A REVIEW OF PRICE DATA IN THE MICHIGAN APPLE MARKET

by

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I. Introduction

A. Problem Statement

The quality of agicultural price data has been a growing concern of producers, researchers, and government officials in recent years. The major work done on improving agricultural price data has, of course, taken place within the United States Department of Agriculture (2,3)[1]. These efforts have not only led to the identification of key problems and issues in price reporting but have also resulted in a deeper investigation into our data and information systems.

The Economic Statistics Committee of the American Agricultural Economics Association (AAEA) has in recent years devoted some of its efforts to price data problems in cooperation with the USDA. The AAEA Committee on Economic Statistics after examining the growing claims that various agricultural data were deteriorating "concluded that certain of the older food and fiber statistics were indeed performing less well in some long time repeated uses" (1). They characterized the major problem of our agricultural data systems as one of conceptual obsolescence. Conceptual obsolescence has reference to the many changes in the economic structure and organization of our agricultural sector that have not been matched with corresponding changes in the concepts which reflect reality and are measured by the agricultural data system. Conceptual obsolescence is not inclusive of all the problems with our agricultural data system. In fact, data based on a biological or

[1] Numbers in parenthesis refer to the references listed at the end of this paper.

physical concepts which have not changed, have been improved in many cases. Nonetheless, conceptural obsolescence is a relevant factor to consider. However, in the case of price data there appear to be some other overriding factors that influence the accuracy of a statistic.

In his 1976 presidential address to the AAEA Professor James Bonnen systematically described the epistemological nature of the U.S. agricultural information system. He viewed an information system as being composed of the following primary components: conceptualization, operationalization of concepts, measurement, analysis and interpretation of data, and decision making. Within the information system paradigm, a subsystem can be identified, the data system. A data system is an attempt to represent reality empirically by counting or measuring some expirical phenomena which has been broken down into a set of categories (5). The data system includes the following steps: 1) conceptualization, 2) operationalization, and, 3) measurement. Therefore the accuracy of price data must not only be investigated with respect to conceptualization but the operationalization and measurement steps are of equal importance.

While an information system theory as such has not been developed, significant contributions have been made in terms of insights gained into the issues, the definitions and the epistemological nature of data systems and information systems. This study will be done in the context of these insights into the nature of data and information systems.

The concept of a data system, from the viewpoint of agricultural policy, is too broad in scope for any one empirical study. This analysis will be limited to the examinations of the market information problems of one commodity as a case study--specifically Michigan apple market prices.

The marketing of apples in Michigan has changed significantly over the years and continued change is anticipated (12,10). These changes mean that not only new types of apple market information are required by growers, processors, merchants and government but also new methods to collect information are needed. To meet these requirement the USDA needs up-to-date knowledge of the processes by which apples are marketed and the uses of market information by market participants.

The apple market involves a complex variety of participants who operate at various levels in the production and marketing phases of the industry. This complexity makes the task of reporting and gathering price information on apples particularly difficult and often casts doubt upon the accuracy and value of the results of the price reporting efforts. It goes without saying the the participants in the apple industry as well as public agencies need accurate and timely price data as a basis for evaluating problems and making decisions in adjusting to changing economic conditions. This study will analyze the problems of the price data collection in the Michigan apple market.

B. Review of Literature

There are no studies that have reviewed or evaluated the price data base of the Michigan apple market within a system approach. There are, however, several studies which as a secondary objective, investigated specific aspects of the price data base within the apple industry (2,10). The approach employed in the studies was to identify areas of concern within certain aspects of the data and information system. That is, conceptual problems were identified and measurement problems were pointed out, however, since evaluation of the price data system was secondary, the authors failed to view these problems in relation

to each other (i.e., in a systems context).

Within other commodity groups, particularly the potato industry, a comprehensive study evaluating the price data base was completed in 1975 (22). The approach used in evaluating potatoe price data employed a random sample of the market participants or the providers of information (growers, packers, processors, etc.). The questionnaire was designed to obtain information from market participants on the manner in which they reported price data to the United States Department of Agriculture. The authors of the study operated under the premise that data are collected for some specific purpose or set of purposes and that the objectives of the data system is to fill the need of some private or public decision making process. While insights can be gained from the market participants who provide information to the government, this approach does not reflect the problems and views of the collectors of price data (mainly USDA). USDA statisticians are in a better position to provide information on the operations of the data system. As a result, an extensive review of the data system (conceptualization, operationalization and measurement) was not completed before the authors began to question its purpose.

A study designed to sample the collectors of information in a particular market as well as the providers (i.e., decision makers) of information would be more revealing than sampling (interviewing) only one of the actor groups. However, that task is too broad to handle given the time and budget constraints imposed upon this study. A more manageable task would be to focus on the collectors of information in the market and therefore the data system, a subset of an information system will be used as a conceptual framework in reviewing price data in the Michigan apple market.

C. Objectives

To date, there have been no conscious efforts to review the price data system in the Michigan apple market. This research has the following objectives:

1. To test the usefulness of an information system approach and the data system paradigm in evaluating specific data systems.
2. To describe the Michigan apple market channels, functions, structure, and price discovery mechanisms.
3. To describe the nature of USDA's prices and the procedure by which price data is collected in the Michigan apple market.
4. To suggest improvements in the price data system within the Michigan apple market.

D. Research Procedures

Section II lays out the conceptual framework employed in this study. The conceptual framework flows directly from the current literature on information systems. In this section, a definition of a data system and each of its components are presented. Also the implications of the data system for price data in the Michigan apple market will be discussed.

In section III the general nature and organization of the Michigan apple market is described. In doing so, first, the market channels are traced. Part two of this section introduces the various market functions from producer to retailer. Third, an overview of the market structure, market participants and existing transaction points within the market will be presented. Finally, the various price discovery mechanisms associated with specific market channels and transaction points in the Michigan apple market will be identified. This information is mostly descriptive, but it is essential to understand the market structure and price discovery mechanisms before one begins to review the price data collection process. This effort is important

because it identifies the inherent problems different pricing mechanisms pose for price data collection and provides some indication of whether these problems are of increasing or decreasing significance.

Some information on the Michigan apple market can be derived from secondary sources such as experiment station publications. These sources were found to be somewhat limited and outdated with respect to the economic aspects of marketing Michigan apples. To obtain greater insights into the current market structure, direct interviews with marketing professors within the Department of Agricultural Economics at Michigan State University and the State Cooperative Extension personnel were relied upon. These interviews provided specific information on the Michigan apple market channels, functions, and structure. Coeperatives Extension personnel, were helpful in arranging visits to apple marketing facilities such as wholesale markets and producer cooperatives. Both sources on information, marketing publications and direct interviews with marketing professors and extension personnel provided the basis for much of section III, which describes the Michigan apple market structure.

The nature of the USDA prices and the price data collection process in the Michigan apple market is presented in section IV. The greatest body of expertise and knowledge on this aspect of the Michigan apple market prices lies with those who collect price data, the government statistician. The statistician is most aware of the issues and problems in collecting price data in the market. This study has reviewed relevant USDA materials on price data design and collection methods. In addition, appropriate government statisticians both on the state and national level were identified and interviewed. Contacts with both levels of government statisticians, initially, involved round-table discussions of the price data system and its problems. These sessions

provided a general familiarization with the nature of the price data collected and some of the problems faced by the Statistical Reporting Service (SRS) and the Agricultural Marketing Service (AMS). Follow up interviews with SRS and AMS statisticians in Michigan were conducted to obtain specific information on the procedure by which they collect price data in the Michigan apple market.

The design of section V flows directly from the conceptual framework of the data system. To fulfill objective four above, the conceptual paradigm and its associated implications for the design of data was compared with the actual data design and procedures described in section IV of the paper. At the same time the limitations of the various Michigan apple market price discovery mechanisms described in section III were evaluated for their implications for apple price data collection in Michigan. Here, again, government statisticians as well as marketing professors were interviewed to obtain specific information on these components of the Michigan apple price data system.

The fourth objective of suggesting possible improvements in the apple price data base was attempted after comparing the conceptual data system to actual data collection procedures in the context of recent changes in price discovery mechanisms and the market structure of the Michigan apple market. These suggestions will be presented in the conclusion in section V.

II. Implications of Study for Data Systems: A Conceptual Framework

A. The Data System[2]

In this section of the paper a conceptual framework of a data system with its implications for price data in the Michigan apple market

[2]This section draws heavily from the work of James Bonnen, "Improving Information on Agriculture and Rural Life," AJAE, 57. 753-763, December, 1975.

is presented. A data system involves an attempt to represent reality by describing empirical phenomena in some system of categories (5). Data are the result of measurement or counting and are usually presented in a quantified form. Before one sets out to quantify anything, we must know what is to be measured. In order for data to possess consistence, coherence, and have some correspondence with reality, the concepts underlying the statistic must be related to each other and reality in a meaningful way. That is to say there must be some concept of reality that is to be measured. This reasonable concept of reality must be capable of being systematized and categorized in a way that can be grasped by the human mind. Thus, a system which produces accurate data must implicitly or explicitly develop a set of concepts that are capable of reflecting the realities of the real world. Bonnen states that "data are a symbolic representation of those concepts . . . if the concepts are not a reasonably accurate reflection of reality, investments to improve sampling procedures or statistical techniques will be useless in generating accurate data" (5).

While data represent concepts, concepts cannot be measured directly. Alternatively, we operationalize the concepts by establishing or defining categories of empirical phenomena which are as representative as possible of the real world object.

Therefore, in collecting data to represent reality we can identify three steps that must be taken: 1) conceptualization, 2) operationalization, and 3) measurement.

The accuracy and quality of data are no better than the failures and limitations of any one of the components with in the data system. Furthermore, the limitations at any stage can be offset only to a very limited extent by improvement or manipulations at the other stages.

The price data collected in the Michigan apple market can be viewed

from a data system approach. That is to say that each component of the data system can be identified in the data collection process and the limitation and strengths of each component can be pointed out. Conceptualization and operationalization will be discussed simultaneously, while measurement will be handled separately.

B. Conceptualization and Operationalization of Price

Practically all of economic theory and most of economic life is organized around value and therefore prices play an important role in economic activity. The concept of a price is dealt with and thought about so often and so routinely that many would find it difficult to define or operationalize this concept. The intent of this section of the paper is to review some of the basic concepts and roles of price in general and specifically in the apple market. We will explore in the next section of this paper the theoretical aspects of the concept (Section III). The focus here is on conceptual tools which have a bearing on the collection of price data in the apple market.

A general definition of a price is, "the exchange value of one unit of a good or service, expressed in terms of money" (11). This definition of price is insufficient when one considers a total barter-economy. In a barter economy prices are not expressed in terms of money nor is it essential to recognize a unit of transfer to have a price. A broader and more comprehensive perspective is probably appropriate when we are actually buying and selling goods or services. Such a definition of price might read, "the exchange value of one unit of a clearly-defined good or service, expressed in terms of money at some particular time and place and under specific conditions of transfer" (11). With the definition, exchange transactions need not actually

occur for a price to have meaning, however a potential ownership transfer of the priced item is clearly implied. Therefore we can conclude by saying that under a broad definition, a price develops or is implied whenever one production or consumption surface confronts another and some substitution is possible (11).

There are many conditions under which the concept of a price can be defined and they all become important when a real world price reporting system is designed and operated by a government agency or when price data is collected for use by a firm or an individual. Within the apple market there are several perspectives of price which are operationalized differently. They include various concepts such as "as sold," "packing house door," "first delivery point," and "orchard run." There appears to be less threat to the accuracy of the price statistic when one considers each of the concepts separately. However, when price data are measured and aggregated into one national average price the differences operationalized in each concept represent a limitation of the accuracy of the national price statistic. For example the U.S. price of fresh apples reported by SRS is not representative of fresh apple prices at any one point in their distribution (2). Prices for Washington and Oregon represent returns at the packing house door; for California, at the first delivery point; and other states, at the point of first sales. Therefore, the U.S. average price is not representative of farm gate or growers prices because this statistic is limited by the opportunities for both the conceptualization and operationalization of the real world. That is, the opportunity for price discovery occurs at different points in the marketing structure and thus the content of the transaction reflected in price is inevitably somewhat different.

The variation in the operationalization of price concepts in the Michigan apple market can potentially be a major threat to the accuracy of the state's price data because there are problems with product identification or transaction content. For instance, prices quoted at the Benton Harbor Market reflect a product that has been harvested, graded, packed, and transported to market. The price received by a grower at a country packing house does not reflect the above mentioned services and therefore is in reality quite different from the product that was sold in the city market. This difference lies primarily in how the concept of price is operationalized. This difference in the way in which the concept of price is operationalized in the apple market has a direct relationship to the accuracy of the price statistic.

C. Measurement of Price Data in the Apple Market

Measurement is one of the most critical components of the data system. Once one has identified and operationalized the concept, it becames the task of the statistician to collect (measure) the data. The procedure used by government statisticians in obtaining price data will be described in some detail. However, briefly put it involves observing transactions directly or indirectly through contacts at readily definable transaction points; tabulating the data with some decisions on categories and making it available to the public via radio, newspaper or mail reports (4). This measurement procedure, collecting price data at readily definable transaction points has become extremely difficult, if not impossible in some instances, because of a constantly changing marketing system. Changes in market structure have impacted transaction points throughout the marketing channels in a manner that makes it difficult for a neutral agent to observe price. Before discussing some of the measurement problems that have developed,

it would be helpful first to describe the general nature and organization of the Michigan apple market. The discussion that follows will emphasize the current changes in market structure and price discovery mechanisms.

III. The Michigan Apple Market[3]

A. Market Channels for Michigan Apples

There are approximately 2400 apple growers in the state of Michigan. These growers market their crop through two major channels: the fresh market which accounts for 35 percent of the state's crop and the processed apple market through which 65 percent of the crop is marketed (see Figure 1). For both fresh and processed markets there exist several different channels from the farm level to the consumer. The decision on which marketing channel to use depends on the variety, quality and quantity of fruit, location of orchard, time and ability to sell (10).

At the farm level the fresh market consists of the following outlets: FOB sales through packers, direct-to-consumer sales, the Benton Harbor City Market, and bulk sales. The FOB sales through packers are the most important fresh market outlet in that 56 percent of the fresh apples (19% of the total) are marketed through this channel (13). Direct sales account for 8 percent of the total apple sales or 23 percent of fresh sales and mainly consist of roadside stands where apples are sold directly to consumers for consumption. Other direct sale outlets include farmer's markets, packing sheds and you-picks. The quantity

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[3] I am deeply indebted to Dr. Donald Ricks for sharing with me his wealth of insight and experience in this section of the paper. I do, however, take responsibility for any errors.

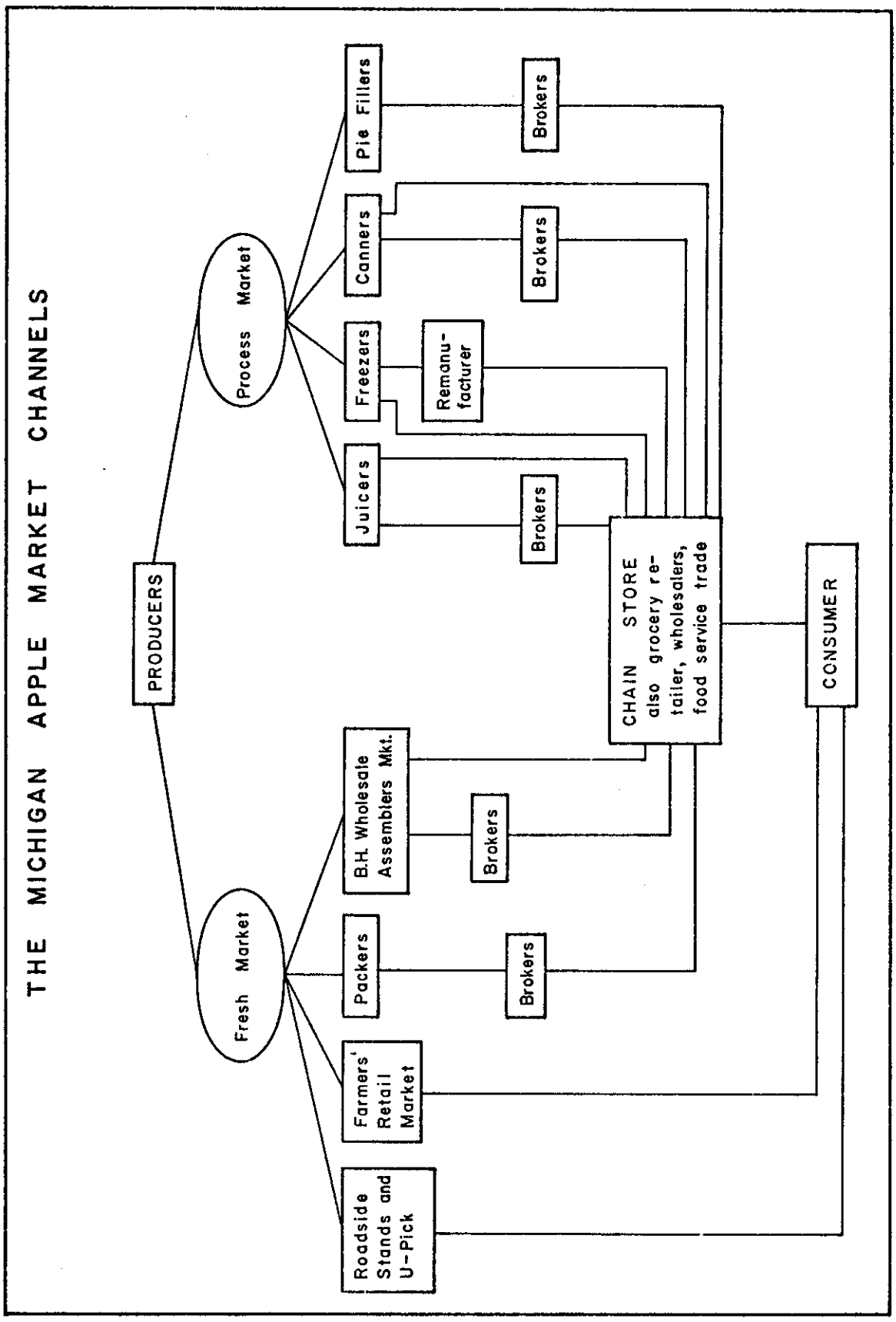

THE MICHIGAN APPLE MARKET CHANNELS
PRODUCERS
Process Market
Fresh Market
Pie Fillers
Canners
Freezers
Juicers
Remanu-facturer
Brokers
Brokers
Brokers
Brokers
B.H. Wholesale Assemblers Mkt.
Packers
Farmers' Retail Market
Roadside Stands and U-Pick
Brokers
Brokers
CHAIN STORE also grocery re-tailer, wholesalers, food service trade
CONSUMER

FIGURE 1.

of fresh apples marketed through the final two outlets vary significantly from year to year depending on the size of the crop. The Benton Harbor outlet is a wholesale assembly market. Bulk sales make up direct cash purchases of fresh apples at the farm level. In a large crop year, a smaller percentage of apples will be marketed through bulk sales as opposed to a short crop year.

The FOB packer's market consists primarily of a channel which connects the packers with a sales agent who then deals directly with the chain or grocery retailer-wholesaler outlets. Alternatively, the sales agent can also market apples through a broker who in return deals directly with retail or food service outlets.

About two-thirds of the apples grown in Michigan are sold for processing markets. Most apples for processing are sold directly by growers to the processors. There are various processed market outlets from which apple growers can select to sell their product. The processed apple market outlets are divided into four general types of firms: canners, freezers, juicers, and pie filling manufacturers.

In recent years, canning apples have on an average comprised 20 percent of the total pack (17). Once the product is marketed through this outlet at the farm level, the next major market stage is the FOB processor market. In the FOB processor market sauce packers market their product direct or through brokers to the chain stores. Some sauce packers deal directly with the chain stores or with a food service outlet.

Apple juice accounts for 26 percent of the processing apples pack[4] (17). Apple juice, like applesauce is marketed direct or through brokers to retail outlets in the FOB process or market. A small percentage of apple juice in Michigan is made on the farm and

[4]The term "pack" refers to the total amount of apples processed in a given year.

sold directly to consumers at roadside stands.

Frozen apple slices make up approximately 15 percent of the processed apple pack (17). In the FOB processor market, a few freezers also market a small volume through brokers to the retail outlets. Unlike other processed market outlets, frozen apple slices are primarily sold to remanufacturers to be reprocessed into final consumer products such as pies and prepared desserts. These remanufacturers are usually not the same firms that produce the initial frozen pack. They market their product through the broker to the chains, other grocery retailers, and food service outlets.

Apple pie filling is the smallest of the processed apple packs accounting for only 2-3 percent annually (17). Pie filling follows a similar market channel as other processed apples in that they enter the FOB processor's market where the broker is the last market transaction point before the product is distributed to retail chains and food service outlets.

B. Market Functions

To obtain economic insight into the intricate apple market, one needs to develop a framework to analyze its fundamental activities. The traditional analytical breakdown of marketing into economic elements is represented by the functional approach. The functional approach in marketing merely attempts to classify and describe marketing services according to the functions they perform (21). Economosts are not in full agreement with the classifications of market functions and therefore over a period of years they have identified different functions to explain various market activities.

Market functions in the apple industry vary from region to region. It is made even more complex by the fact that functions vary among market participants. This, in turn, has an impact on the observed price of a commodity at the specified point in the marketing channel. Furthermore, the market function approach as applied to the apple industry is complicated by the existence of two market channels--the fresh market and the processed market. Therefore an analysis of the apple market should not only be concerned with the economic functions of the market but also should address which roles the market participants are performing in both of the major channels.

In its simplest form the functional process of moving apples from the farm to the ultimate consumer involves several functions: producing, storing, packing, processing, transporting and pricing. However, when one considers all possible market functions, the clear-cut isolated segments are blurred and not always visible. Two or more functions are usually handled by one participant in the market or it is not unusual to find a market function being skipped over.

Growers are primarily responsible for such marketing functions as producing, quality control and initial transportation. In some cases, under vertically integrated packing facilities growers will pack and grade but, by and large, most growers have not performed these functions in recent years.

Processors are typically responsible for assembling, grading, processing, storing, pricing, risk bearing and they also provide some market information to growers and to retailers. Brokers are providers of market information and exchange functions. Retailers are considered as reflectors of demand and they perform display and pricing functions.

The packing function is important in the fresh market channel. Processing into sauce, slices, juice, etc., as one might expect, is a key function in the processed apple market. Pertinent to both market channels are the functions of storing, transporting and pricing.

The quality of price data in a complex market such as that for Michigan apples is of particular interest and therefore, the function of price in the apple market from a theoretical perspective will be presented at this point. A more detailed discussion on the pricing points and price discovery mechanisms is reserved for a later section of the paper.

Essential to the free market system are the functions which price performs. Once the price is determined, signals are sent to producers guiding them on what and how much to produce and to consumers guiding their purchases and directing products to various market outlets. Prices also perform the function of rationing and allocating the factors of production for the goods and services that consumers demand (21).

To many apple producers and perhaps some consumers the price of apples is a matter of daily concern. The livelihood of many is directly related to the price received for the season crop. In the apple market, pricing problems are concerned with two distinct areas: (1) The establishment of the tone, base price or general level of the market each season that will match the total crop of apples to the demands of consumers; (2) The determination of day to day variation in prices that will allocate apples to different markets through the entire season and among different grades, packs and final uses (2).

Despite the introduction of new technology to the apple industry, by and large, apples are a perishable good faced with a competitive market.

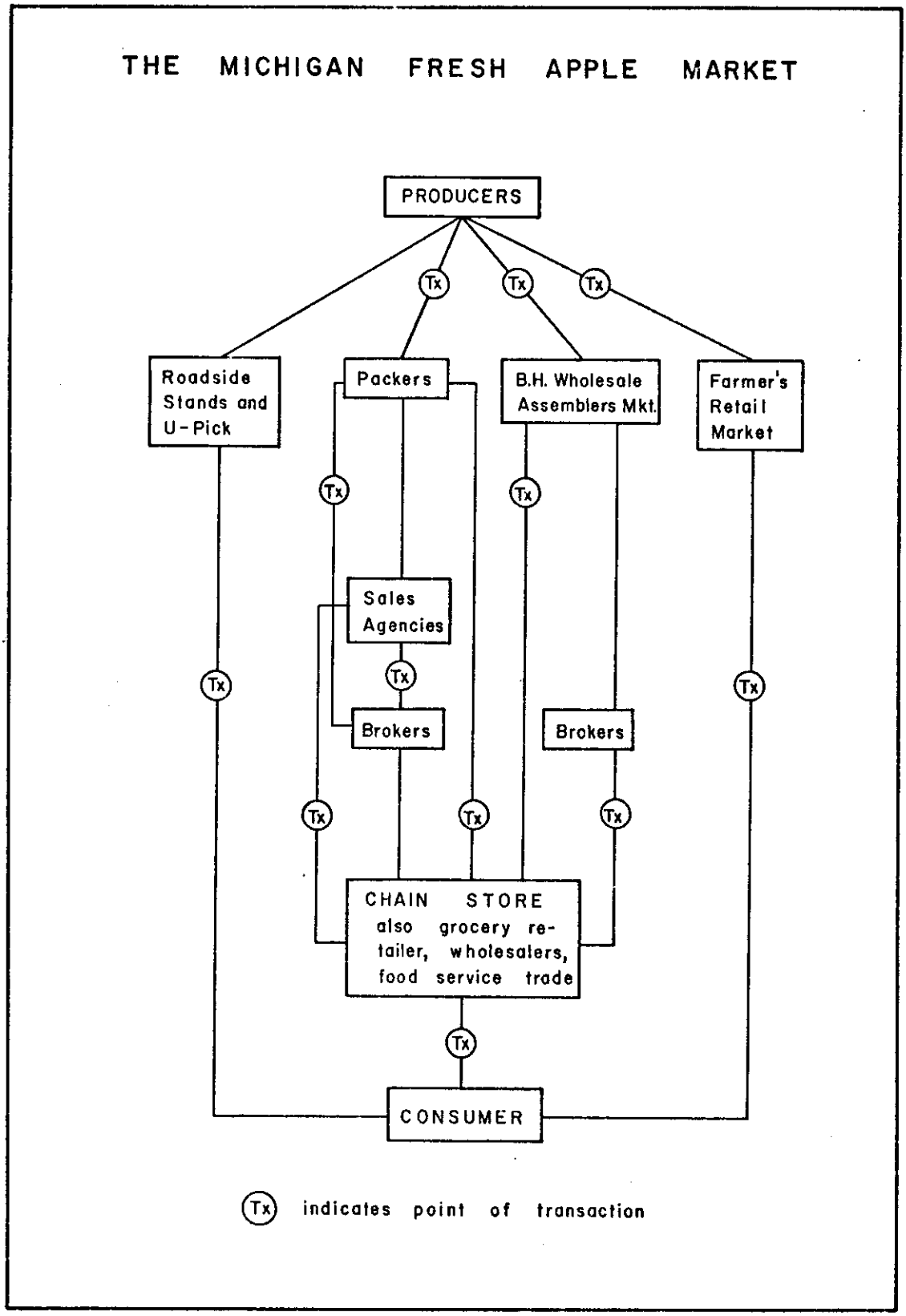
Unlike most non-agricultural industries it is impossible to decide on a price and then produce enough quantity to meet consumer demands. Rather, prices are determined by supply-demand relationship in the market. From the supply side of the market, the amount of apples produced in a given crop year and the carryover stocks (processed apples) from the previous year are major determinants of apple prices. From the demand side of the picture, the number of consumers, consumer income, consumer taste and preferences and prices of competing fruits are significant factors in determining the price of apples for a given year. Research indicates that these factors are significant in both fresh and processed channels (7,15).

C. Market Structure

C.1. The Fresh Apple Market

The farm level fresh apple market channel consists of a large number of grower-sellers who market a more or less undifferentiated commodity (see Figure 2). No one grower-seller is large enough to influence the price even though a disproportionate percentage of the apple crop is produced by the larger growers. Current data shows that growers with more than 20 acres have 63 percent of the Michigan apple acreage while representing 37 percent of the Michigan growers (14). This indicates that there is some degree of concentration in apple production. Nevertheless an individual grower has little or no effect on price.

The growers' surge for market power has grown out of what has been historically characterized as the weaker position relative to packers in influencing the price of their products at the farm level. This market transaction point is competitive on the growers' side and somewhat


THE MICHIGAN FRESH APPLE MARKET
PRODUCERS
Tx
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Roadside Stands and U-Pick
Packers
B.H. Wholesale Assemblers Mkt.
Farmer's Retail Market
Tx
Tx
Sales Agencies
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Tx
Brokers
Brokers
Tx
Tx
Tx
CHAIN STORE also grocery retailer, wholesalers, food service trade
Tx
CONSUMER
Tx indicates point of transaction

FIGURE 2

oligopsonistic on the packers' side. Many growers, at least in Michigan, are saying that they do not like this situation and they want to do something about it (16). They want to gain more influence over their returns--more comparable to the influence of large labor unions with powerful non-agricultural companies in the U.S. Growers have explored several approaches to this end such as more effective consumer access, astute evaluation of changing tastes and market news, and maintenance of stable supplies. Some growers strongly favor bargaining legislation (16). Many of these demands are however more commonly experienced in the processed apple market.

As a result of the growers' quest for higher returns, important developments affecting market structure at the farm level have occurred in recent years. The developments include the emergence of cooperative organizations, packers' associations and grower-owned fresh packers. These developments have had a major impact on the open market pricing arrangements. The impact of the pricing mechanisms of these institutions on data collection will be discussed in the next section of this paper. These market innovations have resulted in most fresh apple sales being made on a consignment basis. Only a limited effective cash market at the farm level exists in the Michigan fresh apple market.

An effective cash market does exist in the direct-to-consumer sales market, which consists of roadside stands, farmers' markets and you-picks. The direct sale market, as opposed to the integrated producer-packer or quasi-cooperative arrangements may approach more of what is considered a monopolistically competitive market in that there exist many sellers with a slightly differentiated product and many buyers in the market place.

Another cash market at the farm level is observed in the bulk sales outlet. Depending on the crop size, a significant percentage of fresh apples may be sold directly to packers or storage operators for a cash price. This market can be characterized as competitive on the sellers' side and perhaps somewhat oligopolsonistic on the buyers' side.

The Benton Harbor Market is a wholesale cash market where growers sell their product to brokers. Again this market is competitive on the sellers' side and somewhat oligopolsonistic on the buyers' side. In recent years fresh apple sales as a percent of the total market has steadily declined.

Up to this point the discussion of the fresh apple market has been centered around the market arrangements that exist between the producers and the first buyers. Just as the producers attempt to obtain market power in dealing with the relatively small group of packers, the packer's (shipper, sales agent, processor) efforts are directed toward acquiring power in his transactions with his customers, the chain stores and major wholesalers. Packers over the years have experienced a disadvantage in dealing with the larger chain stores. The power struggle at this market point has resulted in structural changes which also have impacts on price discovery. Packers have resorted to concentrating shipping points into fewer hands. Many have employed the services of sales agents and brokers to sell their apples. By consolidating packing facilities and sales desks, economies of scale and size can be realized in both the packing and selling functions, better returns can be obtained through the ability to provide full truckloads for desired chain store delivery (2).

The retail level is unlike the wholesale level and even more unlike the farm level. Major retail outlets relative to producers and shippers are few in number and operate like oligopsonies. Prices to consumers are not established solely by the unimpeded forces of supply and demand but are partially administered or set according to established markups over invoice costs (2). A major concern of the participants in the apple market is the retail markup. Growers feel the retail margins are too large. There is also concern about the bargaining power of retailers with respect to other segments of the apple industry.

Marketing research in fresh apples has historically focused primarily on the production, first handlers and wholesale levels. However, as consumer groups continue to grow more vocal, studies at the retail level on fresh apples become a more relevant issue. A consumer behavior study by Chain and Shuwarya concluded that consumers indicated that the quality of fruit was the most important consideration in the purchase of fresh apples regardless of the type of outlet (8). There is certainly a need for more retail level studies concerning consumer behavior.

C.2. The Processed Apple Market

The farm level processed apple market consists of a large number of growers-sellers who market their commodity to one of four different types of processor firms: canners, freezers, juicers and pie fillers (see Figure 3). These firms usually require relatively large volumes of fruit to realize economies of scale and size in both processing and marketing.

Processor firms are characterized by four types of ownerships: (1) private, (2) vertically integrated processor-grower,

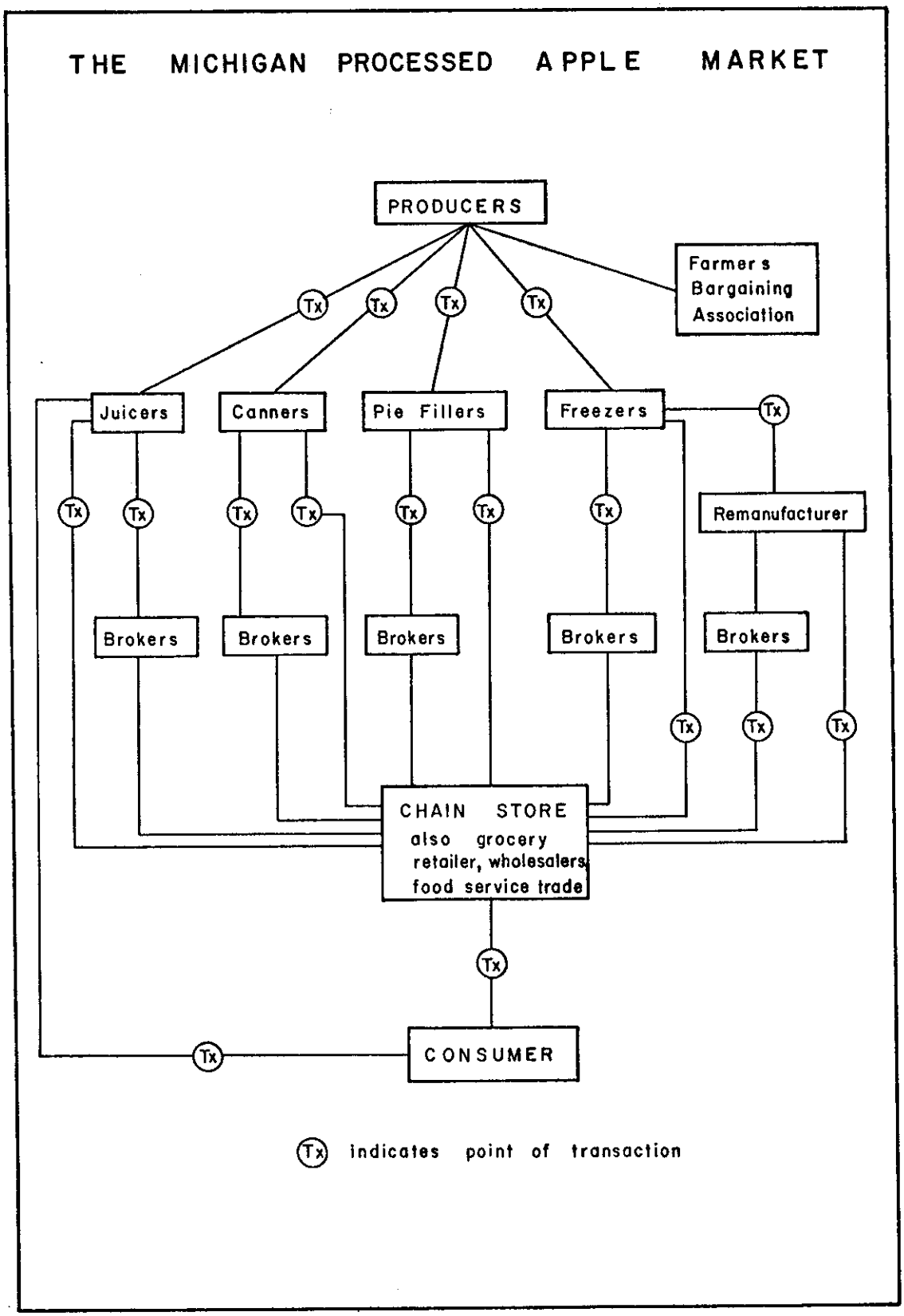
THE MICHIGAN PROCESSED APPLE MARKET
PRODUCERS
Farmers Bargaining Association
Tx
Juicers
Canners
Pie Fillers
Freezers
Remanufacturer
Brokers
CHAIN STORE
also grocery retailer, wholesalers, food service trade
CONSUMER
Tx indicates point of transaction

FIGURE 3

(3) cooperative and (4) co-op-corporation vertical joint venture. There are approximately 12 juice processing firms in Michigan. Typically, these firms only handle apple juice. The nine Michigan apple canners handle primarily applesauce, canned slices, baby foods, spiced apples and crab apples. The largest number of processors are freezers which total 16 firms. Their major products are frozen apple slices and dices. The two pie fillers in the state of Michigan represent only a very minor share of the apple industry sales.

Pricing at the grower level for processed apples has been historically characterized as a rather one-sided arrangement with processors announcing their offer on a take-it-or-leave-it basis. This situation has frequently resulted in poor relationships between growers and processors. Similar to the packers in the fresh market, the processors are relatively few in number which appears to afford them some oligopsonistic power. The large number of producers were not organized before bargaining associations were created and therefore failed to exercise a concerted influence on price because of their competitive nature.

There are some indications that the processors oligopsonistic power may not be as strong as it appears to be. Canners, freezers and pie fillers all compete at the farm level for processing apples, called peeler apples. As a result these Michigan processing firms in short crop years are highly competitive. In fact, they represent the highest concentration, with respect to number, of apple processor firms in the nation. Under these conditions the market structure on the buying side approaches atomistic competition. With a large crop year, the market structure on the buying side is characterized as weekly oligopsonistic while the selling side for processed apples remains competitive.

Juice processors buy apples in three different ways. (1) They purchase drop apples[5] in the fall of the year directly from the grower and (2) they purchase culled and small apples from fresh packing houses who act as receivers and (3) they purchase undersized apples from other processors. With only 12 juice firms, there appear to be some elements of oligopsony on the buying side.

The Michigan Farm Bureau has been active in forming bargaining associations to negotiate with processors. Through activities of the Michigan Farm Bureau, legislation has been passed which has provided more bargaining power to growers in the price negotiation process. The Agricultural Marketing and Bargaining Act, Public Act 344 of 1972, establishes new rules and procedures governing relations between farmers and first buyers of farm products. Under this act procedures for (1) defining a bargaining unit, (2) accrediting an association to bargain as exclusive agent for all producers in a bargaining unit, (3) good faith bargaining between an accredited association and handlers, (4) enforcing fair practices in organizing for collective bargaining, (5) establishing minimum requirements and rights in the operation of an accredited association, and (6) resolving a bargaining impasse by binding arbitration were established (19).

At the farm level, growers' bargaining associations, under Public Act 344 has a significant impact on market structure. The bargaining association gives growers oligopolistic powers in that an accredited association can bargain for all growers who produce more than 210,000

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[5] Drop apples are the apples that fall from the trees before they are harvested. In most cases they receive some damage and therefore are marketed for juice processing.

pounds of apples in either of the two previous years as the sole bargaining agent. In effect, the act gives growers monopolistic powers. However, when one considers the number of small growers who are not affected by Public Act 344, apple growers as a whole have oligopolistic power in the Michigan apple market. The real power of the bargaining association is diminished considerably because Public Act 344 is unique to Michigan. This is especially important since processors are active in a national market. Processors have the option under Public Act 344 to purchase their apples from neighboring states where growers are not as well organized.

The market for canned applesauce is primarily between canners of private label applesauce on the selling side and the large chain stores on the buying side. A few canners have strong labels[6] in applesauce. The remainder of the canners sell weak private labels which is essentially a commodity market. In this market, Michigan canners sell in competition with other firms in a national market comprising approximately 30 private label applesauce canners. There are about six major brand name canners and of these brand name processors, three are located in Michigan

In the brand name applesauce market the six major canners exercise limited oligopoly power on the national level. The remainder of the sellers, private label canners, approach atomistic competition. On the buying side, the chain stores operate somewhat like oligopsonists.

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[6] Strong label is a product having a sufficient degree of consumer acceptance or product differentiation in the eyes of the consumer that it can command a premium price compared to private label products. Alternatively, a weak lable is a product that does not have a sufficient degree of consumer acceptance and therefore does not command a premium price. Even though it has a packer's label the market treats a weak label like a product which is essentially undifferentiated from private labels.

With frozen apple slices, the buyers are remanufacturing companies. There are no brands with frozen apple slices, therefore it is strictly a commodity market. With 35 frozen apple processors in the nation, the market approaches atomistic competition on the selling side. Buyers have a degree of oligopsonistic power in the market with a few of the larger remanufacturers acting as price leaders.

Pie filling processors account for only a minor percentage of apple consumption. The market consists of four firms which dominate the national pie filling industry, two of which are located in Michigan.

The apple juice market structure is a regionalized market in the U.S. with some elements of a national market. There are some private labels in the market. However, they are not strong labels. Apple juice processors sell primarily weak label or private label juice to retail outlets. Some juice is sold on the institutional market. On the selling side the market approaches atomistic competition. The buying side is typically characterized as oligopsonistic.

It is likely that the apple market will continue to undergo changes in structure. Relevant to these changes, it is essential to understand their impact on the price mechanism. The next section of this paper will discuss price discovery mechanisms in the apple market.

D. Pricing Points and Discovery Mechanisms in the Michigan Apple Market

This section of the paper deals with alternative mechanisms for discovering prices in the Michigan apple market. The methods used to arrive at a specific price at a specific market outlet in the apple market are described below. In addition, to establish some sense of the relative importance of the different price discovery mechanisms, an attempt is made to assign percentages of apples marketed via the

Table I: Summary of the Sture of Various Markets in the Michigan Apple Industry

Grower-seller Processor-buyer	2400 producers
Concentration	Atomistic selling and moderate buying concentration
Product Differentiation	Slight to none
Sector Growth	Slow increase
Barriers to Entry	Little but increasing financial high risk, and technological knowledge
Fresh Packers-sellers and Retailer-buyer	76% of Fresh sales (26% of Market)
Concentration	Atomistic selling and moderate high buying concentration
Product Differentiation	Slight
Sector Growth	Declining slightly
Barriers to Entry	Some financial and risk
Canner and applesauce sellers and Retail Buyers	31% of processing apples (20% of Michigan apples)
Concentration	Moderate high buying side
Product Differentiation	Slight on private label, some on branded
Sector Growth	Slow growth
Barriers to Entry	Some, especially on branded
Juice sellers and retailer-buyers	41% of processing apples (26% of Michigan apples)
Concentration	Atomistic selling and moderate high buying concentration
Product Differentiation	Slight, some on branded
Sector Growth	Rapid growth
Barriers to Entry	Some
Freezers sellers and remanufacturers buyers	23% of processing apples (15% of Michigan apples)
Concentration	Atomistic competition selling; moderate high buying
Product Differentiation	None
Sector Growth	Moderate to stable
Barriers to Entry	Few
Pie Filling Makers	5% of processed pack
Concentration	Oligopolistic, moderately high buying concentration
Product Differentiation	Substantial
Sector Growth	Slow to steady
Barriers to Entry	Yes

price mechanism at a given market transaction point. It should be noted that there does not exist a one-to-one correspondence between the various market transaction points and price mechanisms, however, for our general purposes we assumed so. Also the percentages of apples marketed through each transaction point and hence price discovery mechanism vary some from year to year, however it still provides a general measure of the relative importance of each price mechanism in the market. This discussion of price discovery mechanisms in the apple market should suggest some of the different problems in operationalizing price concepts. The discussion should especially be suggestive of some of the measurement problems encountered in collecting price data in the Michigan apple market. (See Section V).

Tomek and Robinson list several mechanisms used to discover prices for farm products (23). Their following general categories are indicative of a major proportion of the pricing systems now employed in agriculture.

(1) individual negotiation
(2) trading on organized exchanges or auctions
(3) formula pricing
(4) group bargaining
(5) administrative decisions

Individual negotiation is for the most part the common method of pricing agricultural commodities. This pricing mechanism is presently the most prominent in the Michigan apple market. However, individual negotiation is expected to play a less significant role in the future because other mechanisms can result in the reduction of risk for the individual transactors in the market.

Organized exchanges tend to replace individual buying and selling as the volume sold increases. The Benton Harbor city wholesale assembly,

market, for example, is used to establish the price of fruits and vegetables in Southwest Michigan. However, the volume of commodites marketed in the Benton Harbor City Market has also been on the decline in recent years.

Formula pricing of agricultural commodities has become more common since World War II. This mechanism is used to facilitate direct buying and to simplify or reduce the costs involved in making pricing decisions (23). A common procedure is to agree to a deliver product, for example apples, at a price (with fixed premiums or discount based on grade, size, transportation, etc.) which moves up or down in accordance with the price established on some particular market (e.g., Benton Harbor). This mechanism plays a minor role in the FOB packers fresh apple market in Michigan.

Group bargaining, as it applies to the Michigan apple market, can be conducted in two ways (1) by exclusive bargaining agent under Public Act 344 and, (2) by voluntary bargaining cooperatives not under Public Act 344. The exclusive agent bargaining is fundamentally different from the typical voluntary bargaining association in that the typical voluntary bargaining association can be the bargaining and/or sales agent only for its own members (20). The exclusive agent cooperative acts for all producers in a given bargaining unit (as defined by law) not just members only.

Administrative pricing decisions include those made in both the public and private sector. To date, public administrative pricing decisions in the Michigan apple market are relatively unimportant. Private administered decisions, such as those made at farmers' retail markets, are prices that are established on a basis of informal formulas

and administrative decisions made by retail outlets. It is simply a non-bargained price that is set by the seller (retailer) based on any number of factors including costs, prices of their competition, expected profits, market margins and previous prices.

Pricing points in the Michigan apple market occur whenever there is a transfer of ownership of apples for a definite price. Pricing of apples is influenced by several interrelated markets in both fresh and processed apple channels. The fresh apple market channel consists of the following major pricing points: (1) between grower-sellers and packer-buyers, (2) between grower-sellers and consumers, (3) between packer-sellers and retailers and (4) between retailers and consumers.

The major pricing points in the processed apple channel are: (1) between grower-sellers and processor-buyers, (2) between processor-sellers and remanufacturers, (3) between processor-sellers and retailers and (4) between retailers and consumers.

D.1. The Fresh Apple Market

At the fresh market farm level pricing point between grower-sellers and packer-buyers there is usually no definite grower price at deliver time. Rather the grower price is determined by the price of fresh apples in the FOB packer market, or more specifically determined at the pricing point between the packer-seller and retailers minus the packers' margin. Thus, pricing on consignment substantially reduces the risks for the packer. Individual negotiation is the major price mechanism at the point of FOB sales for fresh packed apples.

A minor percentage of the fresh apples is sold for cash at the farm level. The pricing points at the farm level are between grower-sellers and packer-buyers and between grower-sellers and consumers.

The grower-seller and packer-buyer pricing point is more noteworthy during smaller crop years when fresh apples are sold for bulk sales. Bulk sales are arranged on an individual negotiated price basis.

The individual negotiated price arrangement accounts for about 20 percent of the volume of fresh apple sales at the farm level. Consignment sales account for approximately 55 percent of Michigan fresh apples marketed at the farm level. The pricing point between grower-sellers and consumer is a direct sales cash market at roadside stands and you-picks. The pricing arrangement at this transaction point is described as administrative. Twenty-three percent of the fresh apple sales are conducted in this manner. (See Figure 4.)

The Benton Harbor market also represents a direct cash market where farmers sell apples for a specific price perhaps to brokers who represent retail chains or to roadside market operators. The Benton Harbor City Market is clearly an organized exchange. This market outlet presently accounts for less than 5 percent of the fresh apple sales in the Michigan farm level market. Given trends and the prevailing conditions in the market, it is expected that the volume of apples marketed through this outlet will continue to decline in the future.

The major pricing point in the FOB packers' market exists between packer-sellers and retailers. Over 90 percent of the apples are priced on an individual negotiated basis.

D.2. The Processed Apple Market

Unlike the fresh market, a cash price exists at the processed apple farm level market. In this market the pricing point is between grower-sellers and processor-buyers. Pricing has been conducted under a group bargaining price discovery mechanism in recent years. Two types

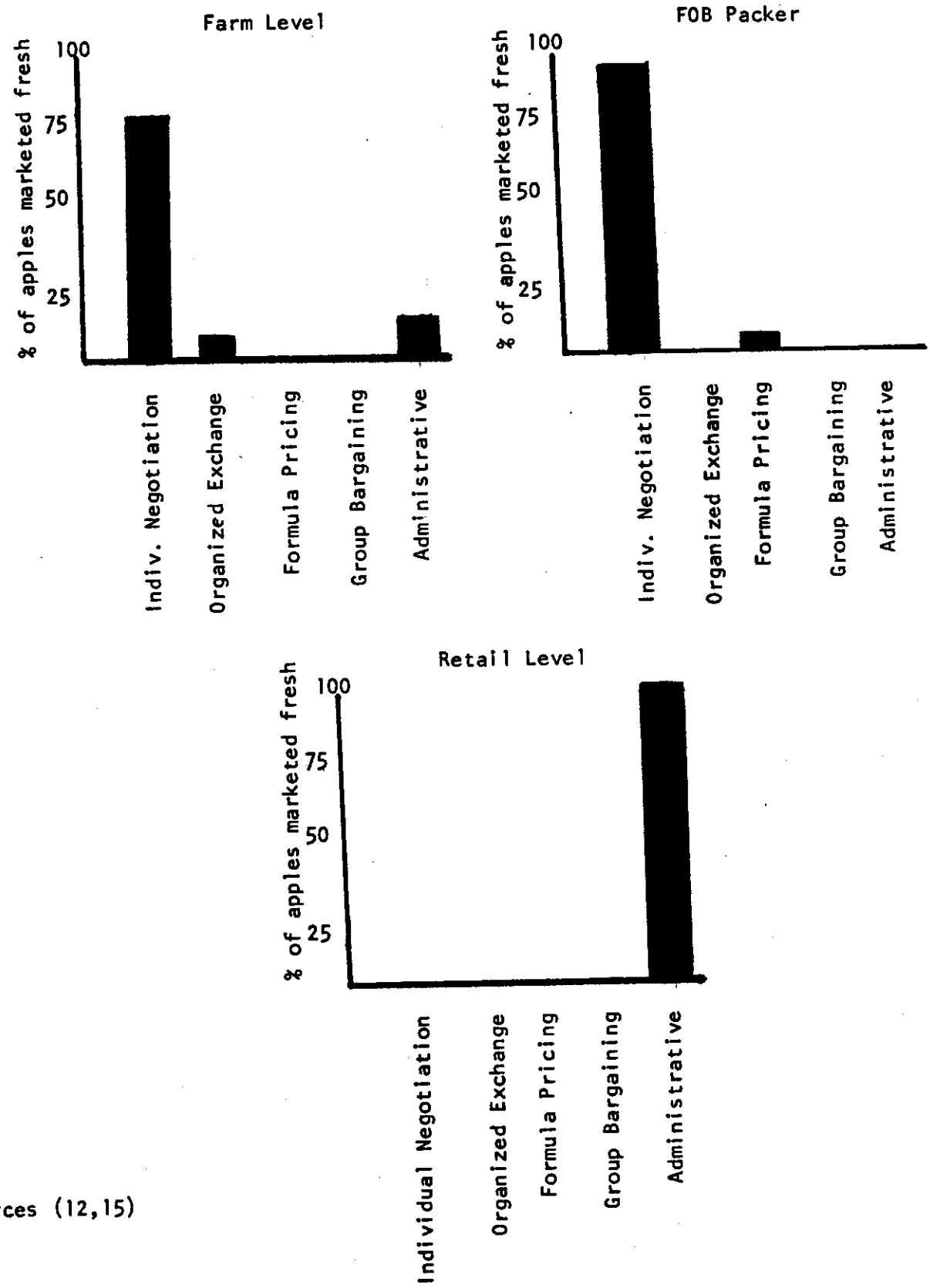
of pricing institutions have been used: group bargaining under Public Act 344, and voluntary processor/grower owned cooperatives (see above discussion on group bargaining).

The bargaining association under Public Act 344 significantly influences the price at the farm level for processed apples in that a bargaining unit as defined in the law has over 50 percent of the growers; however, these growers produced over 80 percent of the processed apple crop in 1976 crop year (see Figure 5). There are a number of smaller growers who do not qualify as members of the bargaining unit since they produce less than 210,000 pounds of apples in either of the two previous years, and therefore they sell their apples by individual negotiation. However, the bargained price arrived at through the efforts of the bargaining unit usually strongly influences the individual negotiated price received by the smaller growers who are not in the bargaining unit. Thus, the smaller growers can be considered as free riders to the bargaining group.

Processed apples marketed through grower owned cooperatives in Michigan presently account for approximately sixteen percent of the processed crop at the farm level. Cooperatives are expected to become more of a factor in pricing processed apples at the farm level because many processors find it to their advantage to purchase their product via a cooperative price arrangement rather than be subject to the statutory powers of the bargaining association. The expected change in the relative importance of this price discovery mechanism will have direct implications for the collection of price data in the farm level processed apple market.

In the FOB processor market, pricing points between processor-

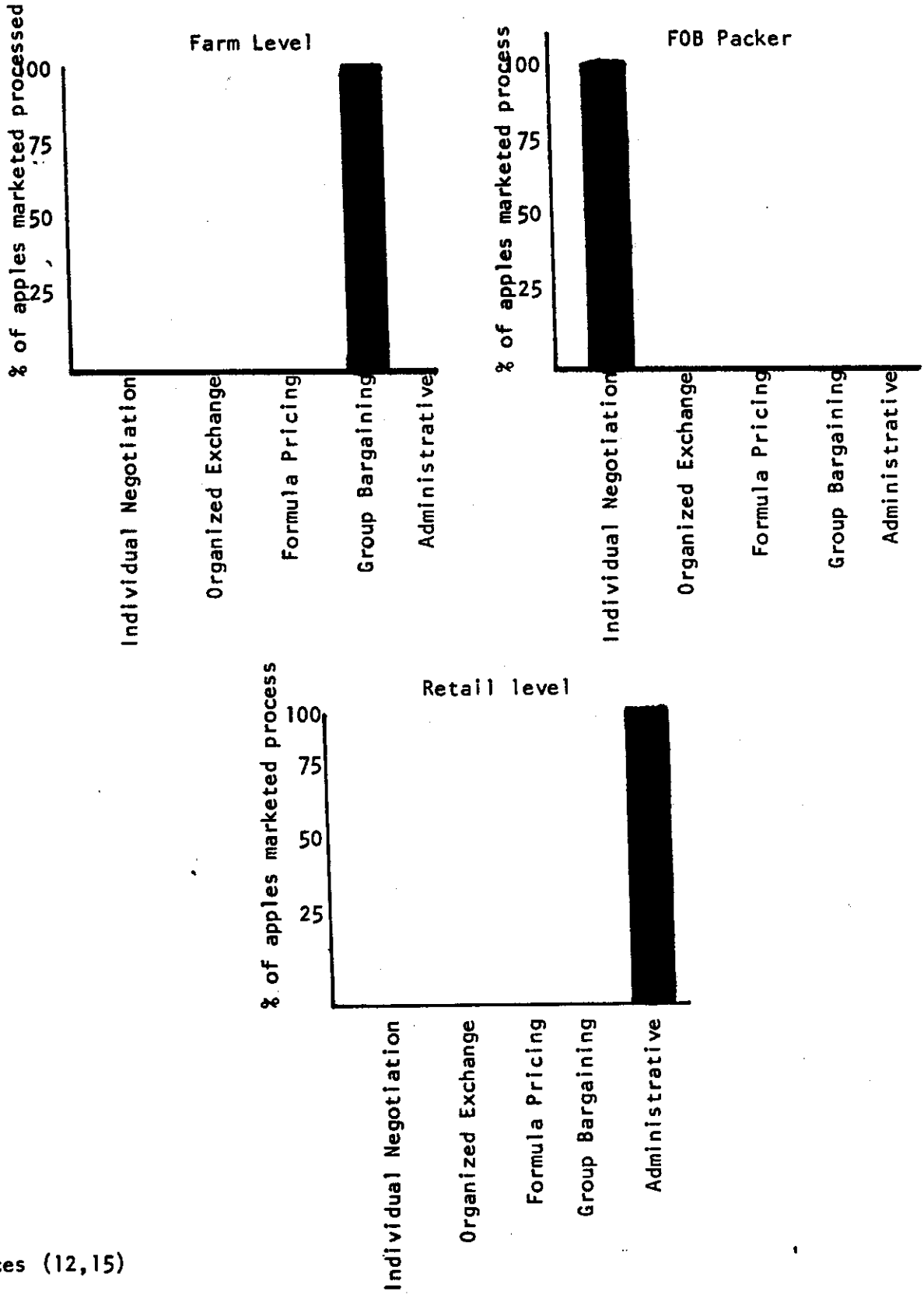
Price Discovery Mechanisms In The Michigan Fresh Apple Market - Figure 4



Sources (12,15)

Price Discovery Mechanisms In The Michigan Processed

Apple Market - Figure 5



Sources (12,15)

sellers and retailers where the processors include canners, juicers, pie fillers, and freezers is conducted on a direct cash price basis through individual negotiation. The pricing point between freezers and remanufacturers is a direct cash price that is also individually negotiated. Subsequently, the manufacturers sell their product to retail outlets on an individually negotiated price arrangement.

For the most part, all of the pricing at the retail level between retailers and consumers for processed apples is conducted by an administrative price mechanism. Formula pricing, such as cost plus a standard retailer gross markup adjusted for any price specials are also employed at the retail level for processed apples.

IV. The Price Data Collection Process in the Michigan Apple Market

A. The Nature of USDA Prices

The focus of this section of the paper is to review the price reporting system for apples as operated by two USDA agencies, the Statistical Reporting Service (SRS) and the Agricultural Market Service (AMS). Both agencies operate in the state of Michigan in cooperation with the State Crop Reporting Service.

At the outset it is important to realize that AMS and SRS have quite different purposes for collecting price data (11,18). The Market News Service was established to provide data which is useful at the micro-level for decision making by growers, processors, packers, shippers and other participants in the market. SRS price data has for its purposes more of a macro decision making focus. It is generally said that AMS price reporting reflects the demand for price data for private use while SRS prices are more for public decision making.

Specifically, AMS prices are generated to fulfill the tactical needs of decision makers while SRS prices are better suited for strategic decisions (18). AMS price is based upon the exchange value of the commodity at various pricing points within the market chanel with specific characteristics of a particular market or market area. This price data is useful in the coordination of the market in the sort run or simply for matching demand with supply. The SRS price statistic provides a measure of the performance of the market. This price statistic is often used in connection with quantity flows of product in the market to obtain a commodity based farm income estimate (Price x Quantity = Total Revenue). This performance related price statistic fills the need of decision makers who are concerned with the estimates of farm income and the gross national product of the farming sector for the national income accounts (18). Thus the SRS price statistic is more of a measure of farm-commodity sector or sub-sector welfare.

Other distinctions between AMS and SRS prices can be viewed with respect to the time dimension involved in the use of price data in the decision making process. For most short-run decisions, very specific and timely data is needed in determining marketing decisions. For example, a grower would need the type of price data that is specific to a certain variety of product, size of container, grade, location and volume. The type of price data that is designed to support short-run allocation decisions of buyers and sellers is primarily collected by AMS Market News. Alternatively, SRS is interested in price data that will be appropriate for long-run decision making. Therefore, the timeliness and specificity of the statistic is not as important.

B. AMS Price Data Collection Procedure

Market News Service operates cooperatively with the Michigan State Crop Reporting Service out of two offices which cover the Benton Harbor City Market and the Detroit Terminal Market. The Federal-State Market News reporters check on qualities and quantities of product sold, the price paid, the demand, the movement, and the trend within the fresh and processed apple markets.

To obtain accurate price information and give an assessment of the market conditions, the Market News reporter has to have knowledge about the variety of crops, an overall impression of the market, and a good working relationship with the buyers and sellers in the market. Market News reporters gather and document apple price data by personal observation of the transactions, by talking to buyers and sellers, and by checking sales records. Also Market News reporters can check the market reports, as in the case with the Benton Harbor Market, to cross check his information.

Price data is also gathered on apples that are not brought to the city or terminal market. The procedure involves the telephoning of a number of packing houses located around the state to obtain price quotations. Mail surveys are also used to collect price and quantity data from packers.

Once the price data is collected on the variety, grade, and size of container, reports are disseminated, as a public service, through the radio, the newspapers, mailed reports, and automatic telephone recorders.

Growers and other market participants who buy and sell apples (many other commodities as well) use this data to make their marketing

decisions. They need Market News in making decisions on how much and what kind of product to grow, on where and when to market, on whether or not to accept a price bid (26). This information helps to keep the marketing channels filled, but not over supplied. The information helps prevent unnecessary shortages and help provide consumers with a reliable and reasonably priced supply of foods to meet their needs.

C. SRS Price Data Collection Procedures

Statistical Reporting Service collects price data on both fresh and processed apples. This agency works in conjunction with the Michigan State Crop Reporting Service. The major statistics collected by SRS include the prices received for and output of crops and livestock as well as the prices and volume of inputs purchased by farmers.

Prices received by farmers for fresh market apples are published monthly. Estimates for the first half of the current month are usually based on Market News Service (AMS) quotations. Prices for the whole month are generally obtained from surveys of growers, Market News Service quotations, and other sources.

End-of-season surveys provide a basis for revision of monthly prices, which are published by the State of Michigan. Season average prices are obtained by weighting monthly prices by the monthly volume of marketings. The season average price computed from this series is applied to the annual fresh market production to arrive at the revised value of the crop produced.

Prices are obtained at the end of the year from processors for those apples that are marketed for processing. With the passage of Public Law 344, prices on processed apples may become easier to obtain because the negotiated price for processed apples is made public at the beginning of each crop year.

The uses of price data are extensive and varied (25). Users range from producers to government officials. To some extent SRS prices are used by private firms (processors). However, there is no way of accurately determining the degree to which the statistic is used by private industry in that many of the larger firms produce their own price data. Even this private price data probably uses SRS prices as inputs in most cases.

V. Implications of Price Discovery Mechanisms and Market Structure for Price Data Collection in the Michigan Apple Market

A. Price Discovery Mechanisms and Market Structure

The apple market, like most institutions, is characterized by constant change that is influenced by changing economic conditions, new technology, the quest for market power by the market participants, and occasionally government policy. Many of these changes have direct implications for the accuracy of price data collected in the Michigan apple market. These market innovations have been handled under two headings, price discovery mechanisms and market structure, so far without saying much about the relationship between the two. Most economists would agree that there is a relationship between price discovery mechanisms and market structure, but the nature of this relationship is not at all clear in the literature. However, it is evident, as pointed out in Section III of this paper that they both effect the price data collection process.

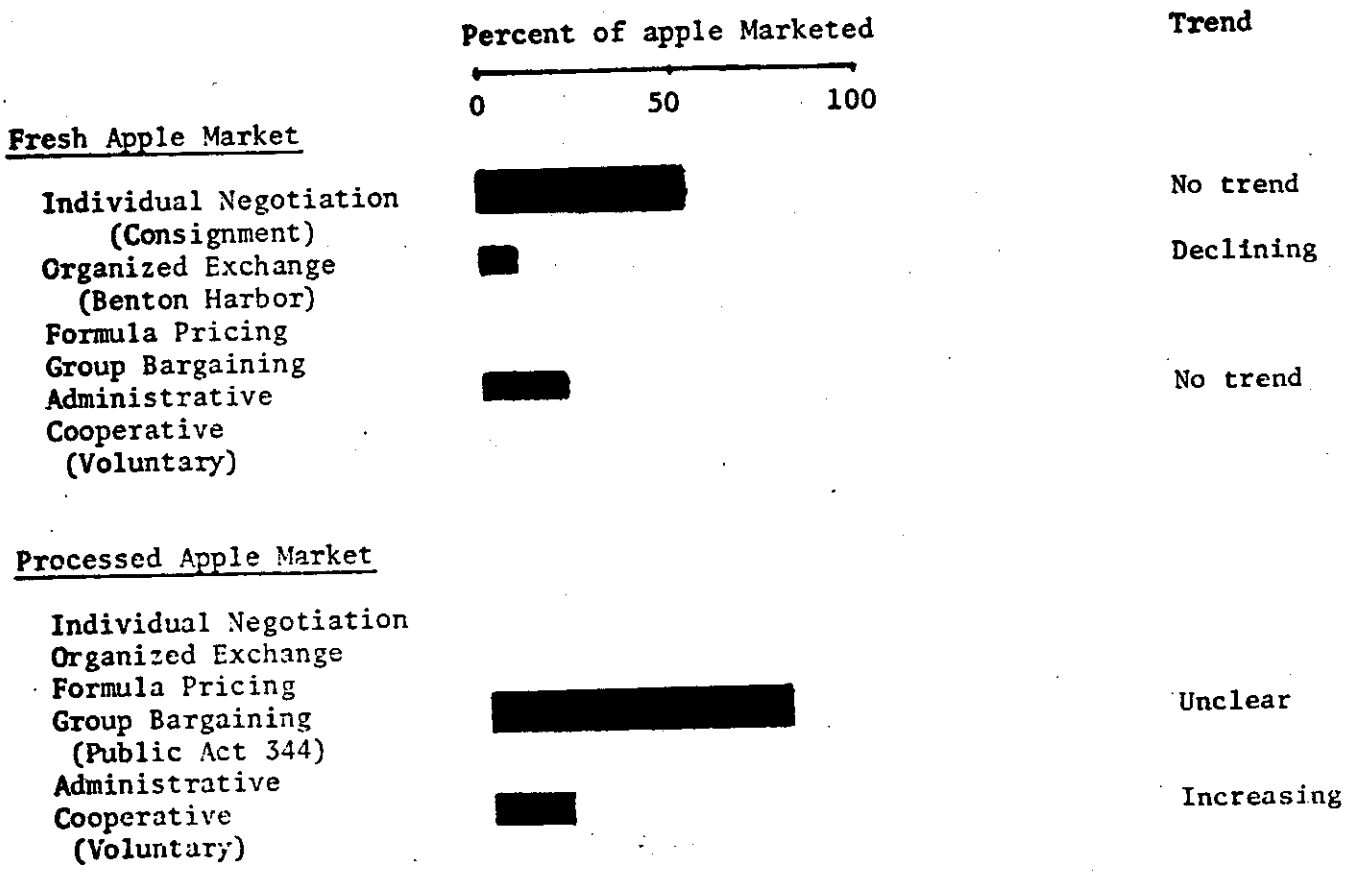
The major threat to the accuracy of price data at the farm level in the Michigan apple market that is due to changes in market structure centers around vertical integration. Vertical integration results in the complete elimination of a direct cash price at the farm level.

This market structure change makes it difficult, if not often impossible, to collect farm level price data. The degree of vertical integration in the Michigan apple market has not been measured in any quantitative manner. However, the impacts of this market structure on the price data collection process will be discussed below.

The problems which the various price discovery mechanisms pose for data collection at the farm level in the Michigan apple market is our next major area of concern (See Figure 6). All price discovery mechanisms are not a hindrance to the data collection process. In fact, some price discovery arrangements that are less evident in the Michigan farm level apple market are formula pricing, administrative pricing, and individual negotiation on a non-consignment basis. These price discovery mechanisms do not pose a problem for the accuracy of price data at the farm level because they play a minor role at the farm level. In some cases they are more prevalent at other market levels in apple marketing.

The various price discovery mechanisms that pose problems in the collection of price data at the Michigan farm level apple market are cooperative pricing, individually negotiated consignment sales, organized exchanges and group bargaining. It is not clear whether these changes in price discovery mechanisms are a result of the existing market structure or in fact some price discovery mechanisms result in a change in market structure. For example, it has been shown that the price discovery mechanism of group bargaining under Public Act 344 has impacts on the Michigan processed apple market structure, however, it can be contended that the market structure prior to the enactment resulted in the creation of the present price discovery mechanism. At

PRICE DISCOVERY MECHANISMS IN THE FARM LEVEL MICHIGAN APPLE MARKET - FIGURE 6



any rate, changes in price discovery mechanisms effect the price data collection process because they, 1) eliminate the direct cash payment through individually negotiated consignment pricing and cooperative pricing arrangements and, 2) alter the flow of price information in the market via such mechanisms as group bargaining.

An enumeration of some of the most frequently documented changes in market structure and price discovery mechanisms are discussed below. These include: (1) cooperative pricing arrangements, (2) consignment packing and sales, (3) vertical integration by the producer into packing or processing, (4) group bargaining by producers, and (5) organized exchange markets.

The various types of pricing mechanisms and changes in market structure require careful consideration in designing data collection if a supply of accurate and reasonably complete information on market activities is to be provided. The conditions that influence the flow of price information in the marketing of apples should be analyzed so that one can answer the following general questions. (1) What problems do various price discovery mechanisms and changes in market structure create for the collection of apple price data? (2) How important are the problems? (3) What is the informational flow and content of price in various market transactions? (4) By what procedures can a neutral agent collect information from the various transaction points? The market innovations which have occurred in the Michigan apple market will be discussed in reference to these questions.

B. Cooperative Pricing Arrangements

In cooperative market organizations, whether grower or processor owned, full payments to the producer are not made at the initial transaction at which title is transferred. Rather, throughout and at

the end of the crop year, growers receive payments for their stored apples from the manager of the cooperative (packer seller). Oftentimes an end-of-the-season patronage rebate is also appropriated. This price discovery mechanism does not allow the farmer at any point in time during the season to know the per unit price of his apples. When the neutral agent surveys for prices of apples at the farm level, the producer is unable to quote an accurate price, thus making it very difficult, perhaps even impossible, to collect accurate price data at the farm level under this price discovery mechanism.

The procedures employed by USDA in collecting price data from the cooperative market price mechanism in Michigan does not as yet take in to account the above situation. Mail surveys, for example, sent out to apple growers who are members of a cooperative will probably not be returned with a price quote. If a price is returned, it is likely an inaccurate price quote because the grower, particularly in the fall of the year is unable to submit a per unit price for his product.

Cooperative marketing organizations are found in both processed and fresh apple markets. However, it is the processed apple market where they are most prevalent. Presently approximately 16 percent of Michigan's processed apples are marketed via this pricing mechanism at the farm level (see Section III-D). From all indications, cooperative market organizations and the associated price discovery mechanism can be expected to play a larger role in the Michigan apple market in the future. Given the present price data collection procedures of USDA with the expected growth in importance of the cooperative market organization and hence its price discovery mechanism, the quality of the price data collected for the Michigan apple market will be slowly eroded if an improved means of collecting this data is not found.

C. Consignment Packing and Sales

Consignment of apples to private packing companies creates similar problems in that private packers make individually negotiated agreements with producers to store the product throughout the market year. Under this arrangement, the producer may be paid in intervals receiving a portion of his payment at harvest with varying additional payments throughout the crop market year. However, it is more often the case he is paid everything at the end of the market year. This pricing mechanism makes it difficult for the producer to provide information concerning price per unit to a government statistician. The agreed price arrangement is considered private property of the packer; therefore, he is not obligated under law to reveal the terms of trade. Many packers believe it contrary to their interest to provide such information. Again we end up with the neutral agent unable to obtain the desired information at the farm level.

The USDA has responded to the problems imposed by this price arrangement by obtaining price quotes from country fresh packing houses. The procedure used by the government statistician in this case is simply to telephone several packing houses across the state and record the various quoted prices. However, the accuracy of this statistic is at times questionable because the packer (processor) may quote an inaccurate price. Such behavior of the packer is perhaps understandable when one considers that the USDA's purpose for collecting farm level price data in the market is not necessarily beneficial to the packer but rather it is designed to meet the informational needs of growers. Thus, simply changing collecting procedures will not solve the problem. The problem is one of a need for institutional change.

Institutional change can take place either within the USDA or within the market. USDA could redesign its information system in such a way that it collects and provides data to all participants at the designated market level. This effort might gain the cooperation of the market participants in the data collection process. Alternatively, a change in the price discovery mechanism and market structure at the farm level could eliminate the need to collect data at the other market levels. Institutional changes of this nature require more analysis than presented in this study. However, they are viable alternatives to the problems which price discovery mechanisms, such as individually negotiated consignment arrangements, present for accurate price data collection in the Michigan apple market.

Consignment of apples, a type of individual negotiated price mechanism accounts for approximately 55 percent of the fresh apples marketed at the farm level (see Section III-D). Although consignment of apples to private packing companies plays a major role in the marketing of fresh apples, there are however, no apparent trends in recent years under this price arrangement that suggest either greater or lesser importance in the future.

D. Vertical Integration by the Producer into Packing or Processing

Grower owned packing facilities integrate many of the marketing functions under one market participant, the producer. The grower-packer vertical integrated relationship has an impact on the informational flow and content of price. Because the producer has ventured into the provision of marketing services he has no easy means of isolating the cost of the marketing functions from production; thus he loses the ability to determine the price of his apples separate

from the marketing service performed. The price of a bushel of apples in the Benton Harbor Market should be different and reflect a different product than a bushel of apples sold orchard run. Because of vertical integration, the transaction has moved from the farm gate to the first handler level. Consequently, when a neutral agent collects price data on the product from the producer, he quotes a price that is quite different from the quoted price of a producer who marketed his apples on the traditional open market cash basis. The informational content of the price does not describe the situation at the farm gate and the government statistician is left with an inaccurate measurement of the farm level price.

The USDA has so far not been able in the Michigan apple market to deal effectively with the problem of vertical integration. Because of the nature of the problem, its solution requires more than merely adjusting statistical procedures. Here again we are confronted with a need for a more fundamental change in the institutions which collect data in the market as well as perhaps in the market itself.

Vertical integration at the farm level in the Michigan apple market has not been measured here in any rigorous fashion. It is, however, common knowledge among agricultural extension personnel that farmers, particularly in the fresh apple market, provide many of the market functions beyond the farm level (any function other than producing - i.e., packing, grading, etc.). Because vertical integration of this nature is practical on a massive scale in the Michigan apple market (mostly fresh market) it has a major impact on collecting price data.

E. Group Bargaining

Group bargaining has existed in Michigan since the early 1960's, however it is new to the Michigan apple market with the passage of Public Act 344 in 1972. This price discovery mechanism is the most prominent one in the farm level market for processed apples. Because it does not require the day to day collection of price data in the market, the implications of group bargaining is of major concern to SRS, and even more concern for AMS.

Bargaining associations play a constructive role in collecting information in the market. Obtaining price data under this price discovery mechanism does not present a major problem because producers and processors at the beginning of each crop year bargain for a price that serves as the minimum price for a given variety, size and quality of product for that year. The price however, is not a rigid one and therefore it is subject to changes that are caused by violations of the Act, legal interpretations of the Act, and changes in market conditions. Nonetheless, the Bargaining Association directly and indirectly provides the basis from which over 80 percent of the apples in the farm level processed apple market are eventually priced. SRS does not presently collect price data from this pricing mechanism. The long term impact of the Bargaining Association on the economic structure of the apple industry is unclear at this point. Therefore long term implications for data collection under this price discovery mechanism are equally unclear. However, the Bargaining Association potentially provides the opportunity for directly obtaining accurate price data for the farm level processed apple market.

F. The Organized Exchange Market

Organized exchange markets perform the important function of discovering prices that will equate short-run demand and supply. For that reason, AMS has the primary responsibility for collecting price data in organized exchanges. The discussion of the organized exchange price discovery mechanism and its implications to the measurement of price data in the Michigan apple market will be limited to the Benton Harbor City Market. [There are any number of retail city markets scattered throughout Michigan however, AMS does not cover these markets except for the one located in Detroit.]

The physical volume of apples traded in the Benton Harbor City Market has been declining in recent years. This phenomenon has occurred because large national grocery chains have increasingly purchased directly from fresh packing houses. The trend toward direct buying of apples by the grocery chains has implications for government agencies, particularly AMS, in obtaining price data in the market. With direct buying of apples from packing houses scattered throughout Michigan, buyers and sellers are no longer brought together in one or a few places. It is obviously more difficult and costly to obtain a representative price quotation from a large number of decentralized markets than from a few centralized ones. Even though the Benton Harbor City Market presently accounts for a minor percentage (less than 5%) of the fresh apples marketed in Michigan, the price collected in this market may be used to establish prices in other market transactions. The real importance of this price discovery mechanism lies in its impact on other market transactions.

The process of collecting price data in the Benton Harbor Market itself does not pose a threat to the accuracy of the statistic.

The real threat to the accuracy and reliability of the price data lies in the declining volumes of apples marketed via this exchange. As the volume sold in the market becomes smaller, the prices established in the market are likely to fluctuate more and may reflect different qualities than the average of the apples which are sold directly in other transactions. Therefore price data collected in the Benton Harbor Market may be very much out of line with prices at country packing houses. As a result the Benton Harbor Market is likely to become a residual market with little or no impact on the establishment of prices in other market transactions. AMS will be forced to collect price data from the many packing houses scattered throughout Michigan.

VI. Summary and Conclusion

This study has reviewed the price data system within the Michigan apple market. A detailed description of the market and its participants, channels, and functions were presented. Some of the problems with respect to collecting accurate price data were also identified.

This research effort falls short of evaluating the data system from the perspective of the data users. The intent was not to evaluate the entire information system but rather to identify problems and needs within the apple price data system subset and its components of conceptualization, operationalization, and measurement. With respect to the price data system in the Michigan apple market the following alternatives, suggestions, and conclusions are offered.

1. The cooperative market organization and hence its price discovery mechanisms are likely to become more prevalent in the Michigan processed apple market. As a result, reliable price data at the farm level will become increasingly difficult to obtain. Research

needs to be done in developing ways to obtain accurate price data from the markets dominated by this price discovery mechanism. Alternatively, one might collect price data in the next major market level, the FOB processor market. This would probably be adequate for tactical decisions by market participants, but it would present a problem for SRS in trying to provide inputs for the present farm income concept.

2. Consignment of fresh apples and vertical integration at the farm level eliminates the direct cash payment for over 50 percent of the market, therefore eliminating the opportunity of collecting price data at the farm level. This change in market structure and pricing arrangement suggest the need for collecting a more accurate price statistic at the next market level, the FOB packer's market. USDA can then convert this price data to farm level price data by subtracting out the cost of various market services. It seems unlikely that further research would lead to a feasible technique for obtaining farm price directly.
3. A study is needed to investigate the implications of the declining volume of trade in the Benton Harbor City Market. This trend has direct implications for the reliability, accuracy, and importance of price data collected on the fresh apple market. Price data will likely have to be collected from the smaller dispersed country packing houses as well as Benton Harbor and other terminal markets in the state.
4. Changes in market structure and price discovery mechanisms at the farm level may overwhelm attempts to improve price data by investing in modividations of statistical methods. Collecting price data at the next market level (FOB packer and processor markets), as was

suggested in the case of consignment pricing, might still produce questionable data since many participants at that market level apparently do not perceive their cooperation with the USDA's data collection efforts to be beneficial to their market activities. If USDA invests in collecting data at the next market level, it should also be prepared to take on the responsibility of serving the informational needs of additional market participants. This statement hinges on a premise that there is a need for government to supply price data at this market level. This study falls short of identifying or validating these needs. However, the economic, institutional,and political ramifications of collecting (supplying) price data at this market level merit consideration.

5. The impacts of group bargaining under Public Act 344 on the Michigan apple market structure were presented in this study. AMS and particularly SRS should be aware of implications of group bargaining on the price data collection process. Bargaining associations play an important role in collecting information in the market. To date, there have been no attempts on the part of the bargaining associations nor USDA to develop an institutional relationship that will coordinate their efforts in the data collection process. The movement toward a coordinated effort in price data collection could possibly lead to savings to both institutions because it would eliminate duplication of effort and at the same time increase the accuracy of the statistic.
6. Changes in market structure and hence price mechanisms are likely to continue in the Michigan apple market (other fruit and vegetables as well). Therefore, the government statistician at local

levels should be made more familiar with the nature of these changes and their implications for price data collection. This might be accomplished by having periodic market structure analyses supplied to AMS and SRS statisticians by other USDA agencies (ERS) or by the State Land Grant Agricultural Economics Departments along with evaluations of the problems of price discovery and price data collection which are associated with various market structure changes.

7. Educate the market actors: Many of the problems in collecting accurate and timely price data in the markets are due to the lack of cooperation on the part of producers. For one reason or another a significant number of producers have adopted the attitude that cooperation with government officials will be detrimental to their interests. This attitude is reflected in the decline in the number of returned survey forms that are mailed out monthly by government statisticians. To alleviate this situation, the government should invest in educating the apple grower and packer/processor on the objectives of their program and stressing the advantages in the program to producers, packer/processors and the consumer where this seems likely to be productive.

8. Mandatory Reporting Laws: If government cannot gain cooperative support from the public, then a mandatory reporting law is an alternative. This is a most drastic alternative and because of political infeasibility it is probably not a viable solution. This approach has long been opposed by USDA statisticians as counter-productive.

REFERENCES

1. American Agricultural Economics Association, Committee on Economic Statistics. "Our Obsolete Data Systems: New Directions and Opportunities." American Journal of Agricultural Economics, 56:867-75, 1972.

2. Apple Marketing Report: A Team Study, USDA, Washington D.C., 1972.

3. Armbruster, Walter J. and R. J. Crom. "Practical Problems in Price Reporting." AAEA-USDA Agricultural and Rural Data Workshop, Series A. Washington D.C. May 1977.

4. Armbruster, Walter J. "The Future of Market News." Unpublished paper presented before the National Market News Association 19th Annual Meeting. Raleigh, North Carolina. June 1976.

5. Bonnen, James T. "Improving Information on Agriculture and Rural Life." American Journal of Agricultural Economics, 57:753-763, December 1975.

6. Bonnen, James T. "An Information System Approach to National Agricultural Data Collection, Analysis and Decision." Paper presented at the Workshop on Minimum Information Systems for Agricultural Development in Low Income Countries. Oxford, England. December 5-6, 1976.

7. Carman, Hoy F. and David Kegon. Economic Aspects of Producing and Marketing California Apples. California Agricultural Experiment Station, Giannini Foundation of Agricultural Economics, No. 301. University of California, Davis. April 1969.

8. Chain, Jarvis and Eugene Shawaryn. Maryland Consumer View Fresh Apples Marketing. Agricultural Experiment Station, MD 890. University of Maryland, College Park, Maryland. May 1976.

9. Dahl, D. C. and J. W. Hammond. Market and Price Analysis. New York: McGraw-Hill Book Compnay, 1977.

10. Dalrymple, Dana. "Economic Aspects of Apple Marketing in the U.S." Unpublished Ph.D. thesis, Michigan State University, East Lansing, Michigan, 1962.

11. Houck, James P. "Concepts of Price: Implications for Agricultural Data Collection." AAEA-USDA Agricultural and Rural Data Workshop, Series A. Washington D.C. May 1977.

12. Michigan. Michigan Agricultural Marketing and Bargaining Act Public Act 344. Department of Administration, Lansing, Michigan, 1972.

13. Michigan Apple Production and Marketing Survey. Michigan Department of Agriculture, Lansing, Michigan, February 1973.

14. Michigan Fruit Tree Survey. Michigan Department of Agriculture, Lansing, Michigan August 1974.

15. Ricks, Donald and David Smith. Price Relationships for Applesauce and Frozen Apple Slices. Agricultural Economic Report No. 256, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan. August 1973.

16. Ricks, Donald. "Some Important Organizational Changes in the Fruit Marketing System." Agricultural Economic Staff Paper No. 74-7. Department of Agricultural Economics, Michigan State University, East Lansing, Michigan. 1974.

17. Ricks, Donald and Susan Karony. "Supplies, Utilization and Marketing Trends Related to the Michigan Fruit Industry." Agricultural Economics Staff Paper No. 77-4. Department of Agricultural Economics, Michigan State University, East Lansing, Michigan. February 1977.

18. Riemenschneider, Charles. "Economic Structure, Price Discovery Mechanisms and the Informational Content and Nature of U.S.D.A. Prices," AAEA-USDA Agricultural and Rural Data Workshop, Series A. Washington D.C., May 1977.

19. Shaffer, James D. "The Michigan Agricultural Marketing and Bargaining Act of 1972." Michigan Farm Economics No. 361, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan. February 1973.

20. Shaffer, James D. and L. G. Hamm. "The Exclusive Agency Cooperative and a Vertical Coordination Mechanism," Coordination and Exchange in Agricultural Subsectors. N.C. Project 117, Monograph 2, January 1976.

21. Shepherd, G. S. and C. A. Futrell. Marketing Farm Products. Ames, Iowa: The Iowa State University Press, 1968.

22. Sjodin, K. E. and D. Dahl. "Potato Price Reporting Procedures and Practices in the Red River Valley," University of Minnesota, 1975.

23. Tomek, W. G. and K. L. Robinson. Agricultural Product Prices. Ithaca: Cornell University Press, 1972.

24. U.S. Department of Agriculture. "Scope and Methods of the S.R.S." Miscellaneous Publication No. 1308. Washington D.C.: U.S. Government Printing Office, July 1975.

25. U.S. Department of Agriculture. Market News: Major Statistical Series of the USDA - How they are Constructed and Used. Vol. 10, No. 365. Washington D.C.: U.S. Government Printing Office, 1973.

26. U.S. Department of Agriculture. Agricultural Marketing Service. No. 1028. Washington D.C.: U.S. Government Printing Office, 1977.