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AN ECONOMIC EVALUATION OF COMPUTERIZED MARKETS IN FUTURE DELIVERY CONTRACTS AS A COORDINATION MECHANISM FOR THE U.S. POTATO SUBSECTOR

By

John M. Halloran

A DISSERTATION

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Department of Agricultural Economics

1983

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ABSTRACT

AN ECONOMIC EVALUATION OF COMPUTERIZED MARKETS
IN FUTURE DELIVERY CONTRACTS AS A COORDINATION
MECHANISM FOR THE U.S. POTATO SUBSECTOR

By

John M. Halloran

This is an investigation of the economic feasibility of a computerized market for future delivery contracts (FDCM). The basic concept is the sale of forward contracts over a computerized market before major production decisions are made. An FDCM is basically a pricing mechanism which has the potential to improve planning and open up the pricing process. Both of which should improve vertical coordination.

The potato subsector was selected as a case study since participants are already familiar with forward contracting. Additionally, there is a need for improved planning as evidenced by wide production fluctuations, which are attributable primarily to planting decisions. However, these decisions do not appear to be a response to changes in future demand or cost of production.

Subsector analysis was employed as the primary methodological approach with emphasis on the producer-first handler transaction. The specific tools used in the analysis were personal interviews, a mail survey, and an econometric simulation of a hypothetical FDCM.

It was concluded an FDCM does have the potential to address many of the problems stated by subsector participants and that it is technologically feasible. A majority of the producers surveyed indicated that an FDCM would be superior to their present marketing

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system. An FDCM makes the pricing process transparent, thus increasing equity. The ability to disseminate almost instantaneously information regarding prices and quantities negotiated and the negotiation of contracts before major product decisions are made can improve planning both on an individual firm level and from a system perspective. Participants will no longer have to make decisions based on limited information or past events, but can construct real future supply and demand curves for their own product.

There are some obstacles which must be overcome before the successful introduction of an FDCM can be achieved. First handlers are reluctant to participate because of a loss of bargaining power and added price risks. The loss of bargaining power would be compensated through improved ability to plan and reduced transaction costs. To minimize the price risk will require significant participation by all first handlers.

The achievement of significant levels of participation may require some form of compulsory participation. Not only would this decrease the price risk, but it would also improve the planning aspect of the market and further reduce transaction costs. It must be noted no group of participants favored compulsory participation.

This study concluded with implications to Agricultural policy an FDCM may have and with specific design proposals for an FDCM. Furthermore, a brief description of the implementation process was given.

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ACKNOWLEDGEMENTS

The completion of this research would not have been possible without the contributions of many. I would like to thank the Agricultural Marketing Service of the U.S. Department of Agriculture and the Michigan Department of Agriculture for providing the financial support for this research.

Committee members John Ferris, Thomas Pierson, and Donald Ricks, provided criticisms and insights which resulted in major improvements in this work. I would also like to thank Professors John Allen and Lester Manderschied who gave me sound advice during my graduate program. I feel fortunate to be able to call these individuals, friends.

Fellow graduate students, James Tucker and Dan Kauffman, also deserve mention. James was instrumental in the development of the basic econometric model used in this research. Dan was always available to kick ideas back and forth and to provide moral support.

Dr. James Shaffer deserves much of the credit and a special thanks for my accomplishment. I have gained much from him during my graduate program. Although it was not always comfortable responding to his questions, they never failed to improve the research and the researcher. I also appreciate his unwavering support and humor during times when everything seemed to go wrong.

I wish I could thank individually all the growers, shippers, processors, retail buyers, and extension agents who provided information necessary for the completion of this study. While there were few incentives on their part to do so, they were always willing to spend time with me.

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This research could not have been completed without the aid and support of many personal friends. I would like to express my gratitude to the Cleo Institute, Steve Davies, Steve Franzel, and Steve Haggblade. In scope, in erudition, and in clarity of thought, their dinner and late evening discussions rivaled those of the Bloomsbury Group. Someday when their names are etched in the pantheon of economic greats you can say you saw them here first. If for some reason they don't make it, just think of this as another economic prediction gone awry. Mark Cochran also deserves mention for the guidance he willingly gave me during my "formative" years of graduate school. I'm not sure where his name will be etched, but I think I've already seen it on several post office walls.

I would like to thank Kate Davis and Kathy Deboer for the pulled muscles, herniae, and shattered ego which they regularly administered on the squash courts or during work projects. Their senses of humor and companionship were a welcomed and needed relief from the rigors of writing a dissertation.

Garret and Michelle Peaslee deserve thanks not only for their friendship, but also for the yeoman work they provided in typing the final draft of this dissertation.

Finally, I would like to thank my family. My sister, Diane, and brothers, Greg and Matt, were always there for support. And to my parents, George and Marian, whose confidence in me never failed and who gave me the confidence I needed, this work is for you.

I. The Pro
1.1 Introduction
1.2 Problem Stat
1.3 Forward Deli
1.4 Research Obj
1.5 Methodology
1.6 Organization

II. Some Th
2.1 Introduction
2.2 Vertical Coo
2.2.1 Compl
2.2.2 Perfo
2.2.2
2.2.2
2.2.2
2.2.2
2.3 Mechanisms o
2.3.1 The P
2.3.1
2.3.2 Alter
2.3.2
2.3.3 Contr
2.3.3
2.3.3
2.3.3
2.4 Information
2.4.1 Infor
2.4.2 Tran
2.4.3 Other
2.5 Forward Deli
2.5.1 The
A Pr
2.5.2 Plan
2.6 Summary

III. Subsec
3.1 Introductio
3.1.1 Data
3.1.2 Orga
3.2 Potato Con
3.2.1 Gen
3.2.2 Fut
3.3 Potato Pro
3.3.1 Maj
3.3.2 The
3.3.3 The
3.3.4 The
3.3.5 Ot
3.3.6 Fa
3.3.7 Pr
3.3.8 Pr
3.4 Potato Ma
3.4.1 Tr
3.4.2

TABLE OF CONTENTS

I. The Problem 1
1.1 Introduction 1
1.2 Problem Statement 4
1.3 Forward Deliverable Contract Markets 8
1.4 Research Objectives 12
1.5 Methodology 13
1.6 Organization of Research 17

II. Some Theoretical Considerations 19
2.1 Introduction 19
2.2 Vertical Coordination 21
2.2.1 Complexity of Vertical Coordination 23
2.2.2 Performance Dimensions of Vertical Coordination 26
2.2.2.1 Efficiency 29
2.2.2.2 Adaptability 32
2.2.2.3 Equity 34
2.2.2.4 Third Party Effects 37
2.3 Mechanisms of Vertical Coordination 39
2.3.1 The Price System 40
2.3.1.1 Pricing Efficiency 46
2.3.2 Alternative Vertical Coordination Mechanisms 49
2.3.2.1 Auxiliary Coordinating Mechanisms 49
2.3.3 Contracting 51
2.3.3.1 Contracting and Uncertainty 54
2.3.3.2 Contracting in Agriculture 58
2.3.3.3 Disadvantages to Contracting 64
2.4 Information 68
2.4.1 Information as an Economic Tool 69
2.4.2 Transaction Costs and Information 74
2.4.3 Other Transaction Costs 80
2.5 Forward Deliverable Contract Markets 81
2.5.1 The Forward Deliverable Contract Market: A Pricing Mechanism 82
2.5.2 Planning and a Forward Deliverable Contract Market 86
2.6 Summary 88

III. Subsector Description 90
3.1 Introduction 90
3.1.1 Data Collection 91
3.1.2 Organization of Chapter 91
3.2 Potato Consumption 92
3.2.1 General Patterns in Consumption 93
3.2.2 Future Trends in Potato Consumption 99
3.3 Potato Production 100
3.3.1 Major Production Areas 102
3.3.2 The Northwest 105
3.3.3 The Northeast 107
3.3.4 The Central States 107
3.3.5 Other Areas 109
3.3.6 Factors Affecting Shifts in Production Patterns 110
3.3.7 Fresh Potato Movements 111
3.3.8 Production Fluctuations 118
3.4 Potato Marketing Channels 123
3.4.1 The Tablestock Marketing Channel 125
3.4.2 The Processed Potato Market Channels 130

3.5 Variables A
3.5.1 Vert
3.5.
3.5.
3.5.
3.5.
3.5.
3.5
3.5
3.5.2 Pro
3.6 Summary

IV. Forwa
4.1 Introducti
4.2 Incentives
4.3 The Contra
4.3.1 Bas
4.3.2 Pre
4.4 Bargaining
4.5 Impacted I
4.6 Contractin
4.7 Summary

V. The F
5.1 Introducti
5.2 Functions
5.2.1 Pot
5.3 Functions
5.4 Comparison
5.5 Futures Ma
5.6 Summary

VI. Parti
6.1 Introducti
6.2 The Survey
6.2.1 The
6.2.2 The
6.3 Survey Res
6.3.1 Bac
6.3.2 Mar
6.4 Operating
6.5 Summary

VII. An Ec
7.1 Introducti
7.2 The Econom
7.2.1 Bas
7.2.2 Yie
7.2.3 Pla
7.2.4 Pro
7.2.5 Pri
7.2.6 Ela

3.5 Variables Affecting Vertical Coordination 134
3.5.1 Vertical Coordination in Tablestock 138
3.5.1.1 Selection of First Handlers 143
3.5.1.2 Terms of Payment 146
3.5.1.3 Use of Brokers 150
3.5.1.4 Labeling and Packs 153
3.5.1.5 Quality, Inspection, Market Orders 155
3.5.1.6 Tablestock Marketers' Attitudes Towards Contracting 158
3.5.1.7 Problems for a FDCM in Tablestock Potatoes 162
3.5.2 Processing Transactions 165
3.6 Summary 172

IV. Forward Contracting in Potatoes 178
4.1 Introduction 178
4.2 Incentives for Forward Contracting 178
4.3 The Contracting Process 188
4.3.1 Base Price Negotiations 189
4.3.2 Premium-Discount Schedules and Other Terms of Trade 200
4.4 Bargaining Associations 207
4.5 Impacted Information 224
4.6 Contracting as a Collusive Mechanism 227
4.7 Summary 229

V. The Futures Market 232
5.1 Introduction 232
5.2 Functions of the Futures Market 233
5.2.1 Potato Futures 243
5.3 Functions of an FDCM 245
5.4 Comparison of Performance: An FDCM vs. The Futures Market 248
5.5 Futures Markets and FDCM's; Substitutes or Compliments 261
5.6 Summary 262

VI. Participant Attitudes Towards An FDCM 264
6.1 Introduction 264
6.2 The Survey 265
6.2.1 The Sample 266
6.2.2 The Instrument 269
6.3 Survey Results 271
6.3.1 Background Characteristics 271
6.3.2 Marketing Practices and Attitudes Towards an FDCM 281
6.4 Operating Characteristics of an FDCM 296
6.5 Summary 304

VII. An Econometric Simulation Of An FDCM 306
7.1 Introduction 306
7.2 The Econometric Model 306
7.2.1 Basic Specification of the Model 307
7.2.2 Yields 311
7.2.3 Planted Acreage 312
7.2.4 Production 317
7.2.5 Prices Received 317
7.2.6 Elasticities 320

7.3 An Econometric
7.3.1 Model V
7.3.2 Simulat
7.4 Summary

VIII. Design Is
8.1 Introduction
8.2 Implementation
8.2.1 Ownersh
8.2.2 Compuls
8.2.3 Rules o
8.3 Operational Ch
8.3.1 Bidding
8.3.2 Length
8.3.3 Product
8.3.4 Quality
8.3.5 Handlin
8.3.6 Contrac
8.3.7 Contrac
8.3.8 Negotia
8.4 Summary

IX. Conclusio
9.1 Introduction
9.2 Conclusions an
9.2.1 Impleme
9.3 Further Resear
9.4 Summary

Footnotes

Appendix A

Appendix B

Bibliography

7.3 An Econometric Simulation of an FDCM in Potatoes 322
7.3.1 Model Verification 324
7.3.2 Simulation of an FDCM 328
7.4 Summary 339

VIII. Design Issues For An FDCM In Potatoes 341
8.1 Introduction 341
8.2 Implementation and Organization of an FDCM 342
8.2.1 Ownership and Operation of the Exchange 343
8.2.2 Compulsory Participation? 351
8.2.3 Rules on Eligibility 360
8.3 Operational Characteristics and Contract Specifications 362
8.3.1 Bidding Procedures 362
8.3.2 Length of Bidding Process 367
8.3.3 Production Risks 370
8.3.4 Quality Assurance and Grading 379
8.3.5 Handling of Disputes 385
8.3.6 Contract Cancellation 387
8.3.7 Contract Size 387
8.3.8 Negotiable Items 390
8.4 Summary 394

IX. Conclusions 396
9.1 Introduction 396
9.2 Conclusions and Implications 398
9.2.1 Implementation 410
9.3 Further Research 412
9.4 Summary 413

Footnotes 414

Appendix A 433

Appendix B 453

Bibliography 462

3.1 Production
3.2 Sales of tl
3.3 Potato Acr
3.4 Yields in
3.5 Selected S
3.6 Potato Unl
3.7 Potato Unl
3.8 Potato Unl
3.9 Potato Unl
3.10 Total Ship
Selected Y
3.11 Monthly Po
3.12 Acreage, P
and Produc
3.13 Production
3.14 Variables
4.1 Estimated
Production
1960 and 1
6.1 Effects of
6.2 Time At Wh
Within 90
6.3 Time At Wh
Accuracy t
6.4 Growers' R
Marketing
6.5 Selective
or Hedge i
6.6 Why is the
So Low?

LIST OF TABLES

3.1 Production and Per Capita Consumption of Potatoes, 1165-1479 94

3.2 Sales of the U.S. Potato Crop, 1956-80 96

3.3 Potato Acreage in Selected Sates, 1956-1960 and 1977-81 101

3.4 Yields in Selected States: 1956-60 and 1977-81 103

3.5 Selected States' Production of Potatoes: 1950-60 and 1971-81 104

3.6 Potato Unloads at Western Cities, Selected Years 113

3.7 Potato Unloads at Midwestern Cities, Selected Years 113

3.8 Potato Unloads at Southern Cities, Selected Years 116

3.9 Potato Unloads at Northeastern Cities, Selected Years 116

3.10 Total Shipments of Potatoes From Major Shipping Areas, Selected Years 117

3.11 Monthly Potato Unloads By Producing Area 119

3.12 Acreage, Production: Percent Changes in Acreage, Yields and Productions 121

3.13 Production and Market Characteristics 136

3.14 Variables Influencing the Transaction 137

4.1 Estimated Percentage of Agricultural Output Produced Under Production Contracts and Vertical Integration, United States, 1960 and 1970 179

6.1 Effects of Farm Size or Major Outlet by Percentage 272

6.2 Time At Which Growers Are Able To Predict Their Yields Within 90 Percent of Actual 274

6.3 Time At Which Growers Can Predict Within 90 Percent Accuracy the Quality Levels of Their Potatoes 275

6.4 Growers' Responses Regarding Why They Use A Particular Marketing Method 283

6.5 Selective Factors Leading Growers Not To Forward Contract or Hedge in Potatoes 285

6.6 Why is the Level of Contracting in Tablestock Potatoes So Low? 288

6.7 Growers'
or Their
Categorie

6.8 Growers'

6.9 What Meth
Honored b

6.10 Who Shoul

6.11 Under What
the Contr

7.1 Parameter

7.2 Parameter
Equations

7.3 Parameter
Equations

7.4 Estimated
Acreage Wi
Substitute

7.5 Comparison

7.6 Mean Value
of Selecte

7.7 Mean Value
Where FDCM
cipation R

7.8 Mean Value
of Selecte
Production
PAF=1.0

7.9 Mean Value
of Selecte
Production
PAF=1.1

7.10 Mean Value
of Selecte
Production
PAF=1.2

7.11 Behavior o
Over Cours

6.7	Growers' Ratings of the Relative Superiority of an FDCM or Their Present Marketing System with Respect to Various Categories	290
6.8	Growers' Responses on Who Should Own and Operate an FDCM	296
6.9	What Method Should Be Used to Insure that a Contract is Honored by Both Parties	298
6.10	Who Should Be Allowed to Contract?	301
6.11	Under What Conditions Should a Grower Be Allowed to Cancel the Contract	302
7.1	Parameter Estimates for Seasonal/Regional Yield Equations	313
7.2	Parameter Estimates for Seasonal/Regional Planted Acreage Equations	316
7.3	Parameter Estimates for Seasonal/Regional Prices Received Equations	318
7.4	Estimated Short Run and Long Run Elasticities of Potato Acreage With Respect to Lagged Own Price, Lagged Price of Substitutes and Variance of Potato Prices	321
7.5	Comparison of Observed and Simulated Results: 1971-1980	325
7.6	Mean Values, Standard Deviation, and Coefficient of Variation of Selected Variables: Base Run, 1981-1990	329
7.7	Mean Values, Standard Deviation, and Coefficient of Variation: Where FDCM Price is 110% of Production Costs and FDCM Participation Rates are Fixed at Various Levels	331
7.8	Mean Values, Standard Deviation, and Coefficient of Variation of Selected Variables: Production Weighted by 1-ZX and Production Not Weighted in Prices Received (Spot) Equations; PAF=1.0	334
7.9	Mean Values, Standard Deviation and Coefficient of Variation of Selected Variables: Production Weighted by 1-ZX and Production Not Weighted in Prices Received Equations; PAF=1.1	335
7.10	Mean Values, Standard Deviation and Coefficient of Variation of Selected Variables: Production Weighted by 1-ZX and Production Not Weighted in Prices Received Equations; PAF=1.2	336
7.11	Behavior of FDCM Participation Rate (Z) in Selected Regions Over Course of Simulation Run; PAF=1.2	338

Figure 3.1 Pota
1950-

Figure 3.2 Major
Produ

Figure 3.3 U.S.

Exhibit 3.1 Plat

Exhibit 4.1 Cost

Exhibit 4.2 Qual

Exhibit 4.3 Stor

Exhibit 4.4 Pric

Exhibit 4.5 1982

Figure 7.1 U.S.

Figure 7.2 Defi

LIST OF FIGURES AND EXHIBITS

Figure 3.1	Potato Utilization in the United States From 1950-1979	97
Figure 3.2	Major Marketing Channels For Potatoes and Potato Products	124
Figure 3.3	U.S. Potato Processing Facilities, 1975	133
Exhibit 3.1	Platform Inspection Form	149
Exhibit 4.1	Cost of Production Indexing	192
Exhibit 4.2	Quality Incentive Clauses	202
Exhibit 4.3	Storage Incentive Clauses	203
Exhibit 4.4	Price Adjustment Form	222
Exhibit 4.5	1982 Field Run Prices By Firm	223
Figure 7.1	U.S. Potato Production Areas, By Region and Climate	310
Figure 7.2	Definition of Variables	326

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CHAPTER ONE

THE PROBLEM

1.1 INTRODUCTION

This research project is a reflection of the great interest in vertical coordination that has been present in agricultural economics for several years. This interest has been spurred, at least in part, by the dramatic changes that have taken place in our food system over the past fifty years. A food system that was once characterized by small, diversified, and labor intensive firms is now dominated by large, specialized, and capital intensive firms. The adoption of new technologies has had a large impact on the structure of the U.S. food and fiber system and the manner in which transactions are conducted. This change has had great repercussions not only for agriculture, but for the rest of the economy as well.

Since the 1930's the number of farms has been more than halved, while average farm size has more than doubled.[1] Even more telling of these changes is that while the number of farms has decreased the concentration of sales has increased to the point where now 2.4% of farms produce about 40% of total sales.[2] However, the change in absolute size and relative economic power at the farm level has been more than matched by those firms with whom farmers must deal. So that in many cases farmers must deal with sellers or buyers who are few in number and large in size.

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Shaffer has referred to the structural and technological changes which have occured as the scientific industrialization of the food system.[3] This process has caused some forms of vertical coordination to atrophy from non-use and others to grow in importance. Shaffer notes that scientific-industrialization imposes a necessity for institutional innovation. " The emerging political economy is the result of the interaction of the process of scientific-industrialization with the political and economic efforts of individuals and groups to take advantage of potential benefits and to achieve protection from negative effects."[4] What forms of innovations have occurred in vertical coordination and whom did they benefit are important questions. The answering of these questions begs another. What kinds of institutions can be designed to improve the performance of the food system?

This interest in vertical coordination is more than merely academic. There is a growing concern among many agricultural economists, subsector participants, and policy makers that vertical coordination in some sectors is not being accomplished as effectively as possible. For example, the existence of "thin" markets has lead to a questioning of the accuracy of prices generated in these markets and whether they are a true reflection of supply and demand conditions. It is also felt by some that these prices can be manipulated to the benefit of certain parties. If either of these two perceptions is true what does this mean for resource allocation? Another example; there has been a noticeable growth in vertic

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growth in vertical integration(broadly defined) which is both a cause and effect of the demise of traditional markets. One effect of vertical integration is the diminishment of price information from the public eye. Although it may increase the level of vertical coordination, concerns of resource allocation and equity are raised. Finally, the once venerable institution of farmer cooperatives have come under increasing attack. These concerns and others have led many people to evaluate the effectiveness of alternative coordination mechanisms.

Even in those subsectors where coordination appears to be conducted at a high level, there are those who are asking if there is a better way of doing things? What do people mean when they speak of vertical coordination? There is no consensus on a definition, but most would agree with the rather simple statement that vertical coordination is a process where the demand articulated by consumers is matched with a supply of a good that satisfies that demand. Consumers express preferences for a wide range of characteristics. A well-coordinated system would achieve a close match over a large number of these characteristics. However, consumers not only have preferences for those goods being exchanged, but also for other outcomes which may be an integral part of the coordination mechanism, such as fairness of the game and the distribution of power. These criteria as well must be taken into account when evaluating vertical coordination.

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1.2 PROBLEM STATEMENT

Overall the U.S. food system must be given high marks when evaluated in terms of providing a safe, reliable, and inexpensive food supply. However certain subsectors perform less well than others and, in general, there is room for improvement in vertical coordination. A long standing problem is wide production fluctuations and cycles in agricultural commodities. Until the biological production functions become as clearly known as those associated with tractors and climate control is possible, an amount of production uncertainty in agriculture will always remain. However, not all production fluctuations are the result of biology and weather. In some cases a greater percentage of these fluctuations are the result of producer decisions.

It should be noted that Marion doesn't consider production fluctuations of this nature to be examples of poor coordination, but rather problems of horizontal structure.[5] This research does consider fluctuations of this type to be examples of poor coordination under certain circumstances. These circumstances arise when there is no changes in consumer demand or input costs that would merit these shifts in production. The mechanisms are lacking for producers to accurately plan their production for the upcoming period, i.e. to accurately assess future demand.

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Most models of producer decision-making assume that farmers form their price expectations on the basis of prices received previously. Their production decisions are a function of their price expectations. As a first approximation this does fit rather well, but it also assumes that mistakes are perpetuated - a dim view of human intelligence. A more optimistic outlook on human nature and one that seems more pragmatic is that producers lack the necessary information to make well-informed production decisions. Producers, because of their position in agricultural subsectors, are unable to gather reliable information regarding future demand on quantity, quality, timing, etc. for their future production. Given the relative scarcity of this type of information, producers are often unable to do anything else but base their expectations on last year with some adjustments based on their evaluation of the upcoming season. As it might appear to an insightful alien observer, given this state of affairs, farmers are probably in the worst position to make these basic production decisions.

The lack of information available is not due to an abdication of duty by first handlers or other subsector participants, but simply a result of the incentives impinging on them. First handlers are leary of holding substantial price risk. This is especially true if they do not have comprehensive information on aggregate future supply and demand. The manner in which most transactions are conducted this information is hard to come by, though, they are better informed than growers. However, unless this information becomes fi

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becomes freely available buyers are not very willing to put themselves in a position where they bear price risk or their actions are apparent to their competitors. Thus, most are not willing or perhaps able to be of much assistance to growers. Additionally, they may not be aware of the cost position farmers may face.

Given this situation there appears to be two possible alternatives; 1) production decisions are formulated from the top down by some omniscient agency; or 2) a system is designed where information concerning future demand and prices is communicated to farmers. One problem with the price system in agricultural is that it does a poor job of communicating information concerning future demand which affects intertemporal resource allocation--that is consumption and production in more than one time period. To an individual farmer the price he will receive for his product is a function of the aggregate supply. While estimates are available at the time production decisions are made, they are often imprecise.

Although the debate still rages over the economic merits of a centrally-planned system, the political ideology of th U.S. would seem to rule out this alternative for the present. So this research will investigate the feasibility of the second alternative. That is, is there a better way to organize agricultural subsectors that would improve vertical coordination?

The changes in structure and problems associated with vertical coordination mechanisms have increased the need for examining these mechanisms. It has also spurred interest in the development of new exchange

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exchange mechanisms. Over the past decade a great deal of effort has been devoted to electronic marketing. This is a broad term which includes telephone and teletype auctions, video and computerized markets, and computer assisted trading.

Electronic marketing is a method of centralizing the exchange process while the traders remain distant. The common practice of trading by phone is a private treaty exchange, while most references to electronic marketing are in the context of bringing together a large number of buyers and sellers. With certain forms of electronic marketing the information generated can be substantial. Frequently information regarding sales, prices,quantities and grades is instantaneously available. This is especially true in the case of computerized exchanges. Computerized exchanges also have the potential to greatly reduce transaction costs if sufficient volume is generated.

In the past five years computerized exchanges have been used for several agricultural commodities, such as cattle, hogs, and cotton. Most of these have been on an experimental basis. In almost all cases these markets were spot market transactions. As such, they still did not address the issue of assisting producers in evaluating future demand and easing the burden of decision-making. However, computerized markets and a familar form of vertical coordination — forward contracting — do seem to offer the potential of eliminating much of those production fluctuations that are not due to the biological nature of production or a legitimate response to changes in consumer demand and costs of production.

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1.3 FORWARD DELIVERABLE CONTRACT MARKETS

Forward contracting has been practiced for many years in several agricultural subsectors.[6] The extent of contracting varies from subsector to subsector as well as the degree of control transferred. For example, in poultry the level of forward contracting is high and the degree of control transferred by farmers often creates situations where the farmers are in essence hired employees of the contracting firm. In processing vegetables, on the other hand, the level of forward contracting is still high, but the growers retain much more control. Some contracting appears to be conducted in most subsectors. Even in those commodities where forward contracting is a minor form of vertical coordination, such as cattle or hogs, forward contracting is far from nonexistent. According to the most recent figures, contracting is growing in use. In 1960 about 15 percent of the production in major commodity groups was contracted. By 1970 this figure was 17 percent with the largest increases in eggs and processing vegetables.[7]

There are several incentives to forward contracting and these will be covered in greater detail in Chapter Two; but for the moment, consider two of these incentives. One is the need for an assured supply on the part of processors or other first handlers. This incentive is magnified when there is a large capital investment or there is a substantial forward commitment on the part of first

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handlers. On the producers side there are sometimes large economic incentives to have a guaranteed market access and in many cases at least a guaranteed minimum price. Although there are costs associated with forward contracting to both parties to the exchange, it is clear that they improve the ability of both parties to make their production plans.

Yet the costs of contracting as presently conducted in most subsectors should not be dismissed too lightly. One of the severest criticisms leveled at contracting is that the distributions of costs and benefits can be inequitable. Often times growers face buyers who have considerable monopsonistic, power and if this power is accompanied by a situation where producers have few production alternatives there is a large imbalance in bargaining power. This imbalance in bargaining power is exacerbated if growers produce a perishable commodity and the distribution of information favors the contractors.

In a bargaining situation, especially those characterized as private treaty negotiations, the producer has little leverage and may receive, in his opinion, a contract that is far from equitable. It was the lack of bargaining power that led to formation of bargaining associations in several commodities. Although bargaining associations have been able to improve some aspects in the flow of information and certain terms of trade have also been improved, the gains are far from those which were originally anticipated by its members. An important reason for the limited success of bargaining associa

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associations is that enabling legislation requiring good faith bargaining, exclusive agency, and binding arbitration is usually lacking.

Assuming that this enabling legislation will not be immediately forthcoming is there a way to open up the bargaining process and still retain the advantages noted above? A concept which Shaffer, has suggested for consideration is the sale of standardized forward contracts over a computerized market.[8] He has referred to this concept as a forward deliverable contract market(FDCM's). The basic idea is to create the institutional and technical mechanisms which would facilitate open bargaining over all terms of trade for contracts which would be negotiated prior to when major production decisions are made. With the advent of the high speed computer, the technical capabilities do exist to open up the negotiation process. For example, growers with access to a computer terminal could view contracts offered by first handlers and make offers to fulfill them. It is technically possible to design the system so that offers and counteroffers could be made over a wide range of contract terms.

The centralization and opening up of the contracting process would generate a great deal of high quality information about supply and demand <u>before</u> major production decisions are made. The primary objectives of such a system would include; 1) improving the coordination of supply and demand; 2) reducing the risk of production by determining the terms of trade prior to production; 3) providing reliable supplies of product meeting handlers' specifica

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specifications; and 4) providing a transparent market,thus reducing discrimination in the terms of trade.

The attainment of these objectives would lead to additional benefits throughout the subsector. Some of them are already available to those who contract. A list of these benefits would include;

1. Greater access to credit.
2. Improving the flow of product from producer to first handler.
3. Improvements in the scheduling and routing of transportation.
4. Increased accuracy in price differentials reflecting quality specifications due to improved information.
5. Increased market access and alternatives.
6. More stability in prices and incomes.
7. Perhaps higher long-term average prices for growers due to a more competitive market.
8. Reduced inventory costs for first handlers.
9. Increased ability on the part of all participants to evaluate demand for their product before major decisions are made.

These potential benefits will be discussed fully in later chapters.

Recognition of the problem of coordinating future supply with demand is not new and the same may be said for the basic conceptual approach. Over thirty years ago D. Gale Johnson in Forward Prices For Agriculture focused on the lack of information available to producers by which to plan production.[9] His proposal was to set up an agency with considerable research activities which would announce forward prices. His proposal included a rather elaborate mechanism to guarante

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to guarantee prices within limits with some forms of production controls if necessary. Although the basic concerns are the same, the approach in this research is to investigate the feasibility of designing a new vertical coordination mechanism that would improve the flow of information regarding future supply and demand while still relying on the market. It would leave decision-making in the hands of the market participants.

1.4 RESEARCH OBJECTIVES

The primary objective of this research is to evaluate the potential of computerized markets in forward deliverable contracts for addressing some of the vertical coordination problems in agricultural subsectors. The emphasis will be placed on two problems, fluctuations in production which are the result of poor planning — an informational problem — and the competitive nature of the bargaining process. This research will also identify those characteristics of a commodity, subsector participants, and the present marketing institutions that increase or lessen the probability of success for a forward deliverable contract market.

Although this discussion has alluded to subsectors which already have a high degree of contracting, the concept seems to be equally applicable to those subsectors where contracting is absent or very low. Indeed, it might be those subsectors where the need for such an institut

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institution is greatest, since some of the planning benefits are already captured where contracting is conducted. This research will also identify those characteristics that make a commodity or subsector amenable to the concept of forward deliverable contract markets.

1.5 METHODOLOGY

In order to evaluate the potential of a computerized market in forward deliverable contracts, a subsector approach has been chosen. This approach offers several advantages. First, it is a systems-wide orientation that focuses on the conditions and behavior of a subsector's participants and institutions which leads to its performance. Given this, subsector analysis is often identified with vertical coordination studies. As the name implies, Subsector analysis puts the majority of its emphasis on the vertical relations. Although the horizontal structure is still considered important, the vertical relationships are critical variables in evaluating the feasibility of any exchange mechanism. Since a subsector is a system, any change at one point has the potential to have impacts throughout the system. Subsector analysis provides the framework to analyze these impacts.

It is hypothesized that the specific design of a forward deliverable contract market will vary by subsector. Only by knowing a subsector thoroughly can an exchange mechanism be designed to fit its needs.

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Since a subsector approach is being used in this research, it is necessary to select a subsector. After due consideration the potato subsector was selected as the subject of the investigation. There are several factors which favor this selection. Potatoes are an important produce item at retail. In 1981 fresh potatoes accounted for 9 percent of sales in retail produce departments.[10] This understates their importance as a food item as more potatoes are consumed in processed form(60 lb/cap.) than in fresh form (47 lbs./cap).[11] They are also an important commodity in Michigan. In terms of Michigan agriculture, potatoes accounted for 56 million dollars in gross revenue to growers. In that year Michigan produced 8.5 million hundred weight to rank eleventh nationally.[12]

A third reason for selecting potatoes is the existence of vertical coordination problems in the subsector. Potatoes over the past twenty years have exhibited more year-to-year price fluctuations. These price fluctuations are due largely to production fluctuations and an inelastic demand. However, it is clear not all of these price fluctuations are due to weather or biological factors. It is also apparent that the year-to-year production fluctuations are not in response to changes in consumer demand or costs of production. A considerable portion of these fluctuations are due to producer decisions.

Production and price variability are not the only vertical coordination problems. With the demise of terminal markets the price formation process is highly dispersed and fragmented. This increases

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the cost of collecting price information as buyers and sellers must expend more effort in the search process. In the processing markets at least half of the needed supply is obtained via contracts. This also removes valuable supply and demand information from the public domain as presently organized. If prices are not highly visible, timely, and accurate, it is difficult to make informed allocation decisions.

As mentioned, it has been charged that producers are often at a bargaining disadvantage when negotiating contracts with processors. There are bargaining associations in most major potato producing areas attempting to make the bargaining climate more equitable. The alleged bargaining disadvantage is attributable to two major factors; 1) the oligopsonistic postition of most first handlers; and 2) the lack of and sometimes inequitable distribution of information regarding prices, current supplies, and future supply and demand conditions. It is the existence of these problems associated with contracting that accounts partially for the attractiveness of potatoes as a candidate for study. Most subsector participants will not be confused by the contracting aspects of this alternative exchange mechanism.

Finally, there are several problems with the futures market in potatoes that decrease its usefulness to subsector participants. Potato future markets have been the cause of considerable controversy. In 1978 a congressionally mandated study was undertaken to examine problems of the potato futures market. Paul, Kahl and T

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Kahl and Tomek concluded that many of the difficulties associated with using the potato futures market were a result of poor contract design.[13] This reduced their viability as a hedging device and led to distrust of the institution.

Given the nature of the research objectives and of the problem for this research, a variety of methodological approaches are used in addition to subsector analysis. However, subsector analysis will provide the general framework. Since subsector analysis is still a relatively young research approach there are some general constructs, but the approach has yet to be fully defined. Hopefully this study will make a modest contribution to demonstrate how this framework can be applied. Subsector analysis is heavily indebted to neoclassical economics. In additional to the traditional areas, more recent work in information theory, and risk and uncertainty will also be important.

This research, as is subsector analysis, is also greatly influenced by institutional economics. Institutional economics views the transaction as the main unit of analysis. J. R. Commons distinguished transaction from exchange.[14] In a transaction not only the physical item transferred but also the legal ownership is transferred as well. Exchange only transfers the physical item. The important point is that in viewing the transaction in broader terms focuses attention on those factors which are critical to the success of any coordination mechanism. Institutional economics enables one to examine those edifices which are important to the legal transfer of all aspects of the good.

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Schmid defines institutions as sets of ordered relationships among people that define their rights, exposure to the rights of others, privileges, and responsibilities.[15] Using this definition a market is an institution and so is any particular vertical coordination mechanism. Institutional economics focuses on what the relationships are surrounding any institution and what they mean for the people involved. The implementation of a forward deliverable contract market would mean the establishment of a new institution(s). That is a new set of ordered relations among people. This research will identify these new relations and who stands to lose or gain relative to the present setting.

In an effort to get some idea on the magnitude of the impacts on selected performance variables, an econometric-systems simulation model is employed. The basis of comparison or performance norms are those generated from the current subsector structure. A key measure of performance will be production fluctuations and how these may vary with participation levels.

1.6 ORGANIZATION OF RESEARCH

The remainder of this research report is organized into eight chapters. The second chapter sets forth the theoretical basis for a forward deliverable contract market. It will cover basic economic theory and its extensions where relevant. The third chapter will be a subsector analysis of the potato subsector. Major emphasis will be placed

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placed on the producer-first handler transaction. However, those aspects of the vertical channel at higher levels that have particular relevance to the producer-first handler relationship will also be studied. Besides more clearly delineating the subsector approach, this chapter will concentrate on present institutions which will affect the design of the FDCM. Chapter IV is an indepth look at the theory and performance of bargaining associations since they are important in the potato subsector. Chapter V examines the role of futures markets and their possible relationships to an FDCM. Chapter VI is an examination of potential participants' reactions to the concept. In Chapter VII an econometric model is presented which will examine the impact varying participation rates have on selected performance variables. Chapter VIII will incorporate those areas of the preceding three chapters in evaluating alternative designs for the forward deliverable contract market. Finally, Chapter IX will evaluate the overall feasibility of forward deliverable contract markets for potatoes including obstacles to its success and conditions necessary for success.

CHAPTER TWO

SOME THEORETICAL CONSIDERATIONS

2.1 INTRODUCTION

This chapter is intended to lay out the theoretical and practical basis for analyzing some of the questions raised in Chapter I. The substance of the discussion is an examination of market rules and the consequences which result from them. It will give a handle for examining the relationship between the institutional environment and the design of a pricing mechanism. This foundation can then be applied to the concept of forward deliverable contract markets -- to identify its strengths and weaknesses and to develop hypotheses concerning alternative designs which will be covered in Chapter VIII.

While emphasis will be on price theory, concentrating on standard price theory would give rise to serious omissions in the theoretical basis for FDCM's. There are aspects to FDCM's which distinguish them from most pricing mechanisms presently used, and these aspects or characteristics are not usually well handled in conventional price theory.

Fortunately, in recent years there has been considerable effort in expanding the boundaries of neoclassical economics. Most of this effort has been directed towards increasing the realism of the assumptions upon which economic theory is based. Where relevant contributions from the risk and uncertainty literature, writings on transaction costs, and organizational theory will be accepted.

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This research will not attempt to provide a grand unified theory. However, it does attempt to integrate price theory with the above mentioned topics. Price theory does a good job covering resource allocation. However, it does this with relatively little emphasis on how the task is actually accomplished. Thus the need for a more integrated approach. In an effort to focus attention, the approach has been to view FDCM's as a method of vertical coordination. Indeed, it is the accomplishment of vertical coordination that gives rise to the interest in pricing mechanisms. While the intrinsic beauty of a pricing mechanism may be admired, it is its ability to vertically coordinate production with demand by which it is judged.

The remaining sections of this chapter will set forth the theoretical basis for forward deliverable contract markets. In order to organize the discussion the chapter is divided into several major sections. Each section corresponds to a primary characteristic of an FDCM and its implications for the performance of an FDCM. For example, the informational attributes of an FDCM are a crucial component of its hypothesized benefits. Hence, there is a section devoted to the theory of information and how this pertains to the performance of an FDCM. The chapter concludes with a summary that ties together the sometimes disjointed topics contained in this chapter.

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2.2 VERTICAL COORDINATION

Vertical coordination is a process that has as its primary function the provision of goods meeting consumers' preferences. The process is being carried out continuously and yet, except for agricultural economists, as an object of study it is almost ignored.(see Marion, Henderson, Shaffer)[1,2,3] When vertical coordination is handled in the economic literature, it is usually under the topic of vertical integration. This is somewhat surprising since most products must pass through many hands and undergo a dramatic transformation before they reach the final consumer. But the process by which this is actually accomplished remains clouded in mystery. It is the purpose of this discussion to shed some light on both the methods and the importance of vertical coordination and how an FDCM might facilitate the process.

Vertical coordination as a subject worthy of study gained momentum in the early 1960's, partially out of a concern for what was seen as an undesirable increase in vertical integration in the food and fiber system. This trend towards increasing vertical integration has since abated and so has the sense of urgency.

A desirable outcome of this concern has been a closer examination of the how and why food products are supplied to consumers. A typical economic text gives the impression that it is simply a matter of prices generating the economic signals which leads t

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leads to an "efficient" allocation of resources. It is clear though, the price system is often supplemented and on occasion supplanted by other mechanisms of coordination not found in the typical economic textbook. This examination of the vertical coordination process has led to an identification of coordination problems and of possible solutions.

"Vertical coordination is the general term that includes all the ways of harmonizing the vertical stages of production and marketing."[4] This definition was first presented by Mighell and Jones in their classic <u>Vertical Coordination in Agriculture</u> and though variants have been offered by several writers, such as Marion, they owe their parentage to this definiton and all suffer from the same congenital weakness.[5] The definition is so general that it lacks much explanatory power. This is due to the complexity of the process which is being defined. A single statement is inadequate to accurately describe the process. However, it misses an important point which Shaffer noted.[6] Vertical coordination is ultimately a problem of preference articulation. More precisely, vertical coordination is the process by which consumer preferences are articulated, communicated and translated into the economic incentives which lead to the provision of those goods desired by consumers.

This definition also suffers from an unadvoidable dose of over-generality, but it does focus attention on preference articulation, which is lacking in other definitions. The recognition

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of demand is the first step in vertical coordination. It is also the step which is most difficult for producers to accurately assess. However, it is crucial that the incentives communicated be consistent with the production opportunity set. Thus some preferences may go unanswered as they are outside of the set.

In most cases consumer preferences must be communicated across several interfaces linking a set of vertically related firms. Farmers are usually the most distant from final consumers and therefore, must depend on intermediaries to communicate consumer demand to them. It should be noted that while in the U.S. economy the consumer is generally held sovereign, even in those economies which are held to be authoritarian the problem of vertical coordination still exists. Although, the preferences may be given.

2.2.1 Complexity of Vertical Coordination

While Mighell and Jones, Marion and others have offered rather simple definitions of vertical coordination, it is clear from their writings they recognize the complexity of the task. One reason for this complexity is the nature of production, marketing, and distribution in a developed economy. The number of transactions that are conducted between the primary producer and the final consumer are numerous. Although the result of each transaction may add value to the final product, each transaction increases the likelihood of miscommunication of consumer preferences or the economic incentives.

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In addition to the problem of communicating across several interfaces, consumers express preferences across a wide range of attributes that goods may possess. In this respect it is useful to recall Lancaster's analysis of consumer utility.[7] Lancaster views consumers demanding, not a good per se, but rather a bundle of utility increasing characteristics, which vary among goods.

In this approach vertical coordination may be thought of as the process of supplying bundles of utility increasing attributes to match consumer demand. The coordination problem is more complex than "just" supplying a good. It is the problem of supplying a good with the desired characteristics. For example, several potato processors supply fast food chains with frozen french fries. These french fries must not be any french fry, but must be made out of potatoes with specific solid and sugar content so that they fry to the desired color. Potato processors find it necessary to contract with growers in order to obtain the desired characteristics. Thus contracting either through private treaty or collective bargaining has replaced open markets.

Marion lists four basic characteristics over which coordination must be accomplished. They are; 1) What is produced and marketed; 2) When it is produced and marketed; 3) Where it is produced and marketed; and 4) How it is produced and marketed, i.e. the efficient use of resources.[8] The coincidence between Marion's list and an introductory agricultural marketing book's list on forms of consumer utility is not accidental. It is over these areas that consumers expres

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express preferences and from which they gain utility. The list is deceptively simple. Intrinsic to each category is an infinite variety of particular specifications which could be demanded. The goal of vertical coordination is to identify these demands and transfer them vertically along with the economic incentives for their provision.

Considering all the factors that must be accounted for, it is remarkable that any product reaches the consumer remotely resembling the product demanded. Of course, the match is never perfect and in some cases there may be considerable discrepancies. It may also be the case that consumers are unable to express their preferences or that they lie outside the production opportunity set.

A common problem in agricultural subsectors is the existence of cyclical or wide production fluctuations. To be sure, part of these fluctuations are due to uncontrollable factors, such as weather. However, for many commodities these fluctuations are primarily a result of producers' decisions. The examples of hogs and cattle are famous. In times of shortages, thus high prices, consumers are apt to complain bitterly and make substitutions in their consumption patterns. These situations certainly cause consumers hardships, while in times of "oversupply" it is the producer who suffers. In many cases, the shifts in production do not seem to be in response to fundamental changes in consumer demand or in the costs of production. However, as subsectors are presently organized, producers are unable to accurately assess demand for <u>their</u> product before

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before they must make production decisions. According to Marion's list this seems to be a problem of when and how much of a product is produced.

The transmission of the economic incentives has been mentioned obliquely several times. In practice, it may be very difficult to separate a problem of preference articulation from that of lack of economic incentives. Is a grading problem in beef one of consumers not being able to effectively articulate their preferences for the different grades of beef, or is it because the economic incentives are lacking? For preference articulation to be effective the preferences must be accompanied by the economic incentives necessary for the production of goods consistent with preferences and the production opportunity set.

2.2.2 Performance Dimensions of Vertical Coordination

Performance is the flow of consequences resulting from a set of institutions, behavior, or other environmental conditions or changes therein. Ultimately, the evaluation of performance must be undertaken to identify problems within a subsector and to offer solutions. Performance is multi-dimensional and those factors selected for evaluation are certain to shape the course of the analysis. For this reason the selection of performance criteria is a crucial step.

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Performance measures in market analysis usually concentrate on three or four variables. Scherer, whose list is typical, includes production and allocative efficiency, progressiveness, full employment, and equity.[9] Shaffer in a paper analyzing pricing mechanisms makes a case for performance measures which are " both more general and more specific."[10] While his list is more extensive than most, the important point is that individuals express preferences for not only the goods which the food and fiber system delivers, but also the manner in which vertical coordination is achieved. Is it a fair system? What are the nature and extent of externalities which result from vertical coordination?

These issues are both political and economic in nature. They are political in the sense that some preferences must be articulated through the political arena. They are economic in the sense that the expression of certain political preferences can affect the outcomes of the economic sphere. Indeed, many of our laws are designed specifically to affect the outcome of the economic system, so much so that the link between the economic and political arenas is often inescapable.

In the evaluation of performance that will be conducted in this research, consideration will be given to both those performance measures which are commonly included in vertical coordination studies and to those performance measures which are sometimes considered more political in nature. The interesting point is that unlike most vertical coordination mechanisms, conscious forethought can

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can be given to these performance measures while the design of the system is being contemplated. It seems possible to design a system which can achieve various performance goals that have both political and economic content.

The performance list which Scherer and others have used is generic in nature, though they are usually employed in studies of market performance. Several authors(see Shaffer and Hamm, Marion,Jesse) have developed performance measures which are more specific to the food and fiber system.[11,12,13] For example, Shaffer and Hamm have offered the following list of performance measures;

1. An abundant and reliable supply of food.

2. Food which is consistent with consumer tastes and with resource constraints.

3. Food which is safe and nutricious.

4. A concern for environmental impacts.

5. A desire for a fair system.

They note further that " All dimensions of performance are dependent on how effectively the modern food system is vertically coordinated."[14]

Although this list may not be immediately operational, it includes most of those performance criteria normally found. The remaining portion of this discussion will use this list as a guide putting it in more familar terms. The significance of this list is that it includes both economic criteria and criteria which are normally expressed in the political arena.

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Before a discussion of the specific performance criteria can begin it should be noted that a listing of performance measures almost always implies tradeoffs. The existence of tradeoffs makes the goal of maximizing performance illusory. It is doubtful that a societal consensus can ever be reached on any performance measure and the adherence to strict standards or norms is misleading.

> " The facts are that good performance is a set of sometimes conflicting goals; the economic world is complex, changing, and never fully knowable; and the economic results of interest range along continuous scales from good to bad rather than being clearly one or another. Economists must accept this if they are to produce valid information, and the public must accept it if effective use is to be made of such information for policy purposes."[15]

2.2.2.1 Efficiency

Efficiency often appears to be the raison d 'etre of economists. It has been the belief of many that once an efficient allocation of resources has been accomplished, society can take whatever actions it deems desirable to affect other outcomes. Usually though, efficiency is only one of several performance criteria listed by most analysts and in many cases these criteria are not overly mutually compatible.

A basic difficulty with the notion of efficiency is its definition. "A definition of an efficient allocation of resources is difficult because there is no single magnitude which is being maximized. For example, it is impossible to talk about the output of the economic system as a whole because there is no unambiguous way of addi

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adding up all the different goods which are produced."[16] Different people will have different definitions of what efficiency is and how it should be achieved.

Another problem with the application of efficiency as a performance measure is that it is often employed to the exclusion of others. Earlier it was stressed that the evaluation of performance involves tradeoffs. It is very likely that the pursuit of efficiency, narrowly defined, may have to be lessened in the hope of achieving some other goals, such as equity.

However, the difficulties with the concept should not be overstated. Efficiency is an important performance variable and is considered as such in this research. It is safe to say that most people would desire the highest level of efficiency possible,ceteris paribus. Two types of efficiency are usually mentioned in vertical coordination studies. They are technical and allocative efficiency. Technical efficiency refers to the notion of technically organizing production processes so that the most amount of output may be produced from a given amount of inputs.

Pricing or allocative efficiency is usually analyzed more fully in vertical coordination studies than is technical efficiency. The essence of vertical coordination studies is to investigate the status of coordination within agricultural subsectors or across vertical interfaces. Allocative efficiency refers to the level with which this vertical coordination is accomplished. Although the two types of efficiency are usually treated separately, there is a relationship c

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between the two. The vertical coordination mechanisms used obviously affect the level of allocative efficiency. However as will become clear later, the mechanisms of vertical coordination can also affect the level of technical efficiency achieved.

Breimyer refers to allocative efficiency as coordinational efficiency. "It(pricing efficiency) refers to how well the marketing system carries out its function of giving directional coordination to the entire production and marketing sequence."[17] The directional device used in most transactions is price.

Price is assigned a unique role in market economies. Its function is to carry all the information necessary for consumers and producers to make rational allocation decisions. This means that price is both a signal for preference articulation and a carrier of economic incentives. The degree to which price accomplishes this function is the level of pricing efficiency.

The difficulty in measuring pricing efficiency is identifying those variables which are indicators of poor or good resource allocation. An example of poor pricing efficiency might be the lack of nonexplainable price differentials for different qualities of beef. It has often been said that producers will produce a leaner piece of meat if they receive the proper incentives. Why aren't they receiving the proper incentives? Another example would be the occurence of wide fluctuations in production not explainable by uncontrollable factors or changes in consumer demand or the costs of production.

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Advertising and other promotions provide difficulty in evaluating pricing efficiency. How much of these activities are productive and to what extent are these activities wasteful? It seems that the indicators used must to some extent fit the situation. Within this research those aspects of pricing efficiency included are; 1) the ability of prices to accurately express quality, temporal, and spatial differences; 2) the ability of prices to convey economic incentives; and 3) the overall ability of prices to effectuate allocation decisions.

The section on pricing mechanisms will treat more fully the role of price in a market economy. It should be noted though, that as markets depart further from the norm of the perfectly competitive model and the likelihood that firms have some ability to effect price increases, the allocative role that prices are designated to perform becomes increasingly more difficult.

2.2.2.2 Adaptability

Marion in listing the four functions or performance areas of vertical coordination includes a fifth.[18] This is a vertical system's ability to adapt to changing conditions. Implied in his discussion are two opposing characteristics - stability and flexibility. Stability implies adherence to the status quo and control. Flexibility, on the other hand, implies change. According to Marion, a well coordinated channel has achieved the proper balance to these two opposing forces.[19]

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Within vertical coordination a basic tension exists between control and flexibility. Intuitively, it seems that a vertical channel that is more tightly controlled will achieve higher levels of coordination than one less so. More control would also seem to imply more stability. However this assumption is based on a narrow list of performance criteria and a narrow definition of stability.

Stability in this research will not mean lack of change, but the ability to react to change in a smooth and orderly fashion. Stability is a condition that is marked by the absence of wide or violent swings in output that are not commensurate with economic conditions. Flexibility is the capability inherent in a system that enables it to undergo changes in its organization without damaging the credibility of the system and without suffering dramatic changes in its infrastructure.

Stability is a relative term and must be judged both with respect to other systems and time. No system can withstand the continual onslaught of time. At one time terminal markets in beef could have been considered stable. But they lost their ability to adapt smoothly; eventually leading to their demise. Although continuation of the species may be one method to judge the stability and flexibility of a vertical channel, of particular interest is a vertical channel's performance in the face of constant, but minor, changes in economic conditions. Are the changes in performance justified by changes in economic conditions, or are they over or under reactions to both current and past events? It is this type of stability that is of interest.

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Change, per se, is not undesirable. In fact, society desires an economic system that responds smoothly to changes in the basic conditions of supply and demand. It is the inability to react to this changes or unwarranted reactions that cause problems. Prices are normally considered to be the catalyst for change by influencing the production and consumption decisions on the economic actors. However, the reaction induced by prices are often after the fact. This can lead to severe economic hardships for many people.

Many systems lack the ability to induce change with respect to production and consumption decisions with enough lead time to plan for the specific conditions that will materialize. One important goal of this research is to find out if an FDCM can be designed such that individuals are able to acquire enough information in advance of major allocation decisions that their decisions will more accurately reflect the conditions that materialize. That is, more closely matching demand which is consistent with the production opportunity set.

2.2.2.3 Equity

Equity is often included in lists of performance variables, yet is often ignored in the final analysis. The major difficulty is applying an economic notion to the term and its measurement. One aspect of equity is the distribution of costs and benefits. However, what standard does one apply in determining whether one distribution of cos

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of costs and benefits is superior to another? To farmers an equitable system might be one that returns them a "fair" price, usually defined as parity or covering some measure of the costs of production. To first handlers an equitable system is one that enables them to obtain their product for the same price as their competitors.

Rather than concentrating on the outcome, another approach is to look at the process. Are the rules of the game such that there is a strong likelihood for an equitable outcome? There are several variables that can affect the process. In terms of most markets they are related to bargaining power, which may be a function of size or differential access to information. One of the hypthosized advantages of perfect competition is that, given the initial distribution of property rights, it is an equitable process. It is equitable in the sense no individual can affect the terms of trade or prices.

It is apparent that as markets depart from the norm of perfect competition the possibilities for influencing the terms of trade or prices increase. As this happens the issue of equity becomes more important.

Both notions of equity, the outcome and the process, will be used in this study. As the initial demarcation, prices will be considered equitable if farmers are able to cover all their costs and a fair rate of return. The use of the word fair is ambiguous. The notion of a fair return will vary among farmers from time to time. It should probably be stated as a range or at least some minimum.

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The competitive market is an ideal and the two most important conditions leading to this ideal are numerous homogenous buyers and sellers and perfect information. At least initially, an FDCM seems to lack the potential to affect the structural condition of absolute numbers of buyers and sellers. However, it does have the potential to widen market access for some producers and first handlers and to increase the amount of information available to all.

The role of information will be handled more fully in a section of its own. However, it has been frequently noted that farmers are often at an informational disadvantage with regards to alternative market opprotunities, prices and terms of trade being offered other farmers, and a knowledge of general market conditions.

Up to this point the discussion has had a definite tilt towards the farmers' perspective. The evaluation of the potential feasibility of an FDCM must also include the first handlers' perspective in regard to this issue. The freer and increased dissemination of information has the potential to aid first handlers as well. However, as a point of fact, it is most often farmers who express concerns about the equity of the process and outcomes.

In the evaluation of the potential performance of an FDCM more emphasis will be placed on the equity of the process than the outcome. The analysis will have to be more qualitative than quantitative, since norms for measuring the degree of equity are not easy to devise.

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It should also be reemphasized that equity and several other performance measures are preferences for a good society. Most likely these preferences must be expressed in the political process. However, this does not make these preferences less legitimate than those preferences expressed in the market process.

2.2.2.4 Third Party Effects

Although it is common to think as a transaction only involving two parties, it has been long been recognized there may be other parties affected by an exchange. Commonly called externalities in the literature, these effects are characterized by costs and benefits that do not enter into the calculation of the two parties to the transaction. For example, traders in the potato futures market may have little concern for potato growers or processors. Yet it is conceivable that the prices generated in the futures market can affect the contracting process between processors and growers. Or if potato growers decide contract prices are not high enough and they have the opportunity, they may opt to switch to another crop. This decision may have impacts on growers of the other crop.

Shaffer refers to problems of this nature as institutional failures.[20] They may result from the inability of individuals to effectively articulate their preferences. In terms of traditional approaches these are commonly referred to as market failures. Institutional failures may result from the incomplete calculation of costs and b

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costs and benefits and from impacted information that prevents this calculation.

The design question is one of formulating a system that enables more of these costs and benefits to be incorporated into the decision-makers calculus. To the extent that an FDCM can free information that prior to its establishment could be considered impacted, the decision-maker can ascertain the fuller impacts of his decisions. Although, there is no guarantee that the incentives will be in place for him to do so. The increased information may help those who would be adversely affected by decisions made by others as they will see the aggregate consequences of these decisions.

More positively, since there is a conscious design behind an FDCM(or it could be any other vertical coordination mechanism) the design of the system can be such that it will minimize the major third party effects. Of course, it is not always possible to "minimize" these effects. But it is still possible to to delineate what these effects will be so that a rational decision can be made about the tradeoffs involved in adopting such a system.

This will be the course set upon in this research. Regardless of the design of any system there will always be third party effects. It is believed that the responsibility here is to carefully describe what those third party effects will be in the case of an FDCM and to make clear what choices are involved.

There are three major third party effects which are immediately apparent with the institution of an FDCM. First, there are those p

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parties who stand to lose because the role they play in the present system no longer serves a purpose. The conventional role of brokers arranging a sale for shippers comes to mind. Second, The institution of an FDCM in potatoes could have large repurcussions for other subsectors. For instance, if production fluctuations are reduced in potatoes through better planning, the cropland that is freed from or is utilized for substitute crops could have dramatic impacts on the producers of these substitute crops. And three, there are farmers, first handlers etc. who for either reasons of size or inability to change may be unable to cope with the system under an FDCM. Hopefully, these latter type of third party effects will be minimized if the system is properly designed.

2.3 MECHANISMS OF VERTICAL COORDINATION

Vertical coordination is a process which can be accomplished via a host of different methods. Shaffer and Schmid point out that are three major classifications for transaction systems. These are status, administrative, and bargained.[21] In a status system transactions are mainly directed by social postition. That is the rules of exchange are guided by or prescribed according to one's social status or custom. Under administrative exchange the rules or terms of exchange are set by a central authority or fiat. In bargained exchange, the "transactions are governed primarily by a set of impersonal rules (i.e. the same set of rules apply regardless

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of social or political position) within which exchange terms are established by the bargaining process."[22]

The U.S. economy combines all three types of transaction systems to coordinate supply and demand. While the bargained form of exchange is probably still the most important, the other two forms of exchange are by no means insignificant. For example, in potatoes it is common for retailers to set a price on their potatoes such that traffic in the store is increased, but which may not reflect current supply and demand. Even status may be an important component of the transaction between a grower and first handler.

2.3.1 The Price System

> "The price is the only information that is known in the market, since this is common to every transaction. Every trader will know how much he himself has traded, but not the aggregate amount traded by everyone. This is not because of secrecy, but simply because the information is not evident - it must be collected and assembled."[23]

This fact has caused problems in theory and in practice. Price is a reflection of supply and demand, but if no one knows these aggregate statistics, how is priced determined. This is the function of pricing mechanisms. To collect and assemble the information regarding supply and demand so that this information may be used in the process of price formation.

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Tomek and Robinson have made the distinction between price discovery and price determination. In their terminology price determination it refers to the basic underlying conditions of supply and demand of which prices are a function. Price discovery, on the other hand, is the actual process of establishing prices. It refers to the numerous ways or pricing mechanisms that are used to establish price.[24]

This report will avoid the term price discovery since it adds a somewhat mystical connotation to an economic process. The term price formation will be preferred. While itself not overly descriptive, it at least implies that price is an output of the collection of information regarding supply and demand and how a particular pricing mechanism may process this information. Obviously, some mechanisms will do a better job of this than others.

While price is accorded a special role in neoclassical economics, relatively little attention is attached the variety and large amount of information it is supposed to convey. Collins questioned seriously the efficacy with which price accomplishes its role as the prime director of economic activity.[25] He noted that in a decentralized market economy three conditions must exist for coordination to be achieved. First, there must be a communication system which links the related performing units in the system. Second, a language or set of signals must be transmitted over the system which accurately characterize the relevant variables. And third, each party must be willing and able to translate these signals into the appropriate set of actions.[26]

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Prices are these signals. Collins went on. "The advantage in using price as a director of economic activity is well known. Ideally, data describing a large number of economic variables are summarized in a schedule relating quantity and price with relevant quality factors subsumed under the definition of the product to which the prices apply."[27] This is indeed a large amount of information to be communicated via one statistic. How well do the prices generated in agricultural markets(or any other market for that matter) do this?

The interest in alternative coordination mechanisms is in part a verdict that prices are not always the coordinating device that theoretically we hold them to be. When prices do not convey all the information which is necessary to guide economic activities effectively it may become prohibitively expensive to use the price system. Prices must be able to say something about the relevant product characteristics to each individual dealing with the product.

The path to improving prices is usually through the improvement of the pricing mechanism. This improvement can be by strengthening the auxiliary vertical coordination mechanisms which support a pricing mechanism. However, history has shown that when prices are no longer deemed reliable it is usually the pricing mechanism which is affected. The demise of some terminal markets is a case in point.

What conditions seem to be necessary for a pricing mechanism to effectively collect and disseminate the information which is necessary for the prices formed on a market to communicate consumer preferences and economic incentives. One condition seems to be the establishm

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establishment of a "critical mass" of informed traders. Ignoring for the moment the determination of this critical mass, concentrate on the concept of an informed trader. By informed, it is meant those traders who by virtue the economic imperatives facing them make it their business to stay abreast of the supply and demand conditions which relate directly to the commodity they are buying or selling. For example, it is assumed that potato growers or processors, given their livelihood is directly dependent on the prices they buy or sell at, have strong economic incentives to be informed. To be sure, some individuals will be better informed than others. This can be attributed to either differences in management ability or differential access to valuable information. These differences may also affect the outcome, i.e. price, so that they may not represent conditions of supply and demand as much as they represent bargaining power.

While the determination of a "critical mass" will not be handled here the notion is still important. Intuitively, it would seem that the number of informed traders should be large enough that their collective opinion has a measureable, if not disproportionate impact on price formation. Futures markets usually have a large number of traders. However using our definition of informed, the majority of traders may not be informed. The effect of their presence in the market on prices has been hotly debated. Yet, while most studies appear to be inconclusive, the evidence shows that as a group speculators suffer losses. Although these speculators add liquidity to th

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to the market, which is essential, their impact on prices with respect to accurately reflecting supply and demand conditions cannot be beneficial. Grossman and Stiglitz have pointed out that the uninformed trader can act as a free rider benefitting from the quality information informed traders bring to the market.[28]

Another condition which seems vital to the formation of accurate prices is the existence of relevant information. Relevant information might include data regarding aggregate production, inventories, prices in other markets, prices offered by competing buyers or sellers, costs, weather,etc. The availability, in effect, makes traders more informed. If this information is readily available during the price formation process and is incorporated by traders, it seems reasonable to expect that the prices generated will more accurately reflect this information.

The ease of access into and exit from a market would also affect the efficacy of the pricing mechanism. Ease of access to a market seems desirable. For one this would encourage the number of traders, which would add liquidity and possibly increase the number of informed traders in the market. While access should be relatively easy it should not be costless under certain conditions. When quality or solvency is a particular concern the ability of a pricing mechanism to guarantee at least some minimum level may be vital to its survival.

Although access to a market should be relatively easy, exit should be relatively difficult. Hirschman in Exit, Voice, and Loyalty points out

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points out that in organizations and markets when exit is costless members may have little incentive to correct what they perceive to be failings in the organization. However, if exit is costly, members do have an incentive to correct poor performance.[29]

In a sense this is related to the concept of informed traders mentioned above. If a trader finds the costs of leaving a particular pricing mechanism high, he may find it in his best interest to improve the mechanism. In practice this may be hard to do since the cost of using a particular coordination mechanism is usually in terms of what the next best alternative is. One does wonder though, that if there had been a method to prevent the exodus from terminal markets if more of them might be in existence today operating at a higher level of performance than at their demise.

At least one other condition would seem to affect the performance of a pricing mechanism. Most prices in the food and fiber system are determined after major production decisions are made. These prices may do a good job allocating a given supply, but since they are unknown when major production decisions are made it goes without saying they are of no value in making these decisions. In fact, it is not uncommon for production decisions to be made months in advance of when the product's price is actually determined. Relatedly, many marketing decisions are made in expectation of certain conditions to materialize.

The timeliness of the information and prices generated in a particular pricing mechanism seems critical. Is there a way to design

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pricing mechanisms so that the information relevant to future conditions is revealed? Presently, most pricing mechanisms, with the exception of the futures market, do not make information available regarding what future supply or future demand will be. Since there are few mechanisms available for economic agents to acquire this information, present spot prices do seem to have acquired disproportionate importance in decisions regarding future production and consumpion decisions.

2.3.1.1 Pricing Efficiency

Pricing efficiency refers to the overall ability of price to direct economic activity so that resources are employed in their most valued use. Tomek points out that efficiency criteria typically use the competitive model as the norm.[30] This criteria sets an impossible goal and raises questions about second best. Another common measure of pricing efficiency is the degree of variability in prices. Are they reflective of market conditions or do they fluctuate too much or too little? This criterion has been included under the heading of stability and flexibility in this work.

Another popular notion of pricing efficiency is the speed and accuracy that prices reflect changes in basic economic conditions. This criterion is often referred to as market efficiency. A market is considered efficient if the prices formed on the market reflect all the available information.[31] While this interpretation of pricing

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efficiency is usually applied to futures and stock markets, the concept interpreted has relevance to all markets.

Since perfection is an impossibility, the concept of pricing efficiency is a relative term. Can pricing mechanisms be designed that enable the prices generated to come closer to this ideal than any other type of vertical organization? The evaluation of the pricing efficiency of an FDCM will be relative to other vertical coordination mechanisms. This evaluation will have to be more qualitative than quantitative, since as yet no FDCMs exist.

This analysis will concentrate on a pricing mechanism's ability to generate prices that come close to fulfilling the role that Collins describes. That is, as the primary coordinational signal for production and consumption decisions. This does not mean that price will be the sole director of economic activity. The effectiveness of a pricing mechanism judged by the quality of prices generated will be in part a function of the other information provided by the mechanism which can be used in the price formation process. Additionally, the information provided once the transactions are complete, such as quality and time of delivery, will also be valuable to those trying to interpret what exactly prices represent.

Although the trend has been away from open markets and there are considerable difficulties in practice with the ideal of a perfectly competitive market, coordination through prices does have desirable attributes. Coordination by prices in many instances may be an inexpensive method of assembling and disseminating information to guide alloca

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guide allocative decisions. Market prices also are a form of decentralized coordination which may add flexibility to the system and may be desirable for political reasons.

Most of the discussion has centered around prices that are formed in open markets. A great many prices, though, are not formed in what would be typified as open markets. In these cases the problems of imperfect information are exacerbated. In situations that may be more accurately described as private treaty the mechanisms for assembling large amounts of information regarding aggregate sales, other market prices, etc. may not exist. For example, potato growers negotiating with potato processors may have little knowledge of general supply and demand conditions or what other market opportunities are available. In fact, these types of situations may be more common than actual open markets. If a pricing mechanism is desirable because of the information it is able to transfer, then there would seem to be a case for establishing pricing mechanisms that meet the four conditions listed previously.

In summary, the case has been made that prices found in the food and fiber system fall short of their role which theory has assigned to them. Yet, there may be benefits in designing pricing mechanisms which can produce prices that come closer to their all inclusive purpose. The two major weaknesses that prices suffer from are the lack of information that is available for their formation and the existence of firms with market power. The two problems in some cases may be inseparable. Market power, simply defined as the ability to

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influence price and other terms of trade, may be used in some instances to distort or withhold information.

The challenge is to design pricing mechanisms that enable all relevant information to be assembled and also place incentives for firms to divulge relevant information. Even under the best of conditions, price alone can probably never accurately summarize all the information that is necessary to make intelligent allocation decisions. The pricing mechanism that is used should also be able to provide the rest of the relevant information that cannot be encapsulated in price.

2.3.2. Alternative Vertical Coordination Mechanisms

The price system is just one method to coordinate a vertical system. The major distinction that is made in the literature is one of centralized control versus decentralized control. The two extremes usually made are a vertical system completely coordinated by markets and vertical integration. There are strong economic incentives that favor one form of organization over another, but the existence of auxiliary coordinating mechanisms may influence the relative costs of using one system over another.

2.3.2.1 Auxiliary Coordinating Mechanisms

Auxiliary vertical coordination mechanisms are those mechanisms which are not theoretically contingent to the exchange, but facilitate the exchange. Of those mechanisms market news might be the most prevalent. Market news is a generic term which includes crop and price reports, planting intentions, cold storage movements, general indicators of economic conditions, etc. Some of this information is publically provided. The justification for this provision is that information has many of the attributes of a public good and improved coordination has benefits to society as a whole.

While the provision of this information appears to be innocuous, it has roused considerable controversies. Many people claim it is a service that should not be publically provided and others, such as some farmers, have claimed that it benefits the wrong parties — those with economic power. This will be handled in greater detail under the section covering information, but the need for any additional information is an indication that prices are not providing all the relevant information.

A second institution that has developed which aids vertical coordination is the provision of grades and standards. Farris states that the establishment of grades and standards assists vertical coordination in two ways. First, they increase the knowledge about a particular product. Second, they reduce the costs of transactions by removing the need for personal inspection.[32]

The effectiveness of the grading system depends on the willingness and ability of market participants to accept them. Also important is the ability of prices to reflect those differences in grades w

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grades which have economic justification. If either of these requirements fail to occur, grades and standards become superfluous to the transaction.

There are many other alternative forms of vertical coordination, such as marketing orders or cooperatives, however, for the moment these will be the only forms considered since they have particular relevance to an FDCM. Futures markets and bargaining associations, which are also particularly relevant, will be handled in a separate chapter.

2.3.3 CONTRACTING

The terms contracting and vertical integration are often used synonymously. Both imply a greater degree of control by one firm than is associated with a market system coordinated by price alone. However, it seems useful to distinguish between these two forms of vertical coordination. Mighell and Jones define vertical integration as "those situations in which a single firm has taken over the administrative operation of two or more stages of production."[33] This definition is somewhat stringent in that each stage of production must produce a saleable commodity.

A contract is basically the giving of a promise for a promise. I promise to perform a specific duty in the expectation that you will perform a specific duty. Contracts may be either written or oral. Macaulay considers contracts to contain two essential elements; 1) a

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rational planning of the transaction with careful provision for as many future contigencies as possible; and 2) the existence or use of actual or potential legal sanctions to insure performance or to compensate for non-performance.[34] This is the general definition used in this report for a contract.

Contracting is often considered a form of vertical integration. The basis for this belief is that contracts seem to imply a transfer of control to the contractor from the contractee. And in some cases of contracting the degree of control transferred does seem to make it virtually indistinguishable from vertical integration. Yet the incentives to contract may not be the same as the incentives to vertically integrate.

One incentive to vertically integrate is to reduce costs. The classical example is the combination of blast furnaces with rolling mill operations in the steel industry. This reduces production costs. Williamson contends that this incentive is insignificant and it is the desire to reduce transaction costs, i.e. those costs associated with using the market that firms want to minimize.[35] Galbraith cites the desire on the part of firms to minimze uncertainty. Given the technological necessity for very large investments, large corporations find it ncessary to control as much as possible to ensure their survival.[36] Another commonly mentioned incentive is the ability to exercise market power through vertical contracting. It should be noted that there are two opposing schools of thought on this point.

A review of the incentives to contract point to many of the same incentives. Potato processors can run their plants more efficiently through contracting. Similarly, they are also able to obtain the product characteristics they desire perhaps more cheaply through contracting and this reduces their uncertainty. Finally, contracting may be a more efficacious way for them to exercise their market power. Although this seems unlikely, given the existence of bargaining associations in potatoes and the gains to this type of strategy are probably not in themselves enough to explain the existence of contracting.

Besides the relative degree of control transferred, the biggest difference between contracting and vertical integration seems to be how their respective ends are achieved. It is recognized that the overall incentive is to reduce costs, but vertical integration does this through greater control and reduced transaction costs. Contracting does this through the reduction of uncertainty regarding quantity, quality, timing, etc. Under a vertically integrated system the production-marketing process is controlled by a single firm. Admittedly, this also reduces uncertainty, but it may also have the effect of raising costs in certain areas as the limits of management may be pressed. Contracting on the other hand may also imply a shift of control, but usually not as great as in vertical integration. Most contracts according to Macaulay while carefully detailing the specifications of the product to be delivered do not specify the manner in which they are produced.[37]

Of course, like most other distinctions there are grey areas. Harris and Massey point out that in contracts there is a wide range of control transferred. This range may go from the independent contractor to the employee of a a firm. Many forward contracts in agriculture are of the independent contractor form, but in the case of some broiler contracts the form of the contract is more similar to an employee-employer contract.[38]

2.3.3.1 Contracting and Uncertainty

Macaulay's definition of a contract stressed two points; contracts involve planning for as many contigencies which are foreseeable and there is at least the potential to legal recourse to guarantee performance or to collect compensation for non-performance.[39] Both these conditions have the effect of reducing uncertainty with respect to the transaction.

Arrow noted that if the market existed for what he termed complete contigency contracts a Pareto optimal could be obtained. The basic concept was that if contracts could be written that specified contigencies for all possible states of nature that could occur then transactions conducted under these would lead to the most efficient allocation of resources possible under the existing set of property rights. The problem is though that no one knows all the possible states of nature that might occur and given the limits to human rationality such a contract would be too complex for the human mind to handle.[40]

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Macaulay's findings show that the behavior of contracting parties may actually approximate complete contigency contracts. He found that although a legal document existed the form of contract was more relational than legal. Basically, Macaulay found that a wide latitude of performance was possible in most contracts, even though most were quite specific in their terms.[41]

Most often contracting parties prefer to settle their disputes over performance via a "Gentleman's agreement", much to the chagrin of their legal departments. Macaulay also noted that in most cases this was a least cost method of settling disputes and only in the most severe cases were legal sanctions resorted to.[42]

Demsetz in "Information and Efficiency: Another Viewpoint" disagreed with Arrow both in fact and in theory.[43] Demsetz argued that the real economic system does allow for the exchange of contigency contracts. He used cost of living adjustments as an example. Demsetz basic thrust though, was that there are costs involved in the description of complete contigency contracts and that these costs should be treated like any other cost. One can not argue that the non-existence of complete contigency contracts represents a non-optimal solution. Rather this only reflects that resources are scarce and they may be put to better use than formulating complete contigency contracts. It only pays to continue specifying contract terms only as long as the gains exceed the benefits.[44]

Returning once again to Macaulay's notion of a contract, the point of interest is that planning is a crucial component. Contracts through the specification of the terms are able to reduce uncertainty to the contracting parties and are able to facilitate their planning. However, it is the threat of legal sanctions that ensure performance of the contract. As Macaulay noted though, rarely are these legal sanctions resorted to. In fact, the most effective sanction that could be imposed was an economic one — the threat of discontinuing business and/or the destruction of a firm's goodwill. He found that although this threat was also a last resort, it was employed much more effectively than the threat of legal sanctions.[45]

This evidence seems to indicate that contracts are; 1) an effective device for planning; 2) more contigencies can be built into them than commonly thought of; 3) the incentives for performance allow a wide range of latitude depending upon conditions that develop; and 4) only rarely is the threat of economic or legal performance necessary to guarantee performance.

Although there are several advantages to contracting, there are also some disadvantages. One is that most contracts are not negotiated on an open market. The disciplinary force of competition may be absent. Given this, it is unclear whether contract prices would reflect all conditions of supply and demand or bargaining power.

However, some firms with market power can use competition among trading partners quite effectively. General Motors contracts with several firms for products of a specialized nature. Most of these contracts are a year in duration and GM owns the equipment necessary to make the parts. They, as a matter of practice, contract with more than one firm. This is a strategy to reduce the bargaining power of the firm acquiring the contract. However, if a large amount of goods are contracted rather than bought and sold in an open market, price is lost from the public domain. Any of the allocative power which resided in price may be lost.

Since contracts may be more distant from the policing force of competition and the information service markets may play, the use of bargaining power may yield greater gains in contracting. The initiation of bargaining associations in potatoes is, in part, a reflection of this concern.

Contracts may also reduce the ability of a firm to react to profitable opportunities or to pull out of unprofitable ones. Potato growers, who have contracted with first handlers, may find themselves in the position they have restricted their profit opportunities by contracting or vice versa. If the differences are large the incentives to break the contract are also large.

Another disadvantage to contracting and related to above is the loss of control a firm may suffer. Although the transfer of control or loss of flexibility may be small in most contracts there is some element of this as soon as a firm agrees to perform a certain task.

And, of course, there is always the possibility that a firm may fail to live up to its responsibility. Though there may be both economic and legal recourse against the offending firm, this probably rarely covers all the costs that may be associated with a firm failing to fulfill its contract.

2.3.3.2 Contracting in Agriculture

Contracting has long been used in agriculture. Holder and Sporleder define forward contracting as a "written agreement between a producer and a contractor relating to the delivery and acceptance of a specified product at a later date."[46] There are three basic forms of forward contracting in agriculture. These are; market specification contracts; production management contracts; and resource providing contracts. Although the demarcation between the contract types is not clear-cut, they are listed in ascending order by the degree of control transferred to the contractor.

Market specification contracts are usually signed after production begins and specify the quantity to be delivered, but not always the quality. The producer retains title to the product until after delivery. Normally cultural practices are not specified and the producer provides the inputs.[47]

Production management contracts differ from market specification contracts in that they are signed before production is begun and specify both quantity and quality. The producer retains title to the product until delivery, but often inputs may be provided by the contractor. Cultural practices are commonly specified.[48]

Resource providing contracts are the most restrictive in terms of limiting the farmers initiative. The farmer usually provides land, labor, and perhaps some capital in the form of buildings, etc. The production process and title to the product are in the contractor's hands once the contract is signed, which is before production begins.[49]

A common incentive for producers to contract is the assurance of market access. In many areas growers may be relatively numerous, but their outlets may be relatively few. Although, this is not a necessary condition. Those growers who produce a commodity which is specialized or particularly perishable may also find it necessary to forward contract to assure a market.

Another common incentive for contracting is the desire to reduce price risk. It was found that in at least fifty percent of the contracts reviewed in a study by Mighell, Jones, and Gavett stated the price to be received and over two-thirds stated how the price was to be determined.[50] In effect these contracts shift the price risk to the first handlers, usually processors.

Contractors may be better able to handle this price risk for several reasons. First, given their position in the vertical channel they are better able to predict what the future demand for a commodity will be. In personal interviews with potato processors, it was found that many of them have forward commitments with their customers for at least part of their production. Normally, contractors because of their size and resources are better equipped to absorb price risks than farmers. Part of this is due to a

contractors' ability to diversify both the commodities they deal in and where they offer contracts. Also contractors may not be overly interested in the price they pay as long as they are not paying more than their competitors. Additionally, if a contractor is large and has sophisticated management it may be able to make better use of the futures market if available than a farmer.

Producers who forward contract may find it easier to obtain credit than if they didn't contract. Loan institutions are much more willing to extend credit if a farmer possesses a forward contract that specifies price and guarantees a market.

Forward contracts may also add stability to a producers income. It was found in this research that prices negotiated between bargaining associations and potato processors usually reflected changes in costs of production from year to year. Since most costs have been rising recently, contract prices have risen along with these costs. However, it should be noted that to a person all producers said the price increases were inadequate to cover the increase in costs. But some price increase was better than none.

Ewell in Contract Farming, U.S.A. noted several other incentives for forward contracting. Some of these incentives included; 1) reducing farmer's responsibility; 2) farmers may benefit from skilled support given by the contractor; 3) farmers may be able to increase the size of their operation; and 4) farmers may receive various inputs from the contractor.[51] The most beneficial of these incentives seems the availability of skilled support. A large processor may be more abreast of the latest production advances than most farmers. This aid is a form of information dissemination.

Obviously, the contractor benefits from giving this aid also. By more closely supervising the production process, contractors may better ensure themselves of the product characteristics they desire. However, many potato growers, at least, felt that the use of field people was a method for the contractor to become better informed of the farmers' intentions and strengthen their bargaining position.

Like any transaction, a contract takes two parties. The first handler has incentives to enter into contracts with growers. In some respects they are the mirror image of a grower's incentives.

Most contractors want to assure themselves of a supply of the commodity. There are a variety of reasons for this. One reason is to assure the firm a commodity meeting the quality specifications it needs in its product. Earlier it was mentioned that potato processors contract for potatoes with specific solids and sugar content so that they can produce the quality of french fry demanded by their customers. Although the open market may be cost effective for obtaining many goods, it may be an extremely expensive way to acquire goods with strict product specifications, where delivery dates are crucial, and they are needed in large quantities.

Another reason for assuring themselves of a supply is the desire to run their operations more efficiently. Many firms with a large capital investment and large labor costs find it necessary to schedule delivery of products so that they can run the lines more or less constantly, since shut-down and start up costs may be large.

Firms who contract with farmers may also have the desire to fix the price to reduce their uncertainty. While they may still have price risk on the down side they reduce the price risks on the up side. Several other incentives that firms may have is the ability to exercise greater control of the production process. This again may be to ensure a uniform quality and to increase production efficiencies. In the case of broiler contracts it has been suggested feed companies may have contracted with farmers to widen the scope of the market for their feedgrains.

If an analysis of the incentives for forward contracts is done for both farmers and first handlers the common feature of most of the incentives seems to be the reduction of uncertainty. Through contracting both parties to the contract are able to reduce or eliminate some of the risks they face. In general first handlers are able to assert a greater degree of control without resorting to ownership. This must be done at a cost though, first handlers must be willing to accept some of the risks that formerly farmers bore.

The choice between open markets and forward contracting is conditioned on a number of factors. Mighell and Jones note that custom or convenience may be as equally important as some traditional economic considerations.[52] However, they further note that contracts have the advantage of being specific in the areas of control. The effect may be to give a firm the ability to extend its influence much further than its resources would allow.[53]

In the study by Mighell et.al., they found that most contracts had a number of contract specifications in addition to price. Some of the most common specifications included;

1. Time of delivery-in about half the contracts surveyed.

2. Grades and standards-in about half the contracts.

3. Place of delivery-most common contract specification.

4. Variety and kinds of plants-less than half.

5. Cultural practices-less than half.

6. Fertilizer and pesticides-less than half.

7. The requirement for fieldmen-three quarters of the contracts.[54]

From this list it is apparent that contractors are able to greatly increase the likelihood of receiving the product they need than they probably are able to in the open market. It would appear that the incentives to achieve this control and reduction are great. It would also seem to indicate that the open market is not able to achieve this end.

Ogren and Blaich noted some of the difficiencies of coordination by open market pricing. "... and, of course, the limitations of such a directive mechanism(price system) are much more when it is remembered that prices relevant to any transaction are, in fact, not determined until after most of the production decisions are made."[55] This single fact makes the function of planning on any firms part much more difficult.

"They are supposed to tell buyers and sellers what quantity and quality of product to produce and when

> they should offer it for sale. Because of the multipurpose function of market price, firms often find it an unsatisfactory guide on which to base decisions. By becoming vertically integrated (including contracting) a firm may achieve the necessary coordination of the successive production processes."[56]

The overall incentive that seems to motivate firms to contract with each other is the reduction of uncertainty covering a wide range of variables that they are not able to obtain from open markets. When a great deal of control is necessary the market system may be very expensive to use. Forward contracts afford the opportunity to both farmers and first handlers to better plan their operations. The improved planning enables them to achieve higher returns than they might have been able to achieve using the open market.

2.3.3.3 Disadvantages to Contracting

As is the case with most things in this world there is no free lunch. While in certain situations contracts have a lot to offer, the way that most contracting is presently organized there may be costs or disadvantages involved. This is true even in those subsectors where forward contracting is prevalent.

Most of the difficulties from a farmer's point of view arise because of the manner contracts are negotiated. Although bargaining associations are present in many subsectors, the majority of contracts are negotiated via private treaty. This brings up two related problems. The differential advantage in bargaining strength and the lack of supporting market information.

It was stated earlier that one of the advantages of forward contracting for farmers was the assurance of a market outlet. The lack of other alternatives puts the farmer at a bargaining disadvantage. In many cases the farmer may be faced with one or a few first handlers he can deal with in the relevant geographical area. Thus, when a producer comes to bargain with a first handler on price and other terms of trade, the choice may be to accept an inferior contract(from the producer's point of view) or be left in the unenviable situation of an uncertain market.

Closely related to a lack of bargaining power on the producer's side is the lack of relevant information in the negotiation process. One of the virtues of an open market is that a great deal of information is equally available to everyone. Though the difficiencies in the information available in open markets has been emphasized, contracting may suffer from greater difficiencies in several regards.

In the negotiation of price information regarding total quantities available and total quantities demanded may be of great use to both parties. Unfortunately, as presently structured this information is unavailable to most producers. First handlers through their greater resources are better able to ascertain these conditions and act accordingly. Although, they too may desire better information regarding aggregate supply and demand. Most producers are also

unaware of what the majority of their fellow farmers are receiving for a similar product. This might also apply to the prices competitive first handlers are offering.

Without this information a farmer's bargaining position is weakened. It also raises the issue whether prices negotiated are a matter of bargaining power or do they reflect aggregate conditions of supply and demand. The growth of bargaining associations has been an effort to curb the bargaining power which producers perceive first handlers possessing. It seems that the success they have achieved is due to dissemination of information regarding market conditions and opportunities, rather than the bargaining strength obtained through large numbers.

What seems to be lacking under the present organization of forward contracting is the discipline of competition. Through their ignorance of not only viable market alternatives, but also their lack of knowledge regarding overall market conditions farmers frequently find themselves in a weak bargaining position. The information on open markets may not always be complete or entirely accurate, but it is freely available to participants to use to their advantage as they see fit.

As Macaulay found while legal sanctions were available in contracts it was the threat of taking one's business elsewhere which was most effective.[57] This option may not be always available to growers, but access to more information regarding competitive conditions should strengthen their bargaining postition. It should also be noted that since in several areas contracts are a valuable commodity for farmers to have, the competition amongst farmers to obtain a contract may be great. In this regard first handlers may be able to more effectively use the threat of alternative sources.

Another commonly cited disadvantage to forward contracting is the loss of control farmers may suffer. In the case of resource providing contracts this loss of control may almost be complete. Normally though, this loss of control usually manifests itself in the nature of foregone profitable opportunities.

A disadvantage to both sides is the possibility that one of the parties may fail to live up to the terms of the contract. Potato chip growers commonly complain that potato chippers will over contract and then break contracts under the dubious claim in their eyes of poor chipping quality in the potatoes. On the other side of the coin all processors told stories of potato growers breaking contracts when spot market prices were high. However, the potato grower exhibiting such behavior usually had the opportunity only once.

Processors besides suffering the risk of broken contracts also incur the risk of paying more than the market for their raw product. If the price is fixed in a contract the processor accepts the risk that spot market prices may be substantially lower at harvest time than are contract prices. However, of greater concern for processors or other first handlers is the possibility that they may be paying substantially more for raw products than their competitors.

As with any coordination mechanism the costs and benefits of forward contracting must be evaluated with respect to alternative methods. In those subsectors where contracting is prevalent it is assumed that the gains to contracting outweigh the costs. However, though contracting has the potential to greatly improve coordination through the transmission of consumer preferences and the economic incentives before major production decisions are made, the drawbacks of unequal bargaining power and the loss of information may also be great.

2.4 INFORMATION

Throughout this chapter the importance of information has been stressed. It has been repeatedly pointed out that the informational content of prices may not be enough to ensure good vertical coordination. In these cases, the open market, as such, may be bypassed or at least need to be supplemented. In the perfectly competitive model, information must be perfect in order for a Pareto Optimal to be achieved. The lack of perfect information and/or the unequal distribution of information has led to concerns about equity as well as resource allocation. The lack of information in market prices and especially the timeliness of this information increases burdens of the planning process.

There are two basic approaches to information in the economic literature. One is to treat information as a good, to be purchased until the marginal costs equal the marginal benefits. Although, because of some peculiar characteristics of information there are difficulties in applying the marginality principles. The second approach looks at how imperfect information affects economic and market behavior and how this affects resource allocation. This literature is usually under the heading of risk and uncertainty. For an excellent review of the various models of market behavior under risk see Hey.[58]

Both these approaches are bayesian in that they treat information as a piece of data which can affect probability distributions regarding production possibilities or prices. Hirshleifer refers to the distinction between the two as technological information and market information.[59] The separation between these two approaches is not complete and probably one of convenience only. However, the common ground that is almost universally shared is to treat the information problem only as one of resource allocation-efficiency in the most narrow sense.

2.4.1 Information as an Economic Good

Much of the literature on information treats it as an economic good. The issue most frequently handled is the public good characteristics of information. Given some other peculiarities of information and of markets is there a tendency to under or over produce it?

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Within agricultural economics the public good nature of information has been stressed. This has been used, in part, to justify the provision of market news by government agencies. Information as a good does exhibit several characteristics that are common to public goods. Riemenschneider notes "The public good attributes of uncertainty, indivisibility, and nonappropriability all are characteristics of information."[60] As with all public goods, the providers of information cannot fully appropriate the returns to information production since it is exceedingly difficult to charge subsequent users of this information after it is disseminated.

This problem is exacerbated since there may be increasing returns to the use of information. There may be high fixed costs to information acquisition relative to its dissemination. Initial purchasers of information are able to provide it at a lower cost to subsequent users than the original providers of the information.[61]

Another difficulty, unique perhaps to information, is that the value of information to a purchaser cannot be determined until he uses it. This uncertainty reduces the amount that a purchaser would or should(in some cases) be willing to pay for a piece of information.

These two facts; 1) the gains to the production of information cannot be fully appropriated; and 2) since its value cannot be determined before its use leads purchasers to bid lower prices for it; have led many people to conclude that there will be an under provision of information in society if left to the private sector.

Yet, the conclusion that information may be under produced in our society is not unanimous. Hirshleifer is a strong proponent of the opposite view. He advances that information in a pure exchange economy is socially worthless, but privately valuable leading to its overproduction.

> "The reason is that changes in probability beliefs (and therefore in market prices) lead to wealth redistributions as well as to productive-consumptive adaptations. The sum of gains from the adaptations represents the social value of the information and is the maximum that can be efficiently paid to cover the costs of producing it. But while the net social value of the redistributions is zero, individuals would obviously be willing to be on the winning side of the shuffle. The sum of the two classes of potential payments would overcompensate the information producer."[62]

There seem to be four important qualifiers to Hirshleifer's analysis. One is that the provider of the information must be able to disguise their market behavior and effectively retain property rights to the information. If either of these conditions do not exist, the incentives to the information producer would be low. Marshall points out that to acquire speculative gains, a trader must be relatively anonymous in the market.[63] Thus the gains to a small trader in a large autonomous market would be greater than to the trader who is a barometer in the market. The gains are even less if the market does a good job in disseminating information with respect to an information possessor's trading behavior.

Hirshleifer, himself, notes that the production of information will not be excessive if a production decision is made simultaneously with the consumption decision by means of a market in contigent contracts which are negotiated before production decisions are made.[64] If the information is made available before these decisions are made it can cause a shift in production and consumption in the direction the information favors. In effect it causes a more efficient allocation of resources to be achieved. If the information arrives after these decisions are made, allocations cannot be affected and the gains are speculative.

Barzel noted that Hirshleifer's analysis is also dependent on the fact that there are zero transaction costs.[65] Transaction costs include those to formulate and police contracts. This means that a transaction can no longer be considered a perfect substitute for information. A duplication of the effort in the collection of information will then be implied. This collection of information will contribute to the overall efficiency of the economy and the social value of its production will no longer be zero.

The fourth point that must be made is that Hirshleifer considers efficiency the only performance criterion. Although it is not necessarily so, the distributional consequences of information provision may be valued by society. Often the problem with information is not its overproduction but its distribution. Although not handled well in the literature, there may be an optimal distribution of information which can lead to reduced transaction costs and a more equitable distribution of income.

Since the assumptions in those models claiming an overproduction of information are severe, it will be assumed here that information in society usually does have a positive value. This does not mean that the relative costs and benefits of the production of information should be ignored, but the case for the underproduction of information seems stronger than the one for its overproduction.

This is based not only on the allocative effects that can be achieved, but also on equity considerations. However, the resource allocation dimensions of information are central to vertical coordination. It will be shown later that the distribution of information can have great impact on the organization of vertical coordination. As mentioned earlier vertical coordination is essentially a problem of preference articulation consistent with the production opportunity set - the ability to express them and then transfer them vertically. It is a problem of communicating information. It has been shown that in many instances the market cannot provide all the information for a good match of supply and demand.

In addition to increased efficiency in resource allocation, the issue of equity has been used as justification for the public provision of information. In agriculture, farmers are often faced with the situation of facing a few relatively large buyers. Because of their greater resources these buyers may be privy to information that farmers find difficult to acquire. Market news was originally intended to inform farmers of general market conditions so that they could make more informed decisions and improve their bargaining position. However, Riemenschneider correctly points out that their may be a differential ability to use this information. Buyers because of their relatively larger size and greater resources may be better able to make use of this information than farmers.[66] In fact, this is often claimed by the farmers themselves. Although, this is a possibility, it seems unlikely. The marginal gain to be had from market news to most large buyer with some degree of market power would seem to be small. These firms are most likely to already have a sophisticated information gathering function and are probably well aware of most of the information provided by market news type services.

An interesting anomaly exists in agriculture with respect to the provision of information. Most market news reports listing prices are for commodities traded on an open market. While this seems justified since even open market prices may be hard for traders to obtain, growers who contract for their product usually have less idea what other growers are getting since there is not really an open and transparent market in contracts.

2.4.2 Transaction Costs and Information

The availability of information may have an impact of the form of vertical coordination that develops. Information can affect the costs of transactions and the existence of various types of transaction costs can influence the relative cost of one type of organization over another. It may be less expensive from a transactional point of view to conduct a transaction within the auspices of the firm than through the market.

Coase clearly identified the role that transaction costs may play in the coordination of production. In his article "The Nature of the Firm", Coase argues that the existence of firms can be explained as an effort to economize on transaction costs.[67] "Within the firm individual bargains between the various cooperating factors of production are eliminated and a market transaction is substituted for an administrative decision. The rearrangement then takes place without the need for bargains between the owners of the factors of production."[68]

Coase is quick to point out that it is not necessarily the case that the costs of organizing a transaction administratively are less than a market mediated one. Indeed, if markets can be admitted as prima facie evidence, it would appear many transactions are handled quite well through the market. An administrative contract is most likely when the terms to a contract are quite complex and would favor a long term contract.

The length or complexity of a contract is only one of several factors affecting transaction costs. Schmid describes transaction costs as contractual, informational, and policing.[69] He describes contractual costs as the costs of reaching an agreement. This would include search, contract formulation, time, etc. Informational costs

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are those costs incurred by a party to interact effectively with the other party. Who has the information and how costly it is to acquire not only affects the outcome of a market transaction, but whether the transaction will be conducted on a market at all.

It is clear that information can affect both contractual and policing costs. As Arrow pointed out, the information to design a complete contigency contract is not available.[70] Alchian and Demsetz have pointed out that transactions conducted within a firm may be a more efficient method to monitor performance. This is especially the case when lapses in performance may be hard to discover.[71]

Williamson is probably the reigning champion of the importance of transaction costs and the organization of coordination. He owes his intellectual inheritance to both Commons and Coase. Commons was the first to draw attention to the transaction as the unit of analysis. Coase's contribution has already been mentioned. However, Williamson has expressed puzzlement over the relative disinterest in transaction costs since these two authors.[72]

Williamson cites two important principles in his analysis of transaction costs and organization. They are bounded rationality and opportunism. Human beings have limits in ability to formulate and solve complex problems and to the amount of information they can process. This in itself would not prevent incomplete contracts from being written, but the existence of opportunism, i.e. self seeking with guile, may make their formulation very costly. Self seeking with guile not only refers to dishonesty, but to the distortion and withholding of information.[73]

The presence of both of these conditions lead to the formation of hierarchical organizations(firms). These conditions can add costs to transactions which a firm can economize on. However, both of these conditions can be present to a greater or lesser degree depending on the type of transaction involved. Williamson has attempted to identify factors which lead to the these conditions being present in a greater degree and lists incentives for internal coordination. He lists 1) uncertainty, 2) the frequency with which transactions occur and 3) the degree to which durable transaction-specific investments are incurred.[74] The crucial factor is number three — also referred to as idiosyncratic investments. These are investments which are transaction specific, both human and physical investments. They transform the relationship between buyer and supplier into one of bilateral monopoly.[75]

In those situations "both buyer and seller are strategically situated to bargain over the disposition of any incremental gain whenever a proposal to adapt is made by the other party."[76] Given the existence of bounded rationality, the opportunities for changes may be numerous since all contigencies cannot be specified ahead of time. However, opportunism means that one party can never completely trust the other party in their demands and evaluations.

Opportunism is exacerbated by information impactedness. Not only is information asymmetrically distributed, but there may be high costs of achieving information parity. When all these conditions are present and idiosyncratic investments must be made, market exchange may become extremely expensive.

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In fact, Williamson claims that it is the existence of these type of transaction costs which lead a firm to vertically integrate.[77] By vertically integrating a firm can avoid the costs associated with bilateral monopolies, bounded rationality to some extent, and the condition of opportunism. A firm that vertically integrates with a former buyer or seller gains information that formerly was impacted. Not only does this reduce the costs of transaction this may give the firm valuable information, which can lead to a competitive edge.

Williamson also notes that the frequency with which transactions occur is also important.[78] Frequent transactions do not usually lead to relatively high transaction costs since this implies that there may be a large number of competitors available for a firm to deal with. The advantages derived from opportunistic behavior would be short-lived. In contrast, the transaction cost saving that would be obtained by vertically integrating, even when very idiosyncratic investments are made, would probably not be worth it if the transaction were a one shot deal.

Williamson's analysis is relevant to this research since some of the conditions he sets forth are present within agriculture and in the potato subsector. As with all transactions there is uncertainty and bounded rationality, however there is also impacted information and the chance for opportunism.

In potatoes, growers are usually relatively small in size and large in number, while the buyers of potatoes, especially processing potatoes are relatively large in size and small in number. This alone is enough to lead to a relative imbalance in bargaining positions under normal market exchange. However, due to their superior size and resource base some potato buyers are able to acquire information much more easily than growers are. This results in an asymmetrical distribution of information and information impactedness. Processors seem to have few incentives to divulge to growers much additional information than is necessary to get the grower to sign the contract.

While some of the conditions exist that might lead to vertical integration, they are not complete and the firms in the potato subsector have little incentive to vertically integrate. The primary condition that does not hold is the relative equity in numbers and financial resources. While both parties have to make idiosyncratic investments, processors are able to chose from a large number of growers. The competition among growers disciplines them to a degree from practicing opportunism; although such nefarious practices as misrepresenting yield or quality do occur. However, if they are caught they may lose a valuable market access.

On the other hand some first handlers can choose among many growers and growers have few disciplinary actions they can take. Thus the condition of a bilateral monopoly doesn't develop and the incentives to vertically integrate are reduced.

Therefore, first handlers may have incentives to practice opportunism. Not that they openly misrepresent themselves, but rather withhold information that would be valuable to a farmer in a negotiation. If the market for forward contracts was competitive growers could quickly find out which buyers were being opportunistic. Although Williamson's analysis is thorough when transactions are conducted between parties of relatively the same size and bargaining strength, he does not discuss very fully when there are large differences in these two respects. In the case of potatoes a bilateral monopoly doesn't exist, however, the idiosyncratic investments do lead to contracting and magnify the affects of impacted information.

2.4.3 Other Transaction Costs

Of course, the analysis of transaction costs can be more mundane than their impact on the methods of vertical coordination and their impact on bargaining. Transaction costs also include search costs to find a buyer or seller, those costs involved in conducting and completing the transaction, and where necessary the costs of policing the operation.

Usually these are considered the costs of normal market operation. They just might be less costly under one form of vertical organization than another. For instance, the time involved in contracting for potatoes is probably more than it takes to buy or sell potatoes through fresh market channels. However, through contracting the contractors are better able to assure themselves of the quantities and qualities of potatoes they need than they could through spot market sales.

Also, though rarely mentioned, there are costs involved in operating any market. The weekly auction held at a livestock yard deducts a marketing charge from the parties to cover the costs of the facilities and labor and to earn some rate of return. As in the case of terminal markets as they lost volume the cost per transaction conducted climbed and this hastened their demise.

Transaction costs will be a key variable of interest in the analysis of FDCM's. They seem to offer the potential of lowering transaction costs in several ways. These will be spelled out in greater detail in the next section. Most are related to information availability, but even this is related to technology. The use of computerized technology also has the potential to reduce the physical costs of making a transaction.

2.5 FORWARD DELIVERABLE CONTRACT MARKETS

Forward deliverable contract markets are the sale of standardized forward contracts over a computerized market prior to when major production decisions are made. There are three crucial points in this description.

First, the contracts negotiated over the exchange are negotiated before major production decisions are made. As has been shown, one of the weaknesses of most spot markets is that the prices are determined after the production decisions have been made. As an efficient allocator of resources this puts prices in an extremely tough position.

Second, there is a transparent market in these contracts. Now negotiation for forward contracts are negotiated via private treaty or through a bargaining association. Nowhere does a market exist for contracts in the conventional use of the term.

Third, the establishment of this market will be through a computer. The feasibility of this concept is dependent on the use of computer technology. Only a computer has the ability to assemble a large group of traders and process their transactions almost instantaneously.

2.5.1 The Forward Deliverable Contract Market; A Pricing Mechanism

As was stated in the beginning of this chapter an FDCM is essentially a pricing mechanism. It is an instrument where the relevant economic information regarding supply and demand is assembled and disseminated. An example may help. Suppose that a potato processor is interested in offering a contract to growers in January. He determines the quantities and qualities of potatoes he needs. He enters into his computer terminal a contract stating the quantities and qualities of potatoes desired. This information is immediately disseminated to all growers and processors on the system. Growers then can offer to fill the contract at the stated terms or or make an offer to fulfill it at another price. This process could continue iteratively until the transaction was consummated.

It is important to realize that the system would have bids to purchase and offers to sell to many participants on at the same time. In this way market participants could quickly and easily evaluate what their market alternatives are. All bids, offers, and transactions would be recorded, summarized, and available to all participants on the system. What would be the potential benefits to such a system?

The key to an FDCM are that pricing decisions are made simultaneously with production decisions and this information is available to all participants.

One immediate potential benefit would be the creation of a transparent market. Shaffer defines a transparent market as a market where price, quantity and all other relevant terms of trade are readily available.[79] It is important, that, at least in potatoes for processing, this represents a substantial change. Presently, a market doesn't exist for potato contracts and the terms of the contracts are far from transparent.

The greater availability of information would inform both sellers and buyers of potatoes of other market opportunities of which previously, they might have been unaware. It also informs traders of what other traders are either receiving or paying for a product of similar attributes as their own.

Another potential benefit is the reduction in transaction costs that could be achieved. The reduction in transaction costs is not only due to improved information, which will be handled shortly, but also due to the efficiencies that can be obtained through a computerized market. Presently there are several computerized markets in agriculture. Ontario runs a system for hogs while cotton and slaughter lambs are sold over computerized exchanges in the United States. In each of these markets it is a less costly way to sell the product per unit than the previous system had been.[80] Admittedly, a minimum volume must be attained before the downward sloping portion of the total cost curve is reached. Given the high fixed costs involved in computers it takes a large volume to become cost effective with present systems. However, once this volume is achieved costs per transaction decline over a wide range. It should also be noted that with the advances in computer technology and time sharing arrangements, even the level of fixed costs is decreasing.

The information generated on a FDCM can also reduce the degree on informational impactedness within the potato industry. Presently growers have a relatively difficult time collecting information regarding prices, quality, total quantities available, and total quantities sold. This information would be almost instantaneously available on a FDCM. The ability of growers to ascertain what his opportunity costs are will be enhanced. If a grower is unable to cover his opportunity costs through the market he may have to re-evaluate his expectations or decide not to contract this period.

Another aspect to information impactedness is the willingness of the possessor of the information to divulge it. Presently, there are few incentives for potato buyers to release impacted information. An

FDCM would not only disseminate a large amount of information in a timely fashion, but since the market is competitive buyers would not find it in their interest to practice opportunism. Sellers are now aware of other market alternatives. And the increased amount of information would lessen a trader's ability to practice opportunism.

An FDCM, through the dispersion of additional information, the creation of a transparent market, and the increasing of competition would give rise to a more equitable process. However, not all participants may view the transition to an FDCM as equitable. But it is important to remember that an FDCM is not a zero sum game and that it appears most major classes of participants can benefit from its establishment.

An FDCM has the potential to increase pricing efficiency. Through forward contracting a much closer match between supplies and consumer preferences can be achieved. Since the contracts can be quite specific in their terms and the contracts are traded in an open market, the ability of the system to reflect price differentials for quality differences should be enhanced.

The ability to determine prices simultaneously with production decision should improve the level of allocative efficiency within the subsector. It should eliminate those fluctuations within the subsector which are not a result of weather or responses to changes in consumer demand or in the costs or production. On the other hand it should increase the ability of market participants to react to changes in consumer demand. Intuitively, it would seem this would be accomplished with less hardship than it presently is.

But more importantly, the FDCM system would produce information about the future which is now unavailable to any market participant. This would contribute to individual and system-wide planning.

2.5.2 Planning and a Forward Deliverable Contract Market

The ability to plan is a crucial element in an economy. The existence of uncertainty demands planning. In fact, the paradoxical situation arises that the greater the uncertainty the greater the need to plan, but the lesser is our ability to plan. In the world of perfect information planning is less needed since everyone knows what will happen.

To do effective planning information is required. This information should be as complete as possible and as timely as possible. Most information which is now available to market participants is either accompanied by a high degree of uncertainty with respect to its accuracy or is unavailable at the time major production decisions are made.

An FDCM would disseminate accurate and timely information about future supply and demand. It would be possible to construct actual future supply and demand curves. The ability to plan would be enhanced.

In addition to the equity aspects it is the increase in planning through a transparent future market which distinguishes an FDCM from standard forward contracting. Growers, in addition to acquiring increased market access, base prices, an assured market, and increased access to credit, will be able to determine the demand for their own potatoes - before they are planted.

In an FDCM information regarding prices and the aggregate amounts demanded and supplied are available while the market participant is making his production, sales, and buying decisions. A grower looking at the transaction summaries can more accurately ascertain the aggregate amount being supplied and within narrower tolerances determine the demand for his potatoes.

Beyond the advantages of an assured supply of specified quantities and qualities delivered at a known time, the availability of aggregate information on future supply and demand can lead to increased ability on the part of first handlers to plan and thus reduce costs. First handlers also will be able to better determine the demand for his product and what prices he can afford to pay for raw product. The timing of deliveries may be improved and inventory costs may be reduced. The increased information about the future may also lead traders to develop better marketing strategies. Having a considerable portion of one's supply contracted in advance may also decrease transportation and other logisitical problems.

An FDCM would shift the risks in the same manner that standard forward contracting would. However, by reducing the uncertainty regarding future conditions processors and other first handlers should be better able to handle these risks. That is, the added information available <u>to all participants</u> reduces the dispersion in the probability distributions facing them. Also since they are better able to determine demand it can be argued that they should be the ones to carry this risk in the first place.

2.6 SUMMARY

It was the intention in this chapter to lay out some of the practical and theoretical considerations of vertical coordination that have particular relevance. The list is not meant to be complete. Some aspects of vertical coordination and of FDCM's can be best handled in the context of the subsector under study and handling specific design issues. It may not also be clear where some of the concepts fit into an FDCM. Again, it is hoped that through the analysis of some of the specific institutions in potatoes and in the design of an FDCM for potatoes the relevance of these issues will be made clear. However, it is felt that this foundation was necessary now so that when specific issues are handled their relevance to FDCM's and vertical coordination will be seen.

It should also be noted that the brief description of an FDCM and its potential was put in the best light possible. There are serious design issues that will be handled. For instance, should participation in an FDCM be mandatory? Should speculative trading be allowed? Who will own and operate the FDCM? What are the third party effects?

All these issues and more will be discussed in the upcoming chapters. The next chapter is a descriptive chapter on the transaction practices presently used in the potato subsector. Much of it is based on secondary data. However, a great deal on potential participant attitudes towards an FDCM was gathered through personal interviews and a mail survey.

CHAPTER THREE

SUBSECTOR DESCRIPTION

3.1 INTRODUCTION

The purpose of this chapter is three fold. First is to concisely describe the production and consumption of potato products. This is necessary to give some background information which will lead to a greater understanding of why certain coordination mechanisms are in use.

Second is to identify the major forms of transactional devices used in the potato subsector. Emphasis will be placed on the grower-first handler exchange. This is done to limit the scope of the study. It is not intended to imply that the concept of FDCM's has limited applicability. It has been found that even at this single interface the variety of ways in which potatoes are exchanged is large. While it is not possible to analyze all these forms of vertical coordination, an attempt is made to identify and to analyze the major forms of coordination at this interface in the major potato producing areas.

The final goal is to assimilate this information and to analyze briefly the major implications for the design of a forward deliverable contract market in potatoes. These implications and their affect on system design will be covered more fully in Chapter VII, which is devoted to system design.

3.1.1 Data Collection

Two different sources of information were utilized in this research. Much of the information regarding production and consumption patterns was gathered from secondary sources. Where relevant this was supplemented by primary data. The information on marketing practices was also gathered from secondary data, but a greater portion of it was collected from primary sources. Growers' and first handlers' attitudes were collected through a mail survey and through personal interviews. The information collected was also used where relevant in identifying and describing major transactional mechanisms.

3.1.2 Organization of Chapter

This chapter is divided into five basic sections. The first two sections cover general conditions of consumption and production in the United States. The third section covers marketing channels available to growers and how they vary according to geographical location and other factors. The fourth section is an analysis of variables affecting the producer-first handler exchange and vertical coordination. The final section is a summary.

3.2 POTATO CONSUMPTION

The potato as a source of food has been around for centuries. To this day it grows wild and is used by the Indians who inhabit the Andes mountains. These wild varieties are the main depository of the genetic stock. The potato was introduced to Europe in the 1600's by Spanish conquistadors. It was incorrectly identified as a yam and given the spanish name batata, hence, potato.[1]

The potato was not an immediate hit in Europe as the people considered anything produced in the ground as unfit. However, slowly it began to catch on. There is a story, perhaps apocryphal, of a trusted minister to King Louis XVI of France who tried to introduce the potato to the peasants with little apparent success. One day he had a brilliant idea. He instructed that the potato be grown in the royal gardens and posted a guard on them during the day only. Sure enough, every morning he would find a few more plants missing and their cultivation spreading through the country-side.[2]

Once they were accepted potatoes spread rapidly through Europe. Today Poland and the Soviet Union are the world's largest producers of potatoes.[3] And of course, the Irish potato famine of 1850 demonstrated the degree to which potatoes were a food staple. Potatoes are grown in almost every country as they are extremely versatile and hardy. The only exception is the tropics. Potatoes do not prosper in hot and humid climates.

Traditionally, potatoes have been purchased in fresh form. Although, the Andes Indians did process potatoes by drying them and making a flour paste and any good Russian knows of its medicinal value when fermented, the processing of potatoes remained relatively primitive until recently. Before World War II the most common forms of processed potatoes were starch and flour. Even earlier than this a cook in Saratoga Springs,N.Y. introduced the potato chip.[4] During the war and shortly thereafter great advances were made in freezing technologies. These advances led to the development of a host of frozen potato products.

3.2.1 General Patterns in Consumption

The general patterns in potato consumption have undergone a fundamental change over the past thirty years. Per capita consumption reached an all time high in 1910 when it was 198 pounds.[5] From that point it began declining until 1950 it was 107 pounds per capita. Since 1950 per capita potato consumption has shown an upward trend. Table 3.1 shows the per capita consumption figures from 1966 to 1979.

These figures show a fundamental change in the form of potatoes consumed. Table 3.2 and Figure 3.1 show how the composition of potato consumption has changed since 1956. In 1956 fresh consumption was still the dominant form of potato consumption. At this time 68 percent(99 lbs)of the potato crop was purchased in fresh form. By 1980 fresh consumption had dropped to 45 percent (53 lbs), while

Table 3.1

Production and per capita consumption of potatoes, 1965-79

Year	Production	Total fresh and processed	Fresh	Processed[1]				
				Total	Canned[2]	Frozen	Chips and shoestrings	Dehyd-rated
	Million cwt.				Pounds			
1965....	291.1	107.0	68.2	38.8	1.7	14.3	15.8	7.0
1966....	307.2	116.8	72.4	44.4	1.7	17.3	16.7	8.7
1967....	305.8	108.0	62.0	46.0	1.7	19.0	16.9	8.4
1968....	295.4	115.2	65.9	49.3	1.9	21.2	17.1	9.1
1969....	312.6	116.9	61.7	55.2	2.0	24.6	17.7	10.9
1970....	325.7	117.5	58.3	59.2	2.0	27.7	17.7	11.8
1971....	319.3	118.7	56.8	61.9	2.2	30.3	17.3	12.1
1972....	296.4	119.4	57.4	62.0	2.1	30.6	17.0	12.3
1973....	300.0	116.8	51.9	64.9	2.3	33.2	16.6	12.8
1974....	342.4	114.3	48.4	65.9	2.3	33.0	16.1	14.5
1975....	322.3	122.1	55.0	67.1	2.0	34.7	15.9	14.5
1976....	357.7	116.1	51.0	65.1	2.0	36.9	16.1	10.1
1977....	354.6	121.7	54.4	69.3	2.3	37.1	16.7	11.2
1978....	365.2	121.1	50.5	70.6	2.3	39.5	17.3	11.5
1979[3]...	343.0	118.3	52.8	65.6	2.2	36.2	17.4	9.7

[1]Fresh-weight basis. [2]Includes potatoes canned in soups, stews, and other combinations. [3]Preliminary.

Source: USDA, ESCS, The Vegetable Situation, November, 1980.

processed potato products had risen to 55 percent of all potatoes purchased for food.[6] This change in the nature of potato consumption has had dramatic impacts on the production and marketing of potatoes.

The years following the war were ones that witnessed great strides in processing technologies. The ability to freeze foods and the dehydration process were greatly improved.

Accompanying these changes in processing technology were changes in the behavior of consumers. Increases in real income led to an increased demand for leisure. This was in conjunction with a growing importance of women in the work force. Both put pressure on the time people were willing to spend in the kitchen. As this trend continued the per capita consumption of tablestock potatoes fell during the 1950's.

The drop in tablestock consumption was more than made up by the increased consumption of processed potato products. Not only do these products satisfy the home consumer's demand for convenience, they are also used to a large extent in the restaurant trade. They provide labor efficiencies in restaurants, which are especially important in the case of fast food establishments.

From Figure 3.1 and Table 3.2 it is obvious that frozen potato products have shown the greatest jump in consumption of all processed potato products. In 1979 they accounted for 37 pounds of potatoes in fresh equivalent. This is 26 percent of total potato food consumption.

Potato chips were the third largest category of potato products

Table 3.2

Sales of the U.S. Potato Crop, 1956-80

	1956-60	1961-65	1966-70	1971-75	1976-80	Annual Rate of Growth 1956-1980
	In 1,000 Pounds, Fresh Weight Equivalent					
Food Sales						
Processed						
Chips	17,268	24,644	33,184	34,615	36,334	+ 3.7%
Dehydrated	5,143	9,722	21,461	29,302	33,430	+ 9.6
Frozen	6,921	19,532	43,531	67,571	90,911	+13.4
Canned	2,550	2,990	3,590	4,607	4,656	+ 3.0
Total Processed Sales	31,881	56,888	100,766	136,095	165,331	+ 8.4%
Tablestock Sales	147,955	145,762	131,223	118,772	116,065	- 1.2
Total Food Sales	179,836	202,650	231,989	254,867	281,396	+2.2%
Feed Sales	10,538	9,858	9.907	5,674	6,429	- 2.4%
Seed Sales	13,435	14,266	16,771	18,275	20,056	+ 2.0
Manufacturing (Starch/Flour) Sales	14,283	11,336	9,537	5,227	2,876	- 7.5
TOTAL SALES**	218,092	238,110	268,204	284,043	313,363	+1.8%
	As A Percentage of Total Sales					
Food Sales						
Processed						
Chips	8%	10%	12%	12%	12%	
Dehydrated	2	4	8	10	11	
Frozen	3	8	16	24	29	
Canned	1	1	1	2	1	
Total Processed Sales	14	24	38	48	53	
Tablestock Sales	68	61	49	42	37	
Total Food Sales	82	85	86	90	90	
Feed Sales	5	4	4	2	2	
Seed Sales	6	6	6	6	6	
Manufacturing (Starch/Flour) Sales	7	5	4	2	1	
TOTAL SALES	100%	100%	100%	100%	100%	

Based on averages shown.
Includes diversion program sales.

Source: Putman, Aroostock County, Maine Potato Industry Study, 1981

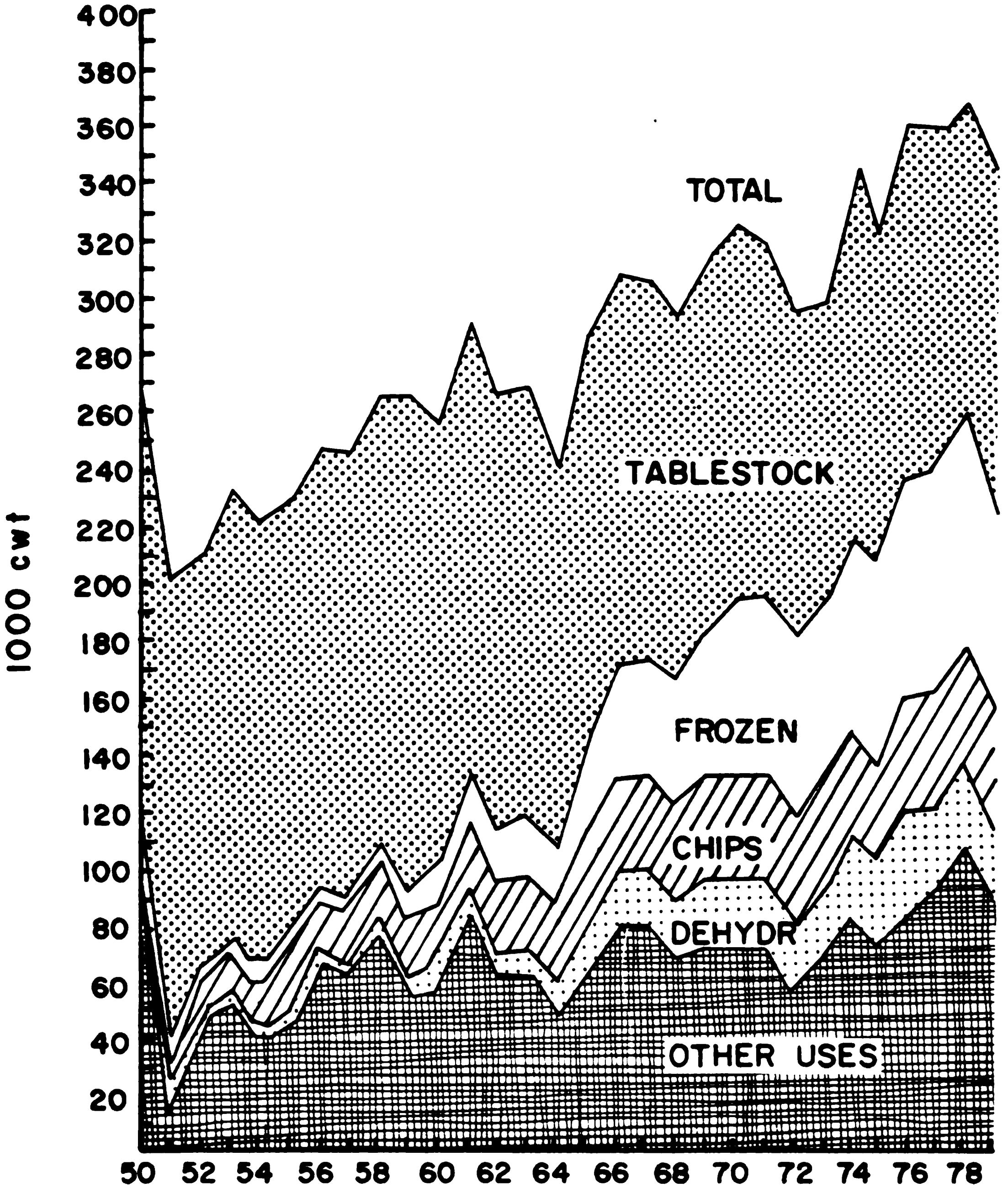

FIGURE 3.1 POTATO UTILIZATION IN THE UNITED STATES FROM 1950 - 1979

* INCLUDES CANNED, STARCH, FLOUR, SEED, SHRINKAGE AND LOSS ETC.

SOURCES: POTATOES AND SWEET POTATOES

consumed. In 1979 they accounted for 17 pounds per capita in fresh equivalent or 14 percent of potatoes consumed for food. The growth in chips was greatest in the 1950's and since then has become relatively stable.

The fourth major product category is dehydrated potato products. As with frozen potato products the period of most rapid growth was the 1960's. They actually peaked in consumption during this period at about 14.5 pounds and have declined to about 11 pounds per capita, fresh equivalent. Dehydrated potatoes are often used in remanufacturing such as in frozen dinners or soups.

Rounding out food consumption are canned potatoes, starch and flour which make up a very small portion of food consumption of potatoes. In 1979 they amounted to two percent of potatoes consumed for food.

The most important use of potatoes for non-human consumption is seed potatoes. The production of seed potatoes is specialized. In 1979 seed sales accounted for a little more than six percent of total potato sales. This has been the average for the last several years. Other uses of potatoes include feed for livestock and diversion programs. Livestock feed usually accounts for about two percent of total potato sales. Those potatoes coming under diversion programs have been erratic. Since 1973 they have been only used twice, accounting for a maximum of four percent of potato sales in 1978.[7]

3.2.2 Future Trends in Potato Consumption

The potato subsector is basically a mature one. It appears that tablestock consumption has leveled off at about fifty pounds per person. It seems that most of the processed products have reached a similar stage in their demand. Even frozen potato products, while still growing, are now growing at a slower rate than before. The stabilization in demand will put added pressure on those firms presently involved in potato production and marketing.

The most promising avenue to increase demand for potato products are foreign markets. Presently, Canada is the biggest single importer of U.S. potatoes, followed by Mexico.[8] However, the greatest potential appears to be the far eastern countries of Japan and, perhaps, China.

Another area of growth is the demand for baked potatoes and potato skins in restaurants and vending machines. Potato skins are now a common item in many restaurants and the baked potato has become a specialty in many operations. In fact, there is at least one chain which specializes in baked potatoes. However, for the most part, it appears that there will be no dramatic increases in potato consumption in the United States.

3.3 POTATO PRODUCTION

Since the end of World II there have been large shifts in potato production, both in terms of variety and in producing areas. In general, potato production has shifted from the Eastern States to the Northwest states of the United States. Yields have increased, farms have declined in number, but have become more specialized and larger. Total acreage has also declined.

Table 3.3 gives figures on total acreage for the U.S. and the major producing states for the years 1956-1960 and 1977-1981. Although total acreage has declined, the decline has not been proportional across all states. In fact, some states have increased their acreages substantially over this time period. The Northwestern states all show large increases in their acreages, while those states in the Eastern United States and some in the North Central region have decreased their acreages.

This drop in acreage, in general, has been more than compensated by significant increases in yields per acre. A general picture of the change in yields the last twenty-five years for the U.S. and the major producing states can be obtained from Table 3.4. With the notable exception of Maine all states listed showed sizable gains in their yield per acre. The increase in yields is attributable to a number of factors. One is that as the number of potato farms became fewer those remaining became larger and had a greater tendency to specialize in potato production. Concurrently, there were large gains

TABLE 3.3

POTATO ACREAGE IN SELECTED STATES; 1956-1960 and 1977-1981

STATE	1956-60	1977-81	% CHANGE
	1000 ACRES		
IDAHO	203	338	+ 66
WASH.	39.6	103.2	+161
ORE.	37.3	58.5	+ 57
N.D.	99.2	121.6	+ 22
MINN.	89.7	76.1	- 15
WISC.	49.4	54	+ 8
MI.	50.2	40.5	- 19
N.Y.	87.1	45.2	- 48
MAINE	144.2	111.8	- 22
CAL.	108.8	56.2	- 48
U.S.	1393.7	1289	- 8

Source: U.S. Department of Agriculture, Potatoes and Sweet Potatoes Various Issues.

in the technology of potato production. This included more disease resistant varieties, better pest control, and an increased use of irrigation. However, yields still vary from year - to - year.

3.3.1 Major Potato Production Areas

Potatoes are grown in every state in the Union. The Crop Reporting Board of the USDA lists 38 states in their annual report.[9] Table 3.5 lists the twenty top producing states over the 1977-1981 period and their position in the 1956-1960 period. These two time periods were chosen to illustrate the changes that have occurred in production over the last twenty years.

Two major points are shown in this table. First, the importance of the Northwest in potato production has increased some 170 percent since 1960. Secondly, those states which were typically noted for producing winter or early spring potatoes have decreased in importance in terms of percentage of total potato production since that time. These states would include California, Florida, Alabama, Arizona, North Carolina, and Texas.

Fall producing states now account for approximately 87 percent of all potato production and 66 percent in 1960.[10] This loss was at the expense of early season producing states. However, not all fall producing states gained equally. In fact, some important fall producing states showed considerable losses during this time. The most dramatic example of this is Maine. In 1960 Maine was the second

TABLE 3.4

SELECTED STATES' YIELDS; 1956-1960 AND 1977-1981

STATE	1956-60 CWT/ACRE	1977-81 CWT/ACRE	% CHANGE
IDAHO	197	260	+ 32
WASH.	259	479	+ 85
ORE.	236	414	+ 75
N.D.	129	162	+ 26
MINN.	124	193	+ 56
WISC.	153	323	+111
MI.	152	235	+ 55
N.Y.	219	274	+ 25
MAINE	256	240	- 6
CAL.	264	358	+ 35
U.S.	180	267	+ 48

Source: Potatoes and Sweet Potatoes Production, Disposition, Value, Stocks & S.R.S. USDA, Various Issues.

TABLE 3.5

SELECTED STATES' PRODUCTION OF POTATOES, 1956-60 and 1977-81

STATE	1956-60 1000 CWT	RANK	1977-81 1000 CWT	RANK	% CHANGE
CAL	28620	3	20084	5	- 30
COLO	11648	6	12739	9	+ 9
FLA.	5966	13	5948	12	--
ID.	39578	1	87588	1	+121
ME.	36911	2	26689	3	- 28
MI.	7700	11	9454	11	+ 23
MINN.	11141	7	14609	8	+ 31
NEB.	2599	18	2041	20	- 21
NEV.	323	42	4610	14	+ 1300
N.J.	3870	14	2078	19	- 46
N.Y.	18556	4	12278	10	- 34
N.C.	3574	16	2532	18	- 29
N.D.	12809	5	19609	6	+ 53
OH.	3036	17	2543	17	- 16
OR.	8803	9	24161	4	+174
PA.	7925	10	5611	13	- 30
TX.	2064	19	3042	15	+ 47
VA.	3734	15	2696	16	- 28
WASH.	10240	8	49318	2	+382
WIS.	7597	12	17313	7	+128

Source: Potatoes and Sweet Potatoes, Production, Disposition, Value, Stocks, Stocks, and Utilization. SRS, USDA, Various Issues.

largest producer of potatoes behind Idaho. In 1960 it represented 13 percent of total U.S. production. By 1980 its share of U.S. production had dropped to a little more than eight percent or a drop in its relative production of 33 percent.[11]

3.3.2 The Northwest

The Northwestern states of Idaho, Washington, and Oregon are now the predominant area of potato production in the United States. Idaho has long been a major producer of potatoes. In 1960 it was the number one ranking producer of potatoes. Since that time it has solidified this position, by increasing its production by over a hundred percent since 1960. It now accounts for about a quarter of the total U.S. potato crop.[12]

However impressive the gains Idaho has made in the past twenty years they have been surpassed, in a relative sense, by Washington. Washington has increased its production by almost 400 percent since 1960. The availability of relatively inexpensive irrigation and energy costs have had a great deal to with this rise. Oregon has also shown sizeable gains in production in the past twenty years.[13]

These three states accounted for about 50 percent of total U.S. production compared to the 24 percent in 1960. While California is not usually counted as a Northwestern state, it is convenient for the purposes of this study to do so. California is much more important in the spring and summer months than any of the three other states and its markets are mostly tablestock. If its prodution is included in the total above, the Northwestern States would account for approximately 54 percent of total U.S. production.[14]

All the major processors are located in the northwest and there is also a wide variety in the type of processor. These would include potato freezers, dehydrators, chippers. These are located primarily in Eastern Oregon and Washington and in Western Idaho. The tablestock production areas are located primarily in the southeast portion of Idaho, Columbia basin of Washington and the Klamuth Falls area of Oregon.

The strength of California lies in two areas, good production conditions and the timing of its marketings. Given the size of California and the variation in its climatic conditions across the state, California is able to produce more than one crop. This means California's potato marketers are able to maintain their market contacts continually. However, it is strongest in the late winter and early spring months. This is the time when major fall producing states are withdrawing potatoes from storage. Combined with generally favorable climatic conditions California is able to produce a quality potato with high yields. The primary variety grown, as is the case throughout the Northwest, is Russet Burbank.

While the shifts in potato production are primarily accomplished, the Northwest still has the capacity to increase production if conditions warrant. Washington especially seems capable of increasing production. This is based on the new land that is coming available due to federally financed irrigation.

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3.3.3 The Northeast

Of those areas showing the greatest loss in production and relative national importance is the Eastern United States. The two most important states in this area, Maine and New York, have had considerable drops in their production since the late 1950's. In 1960 New York and Maine plus the remaining New England states and Middle Atlantic states represented almost 28 percent of national production. They now account for about 14 percent of national output.[15]

Maine is beset with production problems relative to states in the Northwest and other areas. It is one of the oldest production areas in the United States. Most of its production is located in Aroostock county. Some of the fields have been used for potatoes over fifty years. This is, in part, due to the lack of substitute crops which are economically viable. This continual use has caused many of the fields to become simply worn out. Unlike the Northwest, Maine is not blessed with ideal climatic conditions. In fact, since the mid-1960's potato yields have actually decreased in Maine.

3.3.4 The Central States

The Red River Valley(RRV) of Minnesota and North Dakota and the North Central states of Michigan and Wisconsin have shown great resilience. In the face of increasing competition from the

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Northwestern states these two areas have been able to hold their own and have increased production. They have accomplished this primarily by filling those markets that the Northwest is weakest in - potato chips and tablestock.

The RRV is made up of five counties in North Dakota and five counties in Minnesota. These counties represent about 97 percent of North Dakota's production and about 66 percent of Minnesota's production.[16] The valley has the highest costs of production among the major potato producing areas. This is primarily a result of the low yields obtained in the area. The RRV has yields that consistently run about 50-60 cwt. below the national average. The area has very little irrigation and the yields are variable. As in other production areas, rotation practices and substitute crops depend somewhat on market conditions. Wheat has traditionally been the rotation crop in the RRV. Recently, however, sunflower production has grown in popularity. This is especially true among smaller growers.[17]

Although Michigan is not one of the superpowers of potato production, it is typical of those states which produce potatoes in moderate amounts. Potato production in these states is a minor enterprise, but is nonetheless an important one.

Most of Michigan growers are small in respect to growers in the northwest or the Red River Valley. Most are specialized in potato production. Michigan grows primarily fall, and late summer potatoes. Late summer production, while still a minority in production totals has been growing in importance. Michigan produced 1.5 million cwt. of summer potatoes in 1981.[18] This is an attempt to add flexbility to marketing and harvesting. It also aids the Michigan marketer by partially avoiding competition with the major fall producing states. Approximately fifty percent of Michigan producers have irrigation.[19]

Wisconsin seems likely to increase its production substantially in the next few years. This is due to the increased production in the Wisconsin Sands area. Most potato marketers interviewed in the northwest cited Wisconsin as the area to watch. Because of good soil and plenty of water for irrigation Wisconsin growers are able to produce a high quality potato with high yields. If transportation costs continue to rise Wisconsin growers will have a substantial advantage over their Northwestern brethern. Principle rotation crops are vegetables, such as snap beans or cucumbers, or alfalfa.

Approximatley 56 percent of Wisconsin's production is in Russet Burbanks or Norgold Russets.[20] Production in these varieties has been growing rapidly. Wisconsin gets good yields, about 375 cwt./acre, and the quality is good. About a third of the production is in round white varieties, which are primarily used in chipstock. The remaining production is in round reds sold as tablestock.[21]

3.3.5 Other Areas

Those states which are primarily spring and early summer producing states have decreased production In 1960 non-fall production was about a third of total U.S. production. By 1981 this propo

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proportion had fallen to only 13 percent. There are several reasons for this drop in importance. One is the improvement in storage facilities. This enables fall producing states to lengthen the marketing period well into the winter and spring months. A second factor hurting these states is the drop in tablestock consumption. This market was their primary market. A third factor which has hurt summer producing states is that some traditionally fall producing states, such as Michigan, have introduced new varieties which mature earlier and enable them to enter the market earlier.

3.3.6 Factors Affecting Shifts in Production Patterns

One of the primary reasons for the ascendancy of northwestern states in potato production was the dramatic shifts in potato consumption. With the shift towards processed potato products, processors utilized large plants that needed large quantities of potatoes that met specific requirements. Idaho was a logical area to increase production of processing varieties. Growers there already specialized in the Russet Burbank variety due to the location of dehydration plants in Idaho during World War II. This variety because of its blocky form and high solids content is ideal for most potato processing. Growers in Idaho also already possessed excess potato production capability.[22] This made it easy for processors to obtain supplies.

In addition to the existing conditions, several water projects in the Columbia and Snake river basins led to the availability of cheap water and energy for irrigation. The cheap energy not only led to low pump costs for irrigation, but made the area attractive to processors from the point of view of running their own operations. The importance of irrigation should not be underestimated. It is probably the single most important factor contributing to increased production and high quality levels. It also reduces the variation in yields due to weather. However, the Northwest has also been blessed with ideal growing conditions.

Although tablestock consumption was declining, Idaho, and to a lesser extent Washington and Oregon, was able to increase their share of that market. The primary reason for this was the institution of market orders, which led to a high quality image for their potatoes. Idaho was particularly successful at this. They supplemented the marketing order with a relatively high level of promotion funded by a grower check-off. In so doing Idaho was able to achieve a degree of consumer franchise for their potatoes. At the time when these markets were being nurtured, transportation costs were relatively low.

<u>3.3.7 Fresh Potato Movements</u>

Most of the data contained in this section is based on information in "Fresh Fruit and Vegetable Unloads" published by the Market News Service of the United States Department of Agricluture.[23] There are some limitations to the data: 1) not all cities are represented; 2) unload data only deal with raw potato shipments; and 3) prior to 1981 it is impossible to tell from the data whether the potatoes were destined for tablestock or potato chips. The major impact of these limitations is to understate the significance of some areas as a source of supply. However, even with these limitations it is felt that the data are useful in describing the general trends in potato shipments and their implications for the major production areas.

Tables 3.6 through 3.9 list potato unloads for selected years. In general, the number of potato shipments to most major areas have remained constant or decreased. Although potato unloads from any area have remained relatively constant, there have been changes in the primary supply areas.

Shipments to the western region are shown in Table 3.6. In the western region the potato unloads have remained relatively constant. But the importance of California as a major supplier to the area has dropped by 18 percentage points. Over the same time period the importance of Oregon and Washington has grown. The production in these two areas has grown measureably and they produce a quality product. And while California may have a slight transportation advantage this doesn't appear to have been great enough to keep these two states out of the market.

Idaho is not a major factor in these markets. In the case of Idaho the transportation costs do seem to have been a factor. To ship Idaho potatoes any distance they must be able to command a

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Table 3.6

Potato Unloads at Western Cities, Selected Years*

	1963	1965	1970	1975	1978	1979
Total Unloads In 1,000 Cwt.	15,194	14,470	15,825	7,305	13,664	15,183
Market Share as Percent of Total Unloads						
California	45%	52%	46%	32%	25%	27%
Colorado	12	9	12	8	7	8
Idaho	11	11	8	15	9	9
Oregon	16	13	17	19	25	22
Washington	10	11	14	17	24	23
Other	6%	5%	4%	8%	11%	11%

*Denver, Los Angeles, Portland (Oregon), Salt Lake City, San Francisco, and Seattle

Table 3.7

Potato Unloads at Midwestern Cities, Selected Years*

	1963	1965	1970	1975	1978	1979
Total Unloads In 1,000 Cwt.	18,550	16,827	18,244	16,163	17,106	14,355
Market Share as Percent of Total Unloads						
California	15%	18%	12%	7%	6%	8%
Colorado	9	9	11	10	14	14
Idaho	17	13	14	14	14	17
Maine	1	5	1	-	-	-
Red River Valley	27	21	25	35	32	28
Washington	4	5	4	3	3	3
Wisconsin	8	9	11	12	8	12
Other	19%	22%	22%	19%	23%	18%

**Chicago, Dallas, Fort Worth, Houston, Indianapolis, Kansas City, Milwaukee, Minneapolis, St. Louis, San Antonio, Wichita.

Source: Putman, Aroostock County, Maine Potato Industry Study, 1981.

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premium over more local potatoes. It would appear that the premium over other western states' potatoes is not enough to offset the higher transportation costs in this case.

Table 3.7 shows the unloads in the Midwestern region. In the Midwestern region the Red River Valley is the region's largest supplier(in terms of unloads). Although there has been some variation in its share of the market, it has kept a relatively constant share of a declining market. Idaho has a much larger share of the market than it does in the western region. In these markets Idaho has a transportation advantage over Oregon and Washington.

As in the western region, California's share of the market has declined. Its decline has been matched by a growth in market share by Colorado and Wisconsin. Both these areas have transportation advantages over California. California is also hurt by the fact that storages have improved in most areas. This extends their marketing season and makes them more competitive in the late winter and early spring months when California potatoes hit the market.

The consumption patterns in the southern United States vary widely from the rest of the U. S. This region consumes fewer potatoes per capita than the rest of the U. S. and consumes more rice and other grain products.[24] Thus unloads are small in comparison to the other regions. However, in terms of relative importance to some eastern and Central states this market area is very important.

The total number of unloads to the southern region has remained fairly stable over the time period shown in Table 3.8. Idaho has sub

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substantially increased its share of the market. Wisconsin and the Red River Valley have also been able to increase their share of the market.

The final region examined is the Northeastern region with the pertinent information displayed in Table 3.9. Overall, the total number of shipments to the Northeastern region has fallen by about 36 percent since 1963. The state most severly affected by the drop in unloads is Maine. Its share of the market has dropped to only 13 percent. This area was long considered its traditional stronghold. New York state has also suffered a significant drop in its market share.

The state showing the greatest increase in its share of the market is Idaho. In addition to Idaho, both Wisconsin and Michigan have been able to show moderate gains in market share.

Table 3.10 gives an idea of what these shipment figures mean on a national level. Of those areas showing increases in shipment, Wisconsin, Idaho and the River Valley gained the most in relative terms. Part of their increase is probably due to increased chipstock and/or seedstock sales, but they were also able to increase their tablestock sales.[25]

Table 3.11 gives an indication of the seasonality of unloads from the major shipping areas over the course of a year. The causes of seasonality are in part to the production period and the availability of storage. The movement of states' production in and out of the market also has an impact on the unloads from any particular area.

Table 3.8

Potato Unloads at Southern Cities, Selected Years*

	1963	1965	1970	1975	1978	1979
Total Unloads in 1,000 Cwt.	8,582	8,422	8,653	8,331	8.476	8.229
Market Share as Percent of Total Unloads						
California	5%	6%	3%	2%	1%	1%
Colorado	3	2	2	2	3	4
Florida	7	8	7	8	7	7
Idaho	13	8	12	14	21	23
Maine	7	12	6	6	3	2
Michigan	3	3	4	5	7	3
Red River Valley	11	6	15	17	17	15
New York	10	12	8	4	4	3
Washington	3	2	3	2	2	2
Wisconsin	10	10	13	18	18	17
Other	28%	31%	27%	22%	18%	23%

*Atlanta, Birmingham, Columbia, Dallas, Fort Worth, Houston, Memphis, Miami, Nashville, New Orleans, Oklahoma City, San Antonio.

Table 3.9

Potato Unloads At Northeastern Cities, Selected Years*

	1963	1965	1970	1975	1978	1979
Total Unloads in 1,000 Cwt.	32,565	32,927	27,478	22,159	20,159	20,115
Market Share as Percent of Total Unloads						
California	7%	9%	9%	10%	9%	9%
Florida	4	3	4	4	4	4
Idaho	9	13	11	13	21	23
Mane	35	32	26	30	17	13
Michigan	5	4	10	8	9	9
Red River Valley	2	1	2	3	4	4
New York	18	18	16	11	12	13
Washington	2	2	3	3	3	4
Wisconsin	1	1	2	4	4	4
Other	17%	17%	17%	16%	17%	17%

*Albany, Baltimore, Boston, Buffalo, New York, Philadelphia, Pittsburg, Providence, Washington.

Source: Putman, Aroostock County, Maine Potato Industry Study, 1981.

Table 3.10

Total Shipment

Table 3.10

Total Shipments of Potatoes From Major Shipping Areas, Selected Areas

	1966	1970	1975	1976	1977	1978	1979	Total % Change 1966-79
	Shipments in 1,000 Cwt.							
Canada	2,633	1,504	1,420	531	1,064	1,501	1,595	-39%
Maine	17,243	15,080	16,887	15,679	12,169	12,170	11,272	-35
New York	9,869	7,698	6,107	8,529	8,111	7,767	7,643	-23
Michigan	3,469	4,112	3,135	3,143	3,015	2,673	2,888	-17
Wisconsin	6,876	7,987	10,232	10,073	10,801	11,653	11,148	+62
Red River Valley	14,307	16,524	15,422	18,285	18,056	20,193	18,723	+31
Colorado	8,245	7,059	6,484	6,122	6,694	7,227	8,311	+ 1
Idaho	14,659	12,285	12,565	14,000	13,980	18,015	19,206	+31
Washington	7,343	5,724	5,984	6,911	7,078	7,067	7,247	- 1
Oregon	4,903	5;316	5,392	6,019	5,681	5,269	5,253	+ 7
California	21,615	22,069	14,100	16,758	14,776	12,360	12,964	-40
TOTAL 11 MAJOR SHIPPING AREAS	111,162	105,358	97,638	106,050	101,425	105,895	106,250	- 4%
	Share of 11 Major Shipping Areas in Percent (%)							
Canada	2%	1%	1%	1%	1%	1%	1%	
Maine	16	14	17	15	12	11	11	
New York	9	7	6	8	8	7	7	
Michigan	3	4	3	3	3	3	3	
Wisconsin	6	8	10	9	11	11	10	
Red River Valley	13	16	16	17	18	19	18	
Colorado	7	7	7	6	7	7	8	
Idaho	13	12	13	13	14	17	18	
Washington	7	5	6	7	7	7	7	
Oregon	4	5	6	6	6	5	5	
California	19	21	14	16	15	12	12	
TOTAL 11 MAJOR SHIPPING AREAS	100%	100%	100%	100%	100%	100%	100%	

Source: Aroostock County, Maine Potato Industry Study, 1981

Idaho shows the most constancy, although, all states show some seasonality in unloads. Florida is typical of producing states in the southern United States.

The significance of these patterns for an FDCM are two-fold. The scope or boundary of the relevant market for any supply area can be large and in some cases national. To be of maximum effectiveness for tablestock marketers an FDCM would have to be able to connect traders as far apart as Blackfoot Idaho and Alanta Georgia. The data on seasonality indicate that the transaction not only involves moving products over large distances, but that the identity of market traders will also change throughout the season.

3.3.8 Production Fluctuations

The potato subsector has for a long time suffered from severe production fluctuations. These production fluctuations along with the generally inelastic demand for potatoes has led to wide variations in prices and incomes. As an indicator of vertical coordination performance these fluctuations are a cause for concern. Although, some of these fluctuations are due to uncontrollable events, much is due to growers' planting decisions.

The correlation coefficient between acreage fluctuations and production fluctuations has been calculated for the most recent twenty year period. The value of this statistic is + .89. It is obvious that acreage decisions have significant affect on total production.

Table 3.11

Monthly Potato Unloads By Producing Area, 1981

Area	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Cal.	247	198	212	229	842	1595	1076	817	623	389	321	291	6890
Idaho	1206	1048	1230	1230	1182	855	619	127	296	426	566	512	9297
Oregon	347	293	322	295	226	144	80	120	293	213	223	312	2878
Wash.	252	240	199	252	354	655	789	780	600	239	242	193	4795
Col.	407	376	416	327	286	138	36	83	174	168	200	227	2788
RRV	409	335	378	284	111	19	29	203	303	154	129	262	2616
Mich.	143	86	127	81	63	6	69	222	298	152	147	123	1511
Wis.	360	247	277	198	104	45	41	385	644	345	298	258	3202
Maine	413	367	503	511	340	87	3	9	80	173	307	380	3173
Florida		21	51	131	318	185							706
Other	1713	698	889	781	775	1215	1595	1023	1277	938	682	844	12470

Source: Consumer Marketing Service, Fruit and Vegetable Division, Market News Branch, Fresh Fruit and Vegetable Unloads, 1981

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Further analysis has shown that acres planted are probably the most important single variable affecting changes in production. Two regression equations were run with year-to-year production changes as the dependent variable and changes in acreage planted and changes in yields as the independent variable, respectively. Annual changes in yield were able to "explain" about 60 percent of yearly production fluctuations. However, annual changes in acres planted could account for almost 80 percent of annual production fluctuations. Although the two variables are related, it appears that changes in acreage have more impact on annual production fluctuations than do changes in yields.

Table 3.12 lists the year-to-year variation in acreage and production. In almost all cases variation in total acreage is matched by a commensurate change in production in the same direction. It also appears that the year-to-year variation in production and acres planted is increasing. The reasons for this increase are unclear; it indicates a deterioration in the effectiveness of vertical coordination.

The percentage changes in Table 3.12 may not be large, but it is enough to cause large variations in prices given that potatoes in general have an inelastic demand. Tomek and Robinson cite the form-level demand elasticity for potatoes as being about .3.[26] As is the case in many agricultural commodities, quantity is usually predetermined within a particular period and it is price which adjusts. The measure of this adjustment is a price flexibility.

Table 3.12

Acreage, Production; Percent changes in Acreage, Yields, and Production[1]

Year	Acreage 1000 acres	Production 1000 Cwt	% Δ In Acres	% Δ In Production	% Δ In Yields
1981	1263	338591	6.9	11.8	4.6
1980	1182	302857	-9.8	-11.6	-2.0
1979	1310	342497	-6.2	- 6.2	0
1978	1398	365429	0	3.0	2.1
1977	1398	354576	-1.0	- 1.0	0
1976	1407	357674	8.1	11.8	3.5
1975	1302	319834	-8.4	- 6.5	2.1
1974	1421	342060	6.9	14.2	6.8
1973	1329	299410	2.2	1.2	-1.0
1972	1300	295955	-9.2	-7.3	2.1
1971	1432	319534	-1.2	-2.0	-.6
1970	1450	325752	0	4.4	4.9
1969	1455	311903	3.4	6.1	3.0
1968	1408	293984	-6.0	-3.3	1.9
1967	1497	305334	0	0	0
1966	1497	306902	5.5	5.4	0
1965	1419	291169	6.4	21.6	14.0
1964	1334	239403	-2.1	-11.9	-9.8
1963	1365	271730	-3.3	1.9	5.1
1962	1408	266783	-7.8	-9.1	-1.4
1961	1527	293394	8.3	14.0	3.6
1960	1411	257435			

[1]Percent change is based on previous year.

Source: Potatoes, Sweetpotatoes, Production, Utilization, and Disposition. SRS, USDA, Various Issues.

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Although the reciprocal of price elasticity cannot be strictly identified as a price flexibility(unless all the substitution effects are zero), it does give the lower bounds on the price flexibility. In the case of potatoes, a price flexibility of 2.5 is reasonable. For example, the 12 percent increase in production from 1980 to 1981 would cause a 30 percent change in price, ceteris paribus.

The important point is that variations in production caused by changes in planted acreage can lead to dramatic variations in potato prices. This price variation can have great impacts on the income of potato growers and marketers. Although there are no measures on the profitability of potato operations Putman has tried to develop a crude index of potato profitability for growers. It is the ratio of gross income received from potatoes per acre to the index of prices paid by farmers. While not a measure of actual profits and only valid for comparisons over a short period of time, Putman found that there were large variations in the year-to-year "profits" and that this variation has increased in the latter part of the 1970's.[27]

Not only do these variations in acreages and hence, prices, affect the profitability of potato marketers, they also make the planning function of potato firms much more difficult to accomplish. A quick perusal of the fluctuations and an examination of potato consumption trends indicate that these year-to-year changes in acres planted are not in response to fundamental changes in consumer demand or costs of production. Most likely, they are in response to past conditions and a best guess of what the future is likely to entail.

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The FDCM is designed to reduce the price variation due to planting decisions.

3.4 POTATO MARKETING CHANNELS

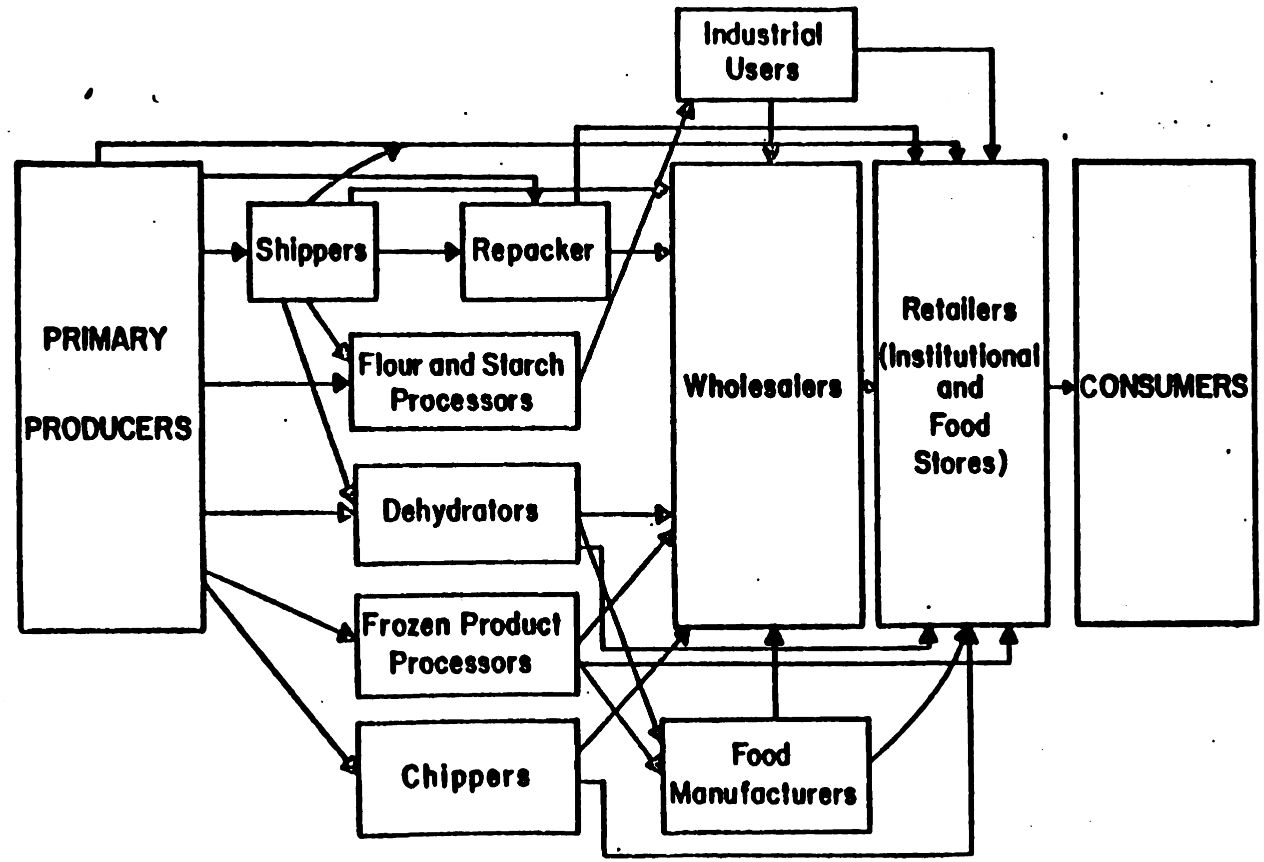
There are two primary marketing channels through which potatoes can move. One is the fresh or tablestock marketing channel and the other is the processed potato marketing channel. Two other channels of lesser importance in terms of volume are the seedstock channel and the livestock feed channel.

Figure 3.2 shows the various market channels for potatoes. This representation is simplified and within the market paths shown there may be intermediaries. For example, in Maine it is not uncommon for potato dealers to exchange potato loads between themselves several times before delivering them to terminal market or wholesaler. Also the role of brokers in the market channels is not identified. The importance of brokers in arranging sales varies greatly from one production area to the next.

From 1980 figures, the relative percentages of product moving through the various market channels was approximately 36 percent for tablestock sales(111 mil. cwt.), 26 percent for frozen french fries(80 mil. cwt.), 12 percent for potato chips and shoestrings(38 mil. cwt.), 10 percent for dehydrated products(30 mil. cwt.), and eight percent for other processed products(23 mil. cwt.). Seed sales accounted for little more than eight percent of all potato sales(25 mil. cwt.).[28]

FIGURE 3.2 MAJOR MARKETING CHANNELS FOR POTATOES AND POTATO PRODUCTS

FIGURE 3.2 MAJOR MARKETING CHANNELS
FOR POTATOES AND POTATO PRODUCTS



Source: Harrison, et. al. Michigan Potato Industry. 1976 vo

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While the seedstock channel is of lesser importance in terms of volume, it is important because of the emphasis on the use of certified seed potatoes. The emphasis is primarily due to a desire on the part of potato growers and other marketers to improve the quality of their product. Also processors commonly require that contracted farmers use certified seed. In 1979 seedstock sales represented about 7 percent of total potato sales.[29] However, the production of seedstock overstates their use as seed. Some of the certified seed is used as tablestock or processing potatoes.

Sales for feed have never been large. Historically they account for about two to three percent of total annual sales.[30] Livestock feed potatoes are primarily culls from fresh-pack or processing operations.

Both the tablestock and processing market channels have undergone dramatic changes in the last twenty-five years. Changes in consumption patterns covered in section 3.2 were the leading factors behind these changes.

3.4.1 The Tablestock Market Channel

Once tablestock potatoes are harvested there are several alternative routes through which they can travel. For example, Harrison found in Michigan the importance of growers washing, grading, packing, and shipping their own potatoes has grown.[31] However, in Idaho it is more common for a non-grower owned packing she

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shed to perform these functions.[32]

It has also been reported that the operation of grower operated packing sheds has led to contracting between growers and retail chains.[33] From this research it appears that this practice is informal at best. Usually it consists of a verbal commitment between the chain and grower stating that the chain will take all the potatoes the grower can produce and pack. This could be a useful device for any retail chain which was trying to develop its own brand. For example, Kroger now has potatoes packaged under their name.

Growers who do not have their own packing facilities typically transfer their potatoes to packer-shippers. In many cases these shippers may grow some potatoes of their own. The terms shipper and packer-shipper can be confusing. In most cases shippers will also pack the potatoes, although ocassionally they will ship in bulk to repackers. The extent to which shippers pack the potatoes or ship in bulk(greater than 50 pound sacks) varies by area and final market outlet. In the Northwest very few potatoes are shipped in bulk. But in the Red River Valley and Maine as much as 60 percent and 33 percent of total tablestock movement may be shipped in bulk, respectively.[34]

The transaction between the grower and shipper is usually of two forms. The shipper may take a grower's potatoes on consignment. In this case the shipper will sell the grower's potatoes for him. The price the grower receives is the F.O.B. price paid for the packed

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potato minus charges for grading, washing, and packing. Under a consignment sale the grower is renumerated according to the packout.

In the second major form of transaction the shipper will take title to the potatoes and pay the grower an F.O.B. farm price. When the shipper takes title to the potatoes they are usually sampled and graded before hand so that the shipper is able to get an indication of what the packout will be and pay the grower on the basis of percent usable.

The packout(percent of potatoes making a consumer grade) varies by area. For instance, in Idaho a packout above sixty percent is considered good, while in Michigan a typical packout is above 70 percent. This difference is not attributable to a higher quality of potato in Michigan, but to stricter quality requirements in Idaho. However, Idaho growers have more alternative uses for their "off-grades" than do Michigan growers.

Under either arrangement it is the shippers responsibility to sell the potatoes. Depending upon the size of the operation and market practices in the area this may be done through their own sales force or through brokers. The use of brokers varies by area. However, in almost all areas, brokers are an important transaction mechanism.

Brokers perform an auxiliary coordination service. Not only do they assist the transaction, they are also an important source of market information. Typically, a shipper will contact a broker when he has a supply of potatoes to move. Or a broker may contact a shipper when the broker needs some potatoes to arrange a sale. Under

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normal circumstances the broker does not take title to the potatoes and receives a brokerage fee. In 1981 a typical brokerage fee was $.25/cwt.

It is the broker's responsibility to arrange a sale for the shipper and usually also arranges transportation. The degree to which brokers are used seems to be a function of firm size, but it also seems to depend on traditional marketing practices. A Michigan shipper said that in Michigan there are no real brokers. Michigan packing and shipping is fairly concentrated and it appears that Michigan shippers have traditionally negotiated their own sales. Although, it is likely that many of their customers may use buying brokers.

Generally, it appears that most shippers keep in contact with at least a couple of brokers. One reason is not to foreclose any market opportunities as some buyers will only work through a particular broker. A second reason is to garner additional market information. Brokers through their constant presence in the market are probably the most informed of market conditions.

While concentration levels in shipping are not high relative to other industries they are still significant. In Idaho the ten largest shippers handle about 60 percent of tablestock sales.[35] This figure is representative across major production areas. In Michigan the ten largest shippers account for about 50 percent of sales and in the Red River Valley about 26 percent of sales are handled by eight shippers.[36] Even in Maine with over 800 packing houses the eight largest shippers account for about 50 percent of the market.[37]

Most packer-shippers are highly seasonal and this is especially true of the grower-owned operations. Even in Oregon and Washington many of the independent shippers operate only for a portion of the year. One shipper in Washington indicated that this was, in part, a conscious marketing strategy. He said that in some years to be competitive with Idaho when it hits the market he must price his potatoes three to four dollars below Idaho potatoes in the eastern markets.

The most striking aspects of the tablestock market channel is the diffuse nature of the price formation process and the variety of participants who may be involved. Growers may perform all functions including the sales function to the ultimate consumer or potatoes may be sold to packer-shippers who may sell direct or use brokers. While potato prices are reported, they are not formed in the typical textbook fashion. The price agreed on is the outcome of the negotiation process between two individuals, who, using the information available to them, try to negotiate the most favorable deal possible. A more in-depth look at the pricing practices and the importance of various market participants is included in the sections on the major production areas.

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3.4.2 The Processed Potato Market Channels

The processed potato product markets are relatively simple compared to the variety of pricing mechanisms and marketing practices used in the tablestock marketing channels. Although, processors do rely on open markets to obtain some of their product, a majority of their needs are obtained through contracting.

Harrison et.al. reported that potato freezers usually contract for well over 50 percent of their raw product needs.[38] The results in this research support this finding. All freezers interviewed contract about seventy percent of their raw product needs. At least one processor contracts for essentially all of its needs. This processor is not in a large production area and alternative sources of supply can be costly.

In the case of dehydrators, the level of contracting is usually reported as about fifty percent.[39] Although, most dehydrators interviewed indicated that under the right conditions they will contract larger amounts. Dehydrators can afford to contract lesser amounts relative to freezers because the quality requirements are less stringent. Additionally, dehydrators are less certain of their demand than are freezers.

Of the major processed forms potato chips are least heavily contracted, usually about 50 percent.[40] One reason is that potato chippers are often local and smaller operations than are potato freezers and dehydrators. The raw product needs to operate a potato chip plant are not as great as those required to run a freezer or dehydrator. Also potato chippers are able to use a wider variety of potatoes than are freezers. Some growers claim potato chippers are prone to break contracts when spot market prices are low relative to contracted prices and use poor quality as a justification. If this is true, objective standards and guarantee of performance are important issues for an FDCM.

Starch and flour processors usually contract very little for their raw product needs. Since the quality requirements are relatively low, much of the incentive for contracting is removed. These processors often use culled potatoes from fresh pack and other processing operations.

The amount to contract by processors is based on several factors. One is the amount of raw product they need to run their operation at an efficient level. Second is a major processor will have much of their processed product sold before production. These commitments are usually with fast food outlets or other institutional establishments. After these are considered the firm will evaluate what they think raw product production will be for the upcoming season. If production estimates are low they will contract more heavily and vice versa. The decision on contracting levels is also based on bargaining strategy. Processors may in some circumstances choose to contract lesser levels if they feel this will give them a future bargaining advantage. All factors are considered in the corporate headquarters before a decision on the level to contract is made.

Figure 3.3 shows the location of major processing facilities in the United States. By far the vast majority of plants are located in the northwestern United States. The reasons for this location were covered earlier.

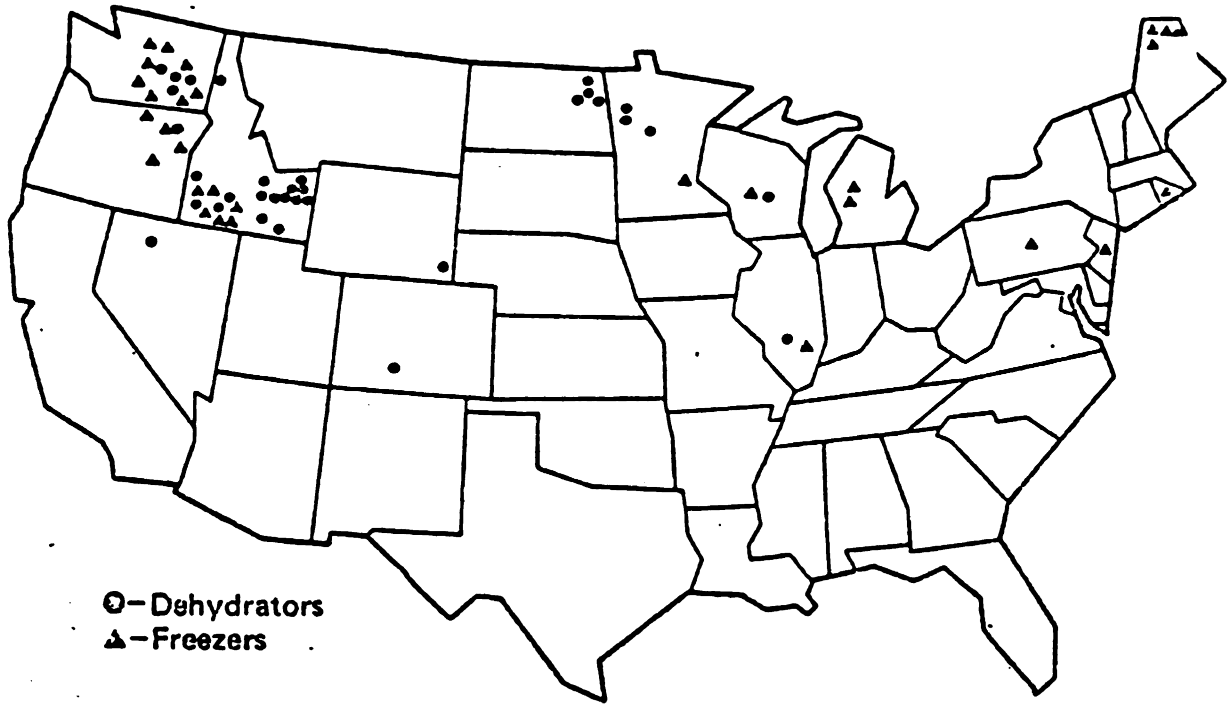
The concentration of processing plants in the Northwest has put other production areas in a bind since it is cheaper to ship the final product than it is potatoes long distances. About 60 percent of processing plants excluding chip plants are located in the Northwest. Chip plants are the exception since it is cheaper to ship the raw product than it is the bulky and relatively perishable finished product.

Growers in the Central and Eastern regions are introducing varieties which do well in their soils and climatic conditions and are good for processing. Also, transportation costs are higher than when the current processing plants were built. Processors are looking for locations to place their plants which are nearer to the population centers and still be able to obtain an adequate supply of quality potatoes. So far, Wisconsin and Michigan seem successful in attracting new processing facilities. Both states seem capable of producing the qualities and quantities desired by processors.

Once the potatoes are processed it is necessary for the processor to find a buyer for them. Most processors have their own sales force. However, they may still use food brokers, especially the smaller firms. Processors will frequently forward contract sales with fast food restaurants and food manufactures, but seldom have contracts

FIGURE 3.3

U.S. POTATO PROCESSING FACILITIES, 1975



Source: Phillips et. al.

with retail stores and other institutional outlets. Forward sales greatly ease their decision making. In fact, the greater the degree of forward demand they have solidified, the greater their ability to forward contract with growers.

This has been a quick overview of the general conditions in processed potato market channels. Most of the detail on the negotiation process involved in contracting has been left out. This was intentional. Most contracts between growers and processors are negotiated under some form of collective bargaining arrangement. Collective bargaining is a major vertical coordination alternative to forward deliverable contract markets. The contracting process is handled separately and in some depth in the next chapter.

3.5 VARIABLES AFFECTING VERTICAL COORDINATION

What follows is an analysis of those factors which affect the producer-first handler exchange. These factors are technical, structural, and behavioral. In each major production area the combination of these variables will change slightly, sometimes leading to subtle differences in the manner in which the transaction is conducted as well as influencing its outcome. However, there are also many similarities among the production areas which allows for some generalization.

The major theme of the following sections is to concentrate on those variables which affect the level of vertical coordination in each area and must be considered in the design of an FDCM. While this chapter is intended to be mostly descriptive, a short analysis of the impact of these variables on the design and potential of an FDCM will be given.

To provide some additional information Table 3.13 has been provided. It shows the major forms of utilization in the major production areas and other production variables. In some areas the form of the transaction and market alternatives is constrained by technical considerations.

Table 3.14 also illustrates some variables which affect the level of vertical performance attained. Unlike the variables in Table 3.13 the variables in Table 3.14 are more qualitative in nature. They are also reflective of the variables contained in Table 3.13. The last measure in Table 3.14 is an informal weighting of the other variables. It is in a sense partially indicative of the need for improvements in vertical coordination. These Tables are provided for reference and organization and will not be referred to specifically in the text.

The following sections are divided according to the two major market channels as the major form of transaction vary between them. Since contracting is examined in the next chapter most of the emphasis is placed on the tablestock channel. The description is organized so that those variables or practices most affecting the transaction and most important to the design of an FDCM are examined.

Table 3.13

Production and Market Characteristics

Production Area	% Utilized as Table.	% Utilized as Proces.	Number of Farms[1]	Average Farm Size[1] (acres)	% Acreage Irrigated[1]	Average Yields[2] (cwt/acre)
California	70	30	360	150	95	358
Idaho	25	75	2300	170	95	260
Oregon	20	80	475	140	90	414
Washington	20	80	540	200	100	479
R. River Valley	39*	61	1500	150	5	180
Michigan	55	45	850	90	50	235
Wisconsin	70	30	695	90	75	323
Maine	60	40	1400	85	5	240

* Includes 14 percent sold as seedstock

1. U.S. Department of Commerce, 1974 Census of Agriculture, 1977
2. U.S. Department of Agriculture, Potatoes and Sweet Potatoes, 1982.

Table 3.14

Variables Influencing the Transaction

Production Area	Number Production Alternatives[1]	Type of Shipppers[2]	Collective Bargaining	Use of Brokers[1]	Market Order	Information Conditions[1]	Level of Vertical Coordination[1]
California	3	I,G	No	2	No	2	2
Idahp	2	I,P,G	Yes	2	Yes	2	2.5
Oregon	2	I,G	yes	2	Yes	2	2
Washington	2	I,G,P	Yes	2	Yes	2	2
R.River Valley	3	I,G	Yes	3	No	2	2
Michigan	2	I,G	Yes	1	No	2	2
Wisconsin	3	I,G	No	2	No	2	2
Maine	1	I,G	Yes	3	Yes*	1	1

1. Where; 1 = Low
2 = Moderate
3 = High

2. Where; I = Independent Shipper
G = Grower-shipper
P + Processor Shipper - Listed in order of volumes sold.

*Market order only applies to Russet Burbank sold as Tablestock; about six percent of production

3.5.1 Vertical Coordination In Tablestock

There are three basic types of shippers, the grower-shipper, the independent shipper, and the large processor shipper. In potatoes most shippers will pack their own, although this does vary by area and some will ship in bulk. Additionally some shippers will ship for packers, such as in the Red River Valley. The grower-shipper is usually small and uses only his own production. They operate only a short time during the year. The independent shipper forms the largest segment in terms of volume. They will either purchase the raw product from the grower or sell on consignment. The processor-shipper is most important in the Northwest.

The relative importance of the various types of shippers varies by area. For instance, in Idaho there are 59 shipper and 28 in Washington.[41] Most of these shippers are independent, although some will grow their own. In Maine on the other hand there are over 800 packing houses, mostly grower owned.[42] In all areas the degree of concentration measured in terms of volume of sales is relatively high.

Most shippers in the Northwest service retail chains or large wholesaler distributors. In most other areas the dominance of the independent shipper is not as clear cut. The structure and identity of the first handler is in part a reflection of market outlets downstream and tradition. In Maine and in the Red River Valley repackers and terminal markets are more important outlets than they are in the Northwest.

The largest single differnce between areas is the degree to which growers are involved in the packing and shipping of potatoes. For instance in the Red River Valley and in Michigan there is a much higher incidence of grower involvement in the grading, packing, and shipping of potatoes than in the Northwest.[43,44] This includes individually owned operations and cooperative ventures.

Moreover, Wellund, as well as Harrison in Michigan, found that in the Red River Valley that as the size of farm operation grew so did the likelihood that they would perform more functions such as grading, washing, and packing.[45,46] Greater than half the packing operations in the Valley were owned and operated by growers.[47] These operations were usually small and handled only their own production. Few operated the entire year.

The presence of substantial grower involvement in the performance of shipping and packing functions can affect the degree of vertical coordination achieved. In Maine most of the 800 packing sheds are small and family owned and operated. Because they lack the facilities over a third of the pack in Maine is in 50 pound sacks.[48] This pack requires the least amount of work and skill in preparation. However, it may contribute to a poor quality image which Maine has.

Putman found only about 50-75 packers in Maine which he would consider centralized. These operations run throughout the year, have a permanent labor force, professional management, and modern facilities. They are able to perform more functions, such as grading, washing, packing and palletization, than the great majority of packing houses.[49] Some of these operations are owned by growers, but for the most part they are not. These packers were more likely to put up a wider variety of pack and exhibit greater quality control.

Maine also suffers from a lack of coordination between the packing and marketing of its potatoes. It is common for the grower-packer not to know the final destination for his potatoes when they are packed.[50] This is unlike the situation found in Idaho. Knowing the final destination of the potatoes enables the packer to put together a pack which meets the demand characteristics desired by the customer. The lack of this coordination surely must hurt the Maine potato grower.

In Wisconsin according to Putman there are very few farm packing operations.[51] Most of those around are larger operations. There are several marketing and packing sheds owned by farmers and operated as Sub-Chapter S Corporations. Most of the tablestock is handled by brokers. However, there are only three major brokers and one has most of the market.[52]

Florida and Texas are the two largest producers in what could be considered the southern United States. They are typical of southern producers. The primary crop is the winter crop. Most of this production is either for tablestock or chippers. Most of the fresh pack is put up by independent packer-shippers, although, some may grow some of their own potatoes. Brokers are used quite heavily in both market channels. These states are usually on the market for only a short time as there is very little storage and they cannot compete when fall production hits the market.

Larger shippers, usually independent shippers, are more likely to have their own sales force. This usually consists of one or two salespeople. Their function is roughly the same as the brokers, but they represent the shipper solely and they are salaried employees. Though, they may receive bonuses or commissions. The customers they service are generally wholesalers, or retail chains. They will negotiate the sale directly with the firm or through their agents.

A typical day for a salesperson begins by making several phone calls to buyers. However, the purpose of these phone calls is not necessarily to arrange sales, but to get an idea of market conditions. Once the seller feels he has an idea of the market he may return to a buyer contacted earlier and try to make a sale. This negotiation is normally over in a few minutes, but the outcome depends on each parties' bargaining strength. The balance of bargaining strength may change from day-to-day. For instance, if a packer knows that he has a particular pack which the buyer is desperate for, he can drive for a more favorable price. However, if through some mistake the shipper overestimated the sales of a particular pack and needs to get the surplus off the packing floor the buyer may be able to drive an extremely advantageous sale.

Several shippers said that it is common for them to change their evaluation of the market as the day goes on. Even under the best of conditions a shipper or broker can only get a limited idea of what the market will bear. Most potato marketers specialize in particular geographical parts of the country or in particular types of customers. Given the nature of the price making process, obtaining prices from outside one's usual sources may be very difficult. During this process the volume of sales at these prices may never be entirely known.

In an effort to increase the reliability and amount of information The Market News Service of the USDA produce daily price quotes for particular packs of potatoes. The prices are obtained through a sampling of shippers in a relevant market area, for example all the shippers in Idaho. To avoid misrepresentation the market news reporter may also contact buyers to get agreement. These prices are published daily, but there is a day lag between their collection and dissemination. However, the prices may also be obtained via the telephone or over the radio on the same day.

With respect to the conditions of sale to major buyers there is a common practice referred to as "price protection". When a retail firm negotiates a sale with a shipper several weeks in advance of delivery, the retail firm will request price protection. This means that if during the weeks between the sale and delivery the price moves against the retailer, i.e. potato prices are lower at time of delivery than they were when the sale was negotiated, the retailer will only be charged the prevailing market price.

The ability to force these terms on a shipper is a function of a buyer's importance in the market. When asked if the courtesy extended in the opposite direction most shipper's responded with a laugh. Some shippers did state that some retailer's will occasionally do them a favor by taking some potatoes off their hands. Shippers also commented that they would like to do away with the practice, but as long as some shippers do it they all must do it.

The effect of this practice is to increase uncertainty that a shipper must deal with. Price protection also affects coordination between the grower and shipper. To arrange an advance sale, the shipper must make sure the potatoes to make the pack will be available. To do so may require him to purchase the potatoes or make an agreement with a grower to supply the needed potatoes at a future time. In the latter case, the price returned to the grower may be uncertain since it will depend on market conditions at the time of delivery.

3.5.1.1 Selection Of First Handlers

The specialization in particular varieties will often dictate what market outlet a grower will patronize. Each outlet uses potatoes with characteristics best suited for a particular utilization. And although no variety is so specialized it can't be used in other utilizations, certain varieities are preferred. Specialization may also be a function of location. Growers in southwest Idaho have limited opportunities to sell their potatoes as tablestock, while growers in Southeast Idaho may either produce for shippers or dehydrators.

According to our survey results an important factor in the selection of markets to sell in by growers is the relationship established with the buyer. Forty percent of the growers surveyed responded that the relationship of their most used market outlet was important enough that they would accept a lower price in some cases. If the grower feels that he has an honest relationship with a buyer, a considerable amount of time and effort may be saved in selecting a market outlet. Also if growers do have few market alternatives they may be unwilling to jeopardize the existing relationship. So they specialize in the production of one or two varieties.

Market access may be expensive to acquire if one lacks it. Just as physical capital can create barriers to entry and in some respects exit, these relationships built up through the specialization of production and market channels, can create barriers to entry into a specific market outlet. It also can make switching market outlets costly.

The lack of alternative market outlets can put growers in a poor bargaining position. Even in those situations approximating atomistic competition, prices will vary across time and buyer. Locking oneself to a particular market outlet may have its advantages in terms of market access, but one cost may be foregone opportunities available through other marketers or in other markets. However, the lack of timely and accurate information regarding prices and quantities makes it hard for growers to evaluate these opportunities.

Tablestock growers in Michigan try to avoid being captive of one shipper by using two, though few will use more than two.[53] Usually the second shipper will only handle about twenty percent of the grower's volume.[54] It seems that this type of use of shippers by growers is an attempt to keep the primary shipper "honest".

Most shippers will work with a "core" of growers. This core commonly is about 10 to 20 growers.[55] Most shippers view this core group as their private property. Interviews with shippers indicate that "stealing" another shipper's grower is a serious broach of etiquette. The shipper has little recourse against the offending shipper, however if the disloyal grower should return he would find his welcome less than that of the prodigal son. In order to discipline the grower the original shipper may refuse the grower's potatoes. Thus a grower who switches shippers, perhaps in order to obtain a better deal, risks the loss of market access unless the switch is permanent.

Harrison found a high degree of geographical specialization among shippers.[56] Shippers will normally buy from growers only within a limited area. Geographical specialization is common. Transportation costs limit the area a shipper may serve, but specialization may also lead to the formation of stronger relationships.

3.5.1.2 Terms Of Payment

Normally, there is a close relationship between the grower and shipper. A shipper is usually able to call "his" growers when he has a particular sale to meet. If the grower has the potatoes on hand and agrees to the sale, he is paid on a packout basis for his potatoes. The price received by the grower is an F.O.B. price minus packing charges. Since this is typical in the subsector the distinction between a consignment sale and a direct sale to the shipper is, in practice, ambiguous. In both instances, growers are normally paid on a pack-out basis and the price received is normally a F.O.B. price. Payment to the grower is usually within 30-60 days. This is fairly standard for the subsector.

Both methods of transaction are far from ideal from the grower's perspective. In neither case do shippers have an incentive to get the grower the highest possible price. When a shipper takes title to the product it is in his interests to obtain the potatoes at the lowest possible price. Of course, his ability to do this is limited by market conditions and a desire to keep the grower in business. The shipper also wants the continued patronship of growers.

When the shipper acts as an agent for the grower and there is a standard charge for the service the shipper again has little economic incentive to get the grower the best possible price. Under this type of arrangement the shipper does face the same incentives listed above. Typically, a grower may have the ability to tell the shipper when to sell. However, to be effective this requires the grower to keep a constant eye on the market with fewer resources to collect relevant information. In some cases, the grower may not retain the right to select the selling date. The major shipper in the Red River Valley is a cooperative and pays its growers on a pooled price.[57] Additionally, a shipper to be effective may be required to put up different packs to meet buyers' demands. If a shipper is unable to assemble a specific pack desired by a customer it may be the grower who suffers in the long run.

A better system from the growers' perspective is if the shipper were paid a percentage of the sale price, perhaps even an increasing one. The shipper would then have a strong economic incentive to obtain the highest price possible for a grower. However, when this question was posed to a Michigan shipper, he claimed that growers lack the strength to push this type of change through. Although, he claimed he would have no problem under this type arrangement.

In some cases when a shipper actually purchases the potatoes from a grower the bargaining strength of the parties may vary. Although this may not be reflected in the price, but in the other terms of trade. The grower in Idaho is usually paid a flat price less so much for tare(dirt, shrink, and general wear). Pencil tare as it is referred to is usually about three percent. However, in some cases the shipper may request the Federal and State Inspection Service to conduct a platform inspection. In a platform inspection the potatoes are sampled and checked for percent usable, i.e. percent U.S. no. 1

and 2's. The amounts of tare, as defined by the shipper, dirt, and other defects are also estimated. The actual payment to the grower is based on the results of this inspection.

Exhibit 3.1 is a copy of an inspection certificate. In this form the percent usable was determined to be 85 percent because of 12 percent serious damage. The three percent tare is considered a given. Thus this grower would be paid the agreed upon price for 85 percent of the potatoes he delivered.

The ability for shippers to request a platform inspection varies with market conditions. If the crop is short the grower is in a more advantageous position and can refuse to agree to a platform inspection. When supply is large the grower has little leverage. The cost of the inspection is usually split between the grower and the shipper. This practice is not common in Washington or Oregon since most shippers sell on consignment in these areas.

The extent of control a grower can exert and will exert over a shipper varies in practice. In the Valley the grower will sometimes own storage on the packer's premises. The grower then controlled the time of marketing. This format could reduce a shipper's flexibility in putting together specific packs. However, as a matter of course it appears most growers relied on their shipper for advice and usually followed it.[58]

Under cooperative marketing associations growers may still own storage but are paid a pooled price. Under the pooled price format, the time of marketing makes little difference. In general, this gives the packer greater flexibility in marketing.

Exhibit 3.1

Platform Inspection Form

UNITED STATES DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
IDAHO STATE DEPARTMENT OF AGRICULTURE
INSPECTION CERTIFICATE

INSPECTION POINT

No.

DATE

TOTAL WEIGHT 169015 lbs

APPLICANT

COMMODITY
☐ POTATOES
☐ OTHER

CONTRACT NO.

GROWER

FEE .63.38

TRUCK OR CAR NO.

	LBS EXAM	LBS. DIRT	SERIOUS DAMAGE: UNUSABLE	SOFT ROT	INTERNAL	OTHER		DAMAGE: INSECT	CUTS	INTERNAL	OTHER	DEFECTS OF U.S. NO. 2	POTENTIAL U.S. NO. 2	U.S. NO. 1			UNDER SIZE
(POUNDS)												USN1					
												1 3/4 oz					
												6 oz					
								Including fresh cuts + bruises									
TOTAL LBS																	
% TARE		3 %	11 %	%	1 %	%	%	%			%						
TOTAL TARE		15 %								%		% 88	%		%	%	%

NET* LBS | TICKET NO. NET WEIGHT 1 2 3 4 5 6

PERSONALLY INSPECTED AND CERTIFIED CORRECT

REMARKS:

LICENSED INSPECTOR

*PERCENTAGES BASED ON CLEAN SAMPLE. SEE REVERSE SIDE OF THIS FORM FOR LEGAL NOTICE

3.5.1.3 The Use Of Brokers

Most shippers interviewed said they used brokers. In some areas, such as Idaho, even the larger shippers, who operate year-round, used brokers for about forty to fifty percent of their sales. The smaller shippers depend upon brokers quite heavily using them for most of their sales. Since these shippers are not in the market for the full year it is difficult for them to establish long lasting relationships with large buyers. Brokers because of their greater number of contacts can arrange sales that the smaller shipper is unable to do.

Shippers feel that brokers give them access to markets that might be closed to them. For example, some buyers will only work through a particular broker.

In the Red River Valley the normal brokerage function of arranging sales and purchases is extended to include the purchase and sale of potatoes by the brokers themselves. Properly, these individuals are not brokers, but dealers. However, to be consistent with the Valley's use of the word broker will be used here. About 70 percent of the volume handled by brokers is purchased by them.[59] Most of this volume, 91 percent, was obtained directly from growers or grower owned packing houses.[60] In almost all aspects of the price generation process brokers are crucial. In the great majority of the transactions they are actively involved. Not only arranging the sale but actually doing the buying and selling. Brokers often are the most prominent mechanism of price formation.

Given this situation the growers' most important source of market information was brokers. The essential point is the potential lack of knowledge growers may have regarding other market opportunities. Thus, the importance of trust cannot be underestimated in the process of carrying out these transactions.

Brokers must make it their business to keep abreast of market situations. The grower is often in the situation where they must accept the broker's opinion of market conditions. It was found that even in those instances where brokers were not the purchasers of growers' or packing house potatoes they were considered the most important source of market information.[61] However, in the majority of instances brokers were the purchasers of potatoes.

The marketing of Maine potatoes revolves around the dealer system. To be able to sell potatoes which one did not grow requires a license. There are approximately 135 licensed dealers in Maine.[62] These dealers average 233 loads per year. Many of these loads are sold between dealers.[63]

The dealer system in Maine is similar to the brokerage system in the Red River Valley. In Maine the dealer purchases the packed potatoes.[64] The dealer then sells the packed potatoes to a terminal market buyer or another dealer. The dealer may supply the packer with packing material, pay for federal-state inspections, and obtain the trucking. The dealer will pay the grower-packer. In most cases, according to Putman, the payment is relatively quick.[65]

Although the dealer purchases the potatoes, the packer is responsible for the quality until they reach their final destination. The only exception is when damage to the potatoes is due to transportation problems.[66] The risk the dealer takes is the one of downward price movements. Dealers are also required to be bonded. This typically runs to $5000 up to the first 200 carloads and an additional $25 for each load above this amount.[67]

Most grower-packers will sell to more than one dealer. This limits their vulnerability to opportunistic behavior. However, it also enables the dealer to have access to a large number of growers and creates an extremely competitive situation for the grower at the grower-first handler exchange.

The dealer system and the large number of small grower-packer operations makes it difficult to establish stable market relationships. This creates a coordination problem by decreasing the incentives a subsector participant might have to communicate concerns about quality, packaging, etc. In the long run this type of behavior or lack thereof, becomes self-reinforcing. Growers unaware of the needs of consumers fail to meet them except by accident. The returns to growers reflect this condition and the growers have even less incentives to produce the characteristics desired.

Additionally, it is not in the dealer's interests to keep the grower totally informed of prices, and perhaps, other terms of trade that might be beneficial to the grower. Since the dealer is the primary purchaser of growers' potatoes, they have the incentive to keep the growers as ill-informed as possible concerning prices and other market conditions. This is unfortunate since dealers are the major source of market information for growers. This means that to be effective a great deal of trust must be established between the grower and the dealer. It is the main reason why growers will work with more than one dealer.

3.5.1.4 Labeling And Packs

The types of pack put up in each area is a function of variety, size of shippers and final market outlet.

The pack and pricing of tablestock potatoes in the Northwest varies from that in the East and Midwest. In the Northwest more emphasis is put on count cartons and consumer packs. Cartons weigh 50 pounds and contain a specified number of potatoes. For instance, a 100 count carton will contain 100 potatoes. These cartons are usually packed by mechanical sorters, which sorts the potatoes on the basis of weight. Most of these packs are geared for the restaurant trade. However, potato marketers in the Northwest will refer to count cartons as the barometer of the market. These cartons make up about thirty-five percent of the tablestock trade in Idaho.[68] The percentage is slightly higher in Washington and a little lower in Oregon.[69] The advantage the Northwest has over other areas is a much more uniform potato in size and shape.

Consumer packs make up about forty percent of the pack in the Northwest.[70] These are typically 5, 8, 10, 15, and 20 pound bags. The remaining portion of tablestock potatoes go into a "non-size A" designation packed in various consumer sizes.[71] Washington and Oregon exhibit about the same distribution in pack sizes and variety as Idaho. Oregon and Washington also only pack about twenty percent of their production as tablestock.[72]

The Red River Valley is more typical of production areas outside of the Northwest. Although it still ships the greater proportion of its potatoes in bulk(greater than 50 pound bags) to repackers, there has been a noticeable move to consumer packs. This effort is partially due to the change in consumption patterns and also an effort to differentiate their product on the part of packers. By providing more services(more pack sizes) a packer is able to offer better service to a customer. The most popular consumer sizes are the 10 and five pound pack in paper or polyethelene.[73] The larger packs, considered bulk, 50 or 100 pound packs, were packed in burlap. Brokers handle a considerable amount of these bulk sales.

The 100 pound bag is the biggest mover in terms of volume. This pack represented 45 percent of the volume moved.[74] This percentage has decreased, though, over the past twenty years. The remainder of the pack, in terms of volume, is made up of 10, 20, 50, and five pound packs in descending order.[75]

The variety grown can influence the type of packing material used. While film bags appear to be the most popular pack among consumers, this causes problems for Maine packers. Round whites are more susceptible than are Russets to greening when exposed to light.

Thus, film is not a very good packing material for round white varieties. Film is also not very good for unwashed potatoes for obvious reasons. Only 15 percent of Maine's potatoes are washed. This is in comparison to the 90 percent common for other areas.[76]

Almost all shippers who pack do so under their own label, although many will also pack under another firm's label. Most packers have at least two labels under which they pack.[77] One shipper explained that this allows them to service two different retail firms in the same market. Most packers interviewed by Wendland feel they have achieved some measure of brand recognition.[78] Most of the firms used little advertising. However, larger firms will advertise. Most of this effort was directed towards wholesalers in trade magazines.

3.5.1.5 Quality, Inspection, Market Orders

A quality image for its potatoes is desired by all areas. The degree to which this is achieved depends on the quality produced, the quality standards enforced, and market practices.

In addition to the favorable conditions for producing quality potatoes, Idaho and Washington both have federal market orders which affects the marketing of tablestock potatoes. Malhuer County in Oregon is covered under the Idaho market order. In the case of Idaho Market Order 945, initiated in 1948, was probably one of the most important factors contributing to its dominance in tablestock markets. The order sets forth stringent quality requirement for all potatoes shipped out of Idaho. These requirements are subject to change, but they are more demanding than are the federal grades. The establishment of the order enabled Idaho to ship a uniformed product of high quality. The Washington order, 946, is designed similarly to the Idaho order.

Idaho also has a very active promotional board, the Idaho Potato Commission. It vigorously promotes Idaho potatoes operating educational programs, contacting retailers, and conducting advertising. The combination of the market order and these promotional activities have made Idaho the preeminent name in potatoes.

Maine, on the other hand, has had difficulty in recent years combating a poor quality image. It isn't that Maine produces poor quality potatoes, but its system of production and marketing lends itself to the packaging of an inconsistent pack. Maine's production and marketing system is very fragmented. With the large number of grower-owned packing houses, most only in the market a short while, it is hard to develop a consistent pack. A seemingly contradictory example of Maine's quality problems is its high packout rate, which is sometimes over 80 percent. This high of a figure indicates lower quality standards. Maine's potatoes are also subject to more bruises, storage deterioration, and handling damage than other areas.[79]

Most dealers in Maine are small. These dealers are unable to practice any quality control over the potatoes they buy. In many instances the potatoes a dealer will ship have already been handled previously by other dealers. Often the potatoes were packed well before any deal has been made. These practices by themselves would make it difficult to ensure quality. However, given that the packer retains responsibility for the quality of the potatoes not the dealer, there are few short-term incentives for the dealer to worry about quality control.

The few large dealers and centralized packers usually work with a established group of grower-packers or growers. This enables them to practice a much greater level of quality control. The large dealers are also much more likely to have a sales staff. They are able to form lasting relationships with their customers. The ability to offer uniform quality helps keep these relationships stable.[80]

Only about 75 percent of Maine's potato shipments are inspected.[81] Inspection may be requested by any party which has a financial interest in the potatoes. At the shipping point these inspections are provided by the federal-state inspection service. The inspectors verify the accuracy of the grade stated on the package label, bill of sale, bill of lading,etc. In large pack plants inspection is done as a matter of routine. Some buyers will insist on an inspection as a condition of sale.

Maine has a market order which covers its Russet Burbanks. However, only six percent of Maine's tablestock shipments are Russet Burbanks.[82]

Michigan also has problems with putting up an inconsistent pack.

Part of this is attributable to the large number of varieties produced in the state(over thirty).[83] However, it is claimed by some growers and shippers that the rejection of loads by potato chippers contributes to a poor quality image. Once a load is rejected a shipper must find a market for these potatoes, which is usually the tablestock market. These rejected chip potatoes may have already traveled great distances and not kept under proper storage.

3.5.1.6 Tablestock Marketers' Attitudes Towards Contracting

While it was previously stated that no evidence of retailers contracting with growers for tablestock was found, contracting for fresh potatoes is actually more common than one might suspect. Most potato freezers and processors practice skimming. That is, they remove the best potatoes from their processing lines and fresh pack them. In fact, the largest potato shipper in Idaho is a potato dehydrator. Many of these potatoes which are fresh packed are contracted. Although, they are contracted as processing potatoes.

A representative of a major dehydrator and shipper said that without the fresh pack operation it would not be possible to operate. Quality potatoes can earn a higher return sold as tablestock than they can being processed. The dehydration plant then can make use of the culls from the fresh pack operation. Dehydrators-shippers may also be able to obtain quality potatoes at lower prices through contracting than if they used the spot market. As these potatoes are obstensibly contracted for processing it can be assumed that the per unit price is less than what a shipper might pay for quality tablestock potatoes. If this hypothesis is correct, then dehydrators-shippers are able to capture a portion of the producer's surplus.

Another advantage to this practice appears to be an example of the importance of transaction costs affecting vertical coordination. For it is possible for dehydrators to obtain culls from other shippers. And in fact they acquire some in this manner. But there are costs in using the market. According to one dehydrator, if he had to use the market extensively to obtain culls the business would not survive. He claims this was one reason for the decline of potato starchers and flour producers. The way they operate now, culled potatoes are a natural product of the fresh pack operation.

A topic of discussion with potato shippers and growers is why there is so little preseason contracting for tablestock potatoes. The answer most frequently given was that they lack the forward commitments from buyers to contract heavily. In the case of a small shipper this is especially true. Because buyers have many alternatives from which they can buy their potatoes, there is little incentive to forward contract with growers or shippers. The merchandising policies of major retailers do not lend themselves to forward contracting. Many times a major promotion featuring potatoes is conceived only a few weeks in advance.

Retailers seem to do little long term planning with respect to their potato needs. As has already been made clear buyers of potatoes are unwilling to accept the price risks that forward contracting might entail. As long as they can receive price protection locking in a predetermined price it has no advantage, unless it is lower. Major buyers already receive this benefit.

At first glance it would appear that retailers and wholesalers have few incentives to forward contract for potatoes. However, potatoes are among the most important items in the produce department at retail. No major retailer can afford to be without them for long. Additionally, potatoes are often used in promotions to increase store-wide sales. Given their importance retailers might be able to benefit from forward contracting. As it does in processing forward contracting could bestow operational efficiencies to the retailer. Scheduling of transportation and labor would be improved as would the use of display shelves. However, the benefits to improved planning of promotional activities may even be greater. Presently, most promotions for produce items are planned only three to four weeks in advance. One reason for this short time period is that retailers are not certain of their supply. By forward contracting retailers could assure themselves of this supply and make plans much further in advance.

Forward contracting would change the manner in which produce buyers acquired their product. However, it also appears that forward contracting could also reduce transaction costs as buyers could avoid constantly going into the market. The two produce buyers interviewed said they might be interested in forward contracting if the price risks were reduced.

A second commonly cited reason for the lack of contracting in tablestocks is that the pack-out or quality of tablestock potatoes is less certain than for processed potatoes. Until field run potatoes are packed the percent No. 1's and 2's is not certain. Shippers are uneasy to forward contract for a specific pack, such as 100 count cartons, without knowing if these potatoes will be available to be packed at the desired time. Given the price risks and the quality risks few shippers are willing to forward contract a large percentage of their potatoes. However, there are quality and production risks in processing potatoes too and they handle such risks through contigency clauses.

One shipper mentioned that some buyers, because of their size, may not be able to forward contract in lots big enough to make it efficient. As long as the small buyer can receive potatoes from jobbers or other intermediaries this would not have to change. What it does mean though is that the forward contracting would probably be done by one of these intermediaries. It is this person who would have to predict the demand and then act upon it.

Most shippers and growers interviewed said that they would not be opposed to contracting for tablestock potatoes. The shippers said that as long as they could get a firm commitment from a buyer they would have no aversion to forward contracting with growers.

Two shippers interviewed do forward contract with growers for a small percentage of their raw product needs. The primary reason is to ensure a constant throughput in their packing operations. This is especially important as the marketing season progresses. A second reason is to be able to ensure quality by contracting with quality growers.

One of the shippers who preseason contracts about thirty percent of his needs feels this enables him to plan the use of his facilities more efficiently. He bases his contract decision on his projected demand and minimum level of output necessary to run his plant efficiently. The pricing decision is based on what he believes are the growers' costs of production. He feels he can get a fairly accurate idea of this since he grows some of his own supply.

3.5.1.7 Problems for an FDCM in Tablestock Potatoes

One of the major difficulties shippers face when considering to forward contract with growers is the inability to acquire forward sales from their customers. Although some produce buyers for wholesalers or retailers may be moving in this direction, they are leary of taking any unnecessary price risk. However, as at least a few shippers do, retailers might benefit from contracting enough potatoes to meet their core demand. The problem is that shippers are no more willing to accept price risk than are retailers.

The ability of shippers to gain forward commitments from buyers and to contract a portion of their expected needs are probably a function of size. Larger shippers are in the market longer, have a wider variety of packs, and better quality control than do smaller shippers in general. All of these characteristics appeal to major buyers. If so, then the ability to use an FDCM to contract with growers would favor large shippers.

However, if the concept of an FDCM can be extended all the way to retailers some of the differential access to buyers may be eliminated. It is also unlikely that all retail buyers would want to participate, especially smaller ones, and small shippers could still service them or terminal markets.

If the concept were extended up to the retail level, much of the need for brokers as traditionally defined would be reduced. However, as demonstrated in the Red River Valley and Maine, brokers could move beyond their traditional function. If so brokers could provide a valuable service by contracting with shippers and buyers who might be too small to contract in amounts large enough to be attractive to large firms.

The potential for increasing vertical coordination within tablestock potatoes is great. Tablestock growers could achieve the benefits now only available to processing growers. Furthermore, the increased information would increase the level of planning and widen the scope of market and knowledge of alternatives. Currently, even the most able trader can only review a small number of transactions before making a decision.

Shippers and other buyers could also greatly benefit. Through improved scheduling of plant facilities costs could be reduced. Packs could be tailored to customers according to type and quality desired. And transaction costs would be reduced.

A common concern is quality and this is one of the most troublesome variables for many areas. There appears to be no reason why premium-discount schedules could not be used as they are in processing contracts. Furthermore, if some individuals believe they have some measure of brand recognition they should probably be allowed to identify themselves on the system.

Beyond assuring quality an FDCM has the potential to improve quality. One way is by improving the level of pricing efficiency so that price differentials accurately reflect quality differentials and that these are communicated to the grower. In Maine these incentives seem to be lacking. The improvement in the flow of information would help growers better ascertain what quality levels are desired. Additionally, an FDCM might reduce the number of times a particular load is exchanged between dealers before it ever reaches the consumer.

An FDCM does seem to have the potential to improve vertical coordination in tablestock market channels. However, the specific design issues which must be resolved for it to achieve its potential must wait until Chapter VIII.

3.5.2 Processing Transactions

While the tablestock market channel is important the processing market channel utilizes the greater portion of total production. The major transactional mechanism for processing potatoes is substantially different than those used for tablestock potatoes. In processing potatoes the use of contracts is much more prevalent as is the use of collective bargaining. Given the importance of collective bargaining in potatoes the next chapter is devoted to the process and its implications.

Contracting enables processors to obtain the quantities of raw product they need to run their operations efficiently and to get the qualities they desire. It is a basic desire to reduce some of the uncertainty they face through gaining more control over the production process. Growers obtain a market outlet for their goods, usually are quoted a price, and may need a contract to obtain financing. From both perspectives contracts improve their ability to plan.

In freezing operations the plant is very dependent upon receiving raw material quality. The size of the potato will affect both the quality and yields of the french fry. Longer french fries are considered a premium product. In addition to size, shape is also important. A large blocky potato increases the yield obtained. Freezers will also have specifications regarding solids and sugar content. Normally high solids and low sugar are desired. The high solids enable the frier to produce a product which absorbs more oil during the process and enhances the flavor. Low sugar content will produce a french fry that is lighter in color than one high in sugars. Most buyers of french fries prefer the lighter color, although it is not universal. Contracting is a method for freezers to help ensure they get minimum quantities of the meeting of these quality specifications.

The quality demands for dehydration are less rigorous. However, they also prefer a potato high in solids. Dehydrators are not as able to use the large potatoes as freezers are. One reason mentioned for fresh pack operations was so that the dehydrator would have an outlet for these larger potatoes.

The chip contract is in many ways similar to a freezer contract. It contains a base price with an incentive-disincentive schedule for various quality factors. The most important quality factor is the sugar content. A high sugar content will lead to a dark chip which is unacceptable. The sugar content of a potato can change overnight.

Contracts between processors and growers are usually negotiated around January for the upcoming season. Although, it is not unheard of for the process to continue to just prior to and into the planting season. Most growers are represented by a bargaining association. Potato Growers of Idaho represents about 75 percent of the processing growers in Idaho. This represents about the same percentage of processing production.[84] In Washington, growers are represented by the Washington Agricultural Marketing Association, the bargaining arm of the American Farm Bureau. They represent about 50 percent of the growers controlling about 60 percent of production.[85] In the last couple of years they have had problems obtaining a contract favorable to growers and some splinter groups have formed. In Oregon, growers are represented by the Malhuer County Bargaining Association. It represents essentially all the growers in the area.[86]

Growers in the Valley are represented by the Red River Valley Potato Growers' Association.

Growers for both the freezing market channel and the chip market channel are represented by bargaining associations in Michigan. Growers for the freezing market are represented by the Michigan Agricultural Cooperative and Marketing Association(MACMA), an affiliate of the American Farm Bureau. Chip growers are represented by several bargaining associations of which Chief Wabsis is the largest. MACMA represents essentially all the frozen processing growers. While the figures are not available, it appears that the chip bargaining committees represent far less than their potential.

Maine growers are represented by the American Bargaining Council, one of the earliest collective bargaining units in potatoes. The process is similar to that found in other areas. However, Maine has two pieces of legislation which are not common to most other production areas. In Maine there is binding arbitration. After a specific date in the bargaining process, both parties, the association and the processor, must submit their final offer. The arbitrator evaluates the position of both parties and then selects one of the offers. There is no middle ground. The intent of the legislation is to force both parties to be realistic in their demands. Two years ago, the first year the legislation was enacted, binding arbitration was necessary.

The second piece of Maine legislation requires all growers signing an association negotiated contract to pay the association a specified fee per cwt. This payment is mandated regardless of whether the grower is a member of the association or not. This is obviously an attempt to rectify the free-rider problem common in collective bargaining.[86]

Members of a bargaining association are charged a fee for their membership. The fees are usually based on a charge per acre or a percentage of gross sales. For instance, Potato Growers of Idaho charges its members one-half a percent of gross sales up to a maximum of $1250.[87]

An association bargains on behalf of its members. It is common to have an association's own members form the bargaining commmittees. In some cases a professional may be hired to oversee and coordinate the negotiations. A member is prevented by the membership agreement from signing a non-association negotiated contract until a release is given by the association or a default date is reached.

All terms of trade are open to negotiation. And while it is not necessarily the case, most contracts negotiated by an association are very similar in most terms. The biggest differences coming in quality specifications. Each processor may have their own quality requirements. However, the structure of these quality specifications are quite similar.

A standard contract usually provides a base price for U.S. No. 1's and No. 2's. Processing grade B's are paid a separate price. The contracts will also contain incentives for specific gravity, size, color, and bruise free. If the contract is a storage contract it will also provide an allowance for storage. This allowance usually increases through the storage season as the risks of deterioration climb.

The contracts can be quite lengthy and complex. They specify when title is transferred and that the processor has the right to inspect the crop at anytime. The base price is usually not actually paid out. Because of the incentives and disincentives contained in the contract regarding various quality factors it is unlikely that the exact base price is ever paid. The incentives are to reward quality growers for the extra effort it takes to produce quality. However, to remain in business a grower must almost certainly obtain these incentives. A grower who continually receives just the base price faces a dismal prospect with respect to a continued existence.

The prices generated in the contracting process are not highly transparent. The various bargaining associations do try to exchange information regarding contract prices. However, this is informal and not always done in the most timely manner. Another important point which will have great relevance for an FDCM, is that the contracts between production areas are hard to compare if the premium and discount schedules are unknown. To compare prices requires a person to make various adjustments in prices which reflect the differences in contract terms. The bargaining associations do attempt to do this, but the results of such attempts may not be available until the following season.

Even within the same production area, prices which competing processors are offering growers are not easily available. Again the local bargaining association does attempt to get this information to growers. The process is not an open market. Once a contract is negotiated between the association and a processor the same basic terms, including price must apply to all growers with whom the processors contract.

In potato chip bargaining as described by the secretary of Chief Wabasis there is no real negotiation. The dominant chipper sets a price and usually sticks to its guns. Their strategy is helped if they can find several independent growers, who represent significant production, to sign a contract before negotiations are concluded. Additionally, the tone for negotiations are usually set in Florida the preceding summer. As the production moves northward so do the negotiations; any price increases negotiated over those in Florida usually represent increases in the costs of production. Other chippers in Michigan usually follow the lead of the dominant firm.

The contract is usually more oriented to the processor's needs than the growers. A particularly disturbing clause to growers is the "chip on arrival" clause. Growers claim that this clause is used against them to reject loads when spot market prices are favorable to the processor. Processors deny this accusation. It should be noted that there are similar clauses in most processing contracts. However, the tolerance levels for sugar content are more narrow in potato chip processing than they are in other forms of processing.

In the Red River Valley, brokers are also actively involved in the processing markets. Most of these potatoes were purchased by chippers. It is not clear how many of these potatoes were contracted by brokers with growers on the behalf of processors. However, in the case of both chip and freezing potatoes many of the potatoes are handled by brokers before they reach the processor. In chipstock approximatley 48 percent of the potatoes were moved via brokers, while 23 percent of the freezing potatoes were handled by brokers.[88]

Maine also produces for the processed market channel. About 40 percent of its production goes into processed products.[89] Unlike other states the relative importance of processing in the state has declined over the past decade.

The primary problem Maine faces in the processing market is a poor quality potato for processing. Compared to the northwest or other processing production areas, Maine's Russet Burbank is smaller and it appears more susceptible to bruising. Although, whether this is attributable to the potato or harvest methods is unclear. The variability in Maine's yields increases the uncertainty surrounding supply, even with forward contracting. The combination of these factors affects the yield of the final product, labor costs and the price received for final product. Exacerbating Maine's difficulties is that a french fry produced in Maine must sell at a discount to french fries produced in the northwest because of final product quality.[90]

Given the existence of contracting in processing potatoes the applicability of an FDCM to this channel seems great. But before any recommendations can be made the contracting process must be looked at in more detail, which will be done in the next chapter.

3.6 SUMMARY

This chapter was intended to provide some background concerning the conditions surrounding the transaction between the grower and first handler. It has also tried to identify the major participants to the transaction, how it is normally conducted, and how it may vary across the country. There are two major marketing channels in which potatoes may be sold, tablestock and processed. Each channel relies on a different mix of transactional mechanisms.

The processing market channel relies primarily on forward contracting between processors and growers as a method of transaction. Still, considerable amounts are purchased through spot markets. Spot markets are the major form of transaction for tablestock. There is some forward contracting for tablestock potatoes, but it is minimal.

The transaction between growers and first handlers is characterized by the diversity in the number and type of economic agents who may be involved. Yet, this diversity is more a variation on a theme than a totally new composition. For instance, in many areas grower-packers are common. However, in other areas it is more common to find independent packer-shippers.

The differences in the relative presence or absence of a particular type of market participant in various production areas seems to be a function of size, tradition, competitive pressures, production conditions, and the importance of a specific market channel. For example, in Florida where growers and packers are visible in the market for only a short time of the year, brokers usually arrange sales. But in Michigan, which is present in the market for longer periods, the use of brokers by shippers is minimal. Still, this is only part of the explanation as brokers move at least fifty percent of the tablestock potatoes in Idaho.

The import of who handles the various functions, especially who is involved in the transaction with the grower, is who will be the party forward contracting with the grower under an FDCM. The diversity in who is the first handler of a grower's potatoes means that their must be some accomodation of this diversity in the design of an FDCM. In some areas with grower-packers, the first handler could conceiveably be a retail store receiving packed potatoes. On the other hand, it might be an independent packer receiving potatoes in bulk from the grower. Beyond the differences in actors involved bulk potatoes and packed potatoes can be viewed as two different goods. Of course, these are just two of the variations that can be found in the potato subsector.

It was mentioned that these differences appear to be one of degree than substance. The differences in who performs certain functions affects who will be forward contracting with the growers, not if it is possible. The major implication for the design of an FDCM is that the number and type of traders "certified" to operate on the system must be increased. This also means that the number and type of contracts must be increased to reflect the differences in the various ways potatoes may be moved.

Another striking feature of the potato subsector is the importance of established relationships. During interviews the importance of established relationships was continuously reinforced. It has been hypothesized that the importance of the relationships is one of the motivators behind specializing in a particular market channel. Obviously, the returns to be gained in producing for the tablestock or processing market channel are most important, but once a decision is made and some "human capital" is built up in a relationship it is risky to break these ties.

Long-term relationships give the seller market access and the buyer a source of supply. The use of brokers by packer-shippers have often been justified as a method of acquiring market access. Frequently growers will have few alternative buyers to sell their potatoes too, both in the tablestock and processing market channels.

The establishment of an FDCM should create greater market access for growers and increase the number of alternative sources of supply for the buyer.

While the actual percentages of potatoes moved being assisted by brokers is not certain, it appears they are involved in a substantial portion of the transactions. In the strictest use of the word, brokers would be auxiliary vertical coordination mechanisms. They usually do not take title to the product but are instrumental to the transaction between the seller and buyer.

Brokers facilitate the transaction in several ways. Of course, they are responsible for the "meeting" of seller and buyer. There are several aspects to this communication function. Beyond the function of just locating a buyer or seller, brokers must try to match preferences regarding quantities and quality. Buyers may have preferences for certain qualities and sellers may become known for selling potatoes with specific quality preferences. It is the responsiblity of the broker to match a buyer's preferences to a supplier, who can match these preferences.

Because of their continual presence in the market brokers are normally much more informed regarding; the location of supplies, including general quality; who is demanding what quantities and quality; and general conditions of supply and demand than are other subsector participants. Thus, brokers can reduce the search costs of those parties who use them. These savings must be matched against the costs of employing the broker.

Brokers may also be a risk reducing device for sellers and buyers. Sellers run the risk of not finding a market for their potatoes at favorable prices. The use of brokers reduce this risk. In addition, they may improve the timeliness of a sale with respect to perishability. From a buyer's perspective there may a risk associated with being out-of-stock. If a buyer of potatoes has built up a quality image to his customers the risks of "out-of-stocks" may be increased. Brokers by assisting in the search for the desired product may reduce these risks. In both cases the costs to using a broker are non-existent unless the broker arranges a sale.

The role brokers play is crucial. However, under some designs of an FDCM the function brokers perform could be eliminated. Computerized markets could eliminate the need for brokers to act as intermediaries for buyers and sellers. Yet, there are specifications of an FDCM that could still include brokers, although their role would be similar to that found in the Red River Valley. Brokers could perform the important function of consolidating orders for those buyers who are too small to effectively forward contract.

The single biggest factor preventing forward contracting in tablestock potatoes appears to be the lack of forward sales by shippers. These sales would most likely be to wholesalers or retailers. In combination with electronic scanning retail firms could start to reap greater benefits from long-term planning and thus forward contracting. Scanning already puts a great deal of information concerning product movements, effectiveness of promotions, and seasonality of demand at the finger tips of retail management. This information can be used to more effectively plan their merchandising stategy and could extend their planning horizon beyond the few weeks present now. Two produce buyers for major retail chains stated that in principle they have no major crticisms of an FDCM, but they would not use it if they were the only firm to do so.

As has been found in this research and food marketing firms are not excessively concerned with the price they must pay as long as it is competitive with the rest of the industry. If only one firm were to use an FDCM it would have to accept the risk that at harvest time it might be paying significantly higher prices than their competitors.

Having all major retail outlets on an FDCM would also increase the benefits an individual firm could derive from an FDCM. Since the aggregate information regarding supply and demand would be available to each firm they could assess the potential demand for their own product much more accurately. This would allow them to make adjustments accordingly in their plans. Firms would also be able to acquire increased operational efficiencies, such as improved delivery schedules, reduced labor costs, and the like.

The following chapter is a description of forward contracting in potatoes. It focuses more closely on the ins and outs of contracting than this chapter and particular emphasis is placed on collective bargaining.

CHAPTER FOUR

FORWARD CONTRACTING IN POTATOES

4.1 INTRODUCTION

As is the case for many processing vegetables, forward contracting is the most common form of transaction in the potato processing market channels between growers and processors. Table 4.1 lists the extent of contracting and vertical integration in selected commodity subsectors. While these are 1970 figures, the levels listed are about the same today.

In this research it has been found that normally, at least, fifty percent of processing production is contracted. This estimate appears somewhat conservative. Even potato chippers, who contract the least of the major types of potato processing firms, indicate they forward contract about fifty percent of their needs. Since forward contracting is so important in the potato subsector and they are closely related to the concept of forward deliverable contract markets, this chapter will be devoted to the description and analysis of forward contracting in potatoes.

4.2 INCENTIVES FOR FORWARD CONTRACTING

Preseason forward contracting in potatoes has grown out of the particular needs of both growers and processors. The advantages to

Table 4.1

Estimated Percentage of Agricultural Output Produced Under Production Contracts and Vertical Integration, United States, 1960 and 1970

Product	Production Contracts 1960	Production Contracts 1970	Vertical Integration 1960	Vertical Integration 1970
Crop		Percent		
Feed Grains	0.1	0.1	0.4	0.4
Hay and Forage	.3	.3		
Food grains	1.0	2.0	.3	.5
Vegetables for fresh market	20.0	21.0	25.0	30.0
Vegetables for processing	67.0	85.0	8.0	10.0
Dry beans and peas	35.0	1.0	1.0	1.0
Potatoes	40.0	45.0	30.0	25.0
Citrus fruits	60.0	55.0	20.0	30.0
Other fruits and nuts	20.0	20.0	15.0	20.0
Sugarbeets	98.0	98.0	2.0	2.0
Sugarcane	40.0	40.0	60.0	60.0
Other sugar crops	5.0	5.0	2.0	2.0
Cotton	5.0	11.0	3.0	1.0
Tobacco	2.0	2.0	2.0	2.0
Oil bearing crops	1.0	1.0	.4	.5
Seed crops	80.0	80.0	.3	.5
Miscellaneous crops	5.0	5.0	1.0	1.0
Total crops[1]	8.6	9.5	4.3	4.8
Livestock or Livestock Product				
Fed cattle	10.0	18.0	3.0	4.0
Sheep and lambs	2.0	7.0	2.0	3.0
Hogs	.7	1.0	.7	1.0
Fluid-grade milk	95.0	95.0	3.0	3.0
Manufacturing-grade milk	25.0	25.0	2.0	1.0
Eggs	5.0	20.0	10.0	20.0
Broilers	93.0	90.0	5.0	7.0
Turkeys	30.0	42.0	4.0	12.0
Miscellaneous	3.0	3.0	1.0	1.0
Total livestock items[1]	27.2	31.4	3.2	4.8
TOTAL CROP & LIVESTOCK[1]	15.1	17.2	3.9	4.8

[1]The estimates for individual items are based on the informed judgments of a number of production and marketing specialists in the U.S. Department of Agriculture. The totals were obtained by weighting the individual items by the relative weights used in computing the ERS index of total farm output.

Source: Contract Production and Vertical Integration in Agriculture, forward contracting for both the grower and processor can be summed up as improved ability to plan. This improved ability to plan is brought about by a reduction in uncertainty in several areas.

Processors benefit from forward contracting in several ways. Forward contracting guarantees processors a known supply of a known quality. Given the large capital investments present in modern processing facilities, there are large costs associated with their idleness. Especially costly can be start-up and shut-down costs. Thus, once a plant begins operation it will operate almost continuously during the processing season. It is not unusual for large freezers to run three shifts and process 100,000 pounds of raw product per hour all day. These plants will often operate essentially year-round. Every minute that the plant, equipment, and labor are idle costs the firm money. Given the raw product needs necessitated by the scale of such operations it is risky for the firm to rely totally on spot markets.

Processors are also concerned about the timing of supply, i.e. when it will be delivered. Through forward contracts processors are able to schedule deliveries in advance and not be subject to spot market movements. Thus, they are able to avoid serious bottlenecks and lulls in their operations. In most contracts processors do not actually specify a date for delivery. Rather, the contract will contain incentive clauses rewarding the grower for keeping his potatoes in storage until needed by the processor. The actual time of use is up to the processor's discretion, although, most contracts require that the processor give the grower sufficient advance notice, for example, a week. These incentives cover the cost of storage and the risk of quality deterioration during storage.

In addition to an assured supply, processors are better able to assure themselves, in advance, of a specific quality. Similar to storage incentives, forward contracts normally include incentives for desirable qualities. The form of the incentive usually states a specific standard to be met with respect to such quality factors as size, specific gravity, sugar content, and percent bruise free. A contract may also include a disincentive clause for those lots not meeting the specified standards. Both the incentive and disincentive schedules are formulas that work off the base price in the contract. Farmers will receive so much above or below the base price for each significant increase or decrease above or below the standard in the contract.

Another factor which makes forward contracting appealing to some processors is that they are often able to receive a forward commitment from their customers. These forward commitments are often formalized in written contracts. This is especially true for freezers who sell to fast food chains. While not all processors are able to obtain these forward commitments, it was found in interviews that many of the larger firms are able to project fairly accurately their core demand. Thus, forward contracting is a way for processors to obtain enough raw product to cover this demand.

Another cost which processors may avoid through forward contracting, as it is presently conducted, is competition. Processors do not have to bid head-to-head against their competitors when forward contracting. More of this point will be made later.

Forward contracting also has advantages for growers. Probably the biggest single advantage is that of guaranteed market access. By forward contracting potato growers are able to assure themselves of a market for their potatoes. Although, it should be recognized that there is not equal access among farmers to these contracts. Given, the quality demands of processors it can be argued that there shouldn't be. However, under the present system quality growers may not be able to receive a contract due to unequal access.

Another important advantage in most contracts is a "guaranteed" price. Guaranteed is in quotations marks because most forward contracts in potatoes state a base price. Through forward contracting growers are able to shift some of the price risks to the contractor. This base price is affected by the incentive-disincentive schedules present in most contracts. The base price is rarely paid. However, a good grower can project his yields and quality levels within reasonable limits and get a fair idea of what he will receive. Probably no grower expects to do worse than the base price and with good reason. One processor commented that if a grower only receives the base price, he won't be in business long. It is usually only enough to cover variable costs.

An increasingly important reason for growers forward contracting is access to credit. Given the record number of defaults on loans and the still high cost of credit, few lenders are willing to make loans without some form of collateral. A contract acts as a proxy for collateral. Since the lender is assured that the grower can receive payment for his potatoes, provided he can grow them, the lender is more willing to make a loan. The reaction of loan officials on the importance of possesssing a contract was unanimously positive.

This brings up an interesting question. How do tablestock growers obtain credit? The answer appears to be not very easily. However, the need for credit, in general, may be less among tablestock growers. Tablestock growers generally operated smaller sized units than processing growers. Therefore, the amount of credit needed may be less. A tablestock grower could obtain credit if he has an excellent track record or he has a large amount of equity.

For most growers potatoes are their primary enterprise. However, they will grow other crops if for no other reason than for an effective rotation. Under contracting a grower knows what type of return to expect on his potatoes. Given this information he could decide which commodity has the best profit potential. This, of course, depends on what his price projections and costs of production are for the alternative crop. In recent years most growers have found very few crops which are more profitable than potatoes. This is not due to a booming potato market, but to depressed commodity markets.

Although the advantages of contracting are great, it is not without disadvantages. Ewell in <u>Contract Farming in America</u> listed as one disadvantage the loss of entreprenuerial independence.[1] In potatoes the loss of entreprenuerial initiative appears minor. Most contracts are of the market specification variety. Although most contracts require the use of certified seed, most cultural practices are left to the grower. A grower is required to keep a record of all pesticides applied. In some cases the grower has the option of applying a fumigant. The grower usually receives compensation from the processor for this practice. In general the constraints on production practices due to contracting are not any greater than any other grower producing for the processed market.

As was seen, most contracts decrease greatly the price risks that growers must take. However, this is not without a cost. Growers by participating in contracting may forego potentially greater prices in spot markets for their contracted acreage. It is extremely difficult to evaluate the foregone potential profits growers have lost through contracting. It is assumed though that growers would not accept year after year contracts on which they did not earn a fair rate of return. Most growers and processors feel that in recent years contract prices have been more favorable than spot market prices. As has been pointed out the advantages to contracting extend further than simply guaranteed prices. If contracts do improve planning and access to credit, it is conceiveable that growers could accept lower prices in contracts than in the spot market and still do at least as well.

Processors in terms of foregone opportunities face the mirror image of growers. By forward contracting they may lock themselves into higher prices than if they had used the spot market. Again, these higher prices may be justified if forward contracting improves other facets of their operations.

Most of this section has been written as if the choice between forward contracting and use of the spot markets is mutually exclusive. Of course it is not. Few, if any, growers contract 100 percent of their production. Contracting has no affect on production risks. Since growers are not absolutely certain of their yields and quality levels, they will not contract all their acreage in case they need to make up a production shortfall on their contracted acreage. There is also a tendency on the part of some growers to play the market with part of their acreage. This tendency of growers not to contract their entire acreage will have to be dealt with if an FDCM is to live up to its planning potential. A major obstacle will be that an FDCM will not be able to affect the production uncertainty which leads to this behavior. So it will have to reduce the costs associated with production uncertainty.

Similarly, processors will not contract all their projected needs. This is partially due to the fact that they are not absolutely certain of their demand. This depends not only on their production plans, but also on the production and marketing plans of their competitors, which are unknown. Additionally, though processors treated lightly the price risks, they do not want to become too heavily contracted relative to the industry and find out at harvest time that they could have purchased their needs much more cheaply. An FDCM does have the potential to reduce this uncertainty if a significant proportion of production is contracted through it. Processors would then be better able to judge aggregate production and marketing plans and use this information in evaluating their own contracting needs and the prices they can afford to pay.

Under the present organization of contracting, the spot market provides the vital function of adding flexibility to both growers' and processors' operations. Grower's surpluses can be marketed through the spot market and if necessary, shortfalls may be obtained through the spot market. Processors are able to accomplish similar actions through the spot market. A design question for an FDCM is how this flexibility can be retained if spot markets no longer function?

Although there are advantages to forward contracting which improve planning, the decision whether to forward contract or make spot market purchases depends upon the relative costs of the two alternatives. There are costs associated with using the market. In terms of potatoes these costs not only include the costs associated with the actual use of the market(time, personnel, and equipment), but also the costs associated with the inability to acquire a sufficient supply--lost patronage and/or plant slowdowns or shutdowns; the costs associated with inefficient use of plant facilities or labor due to an erratic delivery schedule; and these costs may also include higher processing costs due to poor raw product quality. These costs must be included when evaluating the relative merits of obtaining raw product through the spot market or obtaining it via forward contracting.

Williamson has described conditions which would increase the tendency of a firm to either use the market or circumvent it. These conditions are related to transaction costs.[2] Whether a transaction will be market mediated or accomplished via some other way, contract or vertical integration, will depend upon the level of transaction costs associated with the alternative methods.

Recall Williamson's analysis on transaction costs presented in Chapter II.[3] Especially important are the concepts of idiosyncratic investments and impacted information, both of which exist to some degree in potatoes. These create incentives on the part of both parties to contract. Although, because of the imbalance in relative numbers and information, a bilateral monopoly is not created and the incentives to vertically integrate are not present. Contributing to the idiosyncratic nature of the investment is that potatoes are not completely fungible.

It was repeatedly stressed in interviews conducted during this research by both processors and growers the importance of quality. A potato is a potato is a potato is not true. There can be a wide variation in quality from one potato to the next from one field to the next, and from one grower's potatoes to another grower's potatoes. Growers who have a track record of producing good quality potatoes have no difficulty in obtaining contracts from processsors.

In fact, it is very difficult for new growers to break into contracting because of the lack of a track record.

In terms of market access and quality assurance, a common reason cited for discrimination in the offering of contracts, there are several design specifications for an FDCM which can address these issues. These recommendations will be presented in Chapter VIII.

Potato processors can use poorer quality potatoes if need be. Thus, processors are able to meet some of their quantity and quality needs through open market purchases. Using poorer qualities raises costs, though. Through the use of forward contracts and the incentive schedules they contain, processors are better able to ensure that they will be able to obtain the qualities they need.

4.3 THE CONTRACTING PROCESS

Although the specific details of the bargaining process vary from area to area, there are enough similarities to give a general picture. Some references to changes in the bargaining process, which are relatively new and not necessarily widely accepted, will also be covered.

Normally, representatives from bargaining associations meet processors at some point in time prior to planting. The growers' representatives are elected from and by the association membership. The length of their terms is typically a year. This can conceivably lead to a a loss of institutional memory. It is possible for an entirely new bargaining committee to be elected every year, perhaps with no negotiating experience or specific knowledge of what transpired in the previous year's negotations. In practice though, this rarely happens as most bargaining representatives are elected to successive terms.

Some bargaining associations employ professional managers to run the association and to coordinate negotiations. This serves the dual function of establishing institutional memory and acquiring bargaining ability. Often larger bargaining associations will have several bargaining committees - each bargaining with a different processor. It is the responsibility of the association president or manager to coordinate the efforts of these separate bargaining committees.

In the past negotiations were usually held during the winter months. Recently, however, more negotiations are being initiated at an earlier date, such as early fall or late summer. This offers the parties two advantages. If negotiations are successfully completed at an earlier time, it gives both parties more time to plan their operations. Furthermore, it gives the parties more time to come to an agreement.

4.3.1 Base Price Negotiations

In most negotiations the primary focus is on base price. Although, premium and discount schedules, components of price, and such issues as grading are also fair game. Not unexpectedly growers are usually bargaining for higher prices than were obtained the previous year. In the past several years higher prices were justifiable because of higher costs of production. Processors, in principle, have no problem with these demands. The bone of contention usually arises over what constitutes valid costs of production. The two largest areas of disagreement are interest costs and land costs. It is very rare that land costs are included in the costs of production. Occasionally interest costs are considered, but the rate at which these cost are pegged at are very important. Farmers prefer to use a rate such as the prime rate. Processors would prefer a rate such as the Farmer's Home Administration rate. A percentage point difference in the interest rate can lead to large differences in costs structures and the prices received by growers.

Since the bulk of the discussions revolve around prices and since growers' expectations are based on covering cost increases with perhaps, a slight increase above these, some associations and processors are beginning to index growers' costs of production. Negotiations over base price becomes a matter of simply referring to the indexed costs of production. When costs are indexed they are collected and calculated by an independent party, usually an accounting firm. Growers are surveyed over the course of the production year and costs are tabulated. An average cost of production is then calculated and presented to the bargaining association and processors. These costs typically include seed, utilities, chemicals, labor, equipment, and perhaps, interest.

Exhibit 4.1 illustrates how prices are indexed and what costs are included. For confidentiality, the names of certain companies and places have been blocked out. The form is quite complex and contains a wide variety of inputs.

Even in those areas where costs of production are not formally indexed and contained in the contract, price discussions revolve around the costs of production. The procedure is similar in both cases. However, when costs are not indexed by an independent third party the areas of dispute are much larger.

The duration of most contracts is one season. That is the terms and obligations stated in a contract apply to only the upcoming growing and storage season. However, an interesting development which is related to both the opening up of negotiations at an earlier date and the indexing of costs, is the negotiation of multi-year contracts. These contracts usually apply to two production seasons. For example, in the winter of 1982-83 a bargaining association and processor might negotiate a contract for which the basic terms in the contract apply to both the 1983 and 1984 production seasons.

The price in these contract for the more distant season can be determined in two ways. It can be indexed to the growers' costs of production from the previous year, or it may be stated in the contract. When the price is indexed to costs of production the contract essentially becomes very similar to those negotiated every year where costs are indexed. However, both growers and processors experience a reduction in market access and supply uncertainty at an earlier date than when contracts are negotiated every year.

Exhibit 4.1

Cost of Production Indexing

Base Price — Second Year

E. Company shall pay Grower for the 1982 potato crop the Base Price specified in 3.A. and B. above adjusted to reflect any increases or decreases in the cost of fertilizers, chemicals, energy, labor, seed, equipment, chemical and fertilizer applications, taxes, and interest incurred by Grower between the first year and second year of this agreement as hereinafter more specifically provided in Input Requirements Per Acre and Input Price Determination. Any increases or decreases in such costs shall be applied only to an average usable yield of 275 cwt. per acre.

(1) Input Requirements Per Acre: Company and Grower understand and acknowledge that only the following Grower inputs shall be used as a basis for determining an adjustment in the Base Price for the second year. Inputs are based on requirements for a potential 320 cwt. per acre yield.

(a) Fertilizer:	Requirements per Acre
18-46-0	200 pounds .10 ton/acre
10-34-0	100 pounds .05 ton/acre
Urea (46%)	400 pounds .20 ton/acre
28-0-0	24 gal. .13 ton/acre
0-0-60	540 pounds .27 ton/acre
Lime	2,000 pounds 1 ton/acre
Nutrient D	5 pounds
(b) Chemicals:	
Temik 15-G	20 pounds
Kocide	4 pounds
Monitor 4LC	2 qts.
Parathion 4F.	1 pt.
Lasso	2 qts.
Lorox	1 pt.
Sencor 50 WP	½ lb.
Dithane M-45	20 pounds
Dinitro	1 gal.
Concentrated Crop Oil	1 gal.
Seed Treater M-45	18 lbs.
(c) Energy:	
Diesel fuel	30 gal.
Gasoline	20 gal.
Irrigation — Diesel	40 gal.
Kilowats	628
(d) Labor	25 man hours
(e) Seed	18 cwt.
Hauling, U.P.	Miles [illegible]
Hauling, N.L.P.	Miles [illegible]
Hauling, R.R.V.	Miles [illegible]
(f) Equipment	(Requirement per acre
Two — 150 h.p. tractors	(determined by dividing total cost of inputs
One — 100 h.p. tractor	(by 15 years straight line depreciation
Three — 10-wheel trucks	(divided by 400 acres.
One — weed sprayer, 12-row	•
One — Betterbuilt seed cutter	•
One — Harvester with air	(Requirement per acre determined by
One — Windrower	(dividing total cost of inputs by 10 years
One — Planter with gandy	(straight line depreciation divided by
One — 6 - 18" pull plow	(400 acres.
One — 21 ft. disk	•
One — 14 ft. Chisel plow	•
Two — 4 row cultivators	•
Three — 20 ft. bulk beds	•
Two — travelers	•
One — 40A pivot - towable	(Requirement per acre determined by
One — 160A pivot	dividing total cost of inputs by 15 years
15,000' 6" pipe	straight line depreciation by 400 acres.
One — 180 h.p. diesel engine	•
One — 100 h.p. electric motor	•
One — 75 h.p. electric motor	•
One — pump - 1,000 gal./min. centrifugal	•
One — pump - 1,000 gal./min. turbin	•
One — pump - 500 gal./min. turbin	•

(g) Custom operations:

Broadcast	Once
Sidedress	Once
Airplane	6 times @ 4 gal. rate
Helicopter	6 times @ 4 gal. rate

(h) Taxes — Average Class 1 Montcalm Co. 154

(i) Interest — 6 month period

(2) Input Price Determination

(a) First Year

(1) Fertilizer — price quotes for each type of fertilizer input listed in (1) (a) above will be requested, received, and averaged from [illegible]; and Allied Chemical, [illegible], for the weeks of November 16, 1980, February 15, 1981, and May 17, 1981.

(2) Chemicals — price quotes for each type of chemical input listed in (1) (b) above will be requested, received and averaged from [illegible]; and [illegible], for the weeks of November 16, 1980, February 15, 1981, and June 14, 1981.

(3) Energy

(a) Fuel price quotes for diesel fuel and gasoline inputs listed in (1) (c) above will be requested, received and averaged from [illegible] (Standard Oil), [illegible]; and [illegible], for the weeks of November 16, 1980, April 19, 1981, and July 19, 1981.

(b) Electricity price quote shall be determined by averaging the following: (1) Diesel price as quoted in (3)(a) above and (2) requesting, receiving and averaging the price per kilowat hour for June, July and August from Consumers Power Company, [illegible], and [illegible], Por [illegible].

(4) Labor — Labor shall be determined by ascertaining the base hourly rate, excluding fringe benefits for the employees of [illegible] Foods, Inc., under their union contract for the year 1981.

(5) Seed — The price of seed shall be the average of the bulk certified 1980 Russet Burbank crop potato seed sales delivered to [illegible] during the months of December, 1980, January, February and March, 1981, from [illegible], Michigan; [illegible]; and Grafton, North Dakota.

(6) Equipment — Price quotes for each type of equipment listed in (1) (f) above will be requested, received and averaged for the first week of October, 1980, and the first week of March, 1981, from the following dealers:

Harvester, Planter	— Crooks Farm Power, [illegible] Parr & Sons, [illegible]
Trucks	— Bollinger, [illegible] Bob Ballard Ford, [illegible]
Bulk Beds	— Lee's Potato Harvester Equipment, [illegible] Crooks Farm Power, [illegible] Parr & Sons, [illegible]
Tractors, plow, disk, hiller sprayer, cultivator	— Crooks Farm Power, [illegible] Parr & Sons, [illegible] Hyde Equipment, [illegible]
Pivot, pump, motor, panel	— Parr & Sons, [illegible] Sprinkler Irrigation Supply Co., [illegible] Raymer Drilling Co., [illegible]

(7) Custom Operation — quotes on applications as listed in (1) (g) above of fertilizers and chemicals will be requested, received and averaged as per the following schedule:

March 15, 1981 and June 15, 1981	Bird Fertilizer Co., [illegible]
Broadcast and/or Sidedress	J & H Spreading Service, [illegible]
July, Aug., Sept. — Airplane Applied	Maurice Flying Service, [illegible] Del Finnup Flying Service, [illegible]
July, Aug., Sept. — Helicopter Applied	Mid-Michigan Helicopters, [illegible]

(8) Taxes — Tax quote will be based on the average tax assessment on Class 1 ground as provided by the County Assessor for [illegible] County for the 1981 crop.

(9) Interest — Interest will be based on the prime rate requested, received and averaged from the First State Bank, [illegible] and [illegible], for March 2, 1981, May 1, 1981, and July 1, 1981, based on a borrowing period of 6 months.

(b) Second Year

(1) Fertilizer — Price quotes for each type of fertilizer input listed in (1) (a) above will be requested, received and averaged from [illegible]; and Allied Chemical, Hopewell, Va., for the weeks of November 15, 1981, February 4, 1982 and May 16, 1982.

(2) Chemicals — Price quotes for each type of chemical input listed in (1) (b) above will be requested, received and averaged from [illegible]; and [illegible], for the weeks of November 15, 1981, February 14, 1982, and June 13, 1982.

(3) Energy

(a) Fuel price quotes for diesel fuel and gasoline inputs listed in (1) (c) above will be requested, received and averaged from [illegible] (Standard Oil), Gr[illegible], and [illegible], for the weeks of November 15, 1981, April 18, 1982, and July 18, 1981.

(b) Electricity price quote shall be determined by averaging the following: (1) Diesel price as quoted in (3)(a) above and (2) requesting, receiving and averaging the price per kilowatt hour for June, July and August from Consumers Power Company, [illegible], and [illegible] Mich.

(4) Labor — Labor shall be determined by ascertaining the base hourly rate, excluding fringe benefits for the employees of [illegible], under their union contract for the year 1982.

(5) Seed — The price of seed shall be the average of the bulk certified 1981 Russet Burbank crop potato seed sales delivered to [illegible] during the months of December, 1981, January, February and March, 1982, from [illegible], Michigan; [illegible], Michigan; and Grafton, North Dakota.

(6) Equipment — Price quotes for each type of equipment listed in (1) (f) above will be requested, received and averaged for the first week of October, 1980, and the first week of March, 1981, from the following dealers:

Harvester, Planter	— Crooks Farm Power, [illegible] Parr & Sons, [illegible]
Trucks	— Bollinger, [illegible] Bob Ballard Ford, [illegible]
Bulk Beds	— Lee's Potato Harvestor Equipment, [illegible] Crooks Farm Power, [illegible] Parr & Sons, [illegible]
Tractor, plow, disk, hiller sprayer, cultivator	— Crooks Farm Power, [illegible] Parr & Sons, [illegible] Hyde Equipment, [illegible]
Pivot, pump, motor, panel	— Parr & Sons, [illegible] Sprinkler Irrigation Supply Co., [illegible] Raymer Drilling Co., [illegible] Rapids

(7) Custom Operation — quotes on applications as listed in (1) (g) above of fertilizers and chemicals will be requested, received and averaged as per the following schedule:

March 15, 1982 and June 15, 1981	Bird Fertilizer Co., [illegible]
Broadcast and/orSidedress	J & H Spreading Service, [illegible]
July, Aug., Sept. — Airplane Applied	Maurice Flying Service, [illegible] Del Finnup Flying Service, [illegible]
July, Aug., Sept. — Helicopter Applied	Mid-Michigan Helicopters, [illegible]

(8) Taxes — Tax quote will be based on the average tax assessment on Class 1 ground as provided by the County Assessor for Montcalm County for the 1981 crop.

(9) Interest — Interest will be based on the prime rate requested, received and averaged from the First State Bank, [illegible], and Bank of [illegible], for March 1, 1982, May 3, 1982, and July 5, 1982, based on a borrowing period of 6 months.

(3) The Base Price for the second year shall be adjusted by the increases or decreases that result from the differences that result from the subtraction of the costs generated by Input Price Determination — Second Year from Input Price Determination — First Year. An example of this computation is as follows (assumptions only):

Factor	First Year Unit Price	First Year Acre Cost	Second Year Unit Price	Second Year Acre Cost
18-46-0	$ 190.00/Ton	$ 19.00	$ 209.00/Ton	$ 20.08
10-34-0	205.00/Ton	10.25	225.00/Ton	11.28
Urea 46%	235.00/Ton	47.00	258.00	51.70
28-0-0	125.00/Ton	16.25	137.50/Ton	17.88
0-0-60	125.00/Ton	33.75	137.50/Ton	37.13
Lime	12.50/Ton	12.50	13.20/Ton	13.20
Nutrient D	.72/lb.	3.60	.80/lb.	4.00
Temik 15G	1.80/lb.	36.00	1.96	39.20
Kocide	1.85/lb.	7.40	2.00/lb.	8.00
Monitor 4LC	32.70/Gal.	16.35	35.97/Gal.	17.98
Parathion 4F	19.80/Gal.	2.47	21.78/Gal.	2.73
Lasso	16.48/Gal.	8.24	17.96/Gal.	8.98
Lorox	35.06/Gal.	4.38	38.22/Gal.	4.78
Sencor 80 W.P.	9.24/lb.	4.62	10.07/lb.	5.04
Dithane M-45	1.60/lb.	32.00	1.74/lb.	34.80
Dinitro	9.90	9.90	10.79	10.79
Crop Oil	2.64	2.64	2.90	2.90
Seed Treat M-45	1.60/lb.	28.80	1.74/lb.	31.32
Diesel Fuel	1.20/Gal.	36.00	1.50/Gal.	45.00
Gasoline	1.40/Gal.	28.00	1.70/Gal.	34.00
Diesel/K.W.	1.20/.067	45.00	1.50/.075	53.55
Labor	5.09/hr.	127.25	5.40/hr.	135.00
Seed — U.P.	12.00/cwt.		11.00/cwt.	
— N.L.P.	12.00/cwt.	210.00	11.00/cwt.	198.00
— R.R.V.	12.00/cwt		11.00/cwt.	
2 Tractors	40,000/ea.	13.33	46,000/ea.	15.33
Tractor (100 h.p.)	20,000	3.33	23,000	3.83
3 Trucks	25,000/ea.	12.50	28,750/ea.	14.38
Sprayer	11,500	1.92	13,225	2.20
Seed cutter	12,000	2.00	13,800	2.30
Harvester	22,000	5.50	25,300	6.33
Windrower	12,000	3.00	13,800	3.45
Planter	17,000	4.25	19,550	4.89
Plow	6,000	1.50	6,900	1.73
Disk	15,100	3.78	17,365	4.34
Chisel plow	6,500	1.63	7,475	1.87
2 Cultivators	6,500/ea.	3.25	7,475/ea.	3.74
3 Bulk beds	5,000/ea.	3.75	5,750/ea.	4.31
2 Travelers	11,000/ea.	5.50	12,650/ea.	6.33
Pivot - 40A	28,000	4.67	32,200	5.37
Pivot - 100A	40,000	6.67	46,000	7.67
Pipe	2.00/ft.	5.00	2.30/ft.	5.75
Diesel Motor	14,000	2.33	16,100	2.68
Electric motor/100	9,500	1.58	10,925	1.82
Electric Motor/75	9,000	1.50	10,350	1.73
Pump/centrifugal	2,500	.42	2,875	.48
Pump/turbin/1,000	14,000	2.33	16,100	2.68
Pump/turbin/500	12,000	2.00	13,800	2.30
Broadcast	4.90	4.90	5.50	5.50
Sidedress	5.40	5.40	6.00	6.00
Airplane	5.00/ea.	30.00	5.50/ea.	33.00
Helicopter	6.50/ea.	39.00	7.00/ea.	42.00
Taxes	12.54	12.54	14.58	14.58
Total		$924.98		$993.94
Interest	18%/6 mo.	83.25	18%/6 mo.	89.46
Grand Total		$1,008.23		$1,083.40

Under this example, an increase of $75.17 per acre divided by 275 cwt. per acre would result in an increase in the Base Price — First year of twenty-seven cents ($.27) per cwt. for both U.S. No. 1 and U.S. No. 2 Process Grade potatoes for the second year of this contract.

When the base price for the more distant production season is stated in the contract it would appear that both parties are increasing their risks concerning unfavorable prices. It is presumed that growers when negotiating this price apply, at least implicitly, some sort of inflator. However, if costs of production should rise substantially and this rise was unforeseen, growers may be adversely affected. Processors, on the other hand, could end up paying significantly more than market conditions warranted if production is large in the second year. The use of an explicit base price for the second year is rare.

The negotiation of multi-year contracts on an FDCM can reduce some of these price risks. Since the information regarding prices and quantities contracted are easily attainable the evaluation of an individual firm's competitive position will be enhanced.

Multi-year contracts and costs of production indexing to determine the base price are controversial among bargaining association members. Some critics charge that multi-year contracts unnecessarily commit growers too far in advance. It is difficult to predict with any accuracy what costs or demand conditions will be 18 months to two years prior to harvest. The evaluation of market alternatives is tenuous that far in advance of production. A grower may be foreclosed from more profitable opportunities.

Similar criticisms are made against having the base price tied to an index of the costs of production. This feature reduces the flexibility a bargaining association has at its disposal. By agreeing to tie price increases or decreases to changes in the cost of production an association may be unnecessarily restricting the gains it could make. However, it may also limit their losses.

From interviews with growers who have signed multi-year contracts they appear to be satisfied with the results. Part of this satisfaction may be a function of cognitive dissonance, but the growers did point out the advantages of long-term planning. The use of these contracts is limited. Of the five bargaining associations interviewed in this research only two had experience with the multi-year contract. It should also be noted that the use of these contracts is new and there is no historical record to evaluate their performance.

The Michigan Agricultural Cooperative Marketing Association(MACMA), an affiliate of the American Farm Bureau, uses the indexing method in their contract negotiations. An official of MACMA claims that Michigan growers have had the most favorable contract prices of any area in the country over the past two years.

Processors gain through an assured supply covering longer than one year. This may help processors better service their customers and also may help them with long-term production and marketing plans. Multi-year contracts may also reduce transaction costs since processors can meet less frequently with bargaining associations.

The major forces behind these developments(cost of production indexing, earlier negotiation dates, multi-year contracts) are transaction costs and improved planning. The earlier opening dates for negotiations give both parties more time to make plans necessary to fulfill the contracts. Processors have more time to arrange plant schedules and sales. Growers have more time to make equipment, seed or other input purchases and to obtain credit. The earlier initiation of bargaining allows both parties more time to adjust their strategies in lieu of bargaining developments. Multi-year contracts may improve the ability of both parties to make investment decisions that are longer term in nature than those they make under the standard one year contract.

While planning is improved by these developments, the primary impetus behind these changes according to contract participants is to streamline the process and reduce transaction costs. All these modifications of the contracting process have the effect of routinizing negotiations and reducing the amount of time to come to agreement. Indexing costs of production or multi-year contracts reduce potential areas of conflict. The earlier bargaining dates give the participants more time to work out potential conflicts. However, it may also increase the tendency of bargaining participants to stretch the process out.

Bargaining is a costly process. Both growers and processors have alternative high-valued uses for their time. A great deal of preparation must be done by both parties before negotiations begin. Bargaining associations must "poll" their members to find out their desires and then must plan their stategies to achieve their goals. Processors must evaluate their forward commitments and forecast the demand for their products. Once this is done they must calculate the amount of raw product they will need, estimate upcoming production and then decide on the amounts they want to contract at what prices.

After both sides have determined their needs and their strategies they must sit down together and hammer out an agreement that hopefully will be satisfactory to all. The actual negotiation process may consist of several meetings that take place over the course of many weeks. It is not unheard of for negotiations to last well after planting. This, of course, eliminates many of the planning advantages attributable to forward contracting.

Any changes that standardize the contracting process or remove items from active negotiation reduce bargaining costs. While the trend is towards greater routinization in the contracting process, only the adoption of earlier bargaining dates has been widely accepted.

Though these changes may reduce transaction costs, they may increase costs in other areas. The largest cost appears to be flexibility. When items are removed from active negotiation through a formula or due to longer term commitments, both sides lose some ability to affect these areas. In many years this loss of flexibility may be incidental. However, there may arise occasions when one party or another may wish to bargain over an item that has been effectively removed from the agenda. It was mentioned that indexing the costs of production may narrow the range both parties have to manuever. It would appear that to date most bargaining associations and processors still value this flexibility more highly than they do the reduction in transaction costs.

4.3.2 Premium-Discount Schedules and Other Terms of Trade

An important component of price is the premium-discount schedule. Each processor, even those within the same product categories, will have different quality standards. Although, the structure of the premium and discount schedules is similar among contracts, they contain different quality standards which are a reflection of the final demand for a processor's product.

The quality standard can affect the total costs of procurement and processing. When potatoes are of an inferior quality it takes more potatoes to produce a certain pack than it would with high quality potatoes. This not only affects the cost for raw product, but it also leads to higher labor, energy, and other input costs to put up the pack.

Some processors tend to specialize in "quality" processed products, while others will specialize in "economy" processed products. Those who produce for the economy market have less stringent quality standards. Since their standards are less high these processors are able to use a higher percentage of any given potato. "Quality" producers have greater waste and culls from their operations since a higher percentage of the potatoes do not meet their standards.

The most important facet of the premium-discount schedules is that the differences in the schedules reflect the true economic value of quality differences and the price gradations accurately reflect these differences. At the bargaining table growers may take the stance that in order to produce the desired quality they need greater economic incentives. Processors on the other hand must make it clear to growers how valuable these quality differentials are to them. Most participants in the bargaining process interviewed noted that usually the schedules are not the source of heated debate. They are normally a matter of clarification over terms and standards. Most incentive schedules are not revised every year, with the possible exception of storage incentives.

Exhibits 4.2 and 4.3 are some examples of incentive clauses commonly found in forward contracts. Exhibit 4.2 includes incentive-disincentive schedules for size, percent bruise-free, and specific gravity. Depending upon the quality of the potatoes delivered adjustments are made to the base price as indicated in the schedules. For example if a grower delivered a load of potatoes that contained over fifty percent of 10 ounce potatoes, the base price would be increased by $ 12.35/ton.

Exhibit 4.3 is a schedule for storage incentives. The dates are only specified within a two-week period. This gives the processor flexibility in setting up deliveries. A grower who has signed a storage contract may have his potatoes taken any time during the season, but it is normal to give the grower advance notice. The

Exhibit 4.2

Quality Incentive Clauses

BASE GRADE AND INCENTIVE CLAUSES:

The base price will be paid on all potatoes which grade U.S. #2 or better for processing as defined in U.S. Standards for Grades of Potatoes for Processing, effective July 10, 1963. The parties hereto acknowledge that they are knowledgeable and familiar with said standards.

All potatoes with internal defects shall be culls if such potatoes fail to meet U.S. #1 as defined in the Standards for Grades of Potatoes for Processing effective July 10, 1963.

Potatoes which do not meet a 2-inch for 4-ounce minimum and are otherwise U.S. #2 or better quality, and all green potatoes which do not meet U.S. #2 specifications, as above, shall be classed as processing culls. Processing culls do have some processing usefulness and Grower will be paid $12.00 per ton for processing culls up to a maximum of 10% by weight, after all Section III deductions, of the potatoes delivered each day.

For all potatoes grading U.S. #2 or better for processing, as modified in Paragraph 1, above, the base price will be adjusted for the percentage of ten (10) ounce or larger potatoes, according to the following table:

Percent of 10+ Ounce	Adjustment Per Ton	Percent of 10+ Ounce	Adjustment Per Ton
50	+ $12.35	37	+ $ 5.70
49	+ 11.90	36	+ 5.15
48	+ 11.45	35	+ 4.60
47	+ 11.00	34	+ 4.05
46	+ 10.55	33	+ 3.60
45	+ 10.10	32	+ 3.15
44	+ 9.55	31	+ 2.70
43	+ 9.00	30	+ 1.95
42	+ 8.45	29	+ 1.50
41	+ 7.90	28	+ 1.05
40	+ 7.35	27	+ .60
39	+ 6.80	26	+ .15
38	+ 6.25	25	+ .00

below 24% deduct $.90 per percentage point.

The base price will be increased fifty cents (50¢) per ton for each percent that the grade of potatoes described in Paragraph 1 above, exceeds 50% bruise free to a maximum of 75% bruise free. The base price will be decreased fifty cents (50¢) per ton for each percent below 50% bruise free to a minimum of 27% bruise free.

a. Bruise free shall be defined as the complete absence of any tuber damage or discoloration caused by mechanical handling during harvest, loading, hauling or unloading, no matter how slight, which shows up after peeling in a lye peeler with at least 10% peel loss, except that any potato which is over 9 ounces in weight after peeling shall be allowed one bruise not to exceed 3/8" in diameter.

b. The percent of bruise free potatoes shall be determined by dividing the total weight of U.S. #2 or better bruise free potatoes by the total weight of U.S. #2 or better potatoes in the peeled sample.

a. The base price shall be adjusted for specific gravity according to the following table for all potatoes grading U.S. #2 or better for processing as modified in Paragraph 1 above:

	Adjustment Per Ton		Adjustment Per Ton
1.089 and above	+ $ 5.30	1.0790 to 1.0799	+ $ .30
1.0880 to 1.0889	+ 4.90	1.0780 to 1.0789	+ .00
1.0870 to 1.0879	+ 4.50	1.0770 to 1.0779	− .30
1.0860 to 1.0869	+ 4.10	1.0760 to 1.0769	− .90
1.0850 to 1.0859	+ 3.70	1.0750 to 1.0759	− 1.50
1.0840 to 1.0849	+ 3.30	1.0740 to 1.0749	− 2.10
1.0830 to 1.0839	+ 2.70	1.0730 to 1.0739	− 2.70
1.0820 to 1.0829	+ 2.10	1.0720 to 1.0729	− 3.30
1.0810 to 1.0819	+ 1.50	1.0710 to 1.0719	− 3.90
1.0800 to 1.0809	+ .90	1.0700 to 1.0709	− 4.50

b. The specific gravity shall be determined by the weight in air, weight in water method on a minimum of three composite samples from each lot delivered daily. A weighted average shall determine the daily average.

Exhibit 4.3

Storage Incentive Clauses

15. PAYMENT: Payment for storage delivery to Buyer's plants will be based on U.S. No. 1 and No. 2 potatoes graded from the current United States Standards For Grades of Potatoes (effective 9/1/71, as amended 2/5/72); subject to the provisions of Section 7 of this contract and according to the following time schedule:

Delivery Period	Prior to Nov. 16	Nov. 16-30	Dec. 1-15	Dec. 16-31	Jan. 1-15	Jan. 16-31	Feb. 1-15
Price $/Ton	80.00	80.75	81.50	82.25	83.00	83.75	84.50

Delivery Period	Feb. 16-28	Mar. 1-15	Mar. 16-31	Apr. 1-15	Apr. 16-30	May 1-15	May 16-31
Price $/Ton	85.25	86.00	86.75	87.50	88.25	89.00	89.75

Delivery Period	June 1-15	June 16-30	July 1-15
Price $/Ton	89.75	90.50	91.25

increases in price that occur over time are to cover the risks associated with quality deterioration during storage.

Through the use of these schedules processors are better able to ensure the delivery of the quality of product they desire. The schedules are structured to give the grower incentives for producing and delivering superior quality and penalizes the grower for poor quality.

Another important item that is related to the premium-discount schedules is grading. In the past grading has been a source of friction between growers and processors. This is the case, even though grading is performed by state and federal inspectors. Potatoes for french fries and dehydration are almost always inspected by federal inspectors, provided by the Federal-State Market Inspection Service. The payment for these services varies and may be split between the grower and processor or paid by the processor.

The biggest complaint that growers have is that the inspector may lose some of his objectivity. Inspectors spend most of their time at the processing plant and due to the proximity of the processor an inspector may form a personal relationship with the personnel of the processor. Growers are quick to point out that any loss of objectivity is unintentional, but just a matter of the close relationship that may form between the processor and inspector.

At least one bargaining association, the Michigan Agricultural Cooperative Marketing Association, has taken steps to limit the potential loss of objectivity by placing a paid employee to monitor all inspections. The secretary of the association pointed out that the purpose of this monitor is more than to keep the inspectors "honest". In most cases when a grower's potatoes receive a poor grade it is deserved. Often, however, the problem is correctable if the grower is informed of the problem. For example, a grower may have a high percentage of bruised potatoes in a particular load. This may be due to grower's method of harvest. The monitor can inform the grower of this problem before the grower delivers another load.

Grading is not usually a severe problem between growers and freezers or dehydrators. Potato chippers may be another matter. In most potato chip contracts there is a clause that requires the potatoes to be of "chipping quality". Other types of processing operations have similar clauses, but the standards for chipping quality are more subjective than in other potato processing operations. Growers claim that chippers use this clause to break contracts even when the potatoes are satisfactory. The incentive for potato chippers to do this is when spot market potatoes are priced lower than are the potatoes they have contracted.

A rejected load can lead to more problems than the economic hardship suffered by the grower. According to the head of the Michigan Potato Commission, a grower with a rejected load on his hands will often sell the load to a packer. By the time the potatoes are packed they are less than excellent condition for tablestock use. If the potatoes are packed under a Michigan label, they may give the consumer a poor image of the quality of Michigan potatoes.

In a discussion with the manager of the Chief Wabasis Bargaining Association, a cooperative in Michigan which bargains with potato chippers, he said they have found this behavior not to be a problem. The chippers they deal with are all "professional" operations and will honor the terms of the contracts they negotiate. He noted that when this problem has arisen they have chosen not to deal with the offending firm in the future.

There may be other areas of concern that are discussed during contract negotiations. The bargaining process is not strictly characterized as a zero-sum game. It is possible for both parties to benefit from the successful negotiation of a contract. Much of this is due to the fact that contract negotiations are a formalized method to acquire and exchange information between the two parties.

This information can be used in a variety of ways. It can improve the ability of both parties to plan. The information exchanged can also reduce the potential for conflict between the two transacting parties. Out of the contract negotiation process farmers and processors are able to get a clearer understanding of the wants and needs of the other. In the absence of this exchange of information farmers or processors may fail to see the need for the other parties demands. However, collective bargaining allows for the discussion of a wide range of issues that might be unresolved without the institution of the process that it brings. These issues may not always be strictly part of the contract, but their discussion may enhance the transaction. If during the negotiations potential points of dispute can be resolved, either due to enlightening the opposing party or by making clearer one's position, the entire transaction may be able to be conducted more quickly and amiably. This may reduce the overall costs of the transaction.

4.4 BARGAINING ASSOCIATIONS

The impetus behind the formation of bargaining association was primarily structural. A general description of the market for processing potatoes would be a large number of relatively small sellers facing a few relatively large buyers. The use of the word relatively is important. Some processors may not be very large compared to the rest of the industry. Yet to the grower they may be very large. In the United States there are 75 chip plants, 35 dehydration plants, and 31 freezers.[4] Of the total number of freeze and dehydration plants, two-thirds are owned by 14 companies.[5]

On the face of it, the market for processing potatoes appears only moderately concentrated and fairly competitive. Yet, national figures can be misleading. In the separate geographical areas where potatoes are grown and the relevant markets are regional, processor concentration may be high. Even in the northwest growers may only have a choice between, at most, two or three processors. Processors on the other hand can select from many potential growers.

It is the difference in relative numbers and sizes between growers and processors in combination with transportation costs and an assymetrical distribution of information that create what growers perceive to be an unfair bargaining environment. It is expensive to ship bulk potatoes long distances. These costs effectively reduce the size of the relevant market to the grower. Most processing firms prefer to purchase their raw product within fifty miles of the plant.[6] Potato chippers are the exception. Because the finished product is bulky with little weight and freshness is a factor, they prefer to locate near population centers rather than production centers. If a grower happens to be located within an area with only one processor, transportation costs leave him little alternative.

An FDCM will not be able to directly address the structural issue, nor is it clear it should. However, the increased information should enable growers to better evaluate contract offers in light of general market conditions across the Untied States, which even in the situation of a single processor should improve their bargaining position.

The growers believed that the establishment of bargaining associations would lead to a balance of bargaining power. The basic premise underlying collective bargaining is simple. By exhibiting a united front to buyers, sellers of a product can obtain a measure of bargaining power and better terms of trade. The key element is a sufficient degree of control over supply so that the threat of withholding this supply is credible. Of course, the members of the association must also be willing to undergo economic hardships if necessary.

Phillips et.al. found that the potato bargaining associations in the United States have two common characteristics. Membership is voluntary. The associations do not control production and they do not take title to the product.[7] Voluntary membership means that the association is not guaranteed to contain all possible growers. In fact, Phillips found that most bargaining associations fall quite short of representing their potential membership. The study reported that a figure of 75 to 80 percent of total possible membership was high.[8] Since associations do not control production they can not affect the amount of supply coming forth every year. The combined effect of these factors is to decrease the degree of control over supply which a bargaining association has.

Bargaining power is more than a matter of the number of alternatives or control over supply. Bargaining power is a complex function of the number of alternatives, financial resources, information, and bargaining ability. It seems likely that this function would vary over time and from one specific situation to the next. It is also likely that there is a high degree of multi-collinearity among these variables. Initially, at least, it was the lack of market alternatives and the assymetrical distribution of market power that led to the formation of bargaining associations.

There are several theories which attempt to model bargaining behavior and predict its outcome. Some of these models are based on easily recognizable variants of neoclassical economics, while others have incorporated game theory. The earliest and perhaps best known approach to bargaining is the model of bilateral monopolies, i.e. a monopsonist and monopolist dealing with each other. Edgeworth was one of the first to use this model.[9] However, without added assumptions, the solution was indeterminate. The price, which was usually the variable under study, could fall anywhere between the strict monopolistic solution or the strict monopsonistic solution.

Following Cournot's lead there was a good deal of effort to impose added restrictions on the participants' behavior. This was done through the use of reaction curves which hypothetically model a participant's reaction to the other participant's strategy. However, as was found in Cournot's theories of oligopoly, a determinate solution was possible only under very strict and, most often, unrealistic behavioral assumptions.

The difficulty in formulating determinate bargaining models is modeling the actions and reactions to each parties' strategies. As Coddington noted, "Part of ego's expectation, in many cases the most crucial part, consists in a probable reaction of alter to ego's, a reaction which comes to be anticipated in advance and thus to affect ego's own choice."[10]

Bargaining models to be effective must deal in some manner how one's expectation of the other party's behavior affects the former party's behavior. To Coddington and many others the most likely way to resolve this dilemma was through the application of game theory. "The application of game theory to these problems has put much greater stress on the strategic reasoning involved in individual decision-making under such conditions of interdependence."[11] Most game theorists(see Coddington, Harsanyi) claim to have solved the problem of indeterminancy within bargaining situations.

> It(game theory) furnishes sharp and specific predictions, both qualitatively and quantitatively, about the outcome of any given game and in particular about the outcome of bargaining among rational players. It shows how this outcome depends on the rewards and penalties that each player can provide for each other player, or the costs that he would incur in providing these rewards or penalties; and on each other player's willingness to take risks.
>
> Of course, in order to obtain determinate predictions for any particular social situation on the basis of our theory, we must always supply specific factual assumptions about the players' utility functions, as well as their strategy possibilities, the information available to them, and their ability to communicate and to make binding commitments(binding promises, threats, agreements) to one another....The advantage of the approach lies in the fact that - once the required factual assumptions have been made - one obtains unique predictions for "all" specific economic, political and social situations on the basis of the "same" theory, without any need for theoretically unjustified and arbitrary ad hoc assumptions in various particular cases.[12]

Within the above quotes are the strengths and weaknesses of the game theory approach. Theoretically it can lead to determinate solutions. However, to do so requires assumptions about the nature of the utility functions and a great deal of data to describe the utility functions. The assumptions made about the utility functions are the same as made under conditions of risk and uncertainty.

Harsanyi calls for an additional assumption, which he calls the principle of mutually expected rationality. "We must require that the subjective probabilities that he assigns to various possible actions by player j should be consistent with the assumption that player j, like player i himself, will act in a rational manner in playing the game."13

Of course, the same criticism that are leveled at risk and uncertainty models can be applied here. There are plenty of examples where people don't exhibit perfectly rational behavior according to the assumptions used. The assumptions are too restrictive.

Even if the assumptions are met there may be a more serious problem in practice. The data demands that must be met are so extensive that they may make the gaming approach complex and very expensive to use in field work. A researcher must be able to accurately estimate an individual's utility function. A person's utility function is not invariant. It can vary with changes in income, age, and over time. Different variables will ascend and descend in importance in a person's utility function with changes in these variables. Thus, the utility function would have to be estimated for every particular situation for every individual involved.

In terms of bargaining associations the measurement problem may even be more severe. The "utility function" of the association does not represent that of an individual. It is a composite function representing the aggregate desires of the individual members. It must take into account the different weights that individual members apply to the variables under consideration. Interpersonal utility comparisons would have to be made. This problem may be intensified when one considers that often bargaining associations employ professional managers who may have goals separate from those of the organization.

The preceding discussion was not intended to be a dismissal of the gaming approach or even to be a thorough analysis. It was intended to illustrate the complexity of some of the issues involved and why an in-depth analysis will not be undertaken. Instead this research will focus on those variables which must be considered during the bargaining process and how the bargaining parties try to influence the outcome. The overall effectiveness of bargaining associations will also be examined.

The goals of a bargaining association may be many and varied. It is assumed that the association has as one of its goals to increase the prices and other terms of trade received by its members. Improved terms of trade can be translated into real price gains. Another goal of the association may be to increase the total incomes received by its members. A third goal of the association may be to maximize the number of its members. The achievement of any single goal may be hard to separate from that of another. For the most part this research will concentrate on the achievement of higher contract prices and improvement in other terms of trade.

Five variables were listed as affecting the relative bargaining strengths of the two parties. These were number of market and/or production alternatives, control over supply or demand, information, financial resources, and bargaining ability. Prior to the establishment of bargaining associations growers were likely deficient in most respects. It is likely that some growers are very adept at bargaining, but unless this ability is backed by some more tangible assets this skill may come naught.

The establishment of bargaining associations enabled growers to increase their strength across all the above variables, with the possible exception of financial resources. Yet the verdict on whether growers have appreciably improved their position is mixed. One definite improvement which appears to have been obtained is added order and stability to the transaction process itself. Collective bargaining has institutionalized certain practices. It has opened up lines of communication between growers and processors and improved the monitoring of performance by both parties. The process has more sharply defined what variables are potentially negotiable and has set up procedures for grievances. Of course, breakdowns are still possible and do happen, but the likelihood of a settlement favorable to both parties is increased.

It is difficult to assess the success bargaining associations have achieved in obtaining higher prices for its members since contract prices are not readily available. Most participants to the bargaining process interviewed feel that growers with contracts have received better prices, in general, than they would have obtained on the spot market or through private treaty. It appears from talking to growers that they feel that bargaining associations have improved the prices they receive, but the gains are less than they have anticipated.

As in the case of prices the effect of bargaining associations on growers' incomes is difficult to evaluate. However, it is safe to say that collective bargaining has added stability to growers' incomes, if not necessarily increasing them. Members of the bargaining association are usually assured of price increases or decreases that reflect changes in most of their costs of production. In the absence of forward contracting growers would have to sell their product on the open market or through private treaty. There is little guarantee under these circumstances that prices will cover their costs of production from year-to-year.

Bargaining associations have done little in the way of expanding actual production or market alternatives for their members. Any gains have been in the area of increased knowledge of alternative opportunities. This knowledge is not to be dismissed too lightly. Even the information regarding what others are receiving for a similar product can be useful in a bargaining situation. The informational aspects of bargaining associations will be covered shortly.

The crucial variable that bargaining associations have tried to increase is control over supply. At this they have been less than fully successful. In almost all bargaining associations membership is voluntary. This alone may be enough to weaken a bargaining association so that it is less effective. Additionally, the control over members' supply is tenuous. Members of the association are required to sign an agreement that bind them to the association and prevents them from signing a non-association negotiated contract until a certain date is passed or until they are released by the association. This release is usually based on a vote of the membership. However, the amount contracted by an individual grower is between him and the proccessor.

Bargaining associations are very rarely able to negotiate for total quantities. If they could this total would be allocated on some basis between the member-growers. While the method of allocation could lead to hard feelings in the association, bargaining associations in general would prefer to negotiate such contracts. The reasons for this are it is a method to handle the free rider problem and to get greater control over supply. There are only a fixed number of contracts to go around. However, the specific contract terms which the bargaining association negotiates can apply to all signing contracts - member or non-member. One individual's signing of a contract doesn't reduce the terms that are stated in the next contract.

Since it is impossible under most state and federal laws to discriminate between growers with respect to the basic terms of a contract, bargaining associations find it impossible to prevent non-member growers from signing association negotiated contracts. In addition to legal considerations, processors have little incentive to offer association members better terms of trade than they offer to non-members. If bargaining associations can negotiate for better terms of trade, including prices, and this is counter to the interests of processors, then it would be to the processors benefit to foster dissension among growers, especially member and non-member growers. The processor would have an incentive to break the association and could use free riders in an effort to do so. If processors can sign non-member growers, who represent a significant proportion of production in the area, considerable pressure is put on the association to come to terms. Maine's law requiring all growers to pay the bargaining association a fee when signing an association negotiated contract is an attempt to eliminate the free rider.

Although, processors appear to have little incentives to actually "break" an association. While prices and other terms of trade might be more favorable to growers with collective bargaining organizations, processors also receive benefits from negotiating with bargaining associations. Collective bargaining is not necessarily a zero-sum game. Processors conceiveably reduce their transaction costs through the elimination of numerous private treaty negotiations. In most cases though, where private treaty negotiations still prevail growers are generally offered contracts on a take it or leave it basis. However, the structure of collective bargaining does assist it settling contract disputes and the designing of contracts favorable to both parties.

Besides the conflicts between members and non-members, there are also conflicts of interests between members. Typically, these conflicts are over differences in costs of production, financial status and how these affect one's outlook towards the bargaining process. That is, to hold out longer or to capitulate. One Official of a bargaining association commented that fifty percent of the negotiations take place between the growers themselves.

Bargaining associations have increased the amount of knowledge available to growers prior to and during the contracting process. This information is used by bargaining associations to set up their goals and strategy. The information collected is varied and includes items such as crop estimates, costs of production, contract prices negotiated in other areas, and some form of a demand estimate. Except for his own costs of production an individual grower would be hard pressed to obtain this information under the present system. The association will provide this information to a member upon request.

This information is useful, especially in comparison to the informational conditions surrounding private treaty, but its usefulness is limited in several ways. Information to be as useful as possible should be timely, accurate, and complete. The information bargaining associations collect falls short on all three accounts. This is not to belittle the efforts of bargaining associations.

In the United States potato bargaining associations regularly exchange information regarding the above mentioned variables. However, this exchange is impeded by many factors. One problem is that contract negotiations are not conducted simultaneously across the country. Those associations which settle early must do so with less information than those which settle at a later date. Although, under certain circumstances it may be advantageous to settle first as a bargaining association official stated that the first major area to negotiate a contract usually sets the tone for those to follow.

A second problem is not all bargaining associations are equally adept at collecting the pertinent information. Small associations with limited resources do not function year round. Their collection of information is more ad hoc and relies more on informal sources. Thus, they are unable to provide as complete information as larger associations. Many times the exchange of information is not timely. While bargaining associations try to stay in close contact with each other, the information exchanged may be dated by several days. In the course of negotiations this can be crucial.

An FDCM is well equipped to handle these problems. It is logical that the bidding period for contracts that will mature at approximately the same date should be negotiated at the same time. Since this information is easily available, no expertise would be required to collect it. Although, the ability to evaluate it would vary from trader to trader.

In addition to the problem of timeliness of the information there is a problem with comparability. This is especially true in the case of prices. Knowledge of base prices negotiated in the contract is useful, but its usefulness is diminished somewhat since it is the rare grower who receives the base price. Without an adjustment reflecting quality differentials any comparison may be misleading. On an FDCM these schedules would be available for inspection to all.

At the present time bargaining associations are attempting to coordinate efforts to make these adjustments and exchange this information. Twice a year the North American Potato Marketing Association meet. Each bargaining association representative gives an outlook for the upcoming year regarding production and prices and an assessment of the previous or current year. They also cover problem areas. The information on prices is meant to be on an adjusted basis to reflect differentials for quality and other variables. However, after attending one of these meetings it is obvious that the program is still in its infancy. Many representatives reported unadjusted prices and any effort to give prices in adjusted terms was "by the seat of their pants". To many knowledgeable association representatives this may be all that is necessary. But to an individual grower with little exposure to other production areas these informal calculations may not be accurate enough. Furthermore, the times at which this "complete" information is exchanged may not be useful in negotiations.

Exhibits 4.4 and 4.5 are examples of price adjustment sheets prepared by a particularly thorough association. In 4.4 field run prices are calculated for the three basic types of contracts a processor offers, direct, company storage, and grower storage. The field run price is the price the grower can expect to receive after adjustments are made for percent usable, bruise free, specific gravity, size, storage where relevant. It is noticeable that in the direct contract the field run price is less than the base price. This is because an adjustment has been made for the percent usable.

In Exhibit 4.5 several commpanies'(represented as letters) contracts are compared. It is this type of analysis that makes various contracts comparable. A grower could simply look at this chart and make easy comparisons as to which contracts are the most favorable given his circumstances. However, many times this type of analysis is not available to growers and even when it is, growers may not have access to the contract.

A major segment of information which bargaining associations and growers lack is on demand. All bargaining association managers or presidents interviewed said that the biggest need for information was the demand side. In Phillip's study on the needs of potato bargaining associations, it was found that the greatest information needs were for demand information.[14] This information would include storage levels, contracted acreages, and demand estimates for tablestock and processed potato products. This information could then be evaluated to form estimates of processors' needs for the upcoming season and the processor's possible courses of action during negotiations. As now structured, growers have very little access to this information. Bargaining association managers were very distrustful of USDA reports on frozen stocks claiming that the processor bias these figures when reporting them. Not unexpectedly, processors do appear unwilling to divulge most of this information.

Exhibit 4.4

Price Adjustment Form

MARCH 8, 1982

Early Direct	August 31 base is $72.90 and increases .40 for each preceding day ([illegible] .33 last year).
Bruise Free	9 oz. peeled potato - tolerance increase from 1/4" to 3/8".
Specific Gravity	Top of scale reduced .20/% point. From 1.084 to 1.089 each category increase is .40 (was .60)
10 oz.	Entire schedule changed increase range from .45/% point to .75 % point. (Was .35 per % point previously)
Storage	November 15 - March 31 From .50 to .75 every 2 weeks. April 1 on From .75 to 1.00 every 2 weeks.
Payment	Balance owing shall be payable 30 days after each month end.

	DIRECT		COMPANY STORAGE		GROWER STORAGE	
	1981	1982	1981	1982	1981	1982
BASE	69.25	72.00	62.00	64.25	72.50	76.25
BRUISE FREE	-	-	9.00 68%	9.00 68%	7.50 60%	7.50 60%
10 OZ.	5.60	7.35 (40%)	5.60	7.35 (40%)	5.60	7.35 (40%)
SP. GR.	.90 (1.080)	.90 (1.080)	.90 (1.080)	.90 (1.080)	.90 (1.080)	.90 (1.080)
STORAGE THRU MARCH	-	-	-	-	5.00	6.75
TOTAL	75.75	80.25	77.50	81.50	91.50	98.75
PAYABLE	.84%	.84%	.84%	.84%	.83%	.83%
TOTAL	63.63	67.41	65.10	68.46	75.95	81.96
PROCESSING CULLS	1.08 9.0%	1.08 9.0%	1.08 9.0%	1.08 9.0%	.96 8.0%	.96 8.0%
F.R.	64.71	68.49	66.18	69.54	76.91	82.92
		3.78 (5.84%)		3.36 (5.1%)		6.01 (7.8%)

Jkn
3/15/82

Exhibit 4.5

1982 Field Run Prices by Firm

March 31, 1982

Firm	Direct	Company Storage	Growers' Storage (March)
A	$68.49(1)	69.54(4)	82.92(3)
B	64.97	70.45(2)	84.93(2)
C	64.17(8)	69.42(5)	84.93(2)
D	67.49(2)	71.04(1)	85.87(1)
E	64.60(6)	69.68(3)	
F	65.46(3)	65.46(7)	77.67(6)
G	64.43(7)		78.88(5)
H	64.80(5)	65.25(8)	81.18(4)
I		68.85(6)	
J		61.75(9)	

4.5 IMPACTED INFORMATION

The asymmetrical distribution of information is an important factor in any bargaining situation. In general, processors have greater access to both supply and demand information than do bargaining associations. Access to information regarding demand is not surprising. Given their position in the potato subsector processors are considerably closer to the final consumer than are bargaining associations. The links they have with retail operations make the collection of such data relatively easy. Processors are also more likely to have sophisticated analysts who can assemble and analyze the data to come up with accurate predictions of future demand. It is also common for processors to have strong forward commitments with their customers.

That processors should have at least as good information on supply conditions may be somewhat surprising. Some of their sources are the same as those used by growers and their associations. For instance the USDA publishes reports on costs of production, planting intentions, and crop estimates. If the price in the contract is tied to an index of the costs of production processors have identical information as the bargaining association.

Processors, however, have additional sources of information. Processors employ field personnel who periodically check with growers to assist with cultural practices etc. These field personnel will also stay in close contact with the growers during the winter months. In so doing, processors are able to obtain first hand reports on many growers' planting intentions.

With respect to planting intentions some processors are able to develop highly accurate estimates of planting intentions of their grower base. Several processors will contract with growers to provide them with certified seed for the upcoming year. While the overriding concern is to obtain quality potatoes, an added benefit is to gain knowledge of the grower's planting plans.

An important factor influencing transaction costs is impacted information. While bargaining associations have been successful in collecting and disseminating information too costly to obtain by many individual growers, such as better understanding of quality demands and prices in other areas, they still fall short of generating much useful information to growers. Information concerning future demand, especially the demand for the individual grower's potatoes.

Armbruster in a study of information needs of subsectors where there is forward contracting found that most growers are at an informational disadvantage relative to the contractors of their production.[15] He recommended a commprehensive reporting of contract prices and other terms of trade be undertaken in those subsectors suffering from informational deficiencies. This would increase the efficiency of markets and would diminish the likelihood of unreliable information.[16]

Armbruster listed four criteria by which to judge the informational needs of a subector with contracting.

1. Alternative land uses; the greater the number of uses the greater the need for contract information.

2. Alternative market outlets; the greater the number of market outlets available the increased need for information.

3. Geographic dispersion or concentration of production; the more dispersed production is the greater the need for information.

4. The existence of bargaining associations; Their presence lessens the need for public price reporting.[17]

He found that the potato subsector met the first three criteria in needing public reporting of contract prices and terms.[18] At first this appears inconsistent with our findings. Potato growers do have alternative land uses, although the prices of alternative commodities have been unfavorable recently. Potato growers can produce for other market outlets, but the knowledge of these outlets and the access is not great. Potatoes are produced over a wide area. Bargaining associations have improved the flow of information, but it is far from complete and much of the time the information is available only after major production decisions have been made.

Armbruster also makes the point that contract prices and terms must be put on a comparable basis to be useful.[19] The attempts of bargaining associations to put base prices on a field run basis is a reflection of this need.

A forward deliverable contract market would create few incentives, per se, for parties to divulge information. However, an FDCM makes it extremely difficult for a party to withhold information. Once on the system all offers and bids would be instantaneously available to all participants. The information available would include aggregate quantities to be supplied and demanded. It would be possible to construct real future supply and demand curves. Although, it is not necessary to divulge the identities of the parties involved, each party could better evaluate the demand for his product or assess the quantities needed in light of the rest of the participants' intentions. Indeed these would be more than intentions since contractual obligations are involved.

Growers would now have access to processors' demand estimates in the form of their contracting levels. This information would be revealed as part of the market process and would be available during the transaction rather than post facto as it is presently. Processors would gain through the revelation of industry estimates on demand and could adjust their own plans accordingly. There would be little to gain from withholding information as the competition could discipline those who willfully misrepresent themselves.

4.6 CONTRACTING AS A COLLUSIVE MECHANISM

It was mentioned earlier that most processors are not overly concerned with obtaining their raw product at bargain basement prices. Their major concern is that they do not pay significantly higher prices than their competitors. Contracting may be an effective mechanism to assure this outcome as presently organized.

Though bargaining associations can use processors' offers as a bargaining chip in the negotiations, they also try to ensure that all processors pay roughly an equivalent price. Bargaining associations have an incentive to make sure that one processor is not put at a severe competitive disadvantage to the rest of the industry. In a worst case scenario this could eliminate a market alternative and, at least, cause hard feelings, which may complicate next year's negotiations.

The latter case is much more likely and has happened. In an extreme example, but one with far-reaching implications, one bargaining association was "forced" to renegotiate a contract with a processor because its contract stated a considerably higher base price than others the association had negotiated. The association was left with little choice since the processor had threaten that it would not sign any growers unless the contract was renegotiated. However, the damage to the association was more than lower prices. Several members of the association, irate at the turn of events, splintered off and formed another bargaining association. Thus, reducing the effectiveness of the original association.

It has been reported that one major processor has stipulated to a bargaining association that it will not pay higher prices than its competitors. What this demand amounts too is a form of price protection. For instance, the processor expects to receive the lower price of two negotiated contracts, even if in its contract its price is higher and negotiations were consummated earlier. The legality of this demand is being investigated, but it emphasizes the importance processors attach to receiving similar prices. It also points how concerned processors are with receiving comparable prices and how contracting may be used to achieve this end. While the above example deals with the problem from a bargaining association perspective, the result is probably similar in private treaty negotiations. Bargaining associations may simply reduce the information costs.

Collusion is not being charged, although, at least one bargaining official interviewed recognized the collusive aspects of contracting as presently organized. The point is that given the incentives facing both bargaining associations and processors the results of contracting can often result in a price structure one might expect to find in an industry that colludes.

4.7 SUMMARY

Forward contracting in potatoes is a method by which both processors and growers can improve their ability to plan. However, as presently conducted, even under the auspices of collective bargaining, both the planning aspects and equity aspects can be improved upon. Effective planning requires information. Contracts through the giving of forward commitments reduces the uncertainty that the contracting parties have to handle. Yet because there is still a large amount of information not available to many participants, the ability to plan is far from perfect. The distribution of information can also lead to situations where one party is in a much stronger bargaining position than another.

Bargaining associations have improved the flow of information, but they still lack information on demand, which puts them at a bargaining disadvantage. Nor is it necessarily the case that the contracts negotiated, either collectively or privately, will be reflective of future supply and demand conditions.

Access to contracts can also be difficult, even under collective bargaining. Processors are legitimately concerned with quality and presently the only way they feel they can assure themselves of the qualities desired is to contract with a known quantity.

A Forward Deliverable Contract Market appears better suited to handle both of these problems. An FDCM improves the flow and distribution in two ways. First, it reduces the ability to withhold information as all bids and offers and the prices and quantities contracted are displayed almost simultaneously to all users of the market.

The information can then be used in decision-making. This is an important point. It is available at the time major decisions are being made - not after the fact. A grower or first handler is able to better ascertain the demand for <u>his</u> product since data on the aggregate behavior of the subsector are available.

An FDCM can also increase the access to market and the amount of knowledge about market alternatives. Any trader can make bids or offers to any other trader on the system. Although, the problem of quality assurance must be handled and will be covered in more detail in Chapter VIII.

Overall an FDCM has the potential to increase the availability and timeliness of information for all market participants compared to collective bargaining or private treaty negotiations. An FDCM will also create wider market access than presently found in potato contracting.

CHAPTER FIVE

THE FUTURES MARKET

5.1 INTRODUCTION

During much of the discussions about forward deliverable contract markets a common question raised is what can a Forward Deliverable Contract Market do that a futures market can not do? Admittedly, the two have many similarities, but the contention maintained here is that the performance of the two markets is very different. It will be made clear a well functioning FDCM may eliminate the need for a futures market in any particular commodity. However, in the absence of a high degree of coverage in any specific subsector the two may become complementary.

The following statement is not offered as evidence as to the differences between the two markets, but to be thought provoking. If the two markets can fulfill the same functions, why do some market participants in potatoes find it necessary to forward contract?

Most people can come up with reasons to explain forward contracting in any particular commodity even when a futures market exists. These reasons apply with equal validity to an FDCM. However, there may be additional advantages to an FDCM, which would lead to the conclusion that the two markets cannot exist simultaneously if the FDCM covered the entire subsector.

The rest of the chapter is devoted to examining these issues. In order to do so requires a brief review of the functions or roles both markets are designed to fulfill. Finally, the question as to whether the two markets are substitutes or complementary in nature will be addressed.

5.2 FUNCTIONS OF THE FUTURES MARKET

The role and performance of futures markets has long been a topic of interest. In the popular press futures markets usually arise as the subject of some controversy. This cloud of controversy has hovered over futures markets since their inception. Originally, they were viewed as a game of chance with no economic justification. They were merely for the amoral amusement(or woe) of speculators. Although this view is extreme and archaic, the notion still persists in the minds of many not familiar with the true nature of futures markets.

True speculators are ubiquitous and necessary participants in all successful futures markets, but they are not the only participants in the market. Most evidence supports the belief that the success of a futures markets requires the presence of hedgers.[1] Most futures markets which don't support hedging have failed to survive.

Much of the popular misconception surrounding futures markets is due to the an unwarranted mysteriousness which is attached to them. Working pointed out that futures markets are just that - markets. He defined futures trading as "trading conducted under special regulations and conventions, more restrictive than those applied to any other class of commodity transaction, which serve to facilitate hedging and speculation by promoting exceptional convenience and economy to the transaction."[2] This definition emphasizes the purpose of futures markets rather than any special characteristics. It doesn't mention deferred delivery or draw any clear distinction between futures and cash transactions. Instead, it claims any difference between a futures market transaction and any other type of transaction is simply a matter of costs. Because of its rules a futures market is less costly for hedging and speculation than are other institutions.

It is the ease and cost savings which are the primary distinguishing features of a futures market. There are other methods by which a trader may hedge or speculate. For instance, a grain processor could obtain a forward contract to hedge his inventory requirements, while a speculator could actually purchase the commodity if he wanted to speculate in price movements. But both of these options, as presently organized, are much more expensive ways to accomplish the same ends. These options may involve considerable search costs and there may be storage and other costs to bear.

The primary focus on the futures market has concerned the functions which hedging fulfills. Typically, the risk-shifting function of hedging is highlighted. Through hedging a producer or merchant can shift the price risk to someone, a speculator, who is willing to bear it. However, the "price insurance" theory as the primary economic function of an organized futures market has been attacked by several authors, notably Working and Telser.[3,4]

The theory was first put forth by Keynes and then Hicks.[5,6] It is usually referred to as normal backwardation. The key point is that speculators, as the bearers of risk, should receive a return or risk premium for this function. This viewpoint was widely accepted until Holbrook Working published "Hedging Reconsidered" in which he argued that there are more important reasons for people to hedge than the transfer of risk.[7]

One reason that people began to reevaluate the role of hedging is that the evidence doesn't clearly support the "price insurance" theory. Telser and Working, to mention a couple, have failed to find a price premium.[8,9,10] According to the theory, futures prices should rise over the life of the contract. Futures prices are said to be biased downwards. The size of this bias is the risk premium. However, in searching for this risk premium these authors have failed to find any consistent downward bias. A logical conclusion of this theory is that speculators as a class would show profits. Working found in wheat that, as whole, speculators were net losers.[10] There is evidence that the larger more sophisticated speculators do show a profit.[11] However, this profit is not attributable to risk-bearing, but to their ability to effectively evaluate market information.

Thus, the "price insurance" theory as the primary economic function of futures markets does not seem adequate. People began looking for other explanations.

Working preferred to concentrate on the merchandising aspects of hedging and the futures market rather than the popular risk-shifting aspects.[12] By hedging a trader is able to increase his flexibility and his opportunity for profit. "Most hedging is done largely and maybe done wholly, because the information on which the merchant or processor acts leads logically to hedging. He buys the spot commodity because the price is low relative to the futures price and he has reason to expect the spot premium to advance, therefore he buys spot and sells the future."[13] In a sense, traders perform a sort of arbitrage between the two markets in order to obtain additional profit. Hedging also increases a trader's flexibility with respect to the buying and selling operations. A futures contract is a temporary substitute for a cash transaction. By virtue of holding a futures contract a trader may not find it necessary to enter into the cash market at a time when he deems it unfavorable to do so.

Telser has said that the price insurance theory does not explain the existence of organized futures markets.[14] Individuals and firms can obtain these benefits through other methods. Telser prefers to view futures contracts as a financial instrument. Futures contracts are very liquid, i.e. easily converted into currency. The reason they are so liquid is that they are very fungible. Additionally, the rules and regulations that the contracts are traded under and the actions of the clearinghouse add integrity to the system. "A futures contract has nearly the same attributes as currency, whereas a forward contract has the same attributes as a check. It is the demand for a fungible financial instrument traded in a liquid market that is necessary for the creation of an organized futures market."[15]

If hedgers want price insurance they need not resort to a futures market. However, the futures market because of its liquidity gives the hedger greater flexibility and reduces his costs. It is the demand for this liquidity and the benefits it brings that leads to the organization of a futures market and not price insurance.

In addition to increasing marketers' flexibility hedging performs two other important and related functions - improved resource allocation and forward-pricing. In the case of continuous inventory commodities, such as wheat and corn, a storage hedge provides a basis for inventory control or improved resource allocation. The basic argument is that for a continuous inventory commodity a positive difference between the futures market price and the current spot market price(or the difference between two futures market contracts) provides an incentive for the merchant to store or withhold stock.[16] The size of the holdings are positively related to the size of the price differential. This theory is also important in evaluating the forecasting properties of futures market prices.

With discontinuous inventory commodities, such as potatoes, forward-pricing is the most important function. Although, for at least part of the season hedging can be used to obtain a return to storage. Gray and Tomek and Gray have argued that through hedging a producer of a discontinuous inventory commodity can lock in an approximate return at planting.[17,18] Additionally, if the harvest-time contract prices are more stable from year-to-year than are cash prices, as they had been in potatoes, producers can achieve some stability in income.[19] Forward pricing and the locking in of an approximate return enables producers to more effectively plan their operations.

Producers of both continuous and discontinuous inventory commodities can benefit indirectly from the futures market to obtain forward prices. A producer can lock in a forward price with a dealer, who then places a hedge on the futures market. The futures market allows the dealer to contract with producers.

The preceding discussion of the functions of the futures market did not include the use of futures prices as price forecasts. Working has maintained that a futures market cannot be both an agency for rational price formation and an agency for price forecasting. The two are mutually exclusive.[20] Any price formation process is considered rational if all relevant information which is available is reflected in its prices.

In the case of continuous inventory commodities the futures prices contain little more information than do current cash prices.[21] This is because with the existence of stocks that can be carried over from one season to the next any new information that might be reflected in futures market prices is also reflected in current cash prices. In the case of continuous inventories the whole constellation of prices, both cash and futures, is affected by any new market information. Working's theory of storage concludes that any difference in cash and futures prices is not a reflection of expected market conditions, but a return to storage.

In the case of a dicontinuous inventory commodity, such as potatoes, some tend to view harvest-time futures prices in the spring as forecasts since there are no carryover stocks. If futures market prices were truly forecasts they would be self-defeating. For example, if the November futures market prices in April were high and used by growers as an indication of future demand growers would plant more acreage and prices would be low at harvest, or vice versa.

The discussion about the role of a futures market as a forecasting mechanism or agency of rational price formation is clouded somewhat by the confusing use of the term forecast. Even authors such as Tomec and Gray, who support Working's notion, refer to futures prices as forecasts in certain situations. Both still believe that futures markets are agencies of rational price formation, but in the case of a discontinuous inventory commodity futures price may be viewed as forecasts when they are used to lock in a return.[22] However, they may not be representative of future supply and demand.

The manner in which they use the term is limited. If a forecast is viewed as a prediction of an event based on a rational analysis of available and pertinent data, it may be be used as a forward pricing mechanism and to make production decisions.[23] For example, the harvest-time price for a particular commodity at spring-time may be a poor forecast for the price that may occur at any particular point in time, but it may be fairly representative of the season's average equilibrium price. If so, it will be a good guide to production plans for producers and enable them to lock in an approximate return at levels representative of the season's average. In certain circumstances, this harvest-time futures price is often less variable year-to-year than are the actual cash prices that are realized. This will enable producers who hedge routinely to stablize their production and their income.[24]

Many authors, however, do not use price forecasts in this guarded manner. Leuthold points out that many still adhere to the view of a futures markets generating specific price-forecasts.[25] Therefore, he tested the price forecasting abilities of futures prices in live beef and corn. The model he used is simple and is shown below.

$$Pc = a + bPft$$

Where: Pc = cash price at time t + 1,2,3,...

a = constant term or intercept

b = slope

Pft = futures price at time t

If the futures price at time t is a good estimate of the cash price at time t+1..., then the expected coefficient on the futures price would be close to one and the value of the intercept to be close to zero. The R-squared should also be close to one.

He found that for periods longer than sixteen weeks between the futures price and the subsequent cash price the futures prices were poor estimates of the cash price.[26] For time periods shorter than sixteen weeks the performance varied according to the commodity, with corn futures generally giving better results than hog futures. It appears, in general, that futures prices are not particularly good estimates for future cash prices. Although, Just has shown that in some cases futures prices may give as good estimates as do sophisticated econometric models.[27]

The efficacy of the forecasting function of a futures market or as an agency of rational price formation is closely related to the concept of market efficiency. Efficiency as used in this context is a measure of market's effectiveness in collecting and evaluating information in the formation of prices. There are three basic tests for efficiency; weak, semi-strong, and strong. A weak test determines only if the market is correctly using past prices in forming expectations. A semi-strong test evaluates if prices reflect all publically available information as it is released. A strong test would examine if any particular group in the market has monopolistic information needed for price formation.[28] Luethold noted that there are no known strong tests.[29] However, this notion will be important later.

If a market is efficient, prices are only inaccurate in the sense that some new information becomes available at a later date. If other inaccuracies are present then it means the market is not effectively utilizing all information, for whatever reason. The concept of an efficient market is closely related to Working's concept of anticipatory prices.[30] Any changes in prices should only be due to changes in information. Since it is likely that the production and release of information is random, price changes in an efficient market should also be random. The existence of long-term predictability in prices indicates the market is not incorporating all pertinent information.

Leuthold and Hartman found that the live hog futures market was not efficient in a semi-strong test. The problem with an inefficient market is that prices are no longer good guides to production decisions. Leuthold concluded that "using poor quality futures prices in marketing and feeding rate decisions may cause bad timing for producers potentially creating financial losses."[31]

While most of the literature emphasizes the risk-shifting function of futures markets, this is only one and many times not the most important, of the many functions served by the futures market. It is many times used as a merchandising tool and adds flexibility to a trader's operations. In the case of continuous inventory commodities, the futures market helps smooth out the flow of product to the market by allowing traders to obtain a return for storage. With discontinuous inventory commodities futures markets allow producers to lock in an approximate return.

The price insurance aspect of futures markets has been hotly debated and the evidence is at best, mixed. Most people do agree that they perform a risk-shifting function, but many critics feel this has been overemphasized. The issue of the efficiency of futures markets and the "goodness" of their predictions has also been closely studied - again with mixed results. The important point is that probably the performance of futures market must be approached on an individual basis, but like most other markets they operate at lesser levels of performance than textbook examples imply.

5.2.1 Potato Futures

The uses and value of futures markets have received a more than proportionate attention in regards to the potato futures market. This is probably because the potato futures market has been the object of considerable controversy. Within the past decade there have been two major defaults in deliveries and an attempt to corner the market. These events have thrown the integrity of the market into question.

Gray and Tomek and Gray have published articles examining the performance of the potato futures market.[32,33] As a commodity that has a discontinuous inventory the function of the futures market is not primarily one giving incentives for storage and smoothing out the allocation of the commodity throughout the year, but as a forward pricing device. Gray and Tomek found that while the November futures price at planting is not a particularly good estimate of the cash price that will be obtained in November it is a good estimate of the season's market equilibrium price.[34] They also found that this price does not vary as much as do cash prices from year-to-year. Thus, farmers, who hedge, can lock in an approximate return that does not vary greatly from year-to-year and can smooth out their incomes. In Maine where most of the hedges are placed, acres planted have not shown much yearly variation. However, in the Northwest where the futures market is little used acres planted show a large response to last year's prices.[35]

With the events of the past decade the performance of the potato futures market as hedging mechanism has again been questioned. In a study requested by congress Paul, Kahl, and Tomek found that since 1973 the futures market in Maine potatoes has become less reliable as a forward pricing device.[36] They attribute the present difficulties of the market to a lack of convergence between cash and futures prices caused by an insufficient number of deliverable potatoes later in the season. This is due to reduced acreages in Maine and a switch to earlier maturing varieties, which store less well than late maturing varieties.[37] They suggested two major revisions in the operation of the market. One was to allow delivery of round white potatoes from other locations besides Maine. The second was to allow financial settlements for delivery defaults. The settlement is based on a formula relating the cash prices with the relevant futures prices. Both of these recommendations would lead to a convergence of cash and futures prices and a reduction in the variability of the basis. Both of these recommendations have been acted upon.

While these recommendations address the delivery problem, some people are questioning the basic performance of the potato futures market. Sooy and Branch looked at the usefulness of hedging over the period from 1953 to 1978.[38] They found that since 1973 a grower's average return would be reduced and the variability of the return increased if the grower practiced routine hedging. Futhermore, the authors also claim that over the entire thirty year period a grower would still have reduced his income by hedging and only slightly reduced the variability of his return.[39] They conclude that the value of the potato futures market as a hedging device must be answered with a "qualified no".[40]

5.3 FUNCTIONS OF AN FDCM

Since the functions of an FDCM were described in detail in the previous chapter, they will be briefly covered here so that the comparison between the expected performance of an FDCM and the performance of a futures market can be more easily understood.

A primary economic function that an FDCM provides is improved planning within a subsector. However, any improvement in planning which accrues is the result of several other functions which an FDCM fulfills and the rules and technology under which transactions are conducted. As in the case of standard forward contracting first-handlers are assured of a supply and producers are assured of a market. In the terminology of an FDCM delivery is guaranteed. Yet, the futures market also guarantees delivery. But in an FDCM delivery and purchase or acceptance is not only guaranteed, but expected and required. This is one of the primary distinctions between an FDCM and a futures market. An FDCM facilitates the physical exchange of the commodity as well as ownership. It is much more than a temporary substitute for a cash transaction. Though Working has pointed out that one of the primary economic functions of hedging is to increase flexibility, an FDCM is a market where the actual merchandising of a commodity may be carried without any involvement in another market.[41]

In many aspects an FDCM does not differ greatly from standard forward contracting and both would provide about the same improvement in the ability to plan. However, the rules and technology under which they are conducted differ greatly. An FDCM uses computer technology to create an open market. This technology enables traders to actively bargain over contract prices and other terms of trade. By centralizing the buying and selling functions and still allowing the traders to remain dispersed it increases the number of market alternatives which traders face relative to private treaty or collective bargaining.

Increasing the number of market alternatives does not necessarily lead to increased competition or to increased planning ability. Both aspects depend on the feasibility of alternative market access or the information concerning alternative market outlets. A computerized market has advantages beyond the centralization of the buying and selling functions. It can almost instantaneously summarize and disseminate the information on all transactions conducted on the system. It is the increased information, especially from the point of view of the producer, which distinguishes an FDCM from standard forward contracting. Not only is there a change in equity, but this information can improve the ability to plan on behalf of all market participants. Since prices and quantities are available on all transactions, a grower is able to ascertain much more accurately the demand for his product. The knowledge of what other producers are receiving can also improve the grower's ability to form more accurate production decisions.

A first-handler, on the other hand, can also more accurately assess the future demand for his product in lieu of what the rest of the industry is doing. This allows the first-handler to more accurately determine his raw product needs and the prices he can afford to pay for it.

At its best, an FDCM would improve the ability of all parties involved to plan by virtue of required delivery and increased information. An FDCM has the potential in this increased ability to plan, i.e. to better coordinate future supply with future demand, to improve vertical coordination throughtout the subsector. From a producer's standpoint and, perhaps, from the perspective of some first-handlers it would also contribute to equity.

An FDCM can also perform some of the functions which a futures market presently performs. It can be used to lock in a price and therefore, an approximate return. An FDCM through the use of storage contracts can improve the allocation of supplies through the entire season. And it does shift some of the price risk to first-handlers. An argument can be made that since first-handlers are better able to evaluate future demand than are farmers they should be able to better handle the risk than are farmers. Speculation is not served through an FDCM nor is hedging as usually described. The next section will look more closely at the differences between the two markets and evaluate the effect of these differences on performance.

5.4 COMPARISON OF PERFROMANCE: AN FDCM VS. THE FUTURES MARKET

At the beginning of this chapter it was stated that the performance of a futures market differs markedly from the performance of an FDCM. A futures market facilitates hedging and speculation, while an FDCM is primarily a mechanism for the merchandising of a commodity between a buyer and a seller and improved planning. This is not to say that a futures market doesn't facilitate both of the latter functions, but it doesn't do as cost effectively as an FDCM might.

It is useful to recall Working's definition of a futures market at this time. It stressed the economy with which an futures market accomplishes the hedging and speculative function as the distiguishing feature between a futures market and any other market. And in the same fashion that a futures market and its performance are distinguished from other markets by the rules and regulations under which transactions are conducted, it is the rules and regulations of an FDCM which distinguish it from the futures market.

The most noticeable difference between the rules in the two markets is that an FDCM requires delivery and acceptance. In the futures market, while the two are guaranteed, they rarely occur. Most contract positions are offset by an equal and opposite transaction. A futures contract is highly fungible. Hedging and speculation would not be greatly facilitated if the contracts were not highly fungible. In an FDCM the contracts will be much more firm-specific. If firms must accept delivery they will want a product that fits their particular needs. How specific these contracts can be before the market loses its planning advantages because of the increased complexity of the comparing contracts will be handled in Chapter VIII.

Since delivery and acceptance of delivery is required, it is difficult to see how hedging or speculation can be accommodated in an FDCM. Most speculators would not want to participate in an FDCM if they had to accept or make delivery. However, it is the use of an FDCM as a sales or procurement mechanism from which it partially derives its planning advantages. It is likely that the only market participants who would be interested in using an FDCM are those with a vested interest; those who make it their business to facilitate the movement of the commodity be they producers, processors, brokers, wholesalers or retailers.

The requirement of delivery changes the motivation of traders and the type of traders who would use the system relative to a futures market. Since an FDCM would interest only those who are actually involved with the physical commodity, the bids and offers on the system would be backed by an intention to actually deal in the physical aspects of the commodity. Presently, most traders on a futures market have no desire to actually handle the commodity traded on the exchange under the conditions specified in the contract. True, hedgers do have an interest in the physical aspects of the commodity, but very rarely are they interested in the commodity and the terms as described in a futures contract.

The crucial difference between the performances of the two markets is the efficacy of each in improving planning. This depends on the level, quality and type of information. Because of the differences in rules between the two markets all three of these informational characteristics will also vary. How well does each contribute to vertical coordination? It will be argued below that a futures market is lacking in its ability to contribute to planning relative to an FDCM and as it is presently organized can not be anything but a rough guide to subsector participants' production and marketing plans.

The futures market does not reflect future demand and supply for an individual's product as well as an FDCM can. This argument hinges on the effectiveness of a futures market as an agency for rational price formation. It also includes considerations of market efficiency. While it is possible to lock in an approximate return through hedging if the basis is well-behaved, the futures market gives less than spectacular performance with respect to what the actual cash price will be at any future date.

It is not possible to estimate demand by the volume of futures contracts purchased or supply by the number sold because these are not backed up by firm commitments to perform. In an FDCM, however, since these commitments are made it is possible to construct real future supply and demand curves.

Planning, which leads to an improvement in vertical coordination, often requires very specific information. For example, a producer's planning effectiveness is improved when he knows the prices he will receive for his potatoes and where and when those potatoes are to be delivered. Also important are the quality of potatoes to be delivered. A futures market only allows a grower to lock in a price for his potatoes, which may be less certain because of quality variations between those stated in the contract and those he produces. It does not add much more information concerning the other aforementioned variables. Obviously, this information can improve a grower's production, cultural, harvesting and marketing decisions. A similar argument can be made on the behalf of first-handlers. So while futures markets can improve resource allocation in a broad manner they lack the ability to improve resource allocation over a wide range of specific activities.

Vertical coordination requires cooperation and coordination between subsector participants. Futures markets contribute only so much to these activities because of the rules of the game and the type of information they foster. A well-functioning futures market provides prices that reflect the prevailing market interpretation of information regarding current and future supply and demand conditions. Yet, this information is often of too general of a nature to greatly contribute to traders' planning and thus, improve vertical coordination. An FDCM provides direct contact between a seller and buyer and the information resulting from any transaction is made public through an FDCM.

Volume is also an important variable and it is difficult to accurately ascertain the volumes that will actually be supplied and demanded in the future from a futures market. When an individual's liability in the market may be simply eliminated through taking an opposite and equal position, the volume or open interest over the course or life of a futures market may have little relationship to the quantities that will be actually produced and sold. Thus, it is possible for the production represented in the total number of contracts bought and sold to be many times larger than actual and normal production levels.

To producers and marketers, production information is very important. The level of production that actually occurs will along with demand determine the cash price levels when this production is marketed. To be able to plan effectively marketers must know the demand for their product and their costs. These items depend on the future demand and supply, which is difficult to determine from futures prices alone. Producers can through hedging lock in an approximate return to production. But this only eliminates the price risk. It does nothing to insure that the aggregate production will be commensurate with demand. Nor does it inform the producer where and when he will deliver his product. From the first-handler's perspective he too may be able to lock in an approximate cost for his raw product and can obtain an approximate return to storage, but suffers from the same uncertainty regarding who he will purchase the commodity from and the timing of these purchases. It is along these lines where an FDCM's performance could be superior to a futures market.

As was mentioned earlier an FDCM is better designed to improve vertical coordination over a broader range of activities. An FDCM also has more detailed information regarding quantities being supplied and demanded. From this information an individual can more accurately determine the demand for his product. This information derives its value from the solid intentions FDCM participants must have to carry out the contract.

The importance of these activities and of determining the demand for an individual's product has a tendency to be underemphasized in most economic texts, but for a system, such as the United States, it is of primary importance. The essence of vertical coordination in our economy is the decentralization of the planning process and the fostering of communication between subsector participants. Theoretically, this is accomplished via price, but price alone is often insufficient with respect to information. Most transactions include other terms of trade such as quantities, place, and time. Vertical coordination is ultimately concerned with the nitty-gritty details that accompany each transaction and the informational content in these details. A futures market is unable to provide this information whereas an FDCM can.

The ability of a futures market to improve vertical coordination to the extent that it can may be impaired if the market is inefficient. Inefficiencies in the market lead to objectionable inaccuracies(those due to the lack of information) and this can affect the ability of people using the market as a guide to decisions. The notion of an informed trader is closely related to the notion of an efficient market. There are two related issues. One is the definition of an informed trader and the second refers to the aspect of monopolistic control of information or in the terminology used here - impacted information.

An uninformed trader is an individual who either has limited access to information or is unable to interpret it. Any market is made up of individuals who are more or less informed. Intuitively, a market composed of more informed individuals versus one composed of lesser informed individuals will exhibit greater market efficiency, ceteris paribus. Cox and Working have examined the effect of uninformed traders in the market.[42,43] Their presence can lead to greater variability in prices and a reduction in the informational content of prices. The key issue is at what levels do uninformed traders have to participate before they have a severely detrimental impact on prices. This is an empirical question and is probably different for each market. However, Cox has shown that they will always have some effect on the dispersion in prices.[44]

The big difference in this respect between a futures market and an FDCM is the cost of being "uninformed". In the futures market because of the regulations and the way it is designed the costs of being uninformed may include margin calls, which represent an unprofitable price movement. To be sure, it is possible for people to lose sizeable sums in the futures market, and they do. However, because of the requirement of delivery and acceptance the potential for losses in an FDCM and the proportion these losses may represent to an individual's livelihood are inherently much greater in an FDCM than they are in a futures market. An individual in an FDCM may not only suffer from adverse price movements, but may also incur additional losses, such as storage or processing costs, marketing, labor, and additional input costs by making the wrong decision. These will affect a person's long-term profitability in a business.

Producers know their costs of production much better than anyone else can while first handlers have a much better idea of future demand. Because of the rules of trading which are a part of the FDCM traders will act on their own information and the information generated in the market. The prices and quantities negotiated on an FDCM can be used to construct real future supply and demand curves, not just guesses about them.

It is the contention here that this rule change(the requirement of delivery) not only increases the level of information regarding supply and demand, but improves it. A person will be leary to enter into an FDCM only on a "whim" or a "gut feeling". Indeed, given the rules of the game, the incentives lead to participants who have a vested interest in the product. Those people who are equipped to handle or merchandise the commodity and make a living through the production and/or sale of the commodity. In general, prices and quantities will be more reflective of fundamental market conditions which are likely to develop in the future in an FDCM than they are in a futures market. Indeed, many futures traders, while perhaps successful, make decisions on the basis of trends rather than an analysis of market conditions.

Following this argument further, if individuals in an FDCM do have greater incentives to be informed, it is logical to expect them to expend greater effort collecting information and analyzing this information. This hypothesis leads to the conclusion that the information represented in the prices generated and the quantities traded on an FDCM are more representative of future supply and demand conditions than are those displayed through a futures market. It is superior for planning. The increase in the ability to plan leads to improved vertical coordination, which is not only reflected in the profit-loss statement of any individual participant, but is also reflected in overall improvement in systems performance.

However, this argument is only valid to a point. Not all traders in a market need be equally informed for prices to be representative of supply and demand. The issue is basically an empirical one. What is the proportion of informed traders that it takes for price to accurately reflect supply and demand. Cox and Working have argued that it doesn't take a large percentage of traders for the market to reflect prices that are the result of an informed population of traders. Their argument is based on two crucial assumptions that markets are competitive and that information is readily obtainable. Basically, they argue that if there is a core of informed traders the market will perform as if all traders were informed. Their reasoning is as follows; informed traders will do, on average, better than non-informed traders and show a profit; non-informed traders noticing the profits of informed traders will follow their lead. This, means though, that after a certain period of time informed traders will find their profits eaten away since everyone is following them.

Both Working and Cox assume that competitive pressures will force the profits of informed traders towards zero. However, if this is true then traders have little incentives to become informed. It is obvious though, that many traders expend a great deal of time and effort to become informed. There are three reasons for this. One is that even in the futures market, the identity of traders and their actions are difficult to recognize. And successful traders have an incentive to cultivate this situation. Secondly, there is a time lag between an individuals actions in the market place and when his actions are known. In the futures market, where minute price changes may mean large profits or losses, this time difference can be crucial. And third, most markets have a degree of monopolistic control over information and non-competitive imperfections exist.

As was noted earlier there is no known test of strong market efficiency i.e. to detect the presence of monopolistic control of information. Obviously in most markets there is some degree of monopolistic control over information or in Williamson's terms impacted information.[45] Large firms usually have greater access to trade information and better resources to analyze it. In some cases this information impactedness may be a result of technological factors or a firm's position in the market channel. Firms positioned higher in the market channel usually have a better idea of final demand than do those firms located at lower levels in the channel. A futures market lacks the mechanisms by which this information may be revealed.

The requirement of delivery or acceptance means that traders must bear the cost of misrepresenting themselves. A contract position can not simply be cancelled by taking an opposite position. Thus, traders must more fully bear the consequences on their actions. Their actions must be backed up with valid intentions. A buyer who tries to understate his demands may find himself in a position of insufficient supply. Conversely, a producer who overstates his costs of production may not be able to make a sale. In the futures market because most transactions are resolved through an opposite transaction and the market is not primarily used to actually merchandise the product, traders are less constrained in their actions. True, if they are wrong they may suffer losses, but these are potentially less damaging to a marketer than the above situations would be.

If the requirement of delivery alone is not sufficient to substantially eliminate the incentives to withholding information, then a second rule change which the design of an FDCM must address is the possibility of compulsory participation. There are several compelling reasons why an FDCM may require compulsory participation to be effective in total subsector planning and coordination, but for the present we will just consider its effect on information.

If participation were compulsory, marketers would have no recourse but to use the market. This makes it especially hazardous to misrepresent oneself because there are no alternatives. Thus, understating one's demand may result in severe shortages to the individual in the future. There seem to be few advantages to overstating one's demand since this would require the payment of larger outlays and/or higher prices. It must be remembered that a buyer would purchase the amounts that would fulfill the demand he sees for <u>his</u> product. A producer would agree to produce the desired quantities as long as it was profitable. When participation is mandatory and the product must be obtained in an FDCM the gains to misrepresenting one's position may be small because of the risks involved.

By virtue of having all traders on a computerized market much information that was formerly privy to just one party would now be available to all parties. While an individual may still try to confuse other market participants in regards to his own specific demand or costs the capacity to do so are diminished if measured by more favorable terms to that party. When there is accurate information regarding the quantities contracted for delivery and the prices at which they were contracted creates at least two problems for firms trying to withhold information. First, traders will be better able to assess the potential for the firm's product. Thus, they will be able to determine if any particular set of terms offered by the firm are unrealistically favorable to the firm in lieu of the information regarding aggregate demand and supply. Second, a firm would have greater incentives to remain competitive since all other firms' bids and offers would be available to their potential trading partner. Again this allows the construction of real future supply and demand curves.

An FDCM not only increase the information about competitors' behavior, but may also, in some cases, increase the number of market alternatives available to traders. Thus, the benefits to monopolistic control to information are less. Interpreted in another way, the costs of achieving some measure of monopolistic control over information are greater than the benefits derived from it in an FDCM.

The requirement of delivery combined with compulsory participation would force all trading parties to reveal their true intentions regarding the production and marketing of the commodity. This information accompanied by the reduction in uncertainty concerning prices and supply and demand enables market participants to more closely plan their operations than is possible under a futures market. The increase in overall planning and the increase in its accuracy would lead to a higher level of vertical coordination.

5.5 FUTURES MARKETS AND FDCM'S; SUBSTITUTES OR COMPLEMENTS?

If an FDCM and futures markets are designed to address different problems then it would seem likely that they could be viewed as complements. But it is apparent that even though the two markets designed to address different issues there is a considerable amount of overlap in their functions. It has been argued that an FDCM can perform a wider range of functions than can a futures market. The one exception is that an FDCM does not facilitate speculation.

If hedging is the raison d etre of futures markets and an FDCM can accomplish most of the hedging functions while bestowing additional advantages with respect to planning and vertical coordination, there is little reason to expect that the two could exist successfully in the same subsector at the same time. Indeed, since an FDCM is able to duplicate many of the functions of a futures market there appears minimal justification for their coexistence. It has been argued that an FDCM is superior to a futures market in most respects and therefore, the establishment of an FDCM is a subsector where a futures market currently exists would eventually lead to the replacement of the futures market.

There are a couple of factors which could mitigate this evolutionary process. If the coverage of an FDCM was limited to the producer - first-handler linkage, there is the possibility that a futures market could be complementary to an FDCM. To the extent that first-handlers lack forward commitments from their customers they may be accepting considerable price risk. One method to reduce this price risk would be to hedge on a futures market. In this manner first-handlers could in an approximate cost for their raw product needs. Relatedly, if participation is not mandatory a futures market could prove to be complementary to an FDCM.

This need would be, of course, eliminated if an FDCM covered the entire subsector - from producer to the retailer. It is worth remembering that a key assumption which an FDCM is based on is that those market participants closer to the final consumer are better able to predict demand than are those participants more distant. Because of their position, retailers are in the best situation to evaluate demand and to bear the consequences of the price risk or more correctly demand risk.

It should also be noted that the commodity exchanges are viable candidates to own and operate an FDCM. They already possess the expertise and facilities and an FDCM might be a logical extension of their activities.

5.6 SUMMARY

The purpose of this chapter was to examine the economic functions of the futures market and FDCM'S and to see how their performance may vary. A futures market facilitates hedging and speculation. An FDCM is designed to facilitate planning. The increase in the ability to plan is due to the requirement of delivery and increased information instantaneously available in a commpetitive market situation. The requirement of delivery gives traders different incentives than they face in a futures market. This along with competition leads to more accurate and detailed information regarding future demand and supply than is available in a futures market. With an increased ability to plan comes increases in the effectiveness of vertical coordination.

An FDCM is also able to perform many of the functions now fulfilled by futures markets. Therefore, the two markets are probably incompatible and in some areas redundant. It is possible that in a subsector where the coverage of an FDCM is only partial the two markets may be complementary. However, this would only be the case if the first-handler faced substantial price risks due to a lack of forward commitments. If the coverage of an FDCM was complete there seems little economic justification for the existence of a futures market.

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CHAPTER SIX

PARTICIPANT ATTITUDES TOWARDS AN FDCM

6.1 INTRODUCTION

The identification of potential participants' attitudes towards a Forward Deliverable Contract Market in potatoes is crucial to evaluating the likelihood of its success. If a large number of the potential participants were to withold their patronage from the system, then the chances of its survival would be virtually non-existent. The purpose of this chapter is to identify the attitudes of growers and first-handlers with respect to an FDCM and evaluate these findings in terms of the likelihood of success of an FDCM. Furthermore, the findings on respondents' attitudes and marketing practices should be useful in the design phase of an FDCM, if such a market is found to have potential.

The rest of this chapter is organized as follows. A brief description of the sample and survey instrument is given as well as some thoughts on theoretical considerations. Once this groundwork has been laid a discussion of the results is given. The results are examined for implications regarding the potential success of an FDCM and, any implications pertinent to the design of an FDCM, if merited. The acquistion of participant attitudes is more than asking whether they would use a system, but also why or why not.

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6.2 THE SURVEY

The approach used to solicit the attitudes of potential participants towards an FDCM relied on both mail surveys and personal interviews. Mail surveys were used to gather the great bulk of growers' reactions towards an FDCM. However, these surveys were supplemented by personal interviews. It was decided to rely on personal interviews for the acquistion of first-handlers' attitudes. Many of these attitudes have already been covered in the preceding two chapters. It was felt that the cooperation and depth of information obtained would be greater in this case. In the case of growers, mail surveys enabled more growers to be contacted across a wider geographic dispersion than would be possible through relying solely on personal interviews.

A mirror image surveying technique was used.[1] In mirror image surveying parties that might represent different sides to a relationship are asked questions that try to solicit their beliefs on the same topic, but that will reflect their own perspective. The use of this technique more clearly demonstrates the areas of agreement or disagreement that the parties may have. This information can then be used to help improve the relationship if this is deemed profitable.

In the mail survey and personal interviews many of the same topics were covered. The advantage of the personal interviews is that they can be slightly more open-ended than mail surveys and allows the interviewer to cover some topics in more depth.

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Ideally, a random sampling procedure is preferred in surveying. By correctly randomizing the selection of potential respondents statistical inferences can be made regarding the beliefs of the remaining non-surveyed population. However, for a variety of reasons, such as costs or lack of complete lists, a random survey is not always possible. This proved to be the case in this research.

To be random every grower or other potato marketer would have an equal probability of being selected for the survey. This requires complete listing for all growers in the United States as they make up the population of potential participants. It was found that the acquistion of a complete listing was impossible. Some states have legislation prohibiting the circulation of grower lists or make a matter of policy not to do so. In other cases states or grower organizations were simply uncooperative.

This limited the number of potential respondents and also eliminated the possibility of a random survey and the ability to draw statistical inferences that would apply to all growers across the United States. However, the results of the survey are still useful. Non-random or purposive sampling is commonly conducted.[2] Although the results cannot be objectively measured, they are still valuable if sufficient judgement is used in evaluating the results and caution is used in drawing conclusions. Hansen, et.al., make the point that purposive samp

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purposive sampling may be more efficient from the point of view of costs if the results are to be used in decisions that will not lead to high costs if the wrong decision is made.[3]

The results identify the major concerns that growers may have with the system and what design issues must be addressed if the system is to have a possibility of success.

Production and marketing practices vary across the United States. Through the careful selection of areas that were available it was possible to survey growers whose primary market outlets vary from area to area. It was also possible to select areas where the timing of the marketings vary.

Five different areas were willing to cooperate in the survey. They were Michigan, Washington, California, The Red River Valley, and Florida. Washington and the Red River Valley produce primarily for the processed potato market channels. California and Florida are primarily areas of tablestock production. Additionally, these two areas are spring and summer producers. Michigan is relatively balanced and is a fall producing state.

Only in Michigan was it possible to obtain a complete listing of all the growers in the state. In Washington and the Red River Valley cooperation was received from their respective bargaining associations and the names were drawn from their lists. These associations represent approximately 75-80 percent of the growers in the areas. Obviously, though, growers who are members of a bargaining association may hold different attitudes than those who are not.

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During the discussion of results possible bias in responses will be covered. In California and Florida two growers' associations provided access to their membership list. The associations are located in the Bakersfield area of California and the Hastings area of Florida. These are the two major production areas in the states.

From each area, except Florida, a total of twenty five growers were randomly selected through the use of a random number generator. In the case of Florida the entire membership of 21 members was surveyed. This made a total of 121 potential respondents. It should be noted that only in Michigan was it possible to actually acquire the growers' names and addresses. While the grower organizations were willing to cooperate, they preferred to retain control over their membership lists. In these cases, the associations were instructed to number their members and twenty-five random numbers were sent to the association. Each number corresponding to a particular grower.

In the case of personal interviews with processors or other first handlers, the emphasis was placed on type of establishment and willingness to cooperate. In total eight processors were interviewed. Five freezers, one chipper and two dehydrators. Less emphasis was placed on location though the bulk of the interviews took place in the northwest. Two produce buyers for major chainstores in the midwest were also interviewed along with seven independent shippers. It was hypothesized, and this hypothesis seemed supported, that there would be less variation among the attitudes held by these participants a

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participants and the coverage need not be as great. Much of the first handlers' reactions has already been covered in Chapters III and IV.

6.2.2 The Instrument

The instrument or actual survey was 12 pages long and consisted of 58 questions. It, along with a cover letter explaining the purpose of the survey and an explanation of a forward deliverable contract market, was sent to all growers in the sample. These items are in Appendix A. The survey was sampled tested with five growers in Michigan.

The intent of the survey was three-fold. One objective was to identify some of the basic characteristics of the respondents. Another was to get a more complete picture of the important factors growers consider when marketing their product. The third objective was to identify specific attitudes growers may have regarding an FDCM, its strengths and weaknesses, and to identify growers' perceptions of how an FDCM should be operated - if it should be instituted.

The personal interviews conducted were similar in intent and followed the basic outline of questions contained in the survey. However, the questions in the personal interviews had more of an orientation to the specific individual being interviewed than did the mail surveys.

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Of the 121 surveys mailed 41 surveys returned were usable. Three returned that were not usable. One because the grower was no longer in business. The other two, while quite eloquently expressing the growers' dissatisfaction with the concept were deemed unfit for the general reading audience. The 41 usable surveys gave a response rate of approximately 30 percent. While this is not excellent, it is good for a mail survey.[4] The breakdown between states was 13 for Michigan, 7 from the Red River Valley, 5 from California, 6 from Florida, and 10 from Washington.

The response rate probably could have been improved if there had been total access to the grower lists. Only in Michigan was it possible to contact the potential respondents by phone. In the other areas all communication between the grower and the researcher had to be channeled through the association. In all cases, follow up letters were sent reminding and asking the growers to please fill out the survey. This effort netted 13 surveys.

The findings of the mail surveys were compared with the results obtained from the broader personal interviews held with growers. While this is no assurance that biases are not present in the respondents, it was found that the survey respondents did not express greatly different attitudes than those growers personally interviewed.

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6.3 SURVEY RESULTS

6.3.1 Background Characteristics

The respondents were separated into three groups according to size of operation. Small operators were growers who produced less than 100 acres of potatoes. This group contained 9 growers or approximately 22 percent of the respondents. Medium sized operators produced between 100 to 300 acres of potatoes. There were 11 growers who fell into this category and they made up about 27 percent of the respondents. Large growers produced more than 300 acres of potatoes a year. This group was the most numerous with 21 growers, approximatley 51 percent of the respondents.

The break down according to size was to see if the size of operation had any impact on growers' marketing practices and their attitudes towards an FDCM. The greater number of large growers is attributable to the areas that were sampled. With the exception of Florida, and perhaps, Michigan the growers likely to be contained in the sample are in areas where the size of potato operations are larger than in other areas of the United States.

The respondents were also separated according to primary market outlet. That is, did they produce primarily(more than fifty percent of their production) for the tablestock, processing, or seed market?

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Three growers produced primarily for the seed market. This represented about six percent of the respondents. Fifteen growers produced primarily for the processing market. This was approximately 38 percent of the growers. About 56 percent of the respondents, or 23 growers, produced primarily for the tablestock market.

A cross tabulation was made to see if there was any relationship between farm size and primary market. Table 6.1 show the results of this cross tabulation.

Table 6.1 Effects of Farm Size on Major Market Outlet by Percentage

		Major Market Outlet		
		Seed	Processing	Tablestock
Farm	Small			5
Size	Medium	3	3	9
	Large		12	9

There appears to be no real trend in these figures, except that smaller growers contained in the sample are more likely to specialize in tablestock potatoes. One reason for this may be that smaller growers are unable to produce amounts large enough to merit contracting with processors. More likely, is that the existence of contracting h.

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contracting has enabled processing growers to expand their operations through greater access to credit. It must also be remembered that operations, in general are larger in the northwest where processing predominates.

There was a correlation between the size of operation and the amount of total income it provided to the grower. Seventy-two percent of the growers received over 50 percent of their total income from their potato operations. All five growers falling in the small category did not earn fifty percent of their income from potatoes. The other six growers fell in the mid-sized category. Three of these growers grew primarily for the tablestock market channel. Due to the nature of potato marketing presently, the larger growers may have greater ease adjusting to an FDCM. If minimum size of a contract should also prove to be a factor smaller, growers may be at a disadvantage under an FDCM.

While it will not be necessary for all growers to have storage facilities to use an FDCM, their flexibility will be increased if they do. Twenty-six of the respondents had at least some grower-owned storage. Eighty-five percent of those growers with storage had the ability to store at least 50 percent of their normal production. Storage facilities enable a grower to sign a "storage" contract if he determines it is profitable to do so.

Another important production practice that could influence a grower's ability to market his potatoes on an FDCM is the existence of irrigation. Irrigation by smoothing out the distribution of water to the pl

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to the plants during the season has two advantages. It usually leads to greater yields and better quality than those potatoes grown on non-irrigated fields. Irrigation also enables the grower to predict with greater certainty both yields and quality levels than possible without irrigation. Among the respondents 70 percent were found to have at least 25 percent of their cropland irrigated.

The growers' ability to predict yields and quality levels was then investigated. Growers were asked at what time were they able to predict their yield. The results are shown in Table 6.2

Table 6.2 Time at which growers are able to predict their yields within 90 percent of actual.

Time When Can Make Prediction	Percent of Responses
Just Prior to Planting	6
Some Time During the Growing Season	47
Not Until Harvest	47

Along with the ability to predict yields growers must also have some ability to predict the quality levels of their potatoes. Buyers of potatoes, especially processors, demand potatoes that meet particular specifications. Growers were asked at what time during the production season they are able to predict the quality levels of their potatoes

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their potatoes to within 10 percent of their actual grade. Most growers responded that they were unable to accurately assess the quality of their crop until harvest. The complete results are shown in Table 6.3.

Table 6.3 Time at which growers can predict within 90 percent accuracy the quality levels of their potatoes.

Time When Can Make Prediction	Percent of Responses
Just Prior to Planting	3
Some Time During the Growing Season	22
At Harvest	53
Not Until Actually Graded	22

Cross tabulations were then run to see if there was any correlation between a grower's ability to predict yields and quality levels and if his fields were irrigated. There appeared to be no statistical difference between the presence of irrigation and a grower's predictive capabilities in both yields and quality. This results goes counter to what most growers expressed in personal interviews. A commonly cited justification for irrigation is that it increases yields and makes them more stable from year-to-year.

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The existence of the apparent high uncertainty surrounding both yields and quality at planting time is not conducive for the operation of an FDCM. Growers would probably be unwilling to commit a large portion of their production to forward contracts for fear of not being able to fulfill the contract terms. In practice, growers seem to have a better idea of their yields and quality levels than they indicated in the survey. In the personal interviews with growers they indicated that at the time of planting they have reasonable estimates of both yields and quality. This was supported by Dr. William Chase, a crops and soils scientist who specializes in potato production. According to Chase most growers in most years are able to predict their yields within 10 percent of actual at planting time.[5] The variation concerning prediction of quality is somewhat higher, but probably below 20 percent.

Growers were asked by approximately how many percentage points the overall quality level of their potatoes commonly varies from year to year. For instance, if you had 70 percent of your potatoes meeting U.S. No. 1 standards last year by how many percentage points will this figure change this year. Seventy percent of the respondents replied that this figure would change less than 15 percent from year to year. This is still higher than would be preferred, but the level is manageable and probably can be handled by properly designed contracts. Indeed, for processing potatoes, growers and processors appear comfortable in handling this level of uncertainty.

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commonly cited for forward contracting in general, is that growers are able to lock in a price for their produce before planting takes place. However, if growers without contracting are able to accurately predict at planting time the prices they will receive then one of the advantages of an FDCM would not be great. Growers were asked to respond to how accurately they can predict harvest prices at the time of planting. Thirty-one percent of the respondents indicated that they were able to predict prices within 10 percent accuracy at planting. Seventy percent of those growers being able to achieve such accuracy contracted heavily - close to 80 percent of their production. In fact, all growers who contracted to this degree felt able to predict prices at planting within ten percent of their actual. Since base contract prices are negotiated before planting this result is not surprising. The remaining respondents had lesser degrees of accuracy with 50 percent of the respondents being unable to come any closer than twenty-five percent accuracy.

The ability to accurately predict price should allow growers to more efficiently plan production. The price prediction that growers form should theoretically be a partial basis for their planting decisions. An FDCM through the simultaneous negotiation of prices and quantities should enable growers, as well as first handlers, to more accurately plan the needs of their operations. Growers were asked if they ever change their production plans based on their price predictions. Only forty percent of the respondents said they did. In retrospect this question was ill-designed. It is unclear whether growers set

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growers set their production plans regardless of any price predictions or if they simply do not change their price predictions and hence, their production plans.

However, it must be remembered that the majority of growers feel they cannot very accurately predict price at planting. If this is so, then the most expedient policy for a grower to follow is to determine his production plans regardless of his price predictions since they are not highly accurate in the first place. Most respondents have a high probability of being wrong with their price prediction so that any change in production plans based on these predictions have as high of a probability as being detrimental as they have of being beneficial.

Given the above responses it is not surprising that almost seventy percent of the growers felt there was a need for more accurate and timely price information. Additionally, 75 percent of the growers felt the wide fluctuations in potato prices that may occur from year to year was a hindrance to them. The wide fluctuations in prices combined with farmers' inability to predict them creates problems when making their planting decisions as pointed above.

The uncertainty surrounding prices that most respondents seem to suffer from conceiveably leads to problems once production is under taken. A serious problem is the inability to cover variable costs of production. Seventy percent of the growers who responded said they are sometime unable to cover variable costs of production. Of those, sixty-five percent did not know until harvest that they would be unable to cover variable costs of production. Since for many growers, especially those who do not contract, prices aren't determined until harvest this result makes sense.

However, contracting may be no guarantee of being able to cover variable costs. A third of the growers, who contract at least seventy percent(4 growers) of their production were sometimes unable to cover variable costs of production. An explanation of this phenomenon lies in the production uncertainty growers may face and perhaps some uncertainty regarding costs. Although, this proportion is less than it is for growers who contract lesser levels or not at all.

The term costs has been used loosely so far. It has been maintained that growers know their costs. Of course, there is some uncertainty surrounding most variables. But, in general, when costs are referred to in this study variable costs are meant. Even under an FDCM growers may have little idea of total costs or more accurately fixed costs. It is assumed growers will contract at prices to cover their variable costs of production as they best judge them in any particular year. However, in any particular year they may not be able to cover their total costs. Obviously, this cannot be the norm. Years of not being to cover total costs may also occur under an FDCM. However, it is the contention here that an FDCM and forward contracting, in general, create additional incentives for growers to better know their cost structure - including fixed costs.

Another advantage to forward contracting is easier access to credit. In or

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credit. In order to get some idea of how much credit potato growers demand they were asked if at least 75 percent of their working capital is acquired through loans. Forty-four percent of the growers responded positively. Of these growers, three quarters found it sometimes necessary to refinance these loans. If contracts do provide the grower greater access to credit then an FDCM would be advantageous to many growers. Interestingly enough though, only 10 percent of the growers responding found it necessary to have a forward contract in order to obtain financing.

In general, the responses indicate that growers suffer from some uncertainty. Most growers are unable to accurately predict prices, quality levels, and to a lesser degree yields. An FDCM has the potential to help reduce the uncertainty surrounding prices and quantities demanded. However, if there is a high degree of uncertainty regarding production levels or quality then the establishment of an FDCM would be more difficult. The growers' responses regarding production levels indicate that they can reasonably predict yields, but not perfectly. Quality levels are more difficult to predict. However, the production uncertainty must be and is dealt with in standard forward contracting.

Growers who contract have really only one response if they want to be sure they are able to meet their contract requirements and this is not to contract all their production. Yet, if all growers participating in an FDCM did this the ability to accurately predict future supply and demand for the potatoes could be diminished. But an

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FDCM would still have considerable advantages. If an FDCM is to be completely successful the design of it must somehow account for the uncertainty regarding production and quality, while still having a high proportion of production moved under its auspices.

6.3.2 Marketing Practices and Attitudes Towards an FDCM

The need growers have for a Forward Deliverable Contract Market and their attitudes towards one are also a function of the way they presently market their product. This section covers some of the conditions growers face in marketing their product and why they may pick a particular method over another. It will also cover some of the basic attitudes towards an FDCM.

One of the common problems cited in many agricultural subsectors is the lack of viable market alternatives. In potatoes it has been claimed that both in tablestock and the processing market channels growers have few market alternatives. One measure of this lack of market alternatives might be the number of different buyers growers may use. Growers were asked to list the number of firms with which they commonly do business. Thirty-four percent of the growers said they commonly do business with only one firm. Another 25 percent indicated that they do business with two to three firms. About 40 percent said they do business with more than three firms.

Undoubtedly no grower if he can avoid it wants to become captured by any particular buyer. In the interviews it was found that while

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growers may work with more than one buyer most market the great majority of their potatoes through one or two buyers. The other portion is to buyers who they have more tenuous relationships with and who take the potatoes that their regular buyers don't want.

The number of buyers available to a grower may also be a poor proxy for market power. While growers may deal with more than one firm they still lack any real power in most cases to affect the terms of trade. Growers, at least, feel they are often in position where they have no bargaining power. Growers were asked if they felt that they were often in a take it or leave it position when selling their potatoes. Ninety percent of the growers who sold on the spot market felt that they were often in a take it or leave it situation. Almost 100 percent of the growers who contract felt they were faced with take-it or leave-it situations. So while many of the growers responding often deal with more than one firm when selling their potatoes, very few feel that they have any bargaining power when negotiating the sale.

A valuable piece of information is why growers select the marketing method they do to move their potatoes. The reasons surrounding the selection of any particular marketing method can shed some light on both the feasibility of an FDCM, and perhaps its design if it should appear feasible. Growers were asked to select characteristics which influence their selection of a market outlet or mechanism. Table 6.4 is a tabulation of the growers' responses to various reasons why they use the method they do.

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Table 6.4 Growers' Responses Regarding Why They Use A Particular Marketing Method.

Reason	Absolute Number Of Responses
1. I sell at the closest available outlet	13
2. I sell where I can get the best price	32
3. It's the only place where I'm treated honestly	8
4. They will accept my potatoes when I want to deliver	1
5. Contracting assures me of a market	19
6. Contracting helps me get financing	14
7. Contracting helps me lock in a return	14
8. Other	6

These results are not very surprising except for two aspects. When specifically asked to comment earlier on the need for forward contracting to obtain financing only four growers said they needed to do so. However, fourteen growers indicated here that forward contracting helps them obtain financing. Few growers may feel that a contract is absolutely necessary to obtain financing, but they obviously feel that it helps.

Growers placed a relatively low priority on honesty. Processors and growers in personal interviews have stressed the importance of personal relationships. An important component of these relationships would seem to be honesty or trust.

Growers were asked if the relationship with their buyer(s) is important enough that they would forego a better deal elsewhere and stick with their buyers. Fifty percent of the growers said it wasn't.

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This result lends some credence to the growers' most popular response for using a particular market outlet - price. Personal interviews with growers indicated while personal relationships are important they only extend so far. A grower may accept poorer deals from his regular buyer than he could obtain elsewhere, but only infrequently. If the practice becomes consistent the grower has no qualms about finding another buyer if he can[1]. Since they are economic reasons for long term relationships an FDCM might be designed so that these relationships are accomodated.

In terms of the other responses that relate directly to contracting, the high absolute numbers are consistent with the commonly cited advantages to contracting. An FDCM would retain these advantages and could extend them to some growers who may be presently unable to obtain them.

Many of the growers have had experience with contracting so that the concept of an FDCM is not totally alien to them. Almost 60 percent of the growers have done some forward contracting and approximately 50 percent contract at least fifty percent of their production. In terms of an FDCM it would be valuable to find out why some growers don't contract their potatoes. Growers were asked to check off possible reasons for not contracting. The question was also directed towards any aversion to hedging on the futures market. This was an ill designed question since it may confuse an aversion to hedging with that of contracting or vice versa. These are listed below in Table 6.5.

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Table 6.5 Selective Factors Leading Growers not to Forward Contract or Hedge in Potatoes.

Factor	Absolute Number Of Responses
1. Can't take the production risk	1
2. Capital position is large enough to absorb occasional losses and in the long run I feel I'm better off not hedging or contracting	4
3. Have been unable to obtain a forward contract	6
4. Terms in a forward contract favor the processor	2
5. Futures market lacks sufficient volume to make hedges viable	6
6. Futures market is too easy to manipulate	8
7. Terms in the futures contract do not facilitate the determination of the basis	6
8. Other	6

In terms of forward contracting the most selected reason for not contracting was the lack of forward contracts. Most of the growers who marked other said they produce tablestock potatoes and no one forward contracts for these potatoes. Overall though, the sparsity of responses indicates that contracting as a practice is generally viewed favorably.

With respect to the futures market the responses indicate problems with the current contract market. Chapter IV covered reasons why this may be so. It is interesting to note that the sense of distrust regarding the futures market was the most popular reason for growers not using the market.

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Most growers, 65 percent of those responding, indicated that they had no rule of thumb on which they base their contracting or hedging decisions. In personal interviews with growers who contract most claimed they contract as much of their production as possible - up to or about 75-80 percent of their projected production. The remaining uncontracted proportion covers production risks and allows the grower to "play" the market. Of those surveyed growers who did have a rule of thumb, it was essentially the same as that quoted in the interviews. A couple said they contract enough to be sure they can cover their variable costs of production, while one grower contracts his entire acreage. If this grower has an acreage contract there may be little risk associated with this strategy.

In all the contracting questions and those related ability to predict such variables as quantity and quality there is a recurring theme of production risk. This issue appears to be the severest obstacle facing an FDCM. To be successful the design of an FDCM must be such that it deals with the production risk while still retaining a large proportion of production. If this cannot be done then the planning advantages claimed for an FDCM will not be achieved.

One of the primary advantages commonly cited for forward contracting is the improved ability to plan. Eighty percent of the growers who do contract felt that forward contracting improves their ability to plan.

Growers who identified themselves as members of a bargaining association(40 percent of the respondents) were asked what benefits

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they obtain from membership. The most commonly selected reason was that bargaining associations add stability and order to the bargaining process. The second most important reason was that associations improve the flow and quality of information. Listed as only the third most important reason is that bargaining associations improve the bargaining position of the grower. These results support our analysis of bargaining associations given in Chapter IV.

Growers who were not members listed several factors explaining their non-affiliation. The two most commonly cited factors were that they either grew primarily tablestock potatoes or there was no bargaining association in their area. However, 20 percent of nonmember growers said they could obtain the benfits of bargaining associations without being a member. The problem of free-riders is ever present for most collective bargaining associations, it also poses problems for the design of an FDCM.

Two questions were asked of the growers regarding the possibility of contracting for tablestock potatoes. Over 85 percent of the growers said they would be willing to contract for tablestock potatoes if they were available. Growers then had the opportunity to choose selected factors why there is so little contracting for tablestock potatoes. Their responses are shown in Table 6.6.

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Table 6.6 Why Is the Level of Contracting in Tablestock Potatoes So Low

Reason	Absolute Number of Responses
1. The product is too perishable	9
2. The production risks are too great for tablestock potatoes	4
3. Buyers are able to get all the product they need without contracting	26
4. Tablestock growers prefer to play the market	11
5. Other	3

Most people interviewed and the survey results support the finding that buyers of tablestock potatoes do not face the incentives to assure themselves of a supply. Potato shippers are not able to get long-term forward commitments from their customers. Additionally, buyers of tablestock potatoes usually can get their potatoes over a wider geographical area, since tablestock potatoes can justify higher transportation charges. It also important to remember that many growers are their own shipper and are likely to be small. Thus, they have no need to contract for potatoes. The production risks for tablestock potatoes appear no higher than they do for processing potatoes.

One of the responses a growers wrote in under "other" was enlightening. He stated that given the number of tablestock buyers and the quality variations, even for U.S. No. 1 potatoes, the lack of a nationall

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a nationally recognized standard makes it difficult to contract for tablestock potatoes. Each buyer has very different standards.

The point made is important. For contracting to be effective in tablestocks standards will have to be generally accepted. Such standards must be easily understood and translated into meaningful price differentials. Technically, it would be possible to have many contracts with their own standards, but this creates difficulties in the comparison of contracts and their terms.

While the buyers of tablestock perhaps do not face the same economic incentives for forward contracting as do processors, this is not meant to imply that there are no economic incentives. Wholesalers and retailers can still benefit from more efficient scheduling of deliveries and they may be able to improve their long range merchandising policies through forward contracting. When produce buyers were asked about forward contacting they had no strenuous objections. However, they stated that they could not be the only ones using the system as it would expose them to price risks that the rest of the industry would not be bearing.

Nothing in these results regarding present marketing practices and attitudes towards them seem to be prima facie evidence against the establishment of an FDCM. In fact, given growers attitudes towards contracting which seems favorable and the advantages they derive from it, the results do not suggest that an FDCM is potentially unacceptable. However, none of the questions covered so far have been expressions of the growers' attitudes towards the concept.

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Growers were asked a series of questions to get some idea of what their attitudes towards an FDCM might be. In particular, growers were asked to rate various aspects of an FDCM vis a' vis their present marketing system. The results of this rating are shown below in Table 6.7.

Table 6.7 Growers' ratings of the relative superiority of an FDCM or their present marketing system with respect to various categories

Category	Percentage of Growers Favoring	
	FDCM	Present System
Prices	67	33
Information, Planning, Management	83	17
Number of Buyers	85	15
Price Premiums for Superior Product	38	62
Acceptance by Farmers in General	41	59
Acceptance by Buyers in General	39	61
Buyer-seller Relationships and Practices	34	66
Efficient Use of Capital You Invested in Potato Production	74	26
Your Satisfaction with the Marketing System	81	19

Overall the growers responding seem to view the system favorably. The areas where they feel the present marketing system is superior to an FDCM are definitely matters of concern.

One area of concern which the growers have identified is acceptance by buyers and sellers. Acceptance is generally a problem with any new concept. If an FDCM is found to be beneficial and feasible it would still take a major educational program before its introduction. The cost of such a program, which include time, must be evaluated before a person can decide which system is superior.

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At least initially, the establishment of an FDCM would disrupt traditional buyer-seller relationships. Their disruption will cause problems, but this does not mean that an FDCM is incapable of forming good buyer-seller relationships. Indeed, if the system is properly designed and operates smoothly the feeling about these relationships could be just as good as is now, if not better. However, the nature of the relationships would be less personal and more "business" like.

Probably the severest criticism or lack of confidence was in the area of price premiums. Most growers believed that an FDCM would not be able to reward superior products as well as the present marketing system does. Theoretically an FDCM could do just as well as the present marketing system. In fact, price premiums paid for superior products are very common in standard forward contracting. One explanation for this response is related to the breakdown of personal relationships which growers feel would occur. In the interviews it was discovered one condition for the continuation of a buyer-seller relationship was the reward the grower received for superior product. The growers may feel that with the breakdown of personal relationships, perhaps through the loss of their identity, they may lose some ability to work with dealers who reward quality. Although, the market can be designed so that it is possible to identify traders.

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The surprising aspect given the growers' responses on acceptance is that 81 percent of them said they would probably be more satisfied under a marketing system that used an FDCM. It appears that the benefits the growers see in the system such as better prices in general and improved planning outweigh the negative aspects. Growers were asked directly if they would consider using an FDCM and an identical 81 percent said they would.

Shippers, though interested, indicated that unless they were able to get forward commitments from their customers they couldn't handle the risks associated with forward contracting. The chain store buyers similarly were not vehemently against the concept, although, they pointed out that the entire industry would have to use it because the price risks would be too great for just a few firms.

Processors had little use for the concept. The most cited reason was the lack of control over quality, However, once a contract is signed a processsor would be able to practice the same degree of control over quality as they do presently. A grower's potatoes would still have to meet the specified standards or they could be rejected. One processor said they would love to have the rest of the industry use it since they could benefit from the information. But they felt their own contracted levels and the prices they pay are confidential. It seems that this reason and the decrease in bargaining power are the most important factors influencing processors dislike for the system.

Although most growers said they would consider using an FDCM, 19

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percent of them said they would not. These growers had the opportunity to choose among several factors why they would not consider using the system. The two most common reasons with 50 percent of the unimpressed growers voicing them were that contracts were disadvantageous to the grower and they were unfamilar with the technology. Though contracting is prevalent in potatoes, it was not uncommon to find out in the interviews that some growers felt contracts were used by the contractor to the grower's detriment. This perception could even be found among growers who contracted heavily. In these cases it would seem though, these growers still find more benefits to contracting than not. An FDCM through greater availability of information has the potential to reduce inequities in contracts if they do exist.

The level of technical skill a grower would need to have to use the system is nil. However, many individuals have an inherent fear or awe of anything computerized. It is felt that an educational program demonstrating the simplicity that commputerized markets operate with will probably be needed before an FDCM could be successful.

Several cross tabulations were conducted to see if various background characteristics had any influence on a growers desire to participate in an FDCM. The factors that were hypothesized to have some affect on the likelihood to participate were; 1) farm size; 2) level of working capital financed; 3) prior experience with contracting; 4) Ability to irrigate; and 5) ownership of storage. Without exception there was no statistical difference across any of thes

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these variables and a grower's answer whether he would or would not participate. In other words these variables seemed to have little influence on the grower's opinion of an FDCM. The reader is reminded that the sample is not random and the results here can not be applied across the entire population with any certainty. Yet, the results do not suggest that an FDCM has any inherent problems which specific segments of the grower population would object too.

A variable critical to the effectiveness of an FDCM is the amount of production growers are willing to contract. While growers may be willing to contract under an FDCM if they only contract a minor proportion of their production the benefits to be derived from an FDCM will be lessened.

Over 70 percent of the growers said they would be willing to contract for at least 50 percent of their production. Slightly more than half said they would contract 75 percent of their normal production. Intuitively, it seems that it will take at least these levels nationally for an FDCM to live up to its potential as a planning device. Again, these figures cannot be applied carte blanche across the country, yet they agree with the rules of thumb stated by growers in the survey and interviews. Less than 10 pecent said they would be willing to contract no more than 10 percent of their production.

An FDCM is based on the principle that most of the production will be forward contracted. If the major portion of the crop is contracted through the system both growers and buyers have a much better

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better idea of future supply and demand conditions. Thus, both parties have a much clearer conception of the demand for their particular product. If an FDCM is only a secondary market much of the planning function is lost. While high levels of participation are preferred, the system may be useful for planning as long as the levels are consistent one year to the next. For example, if the contracted acreage negotiated on the system is known to represent approximately fifty percent of total production every year, then subsector participants would still find the information valuable for planning.

Over three-quarters of the growers felt that an FDCM would reduce the year-to-year volatility presently found in potato supplies and prices. It should be remembered that an equal number of growers found price volatility to be a hindrance in their planning. This leads to growers often being unable to project their returns and sometimes finding themselves in the position of not being able to cover their costs.

Growers were asked if the establishment of an FDCM would change their production practices. The underlying concept of an FDCM is that through forward commitments growers would no longer over or under produce and that production would be much closer in line with demand conditions. Sixty percent of the growers indicated that they would change their production practice under an FDCM. Several of the comments that growers offered on how they would change their practices were personalized to their own operations. Most though, were

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were along the line that they would have to more closely monitor their operations in order to know how much of their production to contract. In other words, growers, who commented, felt that in order to contract they would have to have a better idea of their production capabilities in order to meet the contracts. This is exactly the type of behavior that an FDCM is hoped to foster.

6.4 OPERATING CHARACTERISTICS OF AN FDCM

Since growers form an important part of the potential participants of an FDCM it is crucial to get their input on the day-to-day operation of the market - if it should exist. The following section is a tabulation of the growers contained in the survey responses concerning some of the basic operational characteristics of the market.

The most basic question seems who should own and operate the exchange. The feelings on this question were split almost fifty-fifty amongst the growers. Table 6.8 is tabulation of their absolute responses.

Table 6.8 Growers' responses on who should own and operate an FDCM

Ownership	Absolute Number Of Responses
The sellers	18
The buyers	1
Government	1
Other	18
Shouldn't Exist	1

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About half the growers felt that the sellers should own the exchange. Most growers who favored grower ownership of the exchange stated that the potatoes were the growers and they should have the opportunity to sell them.

Most of the growers who marked "other" felt that ownership of the exchange should be some combination of growers and buyers. Most common was that the ownership should be controlled by some association of the growers, such as a bargaining association or a potato commission and buyers. Though they were less specific who the buyers should be.

The second most popular suggestion was that the exchange should be owned by an independent third party. Most growers suggesting this emphasized that the party should be a disinterested one. One grower said it should be constructed along the lines of the Chicago Board of Trade. This does seem to have some merit. The HAMS project in Ohio seems to have been short-circuited by the ownership of the market by the cooperative that had its own interest to pursue in addition to that of the exchange.[6]

Another important item is who should bear the cost of the exchange. An equal percentage of the growers, 15 percent, felt that the cost of the exchange should be borne by either the buyer or seller. However, 70 percent of the growers felt that the cost should be split between buyers and sellers.

In order for an FDCM to work, performance must be guaranteed. There are several methods by which performance may be guaranteed.

Presently, in forward contracts the courts do most of the enforcement, though it must be a serious breach of contract to go to court. Usually, poor performance is rewarded by no contract the following year. This is especially useful from the processsor's point of view. However, given the costs involved this may be an expensive way for the system to gain credibility.

Growers were asked to select among several options that method they most preferred to guarantee performance. The responses are listed in Tables 6.9 below.

Table 6.9 What method should be used to insure that a contract is honored by both parties.

Method	Absolute Number of Responses
1. A bonding agency for both parties	9
2. Agreed upon penalties imposed on either party failing to perform	15
3. Let the courts enforce the contract	6
4. An arbitrator whose rulings would have the force of law	8
5. An agent of the board of directors of the exchange could handle disputes	3

The most popular method among the respondents was that of agreed upon penalties applied to either party failing to live up to the contract. Penalties are already incorporated into a standard contract in the form of premium-discount schedules. It appears that this could be the subject of actual negotiation. A bonding agency could cover losses suffered in the event of non-performance and the amount of the bond required could be based on past performance and financial standing.

One problem processors had with the system is how to ensure quality. Presently, processors do this by contracting with growers who have an established track record with the processor. One possible solution to this could be to have a rating system for the growers based on their past performances. Growers were asked if they would be willing to submit to a rating system. Eighty-one percent of the growers said they would not have any problem with a rating system. Approximately 25 percent of the growers said that growers should establish and do the rating while an equal number said the buyers should do the rating. The other half of the growers felt that it should be an independent third party. Most of these growers suggested that this party should be the USDA. However, a few felt that bargaining associations could perform this function.

A rating system is not unprecedented, as most processors presently rate the growers. In fact, at least one processor makes this list public. The system could be similar to the Blue Book, which rates the financial status of many produce marketers. Another possibility, which might eliminate ratings as a part of the system is to allow growers to be identified when offering to sell if they choose. The buyers would then be able to use grower identity as an indication of quality.

Most contracts in potatoes today have premium-discount schedules in them for quality and storage incentives. An FDCM's contracts would

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also most likely contain such schedules, but there are at least two ways they can be handled. One is to have such schedules negotiated in every contract. The other method is to have set schedules previously negotiated by a growers organization and the processor. Each method has some advantages. The growers appear to prefer the latter method. Sixty-six percent of the growers responding felt that the quality schedules should be negotiated prior to active bidding on the market. Seventy percent of the growers felt that these schedules should be established by the government. Only 10 percent felt they should be established by buyer-grower bargaining committees.

The preferred suggestion seems rather untenable, however. It is unlikely that the government could establish premium-discount schedules that would be met with the processors' approval since it would be hard to determine their needs. A bargaining committee, however, probably could negotiate schedules compatible with both the growers' and first handlers' interests.

An important issue which affects almost all the operational rules of the exchange is who would be allowed to trade on it. The growers were asked to identify what they thought was the best suggestion for certifying participation. The raw results are in Table 6.10.

Table 6.10 Who should be allowed to contract?

Party allowed to Contract	Absolute Number of Responses
1. Anyone	9
2. Any receiver or producer who has received or produced potatoes in the past	11
3. Only those certified as being able to deliver on their promises	17
4. Only producers or receivers with five years of experience	1
5. Anyone who can buy a performance bond	3

The issues of performance guarantees, quality assurance, and who can trade on the system are intimately related. Although no one suggestion may be able to achieve a high level of performance across all these areas, bonding seems most applicable in combination with contigency clauses covering quality and non-performance.

Related to these issues is the question of whether there should be secondary markets in the contracts. That is, should traders be allowed to exchange signed contracts among themselves. Seventy-two percent of the respondents felt there should be secondary sales allowed. If so, this would add to the complexity of the system. However, a secondary market in the contracts may be one way to compensate for production risks. For example, a grower who is unable to fulfill his obligations could sell his contract to a grower who could.

Growers were also asked under what conditions should a grower be allowed to cancel a contract. Their responses are shown in Table

6.11. Over ninety percent of the growers felt that acts of God should allow a grower out of performance. A little less than 33 percent of the growers felt that serious disease problems should also be a valid excuse for non-performance. However, all other reasons, such as adverse price movements, most growers did not feel should enable a trader to break a contract. Most growers who commented felt that a signed contract should not be broken except in the most severe of circumstances.

Table 6.11 Under What Conditions Should a Grower be Allowed to Cancel The Contract

Conditions	Absolute Number of Responses
1. Acts of God	38
2. Disease outbreaks causing losses in yield or quality	14
3. Adverse price movements	1
4. Other	3

Another factor which might affect who can participate on an FDCM is whether the contracts are volume or acreage contracts. Processors prefer volume contracts since this gives them better control and allows them to plan their operations more tightly. Growers preferred acreage contracts. Seventy two percent of the growers said they would rather sign acreage contracts. Acreage contracts reduce the production risks growers have to face. The processors interviewed indicated the biggest problem they have with acreage contracts is that they give growers an incentive to cheat. In long crop years when the spot market price is low, growers get phenomenal yields and just the opposite in short crop years. Only one processor used an acreage contract. This processor commmented that the growers they work with are "very honest" and they feel confident using this type of contract with them, but might not use them with other growers.

It has been stressed throughout this research that to be fully effective as a planning device an FDCM will require large participation rates. One way to achieve high rates would be to have compulsory participation. Although this may seem counter to this country's basic philosophy to some, it is not without precedent. Marketing orders require mandatory participation. Growers were asked if they thought an FDCM would be beneficial to them would they vote for compulsory participation. Seventy-five percent said they would not.

In general, most growers seem to dislike what they feel is unnecessary government intervention. The few comments offered on this question all were of the nature of let the free market work. An FDCM would be an open competitive market. However, most growers view compulsory as meaning they lose their freedom of choice. But growers and buyers have little choice about the present system. While not governmentally mandated, they must use the present system or none at all.

6.5 SUMMARY

The major purpose of this chapter was to identify potential participant reactions towards a Forward Deliverable Contract Market. While the reader is reminded that the results are not generally applicable to all growers, the responses offered by the growers had many insights on design problems for an FDCM.

The survey identified at least three major areas of concern which must be dealt with in designing an FDCM. One area is the limit in accuracy growers possess in predicting and controlling quality and quantity. One way to handle this would be growers only contracting a portion of their total production, but this will reduce overall coverage and could lead inferior planning.

A second area of concern is how to insure reliable participants and how should performance be guaranteed? These two problems are not completely separable. In fact, both areas of concern are a matter of designing the system so that growers have incentives to contract large amounts and to perform. In some respects this may mean minimizing the disincentives. That is reducing the trader's risks associated with the system.

The final area of concern is more general. It seems that many of the growers' responses were partially attributable to some confusion about the concept. In any event for an FDCM to have a high probability of success and to be fully effective would require a major effort to assure an understanding of the system by potential participants.

The survey seems to have fulfilled its major purpose and though it is not representative of all growers it does to indicate that growers are not antagonistic to the idea and are interested in achieving the objectives of an FDCM if it can be designed to deal with the problems they perceive with the current system and their concerns about the proposed FDCM. Chapter VIII will cover the design issues identified here.

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CHAPTER SEVEN

AN ECONOMETRIC SIMULATION OF AN FDCM

7.1 INTRODUCTION

In this chapter an econometric model designed to simulate some of the impacts of an FDCM on the potato subsector is presented. Specifically the model will investigate the effects participation rates have on production fluctuations and other variables. In potatoes there will not be a complete elimination in production variability since some is due to changes in demand or are due to random fluctuations in yields.

This chapter is divided into two major sections. The first is a description of the basic econometric model which will later be used to simulate the impacts of an FDCM. The second major section will be a description and analysis of the simulated impacts of the introduction of an FDCM in the potato subsector. The actual negotiating process will not be simulated. Instead an algorithm is used to select a representative price which is likely to be generated from the market.

7.2 THE ECONOMETRIC MODEL

Potatoes have been the object of several econometric studies over the past two decades. However, a review of these studies will not be u

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undertaken here, although, references will be made to previous work where relevant.

A study by Armbruster et. al. proved to be extremely valuable for the purposes of this study.[1] Armbruster's objective was to examine the effects of a collective bargaining board representing the interests of northwest producers. There are some similarities in Armbruster's objective and this research's. Thus, his approach was most instructive. He constructed a model to simulate the performance of the potato subsector as it is presently organized. He then imposed the structure of a bargaining board on his model. This was done by specifying pricing goals of the board and feeding these prices into the model. Armbruster did not specify the operation of the board.

Given the similarity in objectives Armbruster's model was used as the basic framework in this research. Although, the specifications of the two models differ considerably and the questions they answer are also different.

7.2.1 Basic Specification of the Model

The econometric model used in this research is recursive. Thus, last year's prices have considerable impact on current year's production. A recursive model is appropriate for several reasons. Strong empirical support comes from the high correlation between past prices and current planted acreage. A regression equation was run with current year's planted acreage as a function of prices received

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the preceding year. This variable alone was able to "explain" over fifty percent of variation in acreage planted.

A second reason is the data available. On a national basis prices received by producers reported are actually an aggregate representing prices collected over several markets and representing different utilizations. Thus, to model a simultaneous system where production, utilizations, and prices are resolved is tenuous. The manner in which an FDCM will operate also suggests the development of a recursive model. Prices for upcoming production will be generated as major production decisions are made. Admittedly, it would be ideal to determine the quantities at the same time in the model, but this would mean modeling the actual bidding process which requires a large increase in expense.

Presently, producers must base their planting decisions on their own price expectations. The formation of price expectations can be explained by the partial adaptive expectation model. However, for simplicity prices lagged one year were used as a proxy for these expectations. Given the evidence this does not appear unreasonable.

The recursive structure of the model means that the relationships specified will be "driven" by prices. In the FDCM simulation phase of the model prices will not only include preceding year's "spot" prices, but prices likely to be generated through an FDCM as well. These prices will enter the model in the same fashion as do prices lagged one year. The term "spot" will be applied to prices which are not generated in the FDCM during the simulation phase.

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To give greater detail and to be able to make some statements on the differential impact of an FDCM different geographical regions the model is made up of six different production regions. The regions have been defined on the basis of both geographical and climatic differences.

There are three fall producing regions. These are the Northwest states, Central states, and Eastern states. There are three other regions which correspond to winter, spring, and summer harvest dates. The states included in these regions are less contiguous than those which are in the fall producing regions. But the type of market these states sell to, dictated by timing, produces similarity in their marketing practices and the problems they face. Some states which have been assigned to a particular region do produce and sell potatoes for more than one period. However, this production is relatively minor when total potato production is considered. It is also believed that further delineation of producing states on the basis of harvest dates adds no greater informational content to the results derived from the model. Figure 7.1 shows the production areas as defined here and the states they include.

For each of these regions four basic equations have been estimated. These equations are yield, planted acreage, production, and prices received. The following sections give the detailed specifications of the equations and the results obtained during estimation.

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7.2.2 Yields

On average, yields have shown consistent upward trend over time. The exception is in the eastern and Winter production areas. The increase in yields are a function of improved varieties, increased irrigation, and improvements in other inputs such as fertilizers or herbicides. Technically, the equation used to estimate yields should include these variables. However, it is difficult to quantify these variables and sometimes even to be able to define what an improvement is. Fortunately, in most cases time as explanantory variable has been able to capture these technological advances. While it is not certain that technology increase in a linear fashion, yields as a function of time show good predictive ability.

Other variables have been suggested as affecting yields, such as weather, expected prices, and cost of inputs. Specifying a consistent proxy for weather has proved difficult. No previous studies reviewed have been successful including a variable representing weather so it was dropped from consideration.

Expected prices might influence the use of yield increasing inputs. Since expected prices are included in the acreage planted equations they were not included in the yield equations. A proxy for the costs of production were experimented with. However, neither the index of prices producers pay nor an index of fertilizer costs(an important input) proved to be successful.

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The results of the yield equations are shown in Table 7.1. The general form of the equation is Y = F(t,u), where;

YX = Yields in region X, period t.

t = time.

u = error term.

From a cursory analysis of the equations it is apparent that all but the Eastern and Western yield equations performed reasonably well. Various functional forms were tried for the latter regions with little success.

All the signs were correct and the variables were significant at the .01 and .05 levels except for above mentioned equations. Most of the equations had high R 's. Although time could only account for about five percent of annual variation in Eastern yields, the Eastern exhibits the smallest standard deviation in yields(11.25). This implies that Eastern potato yields exhibit the smallest annual variation of the six regions and thus, the equation was deemed adequate to be used in the simulation. A larger concern is the presence of the squared and cubed terms in the Winter and Summer yield equations as these would lead to unreasonable results in the simulation phase. More of this point will be made later.

7.2.3 Planted Acreage

The amount of acreage a farmer devotes to a crop is one of the most important decisions he must make. There is a considerable lag

Table 7.1

Parameter Estimates for Season/Regional Yield Equations estimated by O.L.S., 1956-1980

Dependent Variable[1] (cwt/acre)	Intercept	T	T^2	T^3	R^2	Mean	S.D.	D.W.
EEAYA	234.332	.367931			.0503	239.24	11.25	1.95
	(46.78)	(1.18)						
ECYA	122.392	4.307395			.93153	180.5	31.5	1.94
	(33.18)	(12.72)xxx						
EWYA	171.869	7.247392			.92375	269.70	53.2	1.25
	(26.14)	(16.72)xxx						
EWINYA	114.092	17.256109	-1.2150	.023792	.49079	187.7	21.3	1.64
	(5.43)	(2.73)xxx	(3.30)xx	(2.12)xx				
ESPRYA	145.020	4.103486			.77443	200.4	32.8	2.29
	(20.83)	(8.943)xxx						
ESUMYA	118.561	14.58842	-.9386	.019245	.68923	184.2	16.0	1.45
	(9.53)	(3.91)xxx	(3.01)xxx	(2.53)xxx				

[1]Yields (cwt/acre) in Eastern, Central, Western, Winter, Spring, and Summer areas, respectively.

Absolute t-values given in parenthesis, where xxx significance at .01 probability level.
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between when a potato producer makes this decision and when he harvests them and makes the sale. This decision is based partially on his price expectations. Thus, as stated previously, prices lagged one year were used as a proxy for these price expectations.

Expected price is only one of the variables which influences planting decisions. Other possible variables might be the level of fixed investment, expected prices of production alternatives, production costs, and risk. Various formulations of these variables were evaluated in the planted acreage equations for the six regions.

Fixed investment can affect a farmer's planting decisions by reducing the amount of flexibility he has. The higher the level of fixed investment the less variation in level of operation one would expect to find. While potato production is not totally specialized, the level of specialization is significant and increasing. As a proxy measure of the level of fixed investment planted acreage lagged one year was included. If the level of specialization is high a significant and positive relationship between acres planted last year and acreage planted this year should be observed.

Depending on the flexibility a producer has, the number of acres he devotes to potatoes will also be a function of the expected prices of his other production alternatives. Potato growers do have some alternatives so in every region the expected price of the most likely substitute crop was evaluated. As in the case of expected potato prices the prices of substitute crops were entered as lagged variables.

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A third variable which was included for consideration was the cost of production. However, as in the case of yields no measure was found to give significant results.

The final variable considered was risk. Estes used price variance, defined as the difference between prices lagged two years and price lagged one year squared, $(Pt-2 - Pt-1)^2$, as a proxy for this price variation.[2] If growers are risk averse a negative relationship is expected.

The general specification of the planted areage equations is shown below.

APX = F(PX ,APX ,PSX ,VPX ,U),

Where; APX = Acres planted, region X.
APX = Acres planted, region X, lagged one year.
PX = Prices received, region X, lagged one year.
PSX = Prices received for substitute crop, Region X, Lagged.
VPX = Variance of prices received, Region X.
U = Error term.

The results of the analysis are shown in Table 7.2.

In each of the equations the regression coefficients are consistent with the hypothesized relationships and almost all variables are significant at the .01 or .05 percent levels. The R 's were also fairly high.

For some unknown reasons the risk measure was not significant in the Winter, Spring, and Summer equations. The growers in these regions are generally smaller than fall producers and it may be that

Table 7.2

Parameter Estimates for Seasonal/Regional Planted Acreage Equations, Estimated by O.L.S. 1956-1980

Dependent Variable[1] (1000 acres)	Intercept	PA t-1 (1000 acres)	Own Price t-1 ($/cwt)	Variance of Price[3]	Price of Substitute ($/ton)	R^2	D.W.
EEAPA	90.077 (1.18)	.7251 (2.95)xxx	6.6445 (2.40)xx	-1.7128 (2.14)xx	1.0969 (2.03)xx	.93	1.91
ECPA	220.253 (3.34)xxx	.3420 (1.64)xx	7.9408 (2.47)xxx	-1.8152 (2.38)xxx	-1.54 (2.85)xxx	.71	2.1
EWPA	30.855 (2.33)xx	.8192 (22.91)xxx	58.1729 (9.07)xxx	-12.966 (5.27)xxx	-3.3034 (5.05)xxx	.99	2.3
EWINPA	7.4497 (1.36)	.7581 (5.22)xxx	1.4629 (1.74)xx		- .2962 (1.94)xx	.77	1.6
ESPRPA	10.3655 (.53)	.8829 (9.08)xxx	7.6702 (2.35)xx		- .9182 (2.39)xx	.91	2.3
ESUMPA	-44.3643 (1.23)	1.0938 (10.82)xxx	8.7646 (2.01)xx		- .3333 (.69)	.96	2.1

[1]Planted Acreage in Eastern, Central, Western, Winter, Spring, and Summer areas, respectively.

[2]Planted Acreage in region, previous year.

[3]Difference of own price lagged two years and one year squared, $(Pt\text{-}2 - Pt\text{-}1)^2$.

[4]Substitute crop was sugarbeets in Western and Central region and hay in all others.

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they are able to move in and out of production more easily and their decision is more influenced by expected prices than it is by the risk.

7.2.4 Production

Production was estimated as a function of the yield and planted acreage equations estimated. The basic equation is; PRX = YX * APX. Since this is a simple calculation no results are shown.

7.2.5 Prices Received

Current year prices received are the last major variable to be estimated in the main component of the model. The equations in this section show the most variation among regions. Several variables were hypothesized to affect prices received including production in the region, production in other regions, level of primary utilization for the region, and substitute products. Listed below in Table 7.3 are the equations for prices received.

In estimating prices received in the Fall producing regions it was found that own production was significant and negative as was hypothesized. Production in the other fall producing regions was generally found to be significant and negative. Although such a specification may lead to problems of multicollinearity, the results indicate that this was not a problem. It allows, though, for the

Table 7.3

Parameter Estimates for Seasonal/Regional Prices Received Equations, Estimated by OLS, 1956-1980

Dependent Variable[1] ($/cwt)	Intercept	Eastern Production (1000 acres)	Central Production (1000 acres)	Western Production (1000 acres)	Frozen Utilization	Own[2] Production (1000 acres)	Prices lagged One Harvest[3] ($/cwt)	T	R^2	D.W.
EEATD	17.9260 (6.65274)xxx	$-.178997\times10^{-3}$ (5.06057)xxx	$-.664\times10^{-4}$ (1.74469)xx	$-.34606\times10^{-4}$ (1.51604)xx	$.794357\times10^{-4}$ (2.26929)xx				.84	1.8
ECD	14.4682 (4.98744)xxx	$-.141747\times10^{-3}$ (3.88481)xxx	$-.66773\times10^{-4}$ (1.79858)xx	$-.297859\times10^{-4}$ (1.34285)	.336398 (.07)			.284346 (2.88892)xxx	.84	1.5
EWD	9.60899 (4.62118)xxx	$-.805564\times10^{-4}$ (3.08013)xxx	$-.20216\times10^{-4}$ (.759693)	$-.442462\times10^{-3}$ (2.78297)xxx	$.34285\times10^{-4}$ (1.02148)			.193503 (2.458)xx	.80	1.5
EWIND	-.123843 (1.161246)						.761204 (1.88691)xx	.21694 (3.69366)xxx	.72	1.7
ESPRD	5.05997 (3.00589)xxx				$.427867\times10^{-5}$ (.358130)	$-.12906\times10^{-3}$ (2.3886)xx	.425579 (4.27688)xxx		.85	1.98
ESUMD	2.83467 (1.97654)xx				$.949185\times10^{-4}$ (4.5899)xxx	$-.669458\times10^{-4}$ (2.71425)xxx	.687154 (5.48877)xxx	.325401 (4.04362)xxx	.93	2.01

[1]Prices received in Eastern, Central, Western, Winter, Spring, and Summer areas, respectively.

[2]Production in Winter, Spring, and Summer production areas, respectively.

[3]Prices received in Western, Winter, and Spring region/areas, respectively.

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For the other production areas(Winter,Spring,and Summer) stocks of potatoes in January, March, and April were experimented with in the price equations. However, no significant influence was found. Therefore, prices from the preceding harvesting period were included and did prove to be significant.

It was found that frozen utilization had the greatest explanatory power in five of the six prices received equation. This result is somewhat surprising since this is not the primary form of utilization in all regions. For example, in the central states potato chip utilization is more important than is frozen. Perhaps because of its increasing importance in total utlization frozen utilization may set the tone for price levels for potatoes going to other utilizations.

In all but the eastern and spring price equations time was found to be a significant variable. The sign on its coefficient was positive. As is well known a time variable is able to act as a proxy for other variables which are unkown, but are highly trended. Time may be acting as proxy for the general increase in demand for all potato products which have occurred during the past fifteen years. Its lack of significance in the eastern and spring regions may be a result of the decline in competitiveness which these regions have recently exhibited.

Other variables hypothesized to affect potato prices are income and population. However, attempts to include these variables in a variety o

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variety of specifications failed to improve the overall fit. In no price equation was a substitute commodity found to be significant. Production of rice and wheat were tried.

While the R^2's are low they are high enough for simulation purposes. They are also generally higher than what other researchers, in general, have been able to achieve.[3]

7.2.6 Elasticities

The short run(SR) and long run(LR) elasticities of the planted acreage equations are shown in Table 7.4. In the planted acreage equations the results for the elasticities for own price are all inelastic except for the Western long run own price elasticity. In the East and Central regions, a 1 percent change in price will affect planted acreage very little in the SR. This might be the result of the declining importance of these regions in production or that producers have fewer alternatives available to them.

The other regions show much more own price elasticity then these two regions. For the Western region a one percent increase in expected price will, on average, lead to a .29 percent increase in planted acreage. Estes in his work found a .26 percent response in planted acreage to expected price.[4] The SR elasticities for the Winter, Spring, and Summer regions tend to be higher than the fall

Table 7.4

Estimated short run and long run elasticities of potato acreage with respect to lagged own price, lagged price of substitutes, and variance of potato price, by region.

Table 7.4

Estimated short run and long run elasticities of potato acreage with respect to lagged own price, lagged price of substitutes, and variance of potato price, by region.

Season/Region	Own Lagged Price		Sugar Beets		Hay		Variance	
	SR	LR	SR	LR	SR	LR	SR	LR
EEAPA	.08226	.29936			-.15961	-.5807		
							-.01422	-.05178
ECPA	.0687	.10441	-.05151	-.12052				
							-.01068	-.01624
EWPA	.29364	.1.623	-.12901	-.02331				
							-.01793	-.00323
EWINPA	.33294	.08049			-.49141	-.11882		
ESPRPA	.24579	.02834			-.24672	-.02861		
ESUMPA	.15541	.00166			-.0581	-.01634		

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producing regions. Growers in this region are smaller and less specialized in potato production so that they are able to move in and out of production easier than producers in the fall regions.

In general the LR elasticities are more elastic than the SR elasticities, which is what one would expect. The exception is the non-fall producing regions. This would appear to reinforce the trend away from non-fall producing states.

The elasticities of changes in the prices of substitute crops are all inelastic, both in the short run and the long run. It appears that while potato growers have some flexibility the number of options they possess is limited and hence, the added importance of potatoes to them.

The elasticities with respect to variance in prices is extremely small. So that while risk does have some influence on production decisions it is not large and again would seem to indicate a lack of alternatives.

7.3. AN ECONOMETRIC SIMULATION OF AN FDCM IN POTATOES

The primary intent of estimating the preceding relations was to be able to ascertain some of the likely impacts of an FDCM on such variables as prices, production and the variations of these variables. Unfortunately, during the simulation phase reasonable results could not be obtained for the Winter, Spring, and Summer regions so they were dropped from consideration. However, since these did not i

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did not interact with fall producing regions the general conclusions to be drawn from the results should not be affected.

Before the results are presented some points must be made. First, although the relations estimated exhibit a reasonable "goodness of fit", the results of the simulation should be viewed as indicative or qualitative in nature rather than as specific estimates. Because of the uncertainty regarding participants behavior under an FDCM it was necessary to make two basic assumptions and, though the assumptions appear reasonable, actual behavior may vary from what is assumed.

The first assumption is that contracting growers will negotiate prices which at least cover their costs of production. The second assumption is that growers will show the same responsiveness to prices generated in the FDCM as they do to expected spot market prices(prices lagged one year). The first assumption is reasonable and while growers may not cover their total costs every year they must do so over time if they are to survive.

The second assumption is more tenuous. Hey has shown that as the uncertainty surrounding prices is decreased producers will increase output.[5] However, growers will still face production uncertainty and it is unclear how this would affect output. Additionally, under an FDCM the quantities will be determined as well thus the prices determined will be for a specified quantity. Given the data which are available, though, this assumption appears the only one possible.

Briefly the model operates as follows. FDCM prices and spot market prices lagged one year are fed into the acreage planted equations. Acres planted is then multiplied by the predicted yields for each

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<u>7.3.1 Mode</u>

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for each region to get total production. Total production is used in the prices received equation to derive spot prices. Appendix C shows the complete specification of the simulation model for a typical trial.

7.3.1 Model Verification

There are two steps which will be used to verify the performance of the basic model. The first step is to evaluate the model's ability to duplicate the behavior of the system over the time for which the relationships were estimated. The model was run over the last ten year period for which data were available and the results were compared with the actual observations. Actual data were used to initialize the endogenous variables as well as to be used for the exogenous variables throughout the run. Definitions of the endogenous variables are shown in Figure 7.2.

The mean values of the variables for the simulated run and those for the actual system are shown in Table 7.5. The relative difference between the mean values of the observed variables and the simulated indicate that the model does a reasonable job of duplicating actual performance. Of the twelve relationships simulated only two show more than a ten percent difference between the observed mean and the simulated.

Table 7.5

Comparison of Observed and Simulated Results: 1971-1980

	% Change	Coefficient of

Table 7.5

Comparison of Observed and Simulated Results: 1971-1980

	Mean Values		% Change Observed to	Coefficient of Variation	
	Observed	Simulated	Simulated	Observed	Simulated
EEAYA	241.8	241.9	0	5.4	.4
ECYA	211.0	210.7	-.1	7.1	5.9
EWYA	323.9	320.5	-1.1	7.3	6.5
EEAPA	219.7	194.3	-12.8	9.8	17.6
ECPA	319.4	317.1	-.7	5.4	4.7
EWPA	562.3	543.0	-3.54	8.8	9.2
EEAPR	51035	47087	-8.4	11.1	19.7
ECPR	60121	66857	10.1	8.9	8.3
EWPR	167880	174720	3.9	11.2	19.6
EEATD	4.63	5.01	7.58	33	28
ECD	4.12	3.99	-3.26	40	33
EWD	3.21	3.09	-3.88	30	24

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EEAYA

ECYA

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EEAPA

ECPA

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EEATD

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EFDCM

CFDCM

WFDCM

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FIGURE 7.2

Definition of Variables

Variable	Definition
EEAYA	yield per acre of potatoes in Eastern States (cwt./acre)
ECYA	yield per acre of potatoes in Central States (cwt./acre)
EWYA	yield per acre of potatoes in Western States (cwt./acre)
EEAPA	Planted acreage in Eastern States,(1000 acres)
ECPA	Planted acreage in Central States,(1000 acres)
EWPA	Planted acreage in Western States,(1000 acres)
EEAPR	Production in Eastern States,(1000 cwt.)
ECPR	Production in Central States,(1000 cwt.)
EWPR	Production in Western States,(1000 cwt.)
EEATD	Price recieved in Eastern States,($/cwt.)
ECD	Price received in Central States,($/cwt.)
EWD	Price received in Western States,($/cwt.)
ZE	Particpation rate in Eastern States
ZC	Particpation rate in Central States
ZW	Participation rate in Wsetern States
EFDCM	FDCM price in Eastern States,($/cwt.)
CFDCM	FDCM price in Central States,($.cwt.)
WFDCM	FDCM price in Western States,($/cwt.)
WEP	Weighted average price of FDCM and price received in Eastern States,($/cwt.)
WCP	Weigthed average price of FDCM and Price received in Central States,($/cwt.)
WWP	Weigthed average price of FDCM and price received in Western States,($/cwt.)

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The coefficient of variation(the standard deviation expressed as a percent of the mean) gives an indication of the relative stability of the variables. In general, the simulated system is relatively more stable than the observed. This is not surprising since the observed exhibit the randomness found in nature, while the simulated do not.

The model estimates of the yearly levels of the endogenous variables were less accurate than their means over the ten year period. However, it has been mentioned that the absolute levels of the variables should not be viewed as actual estimates, but as indicative of likely performance. It was judged that the mean and standard deviations of the simulated variables over the estimate time period were reliable enough to be the basis of future runs.

The second step of the verification process is to simulate the performance of the model into the future for which there are no data. Exogenous variables were estimated as simple trends and fed into the model as data. The model was run over a twenty year period representing the time period 1981-2000. Most of the results appeared reasonable, although Western production probably rose somewhat more than what is likely.

The model also suffered from a lack of randomness. Further work should probably add a stochastic element to yields as this would add a futher measure of reality to the system. An important point is that the prices in the base run show much more stability than they have historically.

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The results of the first ten years of this run are shown in Table 7.6. These results will be the basis of comparison for all subsequent runs.

7.3.2 Simulation of the FDCM

The following discussion presents a series of trials in which the structure of an FDCM was imposed on the system. Remember it was assumed that growers will negotiate prices which cover their costs of production. Zepp developed costs of production Tables for the Pacific Northeast, the Red River Valley and Maine for the years 1980 and 1981.[6] These costs included seed, fertilizer, labor, harvesting, machinery, land and interest costs, etc. up to the point of storage. Although there are limitations to these data, they were the best available.

These cost estimates were then generated for the entire ten year period to be estimated by inflating them 10 percent every year. This rate of gain is based on the annual rate of gain shown by the prices producers paid index over the most current 10 year period. FDCM prices were then derived by multiplying costs by a price adjustment factor(PAF). Three levels were used. In one scenario growers just covered their costs of production(PAF=1.00) and in the others growers were able to negotiate prices ten(PAF=1.1) and twenty percent(PAF=1.2) over their costs of production, respectively.

Once the FDCM prices were calculated for each region through the

Mean Values,

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EEAPA
ECPA
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EEAPR
ECPR
EWPR
EEATD
ECD
EWD

Table 7.6

Mean Values, Standard Deviation, and Coefficient of Variation of Selected Variables: Base Run 1981-1990

Variable	Mean	Standard Deviation	Coefficient of Variation
EEAYA	245.5	1.11	.5
ECYA	253.8	13.0	5.1
EWYA	392.9	21.9	5.6
EEAPA	183.8	7.6	4.1
ECPA	317.2	6.3	2.0
EWPA	588.3	24.3	4.1
EEAPR	45734	1778	3.8
ECPR	80463	3449	4.3
EWPR	231460	20123	8.7
EEATD	5.48	.55	10.0
ECD	4.53	.50	11.0
EWD	3.61	.43	11.9

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run they would enter the model in the same fashion as spot market prices. In the simulation runs the price equations shown in 7.2.5 are used to calculate spot market prices(i.e non-FDCM prices). The price which is then used in the planted acreage equation is a weighted average of the FDCM price and the spot market price for each of the three regions. Shown below is how these variables enter into the acreage planted equations.

APX = b +....+b (ZX*XFDCM + (1-ZX)*XSPOT(t-1)) +...

Where APX = acres planted in region X.
ZX = FDCM participation rate in region X.
XSPOT = Spot market price in region X, lagged one year.
XFDCM = FDCM Price in region X

Several runs were made where the participation rate, Z, remained constant throughout the ten year period simulated. The results of three runs, each with a different participation rate are shown in Table 7.7. The price adjustment factor was 1.1, although its level had little affect on the general behavior of the results in these runs. In this table and subsequent ones yields are not shown since they did not vary from the base run.

The results show two interesting points. First, as participation rates increase the variability in spot prices rise. And second, the western region shows increased variability in planted acreage and production as measured by the coefficient of variation. More of these points will be made shortly.

A series of runs were made in which the FDCM participation rate, Z, was allowed to vary over the course of the run. The algorithm by which the rates were allowed to vary was a function of the relative

Table 7.7

FDCM price is 110% of production costs and FDCM

Table 7.7

Mean Values, Standard Deviations, and Coefficient of Variation of Selected Variables: where FDCM price is 110% of production costs and FDCM participation rates (Z) are fixed at various levels.

	Z = .25			Z = .50			Z = 1.0		
Variable	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation
EEAPA	189.5	5.3	2.8	192.8	4.79	2.5	215.3	12.1	5.6
ECPA	321.6	2.4	.7	325.9	2.26	.6	344.9	10.2	3.0
EWPA	523.4	33.1	5.3	676.7	52.4	7.7	979.5	248.8	25.4
EEAPR	46604	1185	2.5	47331	1075	2.3	52878	3204	6.1
ECPR	81613	4119	5.0	82619	4457	5.3	87651	7026	8.0
EWPR	245557	25839	10.5	268700	34725	13.0	389762	119256	30.6
EEATD	4.67	.37	7.9	3.75	.59	15.7	NA[1]		
ECD	3.84	.31	8.1	3.03	.49	16.2	NA		
EWD	2.85	.34	11.9	1.83	.67	36.6	NA		
EFDCM	6.67	.98	14.7	6.67	.98	14.7	6.67	.98	14.7
CFDCM	6.66	.98	14.7	6.66	.98	14.7	6.66	.98	14.7
WFDCM	5.67	.84	14.8	5.67	.84	14.8	5.67	.84	14.8
WEP	5.17	.32	6.7	5.21	.32	6.1	6.67	.98	14.7
WCP	4.54	.30	6.6	4.84	.34	7.0	6.66	.98	14.7
WWP	3.56	.23	6.5	3.75	.20	5.3	5.67	.84	14.8

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prices between the FDCM and the spot market. If the FDCM price for one year is higher than the spot market price lagged one year FDCM participation increased from the preceding year or vice versa. The equation or algorithm is shown below.

$$ZX = ZX(-1) + (XFDCM/XSPOT(t-1) - 1)/3$$

where; ZX = FDCM participation rate in region X
ZX(-1)= Participation rate preceding year in region X
XFDCM = FDCM price in region X.
XSPOT = Spot price in region X, lagged one year.

Initially, runs were made where the full effect of the relative prices would be reflected in changes in the participation rates. However, this led to wide and unreasonable fluctuations. Thus, they were divided by a factor of three. For instance, if the ratio of prices was 1.1, the partipation rate would increase by .033.

However, the point is an important one. It is believed the rate of adoption of an FDCM will be affected by the relative prices between the two markets and the responsiveness of growers to the relative prices will have a large impact on the speed of adoption. Although, relative prices are not the only factor affecting adoption. Other important variables are marketers' attitudes, present practices, and market structure.

Recall that acres planted and therefore production are a function of the weighted average price of the FDCM price and the spot market price(lagged one year). It was hypothesized that total production - contracted and uncontracted - would influence current year spot market prices. An analogous situation is when the presence of large carryover stocks depress harvest prices. If contracted levels(Z) are high then one might assume the demand for spot potatoes would be low.

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However, there is an alternative hypothesis, which is that contracted production will have little influence on spot market prices since they are separate markets. While this hypothesis is less likely since secondary sales of contracts could be allowed its implications were evaluated. Under this hypothesis production entering the prices received equation would be weighted by (1-ZX), i.e. that proportion of production not contracted.

Tables 7.8, 7.9, and 7.10 show the results of these runs at various price adjustment factors. One of the noticeable impacts an FDCM will have is on the variance of spot market prices. If large amounts of total production are contracted, the spot markets will become essentially residual markets. As such, they will bear most of the burden of short-term adjustments in production and pricing. Thus, the prices on these markets will become more variable. In terms of vertical coordination it means that marketers using the spot market will bear more risk and likely find the market more difficult to use. This pattern was shown in all the runs. When production is weighted in the prices received equation they show less variability. This is probably because the absolute levels of acreage entering the equation are smaller and as ZX gets larger throughout the course of a run planted acreage becomes relatively less important in the equations.

The variability in FDCM prices is artificial, since this was determined by the form of the algorithm used to generate them. However, the weighted average of the two markets' prices show less variablity than spot market prices and suggest that an FDCM, even

Table 7.8

Mean Values, Standard deviations, coefficient of variations of selected variables: **Production weighted** *by 1-ZX, and production not weighted in prices received (spot) equation.*

Table 7.8

Mean Values, Standard deviations, coefficient of variations of selected variables: Production weighted by 1-ZX, and production not weighted in prices received (spot) equation.

PAF=1.0

	Non Weighted			Weighted		
Variable	Mean	Standard Deviation	Coefficient of Variation	Mean	Standard Deviation	Coefficient of Variation
EEAPA	191.7	3.3	1.7	189.5	3.3	-1.7
ECPA	329.9	8.44	2.6	328.3	6.3	1.9
EWPA	764.9	171.4	22.7	767.3	135.6	17.7
EEAPR	47061	939	2.0	46516	749	1.6
ECPR	83802	6407	7.6	83414	5746	6.9
EWPR	303812	84704	27.9	304446	70504	23.2
EEATD	2.77	2.11	76.2	5.25	1.04	20.8
ECD	2.16	1.77	81.9	4.8	.59	12.3
EWP	1.34	1.31	97.8	4.81	.89	18.5
WEP	5.33	.99	18.6	5.46	.77	14.1
WCP	5.28	1.05	19.9	5.32	.77	14.5
WWP	4.54	.92	20.3	4.79	.66	13.8
EFDCM	5.56	.82	14.7	5.56	.82	14.7
CFDCM	5.55	.82	14.7	5.55	.82	14.7
WFDCM	4.73	.70	14.8	4.73	.70	14.8
ZE	.61	.35	57.3	.32	.19	59.4
ZC	.72	.32	44.4	.49	.24	48.9
ZW	.78	.29	37.0	.32	.1	51.3

Table 7.9

Mean Values, Standard deviation, and coefficient of variation of selected variables: Production weighted by 1-ZX, and production not weighted in prices received (spot) equation.

Table 7.9

Mean Values, Standard deviation, and coefficient of variation of selected variables: Production weighted by 1-ZX, and production not weighted in prices received (spot) equation.

	Non Weighted			PAF=1.1	Weighted		
Variable	Mean	Standard Deviation	Coefficient of Variation		Mean	Standard Deviation	Coefficient of Variation
EEAPA	200.1	8.29	4.1		196.2	4.82	2.4
ECPA	336.0	10.8	3.2		334.5	9.8	2.9
EWPA	849.2	218.8	25.8		832.8	178.8	21.9
EEAPR	49147	2527	4.4		48180	1372	2.8
ECPR	85383	7090	8.3		84993	6704	8.0
EWPR	337981	104988	31.0		330724	88625	27.0
EEATD	1.93	2.17	112.0		5.40	1.12	20.7
ECD	1.53	1.78	116.0		4.60	.78	15.9
EWD	.95	1.42	149.0		5.20	.93	17.9
WEP	5.85	1.17	20.0		5.96	.73	12.3
WCP	5.83	1.21	20.8		5.88	1.02	17.3
WWA	5.00	1.03	20.6		5.22	.94	18.0
EFDCM	6.11	.90	14.7		6.11	.90	14.7
CFDCM	6.10	.90	14.7		6.10	.90	14.7
WFDCM	5.20	.77	14.8		5.20	.77	14.8
ZE	.74	.31	41.9		.47	.27	57.4
ZC	.85	.25	29.4		.40	.12	30.0
ZW	.80	.27	33.8		.64	.29	45.3

Table 7.10

Mean Values, Standard deviation, coefficient of variations of selected variables: Production weighted by 1-7X and production not weighted in prices received (spot) equation.

Table 7.10

Mean Values, Standard deviation, coefficient of variations of selected variables: Production weighted by 1-ZX and production not weighted in prices received (spot) equation.

	Non Weighted			PAF=1.2	Weighted		
Variable	Mean	Standard Deviation	Coefficient of Variation		Mean	Standard Deviation	Coefficient of Variation
EEAPA	209.1	13.6	6.5		204	10.5	5.1
ECPA	342.1	12.9	3.8		340.6	12.6	3.7
EWPA	935.1	263.8	28.2		901.6	223.2	24.8
EEAPR	51357	3562	6.9		50104	2797	4.4
ECPR	86965	7666	8.8		86581	7595	8.9
EWPR	372592	124053	33.3		358668	107689	30.0
EEATD	1.43	2.06	144		5.32	1.31	24.4
ECD	1.23	1.67	132		4.00	1.54	38.5
EWD	.71	1.23	170		5.61	.76	17.1
WEP	6.40	1.12	17.5		6.51	1.11	17.1
WCP	6.39	1.34	21.0		6.43	1.18	18.4
WWP	5.47	1.31	23.9		5.67	.80	14.1
EFDCM	6.67	.98	14.7				
CFDCM	6.66	.98	14.7				
WFDCM	5.68	.83	14.6				
ZE	.82	.27	32.9		.59	.25	42.4
ZC	.87	.24	27.6		.73	.28	38.4
ZW	.88	.21	23.9		.48	.13	27.1

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when coexisting with a spot market, can increase the stability of prices in general. Thus, improving the ability to make plans.

Relative to the base runs all the other variable are at least as stable if not more except for Western acreage planted and production. If this is to be the case, such behavior might favor some relocation of potato production East of the Western states since they will experience a relative reduction in uncertainty. However, it is important to note that the added variability in Western planted acreage and production is due to the ever-increasing FDCM price and that as ZW increases due to higher FDCM prices so does Western planted acreage. Remember that the Western region showed the greatest responsiveness in acreage planted to price changes. Recall also that under a real FDCM quantities would be negotiated as well as prices.

The behavior of the participation rates over the course of a simulation has some implications towards the relative competitiveness of an FDCM as a marketing mechanism. Table 7.11 shows the participation rates in the three regions during one trial, which are typical of all the trials. All show at first a general drop, but then rise steadily throughout the rest of the run. When the price adjustment factor is 1.2 both the Western and Eastern regions attain 100 percent participation in the eighth year of the simulation. Of course, this is a function of the prices generated in the FDCM, but it would appear that as long as they are higher than spot market prices participation rates will increase. Notice that the relative gain is less in the Western region which might be a partial

TABLE 7.11

ANNUAL CHANGES IN PARTICIPATION RATE BY REGION. PRICE ADJUSTMENT FACTOR = 1.0

Year	ZE[1]	ZC	ZW
1	.305	.310	.344
2	.159	.220	.202
3	.121	.248	.185
4	.146	.311	.230
5	.201	.383	.272
6	.271	.475	.316
7	.352	.531	.353
8	.445	.677	.401
9	.552	.794	.443
10	.674	.922	.485

1. FDCM participation rates in Eastern, Central, and Western Regions

explanation for the increased variance in planted acreage and production.

7.4 SUMMARY

While the model could use some improvements to increase its realism, it does provide some indication of the effects on performance in the potato subsector which might result from the establishment of an FDCM. First, in general, variation in weighted prices and production would decrease relative to historical patterns. This is to be expected since under an FDCM both variables would reflect future supply and demand conditions. And, though, variability would not be eliminated, it would be a reflection of future conditions and random yields rather than a reaction to future conditions. Second, if spot markets were still used they would suffer from increased variability in prices since all the adjustments in quantities in prices would fall on them. This could cause hardships to marketers utilizing "spot" markets. If this is the case, one hypothesis is that their use would decrease even faster as they became less reliable. Finally, it would seem, ignoring other factors, that if the prices negotiated in an FDCM were relatively favorable to spot market prices an FDCM would eventually become the primary vertical coordination mechanism. This would suggest that compulsory participation might not be needed. However, the other factors cannot be ignored and a final decision on compulsory participation must appropriately weigh these factors.

Finally, there appear to be several improvements that can be made in the model which would increase its realism. First would be the randomization of yields. Second would be to allow for FDCM prices to fluctuate both up and down during the course of the run. Both should be considered in future work.

CHAPTER EIGHT

DESIGN ISSUES FOR AN FDCM IN POTATOES

8.1 INTRODUCTION

In the previous chapters the theoretical underpinnings of an FDCM have been laid out as well as the structural conditions and transaction mechanisms found in the subsector. The purpose of this chapter is to evaluate both the theoretical and practical issues which must be considered in the design of an FDCM in potatoes. This chapter will present recommendations regarding these issues which are judged most likely to lead to the successful implentation of an FDCM.

There are a plethora of issues that must be handled in the implementation of any policy. Some undoubtedly are unanticipated and are not recognized until the implementation process begins. It is believed that most of the major issues regarding implementation, organization, and operation of the FDCM have been identified in this chapter. For convenience these issues have been divided into two major categories; 1) the organization and basic framework of an FDCM and 2) the contract specifications and operational considerations. Most of the issues examined are interrelated and this interrelationship needs to be recognized in drafting alternative designs.

In this chapter it will become apparent that some design considerations are broad in scope, while others seem to be details.

However, after examination of the performance of preceding computerized exchanges it appears that the success or failure of these markets often hinges on one of the more detailed aspects of the market's rules. It is also the case while these issues are handled with respect to an FDCM in potatoes specifically in mind, almost all these issues must be handled in the design of an FDCM for any commodity.

8.2 IMPLEMENTATION AND ORGANIZATION OF AN FDCM

The rules for the implementation and organization of an FDCM are analogous to the rules which govern all markets and transactions in an economy and are provided by the government, such as the Uniform Commercial Code and common law. And indeed, these will still apply to transactions conducted in an FDCM. However, other rules will specifically apply to an FDCM and may be more similar to the by-laws for a commodity exchange. It is the specific rules of a futures market which are the distinguishing feature of it compared to all other markets. These rules set the boundaries on what are acceptable actions and determine the distribution of rights within the jurisdiction of the market. The influence of these rules will be to narrow the latitude a market architect has in designing the remaining rules covering the operational and procedural activities.

8.2.1 Ownership and Operation of the Exchange

For the purposes of this chapter it is assumed that demonstrable benefits have been obtained for the the hypothetical performance of an FDCM in potatoes. Furthermore it is assumed that these benefits extend to many classes of individuals. It is therefore assumed that the significant number of the potential participants believe that the establishment of an FDCM is in their best interests.

As Holder, Paul and Sporleder have pointed out, there are three basic alternatives of ownership groups which could own and operate an FDCM. These are user-owned, investor-owned, and governmentally-owned.[1] There appear to be four crucial areas with respect to the ownership of an FDCM; 1) costs; 2) access to the system; 3) market integrity; and 4) ability to provide services meeting the needs of users and other food system participants.

From the perspective of accumulating the capital necessary to cover the fixed investment and initial operating costs it appears that either a government-owned system or an investor-owned system would have an advantage over most forms of a user-owned system. A government sytem could be financed out of tax revenues. Most of the experimental electronic markets attempted in the United States have been funded by the United States Department of Agriculture. An investor-owned FDCM may also have relatively easier access to capital. They may have an established line of credit and in some cases they may already possess many of the facilities necessary to establish an FDCM. This would reduce the level of their initial outlay. While, in general, it would appear that a user-owned FDCM would be the most difficult to finance, there may be exceptions. TELCOT, owned and operated by the Plains Cotton Cooperative Association, is an example.

Because of its informational aspects and the potential for improvement in vertical coordination which may extend to consumers as well as marketers an FDCM has some public good characteristics. Thus the provision of public funds may be justified. However, on the basis of this research and past experience it is believed the market can be successfully implemented with private funds.

The advantages of a user-owned system are in the recognition of user needs and lower user fees, ceteris paribus. Most of the successful electronic markets have received heavy user-input in their design. However, the actual level of user fees corresponding with ownership identity is indeterminate since they are a function of total costs and how overhead costs are allocated. Nor is it always the case that because a cooperative is non-profit it can be run at lower costs.

In terms of costs to users there appears to be no a'priori advantage of one form of ownership over another. The actual performance of the system is less related to actual identity of the owner(s) than it is the impact, if any, ownership identity has on the design of market rules. While the subsidy issue is important the value of subsidizing a system may not be related to who owns and operates it.

The incentives to participate are not based solely on user fees. The market must also be able to meet the particular needs of the majority of its potential users.

It is possible from examining some of the successes and failures in electronic markets to identify key elements regarding ownership and the issues handled here which would increase the likelihood of success for an FDCM in potatoes.

Canada has longer experience in electronic marketing than does the United States. The most successful of their markets is The Ontario Pork Producers Marketing Board. Virtually all hogs marketed in the province are sold through the system. While the board of directors is made up of producers it receives its legitimacy through government mandate.[2] The province has required all hogs marketed in Ontario to be sold through the system. When the market was first established in 1955 participation was voluntary. The market struggled for a few years and then the producers were able to get legislation(1960) passed that required all sellers and buyers of slaughter hogs to use the market.[3] Although technically not owned or operated by the government, enabling legislation contributes to the effectiveness of the market.

In the United States the experience with electronic marketing, and especially computer marketing, is mixed. Most computerized markets sponsored or funded through government monies have not survived. Some examples are CATTLEX(cattle),HAMS(hogs), and CATS(wholesale beef).[4,5,6] The major drawback in almost all cases was the inability to attract sufficient volume. The reasons for this are many. One, of course, is the newness of the concept. Another was that in all cases they were sold as pilot projects. This was a necessary step, but in combination with the markets' newness it created an image of a lack of permenence in the minds of potential participants. Few seemed to be willing to sever old relations to trade on a system which may be defunct in a year or two.

While these markets obstensibly addressed the problem of thin markets, they were most attractive to small producers who had problems with market access. This is laudable, but the markets were perceived by large producers as not having any particular advantages to them. Buyers became disenchanted with the sytems because it became difficult for them to assemble economically sized lots through the market. Thus, as their interest waned volume became even smaller. Participation in these markets was, of course, voluntary and there were indications of substantial free-riding with respect to their informational benefits.

Two computerized exchanges in the U. S. have shown an ability to survive. One, TELCOT, is owned and operated by the High Plains Cotton Producers Cooperative. It was started in 1975 after some disastrous years for producers and the cooperative. Since then volume traded on the market has increased almost every year and the market is self-supporting.[7] The other market, EEMA(Eastern Electronic Marketing Association), was originally a pilot project cooperatively run by Virginia Polytechnical Institute and the USDA-AMS. It showed promise and in 1980 it became a non-stock corporation. The reason for its success is that it is an extremely cost-effective market. While other pilot projects owned all their equipment and had dedicated phone lines, EEMA leased time-sharing from a computer firm and used regular phone lines. So even though it is attractive to smaller sheep and other livestock producers the reduction in its costs made it possible to economically service this clientele. EEMA now contracts its services to interested parties wishing to set up an electronic market.[8]

The success of these two markets is attributable to the ability to provide the services demanded by their users at reasonable costs. And even though one is owned and operated by the users and the other is an investor-owned system, they both have had considerable inputs from the users regarding specific problems with the system and how it can be improved. The one generalization that seems significant regarding the successful establishment of a computerized market is the ability to meet the needs of the potential users.

The concept of seller-buyer representation on the board of directors would probably be the most preferred manner to ensure that the design of the market would suit all the users' needs. In EEMA an advisory board of producers and merchants was established to oversee the design and operation of the market.[9] The costs of organizing the owners and who would be an owner in a seller-buyer owned FDCM are the key variables which must be analyzed. The number of candidates in the potato subsector are large and care must be taken to safeguard the interests of those not represented in ownership.

Among producers the most qualified candidates are bargaining associations or state potato industry commissions. Both groups may be able to raise sufficient capital and to attract a majority of growers and shippers. The problem is that both groups are identified with particular geographical areas and their ability to attract traders from outside areas may be limited. In the case of bargaining associations, there may be a case of conflict of interests as an FDCM will reduce the need for their main function. However, if bargaining associations are concerned ultimately with obtaining their members better prices and other terms of trade, they may be amenable to a change in their role. Furthermore, even with an FDCM there still may be a need for some bargaining in order to reduce the number of negotiable items in the contract during the bidding period. For example, bargaining associations may negotiate with first-handlers over premium-discount schedules with regard to quality etc.

The jurisdictional boundary issue applies both to bargaining associations and potato commissions. Would an FDCM just apply to the area represented by the organization and if not, how could it attract participation from traders in other areas? To get the maximum benefits from an FDCM it must be close to a national system. Thus, a single organization operating the system would need cooperation from other groups unless it was national in scope. There are at least two national growers' organization who might be able to bridge this jurisdictional gap. These are the North American Potato Bargaining Association and the National Potato Council. Between these two groups they represent the interests of the majority of producers. Some form of partnership between these two groups would help ensure that the interests and needs of the producers would be met.

To ensure that the interests of most potato buyers are represented is more difficult as this is a more heterogenous group than are potato producers. Compounding this problem is that there are few national umbrella organizations which can be said exist primarily to promote the interests of potato buyers. However, there are general trade organizations both in processing and fresh produce which might be convinced to at least select some individuals to represent buyers on an FDCM board of directors. The method of selection would be crucial as to ensure fairness it would be desirable to have at least one representative for each major group of potato buyer.

While equity within the market is vital, the main reason to have broad representation of users within ownership and operation of the FDCM is to be able to appeal to a larger constituency than otherwise might be possible. The success of an FDCM hinges on large involvement by parties on both sides of the transaction. To instill confidence to all parties and to be able to ascertain the needs of specific users will require individuals with a specific expertise. It is assumed that sellers know the needs of sellers better than anyone else and that buyers are similar in this respect. The computerized markets that have been successful have been able to fulfill the needs of their clientele.

While a balanced ownership and operation will enhance the design of the system, the overriding factor is still cost. Kauffman has shown that the most economical design of the market may be to rent time-sharing facilities from a major computer firm. This is the manner in which EEMA is operated. In fact, EEMA now contracts its services to any other interested parties. It is Kauffman's conclusion that for an FDCM to be cost effective, initially, a time-lease arrangement is the best way to do it.[10] This approach reduces the amount of initial capital needed and using an organization, such as EEMA, as gives access to the computing skills necessary to design the software. For instance, if the North American Bargaining Associations wanted to start an FDCM they could simply contract EEMA for the services.

Given the key issues identified in this chapter as crucial to the success of an FDCM in potatoes; 1) the ability to support the initial fixed investment; and 2) the ability to satisfy its users demands all of which contribute to increased volume, it is desirable that the ownership and operation of an FDCM be involved in a group of both producers and buyers which represent the majority of subsector participants. Preferably, this group would involve at least one major national producer organization and at the least representatives from major buyer organizations.

While participant involvement is desirable, there are several third parties, such as a commodity exchange, who possess the expertise and facilities to begin an FDCM relatively easy. If properly designed, an FDCM could be a natural outgrowth of their other market operations. Therefore, it is recommended that ownership and operation of the market be allowed for any group which has the necessary skill and resources available and are willing to undertake the effort. However, care should be taken that it is distinguished from a futures market.

Additionally, it is recommended that, at least initially, the possibility of contracting for computer facilities and services be investigated as they will reduce the initial investment and may speed up the market's implementation.

8.2.2 Compulsory Participation?

The issue of participation rates in an FDCM is persuasive. Many of the benefits of a transparent market, improved planning, and a reduction in transaction costs are tied to participation rates. Transaction costs are probably the most obvious item. Given the high fixed costs of an FDCM, the costs per transaction decline over a wide range as the number of transactions increase. However, it may take a sizeable volume before the system becomes self-supporting. Thus, the incentives are to encourage participation.

A transparent market is one where the prices are very visible or easily attainable. Computer technology makes it possible to easily access information covering a wide range of variables. This creates a more competitive market and while no claims can be made about the level of efficiency throughout the economy, a transparent market has the potential to improve resource allocation within the subsector. Additionally, a transparent market can lead to a more equitable distribution of bargaining power and in the terms of trade.

A primary motivation behind the establishment of an electronic market has been to alleviate the condition of thin markets. The problems with these markets are well known. A solution is to increase the volume of commodity traded in the market. This makes manipulation more difficult and prices should be more reflective of supply and demand conditions. What the critical mass of traders is to achieve this state is unknown, but intuitively it seems that more traders are preferred to less, ceteris paribus.

The idea of a transparent market is closely related to the notion of improved planning. The improvements in planning are two-fold; 1) knowing future supply and demand conditions before major production decisions are made; and 2) the increase in information generally available which includes prices and quantities supplied and/or demanded at various prices. Much of this information is now impacted or unavailable. However, it would not only be useful to producers but to first handlers and other potato subsector participants as well. The information on aggregate quantities supplied and demanded can help individual firms evaluate the demand and/or raw product supply for their own product. This information can aid them in determining the costs they can afford to pay or the prices they can charge in lieu of subsector production and marketing plans. Thus, even though some firms will suffer a reduction in bargaining power, they can benefit from increased ability to plan leading to both operational and allocative efficiencies.

However, the benefits from increased information are predicated on a significant number of traders who represent a large and consistent proportion of total production and sales. This increases the likelihood that the quantities and prices in the market represent overall future supply and demand conditions.

The question is can an FDCM achieve the necessary levels of participation solely through voluntary participation. There are those who would argue if it can't function on a voluntary basis it shouldn't exist. However, there are valid economic reasons why voluntary participation can give unsatisfactory results and why compulsory participation may be required to give satisfactory results.

One of the main arguments against compulsory participation in any kind of program is that it would be a restriction of personal freedom. To a degree this is true; participants would lose some volitional freedom regarding how to market and acquire their product. However, the loss of freedom is much less than some imagine and ignore how the present marketing system operates. Compulsory participation would only require them to market their potatoes through an FDCM. It would not require anyone to grow and buy or sell potatoes if they felt that it would not be profitable. Compulsory participation with respect to freedom is not that much different than the present system except that it is more explicit. Few people stop to think about how their freedom is constrained under the present system. Once rules, regulations, and standard practices are institutionalized, it is difficult for any individual to market a product except under these rules of the game. Although individuals are "free" to attempt new methods of carrying out transactions, the range of these new methods are limited by what is considered legal and acceptable.

Shaffer discusses in "Observations on the Political Economics of Regulation" that in order to have a society and an organized economy rules and regulations are required.[11] Most often these rules and regulations are institutionalized through the government and are the bare minimum needed to define what is acceptable behavior. Some examples are the Uniform Commercial Code and contract law. These are needed for the market to work. Not all regulations on behavior need be codified either. Most often market participants give little thought to these regulations even though they restrict their freedom.

The important point that Shaffer makes is that it makes no sense to talk about an unregulated economy versus a regulated one.[12] The important question involves the specifics of government involvement. Some markets such as organized commodity exchanges have supplemented government regulations with some of their own. Working claims these markets owe their success to these additional rules which make them more efficient for certain purposes.[13] In a very real sense requiring compulsory participation in an FDCM is not that much different than requiring that contracts have the legal force of law if properly executed. Compulsory participation in an FDCM simply replaces one set of market institutions with another. Although, the constraints on behavior are more explicit in the case of an FDCM and it does change the distribution of property rights.

Related to the notion of a restriction of freedom many people are philosophically opposed to government "intervention" in the market. Again this is a matter of specifics. Agriculture in particular has numerous examples of large government involvement, such as the price and income support programs. There are also examples where the government has enabled groups to collectively decide on compulsory participation. The obvious example is a marketing order. A less obvious example though is the Payment in Kind program(PIK) which requires cross compliance with two other federal programs before a farmer is eligible for PIK. In essence, this is a form of compulsory participation without the expressed consent of those participating.

It would appear that the only government involvement necessary for an FDCM which is "extraordinary" relative to other markets is the passage of enabling legislation that provides for the option of compulsory participation, to be decided upon by a vote of the traders affected.

The third complaint, and the most difficult, is the problem of handling production variation and non-performance in a totally forward contracted system. This specific issue will be discussed in more detail later. However, it appears possible to handle production fluctuations outside the control of the producer in an variety of ways. Some possibilities are crop insurance programs or contigency contracts. In fact, both these options are presently available to growers in some form.

Most of these criticisms can be incorporated into the design of an FDCM. However, the case for compulsory participation has yet to be made. The argument for compulsory participation hinges on two related notions; 1) the benefits derived from an FDCM - improved planning, reduced transaction costs, and greater equity - are a positive function of of the level of volume on the system; and 2) the incentives to free ride undermine the provision of these benefits through a voluntary system.

The case has been made elsewhere regarding the need for large volume. It would seem that if most people would benefit from using an FDCM, then compulsory participation would be unnecessary. However, this ignores the incentives to free ride. A free rider is an individual who obtains the benefits of the provision of a good, but bears none of the costs of the good's provision. One of the common failings in some of the experimental electronic markets was to control free riders. In CATTLEX non-participating traders were able to acquire many of the informational benefits and price enhancement effects without participating and contributing to covering the costs of the system.[14]

The incentives to free ride are easy to understand. Yet, it is a mistake to assume that free riders would always be unwilling to support the system. The information from an FDCM is valuable. However, it has many characteristics of a public good and the most important characteristic in this context is that it is hard to prevent its dissemination once it is produced. Since this is the case, many potential traders have an incentive to free ride even though they might be willing to support its provision if it meant being without it.

The issue of free riding has equity considerations. Free riding is an example of a social trap which could result in the eventual demise of an FDCM. A social trap as defined by Cross and Guyer is where the short-term benefits run counter to the long-term interests of the individual or society.[15] Although some individuals may not have the short-term incentives to support an FDCM it may be in their long-term interests to do so. As some participants begin to resent the presence of free riders, they may choose to drop out of the market. If this process continues, the costs to the remaining individuals increases and the benefits of the market decrease. Unabated this would continue until the market is no longer economically viable. In this event everyone, including free riders, would lose.

The remedy to social traps resulting from free riding is to change the structure of incentives so that the long-term adverse affects of this behavior are more immediate. Unfortunately, this is not always easy to do. The easiest manner to restructure these incentives is to make participation mandatory. This is based on the assumption that free riders are not "unwilling" to support an FDCM, but that their short-terms incentives lead them to act in this manner.

In addition to eliminating the free rider problem, compulsory participation has another advantage. It gives incentives to individuals to articulate their preferences regarding the design and operation of the market. Hirschman in Exit, Voice, and Loyalty analyzes various institutions, including markets, with regard to the ability and the incentives of their members to articulate their preferences. In an organization where membership is required or exit is difficult and costly, there are strong incentives for members to voice their preferences regarding the design, operation, and ultimately performance of the organization. He argues that if there are mechsnisms for voicing these preferences the performance of the organization can be improved.[16]

The manner in which compulsory participation is implemented is important. First of all it may require enabling legislation. It is not clear that compulsory participation in a market is covered under the Agricultural Marketing Act of 1935. If not then it would require state and/or federal legislation. Admittedly at the present-time such legislation is doubtful. The main opponents would probably be those who fear a loss of bargaining power. Such legislation could be modeled after the procedures which are established for marketing order approval.

The criteria for approval of an FDCM could be based on; 1) the ability to finance and operate the market; 2) proof that there is no conflict of interest between growers and assurances that the market will not be designed in such a way that it would disadvantage buyers; 3) this represents the wishes of the producers. For example, approval would take at least fifty-one percent of the growers or the approval of those growers who represent at least fifty-one percent of the production in the region covered.

It must also be noted that when growers on the survey were asked their attitude towards compulsory participation, even if it could be shown that it would to their benefit, only 25 percent said they would favor compulsory participation. The political realities must be recognized. It will be extremely difficult to get compulsory participation approved at all levels at this time. Therefore, it may politically expedient to recommend that participation be voluntary initially and see if the market gains acceptance.

Although only a quarter of the growers responding indicated that they would favor compulsory participation, over four-fifths said they would be willing to use the system if they felt they could benefit. This response should be evaluated with respect to the typical response of the first handlers. They indicated that if they were to use the system it would have to cover most other first handlers or else they would not be able to bear the price risk. Remember that the price risk to a first handler is paying more than his competition.

Compulsory participation would give individuals greater incentives to voice their preferences regarding the operation of an FDCM. Futhermore, this design would create incentives for traders to express their satisfaction or dissatisfaction with the system.

Because the benefits are directly tied to the level of volume in an FDCM, and their are incentives to free ride, it is recommended that enabling legislation be passed that allows for a user referendum on the issue. Exceptions may be allowed for size of trader.

8.2.3 Rules On Eligibility

The question of who can participate in an FDCM is important because it affects both the integrity of the market and its usefulness as a delivery and planning mechanism. There is a desire to minimize the possibility of contract non-performance. Non-performance can result from the nefarious schemes of a trader, or more likely, the result of unforeseen circumstances. However, the ability to cope with these unforeseen circumstances will vary among individuals. It will also be impossible to eliminate non-performance completely. Thus, another goal is to minimize the adverse effects of contract non-performance. Both of these factors will be considered when considering who should be allowed to trade on an FDCM.

There is a tradeoff between eligibility requirements and attaining adequate participation levels. The more stringent are the eligibility requirements the lower are the participation rates. Some form of balance must be achieved between these somewhat contradictory goals.

Problems of fraud and misrepresentation plague every market and an FDCM would be no exception. In these cases it seems best to let the courts handle them.

Speculation is another matter. Most markets probably have some individuals who speculate, although, some markets are more conducive to speculation than others. It might appear that an FDCM could facilitate speculation. However, the basic design actually would discourage speculation. The contracts traded on an FDCM will not be nearly as fungible as those on a futures market. Therefore, the cancellation of one's position with the taking of an opposite and equal posisition will be difficult. More importantly, the market will guarantee and <u>require</u> delivery. Thus, the costs to speculate will be high.

In general, it appears the requirements to trade on the system will not be great. From the sellers perspective it should be required that they demonstrate the ability to deliver. Thus, most farmers and shippers etc. would easily qualify. New growers might have to petition the board for eligibility, but as long as they could demonstrate an ability to perform there should be no problem.

From the buyers' perspective the only criterion should be, can they pay for the potatoes? What they do with them is their concern.

Both the likelihood of non-performance and the distress it causes can be reduced through the requirement of bonding. Presently, most potato marketers other than growers are required to be bonded. Bonding serves two purposes. To obtain a bond a party must be able to demonstrate the ability to perform. Thus bonding is an accreditation process. Additionally, bonding can reduce the damage suffered by one party in the case of non-performance. Approximately a quarter of the growers in the survey preferred bonding for guaranteeing performance.

The traders' confidence may also be increased through the use of prescribed penalties in the contract. Almost 40 percent of the growers surveyed preferred this method in the event of contract default. These penalties could be set and standardized by the supervisory board acting on the suggestions of market participants. Shavell has shown that incomplete contigency contracts with properly designed penalty clauses can result in the same performance as complete contigency contracts.[17] Contigency clauses will be handled in more depth shortly, however, they are already an important part of most forward contracts.

In summary, it is recommended that any trader who can obtain a bond be allowed to operate in the FDCM. If equitable penalties can be designed their use could also improve performance.

8.3 OPERATIONAL CHARACTERISTICS & CONTRACT SPECIFICATIONS

8.3.1 Bidding Procedures

Perhaps of all the operational rules, the manner in which bidding is conducted will have the greatest impact on the performance of an FDCM. An important notion to bear in mind is that the rules which compromise the bidding process are an assignment of property rights. The distribution of these rights influences the outcome. Vernon L. Smith has done considerable work on the effects of various bidding procedures on the performance of microeconomic system(market).[18] What is particularly interesting about Smith's work is that he has been able to substantiate his claims through the use of clinical experiments. His work will have great relevance here. However, before reviewing his findings, it will be useful to review the alternative forms of bidding attempted or currently used in electronic marketing.

The two most common forms of bidding procedures are variants of either a Dutch or English auction. The English auction is probably most familar in the United States. In an English auction the bidding is progressive from low to higher prices and there are specified stopping rules, such as three calls without a higher bid terminates the bidding and the product is awarded to the last bidder. The general format has been modified somewhat in electronic markets so that bidding is terminated after a specified time period has elapsed.

Dutch auctions are more popular in Canada. In a Dutch auction the bidding is descending. Normally, a starting price well above the expected sales price is selected. The bidding period opens and the price declines every so many seconds. This continues until a buyer places a bid and the sale is made. The seller may enter a reservation price below which a sale cannnot be made.

As should be apparent the outcomes or performance resulting from these two bidding procedures can be different. One cause of this difference is that two different buying strategies are needed. In a Dutch auction, with only one bid being placed a buyer must determine at what point to move to be assured of the sale and yet, not pay a unrealistic price. In the English auction a buyer must determine his maximum bid price. Questions have been asked concerning which bidding procedure leads to prices more representative of the competitive equilibrium price, which one leads to faster sales, and how are the answers to these two questions affected by the number of buyers and sellers in the market?

Smith in several studies has examined the various properties of alternative bidding procedures. Specifically, he was interested in finding out which bidding procedures are most likely to lead to competitive prices and Pareto Optimality and under what conditions. The results of his research have surprising implications for economic theory and the design of market machanisms.[19]

Smith investigated the properties of four major alternative bidding mechanisms - the Dutch auction, the English auction, sealed-bid, and the double auction(bid-offer). In his experiments he found that the double auction converged to the competitive equilibrium price much faster than the other alternatives. What was surprising was that this alternative showed extreme robustness under a variety of conditions. Specifically Smith found that a double auction; 1) leads to allocations and prices which rapidly converge to near competitive levels; 2) attains convergence with as few as six traders and only two buyers; and 3) does not require complete information among all participants regarding theoretical supply and demand conditions.[20] These findings are very pertinent to the design of the bidding mechanism for an FDCM.

Basically, the double auction as described by Smith is a bid-offer system. Sellers are able to make offers to sell and buyers are able to place bids to purchase. They are able to negotiate directly with each other and the process is iterative. " A binding contract occurs when any buyer(seller) accepts the offer(bid) of any seller(buyer)."[21] A similiar type of mechanism is used in organized security and commodity markets.

Given the purposes of an FDCM, a double auction is preferred over the alternative bidding procedures. Only a double auction allows for direct negotiation between a buyer and seller. An FDCM contract has many attributes in addition to price. The other bidding procedures allow no feedback on these other attributes. This reduces the flexibility of the system and its usefulness as a planning device for all individuals.

Futhermore, Smith's findings give empirical and theoretical support to the superiority of a double auction over the alternatives. It would appear that a double auction could lead to improved resource allocation within the potato subsector and could achieve near competitive prices. The results also suggest that a double auction is a fair game and it would be difficult for any individual to wield substantial market power. The lack of the need for complete information under this procedure lends support to one of the basic notions of an FDCM. That is, growers know their costs better than anyone else, and buyers know the demand for their product better than anyone else, and that this is all that is required to approach a competitve equilibrium. In Smith's experiments all traders knew were their own valuations(costs or demand) and no one else's.[22]

There are two drawbacks with a bid-offer bidding procedure. The costs of programming the process is greater than for other procedures, and the participants may not be familar with it. These tradeoffs must be weighed when designing the system.

It is possible to design the system so that an English or Dutch auction can be used. In fact, the basic software is already available. It is probable that initially market participants would be more familar with these procedures. However, these bidding systems are not as flexible as the bid-offer procedure is and it would be more difficult to handle as many negotiable variables. Even so they merit attention and should be looked at carefully when the market is being implemented.

Given the practical considerations concerning flexibility and the ability to plan, and the theoretical and experimental support, it is recommended that the bidding procedure for an FDCM be a double auction i. e. a bid-offer system. Under this mechanism buyers and sellers may place bids and offers, which would be disseminated to all participants in the market. In turn, they could also make counter-offers and the process would be iterative.

It may turn out that under any bidding procedure there are too many variables to handle. If so, some of these variables, such as quality premiums and discounts, may have to be pre-negotiated.

8.3.2 Length of Bidding Process

The length of the bidding process revolves around two issues; 1) how far in advance of harvest and delivery may the parties contract; and 2) how long should the bidding period last. These issues are related.

For years the practice in forward contracting in potatoes was to begin the contracting process in the late fall and go through the winter. It should also be noted that on occasion growers will sign contracts after planting has been completed. Recently though, there has been a tendency to begin the negotiating process earlier in the preceding crop year, for example, in the late summer. Some contracts have even been negotiated as far as two production periods in advance of delivery. The second year of these multi-year contracts is usually tied to first year by an indexing of the costs of production.

There are two valid reasons for limiting how far in advance of delivery a contract may be signed. One, of course is the greater uncertainty with respect to performance and relevant economic variables that accompanies the longer time period between signing a contract and performance. For instance, predicting weather only a few months in advance is not a sure thing, and as the time horizon expands it becomes even more difficult. The ability to predict general economic conditions which may affect supply and demand is also more difficult the longer the time period. Additionally, having several contracts which mature in different years increases the complexity of the negotiating process.

However, contracts negotiated well in advance of delivery do have some advantages. They may allow both growers and first handlers to more effectively plan long-term investments, production, and marketing decisions. They may also reduce the uncertainty surrounding the ability to fill a core demand or attain market access.

Since there are some advantages to contracting further in advance than what is the industry norm and that it is already done on a limited basis, it is recommended that growers and first handlers be allowed to enter into contracts as far as two production seasons in advance if they so desire. Under this rule two parties operating in the market in the winter of 1984 could sign a contract where delivery is not expected until after the harvest of 1985, approximately 18-21 months after signing.

Critical to the planning aspects of the FDCM is at what time or date does the bidding terminate for upcoming year contracts. Given that an FDCM's benefits are derived mainly through improved ability to plan based on firm commitments to deliver and accept before major production decisions are made, it is necessary that the bidding period be completed before planting is completed.

There are four major planting times in the United States corresponding to the fall, winter, spring and summer harvest times.

It appears that there should be four distinct trading sessions. The problem is how to ensure that the transactions made during these trading sessions actually apply to that seasonal production period and not another production period. If this is not possible the FDCM may become essentially a spot market. There is also the problem of allowing for the variance in planting dates between regions which still produce for the same harvest time.

Most areas specialize in the production of one crop usually dictated by climatic conditions. However, there are some areas, such as California and Florida, which have the capability to produce more than one crop. This makes the task of keeping trading within a particular production period more difficult.

There are several approaches to this problem, but the simplest is to set a time interval between the signing of a contract and when delivery can be made. That is a specified period must elapse from the date a contract is signed and when delivery is made. A logical basis for the length of this interval is the length of the growing season for potatoes. This is approximately seventy days to ninety days depending upon variety and local. An immediate suggestion would be seventy days. This gives the system some added flexibility.

A rule of the exchange could be "Contracts must be entered into at least seventy days prior to delivery date. This date is to be agreed upon as part of the terms of the contract."

This rule forces traders to make decisions in advance. Although it is still possible for sellers to contract potatoes they have in storage, the ability to plan would be enhanced.

8.3.3.Production Risks

Although much of the year-to-year fluctuations in potato production are due to producer decisions, some of it is attributable to unforeseen circumstances, such as weather or pestilence. A valid concern is raised by potential traders regarding these types of production fluctuations and how a totally forward contracted system could handle them. Through no fault of their own, producers could end up with a short-crop and/or poor quality. This causes problems for first handlers. Or conversely, production may be a bumper crop and growers have difficulty getting rid of the excess.

Presently, when potato growers contract they normally only contract upwards to 75 percent of their expected yields. Under most contracts growers bear all the production risk. This strategy would probably extend to an FDCM unless it were compulsory. In the case of a compulsory system some other method would have to handle unforeseen production fluctuations.

There are five major policy alternatives which can address this problem. One would be some form of crop insurance program. Another would be a storage program into which surpluses are deposited and withdrawals are made to meet deficits. The third alternative would be to allow the secondary sale of contracts. The fourth alternative would be to have acreage contracts rather than volume contracts. The final alternative is to have contigency clauses in the contracts covering these possibilities.

The policy alternative which appears least viable is the storage program because of the costs involved in running such a program. One objection is that the stocks would have to be built up each year as there is no carry-over in potatoes. Thus, the timing of deliveries would be difficult to achieve early in the season. Secondly there is the problem of who would provide and pay for the storage. To minimize transportation costs would require several storage facilities in each of the major production areas. Some growers with facilities would probably be willing to store these potatoes for a fee. The costs for the storage could be assessed to the grower who needs the potatoes to meet a deficit on his/her contract. However, there is no guarantee that in any particular area or year that deficits would equal surplusses. In the case of excess stocks, who would bear the costs? The administration of this program would also incur significant costs. Given the costs and complexity of this program, this policy appears unmanageable.

Crop insurance is common in agriculture. The United States Department of Agriculture provides for crop insurance through the Federal Crop Insurance Corporation. Most of its insurance is marketed through local agents. It would be a relatively low cost method by which the farmer could insure himself against crop failure. The one drawback is that it usually only covers disaster situations. Most forward contracts in potatoes already stipulate that an Act of God is cause for release from contractual obligations. So that to be of use to the other party holding the contract, the program would have to be modified to cover less than complete disasters. In this event, a policy-holder could recover damages and again, at least, partially compensate the other contract holder.

A rule allowing the secondary sale of contracts has some interesting design implications for an FDCM. An appealing aspect of secondary sales of contracts is that it is a market mediated approach to the problem of random production fluctuations. The drawbacks are that there are some administrative costs involved for the market and the possibility of abuses. If allowed, secondary sales must be constructed so that the incentives for speculation are minimal.

Secondary sale of contracts raises two issues immediately. How do potential sellers and buyers of these contracts locate each other, and how are the prices determined? For example, if two individuals were able to locate each other, would it be a simple exchange of responsibilities and the second holder of the contract would simply receive the price or product stated in the original contract? Or would there have to be additional incentives to find either a buyer or seller of the contract?

To safeguard the interests of the party still holding original title it is recommended that all secondary sales of contracts be conducted through the FDCM. There are additional advantages to this rule besides ensuring that the contracts would be sold to individuals with the capabilities to perform on the contract, since all market participants would already be accredited. It would also be a manner in which the fixed costs of the system could be spread out over a larger number of transactions, thus reducing the costs per transaction.

Using the system for the secondary sale of contracts would reduce the search costs for both buyer and seller. Also in this manner prices for secondary contracts would be competitively determined in a transparent market. The issue of equity becomes less important. Therefore, prices for secondary contracts could be higher or lower than they were for the original transaction depending upon supply and demand conditions. A secondary market in contracts also contributes to increased flexibilty that was lost with the demise of the spot market. For example, growers who are experiencing an unexpected crop shortfall could sell a portion of their contract obligation to other growers(or any other trader able to perform) who have excess potatoes. The process would still allow for counter-offers to be made, but negotiations would only be over the amount and price. Other terms of trade would not be in the realm of negotiation in order to protect the other original contract holder.

Although only accredited traders could sell or purchase contracts in the secondary market, there may be those who would dislike this idea for fear of default. This problem could easily be rectified by a contigency clause in the contract that would prohibit the secondary sale of the contract. It is assumed in this case the individual demanding this clause would have to pay higher costs to obtain a contract since it imposes additional costs on the other party.

A slight modification of this notion would be to require the other parties permission for a secondary sale of the contract. This would raise transaction costs, but it might molify the fears of some individuals. Most original contract holders, though, are more concerned with the performance of the contract terms than who performs them. In most instances it does little good to hold another party to a contract when they are unable to perform them if they are able to transfer the contract responsibilities. A secondary market in contracts operated under and through the FDCM is a cost effective and equitable manner in which to handle random production fluctuations.

Specifically, it is recommended that a secondary market in contracts be allowed and that the following provisions apply; 1) All secondary sales of contracts must be conducted through the FDCM; 2) before a secondary sale of a contract is allowed approval from the remaining original contract holder is required if so stated in the original contract; 3) once the contract is sold and purchased the buying party now assumes all rights and obligations stated in the original; 4) the bidding procedure in the secondary market is to be identical to that used in the primary market; and 5) any contract may be sold in the secondary market up until the date of delivery.

The advantages of a secondary market structured in this fashion is that it allows both producers and first handlers a market mechanism to handle either production fluctuations or unforeseen changes in demand. Futhermore, it protects the integrity of the market by only allowing accredited traders to participate in the secondary market.

The fourth policy which addresses production fluctuations as well as other circumstances is the inclusion of contigency clauses in the original contract. A contigency contract basically provides remedies for both parties in the occurence of an event which at the time of signing could not be determined with certainty. Arrow has shown that the use of complete contigency contracts can achieve a Pareto Optimal even in the face of uncertainty.[23] The basic notion is to have a completely specified contigency contract with clauses that apply to every possible state of nature. The problem, of course, is that the contract would be beyond human comprehension. It is for this reason that contigency contracts are often ignored.

However, in practice, incomplete contigency contracts are the rule rather than the exception. MaCauley has found that most contracts have contigency clauses stated explicitly or understood implicitly.[24] Contracts are not the involute objects as most people commonly think. In potatoes contigency contracts are standard. There are many clauses regarding production, cultural, and harvesting practices which greatly affect the final price received. The most clear-cut example of these are the premium-discount schedules which apply to potato quality. The base price in most contracts is tied by a formula to the quality of potato which the farmer delivers.

It is possible to design contingency contracts which apply in the case of random production fluctuations. They must be carefully structured, though, so that incentives to over or under produce are not created. Therefore, the returns to a grower would be highest the closer the grower came to matching the total required by the contract. The most logical route for over supply would be to pay the stated price for that amount which met the contract terms and a decreasing price for every increment above this amount. Beyond a prestated maximum the first handler would not be required to purchase anymore. For shortages, the growers could still receive the quoted price unless it was below a prestated minimum which is uneconomical for the handler to deal with or causes the individual additional costs by having to go back in the market. It would then be the responsibility of the grower to find a manner in which either performance or compensation could be accomplished. Of course, if it was so stated in the clause penalties could be applied for under sized deliveries.

In terms of the amounts stated in the clauses these should probably be in the form of a range since it be very unlikely that a grower could produce exactly the right amount. This range as well as the premium-discount schedule could be negotiable.

The advantages of contigency clauses is that they reduce the need to resort to further action or remedies should one of the contigencies occur. Transaction costs are reduced as well as enforcement costs. Additionally, properly designed contigency clause would give both parties greater incentives to live up to the terms of the contract. Contigency clauses are also well understood by those already forward contracting in potatoes as they are common.

Specifically, it is recommended that contigency clauses be designed and incorporated into the basic contract which cover the possibility of random production fluctuations.

Growers, if possible, would like to be able to negotiate acreage contracts to a greater degree than is possible now. In an acreage contract growers are required to delivery the production off a specified amount of land. These contracts shift the burden of risk to the contractor.

The main concern first handlers have is that such contracts give incentives to cheat depending upon the prevailing spot market price. If the spot market price is high relative to the contract price growers have an incentive to short the first handler. Or if, on the other hand, the spot market price is low relative to the contract price, yields on contracted acreage miraculously increases.

However, if the FDCM were compulsory this incentive would be removed. Although, first handlers would still probably be leary of offering these contracts since they would still bear the production risks and their ability to plan is not as precise as it is in the case of volume contracts. One method to reduce this risk would be to set upper and lower limits on the yield per acre which growers could claim. Any yields outside of this range would incur a penalty similar to those discussed above.

Although, it is believed that acreage contracts would not be heavily used, there is no compelling reason why they should not be allowed. It is recommended that if the contracting parties agree they may negotiate acreage contracts.

The possibility of unforeseeable production fluctuations is a problem to both producers and first handlers and if ignored would reduce the effectiveness of an FDCM and its integrity. However, it seems possible to minimize the adverse effects of these fluctuations. This could be accomplished through crop insurance, a secondary market in contracts, and the inclusion of contingency clauses in the contract.

As was stated earlier in this section, these policy alternatives are not mutually exclusive and in combination seem to be able to cover most situations resulting from production fluctuations. For example, a secondary market alone is not able to cover nationwide production shortages or surplusses. Survey results and crop specialists indicate that growers can predict their yields within fifteen percent. So that a reasonable rule of thumb for growers would be to contract 85 percent of their expected production. Contigency clauses that specify declining prices for a product delivered over the contracted amount could cover production surplusses. In the case of a national crop failure, contracts could contain clauses which have a formula for contract settlement based on total crop production.

The need for these policy recommendations would be greatly reduced if participation is not compulsory. Then production shortfalls and surplusses can be acquired or sold through the spot market.

8.3.4 Quality Assurance and Grading

In addition to the problem of production fluctuations the issue of quality assurance was a great concern among both growers and handlers. Part of their reasons for concern was somewhat puzzling. Many processors stated that they will not purchase potatoes sight unseen. In this respect an FDCM would not differ from standard forward contracting. Processors would still have the right to supervise the production practices if so stated in the contract and to reject the potatoes if they did not meet the minimum quality standards.

Part of the processors' response was not puzzling though. It is the assurance of quality which is a primary concern for first handlers raised by the prospect of the destruction of long-term relationships. These relationships often have economic justification. They reduce some transaction costs for both parties, such as search, and they may be a relatively inexpensive way to assure quality. An FDCM, depending on its design, could lead to the breakup of these relationships.

One method, which processors already use to assure product quality are contigency clauses. These clauses create incentives for producers to deliver at least the base quality stated in the contract and further reward them if they deliver superior quality. These clauses also contain disincentives, discounts off the base price, for delivering inferior quality. It is recommended that these clauses remain part of the contract.

Although these clauses create incentives for producing and delivering quality, they do not ensure that the contracting grower can meet these standards and this is the concern of first handlers. They also do not ensure that a quality grower will be rewarded for his ability by receiving a contract. Both these issues are raised when long-term relationships are disrupted.

There are two possible rules which could ameliorate these concerns. The first would be to allow traders on the system to identify themselves during the negotiation process if they so wish. While anonymity of traders is usually protected, the reasons for this may be few in an FDCM. For instance, it would be difficult to discriminate against traders for noneconomic reasons in an open and competitive market. The system can also be designed so that after the transaction is completed the names are removed before the terms and other particulars are listed. Thus, only the two contracting parties can recognize the results.

As Levilt points out, even producers of agricultural products are not the homogeneous class of individuals as commonly thought and neither is the product they produce.[25] Producers work to differentiate themselves and two common ways to do this are through the provision of better service and quality. If these commodity attributes are valued by buyers then these producers should be rewarded for their efforts.

Voluntary identification of traders would allow the retention of some of the economic benefits obtained through long-term relationships. It would reduce the search costs for quality growers. If the market values quality, then these growers would receive higher prices for their product. From the other point of view, some first handlers may be preferred by growers because of swifter payment, honesty or the like. Growers may be willing to produce for these first handlers at a lower price than they would for other first handlers.

With voluntary identification some growers may prefer to remain anonymous for reasons unrelated to the above. Thus, assurance of quality would still be an issue. The second rule proposal would be able to handle this situation. This is to have a voluntary rating system of grower quality levels. This would be based on their track record, covering perhaps the three most recent years. A three year period allows for those occasional years when a grower may produce lower quality due to adverse weather conditions. The ratings would be compiled and tabulated by an independent third party. A logical candidate for this party would be the Federal-State inspection services.

For simplicity, it seems that only three grades would be required, superior(three star), good(two star), and fair(one star).

The ratings would be based on objective criteria and the percent of potatoes delivered meeting these standards.

The growers surveyed supported a rating system for quality. Over 80 percent of the growers indicated that they would be willing to submit to a rating system to assure quality.

There are two main issues regarding a rating system; 1) who would pay for the rating service; and 2) how would the standards be set. It is logical to expect that those benefiting from the service should bear the costs. If growers receive higher prices for being a quality grower and first handlers demand quality growers then it seems logical to expect those growers and first handlers participating in the program should pay for it.

The most logical basis for the rating system would be a grower's ability to deliver the quality specifications stated in the contract. For instance, a grower who had at least seventy percent of his potatoes meeting the base quality requirements in the contract might be assigned a three star rating. Another grower with sixty percent of his potatoes meeting the base standards would get a two star rating and so forth. The exact scale would probably be determined by a governing board of the market. Furthermore, the scale may vary from one area to the next to reflect different growing conditions and standards.

The support for these proposals are three-fold. First, since handlers demand specific qualities of potatoes, quality is a valid area of competition between growers. Those who can produce superior quality should be rewarded with superior prices or terms. Secondly, they give incentives for improving the quality of potatoes produced throughout the subsector. And third, having the proposals be voluntary gives growers a choice on what attribute they want to emphasize - for example, price or quality. Many growers and first handlers may choose to specialize in the production and/or marketing of "lesser" quality potatoes in order to reach a specific segment of the market.

An integral part of the measurement of quality are grades and standards. Effective grades and standards are necessary to sell commodities by contract. These grades must be able to be objectively evaluated and easily understood by all participants. They must also be realistic and reflect economically discernible differences. These economic differences must be accurately reflected to producers so that they can meet them.

Fortunately, grades and standards in potatoes are fairly well-recognized and understood. Often USDA grades will be supplemented by marketing order or packer grades depending upon the geographic area and the particular market outlet they are destined for. For instance, french friers specify quality characteristics covering size, specific gravity, and sugar content. While these characteristics are not covered under USDA guidelines and the tolerance levels may vary from processor to processor, their format is similar and most subsector participants have few difficulties understanding them.

In tablestock potatoes the use of USDA grades and standards is more common. However, these grades are somtimes superseded by more stringent marketing order grades, such as in Idaho. Additionally, packer-grades are sometimes important. Such as in Idaho again where many potatoes are packed and graded by size to make premium count carton grades.

It appears that the grades and standards presently used in the subsector are adequate for use in the FDCM with little or no modification. The one exception where there appears to be a problem is in potato chips. The quality standards in this market are the most subjective and growers claim that they are used against them. There is a clause which states that the potatoes must be of "satisfactory chipping quality". If growers' claims about the use of this clause are justified, some work may be needed to make these standards more objective.

While the grades and standards in potatoes are sufficient there probably should be guidelines for participants to avoid possible disputes. Where possible the grades and standards should be stated and determined with objective and quantifiable standards. For instance, the tolerances that define the boundaries for a potato of "satisfactory chipping quality" should be able to be determined either through inspection or clinical analysis.

One area of potential dispute is who does the grading. Fifty percent of the growers surveyed preferred third party grading. Presently the USDA through the Agricultural Marketing Service and in affiliation with State departments of agriculture do provide grading services. In the processing channels inspectors are often used. However, they are less used in tablestock potatoes. In order to protect the integrity of the market mandatory third party inspection is recommended. The costs of this inspection would be split between the two parties. Since these services are done at a cost, if the two contracting parties agree, they may do away with the mandatory inspection. However, they do so at their own risks. This is fairly close to the manner in which grading is presently conducted.

8.3.5 Handling of Disputes

Inevitably disputes will arise over contract terms and performance. The design issue is how should these disputes be resolved. There are two major policy alternatives, not necessarily exclusive, which can be applied to contract disputes. One is to simply let a court of law decide the relative merits of a dispute according to the laws regulating commercial transactions. The second alternative is to design a mechanism internal to the operation of the market to settle disputes.

The former proposal is attractive for a variety of reasons. First, by using a court of law to settle disputes the design and operation of an FDCM incurs no more additional costs. Secondly, many of the potential areas of dispute with regard to potatoes are already covered by the Perishable Agricultural Commodities Act(PACA).[26] This act details what actions are legal and what remedies an individual may take if they feel they have been wronged in the transaction. It sets forth the procedure for making a grievance and provides the adminstrative structure to settle these disputes.

The major disadvantages are that these settlements may not be a timely basis and there may be problems of equity. If the source of the dispute is not covered in PACA, then the plaintiff may have to go to court. This will involve costs. Because growers are, in general, smaller than first handlers they may be less able to wage a successful court battle. This may discourage growers from taking first handlers to court. However, as Macauley has found most disputes never reach court since it is usually in the best interests of both parties to settle out of court.[27] Only in the exceptional cases will cases go to court and then it may be in the interests of even smaller producers to risk a court settlement.

Although only twenty percent of the growers responding expressed a preference for binding arbitration in the handling of disputes, it appears to be equitable and the least cost method. A rule of the exchange could be that all dispute that cannot be settled by the two parties must be submitted to a board for binding arbitration whose findings are final. The board could be made of individuals who are mutually acceptable to sellers and buyers.

8.3.6 Contract Cancellation

Under what conditions should contract cancellation be allowed? The selection of these conditions will have an obvious impact on the performance of the FDCM and the sanctity of the contract. In terms of the integrity of the market and its functions contract cancellation should be permitted only under the severest of circumstances.

Growers were asked to respond to this issue on the mail survey. Some of the choices available to them were a significantly higher price in the spot market at the time of harvest and Acts of God. Presently, such a clause is standard in most forward contracts in potatoes. Only in the case of extreme weather or earthquake etc. is contract cancellation without liability allowed. Or from a first handler's point of view only in the event of a fire or tornado etc. may he or she cancel a contract without liability.

Considering the responses of growers, present practices, and the need for the integrity of the contract it is recommended that only in the event of an Act of God should contract cancellation be permitted.

8.3.7 Contract Size

One of the concerns about an FDCM is the question of differential impacts on different sized firms. For instance, to operate on the system at home may take an investment of several hundred dollars for the modem and terminal. However, this obstacle for small producers could be overcomed by making terminals available at county extension offices. A larger concern is that the economics will dictate a contract size which is beyond the capabilities of small producers. The answer seems to be no.

It is true that there will be a minimal sized contract that is efficient for a first handler to accept and this size will vary from firm to firm. It would seem that for large operators, given the costs of inspection and unloading, the minimum sized contract would be a truckload. A truckload is approximately 40000 lbs. of potatoes. Even with below average yields it would only take about three acres of production to obtain a truckload. This is well in the reach of almost all producers and especially producers who make their livelihood from selling potatoes. According to U.S. Agricultural census data, the average sized potato farm in the U. S. in 1974 was 50 acres.[28] Most commercial farms are larger. Therefore, even below average sized producers would be able to comfortably meet this minimum contract size. Actual experience seems to support this. A large processor in Idaho contracts mainly with growers who only average 80 to 100 acres of potatoes.

Handlers are not overly dependent on the deliveries on a specific date of an individual grower. Usually the delivery date in the contract is an interval. The growers are then informed a few days prior to delivery that their potatoes will be needed on a particular day. If there are minor difficulties in meeting this date, processors are usually amenable to a short delay. The reason processors can do this is that they spread out their deliveries among many growers. They prefer to do this because the supply risks are too large if they depend on a single grower for a day's delivery and also to minimize the bargaining power a grower may have over them. What this means for a minimum sized contract is that they can be smaller since the plant's efficient operation is not overly tied to the fortunes of single grower.

Overall it would appear that a minimum sized contract would not be overly constraining to the great majority of growers. Almost all growers produce several truckloads of potatoes every year. From a costs perspective it appears that it is deliveries of less than a truckload which are most inefficient. If inspection is done this runs roughly about 20 dollars a load. So to pay an inspector, start up the plant operation for less than a truckload is unreasonable for most firms.

In terms of minimum sized contracts no recommendations are made except that they be up to the individual discretion of the first handler. However, it is suggested that the contracts be designed so that standard units are traded. For example, contract size could be a multiple of truckload units, including fractional units such as half truckloads. Trading in truckload multiples would speed up the negotiation process and make contract comparison much easier. Allowing fractional units to be traded enables smaller market participants to take fuller advantage of the market.

8.3.8 Negotiable Items

It is literally possible to negotiate over every item in the contract. However, this would lead to higher transaction costs and greater difficulty in comparing contracts. Yet, having a standardized contract with only the base price being negotiable would eliminate many of the benefits growers and first handlers receive from forward contracting due to their specificity. There is a tradeoff between the number of items which are negotiable, giving it specificity to a particular operation, and the transaction costs and comparability of the contracts.

Although it is not clear what the exact nature of the tradeoff between specificity of contracts and transaction costs is, it does appear that only a few key variables will be able to be actively negotiated on the FDCM. A list of these variables would include; 1) base price; 2) quality premiums and discounts; 3) production premiums and discounts; 4) storage incentives and delivery dates and location. Other variables contained in the contract such as production, cultural and harvesting practices would most likely be reflected in the base price. First handlers vary in the degree of control they wish to exert over these activities. So even though these items might be taken out of the active bidding process, they still must retain the flexibility to meet a particular first handler's demands.

The tradeoff between specificity of contracts and transactions costs at least suggests that there will have to be some standardization of contract form. The easiest place to begin is those areas of the contract which do not apply directly to the production, delivery and acceptance of the product. These terms lay out the legal obligations and rights of the two parties. Such clauses are contained in every contract. For instance, who has first claim on the product when there is a lien-holder.

The standard contract would contain clauses regarding these legal rights and obligations. These parts of the contract would be out of the realm of negotiation. The design of these terms should be the responsibility of a committee representing producers and buyers with a mutually agreed upon legal counsel.

The next area for possible standardization would be those variables not listed as key elements, but do affect the production, delivery and acceptance of the product. They affect costs. An example of these types of clauses are those specifying certain chemical applications during the growing and harvesting season or the use of certified seed. Among processors there is a wide variety in these terms. They use these terms to ensure against specific risks and to tailor the product to their demands. Since there is a wide variety in intent and specifications in these terms the task of standardizing is more difficult than it is in the case of those terms which just set forth legal rights and obligations. If these terms are overly standardized they will lose many of the advantages which they hold for product procurement.

It is suggested that these items be taken out of active negotiation, and put into a format where contractors can put in specification or options which fit their own operation. That is the format for chemical treatments would be identical in each contract, but a grower offering a contract or a first handler selling a contract could enter the options he or she desires into the format. For example, a standard clause might be worded as such, "The grower is required to apply the following chemical treatments of________ in the following manner _______________." This clause would be contained in every contract, but it would be an option that might be or might not be filled in.

If these blanks were filled in by either party they could not be modified by the other party. It is assumed such specifications would then be reflected in the base price. If the demands were great it is assumed that the prices would be higher or that fewer people would be willing to accept the contract in its present form. If so, then the individual offering the contract would have to revise it.

The final areas of interest are the key variables mentioned in the beginning of this section. In terms of contract specificity it would be ideal to actively negotiate over all these terms. However, this would be sure to raise transaction costs. It is unknown whether the benefits from increased contract specificity would merit the increase in transaction costs. Additionally, it is difficult to see how bidding can be facilitated over some of these terms in their present form. As was demonstrated in Chapter VI the quality contingency clauses cover three or four different characteristics and the increases(decreases) in the base price corresponding to these characteristics are not always a straight line function. It would also make the comparison of contract terms more difficult. As Campbell has pointed out contracts must be compared across all their terms not just price.[29]

Outside of the base contract price it is quality schedules which are the subject of the most intense bargaining. One suggestion is to let the bargaining associations continue negotiating these terms. While this may reduce the transaction costs incurred over the FDCM and improve contract specificity, it may lead to an increase in total transaction costs as this would require the existence of bargaining associations in much their present form. If a bargaining association(s) was the owner-operator of the FDCM this may be a feasible solution.

In the event that the FDCM is not owned by a bargaining association, and maybe even if it is, it would seem preferable to limit the format under which these premium-discount schedules may be entered into a contract and negotiated. As was the case with clauses specifying chemical applications, the form of these clauses would be standardized and the two parties would be limited over the premiums or discounts for each quality level - not the actual quality specifications. Thus, they would not be able to change the levels themselves or the form of the clause. If they could not come to agreement, then a new contract form could be submitted with new specifications in it. This enables the individual offerring the contract to tailor it to his operation.

Some quality schedules or incentives will not be as difficult to negotiate as others. For example, growers are usually paid by shippers on the percentage packout, i. e. those potatoes meeting a specific grade. There may be a lower price for potatoes which meet the next lower grade.

Storage incentives should also be relatively easy to negotiate. Currently most storage contracts increase the base price paid by adding increments for each additional month the potatoes are in storage. This covers the storage costs and the increased risk the growers experience. Most producers are probably in a better position to evaluate their stroage costs and risks than are first-handlers. The storage incentives could be negotiated in a manner similar to the base price.

8.4 SUMMARY

This chapter is a discussion of the major design issues facing the establishment of an FDCM in potatoes. Recommendations have been made regarding these issues. These recommendations have been made after careful evaluation of the needs of the potential participants, present practices and theoretical considerations. However, it is fully expected that the actual establishment of an FDCM will require extensive experimentation in the rules governing its organization and operation. While the rules must be guided by pragmatic considerations, any rule which threatens the existence of an FDCM as a planning and delivery mechanism should be resisted. For if these two aspects are diminished then the distinguishing features and its fundamental reason for being are lost.

CHAPTER NINE

CONCLUSIONS

9.1 INTRODUCTION

This chapter is a brief summary of the results and the major implications for policy which can be drawn from them. The predominant theme in this research has been that an FDCM is essentially a pricing mechanism. Its design leads to improved planning and from some points of view to a more equitable system. The need for planning in agriculture is evident. Presently, United States agricultural policy is coming under increasing criticisms from all fronts for large expenditures and promoting those conditions which it is supposedly designed to address - low farm incomes and overproduction. What these policies lack is an effective mechanism to help agricultural producers and marketing agents more accurately assess futures supply and demand conditions and to coordinate decisions based on these assessments.

An FDCM is a mechanism which not only allows subsector participants to act on their own evaluations of supply and demand, but it also increases the availability of information regarding supply and demand. Through the instant dissemination of information regarding contracted prices and quantities, market participants can construct better estimates of aggregate future supply and demand and develop better estimates of the demand for their own product.

An FDCM is based on the needs for planning and the benefits accrued through forward contracting. However, it differs substantially from forward contracting. An FDCM is a planning mechanism which is market mediated. An FDCM accomplishes this by moving forward the pricing process to occur simultaneously with the decision-making process with respect to major production decisions. An FDCM makes the price determination process coincident with production decisions.

Now forward contracting may do this to some extent, but because of the design of the mechanism much information is not available to the great majority of subsector participants. For instance, a grower contracting with a processor usually has little idea of total quantities being contracted and thus, the demand for his product.

Under either form of forward contracting some forecasting is necessary, but an FDCM gives traders the information necessary to make these production decisions. Currently, growers bear the burden of predicting forward demand for their product and they have little information on which to base their decisions. It is reasonable to assume though, that participants further up the subsector channel have greater ability to predict final demand because of their greater proximity to the final consumer and the additional information they are able to gather and assimilate.

An FDCM through the increase in information and by enabling the production decision to be made simultaneously with the pricing decision has the ability to reduce the production fluctuations seen in agricultural commodities which are not due to changes in consumer demand or costs of production.

The rest of the chapter is divided into three major sections. The first section covers the major findings, conclusions, and policy implications of this work. This is followed by some recommendations for further research. Finally, a brief summary is given.

9.2 CONCLUSIONS AND IMPLICATIONS

In this research it was concluded that an FDCM could improve the overall performance of the potato subsector. Performance was evaluated on the basis of reduced production fluctuations, equity, level of transaction costs, and the ability to plan. The basis for comparison is the present marketing system. Most of this improvement would be attributable to the increased information available, including prices and quantities demanded, at the time of major production decisions are made.

It was also evident from both theoretical and practical considerations that an FDCM is not applicable to all commodity subsectors. Or more accurately, the costs of adapting the concept and designing the mechanism would be so prohibitive relative to the benefits that it would not be in the interests of subsector participants to have one.

As a bare minimum it was found that certain conditions must exist or certain variables must be controllable before an FDCM can be successfully introduced. The overriding criterion that must be met is that production fluctuations must be controllable and predictable within certain limits. The production function does not have to be determinant just that unforeseen variations are within tolerances that can be incorporated into the design of the contract. For example, in most years potato growers can predict production within about 15 percent of actual yields. This level of variation and even greater ones can be handled by contingencies in the basic contract. How predictable yields must be before it is economical to sell a commodity through an FDCM is not clear, but it is apparent that as the level of randomness increases the efficacy of an FDCM as a planning mechanism decreases.

While the more fungible a commodity is the easier it is to introduce an FDCM, complete fungibility is far from necessary. Rather, it is the ability to set objective grades and standards which is necessary. Potato grading is usually not a problem. Yet, potatoes are not completely fungible. Not only must the grades be objective, but they must be well understood by everyone and accurately reflect differences which are translatable into economic incentives.

Another characteristic which creates the need for an FDCM is impacted information. The cause of impacted information may be structural, technological, or simply the result of a firm's position in the subsector giving it access to certain types of information. An FDCM through computer technology makes information regarding prices and quantities equally available to anyone on the system. Additionally, by allowing the pricing decision and production decision to occur simultaneously it reduces the ability to withhold information or make it easier to dissemeninate.

Another critical variable which must be considered is the size of the market. Although Kauffman has concluded that the market need not be as large as originally thought, it still must be large enough to support the fixed costs of the system.[1] For some markets, perhaps in specialty crops, the number of individuals using the system may not be able to support it. However, this is a technological question and it appears that as advances are made volume will become less of a factor.

The chances of an FDCM being successfully introduced would also be increased if there is a large and well organized producer and/or buyer group already functioning in the subsector. This group could then appeal to a broad constituency of potential users and be better able to understand their needs, ceteris paribus. However, it has been concluded that the ownership of an FDCM could be vested in any group which could gather the support of participants and have the resources and expertise to operate it. For example, existing commodity exchanges would appear to be likely candidates for ownership.

It was concluded that the benefits market participants acquire through an FDCM are many. From a grower's perspective a list of some of these benefits would include:

1. Greater access to information regarding prices and quantities contracted across the United States;

2. By virtue of this information the ability to assess the demand for his/her product is increased;

3. This leads to improvements in the planning of one's operation — from the number of acres to devote to various crops to the prices needed to cover costs of production;

4. Greater flexibility in planning the overall operation of the farm through forward commitments;

5. An improvement in a grower's bargaining position through the elimination of private treaty negotiation and increased information which formerly had been impacted. This may or may not result in higher prices to growers. If prices are competitively determined, as it appears they will be, it is unclear whether the prices farmers receive will be higher under an FDCM than they are under collective bargaining. Although, processors certainly believed they would be. By knowing test prices before production decisions, the probability of producing below costs of production is reduced, thus improving incomes and preserving grower reserves. An important point to remember is that the costs growers will try to cover in any particular year are variable costs. They may not be able to cover total cost. However, in the long run total cost must be covered. Pricing at the time production decisions are made creates an incentive for growers to become more informed of their costs.

6. Greater market access. Presently, potato contracts have almost a grandfather clause aspect to them. Once a grower obtains one his performance must be fairly poor not to receive one the following year. While this benefits some growers, it obviously hurts other capable growers.

7. Increased access to capital.

It has been maintained throughout this research that an FDCM is not a zero-sum game. For example, processors fear a loss of bargaining power, a reduction in the proprietary nature of information, and a loss of control over quality. However, it has been concluded that while the first item may be a valid concern from their point of view their other concerns are less tenable. Indeed, processors and other first handlers can benefit substantially through the introduction of an FDCM in the following ways:

1. An assured supply.

2. An assured quality. One of the concerns about an FDCM is that the the assurance of quality would be harder to achieve than through the present marketing system. This appears to be based on a misconception about an FDCM. The same quality provisions and requirements would still apply as they do in conventional forward contracting. In fact, quality may actually improve if a quality rating system is employed.

3. More efficient scheduling of plant facilities, labor, and transportation services.

4. Improved planning through increased information and the guarantee of performance. This includes planning for merchandising and promotional efforts.

5. Reduced transaction costs.

6. A buyer using an FDCM will be able to offer his customers better services.

7. Since prices are publicly available, an FDCM can help assure the contractor that he/she will be paying competitive prices.

A list of some of the specific design recommendations follow. The nine recommendations are used advisedly since in practice there may be considerable differences in design. However, on the basis of this analysis it is believed these recommendations are the most likely to lead to the successful operation of an FDCM.

1. Enabling legislation be passed for a grower referendum on participation.

2. Ownership should be open to any party that can assemble the resources and expertise to effectively operate an FDCM.

3. Production risk could be handled through:
   a. crop insurance
   b. contingency clause
   c. secondary sales of contracts
   d. acreage contracts

4. Quality assurance could be handled by:
   a. contingency clause
   b. voluntary identification of traders
   c. a voluntary quality rating system

5. Contract cancellation be allowed only for act of God.

6. Traders should be bonded.

7. Negotiable items be limited to:
   a. base price
   b. quantity
   c. quality
   d. storage incentives

8. Disputes should be submitted to a board made up of individuals who are mutually acceptable to all parties and whose decisions are binding.

9. The Auction procedure be a bid-offer system.

The most controversial recommendation is the enabling legislation for mandating compliance. In potatoes it was found that few first handlers would be willing to use the system unless other handlers did also. The fear of price risk is the primary reason for this reaction. To get the participants necessary to reduce this risk may require some form of mandatory participation. However, it should be noted that of all the policy recommendations, this one has the least likelihood of being enacted.

The econometric simulation presented in Chapter VII demonstrated that under mandatory participation, production variations were in response to prices. In an FCDM though, the price producers are responding to in their planting decision will be a future known price rather than an expected price of unknown formulation.

While it was not surprising, the simulation also demonstrated that as participant levels in the FDCM increased, prices in the "spot" market became more variable. As a residual market it must absorb the shocks. As FDCM prices became more favorable relative to "spot" prices, participants increased in the FDCM and "spot" prices became more variable. Under a high FDCM price scenario participants in the market would in time become essentially 100%. A hypothesis generated from this result is that if an FDCM could be established on a voluntary basis, and if FDCM prices are consistently higher than "spot" prices from a growers perspective, compulsory participation would not be needed. However, it must be remembered that the issue cannot be viewed without taking account the buyers response.

Related to compulsory participation is the issue of handling production risk. If the market is not compulsory, this is less troublesome as spot transactions can be utilized to handle shortfalls or overproduction. In the event participation is compulsory, and even if if isn't, it appears that the above recommendations can alleviate most of the severe production risk.

Quality assurance was also a concern to potential participants. It was concluded that the recommendation made above can improve quality assurance through the incorporation of specific economic incentives and a grading system.

An FDCM can also lead to improvements in overall subsector performance which are not easily assigned to any particular individual or group of individuals. For example, Hamm found that many food manufacturers are shying away from commodity based products because of the uncertainty surrounding their supply.[1] This finding should be of great concern to growers. One method of assuring supply is conventional forward contracting. But as conducted, the increases in planning are limited. An FDCM will be able to improve the planning function and reduce the instability in supply associated with some commodity subsectors.

Beyond the benefits accruing to subsector participants, society in general could benefit. If an FDCM leads to reduced transaction costs and increased efficiencies these savings may be passed on to the consumer. Whether they are or not is a matter of market structure. And while food marketing industries are becoming more concentrated, it appears they still don't wield enough parity to capture all these gains.

The savings to society that may result from a reduction in supply fluctuations may be even greater. For years U.S. agricultural policy has been aimed at achieving some stability in production levels at levels consistent with consumer demand. The high expenditures that these programs are incurring without any evidence in gaining control over supply suggests that these programs have been less than successful. In 1983 the price and income programs have been projected as high as 34 billion dollars.[2] The costs of these programs and their apparent ineffectiveness have provoked criticisms from all quarters.

The basic problem with these programs is that they lack the mechanisms to coordinate supply with demand. Producers must base their decisions on target prices and loan rates which often are a reaction to a situation created from past decisions. their own limited information to predict future demand. One of the conclusions of this research is that an FDCM may be able to address these problems and substantially reduce budget outlays. To do so may require compulsory participation. To be effective as a planning mechanism will require a significant proportion of production to be represented on the market. It must also be able to incorporate export and import markets. Under such a proposal growers would have few incentives to produce more than they contracted and buyers would have to use the market in order to obtain their supplies.

The concept has several appealing points. One is that it is a market mediated approach to supply fluctuations in agriculture. The joint revelation of supply and demand leads to a closer match of supply with demand. Of course, mistakes will be made, but the chronic oversupply or widely varying production levels should be eliminated.

An FDCM would also have minimal need for budget outlays, hence taxes. The system itself could be self-supporting and any auxiliary services, such as inspection or contract enforcement, would be inexpensive relative to current programs. In fact, these costs could also be covered by the users.

These two points give strong justification for compulsory participation. Society may view it in their best interests with respect to improved vertical coordination and the decrease in budget outlays to impose mandatory participation. If so, it is probably best to view such a proposal as a replacement of one set of market rules, institutions, and regulations with another set. The market would still be open and competitive.

Initially, an FDCM may cause problems for some. The establishment of an FDCM can will change the long-term relationships and change the way firms do business. The breakdown of long-term relationships has some adverse effects. Some relationships can improve the communication between different stages in the subsector. However, in terms of systems-wide performance they only make a minor contribution as much of the information generated by these relationships never leaves the possession of the transacting parties.

It appears that many of the benefits of personalized relationships can be retained in an FDCM through voluntary trader identification. Those growers or buyers who are valued because of quality or service can use this as a marketing tool. Most users will probably be able to make the adjustment relatively easy although there will be hardship for some. For instance, the traditional function of brokers - finding buyers and sellers - will be reduced. This does not mean though that the need for brokers will be eliminated. Brokers could contract on the system and assemble supplies for those buyers whose orders are too small to use the system, such as the ma and pa stores. Additionally, some buyers may simply want to leave this function to brokers. Brokers will be especially useful if only the transaction between the producer-first handler is on the system.

An FDCM will also necessitate some changes in the way some firms do business. At least 50 percent of processing potatoes are forward contracted. Since contracting is not widely practiced for tablestock potatoes this means that about 70 percent of total potato production is not contracted. Although forward contracting has definite advantages to firms, it also entails certain responsibilities. It forces the contractor to accurately project the future demand for his/her product.

Presently, the burden for predicting this demand falls almost exclusively on the producer. Even in the case of processing most firms do not contract their entire expected demand. An FDCM will shift more of this burden to the contractor. From a vertical coordination perspective this seems preferable on two counts. If those individuals with the greater information on demand are more involved in the process at the time production decisions are made, vertical coordination will be improved. From an equity perspective a case can be made that those in the best position to make a decision because of their information should bear the responsibility and consequences of the decision.

The introduction of an FDCM will create incentives throughout the subsector to obtain forward commitments. These commitments will lead to more accurate estimates of future demand and thus, the future supply needed. This would be the case even if the FDCM covers only the producer-first handler transaction. However, an FDCM covering the entire subsector is not hard to envision. For example, retail produce buyers could contract with shippers for delivery three months down the road. Although these individuals do not presently forward contract and they are concerned with many more items than potatoes, they would be able to benefit from contracting through an FDCM. Their long-term planning with respect to merchandising and promotional efforts can be improved. Forward contracting would also lead to increased operational efficiencies and reduced transaction costs. However, to use it effectively would require a significant change in their approach to produce buying and selling.

It is apparent that performance will be changed depending on whether participation is compulsory or voluntary. This has been covered in-depth elsewhere. The largest single change will be an FDCM's usefulness as a planning device. There is still the possibility that participation rates will be either high or consistent enough to capture these benefits without compulsory participation, but it is less likely. However, there are still substantial benefits to be gained. Both parties to the contract are able to obtain increased operational efficiencies in the area of plant and labor scheduling and improved planning in their transportation needs. The market would still be competitive and the information would be freely available to all participants. This could strengthen the bargaining position of some individuals and increase the ability of all to project the supply or demand for their product. Although, neither of these aspects would be as great as they probably would be under compulsory participation.

Conceiveably, if a voluntary FDCM can overcome the free-rider problem, its advantages could, in time, become as great as those received under a compulsory FDCM. However, the widespread adoption of an FDCM, especially in tablestocks, would probably be slower. Some firms are particularly leary of using the market if their competitors are not.

9.2.1 Implementation

Ignoring the broader policy implications of an FDCM for the moment, the issue of its introduction still has to be handled. It is our conclusion that a gradual three stage process will work best. The first stage would be a large educational effort. The purposes of this effort are three-fold. Two major goals are to familarize potential users with the computer technology and to delineate the benefits of the market to them. A demonstration of how the market would work would be useful, perhaps held at extension offices. The initial effort should be directed at major trade organizations within the potato subsector. To be successful an FDCM will require the backing of a significant portion of the subsector. The aid of a major organization(s) will give the concept legitimacy. They will also be able to appeal to a larger constituency. This is especially important if the market is not compulsory.

The educational effort at a bare minimum will probably require at least two years and perhaps more. This stage should be followed by the introduction of a modified FDCM on a regional basis and where spot transaction are allowed to be conducted. Many individuals uncomfortable with the concept stated that they felt there was a real need for a computerized market for spot transactions. The adjustment from making transactions over the phone to the computer would be relatively easy.

Starting the system on a regional basis would reduce initial start-up costs in total and will give the technology an opportunity to prove itself. Many participants will reserve their judgement and patronage until they are able to decide whether the market will benefit them. The benefits in total will not be as great on a regional basis as if it were national in scope, but considering the political and practical considerations, introducing the system on a regional basis may be more expedient. It should be made clear, though, that the commitment to sell forward contracts is firm and that this design of the market is only intermediate to allow adjustments to the system to be gradual.

The third stage is the elimination of spot market transactions. The most straightforward approach is to set a termination date after which spot transactions are no longer allowed. For example, two years after trading is initiated spot sales would be removed from the market. The specific termination date reduces uncertainty and creates incentives for participants to move towards forward contracting. Along with this it is hoped that the market would expand its scope to be more national if not already.

The actual steps and timetable will vary, but these are deemed to be the essential steps for the introduction of an FDCM. Of all the steps the educational effort can not be overemphasized. The need for an informed and supportive patronage is paramount.

9.3 FURTHER RESEARCH

There are several areas where further research may be beneficial. But it is strongly believed that this research should be simultaneous with efforts to introduce an FDCM if participants are interested. Such research would be complementary with the educational and introductory phases of FDCM implementation. During the educational effort a broader and more detailed identification of participant attitudes could be accomplished. This would be useful during the design phase of the FDCM.

Many of the questions regarding design issues can probably be best answered through experimentation during the initial introductory stages of the market. For instance, one design rule suggested in

Chapter VIII is to have a bid-offer bidding procedure. However, it may become apparent for a variety of reasons that this procedure needs to be supplemented or replaced by another procedure. It appears that the only way to be certain of resolving this and similar issues is through the actual operation of the market. Thus, the type of research being suggested is actually part of an iterative process conducted between the analysis of potential design rules and the implementation and operation of the market. It should be noted that as defined here the research never really stops since markets evolve over time as needs and conditions change.

9.4 SUMMARY

This chapter has been a review of the needs leading to the research and the major conclusions of this research. The primary conclusion is that an FDCM can be used effectively to address many of the problems facing the potato subsector and bestow substantial benefits on most subsector participants. However, the concept will not evolve naturally and will require the backing of one or several trade organizations. To enlist this aid will require a effective educational program. Most likely, an FDCM will be started on a limted basis. This means it may be only regional, voluntary, and, perhaps initially, on a spot market basis.

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APPENDIX A

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF AGRICULTURAL ECONOMICS
AGRICULTURE HALL

EAST LANSING · MICHIGAN · 48824

Dear Sir:

A questionnaire accompanies this letter. We realize that you probably have been surveyed to death. Unfortunately, we can't even promise this survey is the survey to end all surveys. However, we strongly believe that you can benefit from participating in it. The survey has two objectives: 1) to describe the present marketing system for potatoes and see where improvement can be made; and 2) to evaluate the feasibility of a new method of marketing potatoes--that is, would a Computerized Auction of Potato Contracts work?

We know filling out questionnaires is tedious, but your participation is important because you have been randomly selected on a scientific basis from grower lists available in your state. Without your participation our results will lack credibility. More importantly, by your participation you will be able to help deliver a verdict on whether this new marketing method is needed or not.

We need you to tell us whether a Computerized Auction of Potato Contracts (CAPC) could help potato growers. Currently such a market for potatoes doesn't exist, but it does combine several elements found in the present marketing system. This combination should produce more competitive forward contract markets and hence superior information about future supply and demand conditions. Under these conditions we believe that both farmers and first handlers would make better production plans and use their farms and plants more efficiently. Planning would be enhanced due to the reduced uncertainty about what price and supply will be. Price fluctuations should decrease because the periodic variation in quantity shipped would moderate. There is no evidence that any market participant benefits in the long run from wide price fluctuation.

The proposed CAPC takes the computerized markets existing in a few other agricultural markets and combines them with the private treaty forward contracts for potatoes that are common. This combination would create an open market in contracts where price and other terms of trade would be negotiable and available almost instantaneously to all market participants. These contracts would be sold to first handlers for the purpose of delivery.

The enclosed article entitled: "Computerized Auction of Potato Contracts" will give you more details of how such a market might work. Please read it before you fill out the questionnaire. You might want to read it and then fill out the questionnaire the next day after you have thought about the ideas a little while. But the example is highly simplified since much of the design of the system will depend on the responses obtained from the questionnaire. So this is your chance to either help shape a new marketing mechanism or, if you think the idea is ridiculous, to tell us so.

The questionnaire is not as long as it appears to be. It had to be spaced out in order to make computer tabulation easy. Each question has a purpose. We tried not to ask any unnecessary questions because we know your time is valuable.

We look forward to hearing from you. Thank you for helping us with this research. We hope your help will someday return benefits to you.

Sincerely,

John M Halloran

plc
Enclosures

What are forward deliverable contracts and what does an electronic exchange have to do with them? The basic concept is the creation of a market which would enable open bargaining over all terms of trade for contracts negotiated prior to critical production decisions.

A forward deliverable contract market (FDCM) is a pricing mechanism that becomes practically feasible because of the computer. An FDCM combines characteristics both of the futures market and standard forward contracting. Comparable to the futures market, a forward deliverable contract market deals in standardized contracts specifying price, delivery dates, quantity, grade and other terms of trade and are traded on an open market. The instrument for obtaining an open market is an easy access electronic exchange. As is the case in some standard forward contracts, the contracts exchanged in an FDCM are negotiated prior to the initiation of the production process. An FDCM, however, would have distinct advantages over both types of exchange mechanisms under circumstances where scheduling and planning, perishability, transportation and good price information are a problem.

The benefits of such a pricing mechanism may be many. First it creates a competitive market in contracts. All information regarding prices, quantities, etc. are available to all participants. It also eliminates the need for private treaty negotiation, which can be costly and may puts some in a disadvantageous situation. The centralization of a large number of buyers and sellers bidding in an open market creates alternative markets for some and generates a great deal of information for all.

The prices generated in an FDCM would be more accurate reflections of future supply and demand estimates than those estimated by individuals or by the futures market. This is based on the assumption that processors, retailers and other first handlers have access to information which enables them to make better judgements than growers as to the level of future demand and the prices they can afford to pay for the raw product. Growers, on the other hand, know their costs of production and therefore, what quantities and qualities they can supply at various prices.

The prices and quantities agreed upon in a contract would be available to all market participants. From a first handler's point of view, his ability to assess the demand for his product will be enhanced by knowing the planed aggregate production of the industry. While this information presently may become apparent as the season progresses, in an FDCM it is much more timely and accurate. Given this information buyers will be able to more accurately estimate the price they can afford to pay for the raw product and the amount they need. From the grower's point of view they are better able to ascertain what other growers are receiving for producing a comparable product. In this manner an FDCM will facilitate firm-level and subsector planning.

The costs involved in operating an electronic market are such that as more transactions are made the cost per transaction declines. Thus, it would be beneficial to have a large number of traders on the system.

Although the specific rules of market operation must be worked out, an example may help illustrate the potential for an FDCM. Suppose in the Winter of 1983 the management of a potato processing firm estimates the demand for and the price it can expect to receive for their own label french fries from retail supermarket chains. After a careful review of the growing season, total firm demand and plant capabilities it decides it needs 500 cwt of potatoes for the second week of November. Given the estimated price they believe retail chains will be willing to pay and their own processing costs, the management calculates the maximum price they can pay growers and still earn a fair rate of return. An offer is made on the processor's terminal connected to the FDCM's computer. This offer is disseminated to terminals which potato growers have access to; for instance, in a county extension office, marketing cooperative, or even their homes.

The processor's offer specifies the price, quantity, grade and other terms of trade for the lots of potatoes it desires. The contract size should be small enough so that most growers could fulfill it and yet still be economical for the processor to handle it.

Although most of the contracts would probably be fulfilled by growers in nearby production areas, the offer would be sent to any location where there is a terminal connected to the system. Once the offer was received a grower would evaluate his costs in meeting the contract. He would then decide if the rate of return for the processor's offered contract exceeds that of all other alternative uses of his resources. If a grower felt he was not adequately compensated for the use of his resources under the present offer, he could, via his terminal, make a counteroffer, perhaps asking for a higher price or earlier delivery requirements, etc.

If a grower submitted a counteroffer, the processor could decide on the quantities they would buy at the prices offered by the growers, or the processor could make a counteroffer. This process would continue until final agreement has been reached. It should be emphasized that this process resembles an auction. Each grower would have equal opportunity to the market and to "bid" on the contract or make a counteroffer. Processors would also have equal access to growers. Most likely, at the opening of the contracting period only a few contracts would be traded. However, during the iterative process of offers-counteroffers all participants would have access to information regarding negotiations, transactions, and the intentions of other participants (based on their estimate of supply and demand). As more information becomes available more and more contracts should be finalized. Given the information produced and the interaction of a large number of growers and processors a price which reflects the consensus of the market's participant's perception of supply and demand conditions should quickly appear.

Since negotiations and prices are immediately available to all participants it would also ensure that local growers could not conspire to drive the price to uncompetitive levels since they would face the possibility of making it profitable for a processor to obtain non-local supplies.

This example has not covered to who should be allowed to trade or how performance should be guaranteed and the like. Many of the more detailed questions will hopefully be answered in the research.

Finally, it should be emphasized that the intent of this research is not one of advocacy, but to answer the question of whether an FDCM could be economically feasible and let the chips fall where they may. Initially, an FDCM seems to be a creative pricing mechanism which could address many of the problems facing the potato subsector and benefit most participants.

POTATO CONTRACT QUESTIONNAIRE

John Halloran, Michigan State University

Directions: Please check the best answwer to each question. When specified, please check only one answer. Occasionally you will be asked to check as many answers as apply.

1. How many acres of potatoes do you plant each year? (please check one)

   A. ___ less than 50

   B. ___ 50-100

   C. ___ 100-200

   D. ___ 300-500

   E. ___ more than 500

2. Do you grow primarily for the processing, seed or tablestock market? (please check one)

   A. ___ seed

   B. ___ processing

   C. ___ tablestock

3. What are the approximate percentages you sell in each market?

   A. ___ seed

   B. ___ processing

   C. ___ tablestock

4. Approximately how many potatoes do you sell each year? (please check one)

   A. ___ cwt.

   B. ___ tons

5. What is your normal rotation? (please check one)

   A. ___ once every two years

   B. ___ once every three years

   C. ___ once every four years

   D. ___ not at all

   E. ___ Other (please specify) ______________________________

   ____

6. What crops do you use in rotation?

A. ___ hay

B. ___ wheat

C. ___ corn

D. ___ sugarbeets

E. ___ dry beans

F. ___ other (please specify) ________________________________

____

____

7. What percent of your cropland is irrigated? (please check one)

A. ___ 0-25%

B. ___ 25-50%

C. ___ 50-75%

D. ___ 75-100%

8. Does your potato operation provide 50% of your farm income in a normal year?

A. Yes ___ B. No ___

9. At what time of year can you estimate within 90% what your yield/acre will be? (please check one)

A. ___ prior to planting

B. ___ just after planting

C. ___ midway or later into the growing season

D. ___ not until harvest

10. Do you have on-farm storage capabilities? (please check one)

A. Yes ____ B. No ____

11. If yes, approximately what percent of your production could you store? (please check one)

A. ___ 0-25%

B. ___ 26-50%

C. ___ 51-75%

D. ___ 76-100%

12. At what time of year can you accurately predict (within 90%) the quality level of your potatoes?

A. ___ prior to planting

B. ___ sometime during the growing season

C. ___ not until harvest

D. ___ not until actually graded or inspected

13. By what percent does your quality of potatoes (as judged by standards set for your major market outlet) change from year-to-year? (ex., The percent of potatoes I have meeting U.S. #1 standards may vary by 10% from one year-to-the-next.)

A. ___ 0-10%

B. ___ 10-15%

C. ___ 15-20%

D. ___ more than 20%

14. Potato growers could make improved production decisions if they could accurately predict the price of potatoes at harvest. Within how many percentage points can you usually predict harvest price at planting? (please check one)

A. ___ 1-10%

B. ___ 10-25%

C. ___ 25-40%

D. ___ 40% or more

15. Do you ever change production decisions based on your price predictions?

A. Yes ____ B. No ____

16. Do you feel there is a need for more accurate and timely market information?

    A. Yes ____ B. No ____

17. In your view, are the wide year-to-year price fluctuations present in potatoes a help or hindrance to producers?

    A. Yes ____ B. No ____

18. When prices are particulary low are you sometimes unable to cover your variable costs such as fertilizer, energy, paid labor, etc.?

    A. ____ Yes

    B. ____ No (if so, go to question 20)

19. If yes, when have you been sure you won't be able to cover your variable costs? (please check one)

    A. ___ prior to planting

    B. ___ sometime during the growing season

    C. ___ not until harvest

    Please comment on the production decision you took in this situation.

    ____

    ____

    ____

20. Is more than 75% of your working capital borrowed:

    A. Yes ____ B. No ____

21. Do you need a forward contract in order to obtain financing?

    A. Yes ____ B. No ____

22. Have you ever had unanticipated cash flow problems requiring you to refinance a loan?

    A. Yes ____ B. No ____

23. If you market through shippers what form of arrangement is standard?

    A. ___ shipper takes title and pays you

    B. ___ shipper sells on consignment

    C. ___ other (please explain) ______________________

    ____

24. How do you market your crop? (please give approximate percentages)

A. ___ contract ___ percent

B. ___ shippers ___ percent

C. ___ direct marketing ___ percent

D. ___ brokers ___ percent

E. ___ other (please specify) ________________________________

____

____

25. If you contract, what type of operation do you contract with? (If you dont't contract go to question #28)

A. ___ potato shippers

B. ___ french friers

C. ___ dehydraters

D. ___ shippers

E. ___ other (please specify) ________________________________

____

____

26. Do you normally contract with more than one firm in a production year?

A. Yes ____ B. No ____

27. Normally, how far in advance of harvest do you contract? (please check one)

A. ___ 18 months

B. ___ 10 months

C. ___ just prior to planting

D. ___ not until planting is finished

28. If you have never hedged or forward contracted or if you have quit, why? (please check all that apply)

A. ___ Can't take the production risk

B. ___ My capital position is large enough to absorb occasional losses and in the long run I think I'm better off without hedging or forward contracting.

C. ___ The futures market has too little volume to make viable hedges.

D. ___ I have been unable to obtain a forward contract.

E. ___ The terms in the forward contract favor the processor.

F. ___ The futures market is too easy to manipulate.

G. ___ The terms in a futures contract do not facilitate the determination of a normal basis.

H. ___ Other (please describe) ________________________________

____

____

29. If you do contract or hedge, do you have a rule of thumb for deciding the protion of your production you want to commit to these methods?

A. Yes ____ B. No ____
If yes, what is the rule? ________________________________

____

____

30. Why do you use the marketing method you do? (check all that apply)

A. ___ I sell to the closest available outlet.

B. ___ I sell where I can get the best price.

C. ___ It's the only place where I'm treated honestly

D. ___ They will accept my potatoes when I want to deliver.

E. ___ Contracting assures me of a market.

F. ___ It is necessary to contract in order to obtain financing.

G. ___ Contracting helps me lock in a return.

H. ___ Other (please explain) ________________________________

____

31. How many different firms do you normall deal with? (please check one)

A. ___ one

B. ___ 1-3

C. ___ 3-5

D. ___ more than 5

32. Is the relationship with your buyer important enough to you to sell to him even though you might do slightly better elsewhere?

A. Yes ____ B. No ____

33. If you have ever forward contracted, did it improve your ability to make management decision in general, and production decision in particular?

A. Yes ____ B. No ____

34. If buyers were willing, would you be willing to contract for the tablestock market?

A. Yes ____ B. No ____

35. Why do you think the level of contracting for tablestock potatoes is so low? (check all that apply)

A. ___ The product is too perishable

B. ___ The production risks are too great fo tablestock potatoes

C. ___ Buyers have no problem getting the supply they need under the present marketing system

D. ___ Growers prefer to play the market with tablestock potatoes

E. ___ Other (please specify) ________________________________

____

____

36. Do you feel many time you are placed in a "take it or leave it" situation?

spot market A. Yes ____ B. No ____

contracting A. Yes ____ B. No ____

37. If you are a member of a bargaining association are you satisfied with its performance?

A. Yes ____ B. No ____ If no go to #39.

38. What do you like about bargaining associations? (Please check all that apply)

A. ___ They give growers a better bargaining position

B. ___ They improve the quality and flow of information

C. ___ They add order and stability to the contracting process

D. ___ Other (Please specify) ______________________________

____

____

39. If you aren't a member of a bargaining association, why not? (Please check all that apply)

A. ___ The restrict my freedom

B. ___ The check off is too high for what I could get out of it

C. ___ I can obtain the benefits of a bargaining association without being a member

D. ___ Other (Please specify) ______________________________

____

____

40. The concept of a Computerized Auction of Potato Contracts (CAPC) has been explained to you in the accompanying letter. With respect to the following categories, would you rate your present system or a CAPC superior? (Write P if you think you present system is superior, C if you think a CAPC would be superior)

A. ___ Prices

B. ___ Information, planning and management

C. ___ Number of buyers

D. ___ Price premiums for superior product

E. ___ Acceptance by farmers in general

F. ___ Acceptance by buyers in general

G. ___ Buyer-seller relationships and practices

H. ___ Efficient use of capital you have invested in potato production

I. ___ Your satisfaction with the marketing system

41. Would you ever consider selling a forward contract on a computerized market?

    A. Yes ____ B. No ____ If yes, go to question 43

42. If you wouldn't consider forward contracting on a computerized exchange, where price is negotiated between numberous buyers and sellers, what are the reasons? (Check all that apply)

    A. ___ Afraid that spot price would move substantially above contracted price and lose a change for outstanding profit

    B. ___ I'm too uncertain what my yield level and quality will be prior to planting to commit much of my production

    C. ___ Contracts reduce flexibility

    D. ___ Most contracts can be used against the growers and the enforcement of contract provicions especially grading, is not always equitable.

    E. ___ I am too unfamiliar with the technology

    F. ___ Other reasons (Please specify) ______________________________

    ____

    ____

43. As you know, not all potatoes are delivered to buyers at harvest, a contract calling for delivery after harvest should have higher prices reflecting costs of storage, shrink and the risk of severe quality deterioration. Given these costs and risks and your present storage capabilities, how long would you be willing to store potatoes to fulfill the contract terms?

    A. ___ 1-2 months

    B. ___ 3-4 months

    C. ___ 4-6 months

    D. ___ Longer than 6 months

44. If the penalty clauses to not fulfilling a contract were acceptable and if you chose to participate in a CAPC, how much of your production would you be willing to contract? (Please check one)

    A. ___ 100%

    B. ___ 75%

    C. ___ 50%

    D. ___ 25%

    E. ___ 10%

45. If a computerized auction of potato contracts became wide spread, do you think they might decrease to the extremes that are present in potato prices?

A. Yes ____ B. No ____

46. If the use of CAPC's started generating more predictive prices with less up and down variation than at present, would it change your production and marketing methods?

A. Yes ____ B. No ____ (If yes, briefly tell how)

____

____

____

47. Whom do you think should own or operate the Computerized Auction of Potato Contracts? (Please check one)

A. ___ Sellers

B. ___ Buyers

C. ___ Government

D. ___ Another party (please specify) ________________________

____

E. ___ Such a market should not exist

48. Who should pay the cost of the exchange? (Please specify)

A. ___ Farmers should pay on a cwt. or on a ton marketed basis

B. ___ Buyers should pay

C. ___ The cost should be split

49. Assume that further study showed that CAPC's could make growers better off, but only if everyone marketed a certain portion of their potato production through it. That is the study showed that the system must have more volume than could be gotten through voluntary participation. Would you then vote for such a required participation?

A. Yes ____ B. ____

50. What method should be used to insure that a contract is honored by both parties? (Please check one)

A. ___ A bonding agency should guarantee

B. ___ Agreed upon penalties should be imposed on either of the parties not living up to the conditions of the contract

C. ___ The written agreement should be enough and the courts could then handle any case of contract noncompliance

D. ___ Questions of whether either party has failed to live up to the contract should be decided by an arbitrator whose rulings would have the force of law

E. ___ An agent of the Board of Directors of CAPC could handle such disputes

51. Who should be allowed to contract?

A. ___ Anyone

B. ___ Any receiver or producer that has received or produced potatoes in the past

C. ___ Only those certified as being able to deliver on their promises

D. ___ Only receivers or producers who have had more than five years experience

E. ___ Anyone who can buy a performance board.

52. Under what conditions should the grower be allowed to cancel the contract? (Check all that apply)

A. ___ Acts of God

B. ___ Disease outbreaks causing losses in yield and/or quality

C. ___ The market price at time of delivery is $10 a cwt. above the contract price

D. ___ Other (Specify please) ______________________________

____

____

53. Should producers or buyers be allowed to sell or pay someone else qualified to take their contracts if for some reason they don't want to or are unable to meet the contract terms?

A. Yes ____ B. No ____

54. Would you prefer acreage or volume contracts?

A. ___ Acreage

B. ___ Volume

55. Processors state that they prefer contracting with growers who have a track record for producing quality. For a CAPC to work it might require quality ratings for growers (it would still be possible to protect the indentity of the grower until the transaction is completed). If objective quality ratings based on past performance could be established would you be willing to participate in such a program in order to use a CAPC?

A. Yes ____ B. No ____

56. Who should establish this rating? (Please check one)

A. ___ Growers

B. ___ Buyers

C. ___ Third party (please specify)

57. How should potatoes not meeting contract standards be discounted?

A. ___ The discount should be negotiated with every contract

B. ___ The discount should be set before hand and periodically reevaluated

58. Who should establish the discount (premium)? (Please check one)

A. ___ The operators of the exchange

B. ___ Buyers

C. ___ Growers

D. ___ Buyer-grower bargaining committees

E. ___ Government

F. ___ It should be negotiated with each contract

G. ___ Other (Please specify) ______________________________

____

____

APPENDIX B

APPENDIX TABLE B.1 REGIONAL PLANTED ACREAGE

	Eastern Acreage	Central Acreage	Western Acreage	Winter States' Acreage	Spring States' Acreage	Summer States' Acreage
		- 1000	acres -			
1956	283	303	302	34	193	291
1957	269	311	309	46	198	295
1958	290	321	340	39	204	306
1959	271	314	327	27	146	276
1960	280	325	351	21	162	270
1961	286	362	419	24	163	272
1962	278	331	402	22	134	231
1963	266	322	379	20	143	231
1964	270	321	366	18	125	224
1965	275	328	438	20	147	211
1966	288	324	482	26	155	223
1967	294	335	485	25	142	216
1968	275	315	466	22	118	212
1969	278	314	511	21	125	207
1970	262	320	530	20	112	206
1971	254	340	513	18	112	194
1972	243	317	490	16	97	136
1973	236	326	523	14	100	129
1974	243	345	571	14	104	136
1975	213	294	561	14	85	121
1976	206	313	637	15	100	122
1977	214	334	610	14	98	119
1978	205	326	628	13	98	115
1979	198 .	308	578	13	89	108
1980	185	291	512	12	75	93

Source: U.S. Agricultural Statistics, USDA, Various Issues

APPENDIX TABLE B.2 REGIONAL YIELDS

	Eastern Yields	Central Yields	Western Yields	Winter States' Yields	Spring States' Yields	Summer States' Yields
			Cwt/acre			
1956	250	143	196	156	150	138
1957	241	123	209	154	154	140
1958	232	144	219	144	148	156
1959	225	141	209	152	156	168
1960	226	148	197	155	161	176
1961	240	156	221	211	195	184
1962	252	159	204	192	170	177
1963	250	147	235	190	196	175
1964	250	144	198	202	182	169
1965	237	177	242	189	181	191
1966	230	163	255	199	184	189
1967	236	171	250	198	168	194
1968	233	179	248	177	200	203
1969	229	182	269	193	208	204
1970	244	189	278	191	211	203
1971	247	192	275	172	192	195
1972	236	194	306	151	219	182
1973	212	186	307	204	214	172
1974	253	209	302	214	242	191
1975	232	215	337	202	237	181
1976	256	211	338	207	251	190
1977	254	229	333	199	250	191
1978	236	230	345	203	198	189
1979	255	227	342	200	255	211
1980	237	217	354	205	238	189

Source: <u>Potatoes and Sweet Potatoes, Production, Value, Stocks and Utilization</u>. SRS, USDA, Various Issues

APPENDIX TABLE B.3 REGIONAL PRODUCTION

	Eastern Production	Central Production	Western Production	Winter States' Production	Spring States' Production	Summer States' Production
			-1000 CWT-			
1956	66756	41267	57611	5260	28352	43470
1957	60950	32677	63354	6790	32102	43666
1958	65788	43785	73363	4971	28855	48967
1959	60082	40762	66889	4005	25784	48277
1960	62355	45487	67200	3264	30101	49189
1961	67644	56253	88638	4967	32393	51602
1962	68722	46085	80443	4160	25123	42170
1963	65634	44334	87373	3866	28981	41542
1964	65595	37998	68597	3691	24414	39108
1965	63686	51492	101631	3629	29164	41537
1966	65044	47453	115290	5084	30861	43170
1967	67220	49392	114612	4894	26596	42620
1968	63757	49607	107422	3885	25479	43844
1969	61985	51265	125297	3828	26995	42605
1970	62573	53154	137798	3582	25907	42738
1971	62182	58834	132780	3088	23658	38812
1972	51431	55029	142381	2327	21011	23776
1973	49327	56115	148425	2853	21213	21478
1974	60274	65359	159853	2933	25032	25421
1975	48394	54097	169439	2887	19994	20898
1976	50734	57718	193655	2984	24722	22541
1977	49836	67772	184696	2660	22870	21982
1978	47292	69276	201490	2621	17963	21167
1979	48695	62326	180948	2383	21348	21847
1980	42193	54672	165143	2363	17067	16999

Source: Potatoes and Sweet Potatoes, Production, Disposition, Value, Stocks, Stocks, and Utilization. SRS, USDA, Various Issues.

APPENDIX TABLE B.4 REGIONAL AVERAGE PRICES RECEIVED: $/Cwt.

	Eastern Prices	Central Prices	Western Prices	Winter States' Prices	Spring States' Prices	Summer States Prices
1956	1.50	1.24	1.23	3.32	3.98	3.43
1957	2.25	2.33	1.70	2.08	1.65	1.70
1958	1.26	1.05	1.09	2.93	1.99	1.39
1959	2.39	1.90	2.18	2.30	3.18	2.21
1960	1.67	1.64	1.99	3.68	3.11	2.21
1961	1.31	1.23	1.14	2.44	1.94	1.59
1962	1.52	1.39	1.48	2.37	2.80	2.02
1963	1.97	1.49	1.57	2.39	2.11	2.03
1964	3.79	3.75	3.40	3.08	3.63	3.01
1965	2.51	1.91	1.92	5.52	4.68	3.21
1966	2.08	2.05	1.86	2.90	2.62	2.13
1967	1.66	1.65	1.70	3.30	2.76	2.44
1968	2.11	1.86	2.21	3.23	3.18	2.32
1969	2.53	1.99	2.00	3.39	2.74	2.43
1970	2.29	2.04	1.81	3.92	3.41	2.90
1971	2.11	1.70	1.64	1.96	3.46	2.44
1972	4.06	3.15	2.50	3.46	2.94	3.50
1973	6.85	5.08	3.82	5.55	6.05	6.30
1974	3.27	3.46	3.74	9.10	6.80	5.10
1975	6.01	5.69	3.60	5.35	6.15	5.70
1976	4.93	3.73	2.83	8.70	5.30	4.35
1977	3.77	3.35	3.00	8.69	6.23	4.80
1978	4.27	3.37	2.50	7.81	7.07	5.96
1979	3.79	3.74	2.93	8.00	4.54	4.33
1980	7.20	7.91	5.50	9.40	6.46	8.96

Source: Potatoes and Sweet Potatoes, Production, Disposition, Value, Stocks, and Utilization. SRS, USDA, Various Issues.

APPENDIX TABLE B.5. UTILIZATION OF POTATOES

	Fresh	Chips	Dehydrated	Frozen	Other
1957	143763	17356	3776	4215	70429
1958	144874	17063	5917	7352	90523
1959	142937	20224	7656	8742	63719
1960	149199	21018	10104	13373	63741
1961	153370	22642	8518	15911	93186
1962	150893	24086	9280	15962	66482
1963	146532	26693	9909	19782	68814
1964	129513	28783	10801	20494	51485
1965	139542	31292	20166	32263	67366
1966	133856	32729	19811	34029	86477
1967	131184	32406	19084	34601	88059
1968	126087	34035	22761	37794	74724
1969	127434	35459	25483	44654	79120
1970	129809	35861	26053	54478	79551
1971	120276	35376	27021	54667	82014
1972	111354	34578	27450	56126	66447
1973	106027	34485	31403	60349	67142
1974	125388	32777	34660	69206	80029
1975	112130	34107	33821	70641	69135
1976	123204	34503	40354	79654	79959
1977	116549	36947	32783	79949	88348
1978	111135	37839	33243	79539	91453
1979	114597	38276	30784	74320	83669
1980	97226	37611	28220	67222	72578

1. Includes other frozen potatoes products except french fries, canned potatoes, starch and flour, seed, feed, shrinkage or loss

2. Source: Potatoes and Sweet Potatoes, Production, Disposition, Value, Stocks, and Utilization. SRS, USDA, Various Issues.

APPENDIX TABLE B.6. REGIONAL PRICES OF PRODUCTION SUBSTITUTES

	Maine Hay	Red River Valley Sugar beets	Pacific North-West Sugar beets	Other Regions Hay'
	$/Ton	$/Ton	$/Ton	$/Ton
1957	23.20	12.20	11.37	22.40
1958	23.10	10.33	11.26	19.40
1959	28.00	11.71	11.53	22.20
1960	25.90	10.05	11.60	22.30
1961	23.00	11.10	11.29	21.70
1962	22.50	10.03	11.30	20.60
1963	22.80	12.33	12.79	21.60
1964	30.50	12.42	11.69	24.60
1965	31.50	10.60	12.26	24.00
1966	32.00	11.43	12.74	24.00
1967	29.00	13.24	13.01	25.00
1968	25.00	14.47	13.29	24.50
1969	24.50	13.07	14.24	23.60
1970	26.50	13.90	14.61	24.70
1971	33.00	14.41	15.95	26.10
1972	33.00	15.34	16.28	28.20
1973	39.00	16.03	17.07	31.40
1974	38.00	25.80	33.68	41.60
1975	41.00	40.03	44.27	50.90
1976	69.00	25.23	24.15	52.20
1977	58.00	18.70	20.00	60.30
1978	54.00	20.60	26.50	54.00
1979	57.00	21.80	28.50	49.80
1980	59.00	22.00	27.00	59.70

1. Weighted average price of hay outside of Maine, Pacific Corthwest, and Red River Valley

Source: U.S. Agricultural Statistics. USDA, Various Issues

APPENDIX TABLE B.7. RETAIL PRICES OF POTATO PRODUCTS: CENTS PER POUND

	Tablestock	Frozen French Fries	Flakes
1956	6.77	35.6	68.8
1957	5.71	30.1	57.8
1958	6.26	32.9	63.5
1959	6.33	33.3	64.2
1960	7.18	35.0	72.9
1961	6.29	34.8	64.0
1962	6.32	33.8	64.2
1963	6.51	32.3	66.1
1964	7.57	29.5	79.5
1965	9.37	30.2	86.6
1966	7.49	28.1	83.2
1967	7.47	26.7	82.9
1968	7.63	27.4	84.1
1969	8.61	28.8	86.6
1970	8.97	29.5	89.4
1971	8.61	29.0	91.7
1972	9.26	29.5	93.0
1973	13.69	30.6	97.6
1974	16.64	39.6	116.5
1975	13.44	45.5	127.3
1976	14.60	48.9	129.6
1977	14.97	50.0	131.4
1978	14.11	54.4	134.2
1979	14.56	55.2	137.0
1980	15.01	57.8	143.2

Source: U.S. Dept. of Labor, Bureau of Labor Statistics, Various Issue

APPENDIX TABLE B.8 MISCELLANEOUS DATA

	U.S. Population -Mil.-	Women in Employment Force -Mil.-	% of Employment Force Women	CPR (1967 base yr)
1956	167.5	20.4	32.0	.814
1957	170.6	20.7	32.3	.843
1958	173.5	20.6	32.7	.866
1959	176.4	21.2	32.7	.873
1960	179.4	21.9	33.3	.887
1961	182.3	22.1	33.6	.896
1962	185.2	22.5	33.8	.906
1963	188.0	23.1	34.1	.917
1964	190.7	23.8	34.4	.929
1965	193.2	24.7	34.8	.945
1966	195.5	26.0	35.6	.972
1967	197.7	26.9	36.2	1.000
1968	199.8	27.8	36.6	1.042
1969	201.8	29.0	37.3	1.098
1970	203.8	29.7	37.7	1.163
1971	206.5	29.9	37.8	1.213
1972	208.9	31.1	38.0	1.253
1973	211.0	32.4	38.4	1.331
1974	212.9	33.4	38.9	1.477
1975	214.9	33.6	39.6	1.612
1976	217.1	35.1	40.1	1.705
1977	219.2	36.7	40.5	1.815
1978	221.5	38.9	41.2	1.954
1979	223.9	40.4	41.7	2.175
1980	226.4	41.0	42.4	2.468

Source: U.S. Dept. of Labor, Bureau of Labor Statistics, Various Issues

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