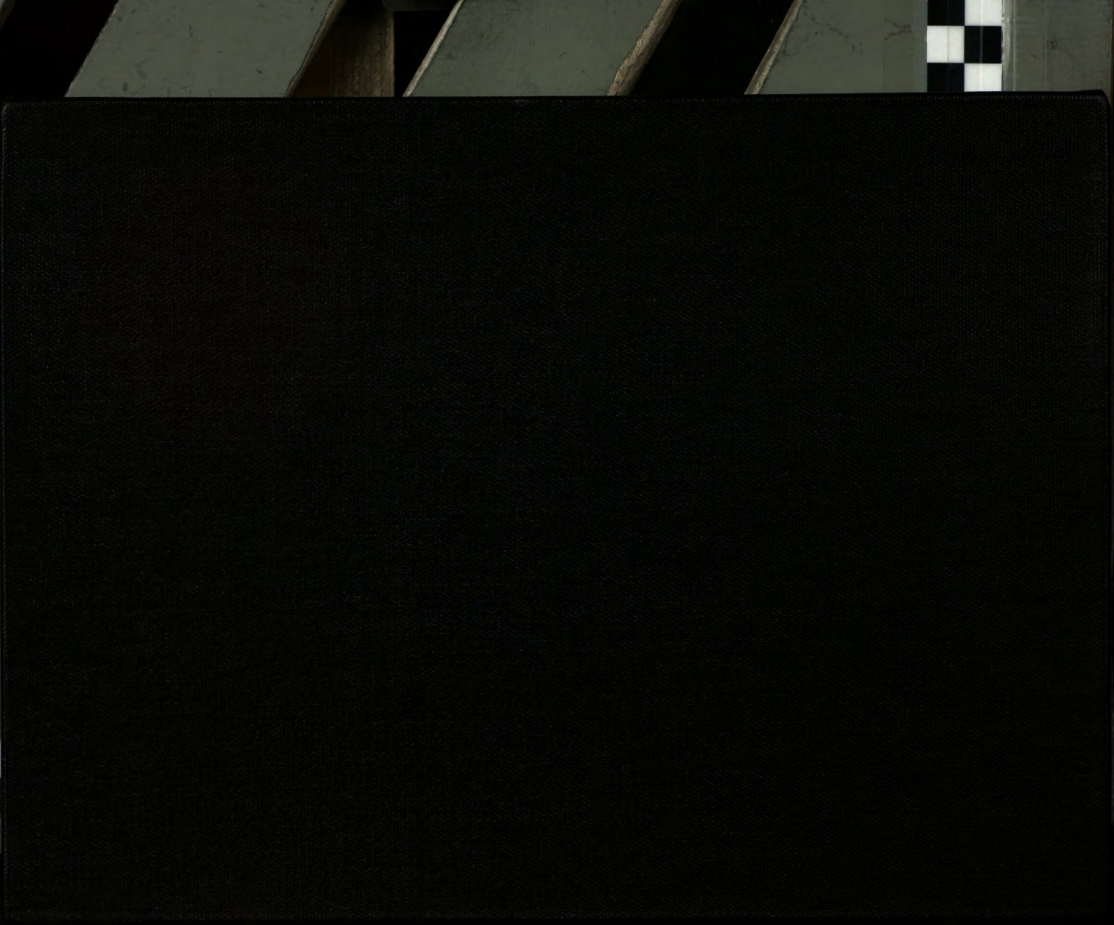


This is to certify that the

thesis entitled

COMPARISON OF COORDINATION MECHANISMS AND PERFORMANCE

BETWEEN THE SUGARBEET AND NAVY BEAN SUBSECTORS

presented by

James Albert Jacobs

has been accepted towards fulfillment
of the requirements for

MASTERS OF SCIENCE degree in AGRICULTURAL ECONOMICS

James D. Shaffer
Major professor

Date July 12, 1988

COMPARISON OF COORDINATION MECHANISMS AND PERFORMANCE BETWEEN THE SUGARBEET AND NAVY BEAN SUBSECTORS

By

James Albert Jacobs

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTERS OF SCIENCE

Department of Agricultural Economics

1988

ABSTRACT

COMPARISON OF COORDINATION MECHANISMS AND PERFORMANCE BETWEEN THE SUGARBEET AND NAVY BEAN SUBSECTORS

By

James Albert Jacobs

Sugarbeets and navy beans, though often grown in the same crop rotation, utilize different mechanisms to coordinate economic activity in the production-value adding-distribution sequences for those commodities. This study is interested in the performance of those coordination mechanisms. The differences in the evolution of sugarbeet and navy bean coordination mechanisms were found to not be randomn, but rather systematically related to the relative degrees of inherent uncertainty and specificity of assets committed to their production and marketing. Sugarbeets, facing more inherent uncertainty in terms of product perishability and asset specificity, are produced solely under forward contracts. Sugarbeets were found to exhibit more stability and better coordination than navy beans produced under a mix of spot markets and forward contracts, with the spot market being the predominant mechanism. Contracting was found to have many benefits over the spot market as a coordination mechanism, and based on the case of sugarbeets, expanded use of forward contracts is recommended for navy beans.

ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to those who have made my graduate studies possible. I am grateful to Dr. Jim Shaffer for his guidance and patience during my studies and the course of this thesis. I also wish to thank Dr. Jim Hilker and Dr. Joe Saunders for their contributions and advice during my thesis research. I would also like to thank my fellow students who through their friendship and encouragement helped keep my endeavors in perspective.

I am also grateful to the members of the sugarbeet and navy bean industries for their cooperation, for without it this study would not have been possible. In addition, I would like to thank the Agricultural Marketing Service of the United States Department of Agriculture and the Michigan Agricultural Experiment Station for their support of this thesis research.

Most of all, I would like to thank my parents and family for their continued support, understanding, and faith in my pursuits and interests. And I especially dedicate this to my grandmother, who through her quiet courage and basic faith in people, is a constant source of inspiration.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

INTRODUCTION

1.1 A QUESTION OF COORDINATION

This study is primarily concerned with the fundamental activity of agricultural markets: the coordination of economic activity involved in the production-value adding-distribution sequences responsible for bringing an agricultural commodity from the field to final consumer. The concept is known as "vertical coordination", described by Mighell and Jones(1963) as : "All ways of harmonizing the vertical stages of production and marketing. The market-price system, vertical integration, contracting, and cooperation singly or in combination are some of the alternative means of coordination." Marion(1986) describes a vertical arrangement for agriculture as a "subsector", viewed as an interdependent array of organizations, resources, laws, and institutions involved in producing, processing, and distributing an agricultural commodity. A number of industries are usually included in a subsector, and this study will focus on the coordination mechanisms at work in the sugarbeet production and processing industries.

The chief objectives to be addressed are embodied in these questions: "What institutions and mechanisms are currently coordinating the production and exchange of the commodity?", "How well are they working and what factors influence their performance?", and "What changes, if any, can and should be effected to improve coordination?".

The goal is to build upon a detailed examination of the coordination process for a specific commodity to not only draw some conclusions on the implications for that commodity subsector, but also to add further information to theories of coordination in general.

Coordination has been noted to refer to both a process and a state(Marion 1986), where the state is an ideal of performance evidenced by perfect harmonization of economic stages(Lang 1978). The concern is with an assessment of the coordination process tempered by the understanding that determining the optimal level of coordination, let alone recommending ways to achieve it, is limited by the need to reconcile the multiple goals of market participants as well as multiple dimensions of performance. The objective of identifying an ideal state of coordination is replaced by a more pragmatic goal of first gaining insight into the coordination processes of sugarbeet markets, assessing the resulting performance, and then giving recommendations, if any, that will improve coordination in a manner that best meets the perceived interests of the market participants. Each agricultural commodity market is affected by a number of unique factors, and a possible outcome of the identification and analysis of those factors is that the market is coordinated as best as can be given the present circumstances, or environment.

A topic meriting consideration is "What are the implications of either the current state of coordination or recommended changes on the macro-economy or general welfare of the public?" Establishing clear

causal relations between institutions and events at a single interface is very difficult. Identifying causations and impacts across the entire economy is beyond the practical scope of the study. However, it could be argued that improvements in the coordinating efficiency of a vertical system should benefit almost everyone. This study examines mechanisms and associatied policies at a single interface and must give chief consideration to the interests of only those individuals or organizations directly involved in the production-value adding-distribution sequence for sugarbeets, not social welfare in general, though a case can be made that since it includes the consumer, the publics welfare is considered.

Implicit in the statement of the objectives in the opening paragraph is that coordination does not flow automatically in the neoclassical economic sense from the workings of price in the marketplace. True, market price is the chief signaller of economic activity in the market, but cannot be assumed the sole director of transactions because of the unrealistic assumptions upon which the theory is based, especially those of perfect competition and perfect information. Government programs, contracts, and vertical integration are a few of the arrangements that often work in conjunction or in complete replacement of the spot market price in coordinating activity. It is recognized that real world conditions, especially uncertainty both in the price discovery process and over future outcomes, can inhibit the ability of price alone to coordinate activity. Mechanisms and institutions then arise in response to the inability of price alone

to coordinate in a manner acceptable to market participants, which ideally create the proper incentives or restraints to economic behavior that ultimately improve coordination. These actions are a response by individuals to obtain a greater amount of control over events and decisions occuring in an uncertain environment, but greater control does not guarantee better coordination, and in fact excessive control at the expense of others may be a detriment. The role of uncertainty is accorded much validity in the impetus to create alternative mechanisms to the market for transactions, and an entire chapter will be devoted to uncertainty's impact on coordination.

Vertical integration removing an economic transaction from the marketplace is one such mechanism where the price system no longer is involved in the coordination of that transaction, often because the level of uncertainty in the market is such that the cost of that transaction in the marketplace is greater than the cost of internalizing the transaction. It is assumed that there are costs beyond those incurred in the physical production of a product, namely the costs of using the market, or "transactions costs". Costs of using the market can warrant the rise of alternative structures to facilitate a transaction, such as contracts or total integration within a firm. Williamson(1981), Coase(1952), and others have presented plausible cases for the impact of transactions costs on market organization, and transaction cost theory will be explored further in explaining coordination behavior in sugarbeet markets.

1.2 COORDINATION AND SUBSECTOR ORGANIZATION

In recent years, the organization and coordination of many agricultural subsectors have undergone significant changes, especially the demise of markets being the only link to a number of small firms to the rise of systems with medium and large firms linked by contracts, vertical ownership, and joint ventures. Reflecting the changes in agriculture over the past 50 years, this phenomena led to an increased interest in the organization and coordination of agricultural industries. One of the earliest and most ambitious endeavors examining changes in the organization of the U.S. food system was undertaken by a group known as the NC 117 Research Project, a mechanism for coordinating research among participants from land grant universities and the U.S.D.A. A principal area of focus by NC 117 was on subsector organization and coordination, recognizing one, that there was inadequate information on the organization of various commodity subsectors, and two, analysis of coordination by subsector beyond the individual firm or market was a relatively recent undertaking for economists. Although there were a variety of theories about firm and market behavior, there were no well-developed theories of subsector organization and performance.

Seen as a compelling challenge, NC 117 researchers undertook studies on a number of commodity subsectors utilizing an adapted analytical framework of industrial organization theory to guide the case studies. Henderson(1975) and Marion(1976) adapted the structure-

conduct-performance paridigm(S-C-P) to subsector analysis, positing that basic conditions plus subsector structure strongly influence conduct in the subsector, which in turn has an important effect on subsector performance. The resulting subsector studies did well to describe in detail the workings of a particular subsector and when possible, identified problems, but did not test the causal relationships implied in the S-C-P framework. This study hopes to build on the earlier studies and concepts put forth by the NC 117 project in two ways. First, the organization of a commodity subsector not examined in the original studies, sugarbeets, will be described, adding to the data base on agricultural subsectors. Second, the analytical framework will be extended beyond the S-C-P paradigm to a framework based on adaptation by Shaffer(1980) of the S-C-P paradigm known as E-B-P.

E-B-P stands for environment-behavior-performance, and goes beyond the S-C-P approach of a one way causation in that given a specific structure, one can expect a certain set of conduct and performance characteristics to be exhibited. The environment is seen as a more dynamic setting of overlapping opportunity sets based on an individuals position in the economy and constrained the organization to which he belongs and its' internal operations, market factors, and the prevailing uncertainty. Behavior is the response of individuals to their environment, and performance is the outcome of the collective behavior of all relevant participants.

The critical difference of E-B-P and S-C-P is that performance acts in a "loop" relationship in that performance impacts the environment, creating a new environment of opportunity sets. Like the S-C-P paradigm, E-B-P allows the consideration of multiple performance measures and the option to choose ones that are appropriate to the analytical purpose. However, E-B-P goes further in allowing behavior to be examined in its particular environment as opposed to what should be based on the expectations attached to a given structure. Redesigning the environment is seen as key to addressing a policy approach to coordination problems, where the proper incentives must be created to induce a desired change, or performance. Explicit to the study will be a detailed examination of the environment and its impact on coordination performance.

The environment of a subsector is made up of a complex interworking of individuals, firms, government organizations, property rights, and prevailing uncertainty. Addressing the environment of an entire subsector from grower to consumer is a cumbersome task, and attempting an even treatment of all stages and interfaces can cloud the analysis of a specific interface. Therefore, in building on the original NC 117 interest in vertical coordination through subsector studies, this work will be a "Sub" subsector study, focusing the coordination of a single commodity interface, the exchange of sugarbeets from grower to first handler, in this case, a sugarbeet processor.

From the single interface of raw sugarbeet exchange, the study will be extended to the examination of a second agricultural market, that of navy beans, to act as a reference point for comparison of similar interfaces to hopefully gain insight into causations of coordinating activity across different markets. One of the recommendations for further research coming from the NC 117 project was for the extension of subsector analysis into the causal links across markets. This study will attempt it in a conservative manner in that only two specific interfaces will be analyzed.

Navy beans were selected as a comparison commodity because in many regions they are grown in the same rotation as sugarbeets, but are marketed and exchanged under dramatically different mechanisms. The use of contracting specifically will be the focal point, since it is the dominant exchange mechanism for sugarbeets and though used somewhat less, an important tool for navy bean marketing. Sugarbeets will be considered the primary commodity of the study, with navy beans introduced as a secondary commodity for comparison. Chapter Two offers a detailed description of both commodities.

1.2.1 COORDINATION AND SUBSECTOR ANALYIS: INDIVIDUAL POLICIES FOR INDIVIDUAL PROBLEMS

Agriculture has been receiving considerable media attention over the past year, and deservedly so, given the severe decline of the farm economy. The attention has come in the form of broad "brush strokes" of generalizations however, and though not the intent, have lumped all

commodities and their subsectors into a single industry, farmers. Policy decisions come to be based on emotions, with calls for sweeping reforms such as those advocating a more "free market" or supply controls aimed at helping the farm economy overall. My purpose is not to debate farm policy and the cure to the farm economy's current state, but rather to point out that there are hundreds of unique agricultural subsectors, each with a different environment, structure, and demand curve allowing some to be faring better than others. Though there is a need for setting broader, general farm policies as a direction or mission statement, of equal or greater importance to actually addressing the "farm crisis" is policy addressing the needs of each subsector or industry individually in terms of the environment that each operates in. This study can be thought of a policy support paper in that in addition to assessing current policy, it should provide policymakers a better understanding of the workings of the individual commodities examined.

1.3 INSTABILITY AND COORDINATION

Related to the above discussion on the farm crisis is the notion that the root of the problem is one of coordination, not production. Not that they operate separately, and excessive production can be both a cause and evidence of poor coordination, but shortfalls of supply is rarely mentioned as problem in agriculture. Rather, in "so many words", coordination of supply with demand is seen as the culprit. Whatever the reasons, be it weather, government policies, or demand

shifts, there is evidence across many agricultural commodities that markets are not coordinated as best they can be. Though admittably a simplification, and the markets may be coordinated the best they can given the environment, poor coordination as exhibited by excessive supply and price instability is the real problem in agriculture.

Price changes alone as dictated by changes in supply and demand is not instability, but rather evidence of the market working according to economic realities. Instability instead is a negative term associated with the degree of predictability afforded to market participants over future market conditions, or rather, a lack of predictability. Excessive instability is such that there is a high degree of uncertainty over future results of decisions. In agriculture, the consequences of a decision, such as how much to produce, is generally lagged many months. Planning becomes difficult under high degrees of uncertainty, with errors in decision making being both a cause and effect of excessive instability. Excessive instability and resultant unpredictability is generally pointed to as evidence of poor coordination, or at the very least, its' existance should warrant an examination of the coordinating mechanisms at work. Uncertainty and instability are seen as closely linked, and the next section will overview further uncertainty and coordination, and Chapter Three will expand further on the role of instability in agricultural markets.

1.4 UNCERTAINTY AS A SOURCE OF INSTABILITY

Compared to most industries in our economy, agriculture is generally agreed to exhibit substantially more instability. With most industries, there can be a reasonable amount of certainty in the quantitiy of output from a known quantity of inputs such as raw material, labor, and capital. While the agriculture producer can have just as accurate an idea of the quantity of inputs they are employing, the resultant quantity of output can be far more uncertain, primarily due to the exogenous effects of weather and disease. Other industries can and do experience various types of uncertainty, such as demand and the supply of raw materials, but these are uncertainties also faced by agriculture producers. Weather and disease effects on yields create an added measure of uncertainty not seen in most other industries, and is felt to be relatively uncontrollable beyond agronomic advances in disease prevention and irrigation techniques that minimize their effects. For the purpose of this study, weather and disease still play a significant role in the production of most agricultural commodities and are assumed largely uncontrollable.

If weather and disease were the only factors felt to be creating the instability problem in agriculture, little could be done to improve the stability of agricultural markets aside from agronomic advances. However, there is another reason for the instability found in agriculture not seen in other industries. While all industries, including agriculture, have a system in place facilitating the transfer

of product from one stage to the next, most non-agricultural industries have a better coordinated mix of contractual and vertical integration mechanisms of exchange less inhibited by the uncertainty of supply either from the preceeding stages or of its own processes. What is needed at the next stage is generally what is produced in the preceding stage. This is not the case in the food system, with uncertainty of supply creating a system of exchange mechanisms not only for the exchange of a product, but also an array of mechanisms and institutions whose primary purpose is to deal with the potential uncertainty of the market, or at the very least are functionally affected by the uncertainty. Coordination of supply with demand, especially at the producer level, is perceived as a significant problem in agriculture, and our interest is in deficiencies in coordination beyond those instigated by weather and disease factors. Deficiencies in coordination beyond weather and disease factors adding to the instability present, be it price or supply instability, is assumed controllable.

1.5 ISOLATING COORDINATION PERFORMANCE

Coordination mechanisms operating poorly, or those that could improve coordination but are not employed also contribute to the coordination problem. Failures in coordination mechanisms can then be both a cause and a result of the coordination problems present in an agricultural system.

What constitutes poor coordination in an industry is not always a consensus opinion, though identifying a result of poor coordination is likely to be easier than isolating the causation(s). Evidence of poor coordination can be fairly overt, such as in the existance of gluts and shortages or wildly unpredictable price fluctuations, or it can be labeled in more "slippery" economic terms, such as inequitable returns to production, product characteristics not meeting buyer preferences, or inefficient allocation of resources. In either case, matching the evidence of poor coordination to the explicit and conclusive cause of its' existance is a difficult task. For instance, are persistant gluts and shortages the result of intentional guile on the part of other system members, impacted or inefficient flows of information to producers, U.S. trade policy, or are they merely rooted in the biological characteristics of the commodity itself. Data on production, price, and demand will be examined for evidence of possible coordination problems, such as in the form of gluts and shortages or random and erratic price changes. Quantitative analysis will serve as a framework in classifying some of the effects of poor coordination, but the ultimate assessment will lie in the real world case study of the mechanisms and environment of the sugarbeet and navy bean markets.

Given the dynamics of the economy in general, a combination of factors is likely, often with one acting as a catalyst for another, creating blurred boundaries to the neatly separated textbook economic causes. A logical beginning approach to assessing causations and effects of instability would then seem to be starting with a single

transaction point, getting a detailed understanding of the mechanisms at work there, and then working out to broader indirect or third party effects. This study emphasizes the role of the individual environment in understanding instability, recognizing that straight mathematical comparisons across markets can only be a signal if at all that coordination problems exist, but never a proxy for the degree of coordination effectiveness. Coordination effectiveness must be assessed according to each institutional setting of a transaction and the forces impacting their performance, especially the degree of uncertainty. Markets are not freely flowing "animals", but rather, operate according to the institutional structure in which the exchange takes place. Changes in market institutions, given the environment, are assumed to potentially change market performance.

With mechanisms and institutions impacting coordination assumed to be potentially controllable, the intent of public policy aimed at improving market coordination should be on what institutional change or conditions are necessary to achieve that goal in an individual market. Lowe(1969) characterized this form of analysis as "instrumental economics", first identifying policy goals and then "working back" from the goals to identify preconditions of their achievement. Heilbroner(1970) expanded on this by suggesting economics become a "policy-oriented instrument whose major theoretical purpose is to discover what 'premises'-what behavioral forces, what technological constraints, what instituitions-would be necessary to attain targets or goals." Heilbroner contrasted this economic philosophy with the

neoclassical application of economics as a science, that "deduces its conclusions or predictions from secure premises of behavior and technology." Lang(1980) rightly interpreted Lowe's policy approach as a major, long-term goal of the economic profession. For this study the concept of instrumental economics serves as a philosophical underpinning, supporting the belief that overt efforts for institutional and behavioral change can achieve a desired policy goal.

1.5.1 ORDERLY MARKETING: THE RESULT OF GOOD COORDINATION?

In addition to the basic interests of the study in creating a better understanding of market coordination and coordination analysis theories, another goal is that of assessing alternatives and changes in public policy that may improve market coordination at the grower/first handler exchange for sugarbeets navy beans. Public policy aimed at market coordination often uses the term "orderly marketing" as the goal of a specific policy, especially those initiated or overseen by the U.S.D.A.'s Agricultural Marketing Service. Programs such as price reporting and marketing orders are instituted because of a perceived desire by market participants for a more orderly market. Certain factors exist, such as excessive supply fluctations or product perishability, that if left to "free market" forces, many grower/first handler markets would regress to states of poorer coordination. A more orderly market is then the desired state of improved coordination over the existing levels of coordination that triggered the policy initiative. If a desire to improve coordination is embodied in the

concept of orderly marketing, I would like to broaden the concept to apply to all analysis of market coordination. First, there is a need to explore further just what orderly marketing means.

Though often stated as a desire by agricultural market participants and reiterated as a policy goal, the meaning of orderly marketing has long been left to be inferred from the context of legislation in which it was written and is not a well defined concept. Orderly marketing implied a stable market with a measure of certainty, but was not a term used in traditional economics and for the most part a vague terminolgy left to individual interpretation. Shaffer(1986), as part of an analysis of marketing orders that frequently stated orderly marketing as goal, put forth a "workable definition" of orderly marketing. Based on the pragmatic notions of market participants and inferences from the marketing order legislation, Shaffer stated the following definition: "Orderly marketing refers to a process of economic coordination by transactions among buyers and sellers which consistently matches supply with potential effective demand at prices consistent with the cost of producing and marketing the commodity." Potential effective demand is added to simply demand to reflect that good coordination should involve product characteristics matched to buyer preferences not revealed through a purchase decision, and also to include demand expansion for the better of the industry and to meet future changes in demand.

The ability to adjust is seen as a critical element of properly working coordinating mechanisms. A value judgement is attached to the market performance in that it is more or less orderly, and not a precise concept or an absolute performance criterian. Shaffer's analysis further states that supply will seldom exactly match demand at prices exactly equal to the cost of production of the average firm in the industry, nor that the definition will be consistent with other criteria for market performance. However, since this study is expressly concerned with coordination performance, orderly marketing as defined above seems to embody the performance criteria that should flow from improved coordination. Criteria put forth by Shaffer(1986) and others that define orderly marketing will serve as the main performance guidelines against which coordination of sugarbeet markets will be assessed.

In addition to the above description, the process or state of orderly marketing is characterized by the following:

-Avoids gluts and shortages

-Facilitates the matching of supply with demand at prices constitent with costs, including a reasonable profit.

-Minimizes unpredictable fluctuations in supplies leading to larger fluctuations in price and thus unpredictable profits and losses.

-Avoids situations where the actions of a few "spoil" the market.

-Results in rewards going to suppliers who produce products with characteristics most preferred by buyers.

-Facilitates the capture of benefits produced by investments to improve quality, expand demand, or reduce costs for the industry as a whole.

-Differences in prices generally reflect differences in costs and are not random and unpredictable.

Other factors that should be considered but not mentioned in the orderly marketing discussion include ease of entry/exit and quality of information, though a number of the above criteria hinge on the quality and availability of information in the decision process.

It is recognized that all of the above criteria may not be given equal weight in the analysis due to varying amounts of information, and not all criteria may be relevant. Those determined to be most relevant will be based on the unique characteristics of the sugarbeet and the mechanisms of exchange framed by environment in which they operate.

The notion of orderly marketing will serve two purposes: as a guideline to information collection, and as a definition of performance measures against which the information gathered can be analyzed. First, since this is essentailly a case study, a good portion of the information gathered is qualitative in nature, primarily through interviewing industry participants and reviewing trade literature. The orderly marketing criteria helps in determining which information is

the most relevant. Secondly, once the information is gathered, the orderly marketing criteria allow it to be "catalogued" and assessed to determine the level of coordination present.

So with the concept of orderly marketing in hand, the remaining chapters will take the following course. First, a generalization of the structure and and basic activities of the sugarbeet subsector will be introduced, emphasizing the grower/first handler exchange. Second, the existing institutions and mechanisms will be analyzed in terms of why they have evolved given the environment they operate in, especially in comparing specific arrangements and mechanisms across regions. What has evolved will be related to theories and concepts of coordination and behavior that will assist in explaining their functions and evolution, especially theories of transactions costs and those recognizing the role of uncertainty. And lastly, utilizing the information gathered on sugarbeets, coordination of the grower/first handler exchange will be assessed, using the applicable orderly marketing criteria. Comparisons will be made to the similar transaction node for navy beans, and alternatives to improve coordination for sugarbeets will analyzed.

Chapter 2

OVERVIEW OF THE MECHANISMS OF EXCHANGE FOR SUGARBEETS

2.1 INTRODUCTION

The previous chapter posited the problem in agriculture as being the coordination of supply with demand in the face of inherent uncertainties created by weather, disease, and imperfect information. The coordinating process in the production and marketing of sugarbeets is felt to operate under similar constraints. This chapter will describe the sugarbeet subsector and its mechanisms of coordination. The generalizations on the sugarbeet system is a composite drawn from industry interviews and reviews of trade literature and reports.

The stage will then be set for the next chapter on the "why's" of the coordination mechanisms that evolved expanding on the realities of the environment and resultant behavior, and where possible, relate to existing theories on coordination and behavior for explanations. The following is a descriptive sugarbeet system reference guide, allowing for subsequent detailed discussions on coordination to be unencumbered by the to need clarify terminology at every turn.

2.2 OVERVIEW OF THE SUGARBEET PRODUCTION SYSTEM

The sugarbeet(also referred to as "beet") is a cool weather annual crop produced widely in the more temperate climates of the world. Sugarbeets, along with sugarcane, constitute the only sources of the the basic food staple, sugar. Though sugar has been produced for hundreds of years, up until the early 19th century sugarcane, a tropical plant, was the only source. With the development in Europe during the early 19th century of sugar extraction capabilities from what is now commonly called the "sugarbeet", sugar production expanded beyond traditional tropical growing regions to the temperate climates of Europe, the Soviet Union, and the United States. Beet sugar now accounts for approximately 40% of annual world sugar production. Refined sugar can be from either cane or beet sources, and on the world market these are considered an identical product. There are over 130 countries producing and marketing sugar.

2.2.1 U.S. SUGARBEET PRODUCTION

U.S. sugarbeet production is currently spread among twelve states, down from 16 states a decade ago. Overall acreage has decreased as well since a peak in 1975, though not in direct proportion to the loss of acreage from states exiting sugarbeet production. Other states responded with expanded acreage to where acreage planted has stayed fairly level into the 1980's. Most of the production is in the more temperate nothern half of the U.S., though the use of irrigation has

allowed production in more dry climates such as the Imperial Valley of California and eastern Colorado. Commercial production of sugarbeets is solely for refinement into sugar, with beet pulp and molasses the primary byproducts of economic value. There is no known direct consumption of raw beets by humans on a commercial scale. All sugarbeet use is derived from processing.

Sugarbeets are grown annually in a multi-crop, 3-to 5-year rotation by independent growers and harvested mechanically each fall. Yields are higher and disease is reduced if beets are rotated with other crops, especially in highly fertile soils, since beets respond better to fertile soils than many other crops. Rotations vary somewhat by region, with corn, wheat, soybeans, potatoes, and dry beans being the chief competitors overall for ground in the individual grower's enterprise. Prior to each spring's planting, the individual sugarbeet grower must decide among a mix of crops which ones to plant and in what quantities. The decision to plant sugarbeets is then not only a function of the expected returns of sugarbeets, but also the expected returns from other potential crops in the growing enterprise. The ability to substitute one for the other is not easy, however, and as will be seen in the next chapter on specific enterprises, is a function of more than just price. For now, the salient point is that sugarbeet production is always part of a larger, multi-crop farming enterprise, and the decision to plant sugarbeets is framed within a broader crop mix decision.

No processor directly owns the acreage on which sugarbeets are grown, though as we shall see in detail later, some growers do own the processing operation through a cooperative arrangement in which they are shareholders. In all cases, all beets are produced under production contracts, written prior to planting, between the grower and the processor. Payment provisions are based on a percentage formula that, though slightly different by region in terms of profit and cost sharing, is directly tied to the amount of sucrose delivered per ton of beets. Returns from the sale of by-products may also be included in the payment provisions, though in some regions the growers do not share in the sales of byproducts.

2.2.2 SUCROSE: CRITICAL ECONOMIC COMPONENT OF SUGARBEETS

The sucrose content of the raw sugarbeet, about 16% of the beet, is the critical variable in the returns to both the grower and processor given a fixed tonnage(tons is the standard unit for raw beets). The economies of scale in processing are such that the costs of extracting that extra percentage of sucrose present in a beet is minimal when compared to costs of processing the beet itself regardless of the sucrose percentage. Thus the higher quantity of sucrose per ton of beets is the most important measure of yield. Production, handling, and storage practices in addition to weather conditions can radically alter the sucrose content of the raw beet. Foremost is the phenomena of the harvested beet burning up sucrose once it is harvested. Reproductively, sugarbeets are biennials harvested after the first year

of vegetative growth, and upon harvest, try to regenerate and continue growing, all at the expense of the critical sucrose content. After harvest the sucrose level steadily diminishes, meaning the sooner the beet is processed, the higher level of raw sugar obtained from a ton of beets.

2.2.3 SUGARBEET HARVESTING AND HANDLING

Sugarbeets are harvested in the fall, except in certain areas of California where beets are harvested in the spring after a fall planting. In all regions, there are fairly standard procedures for the harvesting and delivery of raw beets. Beets are mechanically harvested, and have been for at least the past 30 years. Hand harvesting is not considered an economical substitute to mechanical harvesting. The harvesters are large, efficient machines pulled behind a standard sized farm tractor, and can cover 4 rows at speeds up to 5 miles per hour, allowing the individual grower with a few employees to service the average operation of approximately 106 acres with a single harvester. The harvest procedure begins with the removal of the beet tops with a separate cutting machine, topping the beet and initiating the respiratory burning of sucrose. The beet tops are removed as near the planned harvest date as possible, and harvest commences thereafter, with daily beet harvest constrained not only by limitations of man and machine, but also the ability of the next stage, the transporting and receiving of beets, to handle the raw beets.

Depending on where the grower is located, beets are delivered either directly to the processing plant or to a receiving station amidst the growing areas. Receiving stations assemble the beets from local growers into larger loads that are shipped more economically, either by rail or truck, to the processor. Some larger processors have a system of receiving stations surrounding the plant, with transportation economics determining the placing of the receiving stations in relation to beet production and the processing plant. The costs of transporting the raw beets from the receiving stations is included in the cost sharing portion of the contract, with variations in formulas evident across regions. Examples of different transportation arrangements are given in further detail in Chapter III.

2.2.4 DETERMINING THE VALUE OF THE SUGARBEET

Whether beets are delivered to a receiving station or a processing facility, the same handling and assembling functions are performed at each. Once harvested, beets are hauled from the fields on large trucks arranged for by the grower, either through direct ownership or contract carrier. Upon entry to the receiving station, the load of beets, including the truck, are weighed and recorded into an account for the individual grower. The truck then takes the beets to a conveyer system that unloads the beets and removes any dirt, stones, or tops, collectively called "tare", from the load, and returns the tare to the truck. As the beets are unloaded, samples are taken for the purpose of establishing an average sucrose level for that load

of beets. The sample is taken to a tare room located at the receiving station, the beet later tested, and a sucrose level for that load is later credited to the growers account. The truck is then weighed again on the way out, including the tare removed from the load of beets, and this weight is subtracted from the original load weight yielding a net tonnage of raw beets delivered. The net tonnage is applied to the sucrose level delivered to determine the amount of sugar that that load will produce, or raw sugar equivalant, and the grower's account credited for the raw sugar equivalant delivered.

The above process forms the basic building block for all sugarbeet contracts, with differences in grower payments related to the unique cost and profit sharing arrangements of specific regions. In all cases, grower returns are directly tied to not only the net tonnage of beets delivered, but also the amount of raw sugar derived from the sucrose content of a specific load of beets.

2.2.5 SUGARBEET STORAGE AND THE MAINTAINANCE OF SUCROSE LEVELS

When the raw sugarbeets are unloaded, they are stored in large piles, up to a quarter of a mile long, until they are processed. Limitations of processing plant capacity generally dictates that the processing period of beets, called a campaign, extends well beyond the harvest period. Therefore, beets are stored in piles for up to 5 months or longer while awaiting processing. During the storage period the sucrose level of the piled beets steadily decreases, and is called

pile "shrink", with certain conditions, such as unseasonably warm temperatures or moisture, accelerating the loss of sucrose.

Various storage and handling practices can minimize the burning of sucrose, such as covering or forcing air through the piles to take off heat. These practices can be costly however, and the investment in the storage and handling must be weighed against the benefits of increased sucrose levels maintained until processing. Therefore, there is a premium on not only attaining a higher sucrose level, but also on maintaining the level or minimizing its decrease until the beet can be processed, both of which must be compared with the required investment.

While all sugarbeet growers and processors have some interest in the sucrose level, the degree of investment necessary to maintain sucrose levels is varied as evidenced by differences in storage practices among regions. Weather conditions endemic to a region during the harvest and storage of raw beets appear to be the significant factor in the adoption of specific storage practices. In any case, there are certain production and storage practices that optimize the sucrose levels in the raw beet, and a detailed examination of the specific practices and their impact on coordination will be discussed in Chapter III.

2.3 SUGARBEET FORWARD CONTRACTS

As mentioned, sugarbeets are produced under a annual production contract between the individual grower and the processor. Some contracts do ask the grower to specify the acreage they are willing to produce on over a two or three year period, mostly in the case of a newly started processing operations. It is a kind of non-binding indication to the grower that the processor is committed to being in operation for at least the next few years, and if the grower agrees to produce this year, he can expect the same acreage offering for two or three more years. The processor, by asking about long range plans, gets a feel for the growers' desire to grow beets on an annual basis as well as expected acreage. In all cases, however, the only binding portion is the upcoming year, and even then there are ask-out provisions right up to planting time.

When a contract is signed for the coming year, there is a mutual agreement on the rights and obligations related to the sugarbeets grown on a specified number of acres. The grower must deliver all beets grown on the contracted acreage, meeting minimum quality requirements spelled out in the contract, to the processor. Loads may be rejected if they contain over a certain percentage of rotten beets. This provision is supported by grower associations where pile losses are shared between the grower and processor. Since rotted or spoiled beets, when piled with "good" beets, can increase the sucrose burning of the entire pile, lowering the returns of all parties. Also, the processor

agrees to take delivery on all beets grown on the specified acreage regardless of yields. With the contract the grower is guaranteed a market, and the processor is given some parameters of expected supply. An extremely rare occurence is either a grower producing beets without a contract or processors purchasing non-contracted beets.

2.3.1 SUGARBEET CONTRACT PROVISIONS

While the actual contract is between the grower and processor, there are annual negotiations, prior to planting, between the processor and a bargaining association representing the grower. The contract resulting from those negotiations is the standard terms offered to all growers for that processing company. The contract terms typically spell out the percentage payout based on the raw sugar equivalant of the amount of sucrose delivered, though regionally, the percentages vary. Contracts are not on a cost plus basis, but are contingency contracts, where no one party is guaranteed a specific dollar return, only a percentage of the profits from the sales of the raw sugar. The grower is basically paid for his ability to deliver the highest quantity of potential sugar, or sucrose, from a given number of acres. The processor is basically paid on their ability to remove the sucrose from the raw beet and transform it into sugar. The more efficiently the processor can process the beets, the more the processor can net from the sales of the sugar.

Though sugarbeet contracts are the same in that costs and returns are shared between grower and processor in a predetermined formula, these formulas vary across regions. Fortunately for the study, these contracts can be categorized by region into three distinct types: Eastern, Western "Sliding Scale", and the cooperative arrangements of Minnesota and North Dakota. The following sections will briefly examine the important differences in sugarbeet contracts across regions.

2.3.2 THE EASTERN SUGARBEET CONTRACT

The Eastern contract is the type used for sugarbeet production in Michigan and Ohio. The contract is characterized by a fixed percentage formula for sharing costs and returns from the delivery, processing, and sales of raw sugar and byproducts produced from the sugarbeets delivered under contract. The following represents how costs and returns are shared in the Eastern contract:

A1. Growers receive 52% of the gross sales of the raw sugar and byproducts from the processing of beets they deliver.

A2. Subtracted from the growers gross returns are: 52% of the costs associated with marketing and delivering the sugar, including bagging, sales commission, advertising, storage of the refined product; 52% of the recoverable sugar lost in storage called pile "shrink", and all of the costs from transporting the raw beets to the receiving

station or plant in a freight pooling arrangement for the individual plant.

A3. The remaining profits are pooled and returned to the individual grower on the basis of the raw sugar equivalants per ton of beets determined by tests on each load delivered. All costs associated with the production of the beets are borne by the individual grower.

B1. The processor receives 48% of the gross returns from the sales of raw sugar and byproducts from the beets they process.

B2. Subtracted from the processors' gross returns are: 48% of the costs associated with marketing the sugar, including bagging, sale commission, advertising, and storage of the refined product; 48% of the pile shrink; and all of the costs of processing the beets.

B3. The remaining net returns are profits to the processing company.

Note that the costs shared are fairly well defined, with growers bearing all production costs and raw beet delivery costs, processors bearing all the processing costs, and all other costs are shared on the same percentage for each cost.

Since the returns to the growers are based on the sales of the raw sugar and byproducts, the exact amount of the returns is often not

known for almost a year after the beets were initially harvested and processed. Therefore, sugarbeet growers are paid on a calendar schedule of periodic payments as the sugar and byproducts are sold.

The above arrangement is identical for the two processing companies in the Eastern region, and the arrangement has changed little over the past fifty years. Growers can sign contracts for up to five years, but are not binding beyond one year in length, and even with a one year contract, the grower is not obligated to grow at all. Field men for the processor verify all acreage prior to and during planting, and if a grower decides not to grow, the field man's only recourse is to shop the contract around to other growers. Conversely, if the grower signs a contract, the processor must take delivery of all beets of suitable quality from the acreage specified in the contract.

2.3.3 THE WESTERN "SLIDING SCALE" SUGARBEET CONTRACT

The Western sliding scale contract basically represents most of the production west of the MinnDak region. Costs and profits are shared between grower and processor in a formula, but differs from the Eastern contract in the costs shared and the determination of returns. Where the Eastern contract has a 52% grower and 48% processor cost/profit sharing arrangement, the Western sliding scale contract typically works out to where the grower receives about 62% of the net returns and the processor 38%.

In the Western sliding scale contract, the grower is paid on the sucrose delivered whereas the Eastern grower is paid on the basis of the processed raw sugar equivalant of the sucrose delivered. The sliding scale contract is called that because when the growers' beets are tested at delivery, the contract contains a scale that relates the average sugar content of beets delivered with a per ton payment based on the average net returns for the sugar. The higher the net returns and the higher the average sugar content delivered, the more the grower is paid. The scale differs from the Eastern contract in that a fixed extraction rate is used to determine the scale payments, and the average net return is the gross returns minus the the costs of marketing and distributing the sugar. Any gains in processing efficiency in terms of sugar extraction accrue directly to the processor, while in the East the gains in processing efficiency are shared with the grower because of their formula sharing in the gross returns. Also, while the processor pays all the processing, storage, and pile shrink costs, the processor does not share the sales of byproducts such as molasses and beet pulp with the grower. Better weather allowing for better storage conditions is one reason cited as why Western beet processors are willing to bear the risks of pile loss in exchange for keeping the returns from byproduct sales.

Based on the differences in contract formulas alone, it is not possible to tell whether the Eastern contract or Western sliding scale generally offers a better return. The Eastern contract does seem to offer the better potential for sharing in increased efficiencies in

sugar processing and sugar sales. However, the Eastern grower also shares more of the risk from poor storage conditions and a reduction in processing efficiency.

2.3.4 THE MINNDAK GROWER COOPERATIVES

The MinnDak grower cooperatives differ from the other arrangements in that the sugarbeet growers supplying the processor are also the sole stockholders owning the processing company. There are three such arrangements in the MinnDak region, and each are essentially identical in arrangement.

One share of stock allows the grower to plant one acre of sugarbeets from which the coop must take all the production. There is an active market for the sale of stock, or the right to grow sugarbeets for the coop, with the individual shareholder setting the offer price. Share prices move in response to the demand by local farmers to grow sugarbeets. The sale of stock must be approved by the coop's board of directors based on location and fit with the piling station-transportation grid. Growers pay dues on a per share of stock basis to the growers association, with voting rights "one man, one vote" regardless of the amount of stock holdings.

The actual agreement between the grower owned processing company and the individual stock holding grower is a two phase contract. The first phase is a one-year binding agreement where the grower must

deliver all beets grown on a specified acreage. The second phase is a longer term contract of 5 years to give the coop some idea of future plantings, and is binding only under certain conditions. For instance, if the farmer decides not to grow in any year of the five year agreement, the coop has the right to buy back the contract from the grower at the original purchase price and offer that contract to other farmers. A penalty of sorts occurs when the market value of the stock has risen since the original purchase price because the difference accrues to the coop. The executive director of the largest coop stated that this was not a common occurence for them, and usually happened when poor soils or bad management caused beet production to be uneconomical for some growers.

The coop grower returns are based on the returns from the sales of sugar and all byproducts, from which the costs of processing, marketing, administration, pile shrink, and tranportation is subtracted. The remaining pool is returned to the grower on the basis of recoverable sugar delivered. The payout arrangement is like that of the Eastern contract, except the grower is a stockholder as well in the company and shares in the net profits of the company.

The cooperative processing arrangement is fairly new to the industry, with the first one adopted in the early 1970's. They are fast growing in terms of acreage expansion, and now collectively process almost 30% of U.S. sugarbeet production. Processing plant closings was the primary reason for growers, facing the loss of their

only market outlet, to organize and forward integrate into processing. The stock ownership system is somewhat more long-term than the other contract arrangements, but like those arrangements, growers are still held to deliver production for only the upcoming harvest.

2.4 SUGARBEET GROWER BARGAINING ASSOCIATIONS

Generally, the basic contract is changed little from year to year, and instead the negotiations appear to be more of a fine tuning process aimed at improving the efficiency and productivity of beet production and processing versus radical changes in payment provisions. The bargaining association acts as the grower representative in negotiations with the processor, and is funded through dues paid by the grower. There are no commitments between the bargaining association and the grower in terms of acreage or guaranteed returns, and again, all contracts are directly between the grower and the processor. Between the grower and the association is a signed marketing agreement in that the association agrees to represent the grower in dealings with the processor, and the grower agrees to market all beets under the agreement reached between the association and the processor. Growers are generally not even required to join the bargaining association, and growers can have dues collected by the processor for the association refunded at the end of the year.

Growers requesting refunds are quite small, and membership was never mentioned as a problem and is close to 100% of production across

the country. Reasons for this are mainly that the dues are fairly small and there is some peer pressure from the fact that "everyone else" belongs. The individual bargaining association is part of a national organization, the American Sugarbeet Growers Association, based in Washington D.C., to represent grower interests. All U.S. processors negotiate contracts with a bargaining association representing the growers.

Beyond contract negotiations, the individual bargaining association's relationship with the processor is to assist in mediating grievances or discrepancies for an individual grower or the membership in general, especially in the area of assuring proper payments to the members. The association can, at its' expense, hire accountants to review the processors books or a qualified technician to be present in the tare room to monitor sucrose testing. All those interviewed, when asked, stressed the importance of the grower association/processor relationship, and that it was not a common practice to hire third parties to adjudicate an issue. Records of processor operations affecting grower returns are usually considered open to the association, and the association itself can generally ascertain the propriety of those records.

2.5 THE SUGARBEET PROCESSOR

Mentioned often till now, but given limited exposure, are the operations and role of the sugarbeet processor. The typical processing

operation is dedicated to processing only sugarbeets into refined sugar, with saleable byproducts in the form of beet pulp and molasses, with the bulk of its' returns derived from the sales of refined sugar. The processing company is predominantly a large, proprietary company, with some foreign ownership, though the conversion of the three companies in Minnesota and North Dakota to grower cooperative ownership since the mid 70's has put almost 30 percent of U.S. beet processing under direct grower ownership.

Since sugarbeets must be grown in a multi-crop rotation, it is not possible for the processor to raise its' own beets, and instead rely on local farmers to supply their beets. Sugarbeet processing plants are located in the hearts of the production areas, often in large farming communities where they have long been one of the major employers and politically important institutions of that town. To economically transport both the coal and limestone needed in processing and the refined sugar to market, the plants must be located along rail sidings, hence the further need to be located in towns with rail service.

Sugarbeet processing was one of the first agricultural industries to move from small, atomistic operations to large scale, capital intensive operations. Today, the investment required for a new processing facility is still quite large, especially for the complex processing machinery required to achieve economies of scale needed to be competitive. Many of today's plants were originally built in the earlier part of this century, and continual upgrading of equipment has

been necessary to maintain or improve a competitive position in the market. Those that did not found themselves at a disadvantage, and though maybe not the sole reason, likely went out of business as a result. The number of processing plants has declined from 97 in 1920 to 36 in 1986. There are currently eleven companies owning the 36 plants. In 1982 the four largest companies operated 27 facilities and accounted for 67 percent of beet sugar produced. The increased concentration in sugarbeet processing generally parallels the changes in most other agricultural businesses. Total U.S. beet sugar production is limited by the industry's capacity to slice beets, and though production has declined somewhat since the 1970's, slicing capacity per plant has steadily increased over the same period.

The processor's relationship with the grower extends beyond providing processing expertise and facilitating a market for the grower's product, raw sugarbeets. The processor also provides assistance in the production of sugarbeets through an agricultural relations office, represented to the grower by a "field man". The field man provides advice to individual growers on production practices, choosing the optimal fields and soil types, and recommending the best seed stocks to plant. In fact, each processor/bargaining association relationship involves the mutual support of a research unit for seed stock testing operations that develops unbiased recommendations to growers on the varieties that work best in their local region. Other research is also done on all facets of production, from fertilizers to better methods of storage and handling. The

research unit is generally supported by grower dues and matching processor payments, since again, any improvements in sucrose levels benefits both.

The field man also is the primary mechanism to monitor grower practices, from planting through to harvest and delivery for contract compliance. If needed, the field man also solicits new acreage in an expansion period or when a contracted grower is unable to meet his acreage obligation under the contract or chooses to quit sugarbeet production altogether. The field man in this case relies on personal knowledge of the local area to seek out interested growers and evaluate their abilities on the basis of soil types to be planted and the perceived expertise of the operator. The company may choose not to extend a contract to a new grower, or even an existing grower, based on the recommendations of the field man. Even in cooperative arrangements there are mechanisms where poorly performing growers or land parcels may be voted out. This is a standard practice by all processors when contracting new acreage, and no real mechanism beyond local relations and a field man is known to exist. The field man appears to play the key role for processing interests in grower/processor relations.

In summary, the processor plays the critical role of transforming the raw sugarbeet into refined sugar. There is no forward integration of sugarbeet processors into finished food product manufacturing, nor is there much backward integration by food manufacturers into ownership of sugarbeet processors, though some of the parent companies of sugar

processors do count food manufacturing operations among their holdings. In short, the sugarbeet processor is a fairly singular entity, unique in its' purpose to strictly process raw sugarbeets. The individual processing company must then market the refined sugar and byproducts in competition with fairly similar entities. The market for sugarbeet products and the pertinent factors effecting its operation are discussed next.

2.6 THE MARKET FOR SUGAR: A "SWEETENERS" MARKET

The market for refined sugar, the primary product of sugarbeet processing, is actually part of a broader category called the sweetener market. Either in granular form or liquid for further food manufacturers, there are other types of sweeteners competing with beet sugar products. For the U.S., in addition to cane sugar products, identical to sugarbeet, there are starch-based sweeteners, especially high- fructose corn sweeteners, and low-calorie sweeteners, such as aspartame, that compete directly with beet sugar in varying degrees in all its' product forms.

Over the past ten years, total sweetener usage has risen from 125 lbs per capita to almost 147 lbs per capita. However, for sugar over the same period, per capita consumption has declined steadily from almost 100 lbs per capita to under 64 lbs per capita in 1985. The loss of market for sugar is primarily due to increased competition from non-caloric and starch-based sweeteners. Increased interest in diet and

nutrition, combined with a perceived negative label attached to sugar, fueled a substantial rise in the use of non-caloric sweeteners such as nutrisweet. Total non-caloric consumption rose from 6 lbs per capita in 1975 to over 17 lbs per capita in 1986. As new varieties of proposed non-caloric sweeteners are approved by the Food and Drug Administration, the beet sugar industry will see even more competition in the sweetener market.

Increased competition from starch-based sweeteners, especially high fructose corn sweeteners(HFCS), has taken even greater portions of the sweetener market from sugar. HFCS per capita consumption alone rose from a minimal 1.3 lbs in 1972 to over 43 lbs in 1985. Usage of HFCS increased almost as much as the decline in market share for sugar, and has almost completely replaced sugar in the beverage industry, as recently as 1978 was 25 percent of U.S. sugar usage. It should not be construed as direct substitution, for the sweetener market did expand over that time and a number of other sweeteners also expanded usage. However, HFCS does represent the most formidable competitor in the sweetener market, especially if a granular "table sugar" is developed, a process currently being tested by a number of corn refiners.

The question to be asked here is how did HCFS and non- caloric sweeteners come to gain such a large share of the sweetener market, much of it at the expense of sugar. In addition to health and diet concerns, and probably more significantly, is the role of the U.S. Sugar Program in the sweetener market. The next section will explore

the role of world markets, trade policies, and specifically the U.S. Sugar Program, in the production and marketing of beet sugar and in the broader context of sweetener markets. Without question, U.S. sugar policy plays a critical role in the ability of the sugarbeet industry to operate as it currently does.

2.7 U.S. SUGAR POLICY

Sugar prices are among the most volatile in international trade, rising sharply one year and falling abruptly a season or two later. Most sugar producing countries have enacted policies protecting their sugar producers and consumers from price instability, even though the effect of the collective sugar policies is felt to heighten the instability by distorting true supply and demand conditions for sugar. The United States has long had a policy of protecting its sugar producers, and the current sugar program reflects that desire.

Sugarbeet production and processing, in a program including sugarcane as well, is currently covered under a sugar price-support component of the present farm legislation, the 1985 Farm Bill. The price-support program allows U.S. processors to use their sugar stocks as collateral for federal loans at the government established support price. Growers contracted with the processor are then elgible to receive operating loans from the processor from the price-support loans. Market prices must remain higher than the loan support price to avoid government acquisitions of sugar due to loan forfeitures. The

U.S. has a policy of assuring that the market price for domestic sugar producers never falls below the loan rate through a system of import fees, duties, and quotas.

Price is actually supported above the loan rate by a few pennies per pound at a market stabilization price, or MSP. The MSP is a price objective established to minimize the risk of domestic prices reaching the loan rate, and can be adjusted periodically by the U.S.D.A. to account for changes in production and transportation costs for domestic sugar as well as the world price. The MSP, since 1981, has been well above the world price, and its maintainance is the primary impact of the sugar program. By avoiding taking possession of sugar in lieu of loan repayments, the sugar program is essentially run at no cost to the U.S. Treasury, unlike most other price support programs.

The fact that the U.S. must import sugar, where most other program crops are net exporters, is the key factor in keeping prices above the loan rate. By restricting imports, the government can control price, transfering the costs of the program to the users of sugar, ultimately the consumer. In contrast is the case of a program crop such as wheat where direct treasury outlays, either through CCC storage program costs or deficiency payments, are required to support domestic production.

The fact that the sugar program has been run at no cost to the treasury has not been lost on proponents of the program, namely sugar producers and processors and their associations. The "no cost" aspect

is a major point in their efforts to inform the policy process, and when compared to other direct treasury outlay support programs, appears to have much appeal in the farm legislation process. More discussion on this policy setting process of the program will be pursued in the section on the sugarbeet industry's role in the sugar policy process.

The primary impact of the sugar program in terms of this study is that domestic sugar producers are protected from foreign competition and assured a price through government policy that, though not stated specifically, does allow them to continue production. Before going further into just how the domestic sugar producer is protected, a little more light will be shed on exactly why the sugar program come to be.

2.7.1 WORLD SUGAR MARKETS AND SUGAR PRICE VOLATILITY

The United States role in world sugar markets is one of importation. The U.S., with approximately half the production from cane sources and the other half from beet, produces around 70 percent of domestic sugar use. The other 30 percent must be imported. There are over 160 countries trading sugar, and it is one of the most volatile international commodity markets. The world price of raw sugar generally follows a pattern of high prices for 1 or 2 years followed by a long period of low prices. World sugar price "spikes" have occurred five times since 1950, the latest in 1980-81. For instance, world

price was 8 cents a pound in 1978, 42 cents in October of 1980, and dropped off to 4 cents in early 1985.

Instability of the world sugar market is rooted in the basic characteristics of supply and demand for sugar. Increases in production capacity during the high-price phases of the sugar cycle take several seasons to be absorbed by relatively steady, but slow, growth in total consumption. Processing facilities are expensive to construct and must be large to capture scale economies. Consequently, there is a strong incentive for processing plants to be fully utilized once operational to spread out fixed costs. World sugar production typically catches up with processing capacity after 5-10 years of low prices and slow growth in consumption. At this point, a disruption to production triggers an explosive price rise and the sugar cycle begins anew. The inability of sugar producers to adjust production rapidly in respone to changing conditions is another source of instability. While beet sugar production can be increased fairly rapidly when world price is rising, since the delay between planting and harvest is about 8 months, sugarcane is much slower. A two-year wait may be required before a new crop of sugarcane is ready to be harvested. Since sugarcane is about two-thirds of world production, this lag dominates in the world sugar market.

In response to the above scenario, most sugar-producing countries have enacted policies to protect their producers and consumers from price swings. In addition to the cyclical aspect of sugar prices, the

volatility of the world sugar market arises from three additional factors. First, both short-term demand and supply of sugar is traditionally insensitive to movements in the price of sugar, or is price inelastic. This means that sometimes quite large price movements are necessary to clear the market of temporary surpluses or deficits. Second, the market is a residual one: over 70 percent of the sugar is consumed in the country of production, usually at government set prices. If bilateral long-term agreements and the U.S. program is taken into account, only about 10 percent is available to be traded in the world "free market". Finally, most major producing/consuming countries have protective policies to insulate their domestic sugar industries from international forces. This means most of the adjustments necessary to clear the market at the global level get transmitted to the small portion of the market that is freely traded. World crop changes and shifts in government sugar policies tend to have disproportionate and erratic effects. In periods of crop failure, governments may temporarily restrict exports, thus intensifying upward pressure on world price. Similarly, in periods of bumper harvests when output exceeds domestic needs, supplying nations may attempt to sell or "dump" their surpluses on the world market, exerting downward pressure on price.

Since the U.S. is a net importer of sugar, the latter case of dumping would hard press domestic producers to compete with a world sugar market that has become a residual market for sugar produced at or below its cost of production, especially since the U.S. is far from the

lowest cost producer. In fact, most countries that produce sugar and still must import have policies to protect their domestic suppliers from the vagaries of the world market regardless of their relative costs of production. A 1986 average world price of approximately 6 cents per pound is well below the cost of production for most sugar producing nations.

With protectionist policies and subsidized production combined with good growing conditions stimulating production in excess of needs, overhanging stock levels is the primary reason for world price dropping below 6 cents per pound. With a loan rate of 18 cents per pound, it is easy to see why the U.S. in its' sugar program must enact policies to restrict imports if it is to support the domestic price.

2.7.2 U.S. SUGAR PRICE SUPPORTS

Quotas are the most significant mechanism in supporting domestic price. As overall domestic sugar demand has declined, the size of the quotas has declined in almost the same amount, compensating for the fact that domestic sugar production has not declined as fast as consumption. Therefore, domestic sugar producers have had their share of the U.S. sugar market protected at the expense of foreign suppliers.

Quotas are a controversial part of the sugar program, and a detailed discussion on their merits are beyond the scope of this study. Briefly, quotas are granted to sugar producing countries, meaning that

the grantee can export to the U.S. an amount of sugar up to the quota limit for that country. Import fees and duties are then added to the price paid by the U.S. buyer, and the supplying country gets a price at least equal or greater than the world price. The U.S., by using quotas to protect domestic producers, buys less sugar on the world market than they would without the policy to protect producers, and the result is less demand for the "free market" sugar, meaning a lower world market price. Quotas can become a foreign policy tool, with countries in good standing with the U.S. receiving larger quotas at the expense of countries falling in disfavor, with Cuba in the early 1960's being a prime example. Countries without a significant U.S. quota and which must trade on the world sugar market are likely hurt by the presence of the U.S. sugar program.

Much to the chagrin of U.S food manufacturers and consumers, the U.S. sugar program provides no protection against world prices rising above supported domestic price. In years of price "spikes" in the sugar market, domestic price follows world price on its upward spiral. By not storing sugar under the program, no mechansism is available to dampen price rises, though the sugar industry is probably correct in stating that maintainance of domestic production through a sugar program does minimize the full effects of a world price "spike". Consumers do ultimately bear the cost of the sugar program through a basic tranferrence of income to sugar producers and processors when purchasing sugar or products containing sugar.

Though sugarbeet producers are directly effected by it, analysis of the merits of the sugar program is beyond the scope of the study. The important point is that the sugarbeet industry has been protected by a specific policy, and changes in that policy can effect the operations of the industry. Also, the program is the major mechanism for coordinating aggregate domestic supply with demand for sugar.

2.7.3 THE U.S. SUGAR PROGRAM AND DOMESTIC SUGAR PRODUCTION

In the case of the most drastic change in sugar policy, total elimination of the program, one thing is certain, some of the current producers would be forced out of operation because their costs of production are not competitive with foreign producers. In fact, almost all of U.S. sugar production costs are well above both the current(1986) world price and the foreign costs of production. In a 1976 study, Gemmill estimated that without the government program, mainland cane production would be reduced by 34 percent and beet production reduced by 23 percent. The major adjustment in beet production would be in California and the Northwest where production costs are higher. Though Gemmill's work is now dated, the main results likely still apply, and in the case of reduced production, it would probably be greater given the lower prices of today versus the world price of when his study was done.

Further speculation on what areas of sugarbeet production might be forced out if the sugar program was eliminated today is a valid issue

and of much concern to the sugar industry, but is not within the scope of this study. The point here is the recognition that the sugar industry operates under the notion that with the program as it is, the current levels of domestic production are likely to be maintained, and in the worse case scenario of total elimination of the sugar program, much disruption would occur in the sugar industry.

2.7.4 SUMMARY OF THE U.S. SUGAR PROGRAM

In summary, the highlights of the U.S. sugar program are that the domestic sugar price is supported above market levels at no cost to the government, with the costs of the program transferred to users of sugar and sugar containing products. Without the current sugar program, some producers would be hard pressed to compete. With the sugar program, lower cost sugar substitutes, especially starch based sweeteners such as High Fructose Corn Sweeteners, have made inroads into the sweetener market under the price umbrella for sugar created by the program. Sugar likely has lost sizeable market share because of the market opportunities created for lower cost substitutes by the price supporting effects of the program on sugar.

Without question, the sugar program has played, and will continue to do so, a critical role in determining the current structure of the sugar industry in the U.S. There appears to be a desire at the policy setting level to maintain a domestic sugar industry. Much more could be said on the sugar program, but this study has a narrower focus on

the operations of a single commodity exchange point, the grower/first handler, and will not debate the merits of a sugar program. Instead, the author recognizes the program as a part of the environment in which the sugarbeet industry operates. The industry's role in the policy process will be examined, primarily in the context of how the level of coordination present in the industry effects the policy process, and not how the program, or lack of one, will impact the future structure of the sugarbeet industry.

2.8 CONCLUSION

In this chapter I have described in general the participants, mechanisms, and their functions in the system producing and marketing sugarbeets, focusing on the grower/first handler exchange. A summary of the functions in the production-distribution sequence is as follows: an individual grower chooses to plant sugarbeets among a variety of crops and markets them to a sugarbeet processor through a production contract. No sugarbeets are sold outside of a production contract, and the contract is the primary coordinating mechanism for sugarbeets. Most growers are represented in contract negotiations by a bargaining association, with the individual grower signing the contract directly with the processor. The processor is the purchasing party under the contract, processing the sugarbeets to raw sugar and providing a market to sugarbeet producers. Both processor and grower are paid on the basis of raw sugar sold, and each shares in predetermined percentages a portion of the profits and costs associated with tranforming sugarbeets

into raw sugar and and delivering it to market. Much of the critical activity centers around the harvesting, storing, and processing of the raw beets. Sugar, the primary saleable product of sugarbeets, is sold in a broader sweetener market, and is facing increasing competition from alternate forms of sweeteners, especially non-caloric and starch based. The primary involvement of public policy in the sugarbeet industry is the protection the industry receives from foreign competition through the U.S. sugar program.

The above synopsis are generalities that can be applied to all grower and processing arrangements in U.S. sugarbeet production, with the contract being the primary mechanism throughout. What does vary are the specific contract contingencies and resulting activities, and those aspects were purposely left out of the discussion because the main purpose was to provide a framework of the basic functions. This chapter explained what the sugarbeet system did in facilitating the general issue of matching supply with demand and what mechanisms are used to do so. The next chapter will explore the environment for reasons that the specific activities and contract arrangements mechanisms in the sugarbeet subsector evolved as they did, introducing the navy bean subsector as a contrast to better explain and understand the forces affecting the evolution of coordination mechanisms not only for sugarbeets, but for all agricultural commodities in general.

Chapter 3

COMPARISON OF COORDINATION OF SUGARBEET AND NAVY BEAN SUBSECTORS

3.1 INTRODUCTION

The previous chapter described the institutions present in the production and exchange of sugarbeets, detailing their workings without exploring causes for their existance. This chapter will look to the environment in which the sugarbeet subsector operates for possible reasons it evolved as it did. Certain theories of market formation and coordination will be applied, especially the role of transactions costs and uncertainty. The comparison between production and exchange of sugarbeets and navy beans will be used to better understand economic coordination.

Navy beans offer an interesting comparison to sugarbeets in that while they are often produced in the same crop rotation, the structure of exchange mechanisms used for each are significantly different. These differences are viewed as more than a randomn occurence, with the environment of the sugarbeet and navy bean subsectors a dominant factor in the systematic development of their coordination mechanisms.

The following sections will first give a brief description of the navy bean industry, mentioning the similar mechanism or activity in the sugarbeet industry. The comparison of those mechanisms will

then be made in a case study. The case study will emphasize the levels of potential uncertainty each faces and its' role in market formation, the policy environment and its' role in market performance, and finally an assessment of coordination performance via an index as a proxy for measuring market instability.

3.2 THE NAVY BEAN SUBSECTOR AS COMPARED TO SUGARBEETS

Navy beans(referred to as "beans" or "navies") are a type of dry bean consumed directly by humans. Almost 80% are consumed as a canned pork and bean product. Thus most navy beans retain to final usage much of their original appearance. Navies are not perishable like the sugarbeet, and can be stored for up to two years after harvest with little loss of quality. Quality in terms of texture and appearance is important to the bean processor and retailer, and navies are priced on quality factors relating to appearance. For sugarbeets, quality of the beet is also important but in a differenet manner. The value of sugarbeets are based on amount of sugar they can be processed into, with the end product bearing no resemblance at all to the original sugarbeet.

3.2.1 U.S. NAVY BEAN PRODUCTION

U.S. production of navy beans is centered in two regions, the "Thumb" area of Michigan and the Red River Valley area of Minnesota and North Dakota, or MinnDak. Since navy beans and sugarbeets do

best in cooler climates, these regions are also the heart of sugarbeet production in each state, with beans often grown in the same crop rotation as beets. U.S. navy production was primarily in Michigan before the 1970's, having almost 90% of U.S. production. From the early 70's, navy bean production in MinnDak has risen to where it annually produces over one-third of the U.S. crop. Though on a national scale navy beans and sugarbeets are relatively minor crops compared to "mainstream" agriculture crops such as corn or wheat, beans and beets are important cash crops in Michigan and MinnDak. With practically 100% of domestic navy bean production and just over 40% of sugarbeet production between them, there is sufficient production in Michigan and MinnDak for a meaningful comparison of each industry.

The typical navy bean farm is also a typical sugarbeet farm, a multi-crop enterprise that also produces corn, wheat, or soybeans in addition to sugarbeets. In the planting and maintainance of the bean crop, much of the same equipment used for other rotation crops such as corn or soybeans is also used for navy beans. However, like the sugarbeet, crop specific machinery is used to harvest navy beans. Where corn, soybeans, or wheat can be harvested with the same combine given a few adjustments, most navy beans are harvested by machinery suited only for navies or other dry beans. A combine can be adapted to navy bean harvesting at a lower cost than the specialized harvester, but the farmer loses much in efficiency in terms of recovery rate and quality maintainance. While the bulk of

navy beans are harvested by a special bean harvester, the ability to adapt a combine does offer the new or "casual" bean producer the option of a lower initial investment.

3.2.2 NAVY BEAN PUBLIC POLICY

Public policy towards navy bean production and processing is characterized by a so called "free market" approach. The are no government support programs for navy beans like that for corn or wheat, and certainly no protection like that afforded sugarbeet producers through the U.S. Sugar Program. Other than a Crop Insurance program for navy beans, the most significant government involvement with navy beans is the U.S.D.A.'s Bean Market News, a price report published on a weekly basis containing grower and shipper bean prices and a smattering of market tone information. More on the use of the Bean Market News will be discussed in Section 3.3.1. For now the important point is that navy beans have little overt government involvement, and feel the full impact of both domestic and world supply and demand conditions.

3.3 NAVY BEAN EXCHANGE MECHANISMS

Though often grown by the same farmer, the mechanisms employed to market navy beans are significantly different than those for sugarbeets. Sugarbeets are exchanged under an acreage based production contract, with each party's returns based on a formula

dividing up the costs of getting the sugarbeet products to market and the returns from the sale of those products. No spot market exists for sugarbeets. In contrast, navy beans are exchanged either by a fixed price contract or the spot market, and involves a third party, the bean "shipper, between the grower and the processor.

Unlike sugarbeets, there is no integration of bean growers into the processing function, and there is limited integration into bean shipping. The grower integration into bean shipping is either through cooperative membership in an elevator or on-farm grading and shipping by an individual grower. Grower-shippers usually ship less than 1% of annual navy bean production.[1]

The navy bean processor, or "canner", typically does not deal directly with the grower, and instead uses the services of the bean shipper to purchase, grade, and deliver navy beans. The bean shipper is a bean merchandising business using a system of local elevators to obtain beans, pooling beans into larger shipments of specific grades desired by the canner. The local elevator, the market outlet as well to the bean grower for their corn or soybean crops, is in a natural position to handle navy beans since they are somewhat similar in storing and handling practices. The shipper serves as the canner's representative to the bean grower, providing an assembly function and source of information to the bean grower in facilitating the transfer of beans from the field to the canner.

---

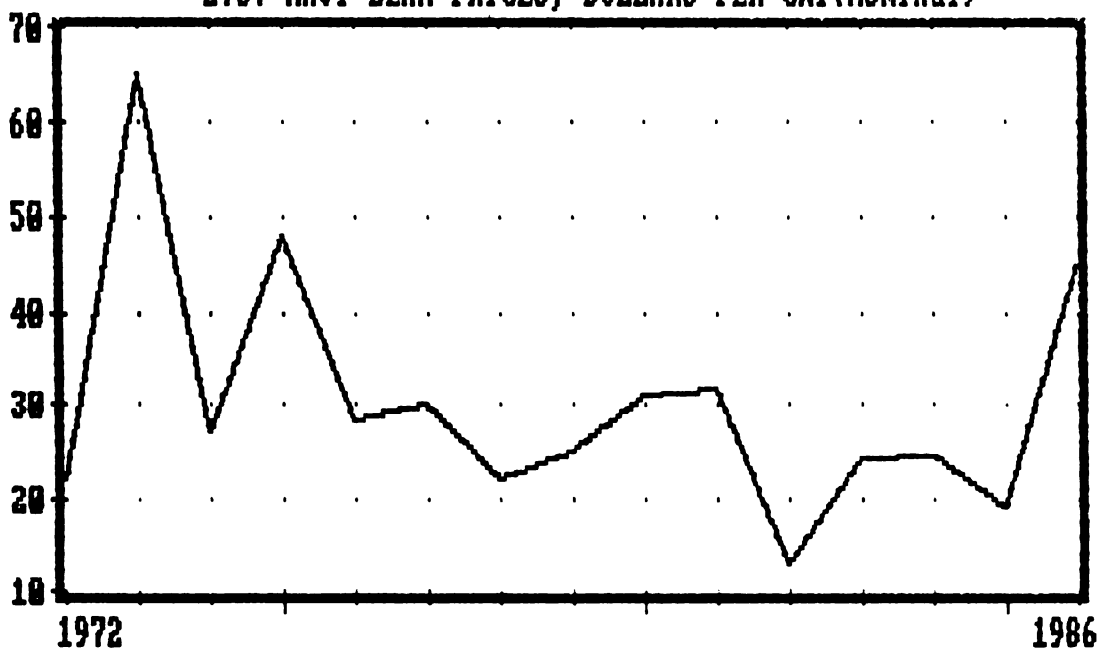
[1] Conversation with Michigan Bean Shippers Association

Shippers sell navy beans to the canner by either the spot market or forward contract. Though the exact percentages vary and are based on rough judgements of industry members, canners usually do not contract for all of their anticipated needs. Canners speculate on the bean markets, a situation facilitated by the fact that navy bean growers appear quite willing to grow beans for the spot market in quantities sufficient to meet canner needs in normal yielding years, as found by Hebert and Jacobs (1988). In fact, the majority of all bean exchanges in a typical year occur on the spot market.

3.3.1 THE NAVY BEAN SPOT MARKET

The navy bean spot market is a sizeable one, generally facilitating the exchange of almost 70% of the nations production, and can be one of the most volatile prices in agriculture as shown in Figure 3.1. There is no futures market mechanism available like that for corn or wheat to minimize the risks of volatile prices through hedging future transactions. Since beans are storeable, exchange of navy beans on the spot market occurs year round. Bean growers can opt to store their beans in hopes of achieving a better return later on, and in fact, the majority of beans are priced after harvest.

Figure 3.1
U.S. NAVY BEAN PRICES, DOLLARS PER CWT(Nominal)



Also, the canner as well does not have to buy all their beans at harvest, and like the grower, is speculating on which price, current or future, when evaluated against storage costs, offers the better deal. In between is the shipper, and they too can speculate by purchasing beans and holding them without locking in a price with the canner. However, most shippers interviewed implied that the shipper's primary business is in the facilitating of bean trading and the returns to that service, and not in speculating on bean markets. As a spot market trader, the bean shipper is less sensitive to market price than either the grower or canner. To the extent shippers store or contract taking a long or short position they also speculate on prices and their margins reflect the volatility in price.

For the navy bean grower, the primary source of price and market information is the local elevator as the bean shipper's representative. By being the grower's major link to market, the bean shipper is the grower's most timely source of market information. Often, the grower's beans are stored at the local elevator, and the grower either leaves a sell price or interacts with the elevator regularly to determine when to sell. Therefore, most beans are sold by the grower are priced on quotes by the local elevator.

As mentioned in Section 3.3.1., there is a price reporting service by the U.S.D.A. called the Bean Market News. Industry members interviewed felt very little trading of beans is done based on Bean Market News market information. The prices quotes have a lag of over a week, and "the market has moved already" is the primary drawback of Market News information. The reports are also voluntary with no volume information affixed, limiting both the reliability and value of the prices reported. The main value of the Bean Market News appears to be in the validating of local elevator price quotes in comparison to those reported regionally by Market News, and acts more as a monitor of price behavior rather than the primary disseminator. This is a valuable function, and is the sole source of published weekly price information.

Exchanging beans on the spot market requires timely and accurate information, especially given the erratic swings navy bean prices can take. Since the canner by definition is in closest contact with the retail markets for navy beans, they possess the best information on both immediate and long-term directions of navy bean demand. With the canner in the best position to gauge consumer demand, when contracts are used for navy bean exchanges, they are said to be "canner driven". Their role in the process of forward contracting for navy beans is discussed in the next section on the overall use of forward contracts.

3.3.2 NAVY BEAN FORWARD CONTRACTS

Navy bean foward contracts typically occur in two sets. The first is the contract between the canner and shipper, and the second is between the shipper and grower. The reason the canner-shipper contract is listed first is because the contract process is said to be canner driven. The process typically first starts with shippers and canners negotiating over terms of forward contracts. Based on this price and other demand information, the shipper then offers the growers a forward contract price. Though not strictly a one-way process, and the shipper can and does go back to the canner to renogiate if the growers are not responding to the initial offering, rarely does the process involve the shipper first getting a grower offer to take to the canner. The canner is usually the proactive party in the contract process, with the grower acting in a reactive mode to a set of contract price offerings.

The shipper usually covers a canner contract with a grower contract. When they do not, they are going either long or short in the market and are speculating. The recent contract problems in the aftermath of the 1986 Michigan floods indicated that the shipper does not always cover a selling contract with a purchase contract.

With the shipper acting primarily as an intermediary, the question of relative bargaining power is actually the relationship of the grower and canner. Bean canners are typically medium to

large sized multi-crop processing firms, and because of their superior resources and knowledge of the market, it is little wonder the canner is believed to have the better position in the contract process. Adding to the situation is the farmers general willingness to grow beans without a forward contract. The willingness to produce beans for the spot market is based on both the farmers decision making process and the nature of the contract itself.

Industry observers note two primary reasons inhibiting navy bean growers from using the forward contract more. The first relates to the desire of bean growers to speculate and especially the fear of missing out on an up market. With most of the other crop prices in the rotation such as corn or soybeans in effect nearly fixed by government support programs, navy beans remain a crop in which the farmer can take a chance to realize a significantly higher price by speculating on the spot market. Also, as Hebert and Jacobs(1988) found, growers view contract prices as "low", and not far above the cost of production. The aftermath of the flooding in Michigan's major bean producing area is a good example, where if the farmer had navy beans, he could realize a price almost 300% higher than the contract offerings for that year. Due to the concentration of production and the effects of the volatile export market, navy beans are prone to wide price swings.

There is the chance for substantial gains if the grower can guess the market correctly, a possible but not easily predictable event.[2]

The second factor inhibiting the use of contracts by navy bean growers is the penalty provisions of many of the contracts. All navy bean contracts are fairly basic, containing only a delivery date, minimum and maximum amounts to be delivered, minimum grade, and price. In Michigan, where over 70% of the nations production occurs, all contracts carry an additional penalty provision for non-delivery by the grower. If a grower cannot supply the minimum amount of navy beans specified in the contract, no matter what the reason, the contracts specifiy that the growers compensate the shipper for the difference between the contract price and the spot market price on the delivery due date. Since the most likely cause of a production shortfall is adverse weather conditions, given the geographic concentration of production, the spot market price is almost always above the contract price when a farmer has a crop failure. One of the reasons Michigan growers usually contract less than one-third of the state's production is to avoid the risk of non-compliance. Even in MinnDak, where contracts usually have an Act of God clause allowing growers out of their contracts in the case of adverse weather, growers still contract for no more than 50% of production.

---

[2] Hebert and Jacobs found that navy bean prices do fluctuate intrannually, but in an evaluation of different selling strategies, found a lack of predictability in when to sell during the year.

More on navy bean contracts will be discussed in the final chapter, but for now the important point is that the spot market is the dominant form of exchange. The next section will look to basic reasons why there is the dichotomy of spot market dominance for the exchange of navy beans while contracting dominates for sugarbeets.

3.4 COMPARISON OF PRODUCT CHARACTERISTICS AND POTENTIAL UNCERTAINTY

Most significant in the comparison of sugarbeets and navy beans is that sugarbeet exchange between growers and processors is coordinated solely by contracts while navy beans utilize a mix of spot markets and contracts, with the spot market predominating. Though not the sole reason, the physical characteristics of each crop play an important role in the evolution of their respective exchange mechanisms. The different set of product characteristics for each crop result in different levels of risk in the production, handling, and marketing of each crop. The next sections will look into the sources of the risk and its' associated uncertainty and how each subsector may have adopted exchange mechanisms in reaction to the uncertainty.

3.4.1 REDUCING POTENTIAL UNCERTAINTY THROUGH FORWARD CONTRACTS

Forward contracting changes the transactions costs of buying and selling a commodity. Production costs are the physical, tangible costs associated with producing, shipping, and handling of

a good or service. Transaction costs are those arising from the transference of a good or service across a technologically separable interface. Costs are incurred by economic agents for search or information processing costs in finding the optimal source of a good or service. Also, a transaction cost may occur from a missed opportunity from a sub-optimal choice when the optimal choice is unknown or unavailable because of uncertainty or bounded rationality[3] on the part of the agent. As a result, economic agents react by "assigning transactions in discriminating ways to economize on transaction costs"(Williamson, 1981). By discriminating ways, Williamson means that the agent has a choice in assigning the transaction to a spectrum of mechanisms, ranging from the spot market to total integration within the firm. This mix of firms and markets is called "governance structures" by Williamson. Firms or agents choice of alternative governance structures can be traced to the transaction costs associated with using that governance structure to acquire a good or service. Generally, the more specific or unique the good is, the costs of transacting on the open market for that good are higher. A firm has more to lose when relying on the open market for an infrequently produced good that is integral to its' organization than on a widely available, less crucial item.

---

[3] Bounded rationality is Williamson's notion of economic man having limited abilities to obtain and assess all the information necessary to always make the optimal decision. Less than optimal decisions occur because man by nature cannot have perfect foresight.

Ronald Coase wrote in 1952 that the cost of using the market are the "costs of using the price system...and firms arise to minimize these costs". Coase went on to state that internal organization was no panacea, and that an equilibrium of sorts is reached when "the costs of organizing an extra transaction within the firm become equal to the costs of carrying out the same transaction in the open market". Firms minimize the loss, or transaction cost, by substituting administrative coordination for market coordination to where the firm operates in a mix of governance structures dictated by relative transaction costs.

Kenneth Arrow recognized that markets are limited in power by transaction costs, and that "market failure is not absolute; it is better to consider a broader category, that of transaction costs, which in general impede and in particular cases block the formation of markets" (1969, p.48). Arrow's statement is a clue to look further to the role of transanctions costs in the dichotomy of a lack of spot markets for sugarbeets and the dominance of spot markets for navy beans. Especially powerful is one of Williamson's attributes of transactions costs known as asset specificity, and is discussed next.

3.4.2 ASSET SPECIFICITY

There are three attributes of transactions that influence the economics of organization: (1) the frequency of the transaction, (2)

the uncertainty to which transactions are subject, and (3) the degree to which transactions are supported by transaction-specific investments(Williamson, 1979). The latter, known as asset specificity, is especially significant in explaining the formation of markets, or lack of, for agricultural products.

Asset specificity can arise in any of three ways: site specificity, when transportation costs or product perishability limit the distance a good or service can travel; physical asset specificity, where specialized equipment is used to harvest or process a good; and human asset specificity arising from knowledge gained only through experience in producing the good. The first two, site specificity and physical asset specificity, are especially influential in the evolution of sugarbeet and navy bean exchange mechanisms.

3.4.3 SITE SPECIFICITY

Probably the most powerful factor in the difference in the evolution of sugarbeet and navy bean exchange mechanisms relates to the degree of site specificity created by two characteristics of each crop: foremost being the relative perishability of each, and secondary the relative size or "bulkiness" of the commodity. Perishability limits both temporally and spatially the economic value of the crop, especially when that commodity is extremely bulky as well.

Sugarbeets are a highly perishable product, and once harvested, the sucrose level steadily decreases, meaning the sooner they are processed, the more raw sugar they produce. Certain storage practices can slow the burning of sucrose, but none can completely inhibit the burning in an economic manner. Conversely, the navy bean can be stored for up to two years without a loss of quality, meaning the market views week old or year old beans as essentially the same value in use. Therefore, the sugarbeet grower needs to find a market as soon as possible at harvest while navy bean growers can store their beans and market them at their discretion on a year round basis.

Compounding the effects of perishability is the secondary effect of the relative size of the beets and beans, or bulkiness. The raw beet is a large, bulky product, with the national average yield approximately 20 tons per acre. Also, only about 15% of the beet is recoverable sugar, meaning that much of the beet, though often made into byproducts, is of much less value than the raw sugar. In contrast, the navy bean, which is consumed whole, has a per acre average yield of 1,400 pounds, less than 5% of the total product weight per acre than sugarbeets.

Shipping distance for sugarbeets is limited by the high cost of transportation, and along with the temporal effects of perishability, explains why beet acreage is rarely more than 30 miles from a processors receiving station. On the other hand, navy

beans, being of much less bulk and perishability, are shipped around the world to be further processed. A case in point is the fact that while Michigan produces over two-thirds of the country's navy beans, only insignificant amounts are canned in Michigan. Obviously, factors other than site specificity dominate in plant location decisions.

Though often grown on the same farm, site specific factors limit the marketing options for beets to not only a much tighter market area than for beans, but also a much tighter time frame in which to market them. Before we go into the influence of site specificity on coordination, physical asset specificity, impacted to a large degree by site specificity, will be discussed next.

3.4.4 PHYISICAL ASSET SPECIFICITY

Physical asset specificity relates to the degree of specialized usage for equipment in harvesting, processing, and handling a crop. By specialized usage, it is meant the equipment has limited alternative usage in other enterprises.

For the production and harvesting of beets and beans, each generally involves the usage of specialized equipment, though the navy bean harvester can be applied to other types of dry beans, and hence somewhat less specific. A strong case cannot be made for significant differences in the specificity of equipment committed to

bean and beet production and harvesting. We will assume each enterprise involves about the same degree of physical asset specificity.

It is in the processing of beets and beans that the most significant impact of physical asset specificity occurs. Sugarbeet processing requires an investment in large multi-million dollar complexes that process only sugarbeets. There is absolutely no alternative use to processing beets once the plant is in place. Due to the site specific factors of perishability and bulkiness, these plants must locate in the heart of beet production areas, making the physical assets involved in sugarbeet processing useless without local beet production.

Conversely, the plants built to process navy beans are less specific to processing beans than the plants for sugarbeet processing. Navy bean processors typically process a wide variety of dry beans and vegetables, often using the same equipment. Also, though the local elevator that assembles and stores navy beans utilizes equipment specific to beans such as an electric eye for grading, the bulk of the elevators storage and handling equipment is also used for corn, wheat and soybeans. Sugarbeet receiving stations on the other hand are for sugarbeets only, and much of the equipment such as the conveyor loaders and testing equipment can only be used for sugarbeets. Therefore, plants and equipment committed to navy bean processing have easily adopted alternatives

in use, meaning the navy bean processor can shift to other enterprises easier than the sugarbeet processor to capture the value of the asset if economic conditions dictate a change.

The effects of site specificity and physical asset specificity are not neatly seperable. In the comparison of sugarbeets to navy beans, the sugarbeet's perishability and bulkiness make the assets committed to processing them highly specific to where beets are produced in addition to the singular use of the plant for beet processing. Site specificity in this case compounds the physical asset specificity for sugarbeets, and the effect of the higher degree of asset specificity for sugarbeets has influenced the evolution of a different mix of coordination mechanisms for beet exchange as compared to those for navy beans. The next section will look at how asset specificity and each industries reaction to it has influenced the development of their respective coordination mechanisms.

3.4.5 ASSET SPECIFICITY AND ITS INFLUENCE ON MARKET FORMATION

In comparing sugarbeets to navy beans, a case has been made that the levels of asset specificity is much higher for sugarbeet production-processing than for navy beans, both in terms of the perishability of the product and the transaction specific assets committed to its' processing. In short, the transaction costs of using the open market to exchange sugarbeets is higher than for navy

beans. Based on our understanding of Williamson's(1979) theory of transaction costs, it follows that one would see the exchange mechanisms for sugarbeets of a more administrative nature than those for navy beans, and is in fact the case with sugarbeet contracts versus the navy bean spot market/contract mix. What the subsector participants are doing is reacting to the inherent levels of risk and uncertainty involved in the production and processing of their respective crops. This section will look at the effects of risk and uncertainty on the adoption of certain coordination mechanisms.

Much of the higher degree of risk involved in the production and processing of sugarbeets stems directly from the perishability and bulkiness of the beet itself. Producing beets for the spot market carries a significant amount of risk. Since perishability and bulkiness limit the time and distance in which they can ship their beets, once the beet is harvested, finding a local home for the beets in a timely manner is critical. With the only market option for the beet grower being the local processor, there would be high levels of uncertainty in relying on the spot market. Conversely, since navy beans can be stored and transported long distances, the spot market carries much less risk for the bean grower. The bean grower can opt to sell their beans at anytime to any buyer in the world, and hence does not have to secure a home for their crop at harvest.

On the buying side, the sugarbeet processor also faces greater risk than their bean processing counterparts in using the spot market to acquire raw product. Being the sole market option, the sugarbeet processor at harvest could adopt an opportunistic "take it or leave it" stance on price offerings to growers. However, since the processor has large amounts of money invested in assets useful only for processing sugarbeets, they too face a high level of uncertainty in using the spot market. While the navy bean processor does not have to locate in the production areas, and also have plants processing a number of different crops, the sugarbeet processor must rely on the local farmers for the only crop they process, raw beets. Therefore, from both the beet processors and growers standpoint, there is mutual interest in substituting a more administrative governance structure for the spot market to ensure consistent production of sugarbeets.

Not only is the value of the perishable and bulky beet highly specific to a time and place, the production and processing of those beets involve highly specific assets. With both parties committing to highly specific assets, Williamson notes "the buyer and seller are effectively operating in a bilateral exchange relation for a considerable period thereafter". It is not practical for either the grower or processor to adopt an opportunistic stance in trying to capture most or all of the value of their assets in a short time. Since each party's assets are rendered useless with the loss of the others services, there is a real incentive to fashion cooperative

agreements. Beet growers, with investments in specialized beet harvesting equipment having no alternate use, need the stability of long-term production to make the investment profitable. With the processor having large amounts of capital invested in beet processing, they especially must take steps to ensure that their local beets growers feel they are being treated fairly. Through the repeated use of forward contracts since the early part of this century, relations between the sugarbeet processor and grower have evolved to a routine, stable exchange of sugarbeets.

3.4.6 UNCERTAINTY AS A POSSIBLE SOURCE OF STABILITY

In reaction to higher levels of potential uncertainty, the sugarbeet subsector contracts nearly 100% of the crop whereas their navy bean counterparts rely on the spot market and forward contracting. Behavior is more automatic for sugarbeets growers and processors in the routine use of contracting or cooperative ownership, adopted as standard operating procedures in the face of high potential levels of spot market uncertainty. Behavior then is more predictable for sugarbeets than for navy beans, partly because behavior is more constrained by the uncertainty. Conversely, with less potential uncertainty, navy bean growers and processors have more options available to them, and therefore typical behavior is less predictable.

At first glance, one might think the greater the uncertainty, the more unstable and unpredictable the observed behavior would be because of increased chances of decision error. On the contrary, excessive amounts of uncertainty can lead to more stable and predictable behavior because as in Heiner's(1983) theory on the origins of predictable behavior, "greater uncertainty will cause rule-governed behavior to exhibit increasingly predictable regularities, so that uncertainty becomes the basic source of predictable behavior". Heiner's basic assumption is that in the face of genuine uncertainty, the difficulty in making the optimum selection is increased, in turn increasing the liklihood of errors in decisions, and the agents instead adopt a more rigid, satisficing behavior to minimize the consequences of poor decisions.

In adapting Heiner's theory to sugarbeets and navy beans, though not a literal application, the greater potential uncertainty for sugarbeets does appear to be one important reason that more rigid behavior is evident in the form of production contracts. The spot market as used for navy beans allows more flexibility, in turn allowing for optimizing behavior in the form of speculation rather than risk averse behavior in the form of routine contracting. In keeping with Heiner's theory, the informal hypothesis flowing from these assumptions is that sugarbeets will exhibit more stability than navy beans. The next task is to the test the hypothesis on stability for sugarbeets and navy beans, with the expectation that sugarbeets will be shown to be more stable than navy beans.

3.5 MEASURING INSTABILITY IN THE SUGARBEET AND NAVY BEAN SUBSECTORS

Measures of instability can be as vague and varied as the definition of instability itself. Just as there is no consensus on what constitutes instability in the economy, there is no generally accepted method of measuring instability. The intent of this study is to assess coordination in selected agricultural subsectors given the levels of instability present, and is partially an expansion of the basic work by Dalziell(1985) on sources of instability in agriculture.

Dalziell found that existing measures each had advantages and disadvantages, and their application depended on matching the correct one with the purpose at hand. Dalziell recognized that no one method would meet his purpose of isolating both variability and instability, and created another measure called INS. The measure is defined as the variance of annual percentage changes, and mathmatically is Var(100*dQ/Q), making the INS dimensionless, meaning data of different units can be compared on equal terms. By using the midpoint of the change as the base has two advantages: it gives symmetrical treatment to increases and decreases, and allows decomposition of a variable such as quantity into yield and area components with less residual error than would occur from using the intitial point as the base. Another advantage to INS is that it exponentially detrends the series, meaning if a series increases by a constant percentage each year, there would be a zero variance.

Dalziell rightly interprets the economic implications of this type of measure in that while market participants can readily adjust to constant percentage changes each year, they will have difficulties if period to period changes are highly variable. Therefore, the INS has some of the qualities of an index of unpredictability as well as variability. Since our definition of instability in this study is one based on the randomn and volatile movements of the market versus gradual and predictable adjustments to changes in supply and demand, the INS measure will serve our purpose in the initial assessment of instability in the sugarbeet and navy bean subsectors.

3.5.1 APPLYING THE INS METHOD TO SUGARBEETS AND NAVY BEANS

Since the interest of this study is with the grower/first handler interface, the analysis will center on production and price related data for raw sugarbeets and navy beans. The first set of data is on aggregate production and price data for the United States, exhibited below.

Table 3.1

INSTABILITY IN U.S. SUGARBEETS AND NAVY BEANS/1

CROP	ACRES HARVESTED	YIELD	QUANTITY	PRICE	RETURNS
SUGARBEETS (1968-1985)	103	35	185	773	395
NAVY BEANS (1965-1985)	242	201	560	2015	864

1/ Numbers in each category are the INS calculated for annual data. "Returns" are price times quantity. Source: U.S.D.A. Sugar and Sweetener Outlook and Situation; Agriculture Statistics; Bean Market News; and various regional navy bean publications.

The numbers in each category represent an index of the variability in the annual percentage changes. For example, the navy bean acreage INS value of 242 means that for over the entire period measured, navy bean acreage changes exhibited roughly double the variability of sugarbeet acreage with an INS value of 103. In fact, for all categories navy bean indexes are higher, and though the ratios in each category vary, are at least double those for sugarbeets. It appears that based on the raw data presented, the differences in stability as measured by the INS index are significant enough to support the assumption stated in section 3.3 that navy beans would have a higher degree of instability than sugarbeets.

The INS indexes are interesting, but are not intended to be a proxy for coordination effectiveness. Many factors act together to influence the magnitudes of the INS index, and the index needs to be evaluated against the total picture of the operations of sugarbeet and navy bean coordination mechanisms, recognizing that the INS index is limited in explanatory power. Also, the INS figures are national aggregates, and need to be broken down regionally for a more accurate reflection of individual production regions. The remainder of this chapter will explore the sugarbeet and navy bean coordination mechanisms to look not only at why the INS indexes are as they are, but also to complete the overall case study on coordination.

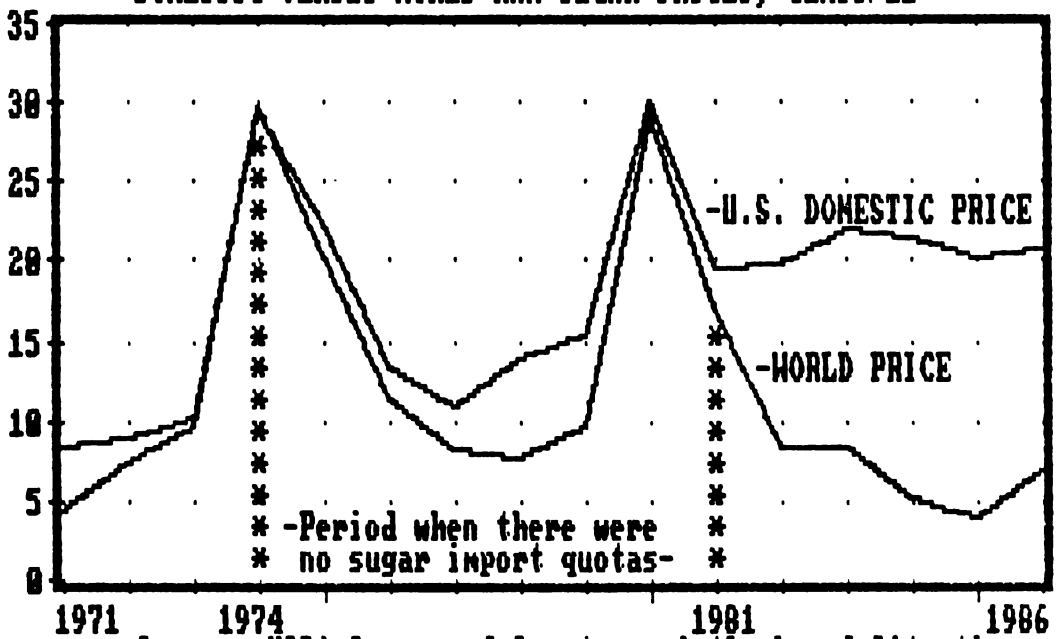
3.5.2 PUBLIC POLICY PROGRAMS AS A SOURCE OF STABILITY

If the levels of instability exhibited by the INS indexes were entirely the cause of the biological characteristics of the sugarbeet and navy bean themselves, little more would need to be said. However, while the INS index partially reflects the bioligical nature of the crops, it also reflects the results of the policy environment in which they operate. The U.S. Sugar Program has contributed to at least the price stability of sugarbeets while navy beans has no formal government program. This section will examine the public policy environment for their impact on the INS index, recognizing the INS index is a reflection of both supply and demand factors.

The U.S. is a net importer of sugar, and the sugar program restricts imports via quotas and tariffs to maintain a minimum level of demand for domestic sugar production. Conversely, the U.S. is a net exporter of navy beans, and even if desired, could not protect the navy bean industry in the same manner as the sugar industry because import quotas are not feasible for net export commodities. Therefore, the navy bean industry feels the full effect of an often volatile world navy bean market while the sugar industry is insulated from an equally volatile world sugar market. The impacts of the net import/net export difference are reflected in the INS data of Table 3.1, discussed next.

While a number of factors influence price volatility, especially contract usage to be discussed later, the demand stabilizing effects of the sugar program is evident in Table 3.1. Since the sugar program protects domestic sugar producers from much of the vagaries of the world sugar markets, the INS indexes for returns, quantity, and acreage reflect the net result of producing for an insulated domestic market. Though domestic sugar consumption has been declining, import quotas have been reduced as well, meaning domestic producers have maintained much of their market share at the expense of overseas producers. Also, while the price INS index for sugarbeets is much higher than the other beet categories, the index reflects the fact the sugar program only maintains a minimum price. When the world price moves above the domestic support price, domestic price moves with it, as shown in Figure 3.2. to occur

Figure 3.2
DOMESTIC VERSUS WORLD RAW SUGAR PRICES, CENTS/LB



Source: USDA Sugar and Sweetener Outlook and Situation

rather sharply in 1974 and 1980. Since sugar is considered fairly price inelastic, and supply response is limited by processing plant capacity, the price INS for sugarbeets reflects more the occasional movements of domestic price with the world price rather than shifts in domestic supply or demand.

On the other hand, navy beans INS indexes reflect the effects of being a net exporter. Where the sugar program limits domestic price volatility via quotas, navy beans have no such luxury. The navy bean export market is a volatile one because not only do navy beans substitute on the world market for other types of small white beans, navies also experience heightened demand in times of worldwide protein shortages as occured in the early 1970's. Navy bean prices increased rapidly during this time, and U.S. navy bean production expanded sharply. However, these exports were of a stopgap nature in meeting basic food needs, and did not represent a long-term stable market. Consequently, when the short-term protein shortages diminished, navy beans experienced market gluts and prices plummeted. Similar situations also occured after the Mexican bean boom when Mexico, a large colored bean producer and consumer, experienced production shortfalls, temporarily increasing prices for all dry beans including navies. The INS measure as defined reflects the effects of this type of instability since the price changes were rapid and unpredictable, causing erratic changes in acreage, and the navy bean INS numbers in Table 3.1 bear this out.

While both sugarbeets and navy bean price INS numbers reflect the effects of the world market, navy beans also reflected the volatility of the world market in quantity, acreage, and returns INS indexes as well. By being a net exporter, short periods of high world prices induced significant production responses because the demand for U.S. navy beans changed significantly. On the other hand, short periods of high world prices had less to do with demand for U.S. sugar, so consequently while sugar prices more than doubled, sugar production changed little, and the INS numbers reflect this.

The U.S. sugar program has been shown to have a significant impact on the relative stability of the sugarbeet subsector in comparison to navy beans. However, the effects of the public policy environment on the INS index is not just the results of having a demand stabilization program versus not having one. Also to be considered is the operation of the exchange mechanisms under the umbrella of their respective government programs, or in the case of navy beans, lack of one. The operation of these mechanisms is due not only to the inherent risks discussed in Section 3.33, but also to the amount of protection the industry receives from the vagaries of the world market place. How the sugarbeet and navy bean industries and their mechanisms react to their respective markets are also a part of the INS index, and is discussed next.

3.5.3 EXCHANGE MECHANISM FUNCTIONS AND THE INS DATA

The differences in the INS data of Table 3.1 also reflect the differences in the coordinating abilities of the exchange mechanisms used for sugarbeets and navy beans. Contracts, while used in both industries, plays a major role in coordinating production for sugarbeets and only a minor one for beans. The INS numbers reflect the stabilizing effects of a full participation contract system for beets. The navy bean INS data reflects an industry coordinated primarily by a spot market bearing the full impact of vagaries in the world bean markets. This section will look at the functions of the different exchange mechanisms and their impact on subsector stability.

With demand stabilized and competition from foreign producers buffered by the sugar program, sugarbeet processors can schedule beet production through forward contracts for a fairly insulated and predictable marketplace. Since there is no spot market, the offering of contracts by the beet processor results in a fairly precise scheduling of acreage to meet market needs. In effect, the total acreage planted is not determined by individual decisions of beet farmers, eliminating the impact of grower decision error on supply response. The supply response of the beet industry is elevated to processor decisions on contract offerings, and with the stability of sugar program combined with the limitations of processing capacity, erratic short run aggregate supply responses by

the beet growing industry are mitigated. Since the INS measure's definition of instability stems from erratic short run fluctuations, the sugarbeet INS measures of Table 3.1 reflect the stabilizing effects of the ability to contract directly for the needs the market.

The navy bean INS measures on the other hand exhibit far more instability than sugarbeets because of the combined effects of spot market coordination of supply impacted by an erratic world bean market. Though for the individual grower the contract price may be the primary determinant of acres planted, in aggregate, the spot market drives the acreage response. The individual bean grower, possessing limited abilities to gauge the supply responses of their fellow growers, are more likely to misjudge the aggregate market needs for navy beans since their behavior is not guided by the availability of contracts. The highly volatile spot market price compounds the errors, and the errors in grower decisions likely exacerbate the volatility. Navy beans can be overplanted, and Hebert and Jacobs(1988) found that bean farmers will react as they did in the aftermath of the flood of 1986 by increasing acreage the following year even though demand had not increased and contract price offerings were quite low. The individual bean grower was reacting to a high spot market price caused by short run shortages and not a shift in demand. The spot market in this case sends a signal to increase production even though demand for the following year is not increasing. The navy bean INS numbers do little to

dispel the notion that a highly volatile spot market price leads to instability in supply unrelated to demand changes.

In comparing the exchange mechanism effects on the INS data, the primary cause of the disparity between sugarbeets and navy beans lies in the relative abilities of the grower to unilaterally decide on how many acres to plant. Sugarbeet acreage stability reflects the control of acreage through contracts by beet processors versus the net result of thousands of individual bean growers predicting market needs based on an often volatile spot market price. A case in point would be if demand were held constant and there was a similar shortfall due to weather in each subsector. Though returns may rise for beet growers, processors still limit the next year's acreage expansion, if any, to their projected needs. Conversely, higher returns for bean production may mean acreage expansion well above that needed to meet market needs because of the ability of farmers to expand acreage in any amount they please. By not knowing the aggregate response of other growers, there is a good chance of overproduction occuring. Note that in this case, which is more common than under production, the bean grower is the party bearing the consequence of overproduction.

The INS data of Table 3.1 represents aggregate U.S. data, and misses some important regional differences for sugarbeets and navy beans. In dissaggregating the INS data by region, unique aspects of

coordinating behavior are better understood, and the following sections examine INS measures recalculated for regional analysis.

3.6 REGIONAL SUGARBEET PRODUCTION AND THE INS DATA

U.S. sugarbeet production is best divided by the different contract types seen for each region. Though all the contracts are basically standard in function, there are unique aspects of contracts seperating them into a Eastern, Western "Sliding Scale", and the cooperative arrangements of MinnDak classification. The individual contract types arose in part because of endogenous regional factors and also shifts of production within the region. The following INS measures are broken down by region to better understand some of the root causes for the unique contract contingencies as well as the differences in instability across regions.

TABLE 3.2

INSTABILITY BY REGION FOR SUGARBEETS/1

REGION	ACRES	YIELD	QUANTITY	PRICE	REVENUE
Michigan	39	164	233	1063	730
Minnesota	171	340	337	1077	1090
North Dakota	231	374	305	1014	898
Far West	308	33	411	735	423
U.S.	103	35	185	733	395

/1 Data annual, 1968-1985. Yields calculated from acres harvested. Minnesota and North Dakota are grouped to represent MinnDak, and note that their INS measures are fairly similar.

Since U.S. beet production is well spread out across the U.S., it is expected that regional INS yield numbers would be much higher than the U.S. yield value. The reason the Far West yield INS is even more stable than the national value is that irrigation is used for almost all of the Far West production while little is used elsewhere. Also, the Far West region encompasses a much wider production area, from Colorado to California, meaning isolated bad weather effects less the total yield numbers than either Michigan or MinnDak.

Why beet yields are more stable for Michigan than for Minn Dak is less clearcut. One likely cause is that Michigan experiences better growing conditions for beets, primarily because of higher annual rainfall and the moderating effects of the Great Lakes on early and late season freezes. Another reason is that the yield data is calculated on acres harvested. Excessively wet weather at harvest is more likely reason to not harvest beets than excessively dry. Too much water in the field rots the beets and makes it impossible to operate harvesting machinery. Conversely, while dry weather may reduce the size of the beet at harvest, dry weather at harvest is not a problem in terms of harvesting. Therefore, since Michigan is more prone to excessive wet weather than MinnDak because of the moisturizing effects of the Great Lakes, Michigan is likely to leave more beet fields unharvested than MinnDak, especially since the contracts in both areas carry no penalty for not harvesting.

The differences in acreage INS measures represent more the structural changes within the region and less an annual fluctuation of acreage. Following from the discussion in Section 3.5.3 on sugarbeet processors controlling acreage via contracts, the regional INS acreage values are a reflection of changes in processing capacity within a region, especially in the form of plant closings or new plants coming on line. Though the sugar program has offered protection from the competition of foreign sugar suppliers, competition within the U.S. sugar industry has caused some plants to close. Plants close because they are allowed to become obsolete or

the owning company no longer sees them as profitable. While beet acreage has declined since the early 1970's, and plant numbers have fallen from 58 in 1970 to 36 in 1986, the average annual tonnage of beets per plant has risen from 445,000 in 1970 to 650,000 in 1986. In short, some of the beet production from the closed plants has shifted to the expanded capacity of another plant. However, the real impact on the regional INS numbers has been the shifting of processing capacity among regions.

Note in Table 3.2 that the acreage INS for Michigan is lower than the U.S. acreage INS, and much lower than the Minndak and Far West INS figures. Over the time period measured, the number of processing plants in Michigan have been constant, and recalling that economies of scale cause plants to run near full capacity, the stability of acreage in Michigan is as expected. In the Far West, just the opposite has occured. With processing plants closing in California and the complete elimination of Washington and Arizona acreage, changes in acreage were rather sharp. The acreage decreases comining in large chunks with each plant closing is reflected in the Far West acreage INS because the INS gives weight to sudden changes and not constant changes, or trends. The MinnDak acreage INS, also above the U.S. value, represents a shifting of acreage from the Far West to MinnDak. Plant closings also occured in MinnDak, though not in the same magnitude as the Far West. These plant closings are what prompted beet growers in MinnDak to forward integrate into processing, and in fact, the last three processing

plants built in the U.S. were by MinnDak cooperatives. New processing plants mean a one time increase in acreage from zero to the initial contracted production, again reflecting the type of acreage changes captured by the INS measure. Also, the MinnDak cooperatives added storeage practices lengthening the processing campaign, meaning more acreage of beets could be processed in a single year. The initial adoption of a storeage practice lengthening the processing campaign is also reflected in the MinnDak acreage INS.

3.6.1 REGIONAL NAVY BEAN PRODUCTION AND THE INS DATA

The differences between regional navy bean production are less clear cut than those for sugarbeets. The opening and closing of a bean processor to no relevance regional bean production like there is for sugarbeets. However, there are some significant regional differences explained in the INS data, and Table 3.3 presented below represents the total disaggregation of the navy bean data of Table 3.1.

TABLE 3.3

REGIONAL INS DATA FOR NAVY BEANS/1

REGION	ACRES	YIELD	QUANTITY	PRICE	REVENUE
Michigan	220	348	713	2015	840
MinnDak	897	236	1157	2015	4803
U.S.	242	201	560	2015	864

/1 Data annual, 1965-1985. MinnDak data as of 1972.

Due to the concentration of production in two regions that do not use irrigation, yield instability is inevietable. As in the case of sugarbeets, growing conditions in Michigan are thought to be better than MinnDak, but the navy bean INS yield numbers show more instability in Michigan. Since yield is calculated on acres harvested, possible reasons for this disparity relate to the nature of the contracts used in each region and the relative amount of production each region has. Michigan contracts have no Act of God clause, and in the case of inclement weather causing poor yields, the penalty provisions of the contract create an incentive for the Michigan grower to harvest more acres regardless of the yields. Also, since Michigan usually has over two-thirds of the nations navy

bean production, poor yields from weather cause prices to rise much higher than similar poor weather in MinnDak. The higher prices make it profitable to harvest beans from poor yielding fields, and combined with the penalty provisions of Michigan contracts, likely prompt Michigan to harvest more poor yielding acreage than their MinnDak counterparts.

The INS acreage disparity between regions is even more pronounced than yield, and is primarily due to the shifting of production from Michigan to MinnDak. Michigan at one time had over 90% of the nations navy bean production, and until 1972, MinnDak had little to none. Led by canner desire to spread production to new areas, increased contract offerings in the MinnDak led to sudden increases in navy bean production in MinnDak. Since the region went from basically zero to 35% of the nations production in only 12 years, the INS measure captures these "lumpy" changes as unstable. Mixed in that time was the export driven booms of the early 1970's and the 1980's Mexican bonanza. These booms masked the direct substitution of MinnDak acreage for Michigan acreage, and slowed Michigan's acreage decline to a more gradual pace.

The tremendously high INS revenue value for MinnDak stems from a number of causes. First, by having less than a third of production and the remainder in Michigan, poor weather is Michigan has a much larger effect on price than the same occurence in MinnDak. Therefore, MinnDak growers experience significantly higher

revenue gains than there Michigan counterparts when the situation is reversed. The fact that the U.S. INS yield is lower than either region is evidence that poor yields usually do not occur at the same time in both regions. The second reason is that the MinnDak INS revenue is calculated over a shorter period of time, and more fully reflects the high revenues of the boom periods than the Michigan INS revenue value dampened by the more stable years prior to 1972.

The regional breakdown of the INS data has helped to better understand some signficant phenomena not evident in the INS data of Table 3.1. First, regional sugarbeet acreage variability was found to be rooted in the opening and closing of processing plants, a fact not seen in the U.S. acreage INS because the production lost in one region was picked up in another. Second, the comparison of the Michigan and MinnDak regions pointed out the effects of the export market because the MinnDak data was primarily over the boom and bust periods of the 70's and early 80's. Overall, the regional breakdown showed that while there are areas of higher instability within a subsector, the understanding of the reasons supports the hypothesis that sugarbeets are more stable than navy beans. The next section will look at reasons why the sugarbeet subsector is more stable than navy beans in ways not addressed by the INS measure.

3.7 ASSESSMENT OF SUBSECTOR COORDINATON: MORE THAN THE INS MEASURE

The INS measure is interesting, but does not tell the whole story in terms of coordination. Coordination is not measured simply by indicators of instabiltity. Differences in volatility exhibited by the INS measure may be due to weather as well as differences in coordination effectiveness. The analysis of the previous sections only attempted to explain where the operations of the coordination mechanisms may have lead to the magnitudes of the INS measures presented, recognizing there are exogenous effects beyond the subsectors control.

3.7.1 FORWARD CONTRACTS AND IMPROVED INFORMATION

In impersonal spot markets like that for navy beans, price is expected to result in a match of supply with demand in the current period and also reveal the quantities and product characteristics most preferred by buyers in future periods. While navy beans do have a grading system in terms of channeling already produced products to buyers desiring the set of characteristics embodied by the grade, the spot market does not offer a mechanism to the buyer allowing them to communicate back to the grower the desire for a set of characteristics not delineated by grade. The lack of two-way communication is especially important for long-term coordination, for one cause of the decline in navy bean consumption is that the growers may be unaware that buyers are leaving the market because a

certain product the grower is capable of producing is not available. Hirchman's(1970) concept of preferences being articulated either through exit or entry into the market versus a "voice" option is relevant to this analysis.

The navy bean spot market is an entry/exit preference articulation mechanism, with information not available to the canner as to why a farmer quit growing beans or to the grower for why a canner chose not to buy. Superior to the spot market in preference articulation is the forward contract. One of the benefits of forward contracting is the two-way communication mechanism between the buyer and seller, as is the case in the tightly knit contracting process of the sugarbeet industry. Not only does the contract offer a means to communicate each party's needs, but also acts as a mechanism to efficiently effect a desired change in a timely manner. The following is an example of how the sugarbeet contracting process improved the performance of the industry by better communicating how to achieve a desired set of product characteristics.

Through the joint funding of U.S. sugarbeet processors, the Beet Sugar Development Foundation provides broad based research aimed at increasing the overall profitability of the industry. From these efforts have come significant advances in the production and processing of sugarbeets that acrue to both the grower and processor since the contracts provide for sharing of costs and benefits. Through the contract, new advances in production and processing

technologies can be quickly adopted by writing them into the contract. Since the contract is fairly standard, in a fell swoop all production can be brought in line with system needs. The following is one such example of the adoption through contracts of advances in sugarbeet production technology.

At one time, the emphasis of the industry was on tons of beets produced per acre. Logic at the time was that the more tons of beets, the more raw sugar, and nitrogen fertilizer was an effective means to increase raw tonnage. As Figure 3.3 shows, tonnage per acre steadily increased from the 1960's, a time when nitrogen application increased for most field crops, including sugarbeets. However, as Figure 3.4 points out, while tonnage per acre was increasing, the sugar extraction rate was declining sharply, causing some consternation in the industry. What it meant was the percentage of sugar being recovered from the raw beets was declining, meaning somewhere in the handling and processing function, sugar was being "lost" at an increasing rate. Eventually, in the early 1980's, research supported by the Beet Sugar Development Foundation isolated the cause of declining extraction rates as the increasing use of nitrogen. They found that in the processing of sugarbeets, nitrogen fixed itself to the raw sugar, causing both the nitrogen and the sugar to be "washed out" into the byproduct molasses. So while tonnage per acre was increasing with the use of nitrogen, the net amount of sugar produced per acre was actually declining. Given the existing method of valuing the beets,

Figure 3.3
RAW SUGARBEETS PER ACRE, U.S.(TONS PER ACRE)

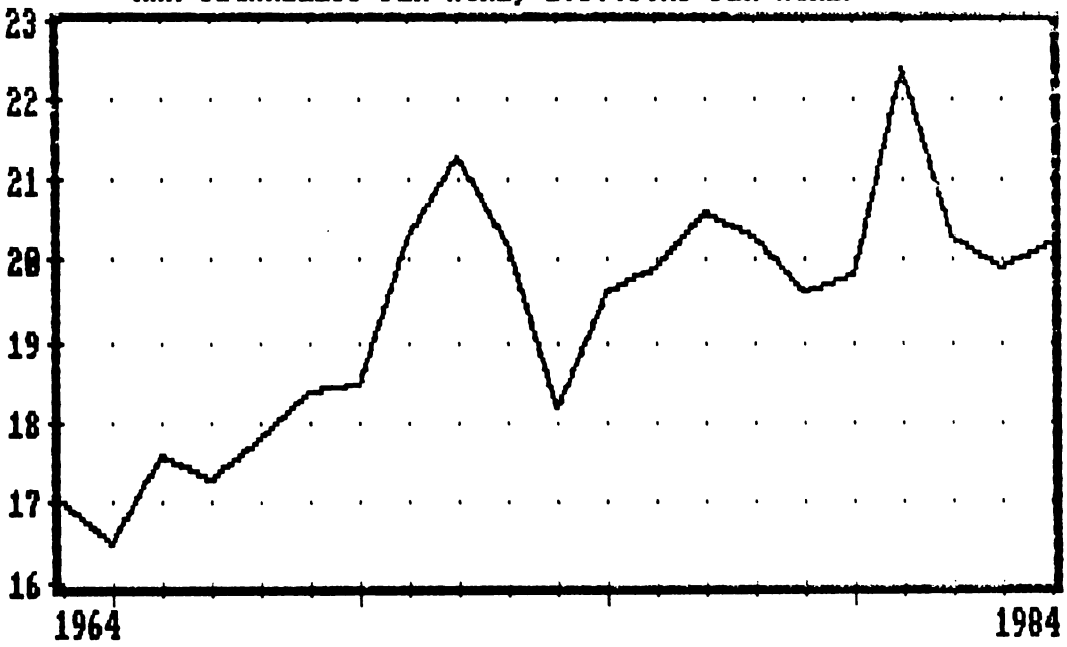
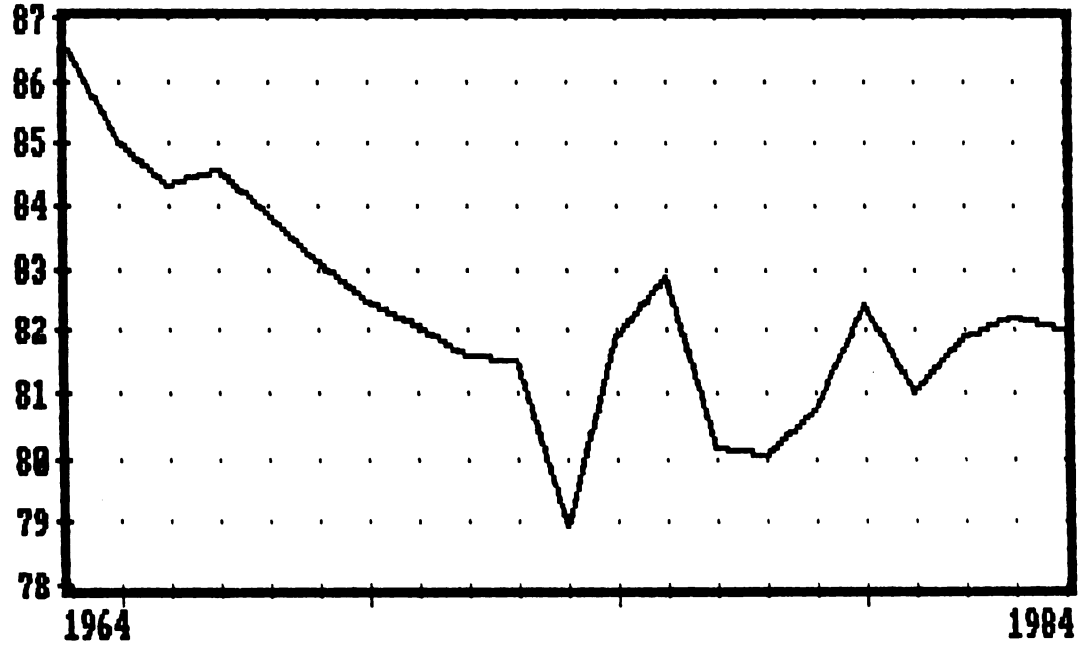


Figure 3.4
SUGAR EXTRACTION RATE FROM BEETS SLICED(PERCENTAGE)



the excessive application of nitrogen benefited the individual grower since they were given credit on the sugar content tested at delivery. The individual grower did not bear the consequences of the reduced yield in processing since the total pool of sugar returns were reduced, meaning all growers and the processor shared in the costs of excessive nitrogen use.

The industry then changed its emphasis from tons of beets per acre to "net recovery rates of sugar" per ton of beets, and in doing so took steps to limit the deleterious effects of nitrogen. Soon contracts between the processor and grower adopted clauses recommending or expressly forbidding nitrogen application after a certain date in the growing season, and the result was that sugar recovery rates began to increase. By mandatory contract requirements and the monitoring of field staff, the industry could fairly well police nitrogen use, and is a good example of where the individual grower was not only advised on the optimal production practice, but also was prevented from spoiling the amount of net returns for all growers. In terms of coordination performance, the industry sponsored research not only identified a significant problem, but via contracting was also able to have an almost immediate adoption of the better technologies.

In contrast, if a similar situation were true in the navy bean industry, the spot market would be limited in its' ability to encourage the adoption of the new production practice. While there

is both grower and shipper sponsored research, and new technologies are adopted, the navy bean subsector appears to have less effective mechanisms to either create the incentive for grower adoption or conversely, impose a penalty for individual behavior spoiling the market for all growers. If price is the only means of dictating behavior, communicating the need for a set of product characteristics not produced is difficult, and often there is a price incentive for dysfunctional behavior, as the case would be for sugarbeets if the spot market policed the use of nitrogen.
It is not presumed that the navy bean subsector is incapable of adjusting to market needs, but it does appear in terms of improved communication alone, sugarbeet contracting is superior to the navy bean spot market for coordinating behavior in response to technological change.

3.7.2 1986 MICHIGAN FLOODS CASE STUDY

In the fall of 1986, severe flooding occured just prior to harvest in the primary sugarbeet and navy bean production areas of Michigan. Yields were substantially reduced and in some cases, indundated fields rendered the entire crop unharvestable. Many sugarbeet and navy bean growers, often the same farmer, experienced significant crop losses. However, the sugarbeet industry suffered much less stress than the navy bean industry because the sugarbeet coordination mechanisms were better able to cope with the effects of the floods than the navy bean mechanisms. The sugarbeet industry

exhibited tighter coordination and a "smoother" handling of the situation than the navy bean, and the case of the 1986 Michigan floods is a good example of how the coordination mechanisms in place for sugarbeets are more adaptable to adverse circumstances than the navy bean. This section will look at the 1986 Michigan floods as a case study example of coordination in the sugarbeet industry versus the navy bean.

Both the sugarbeet and navy bean industries experienced the general stress of lost revenues associated with severe reductions in yields. The navy bean industry, however, experienced additional problems and controversey over the fulfillment of contracts. The short crop caused many bean growers and shippers to be unable to deliver on their contracts. Many sugarbeet growers as well could not deliver on the acreage specified in their contracts, but because of Act of God clauses in sugarbeet contracts, beet growers are obligated to deliver only what they can harvest. There are no minimium delivery requirements in sugarbeet contracts, only the stipulation that all production of acceptable beets is received by the processor. Navy bean contracts between Michigan growers and shippers and all shipper and canners have minimum delivery requirements and do not contain Act of God clauses. Bean contracts state that if the minimum delivery requirement is not met, the seller compenstates the buyer by purchasing beans on the spot market to make up the shortfall in delivery. Since the spot market price

rose considerably after the flooding, the seller faced a substantial penalty in making up for their shortfall in delivery.

Shortly after the full effects of the floods were known, navy bean prices jumped from around $15.00 per hundredweight to over $50.00/cwt. Canners, uncertain over the quantities of good quality beans, changed traditional harvest time buying patterns to buy as many of the remaining good quality beans as possible. The fortunate growers with good quality beans in excess of contract obligations experienced a bonanza, especially those in MinnDak where harvest conditions were excellent. As an aside to prior discussions on contract use, MinnDak's good fortune shows that though not usually as drastic, poor Michigan yields are a boon to MinnDak growers not contracted, reinforcing the decision of MinnDak growers to not contract for more than half their crop.

Navy bean growers and shippers without beans, yet needing to make deliveries because of contract obligations, had to make purchases from Minnesota and North Dakota, where the $50.00-60.00 per hundredweight price was approximately three to four times the prices specified in most contracts. This situation happened one of two ways: one with the many shippers who had contracts with canners not covered with contracts to growers, and the other with growers who had a contract with the shipper, but were short the minimum production specified in the contract. Facing significant losses in meeting contract obligations, many shippers and growers tried to

renegotiate the minimum delivery requirements. In some cases, the canners allowed the shipper to make up the contract the following year, and some shippers allowed the same for their growers. However, since canners do not offer Act of God clauses, many forced the shippers to meet contract obligations. Shippers in turn attempted to force growers to make the minimum delivery or compensate them for their losses. Lawsuits ensued, particularly between the grower and the shipper, over the minimum delivery stipulations and the issue of Act of God clauses.

Though Michigan navy bean contracts do not contain Act of God clauses, the occurence of a weather related disaster prompted law suits to clarify what recourse is available to growers and shippers who faced substantial losses if required to meet contract obligations. The most significant findings from the lawsuits was that a Michigan law concerning Act of God clauses in agricultural based contracts did cover the navy bean industry in particular instances. The distinction of a broker versus acreage contract decided if the state Act of God law applied to a contract dispute. If the grower contract with the shipper specified the number of acres from which a minimum amount of delivery was required, the grower could forego contract obligations by citing the state Act of God law. If the grower contract only specified a minimum number of beans to be delivered, the grower was deemed a broker, and the Act of God law did not cover them, meaning they could be held to their contracts in the eyes of the court. The net result was confusion in

the industry over Act of God clauses and a heightened realization that a change was needed in the Michigan navy bean contracts to better cope with Act of God situations. In the final chapter, some solutions to the Act of God clause issue will be discussed.

Some of the problems created by the contract situation were solved jointly by canners, shippers and growers. One of these was in determining the minimum grade of beans available that the canners felt they could work with. Since the rains came after the crop was mature, some fields experience near normal yields in terms of sheer quantity but with severely reduced quality from the sun hitting the wet beans, causing them to blacken and become spongy, reducing their value to canners. The Michigan Bean Shippers in conjunction with the canners sampled the beans to see what quality they could achieve once they were "cooked up". Once a minimum quality was determined, canners sought to buy beans of at least the minimum grade. Though the navy bean industry did show cohesion in establishing a minimum grade, the problem came in disseminating the minimum grade information to the individual grower. Without a bargaining association or field staff relationship, there was a lag time in the information reaching some growers, if it did at all. Needing to make a decision on whether it was profitable to harvest a field, the grower faced a considerable problem in making the proper decision in a timely manner. Admittably a difficult situation for any industry to deal with, navy beans, by not having a tightly organized system

like sugarbeets, problems in information dissemination posed a serious short term coordination problem.

The Michigan sugarbeet industry as well faced the prospects of flood caused reductions in both yields and quality. While some fields were indundated and rendered the beets useless, there was also a significant amount of marginal quality beets that could be economically processed. However, the marginal beets when piled pose the problem of accelerated sucrose burning of the entire pile because the marginal beets are partially deteriorated. Deteriorating beets generate more heat than good quality beets, increasing the normal rate of sucrose burning in storage. To minimized sucrose burning, the marginal beets were stored in separate piles.

Through the close ties between the processor field staff and the growers, marginal beets were identified in the field to the point that the individual fields were "disected", leaving sections of less than acceptable beets in the fields. The marginal beets, though deteriorating, still tested fairly close in sucrose levels to the better quality beets. Growers who delivered marginal beets received returns comparable to deliveries of good beets, primarily because the processors and bargaining association got together after the processing campaign and assessed the net results of the floods. Losses from the flooding were partially shared among the growers,

meaning no one grower bore an exceptional hardship if they could only deliver marginal beets.

By being able to separate out the marginal beets, the effects on pile loss were minimized, and the representative of the largest Michigan sugarbeet bargaining association commented that their industry did not suffer as much damage from the flooding as originally estimated. A major reason attributed to the Michigan sugarbeet industry's successful coping with the flooding was the longstanding good relations between grower and processor.

In conclusion, the higher level of stress in the navy bean industry from the flooding stemmed more from the controversy over contract obligations than from lost revenues. The penalty provisions for non-delivery meant some bean growers were committed to pay more in compensating shippers than the total revenue from the beans they were able to sell. The navy bean grower bears an inordinate amount of risk in contracting as compared to their sugarbeet counterparts, who by having an Act of God clause, shared more of the risk of adverse weather with the processor. The 1986 Michigan floods case study is a graphic example of just how large the differences in risk can be, and more importantly, how a mechanism such as contracting can reduce the risk in one industry while actually increasing the risk in another. Inordinate amounts of risk born by one party does not promote good performance. The the controversey following the 1986 floods suggest the Michigan navy

bean industry may have deficiencies in their current set of coordination mechanisms.

3.8 CONCLUSIONS

After describing the navy bean subsector as compared to the sugarbeet, two main differences were discussed. First, the sugarbeet industry receives significant protection through public policy from the vagaries of the world market while the navy bean industry does not. Second, the nature of the commodities themselves led to a different mix of exchange mechanisms for each subsector. Product perishability severely limits the realistic market options for sugarbeets as compared to those for navy beans, and has led to the adoption of contracting or more cooperative arrangements. Though not weighted, the combination of the sugar program and contracting are the primary reasons the sugarbeet subsector is more stable than the navy bean as measured by the INS index. The INS index did well in pointing out the levels of instability in the pertinent variables, and the operations of the coordination mechanisms offered a number of plausible explanations for the magnitudes of the INS index. However, assessment of coordination is more than measures of instability, and involves a number of qualitative factors not captured by an index.

The last chapter will look at the whole coordination picture, summarizing the major findings, recognizing the major findings must

be further qualified with case study examples. The impact of the sugar program on encouraging substitute production, the role of the bargaining association, and the behavior of navy bean growers if they had a contract similar to the sugarbeet growers are some of the matters to be discussed.

Chapter 4

SUMMARY OF COORDINATION IN SUGARBEET AND NAVY BEAN SUBSECTORS

4.1 INTRODUCTION

The goal of this final chapter is to summarize the assessment of coordination for sugarbeets and navy beans by discussing the major findings for each subsector and their implications for possible improvements in coordination. Alternatives to existing coordination mechanisms will be discussed, with suggestions for future research.

4.2 THE SUGAR PROGRAM STABILIZES SUGAR DEMAND IN THE SHORT RUN

The stability of the U.S. sugarbeet industry without question is due in part to the protection it receives from foreign competition through the U.S. Sugar Program. For many decades, the sugar program in one form or another has reduced the risks of committing assets to domestic sugarbeet production by virtually guaranteeing a minimum market for the output of those assets, sugar. The value of those assets are undoubtably higher with a sugar program than without one, and likely reflect the premium domestic sugar producers enjoy from the sugar price support.[1] Since the

---

[1] Based on the findings of Schnittker Associates in a 1983 report called "Sweetener Markets and Policies--The 1980's". The report was commissioned by the Sugar Users Group.

elimination of the program would certainly result in a lower domestic sugar price, the short run risk to owners of assets committed to sugar production is reduced by the amount of protection from the vagaries of the world market provided by the sugar program.

The U.S. sugar program, however, poses a threat to the long-term stability of the domestic sugar industry. While the sugar program of the 1980's contributes to the short run stability of the sugarbeet industry, the net impact of the program may be negative in the long run. The sugar price umbrella created by the sugar program has encouraged the producers of sweetening products from non-traditional sources, such as corn, to expand production.

4.2.1 THE SUGAR PROGRAM ENCOURAGES THE ADOPTION OF SUBSTITUTES IN THE LONG RUN

The sugar market is part of a broader sweetener market. As processing technologies improved, new sweetener products were created from non-cane or beet sources such as corn that compete directly with many of sugar's uses, often at a lower cost than sugar. While per capita consumption of all caloric sweeteners rose slightly since 1975, sugar consumption steadily declined as seen in Table 4.1 on the next page.

High Fructose Corn Sweeteners(HFCS) were the major substitutes for sugar. HFCS can achieve almost the same sweetening equivelant as sugar at a lower cost than sugar, and in cases such as soda pop

where HFCS can be directly substituted, sugar has virtually dissappeared from use. Although granulated table sugar, the last bastion of the sugar industry, has not been penetrated by HFCS, the sugar price support umbrella is stimulating intensive research into granulated forms of HFCS. If a comparable granulated HFCS product is developed at a competitive price, the domestic sugar industy faces the reduction to a minor supplier of the sweetener market.

Table 4.1

U.S. Per Capita Caloric Sweetener Consumption

	1975	1985
Sugar	75.5%	48.8%
HFCS	4.2%	33.5%
Glucose Corn Sirup	14.9%	13.9%
Dextrose	4.2%	2.7%
Other	1.2%	1.1%

Source: 1986 U.S.D.A. Sugar and Sweetener Outlook and Situation

Evidence of the price umbrella for HFCS created by the sugar program can be seen in the domestic price differentials between sugar and HFCS. Table 4.2 shows the HFCS prices, price of refined sugar, and the HFCS price discount to sugar.

Table 4.2

U.S. HFCS and Sugar Prices, Dollars per 100 pounds

Year	HFCS-55	Refined Sugar	HFCS Price Discount to Sugar
1982	18.81	27.62	31.9%
1983	21.60	26.10	17.2%
1984	22.70	25.66	11.5%
1985	20.03	23.18	13.6%
1986	19.96	23.42	15.6%
1987	17.46	23.60	26.0%

Source: 1988 U.S.D.A. Sugar and Sweetener Outlook and Situation

HFCS-55 is used primarily for soft drinks, and has almost completely replaced sugar as the sweetening agent for soft drinks.

The sugar program then is something of a double edged sword in that on one hand it protects domestic sugar producers from foreign competition, and on the other it encourages domestic competition in the sweetener market from other forms of sweeteners. In fact, the corn grower and processor organizations are one of the Sugar Program's most ardent supporters, recogniizing the benefits of a sugar price umbrella for corn sweeteners in the marketplace. While quotas on sugar imports have been reduced to compensate for downward price protection from declining sugar consumption, the long-term impact has been the sacrificing of market share to achieve a

stabilized sugar price. The INS data from the last chapter showed sugarbeet production to be fairly stable, and did not pick up the long term implications of the sugar program on sugarbeet coordination. The INS is a measure of year to year instability and not an indicator of long run coordination effectiveness.

4.2.2 NAVY BEAN PUBLIC POLICY DOES NOT ENCOURAGE THE ADOPTION OF SUBSTITUTES IN THE LONG RUN

With no formal public policy to mitigate the impacts of a volatile world bean market, in addition to adverse weather, the often unstable domestic navy bean price in part owes its's volatility to the sometimes unstable export market. Changing prices in itself is not evidence of poor coordination, but unstable and unpredictable prices by definition tend to contribute to a less orderly market, and hence poorer coordination. Compared to sugarbeets, with its sugar program, navy beans at least in the short run experience more instability by not having a public policy aimed at stabilizing navy bean markets. However, though in the long run continued instability may be of a negative impact to the navy bean industry, of some consolation from not having protectionist public policies is that competition from substitute products is not encouraged as in the case of the sugar program. Granted, domestic navy bean consumption is declining, but it is primarily due to changing consumer tastes and not from an overt public policy altering prices and the market structure. Declining market share due to changing consumer tastes is better coordination than a

declining market share due to artificially high prices, and in matching consumer preferences with production, in this instance the public policy towards navy beans may promote a more orderly market than the sugar program in the long run.

4.3 CONTRACTS PROMOTE A MORE ORDERLY MARKET THAN THE SPOT MARKET

Sugarbeet forward contracts better coordinate production with demand than the navy bean spot market. The INS data presented in Chapter 3 showed sugarbeets to be more stable than navy beans in all categories. The sugar program is posited as one stabilizing influence, but is not the sole reason. The exclusive use of contracts also contributes to the stability of the sugarbeet industry, and the dominance of the spot market contributes to the instability in the navy bean industry.

With sugarbeet grower decision error significantly reduced by the exclusive use of contracts, supply instability is much less than navy bean supply which is the result of the aggregate supply response of individual growers based on their interpretations of expected demand. Navy bean farmers primarily make acreage decisions based on expectations of the coming years spot market price while their sugarbeet counterparts have acreage decisions in effect made for them by processor contract offerings. Given the unstable nature of navy bean prices, grower decision error is more likely for navy bean growers than sugarbeet. Since each is the dominant coordinator

of production in their industry, in terms of the orderly market characteristic of supply matching potential effective demand, the sugarbeet contract promotes a more orderly market than the navy bean spot market.

The evolution of the forward contract as the dominant exchange mechanism for sugarbeets and the spot market for navy beans was not a randomnly occuring phenomena. The following are reasons found for the differences in exchange mechanisms.

1. Sugarbeet production and marketing is inherently more risky than navy bean production due to greater product perishability. The significant degree of potential risk associated with spot market transactions for sugarbeets is one reason growers will only produce beets under a forward contract. Conversely, the navy bean grower faces less risk in using the spot market due to product storeability, and is one reason the spot market is still the dominant exchange mechanism.

2. Assets committed to sugarbeet production and especially processing are more specific than navy bean production and processing. Williamson's(1981) theory on the effect of transaction specific assets on market formation discussed in Section 3.4 is supported by differences in exchange mechanisms used for sugarbeets and navy beans. The analysis adapted Williamson's notion of asset specificity to the characteristics of the products themselves, and

found that relative perishability and bulkiness impeded the effectiveness of the spot market for sugarbeet transactions. Contracting likely arose in response to the high level of transaction costs associated with the spot market.

The large investments required for singular purpose sugarbeet processing plants places a premium on maintaining a steady supply of sugarbeets. Since beets cannot be transported very far, beet production must occur in a close proximity to the processing plant. Therefore, sugarbeet processors must rely on local farmers as their sole source of sugarbeets, and use forward contracts to coordinate supply and develop a good working relationship with the farmer. Navy bean processors on the other hand build plants to process a variety of crops, and more importantly do not have to locate in navy bean production areas. Bean processors can purchase beans from around the world, and are not tied to a specific group of farmers. Combined with the fact that farmers tend to produce enough navy beans anyway, there is less incentive for the bean processor to contract for more of their needs.

3. U.S. navy bean production is geographically concentrated, making beans subject to significant yield variability. Contracting in itself does not lessen yield variability, meaning with the existing concentration of bean production there will always be some supply instability for the bean processor.

4. Sugarbeet contracts spread the risks of producing and processing beets for the sugar market rather equitably between grower and processor. Costs are share by a predetermined formula, and if the price of sugar rises after harvest, both party's benefit. Conversely, navy bean contracts contain a fixed price, often not very far above the average cost of production, and by locking in a price, bean growers forego the opportunity to partake in a "bull" market at harvest. Also, sugarbeet contracts contain Act of God clauses while most navy bean contracts do not, meaning in the event of yields reduced by severe weather, the bean grower bears most of the risk. The case study on the 1986 Michigan floods presented in Section 3.8 gave a clear example of the high degree of grower risk associated with the Michigan bean contract at that time.

5. If navy bean growers were offered a contract similar to the sugarbeet, navy bean contracting would likely increase. The comparison of the forces effecting the adoption of contracts must be tempered with knowledge that the nature of the contract itself influences its' degree of use.

6. The navy bean spot market, in essence created by the above mentioned inhibitions to contracting, is often volatile. With a structure of a small number of shippers selling to a smaller number of canners, part of the volatility may be due to the ability of large shippers or canners to influence the market unilaterally. The bean market may experience sudden price fluctuations unrelated to a

change in underlying supply or demand.[2] Speculation by shippers or canners based on their interpretations of market information may cause significant price movements. The individual grower does not have the ability to influence spot market prices, and having limited ability to collect and interpret market information, is at a disadvantage to the shipper or canner possessing greater market information. In terms of coordination, the shipper and canner seem to have a greater ability to influence the market, and the individual grower ends up bearing considerable risk of a volatile spot market.

4.4 BARGAINING ASSOCIATIONS CAN PROMOTE MORE ORDERLY MARKETS

The sugarbeet grower bargaining association promotes a more orderly market by consolidating grower-processor contract negotiations to the interactions between a single body representing all growers and the processor representatives. Search time and costs to the individual beet grower in determining the optimal arrangement is reduced. Reducing search costs reduces the chance of grower error and risk they bear from the consequences of a bad decision. The bargaining association then is a means by which sugarbeet growers reduce the risk of sugarbeet production by pooling their resourcs to ensure their contract is the best one available. Also, since the contract resulting from the negotiations is standard

---

2 From conversations with industry participants and observations of market data.

for all growers, there is a more equitable treatment of beet growers and reduces the need to wonder if other growers are receiving a better deal.

The individual bean grower, by not having bargaining association representation, when they do contract face a higher degree of risk and search costs than the sugarbeet grower. Bean growers negotiate individually with the shipper, and do not have a mechanism other than word of mouth to determine which shipper is offering the better contract. Two bean growers signing contracts on the same day with the same contigencies, but at a different price, is not orderly marketing. A bargaining association is one way to ensure that the bean grower is receiving the best deal they can.

Another benefit of bargaining associations for sugarbeet growers is its ability to monitor the profits and losses of the processor and the factors causing them. The bargaining association is in a position then to assess whether grower integration into processing is feasible in the event of a plant closing. There have been three recent cases of grower integration into beet processing, and in all the bargaining association played a significant role in pooling grower resources needed to purchase the processor's assets[3]. Conversely, the navy bean grower does not have a mechanism to monitor the operations of either the shipper or canner. Though

---

[3] Discussion with Richard Fitzimmons of the Red River Valley Growers Cooperative.

there is less incentive for forward integration because bean production is not tied to the existance of a particular operation like sugarbeets, the availability of a bargaining association would make the evaluation of any contemplated forward integration easier.

4.5 SUGARBEET GROWERS ENJOY A HIGHER DEGREE OF MARKET POWER

The close sugarbeet grower/processor relationship allows the sugarbeet grower to have a higher degree of influence over their affairs, or market "power", than their navy bean counterparts. Via contracts and bargaining associations, sugarbeet processors pass through to their growers some of the benefits of being part of what Galbraith(1973) described as the planning sector. The planning sector, as compared to the market sector, is characterized by influence over prices it receives and it's major costs. The market sector is characterized by most agricultural producers, that of price taker whose fate is mostly in control of the market place.

Sugarbeet processing companies are typically large, well capitalized firms with a singular interest in the sugar market. The sugar industry in general exhibits tight cohesiveness among processors as evidenced by the full participation of every company save one in the U.S. Beet Sugar Association. The Beet Sugar Association wields a considerable amount of influence over their affairs, and the routine passage of protective trade legislation is a good example. Another example is the intensive research

activities supported by sugarbeet processors aimed at enhancing the profitability of the entire industry, as was seen in the case study in Section 3.7.

Since the sugarbeet contract shares costs and profits via a predetermined formula, the beet grower shares in the benefits of the sugar industry's ability to exert influence over the market. Sugarbeet processors value a good working relationship with their growers since they are limited in supply alternatives(Section 3.4.5). Therefore, the national beet processor association works closely with the national beet growers associations, and combined is a formidable influence in the food and farm legislation process. Since maintainance of the sugar program is critical at least in the short run to maintaining current levels of production, the tight grower/processor relations is of necessity in an "us versus them" philosophy. The net result is the beet grower enjoys the benefits of planning sector "membership" through higher prices and stabilized markets.

The navy bean grower on the other hand is a member of Galbraith's(1973) market sector, acting as a price taker with much less control over political and market activities than their sugarbeet counterparts. Since the bean shipper is the market channel intermediary between bean grower and processor, there are essentially no ties between them beyond the simple exchange of beans. In fact, though not necessarily adversarial, the grower and

canner do not have the same type of common goals the sugarbeet grower and processor have.

The major bean canner such as Campbell's or Quaker Oats may have the same type of planning sector capabilities as the sugarbeet processor, but the bean canner has less incentive to pass the benefits of planning sector membership back to their growers. Bean canners are typically mult-commodity processors, and are not as dependent on the navy bean as the sugar processor on sugarbeets. The bean canner is looking for good supplies of quality beans at the lowest cost, and since the spot market appears adequate for this purpose, limits the relations with growers to the purchase of beans passed through the shipper. Often, bean growers and canners are on the opposite side of the issue, such as the contract disputes after the 1986 Michigan floods and canner support of Farm Bill provisions allowing navy beans to be planted on set aside acreage, a policy with which the existing growers were vehemently opposed.

Though both the bean shipper and grower have organizations for lobbying and research, they are of a much smaller scale than the sugarbeet organizations, primarily because they are not co-funded by canners whereas the sugarbeet organizations are by processors. There is less incentive for the canner to work more closely with the bean grower, and the greater degree of risk bean growers bear is in part due to the canner having less need to contract with growers,

and hence canners enjoy planning sector capabilities without sharing the benefits with the grower, who remains a market sector member.

The next section considers some possible ways to improve coordination for navy beans, especially those focusing on improving the performance of the contract and the spot market. The suggestions center on ways the industry itself, with some possible cooperation with government agencies, can improve coordination.

4.6 EXPANDED USE OF CONTRACTS TO IMPROVE NAVY BEAN COORDINATION

A lesson from the comparisons of the subsectors is that a contract system can be an effective means to improve coordination. The 1986 Michigan floods case study graphically showed the problems associated with existing navy bean contracts and the high degree of potential risk facing the contracted grower. Much of the risk is due to a lack of Act of God clauses, like those seen in sugarbeet contracts, where in the case of catastrophic weather conditions the bean grower is still expected to meet minimum delivery requirements. It follows then that including Act of God clauses in navy bean contracts should increase grower willingness to contract. Certainly it only seems fair that if a grower is left without a crop due to circumstances completely beyond their control, they should not bear additional costs by compensating the shipper for falling short of delivery requirements. Other commodities such as sugarbeets and processed vegetables routinely offer Act of God clauses in forward

contracts. Even navy bean growers in MinndDak have Act of God clauses in their contracts. The question is then why Michigan bean growers are not offered Act of God as well.

4.6.1 IMPEDIMENTS TO ACT OF GOD CLAUSES IN MICHIGAN BEAN CONTRACTS

Michigan bean shippers say the reason they do not offer Act of God clauses in their grower contracts is that the canner does not offer Act of God to the shipper. Why then do MinnDak shippers offer Act of God in their contracts with growers without canners offering Act of God to them. First, historically MinnDak contracts for a number of crops such as pinto beans have included Act of God. When efforts were made to stimulate MinnDak navy bean production, farmers would not contract unless Act of God clauses were included[4].

Second, because MinnDak has less than a third of North American production, adverse weather conditions causing crop shortfalls has much less upward pressure on spot market prices than a similar situation in Michigan. The MinnDak shipper can afford the risk of Act of God because they can meet canner contract obligations by buying beans at a profitable price in Michigan. Also, since the spot market price rises much less in the event of adverse MinnDak growing conditions causing production shortfalls than a similar situation in Michigan, there is less incentive for MinnDak growers

---

[4] Conversation with Tim Cornyea of the Northharvest Bean Growers Association of Minnesota.

to falsely cite Act of God to market beans on the spot market. It is not implied here that the bean grower does try to renege on contract requirements in MinnDak where Act of God clause are used, or would in Michigan if they were used. This possibility is instead brought up as one reason why Act of God is not more widely used, especially since the incentives to wrongly invoke Act of God are greater in Michigan because of the potentially higher spot market price.

One of the problems then inhibiting the incorporation of Act of God clauses in Michigan bean contracts is the monitoring of Act of God citations used in lieu of delivery. Improved monitoring of grower contracts might ease some of the uncertainty over Act of God for both the shipper and canner. The canner, better assured that the shipper is limited in their abilities to meet contract obligations because of grower inabilities to meet contract obligations, might be more willing to offer Act of God to shippers. Sugarbeet processors with sizeable field staffs do not have the problem of monitoring Act of God citations since there is no sugarbeet spot market, and perishability and bulkiness effectively limit grower market alternatives to the local processor. With a base of almost 5,000 navy bean growers, Michigan bean shippers cannot employ the same type of extensive field monitoring like the sugarbeet industry to determine the exact effects and breadth of Act of God situations. One possible means for reducing the need for extensive field monitoring has been proposed by Hebert and

Jacobs(1988) that offers a regional solution to wide-spread occurences of adverse weather.

In the event of region or country-wide bad weather growers under contracts would be required to deliver beans, but the required deliveries would be reduced from that specified in their contracts by the percentage decline in total production that is the result of the bad weather. For instance, a 40% decline in production from some specified level from some specified region would mean that each grower's required deliveries would be reduced by 40%. A combined task force of the U.S. Crop Reporting Service and bean shipper and grower organizations could develop the consensus on regional production. The industry itself would have to jointly decide on the regional definitions, on what constitutes extensive bad weather or other catastrophic circumstances, and on what is the specified level of base production from which the percentage changes would be calculated. The canners and shippers might find this arrangement acceptable since there are equitable and legally grounded assurances that they are receiving all the beans that a grower can supply.

This variable delivery Act of God arrangement would still leave the individual contracted grower exposed to the risk of localized weather induced poor yields. Shippers and canners would likely still hold to their contracts the individual grower experiencing reduced yields from isolated circumstances. Although the incentive to sell on the spot market is greatly reduced because localized bad

weather does not mean increases in market prices, shippers would still have to be concerned about sales of contracted beans on the spot market since only small differences between the contract and market price would make it profitable to renege on the contract.

Growers might be willing to accept this variable delivery Act of God allowance even if shippers and canners do not let the individual grower cite Act of God clauses in localized instances of adverse weather. Localized bad weather would increase the spot market price little, meaning the penalty for non-delivery would be much less than those occuring during the 1986 Michigan floods. Also, Michigan growers already contract to a significant extent without Act of God clauses, and therefore might agree to an arrangement whereby they are equitably protected from region-wide reductions in yield from adverse weather.

4.6.2 NAVY BEAN FIXED PRICE VERSUS FORMULA PRICE CONTRACTS

Certainly another lesson learned from sugarbeets is the attractiveness of a formula price contract to the sugarbeet grower. With a formula price based on the net returns to the sugarbeets delivered and processed, the returns to the grower move in accordance to the returns to the sales of the finished product, meaning the grower would benefit from higher sugar prices. The ability of the grower to share in the benefits of higher sugar

prices is one reason why all sugarbeets are grown under a contract.

Conversely, with a fixed price contract, the contracted navy bean grower does not share in the benefits of short crop years and the ineveitable price increases they bring. A formula price bean contract would be attractive to the bean grower in that the grower could share in an up market, depending on how the formula is determined. A formula price contract for navy beans would address one of the impediments cited to further use of contracting, the desire by many growers to speculate.

At least in theory, a navy bean contract formula price could be pegged to the returns from the sales of the finished navy bean product in the same manner as sugarbeets. However, since the canners buy from shippers who in turn buy from growers, and navy beans are differentiated more than sugar in the finished product, formula pricing for navy beans would be more complicated than for sugarbeets. Also, with sugar price supported at a minimum level, there is really no downside risk for either party in the sugarbeet contract. A more practical approach would be to take advantage of the relatively small number of actors in the navy bean industry in a combination bargaining/formula price arrangement. The price could be pegged to the spot market, or if contract use rises to the point that the spot market becomes too "thin", a more administrative arrangement where grower groups, shippers, and canners get together to set price according to estimated supply and demand. Contracts

then would be offered to growers based on the estimated acreage. Instead of a fixed price, the contract would contain a formula where the grower would receive a fixed percentage of a navy bean price jointly determined by a grower/shipper/canner board estimate of supply just prior to harvest. The shipper/canner contract would be of a similar arrangement.

Since returns are based on a percentage versus a fixed price, as tighter supplies move price up, grower and shipper would both share in the benefits. Conversely, as prices move down in big crop years, the effects of lower prices are shared as well. While the grower and shipper both benefit from a contract offering the ability to speculate, in moving from a fixed price to a formula price, in short crop years the contracted grower would receive a higher than usual return and the shipper a less than usual. However, since the formula price contract has the spot market attribute of a moving price, and if formula price contracting replaced a significant portion of spot market transactions, the shipper may in fact pay less overall for a quantity of beans that used to be purchased primarily on the spot market. Formula price contracting offers the ability to both better coordinate production and maintain the desired speculative aspects of the spot market. Though a simplified solution to a complex issue, the sugarbeet lesson of formula pricing is one the navy bean industry should consider looking into.

4.6.3 CONCLUSIONS ON INCREASED USE OF NAVY BEAN FORWARD CONTRACTS

From the lesson of the sugarbeet industry, the benefits of contracts in disseminating information and coordinating supply would seem of value to the navy bean industry. Depending on how much more contracting is used, acreage variability could be reduced, potentially stabilizing revenues in the process. If expansion of contracting is accompanied by the widespread adoption of Act of God clauses, expanded use of forward contracts would likely result in a more equitable and even distribution of risk in the production of navy beans. With the current situation in Michigan, contracting without Act of God can create a greater risk to the grower than the spot market.

Increased use of contracting, while possibly stabilizing supplies, would likely lead to increased volatility in the remaining trades on the spot market. The effects of weather variability and vagaries in the world market would be squeezed into the more thinly traded spot market, causing heightened volatility in price from the spot market adjusting to those conditions. Depending on just how much contracting does increase, if at all, the effects of heightened spot market volatility on overall revenue stability cannot be readily projected.

It is not presumed that contracts will ever completely replace the spot market for navy beans, especially since there would always

be a group of canners, shippers, and growers who feel confident in their ability to profitably play the spot market. Contracts in their view would prevent them from exercising their ability to profit from the spot market. The desire to speculate has been cited as an inhibition to further use of forward contracts, and the inclusion of Act of God clauses will not change this desire.

In terms of most pressing problems in navy bean coordination, it is not the variability of the spot market in itself, but rather the nature of the contracts and the requirements to utilize a volatile spot market to meet minimum deliveries in the event of production shortfalls. From a long-term coordination standpoint, a few more situations like that of the 1986 Michigan floods where the grower was expected to bear most of the consequences and the canner may indeed begin to experience chronic shortfalls in production rather than overproduction. The risk to Michigan bean growers may be realized to be too great in contracting any production, and overall production may drop as a result, even if contract prices are bid up. Including Act of God clause in all bean contracts has the potential then to improve the long-term stability of the industry by keeping farmers in navy bean production.

4.6.4 SUGGESTIONS FOR THE NAVY BEAN SPOT MARKET

Since contracting is never expected to completely replace the spot market, the navy bean industry can take steps to improve the

performance of the spot market in coordinating economic activity. From the standpoint of the grower, they especially have an interest in a spot market that better serves their interest because of the disadvantage they have in terms of risk and information compared to the shippers and canners. Grower based initiatives to improve reliability and timeliness of spot market information is one way to improve the ability of the individual grower to use the spot market.

Though the sugarbeet grower does not utilize the spot market, a lesson in terms of grower cohesiveness and the pooling of resources for a mutual interest can be learned. Navy bean growers in Michigan and MinnDak do have grower organizations supported by either voluntary or mandatory "check-off" grower dues, but are less effective than the sugarbeet organizations in improving their positions in the marketplace. Bean grower organizations tend to focus their efforts on production research, with some recent attention to market development activities. Missing from their efforts seems to be research into the operations and effectiveness of their coordination mechanisms as well. Certainly, a united growers effort into the reshaping of contracts would have an effect in getting shippers and canners to negotiate on contract changes. Concentrated grower efforts can also improve the ability of the spot market to serve grower interests in a more equitable manner. The grower organizations are in place to at least study a few mechanisms to improve the spot market, and the following will discuss some of these.

Section 3.3.1 pointed out the deficiencies in the U.S.D.A. Bean Market News reporting service in providing timely and accurate information to bean growers. Bean grower organizations such as the Michigan Bean Commission(MBC) is a mechanism that could fill the void of timely bean market information being provided only by word of mouth. The Michigan Bean Commission as a service to its' growers could provide the same type of commodity news service as offered by private firms for crops such as corn or soybeans. Many farmers, including bean growers, subscribe to a private commodity news service, with electronic services over a teletype or computer being the most effective. Though not all growers would initially have the ability to receive electronic bean market reports, the age of low-cost computer information dissemination via modems has arrived to make it an economical process.

The information provided would not have to be complex, and the Michigan Bean Commission or similar organization could employ the same simple techniques as the U.S.D.A. market news reporter, phone calls to shippers. Claiming a good relationship with the Michigan Bean Shippers, the MBC could utilize the relationship with Michigan shippers to obtain up-to-date price information, and via a modem, transmit the information to bean growers. The industry generated market news service could be paid for by user fees or a combination of user fees and funds from the mandatory check-off funds received from all growers. With many U.S.D.A. market news services being curtailed or eliminated in light of budget constraints, many

industries face the possibility of providing their own market news service. Navy beans, given their declining importance in domestic markets and current thread bare Bean Market News staffing, would seem a candidate for removal from the federal market news program if further cuts are made.

Grower initiated market news services combined with today's low-cost computer technologies offer a real alternative to navy bean growers in receiving more timely price information. By pooling their resources, growers can survey more completely shipper and canner activity, offering the grower information useful in timing marketings. While there might be an incentive for canners and shippers to manipulate the information, the organized growers would be in a position to monitor the system and interpret it to grower members.

Another benefit of a grower supported news service is that contract offerings can be better monitored as well. Each day, growers could receive information on contract offerings from a number of shippers, allowing growers the opportunity to make more informed decisions of forward contracting. It is possible that such a service could evolve to system where buyer and seller get together electronically, allowing the grower and shipper to react quickly to each others contract offerings. Electronic contract marketing is believed to hold much promise for agriculture, and given the disparities in information between grower and the shipper or canner,

the navy bean grower in particular would have a tool to minimize the inherent risks of producing and marketing navy beans for a volatile spot market.

4.7 WHAT CAN THE SUGARBEET SUBSECTOR LEARN FROM THE NAVY BEAN?

Throughout the study, the underlying theme has consistently been that the sugarbeet subsector is better coordinated than the navy bean. In such a scenario, what could the sugarbeet subsector learn from the navy bean is not quite as clear as the opposite situation. One issue already touched on was how the sugar program poses a long term coordination problem by encouraging the use substitutes whereas the navy bean industry without a formal program does not encourage substitutes. One lesson learned from navy beans, and is something the sugar industry is increasingly aware of, is that artificial adjustments of the market price can accelerate the decline in domestic use of sugarbeet products the public program had originally meant to forestall. The sugarbeet industry then needs to examine further the actual benefits of the sugar program, and whether if not the complete elimination, at least a partial reduction in the support price would slow down the conversion of the sweetener market to non-sugar sources.

An issue not really mentioned overtly till now but discernable from previous discussions is the question of market tranparency and ease of entry for sugarbeet production. By using only contracts for

exchange, and since the terms of those contracts are not publicly reported, farmers not producing sugarbeets and interested in doing so seem to have a problem in determining what the potential profitability of the sugarbeet growing enterprise would be. More of a theoretical notion of barriers to entry from impacted information, because of the tight concentration of sugarbeet production, in practice there does not seem to be a serious problem of a barrier to entry. Given the specificity of the assets involved and their high costs, it is not feasible for farmers to routinely move in and out of beet production. Once the investment is made, the farmer needs the assurances of not only a beet contract for the coming year, but also for the next few years. Though contracts are usually not for more than one year, in practice, farmers doing a good job of producing beets can expect the same contract for the next year. Industry participants interviewed basically felt that most every farmer in the areas surrounding the beet processing plant, whether a beet grower or not, knew about the terms of the relationship between the grower and the processor via word of mouth. Navy bean prices are more visible than sugarbeet, but based on the indications from members of each industry, there does not appear to be a coordination problem for either in terms of entry.

Some problems in general mentioned by sugarbeet industry participants related to the development of isolated instances of bad relations between a group of growers and the local processor. In one case involving the now defunct Great Western Sugar Company,

lawsuits were filed by growers over disputes in profits returned to the growers. Part of the problem was the deteriorating economic health of the company and the allowing of plants to become technically obsolete. After Great Western's demise, some plants were reopened by new owners, but some remain idle today. Allowing plants to become obsolete was also behind the grower integration into the purchasing of American Crystal Sugar Company's assets, a situation prompted by the desire of American Crystal to exit sugarbeet processing. Companies allowing plants to slowly decline with the knowledge that the company will eventually close the plant or exit the sugar industry completely may be evidence that there are too many assets committed to sugarbeet production. Regardless of the protection of the sugar program, sugar consumption is declining while world sugar production has been slightly increasing, meaning domestic sugar production is not needed at the levels it once was. The sugar program as a coordintion mechanism in this case may be prompting an over investment in sugarbeet production, and if the sugar program is eliminated, owners of the assets face considerable losses.

4.8 FUTURE RESEARCH

The present study has focused on instability and coordination for two commodity subsectors, with a broad based approach to the entire range of coordination mechanisms. Forward contracts were found to be one of the most important mechanisms, and of interest

would be to extend the analysis to the role of forward contracts across a range of commodities. Using sugarbeets as a reference, a good question to be addressed is "Do other predominantly contracted commodity subsectors experience the same type of stability as sugarbeets?" The answer to that question may in turn shed more light on the effects of the sugar program on market stability.

In the aftermath of the 1986 Michigan floods, there was a call by some industry participants for changes in the navy bean contracts, primarily centering on the inclusion of Act of God clauses. More complete analysis is needed over a number of years on the costs of ensuring contract compliance and transactions costs to shipper and canners from the adoption of Act of God clauses. If a commodity could be identified that has a spot market option to contracts like navy beans, but also offers Act of God clauses in its contracts, an interesting comparison could be made on the issue of monitoring contract compliance.

Sugarbeet contracts, though fairly standard in make-up, were found to have slight differences in contract contigencies along regional boundaries. A more complete analysis of specific types of sugarbeet contracts would be useful in understanding more fully the potential of contracting systems for coordination of economic activity. Understanding further why sugarbeets are coordinated as they are would be helpful in similar analysis of other commodity subsectors.

Sugarbeet grower owned processing cooperatives are an interesting case of forward integration by growers to maintain a market for their crops. More in-depth treatment of the operations of sugarbeet processing cooperatives could be formulated into a model for growers in other subsectors if they are considering forward integration.

APPENDIX

Appendix A

SOURCES OF INFORMATION

In addition to the sources sited in the bibliography, a good portion of the analysis and findings of this study were based on interactions with sugarbeet and navy bean industry participants and observers. From formal interviews to brief phone conversations, information was gathered and corroberated. Often, the author based a statement or finding on the consensus developed from a number of interviews and conversations versus a single statement. The author also understands that certain views or findings presented may be contrary to the particular beliefs of some industry members, but all views expressed are based as closely as possible on the insights of an industry member or observer. The author, of course, accepts full responsibility for the information presented.

The following are the sugarbeet and navy bean industry members and observers with which the author interviewed or had conversations with in the course of compiling the information for this study. Not included are those briefly encountered such as growers.

SUGARBEET INDUSTRY SOURCES

Luther Markwart, Executive Vice President, American Sugarbeet Growers Association

Jim Fisher, Manager, Beet Sugar Development Foundation

Steven Reynolds, Assistant Manager, Beet Sugar Development Foundation

Robert Young, Executive Vice President, Great Lakes Sugarbeet Growers Association(Supply Michigan Sugar Company)

Wayne Caruthers, President, Monitor Sugarbeet Growers, Inc. (Supply Monitor Sugar Company)

Ruth Vaas, Mountain States Beet Growers Association(Supply Western Sugar Company)

Richard Fitzsimons, Executive Director, Red River Valley Sugarbeet Growers Association(Supply American Crystal Sugar Company cooperative)

George Grant, President, Idaho Sugarbeet Growers Association (Supply Amalgamated Sugar Company)

Davis Sutherland, Vice President-Agriculture, Michigan Sugar Company

Robert Sanborn, Vice President-Agriculture, Monitor Sugar Company

Hugh Winn, Marketing Extension, Colorado State University

Don Lybecker, Marketing Extension, Colorado State University

David Harvey, Situation Coordinator, USDA, Economic Research Service, Sugar and Sweetener Unit

Luigi Angelo, USDA, Economic Research Service, Sugar and Sweetener Unit

Greg Varner, Bean and Beet Farm, Michigan State University

Dr. Vern Sorenson, Professor of Agricultural Economics, Michigan State University

NAVY BEAN INDUSTRY SOURCES

John Magill, Executive Director, Michigan Bean Shippers Association

James Byrum, Executive Director, Michigan Bean Commission

Tim Cornyea, Vice President, Northharvest Bean Growers Association of Minnesota

Duane Mergner, MinnDak navy bean grower

Jerry Theil, Coordinator, Michigan Department of Agriculture Bean Inspection Unit

F. Dale Kuenzli, President, Valley Marketing Cooperative, Inc.

Jim Ostrowski, Valley Marketing Cooperative

Larry Sprague, Northern States Bean Company

Carol Lenhard, Star of the West Milling Company

Keith Padgett, Market Reporter, Bean Market News

Neil Conklin, USDA, Economic Research Service, Vegetable Outlook and Situation

Greg Varner, Bean and Beet Farm, Michigan State University

Dr. Larry Hamm, Professor of Agricultural Economics, Michigan State University

Dr. James Hilker, Professor of Agricultural Economics, Michigan State University

BIBLIOGRAPHY

BIBLIOGRAPHY

Agricultural Statistics (various issues), USDA.

Armbruster, Walter J. and Dennis R. Henderson and Ronald D. Knutson (1983), Federal Marketing Programs in Agriculture, Issues and Options, Farm Foundation, Interstate Publishers, Danville, Illinois.

Arrow, Kenneth J. (1969), "The Organization of Economic Activity: Issues Pertinent to the Choice of Market Versus Nonmarket Allocation," in The Analysis and Evaluation of Public Expenditure: The PPB System, Vol 1, U.S. Joint Economic Committee, 91st Congress, 1st Session, U.S. Government Printing Office, p59-73.

Coase, Ronald (1937), "The Nature of the Firm," Economica N.S., 4, p386-405.

Craig, Robert G. (1987), Navy Bean Market Outlook and Bean Contract Options, Michigan Farm Bureau, presented at Gratiot County Field Bean Crops Day, Feb 12, Ithaca, Michigan.

Dalziell, Ian L. (1985), Sources of Agricultural Market Instability, Ph.D. Dissertation, Michigan State University, East Lansing.

Economic Research Service, USDA (1973), Market Performance: Concepts and Measures, Agriculture Economic Report No. 244.

Economic Research Service, USDA (1986-1988), Sugar and Sweetener Situation and Outlook, various issues.

Economic Research Service, USDA (1984), Sugar: Background For 1985 Farm Legislation, Agriculture Information Bulletin No. 478.

Economic Research Service, USDA (1984-1987), Vegetable Situation and Outlook, various issues.

Ferguson, Allen R. (1985), The Sugar Price Support Program, prepared for U.S. Cane Sugar Refiners' Association.

Galbraith, J.K. (1973), "Power and Economics", American Economic Review, Vol 63, No. 1, March, p1-11.

Gemmill, Gordon (1976), The World Sugar Economy: An Econometric Analysis of Production and Policies, Ph.D. Dissertation, Michigan State University, East Lansing.

General Accounting Office (1984), U.S. Sweetener/Sugar Issues and Concerns, report to the Congress by the Comptroller General.

Hebert, Thomas and James Jacobs, (1988), Contracting, Coordination and Instability in the Navy Bean Industry, Agricultural Economics Report No. 504, Michigan State University, East Lansing, Michigan.

Heilbroner, R.L., (1970) "On The Possibility of Political Economics," Journal of Economic Issues, No. 4, p1-22.

Heiner, R.A. (1983), "The Origin of Predictable Behavior," American Economic Review, 73(7) Sep p560-595.

Hirchman, Albert O. (1970), Exit, Voice and Loyalty, Harvard University Press, Cambridge, Mass.

Hoff, Frederic L. and Max Lawrence (1985), Implications of World Sugar Markets, Policies, and Production Costs for U.S. Sugar, ERS, USDA, Agricultural Economic Report No. 543.

Lang, Mahlon G., (1978), Structure, Conduct, and Performance in Agricultural Product Markets Characterized by Collective Bargaining, NC 177 Monograph 4: Agricultural Cooperatives and the Public Interest, Madison, Wisconsin.

Lang, Mahlon G., (1980), "Economic Efficiency and Policy Comparisons," American Journal of Agricultural Economics, 62, Nov, p772-777

Leibenstein, Harvey (1979), "A Branch of Economics is Missing: Micro-Micro Theory," Journal of Economic Literature, June, p477-502.

Love, Ross (1980), Optimal Carryover Policy for the United States Navy Bean Industry, Masters Thesis, Michigan State University, East Lansing.

Lowe, Adolph, (1969), "Toward a Science of Political Economics," Economic Means and Social Ends, ed. R.L. Heilbroner, Englewood Cliffs, N.J., Prentice Hall.

Marion, Bruce W., (1986), The Organization and Performance of the U.S. Food System, N.C. 117 Committee, D.C. Heath and Company, Lexington, Mass.

Michigan Bean Commission (1982-1987), The Bean Commission Journal, various issues, Lansing, Michigan.

Michigan Bean Shippers Association (1983-1987), The Michigan Dry Bean Digest, various issues, Saginaw, Michigan.

Michigan Sugar Company (1986), Pioneer Newsbeet, Vol. 3, No.2, Carrollton, Michigan.

Mighell, R.L., and L.A. Jones, (1963), Vertical Coordination in Agriculture, AER19, USDA, Economic Research Service.

Shaffer, James D. (1980), "Food System Organization and Performance: Towards a Conceptual Framework," American Journal of Agricultural Economics, May p310-318.

Shaffer, James D. (1986), Toward a Workable Definition of Orderly Marketing, Marketing Order Working Paper #2, Michigan State University, East Lansing.

Schnittker Associates (1983), Sweetener Markets and Policies-The 80's, An Analysis and Compendium of Facts, prepared for the Sugar Users Group, Washington, D.C.

Williamson, Oliver E. (1981), "The Modern Corporation: Origins, Evaluation, Attributes," Journal of Economic Literature, Dec p1537-1568.