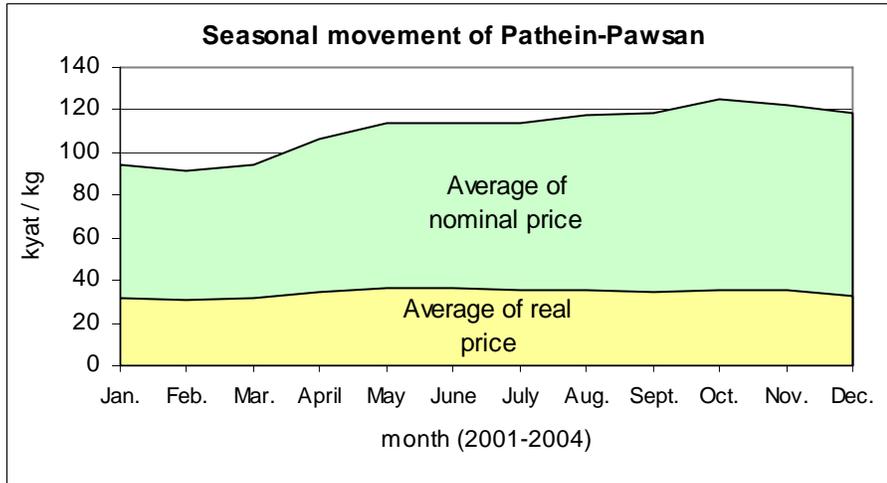
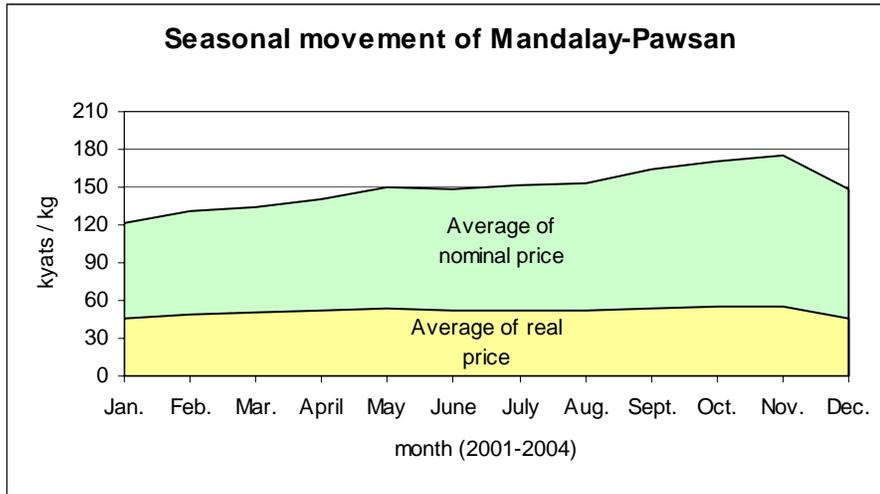
Pair of Selected Rice Markets	Miles
Yangon-Mandalay	552
Yangon-Pathein	130
Yangon-Taunggyi	454
Pathein-Mandalay	682
Pathein-Taunggyi	884
Mandalay-Taunggyi	210
Pyay-Taunggyi	394

Source: MAS (Myanma Agriculture Service), 2004

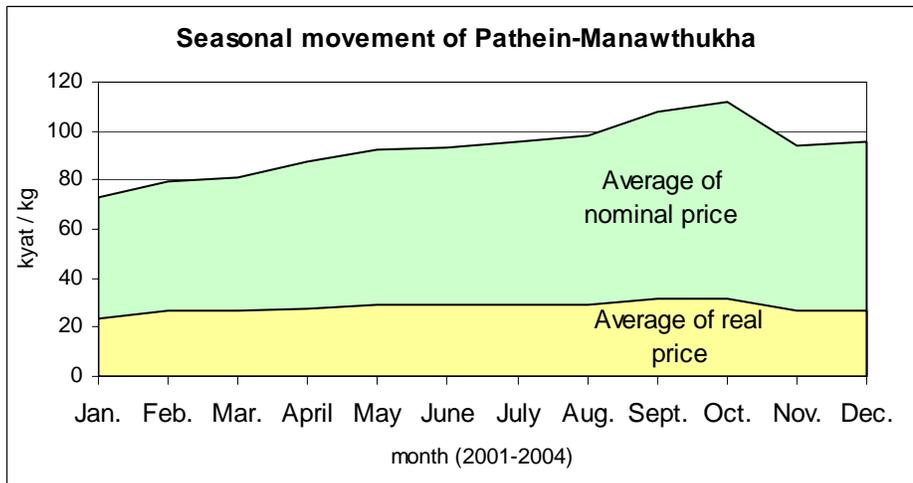
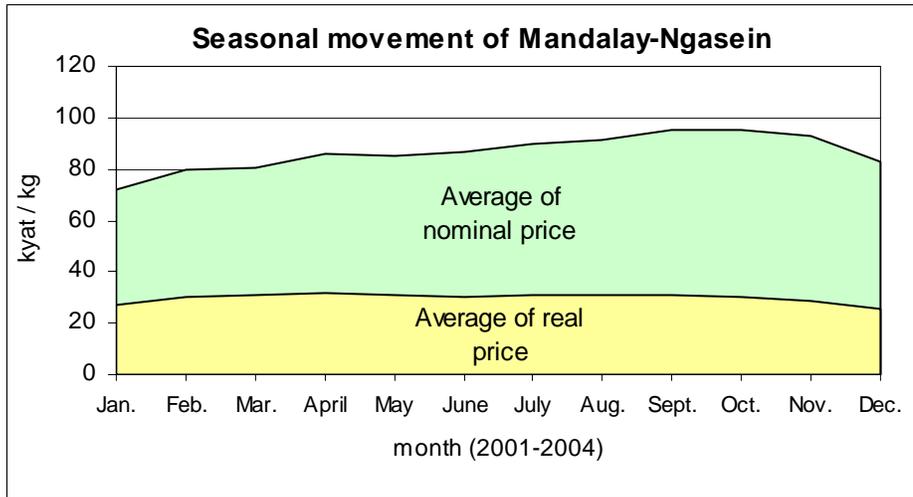
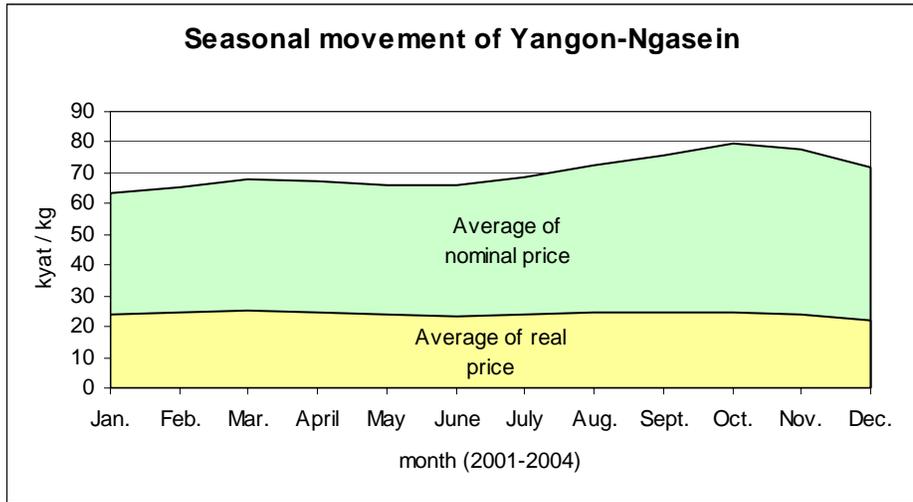
Appendix 7 Figures for seasonal movement of nominal and real price series in each selected rice market



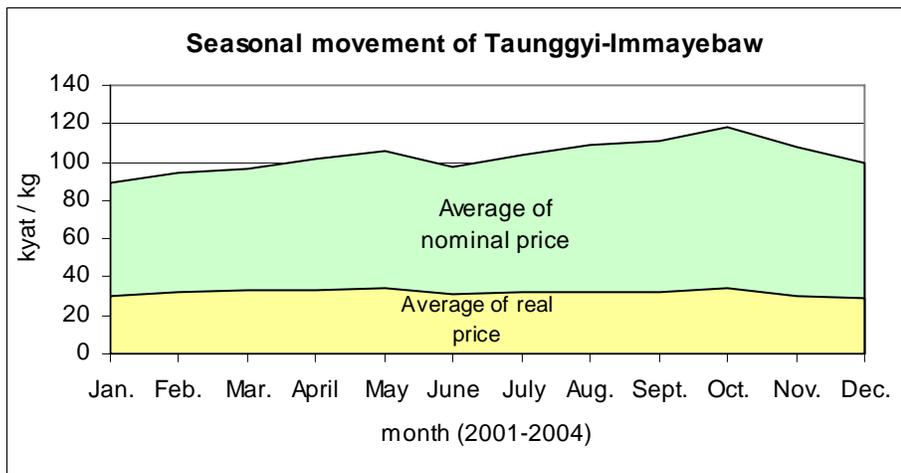
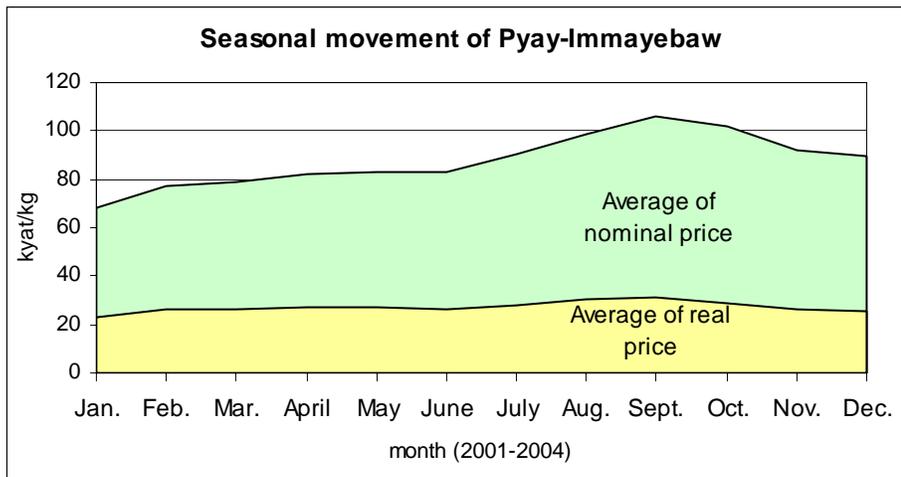
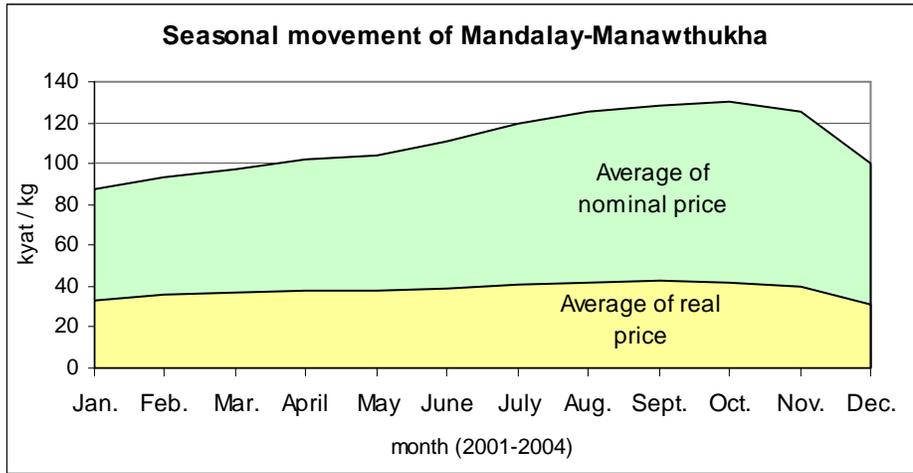
Appendix 7 continued



Appendix 7 continued

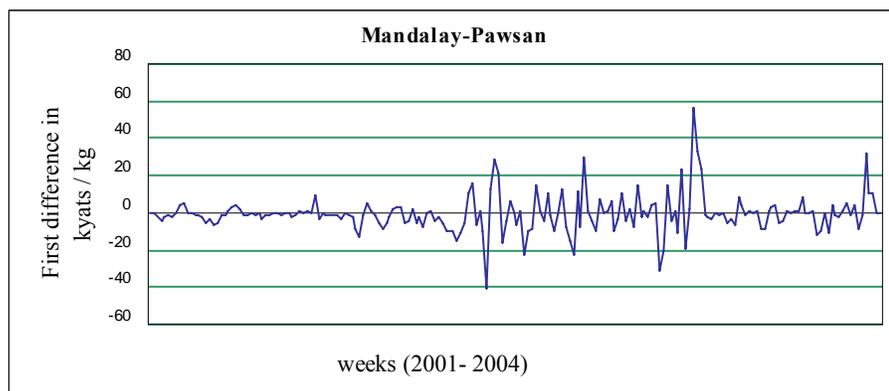
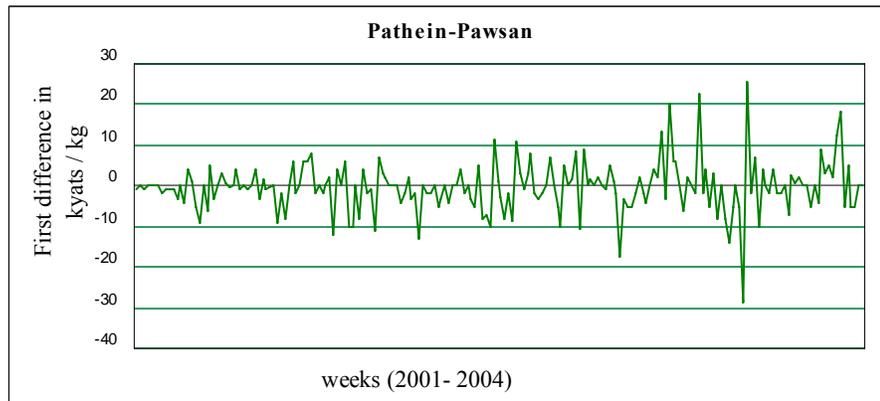
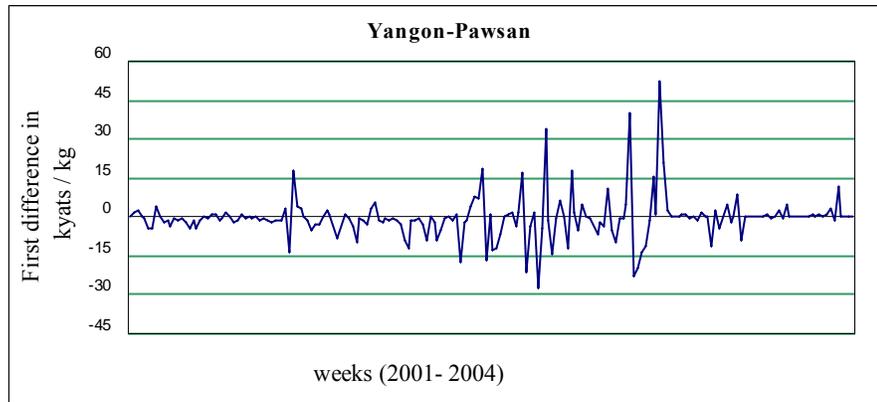


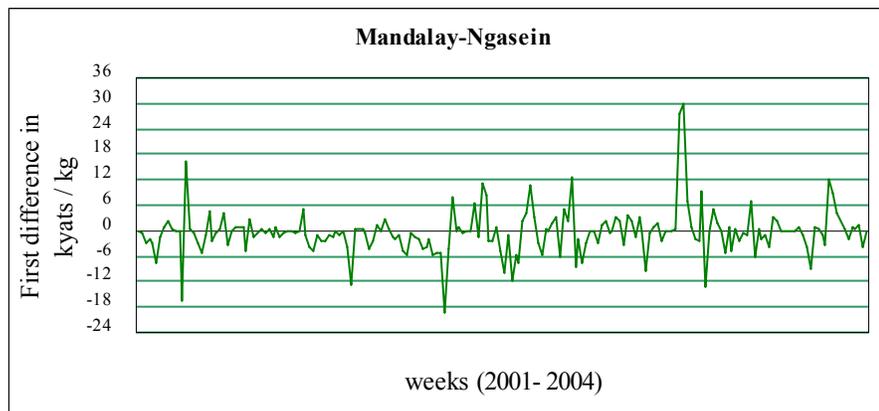
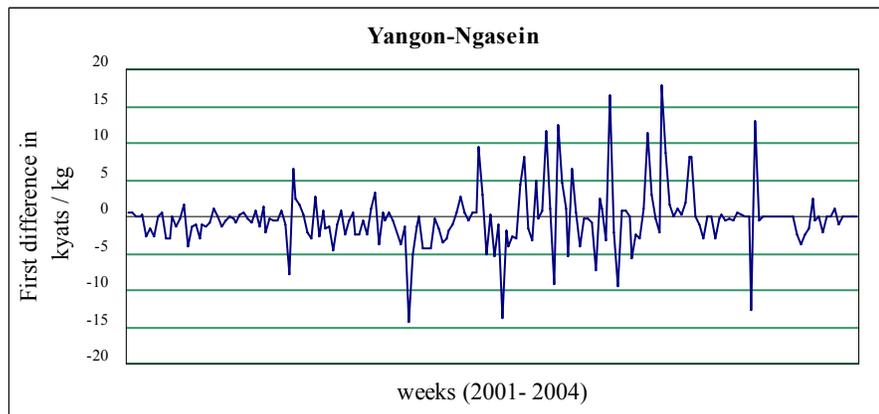
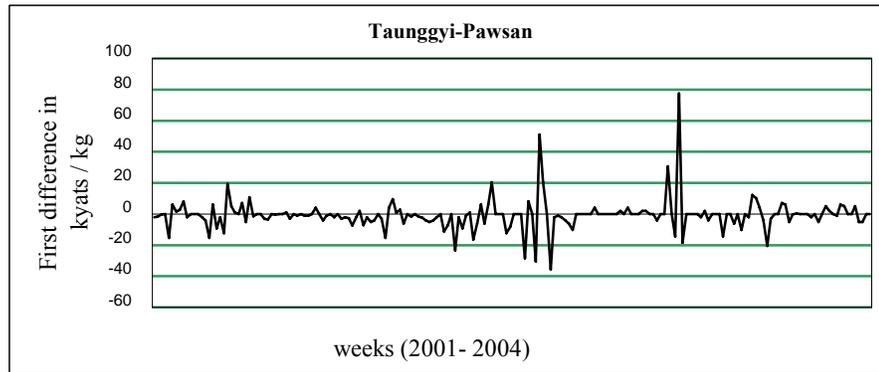
Appendix 7 continued

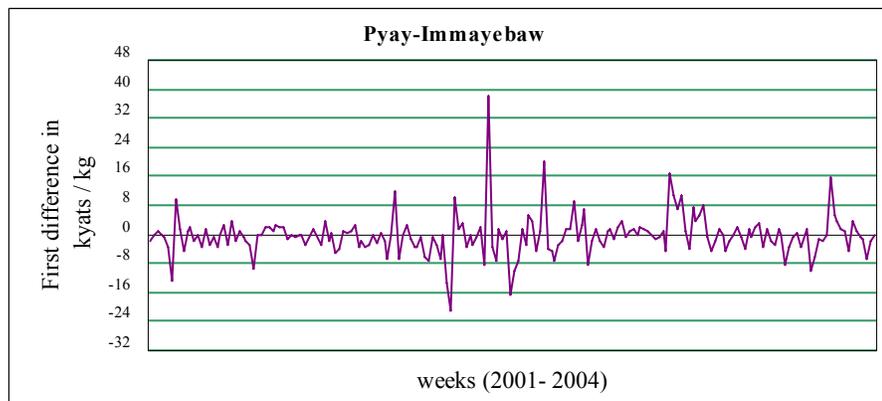
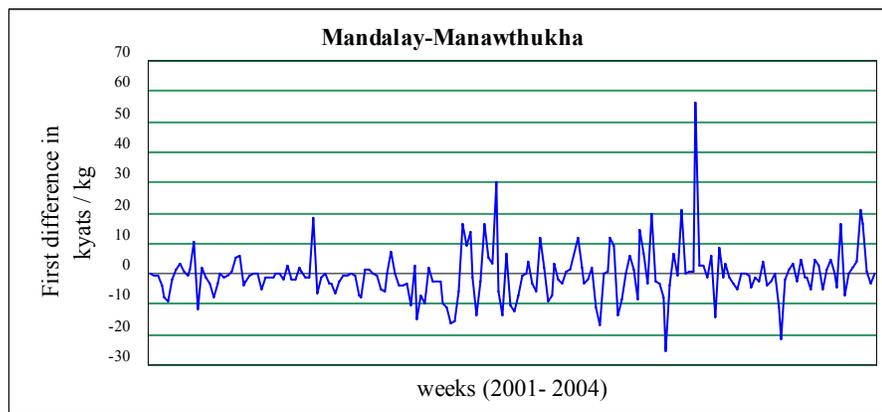
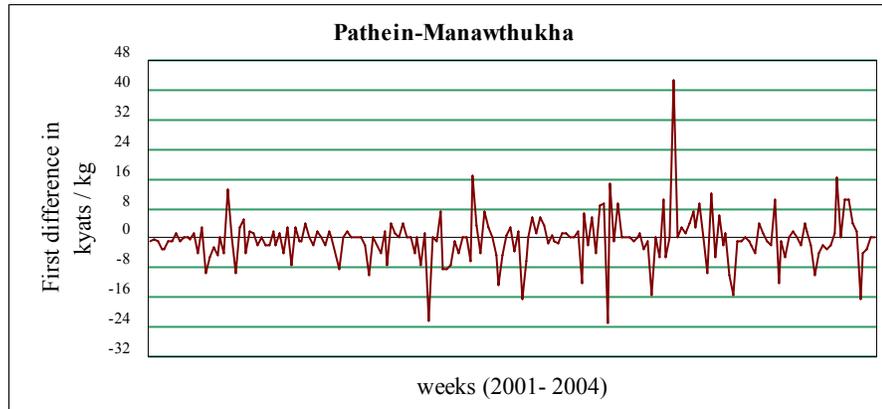


Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004.

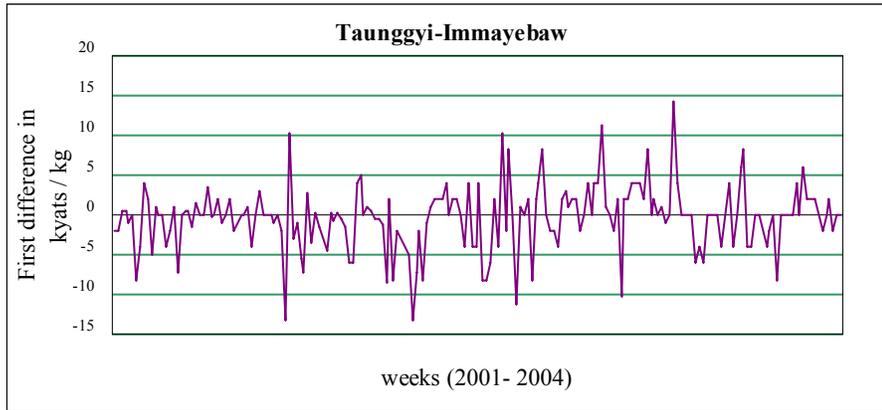
Appendix 8 Figures for first differences of weekly price series in selected rice markets (nominal value)



Appendix 8 continued

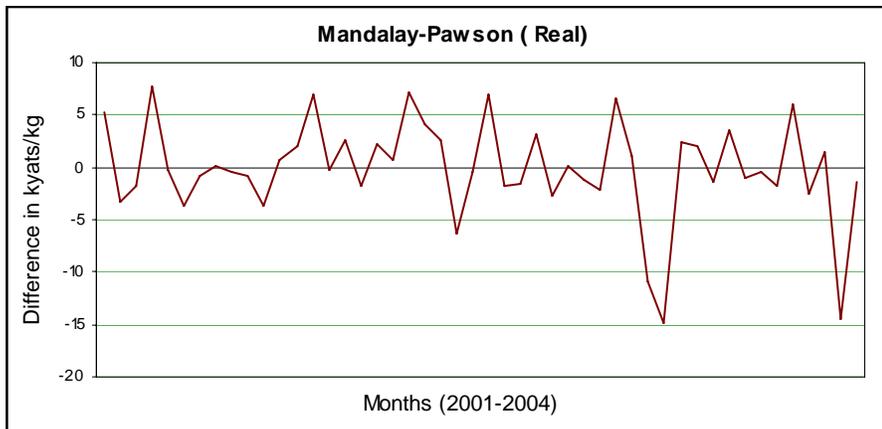
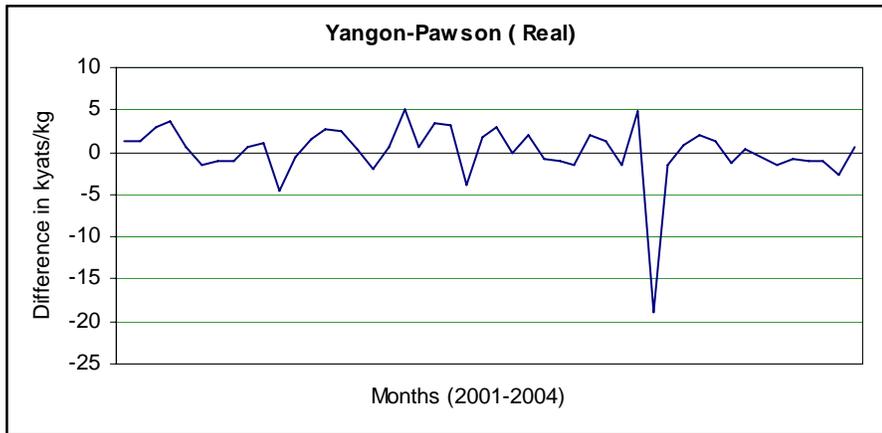
Appendix 8 continued

Appendix 8 continued

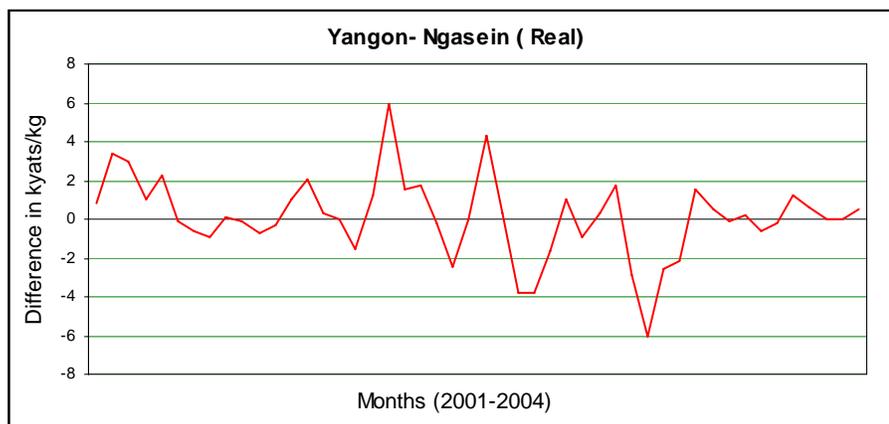
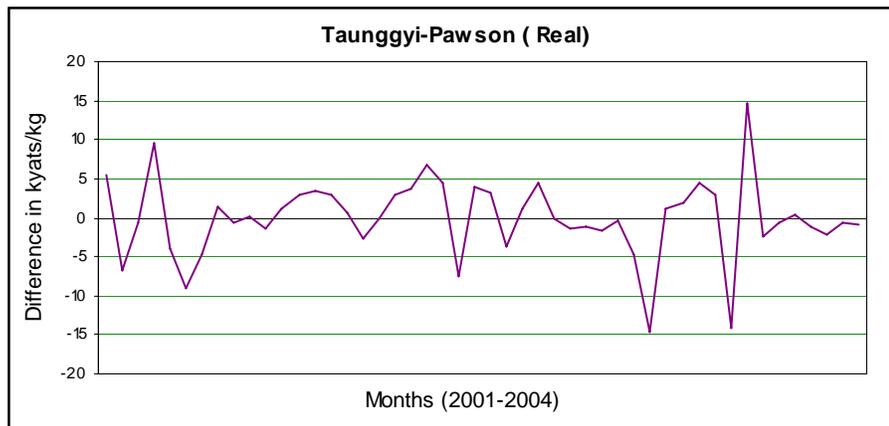
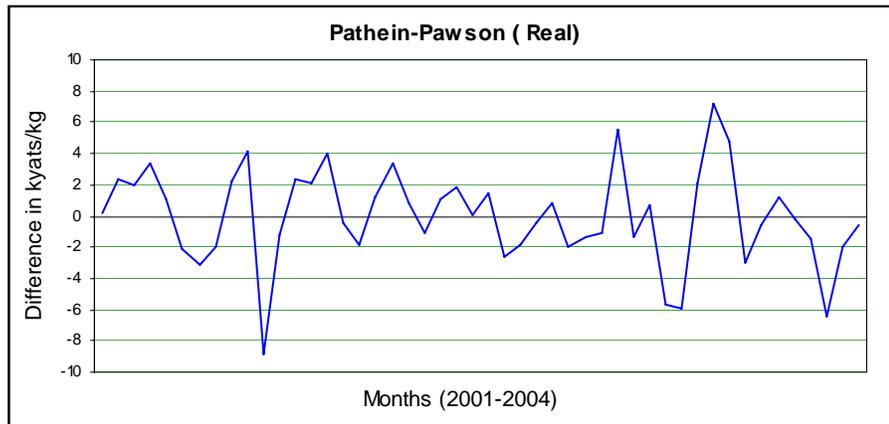


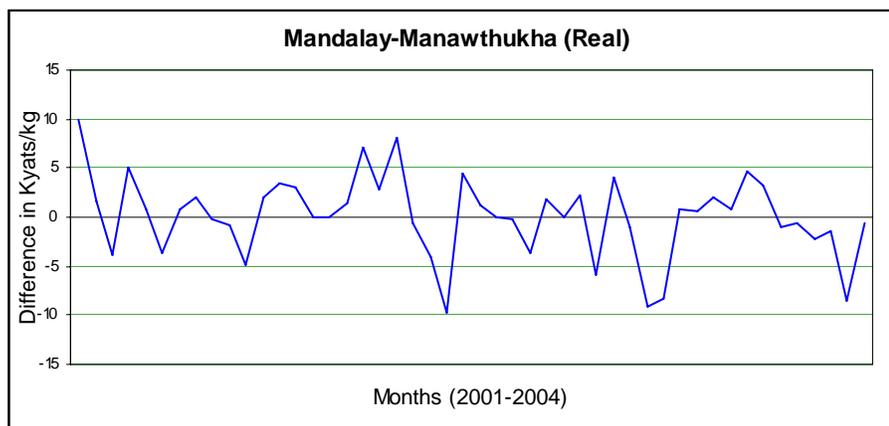
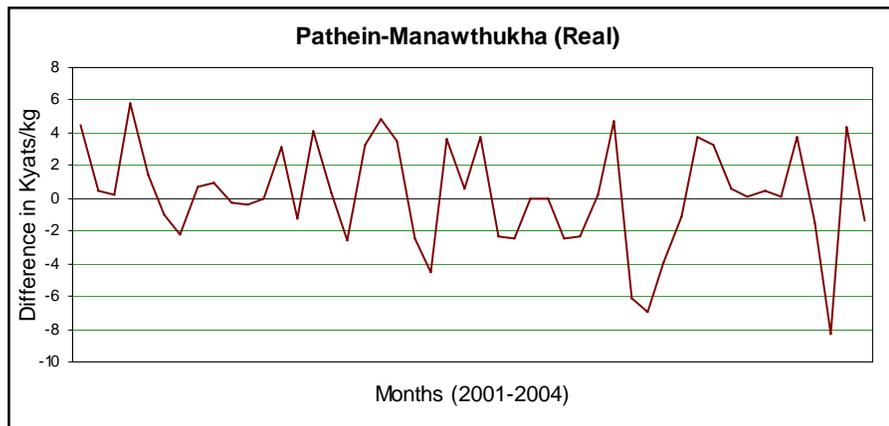
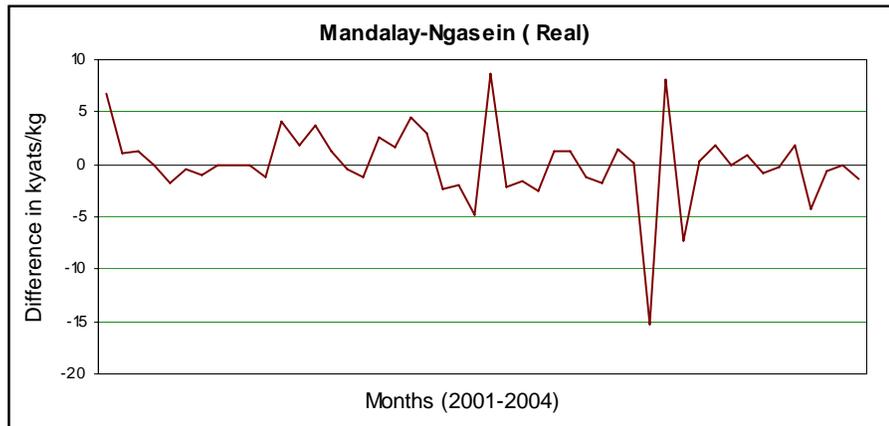
Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004.

Appendix 9 Figures for first differences of monthly price series in selected rice markets (real value)

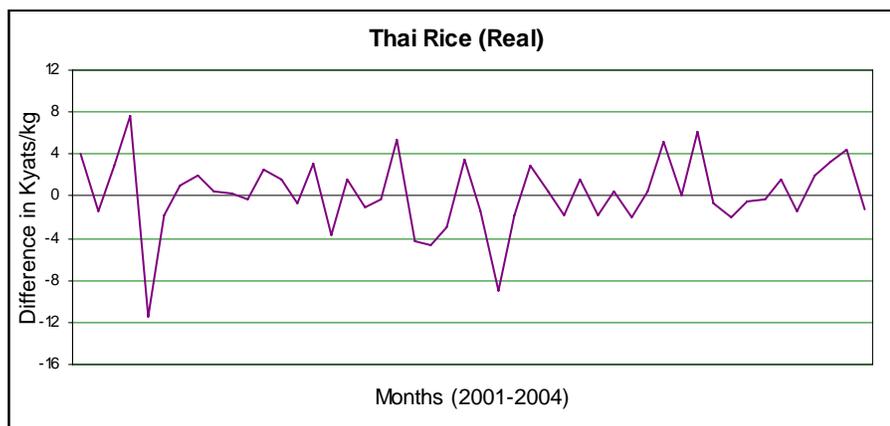
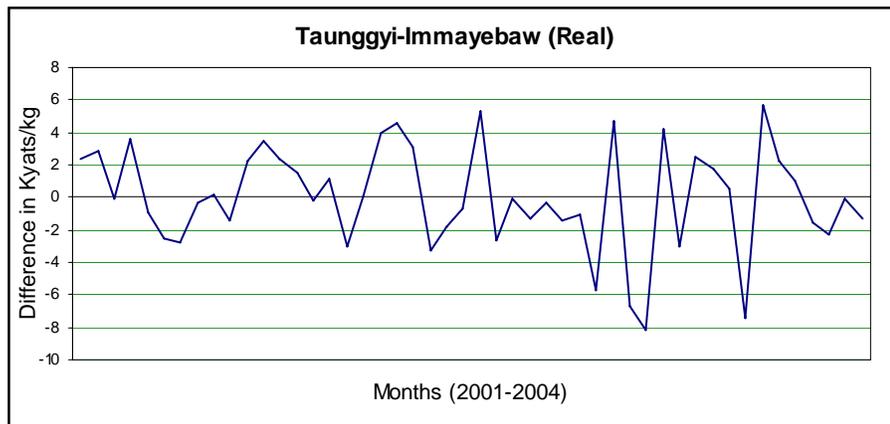
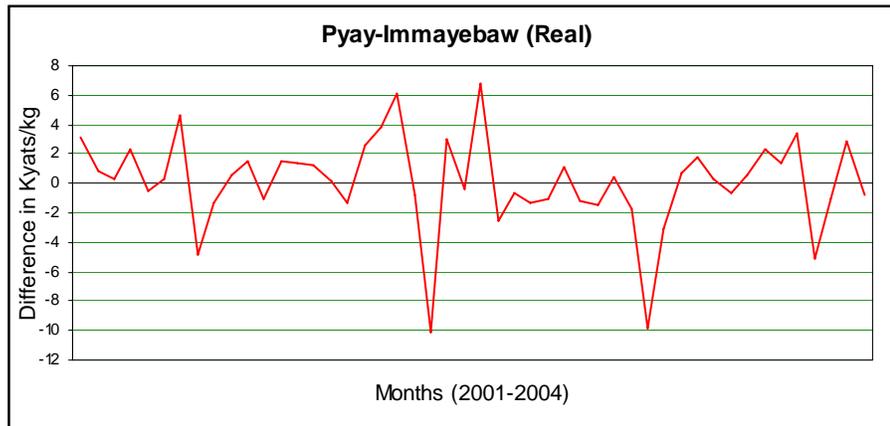


Appendix 9 continued



Appendix 9 continued

Appendix 9 continued



Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Monthly price series from January 2001 to December 2004. Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.

Appendix 10 Important statistical results of cointegration regressions (nominal price series)

Pairs of Price series (Nominal Value)	Co-inte. Vector	Trend	Coef. of residual	Std. error	ADF <i>t-stat.</i>	R ²	Durbin-Watson Stat.	F-value
<u>Pawson</u>								
Yongon.-Pathein	-0.4139	0.5132	-1.5295	0.1707	-8.9575***	0.57	1.99	59.72
Pathein-Yongon	-0.1866	0.3262	-0.8639	0.1574	-5.4875***	0.53	1.99	51.14
Yangon-Mdy.	-0.1518	0.7101	-1.3535	0.1599	-8.4628***	0.53	1.97	51.82
Mdy.-Yangon	0.0222	0.5145	-1.0741	0.1627	-6.6009***	0.46	1.99	39.39
Yangon-Tgy.	-0.0124	0.6964	-1.3858	0.1614	-8.5830***	0.54	1.98	52.47
Tgy.-Yangon	-0.0239	0.4765	-1.3994	0.1891	-7.3972***	0.55	1.99	50.32
Pathein-Mdy.	0.0410	0.4778	-0.7638	0.1452	-5.2573***	0.51	1.99	47.09
Mdy.-Pathein	0.1332	0.5598	-1.0466	0.1607	-6.5092***	0.46	1.99	38.68
Pathein-Tgy.	0.0008	0.4578	-0.7914	0.1479	-5.3482***	0.52	1.99	48.16
Tgy.-Pathein	0.0037	0.4951	-1.3884	0.1888	-7.3511***	0.55	1.99	56.32
Mdy.-Tgy.	-0.0075	0.4952	-1.0949	0.1642	-6.6654***	0.47	1.99	39.96
Tgy.-Mdy.	-0.0098	0.4885	-1.3923	0.1890	-7.3634***	0.55	1.99	56.29
<u>Pawson-Thai-rice</u>								
Yangon-Thai	-0.0198	0.2468	-1.2659	0.3350	-3.7780*	0.56	1.96	28.61
Thai-Yangon	-0.0128	-0.0347	-1.0858	0.3819	-2.8427^{ns}	0.54	1.86	41.32
<u>Ngasein</u>								
Yangon-Mdy.	-0.0299	0.8501	-0.9564	0.1341	-7.1332***	0.42	2.01	44.99
Mdy.-Yangon	-0.2216	0.1437	-0.8839	0.1264	-6.9915***	0.40	2.00	37.79
<u>Manawthukha</u>								
Pathein-Mdy.	-0.0180	0.4314	-1.0465	0.1699	-6.1575***	0.57	2.01	59.20
Mdy.-Pathein	-0.0299	0.8501	-0.9564	0.1341	-7.1332***	0.42	2.08	44.99
<u>Immeyebaw</u>								
Pyay-Tgy.	-0.1524	0.4632	-0.9331	0.1526	-6.1143***	0.50	2.01	45.14
Tgy.-Pyay	-0.2271	0.2757	-1.0222	0.1577	-6.4789***	0.49	1.99	44.49

Notes: 1. First variables are independent variables in cointegrating regression.

2. Mackinnon critical value: -4.4085 (1%), -3.8308 (5%) and -3.5343 (10%)

3. □ indicates monthly data: Mackinnon Critical value: -4.6972(1%), -4.0028(5%) & -3.6617(10%)

4. ***, **, * and ns indicate market integration in 1%, 5%, 10% level and no integration respectively.

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Weekly price series from January 2001 to December 2004. Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.

Appendix 11 Important statistical results of cointegration regressions (real price series of pawson variety)

Pairs of Price Series (Real Value)	Co-inte. Vector	Trend	Coef. of residual	Std. error	ADF t-stat.	R ²	Durbin-Watson Stat.	F-value
<u>Pawson</u>								
Yongon.-Pathein	-0.1963	0.0541	-1.6837	0.3798	-4.4326**	0.62	1.97	21.72
Pathein-Yongon	-0.1576	0.0251	-1.6539	0.3706	-4.4612**	0.56	1.99	17.11
Yangon-Mdy.	-0.1974	0.0297	-1.2736	0.2481	-5.1333***	0.62	1.93	41.81
Mdy.-Yangon	0.7412	0.1129	-1.2229	0.4784	-2.5569^{ns}	0.28	1.54	31.43
Yangon-Tgy.	-0.3803	0.0532	-1.7892	0.3927	-4.5561**	0.65	2.11	25.33
Tgy.-Yangon	-0.8519	-0.0310	-1.4519	0.4141	-3.5061^{ns}	0.67	1.96	30.45
Pathein-Mdy.	-0.1987	0.0208	-1.6542	0.3806	-4.3459**	0.57	1.99	17.77
Mdy.-Pathein	-0.4611	0.0549	-1.3886	0.4068	-3.4128^{ns}	0.59	1.96	19.34
Pathein-Tgy.	-0.0036	0.0349	-1.4739	0.3416	-4.3136**	0.53	2.00	15.13
Tgy.-Pathein	-0.0101	0.0205	-1.3056	0.3625	-3.6016^{ns}	0.56	1.95	18.83
Mdy.-Tgy.	-0.3678	0.0634	-1.8927	0.4098	-4.6176**	0.63	2.03	22.19
Tgy.-Mdy.	-0.4422	-0.0105	-1.7625	0.4072	-4.3287*	0.67	1.96	27.55
<u>Pawson-CPI</u>								
CPI-Yangon	-0.2425	0.1531	-0.4591	0.2012	-2.2812^{ns}	0.39	2.00	8.39
Yangon-CPI	-0.1071	0.0430	-1.8782	0.3667	-5.1212***	0.62	2.02	21.53
CPI-Pathein	-0.1834	0.1614	-0.4202	0.1927	-2.1808^{ns}	0.40	2.01	8.94
Pathein-CPI	-0.0650	0.0241	-1.4975	0.3426	-4.3707**	0.54	2.00	15.41
CPI-Mandalay	-0.1893	0.1543	-0.4483	0.2042	-2.1955^{ns}	0.41	1.99	9.09
Mandalay-CPI	-0.1557	0.0449	-1.6594	0.3974	-4.1755**	0.58	1.94	18.24
CPI-Taunggyi	-0.1401	0.1649	-0.4651	0.2008	-2.3164^{ns}	0.38	1.99	8.18
Taunggyi-CPI	-0.1386	-0.0023	1.5705	0.3788	-4.1460**	0.61	1.93	20.57
<u>Pawson-Thairice</u>								
Yangon-Thai	0.0031	0.6099	-1.4763	0.4431	-3.3318^{ns}	0.58	1.99	24.16
Thai-Yangon	0.0032	-0.0023	-0.7888	0.3387	-2.3285^{ns}	0.58	1.93	23.68

- Notes: 1. First variables are independent variables in cointegrating regression.
 2. Mackinnon Critical value: -4.6972(1%), -4.0028(5%) & -3.6617(10%)
 3. ***, **, * and ns indicate market integration in 1%, 5%, 10% level and no integration respectively.

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Monthly price series from January 2001 to December 2004. Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.

Appendix 12 Important statistical results of cointegration regressions (real price series of other varieties)

Pairs of Price Series (Real Value)	Co-inte. Vector	Trend	Coef. of residual	Std. error	<i>ADF</i> t-stat.	R ²	Durbin-Watson Stat.	F-value
<u>Ngasein</u>								
Yangon-Mdy.	-0.2853	0.0245	-1.3713	0.2668	-4.1310**	0.42	1.88	9.45
Mdy.-Yangon	-0.9368	0.0187	-1.1024	0.4113	-3.3339^{ns}	0.79	2.05	49.50
<u>Manawthukha</u>								
Pathein-Mdy.	-0.2745	0.0343	-1.9188	0.4312	-4.4995**	0.64	2.01	23.69
Mdy.-Pathein	-0.4552	0.0485	-1.1397	0.3580	-3.1829^{ns}	0.55	1.95	16.08
<u>Immayebaw</u>								
Pyay-Tgy.	-0.5004	0.0134	-1.8096	0.4096	-4.4175**	0.61	2.02	20.79
Tgy.-Pyay	-0.5118	0.023	-1.4870	0.4035	-3.6245^{ns}	0.65	2.01	24.25

Notes: 1. First variables are independent variables in cointegrating regression.

2. Mackinnon Critical value: -4.6972(1%), -4.0028(5%) & -3.6617(10%)

3. ***, **, * and ns indicate market integration in 1%, 5%, 10% level and no integration respectively.

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Monthly price series from January 2001 to December 2004.

Appendix 13 Important statistical results of causality model

(a) Dependent Variable: P =Yangon Pawson

Statistics	Independent Variables (R)			
	Pathein	Mandalay	Taunggyi	CPI
Constant	1.2923 (4.3006) {0.3005}	2.0064 (1.5785) {1.2711}	-2.0597 (2.3228) {-0.8867}	3.2366 (3.1519) {1.0268}
ΔR_{t-1}	0.3536 (0.1830) {1.9425}	0.5870 (0.0781) {7.5121}	0.4631 (0.0786) {5.8903}	0.1506 (0.1003) {1.5012}
R_{t-1}	0.1095 (0.1698) {0.6449}	0.2474 (0.1194) {2.0712}	0.2971 (0.0925) {3.2123}	-0.0012 (0.0066) {-0.1919}
P_{t-1}	0.1254 (0.1939) {-1.3357}	-0.3561 (0.1502) {-2.3707}	-0.3292 (0.1110) {-2.9634}	-0.0929 (0.0859) {-1.0807}
ΔP_{t-1}	-0.1400 (0.1827) {-0.7706}	0.4251 (0.1741) {-2.4419}	-0.0977 (0.1905) {-0.5129}	-0.0667 (0.1710) {-0.3899}
R^2	0.12	0.53	0.52	0.12
F (fit)	1.42	11.99	11.20	1.99
DW	1.99	1.96	1.94	1.39

Notes: Figure in parenthesis (...) and {...} are standard errors and t values

(b) Dependent Variable: P =Pathein Pawson

Statistics	Independent Variables (R)			
	Yangon	Mandalay	Taunggyi	CPI
Constant	1.2721 (0.7872) {1.6158}	1.2948 (1.2599) {1.0276}	1.0252 (1.8034) {1.2761}	1.5622 (1.4142) {1.1046}
ΔR_{t-1}	0.1105 (0.1122) {0.9849}	0.1834 (0.0840) {2.1824}	0.5394 (0.0803) {0.6712}	0.1465 (0.0911) {1.6067}
R_{t-1}	0.3175 (0.1445) {2.1971}	0.2063 (0.1542) {1.3374}	0.2135 (0.0971) {2.1989}	0.0052 (0.0084) {0.6131}
P_{t-1}	-0.7449 (0.3211) {-2.3199}	-0.6784 (0.5584) {-1.2147}	0.6211 (0.2978) {-2.0854}	-0.5296 (0.4381) {-1.2089}
ΔP_{t-1}	0.4932 (0.2990) {1.6490}	0.3711 (0.5429) {-2.2319}	0.4070 (0.3111) {1.3082}	0.3798 (0.4742) {0.8010}
R^2	0.3589	0.36	0.35	0.27
F (fit)	5.88	5.95	5.66	3.94
DW	1.79	1.79	1.97	1.78

Notes: Figure in parenthesis (...) and {...} are standard errors and t values

Appendix 13 continued**(c) Dependent Variable: P =Mandalay Pawson**

Statistics	Independent Variables (R)			
	Yangon	Pathein	Taunggyi	CPI
Constant	-1.9006 (0.4470) {-0.4251}	-4.7596 (1.9745) {-0.7966}	-2.5603 (1.5870) {1.4582}	1.8479 (0.4749) {0.8102}
ΔR_{t-1}	0.7828 (0.1295) {6.0427}	0.6707 (0.2384) {2.8133}	0.4745 (0.1185) {4.0026}	0.2501 (0.1481) {1.7633}
R_{t-1}	1.4358 (0.2296) {6.2527}	0.4470 (0.2506) {1.7838}	0.7093 (0.2137) {3.3190}	0.0057 (0.1106) {0.5409}
P_{t-1}	-1.1213 (0.1712) {-6.5490}	-0.2139 (0.1178) {-1.8154}	-0.6824 (0.2273) {-3.0014}	-0.1466 (0.1193) {-1.2825}
ΔP_{t-1}	0.4559 (0.1721) {2.6490}	-0.0181 (0.2003) {-2.0903}	0.3530 (0.2623) {1.3459}	0.0424 (0.1869) {0.2268}
R^2	0.63	0.22	0.41	0.27
F (fit)	18.22	2.79	7.08	3.39
DW	1.98	1.96	1.98	1.93

Notes: Figure in parenthesis (...) and {...} are standard errors and t values

(d) Dependent Variable: P = Taunggyi Pawson

Statistics	Independent Variables (R)			
	Yangon	Pathein	Mandalay	CPI
Constant	-1.8177 (0.4082) {-1.7069}	-4.3049 (0.9778) {0.6336}	-1.8688 (1.0570) {1.6930}	1.3202 (0.9048) {1.0846}
ΔR_{t-1}	0.9794 (0.1664) {5.8849}	0.2037 (0.2752) {0.7401}	0.5848 (0.1422) {4.1126}	0.2489 (0.1392) {1.7880}
R_{t-1}	0.3585 (0.1715) {2.0902}	0.2156 (0.2623) {1.8219}	0.2997 (0.1774) {1.6889}	0.0131 (0.0092) {1.4246}
P_{t-1}	-0.3943 (0.1559) {-2.5289}	-0.2292 (0.1402) {-1.6347}	-0.4248 (0.2080) {-2.0415}	-0.2164 (0.1085) {-1.9924}
ΔP_{t-1}	0.1321 (0.2135) {-0.6188}	-0.0403 (0.2137) {-2.1887}	0.1352 (0.2514) {0.5377}	0.7555 (0.1812) {0.4169}
R^2	0.51	0.20	0.37	0.17
F (fit)	10.77	2.31	6.03	2.10
DW	1.95	1.94	1.98	1.96

Notes: Figure in parenthesis (...) and {...} are standard errors and t values

Appendix 13 continued

(e) Dependent Variable: P = Consumer Price Index (CPI)

Statistics	Independent Variables (R)			
	Yangon	Pathein	Mandalay	Taunggyi
Constant	-0.8636 (0.5611) {1.3163}	-1.6846 (0.8164) {0.4513}	-1.1323 (0.5877) {1.3836}	1.1142 (0.1296) {1.4633}
ΔR_{t-1}	0.2495 (0.1972) {1.2654}	0.4101 (0.2456) {1.6619}	0.1965 (0.1562) {1.2574}	0.2622 (0.1857) {1.9325}
R_{t-1}	0.1997 (0.1580) {1.2640}	0.6011 (0.2368) {2.5385}	0.1858 (0.1194) {1.5564}	0.3092 (0.0803) {3.8502}
P_{t-1}	-0.0329 (0.0125) {-2.6147}	-0.0338 (0.0105) {-3.2024}	-0.0352 (0.0119) {-2.9453}	-0.0313 (0.0124) {-2.5229}
ΔP_{t-1}	0.3600 (0.1440) {2.4998}	-0.2890 (0.1502) {-2.9235}	0.3097 (0.1504) {2.0578}	0.3526 (0.1418) {2.4859}
R^2	0.36	0.41	0.37	0.36
F (fit)	5.91	7.33	6.05	7.05
DW	2.18	2.16	2.16	2.19

Notes: Figure in parenthesis (...) and {...} are standard errors and t values

Appendix 13 continued

(f) First markets is dependent variable (P) and second is independent variable (R) in each market pair

Statistics	Ngasein Variety		Manawthukha		Immayebaw	
	Yangon- Mandalay	Mandalay - Yangon	Pathein- Mandalay	Mandalay Pathein	Pyay- Taunggyi	Taunggyi- Pyay
Constant	1.0276 (0.4751) {1.9000}	-0.2087 (0.2231) {-0.1706}	-1.5698 (0.0682) {1.2425}	-1.5421 (0.9075) {1.3946}	-0.6152 (0.1624) {1.2845}	1.7737 (0.2065) {1.8588}
ΔR_{t-1}	0.3162 (0.0649) {4.8690}	0.9020 (0.1446) {6.2374}	0.4415 (0.1238) {3.5671}	0.4511 (0.1446) {3.1180}	0.5654 (0.1159) {4.8765}	0.6433 (0.1294) {4.9485}
R_{t-1}	0.4183 (0.1292) {3.2355}	0.1655 (0.0999) {1.6564}	0.2949 (0.1847) {1.5966}	1.0234 (0.2075) {4.9354}	0.4666 (0.2669) {1.7479}	0.4268 (0.2176) {1.9618}
P_{t-1}	-0.6488 (0.2365) {-2.7431}	-0.1348 (0.0875) {-1.5405}	-0.4748 (0.2516) {-1.8873}	-0.8221 (0.1723) {-4.7715}	-0.5696 (0.3286) {-1.7331}	-0.4199 (0.2072) {-2.0258}
ΔP_{t-1}	0.7395 (0.1927) {3.8369}	-0.47950 (0.1348) {3.5549}	0.0373 (0.3109) {2.1201}	0.4518 (0.1839) {2.4565}	0.1016 (0.3744) {2.2713}	0.0284 (0.2535) {0.1123}
R^2	0.53	0.53	0.32	0.50	0.46	0.42
F (fit)	11.96	12.05	4.95	10.36	8.85	7.45
DW	1.98	2.08	2.01	2.01	1.95	1.97

Notes: Figure in parenthesis (...) and {...} are standard errors and t values

Data source: Market Information Service Project (TCP/ MYA/ 882 -2000), Monthly price series from January 2001 to December 2004. Central Statistical Organization (CSO), Myanmar and The Pink Sheet. World Bank, online.



**Institut für Betriebslehre
der Agrar und
Ernährungswirtschaft**

Prof. Dr. Siegfried Bauer
Senckenbergstraße 3
35390 Giessen
Tel.: 0641 / 99 - 37310
Fax.: 0641 / 99 - 37319
Email: Siegfried.Bauer@agrar.uni-
giessen.de

14 September. 2006

**TO
YEZIN AGRICULTURAL
UNIVERSITY
DISSERTATION COMMITTEE**

**LETTER OF EVALUATION OF THE DISSERTATION OF
MRS. THEINGI MYINT**

I am pleased to write this letter of recommendation for Mrs. Theingi Myint from Yezin Agricultural University, Myanmar, who was a PhD research visitor (within the DAAD-Sandwich Program) at the department of Project and Regional Planning, University of Giessen, Germany since the year 2004. I personally supervised her research work about the topic

‘Myanmar Rice Market: Market Integration and Price Causality’.

This topic is very relevant in many developing countries, especially in large countries with an underdeveloped infrastructure. High transportation costs, the risk of trading and transporting agricultural commodities and an underdeveloped market information system may lead to separated markets with high differences in market prices and more or less separated markets.

Beyond this background the study of Mrs. Theingi Myint analyses the Rice market system in Myanmar and concentrates particularly on the explanation of spatial price differences. The research question involved in the study is very relevant, since the Myanmar rice market has been reform since 1988.

There has been a principle reform along a more market organisation, but there are still many government interventions. It is therefore an open question, how strong the various horizontal and vertical market elements are integrated.

Mrs. Theingi Myint demonstrates in her study, how advances methods can be applied to analyse this important question. She uses the so called co-integration approach and vector auto regression analyses in various combinations in order to find out the functioning of the Myanmar rice market. The study is organized in a clear and well structured way and written in a very clear way. After the outline of the conceptual and theoretical frame of study, the methodological approaches are presented very clearly.

After the explanation of the data base and the applied methods, the author presents the results of the analyses. The results show clearly, that the Myanmar rice market is in a more or less competitive condition. This applies to the vertical dimension between the rice millers, the wholesale traders and the farmers. This is also true for the regional integration of the rice market in Myanmar.

From the formal statistical analyses the author derives several policy conclusions. This refers in the internal market and especially to a better functioning market information system. Also there is a need for an improvement of the infrastructure in rural areas in order to come to a more efficient marketing system. At the same time the integration the Myanmar in the international market should be improved in order to allow the benefits from an international market competition.

In total, the dissertation fulfils fully the requirements for a doctoral work. The dissertation is good and logical structured, written in a good understandable English and give excellent insides into the Myanmar rice market. The topic is very relevant for the future development of Myanmar and the conclusions are important for policy making in Myanmar. Finally, the author shows that she can apply sophisticated scientific approaches and advanced methodologies in relation to relevant problems in Myanmar.

In total, the dissertation reaches the international standards for dissertations and could also be accepted in German university. Therefore would suggest the Yezin Agricultural University and the Ministry of Agriculture and Irrigation in Myanmar to accept the dissertation. I recommend an evaluation of the dissertation with

- VERY GOOD (magna cum laude) -

Please do not hesitate to ask me any additional question concerning the qualification of Theingi Myint, the scientific quality of her dissertation or the evaluation given.



Prof. Dr. Siegfried Bauer