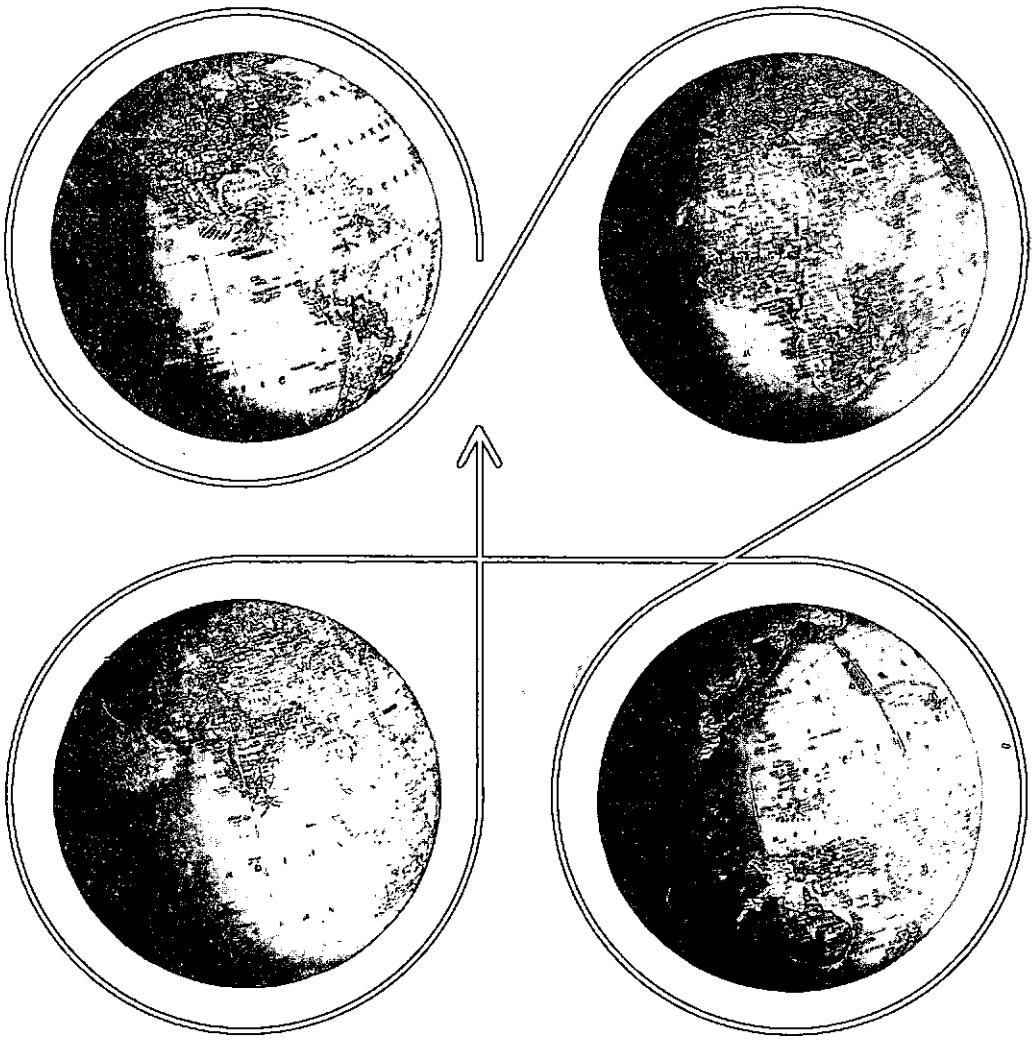

SMALL FARM MAIZE MARKETING: A Case Study From Northern Vera Cruz, Mexico

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Small Farm Maize Marketing: A Case Study From Northern Vera Cruz, Mexico

by

Philip Garcia

This report derives from the author's doctoral dissertation, "Market Linkages of Small Farms: A Study of the Maize Market in Northern Vera Cruz, Mexico" submitted to Cornell University in January 1978. Principal funding for the research was provided by the International Agricultural Program at Cornell. Supplemental funding and intellectual collaboration was provided by the Economics Section of the International Maize and Wheat Improvement Center, Mexico. Philip Garcia is currently an Assistant Professor in the Department of Agricultural Economics, University of Illinois at Urbana.

CONTENTS

ABSTRACT

The findings of the study indicate that the local rural maize marketing system is operating reasonably well even though a level of monopsonistic practice exists. Comparison of the results from an econometric analysis of the variation in producer prices with marketing costs showed that prices vary rather systematically with differences in processing costs and levels of maize moisture content. Price differentials slightly greater than transportation costs were encountered as the distance from the central market increased. The results of the marketing margin analysis suggest that large monopsonistic profits are not characteristic: of the local maize markets. This absence of large profits is consistent with the market conditions analyzed within the market structure and conduct paradigm.

Increased marketing efficiencies can be achieved by augmenting the flow of price information, by improving on-farm storage facilities and by encouraging the marketing of larger volume units.

Key Words: Maize marketing, market structure, marketing margins, Mexico, peasant farming, pricing efficiency.

INTRODUCTION

Nature and Scope of the Problem

Concern for the problems of small farmers in the developing world has increased dramatically over the past several years. Despite their potential importance, little has been written on the marketing systems that service these small farmers. The main body of published agricultural marketing research treating developing countries has concentrated on the operations and effectiveness of national and regional wholesale and retail markets. While most of this work does not investigate rural marketing systems directly, some of the findings are relevant.

Several Latin American Studies delineated a difference in the marketing systems which service large and small farmers. These studies suggest that the large specialized commercial farmers are serviced by large assemblers, wholesalers and processors. These operations, "the big trade," are sufficiently large to capture economies of scale and appear to perform relatively well, benefiting both the large farmers and the merchants. The marketing system that services the small farmers who sell their marketable surplus is not as effective. The "small trade," composed of small assemblers who sell to larger assemblers, retailers or mills in nearby market towns has higher costs of operation and consequently, pays lower prices to the small producers.[1] This discovery is consistent with findings in Africa which note market stratification between large and small farms.[2]

The degree of inefficiency and/or exploitation in the marketing system that serviees the small farmer derives from: (1) the small unit sales which result in high transaction costs; (2) the limited bargaining power, including the fact that the farmer often depends on credit from local buyers; (3) the low level of market information available to the farmer; and (4) the atomistic structure of small farm agriculture which tends to limit the eost reducing potential from vertical coordination.[3]

Similarly, it has been hypothesized that the small farmer is disadvantaged beeause the private and government marketing agencies which

[1] Kelley Harrison et al., Improving Food Marketing Systems in Developing Countries: Experiences from Latin America. Latin American Studies Center, Research Report No. 6 (East Lansing, Michigan, Michigan State University, 1974), pp. 60-79.

[2] William O. Jones, Marketing Staple Food Crops in Tropical Africa, (Ithaca, New York: Cornell University Press, 1972), p. 175. "

[3] Kelley Harrison and Kenneth Shwedel, Marketing Problems Associated with Small Farm Agriculture, Seminar: Report No. 5 (New York: ADC/RTN, 1974) pp. 1-3.

serve large farmers are not able to provide the same services to the smaller ones. Such organizations tend to have a commercial bias which favors large scale producers. Government programs designed to supplement and/or replace existing marketing organizations serving small farmers often fail to achieve their objectives and foster a lack of confidence in government intervention. Thus, while the larger farmer's access to different markets increases through an efficient marketing system, the smaller farmer's access to the same market may be reduced or even eliminated.[1]

While a number of anthropological studies have considered the nature of rural marketing systems in Mexico,[2] little economic research has examined in depth the relative effectiveness of rural markets. Even less is known about the influence on economic performance of the social and economic interactions between the small farmer and local buyers. Neither has there been much conceptual analysis or research investigating the characteristics of producer marketing behavior, nor of the market participants modus operandi. Similarly, there has been a lack of research on the ability of the marketing system to transmit consumers choices to producers and handlers.

This lack of systematic knowledge, research, and policies in the area of the small farmer and the marketing systems serving *him* is somewhat incongruous because the "middleman" often has been accused of being an exploitative agent in the developing world. Government officials in developing countries have frequently stated that the social and economic power of local buyers leads to the exploitation of farmers and consumers and precludes government programs designed to increase the welfare of the small producers.[3] It is necessary to understand both the small farmers' marketing patterns and the marketing systems that deal with small farm agriculture to integrate this sector into the national economy. A better understanding of market behavior is required before programs can be designed which will increase the effectiveness of rural and agricultural development programs.

[1] Ibid., p. 14.

[2] Frank Cancian, Changes and Uncertainty in a Peasant Economy: The Maya Corn Farmers of Zinacantar, (Stanford, California:Stanford University Press, 1972); and Ralph L. Beals, The Peasant Marketing System of Oaxaca, Mexico, (Berkeley, California: University of California Press, 1975).

[3] Within the Mexican government these beliefs have been expressed frequently, as for example in Compania Nacional de Subsistencias Populares (CONASUPO), "Resumen General," Mexico D.F., 1972. (Mimeographed).

Setting

Maize is the basic component of the Mexican diet. Much of the production is centered on small, nonirrigated, low income farms. These farms have low levels of technology, and the farmers retain a large part of their production for household consumption.[1] Since the mid-sixties Mexico's maize production has lagged behind domestic demand, resulting in imports of up to 25 percent of national utilization. The purchases represent a significant foreign exchange drain. Demand for maize has been estimated to be growing at a rate of 5.1 percent and 1.6 percent in the urban and rural sectors, respectively. From 1970–76, production has fallen slightly. This decreasing production has been associated both with slight reductions in average yields and in average area harvested. The lower yields and reduced areas harvested are associated, in part, with poor weather, shifts in cropping patterns, and shifts in the maize production regions. Government officials claim that the marketing system is not providing the necessary incentive to expand production through increased acreages planted and the use of new varieties.[2]

The Mexican government's marketing agency, Compania Nacional de Subsistencias Populares (CONASUPO), has posited that middlemen's activities have resulted in high consumer and low producer prices, and have imposed an important constraint on increased maize production and marketings.[3]

[1] Maize occupies about 45 percent of the cultivated land, provides employment for 14 percent of the active labor force, and accounts for 22.3 percent of the value of all agricultural output. For a more comprehensive description of the maize situation in Mexico see Philip Garcia, "Market Linkages of Small Farms: A Study of the Maize Market in Northern Vera Cruz, Mexico." (Ph.D. dissertation, Cornell University, 1978).

[2] CONASUPO, "Resumen General" 1972; Grindle, Merilee S., Bureaucrats, Politicians, and Peasants in Mexico: A Case Study in Public Policy, (Berkeley, California: University of California Press, 1977), p. 88 who bases her assertion on CONASUPO, "Esquema General para la Transformacion de la Agricultura de Subsistencia," Mexico, D. F., 1972. (Mimeographed).

[3] CONASUPO's objectives are: (1) to regulate trading in basic commodities by eliminating excess profit in the marketing system and improving marketing efficiency; (2) to raise the income of the low income campesino by implementing the government's price policy; and (3) to incorporate the low income campesino into the development of process by ensuring the availability of basic goods at reasonable prices.

It maintains storage facilities (throughout the country) with a capacity of 5.3 metric tons and has complete control over exports and imports of basic commodities. In 1974, its assets and operational budget were 3,238 million pesos and 18,300 million pesos, respectively,

(continued on next page)

Implicit to this position is the contention that producers are receiving artificially depressed prices due to irregular market structure or conduct, deficiencies in information, inefficiencies in marketing operations, or a combination of these factors. In turn, these low producer prices are viewed as the cause of lower levels of production and less incentive for the adoption of modern technology than would be expected with an effective marketing system. Since many producers are unable to sell directly to CONASUPO because they lack transportation, increases in guaranteed prices are viewed by some government officials[1] as a transfer from the taxpayer to the marketing intermediaries.

In 1975, the Community Maize Production and Marketing Program (PACE) was initiated by the Mexican government in response to the deficit situation in maize production and in recognition of the large proportion of domestic production harvested on small farms. The major goals of the program have been to stimulate production, to increase marketings through official agencies, and to improve the income level of maize producers.

The plan calls for a simultaneous effort on the part of the Banco Nacional de Credito Rural (National Rural Credit Bank), Aseguradora Nacional Agricola y Ganadera (The National Crop Insurance Agency), Secretaria de Agricultura y Ganaderia (The Secretary of Agriculture and Livestock), CONASUPO, and other public agencies. This cooperative effort entails providing preferential credit to maize producers; increasing crop insurance; distributing fertilizer, improved seeds, and insecticides in accordance with the farmers' needs; providing technical agricultural assistance; increasing the sales of basic commodities at local CONASUPO warehouses at subsidized prices; providing credit for consumption of the basic commodities so that the farmers will not be forced to sell their commodities precipitously in order to meet their subsistence needs; loaning packaging materials and shelling equipment to maize producers; and providing a maximum rebate of 150 pesos per ton above the guaranteed price of 1,900 pesos to reimburse farmers for transportation and shelling costs.

On the community level, where the program is aimed at ejidos[2] the government is promoting the development of Comites de Produccion y Comercializacion de Maiz (Production and Marketing Committees) whose members are producers from the community. The committee's functions include: identification of production patterns; inscription of producers interested in participating in the program; acquisition of transportation to transfer the ejido's maize production to the warehouses; and distribution of farm inputs and payments from sales of the maize.

(continued from preceding page)

In terms of maize, the majority of its purchases is sold to the industrial sector - for processing into corn meal. Often it performs these operations on an inverted marketing margin, selling maize at a lower price than the original purchase price plus the cost of operations.

[1] Grindle, Bureaucrats in Mexico, p. 82; CONASUPO, "Resumen General."

[2] Ejidos are rural communities which have received land grants under the Mexican agrarian reform programs.

Producers interested in participating in the marketing program must enroll, estimate the amount of production to be sold to CONASUPO, and provide an approximate harvest date, prior to the harvest itself. Only enrolled producers may benefit from the 150 pesos rebate for the stipulated amount to be sold to CONASUPO, although they are not compelled to sell their maize to CONASUPO. In theory, the CONASUPO price and rebate act as a floor price. An estimate of the magnitude of the financial resources to be directed into the program was not available. However, the program's coverage has been projected to be administered in the 50 percent of the communities (ejidos) that produce 90 percent of the maize.[1]

Objective of the Study

The objective of this study is to increase the understanding of the maize marketing system which deals with small farm agriculture in Vera Cruz, Mexico - specifically considering the issue of pricing efficiency as well as attempting to isolate those market structure and conduct variables related to aberrations in an efficient pricing pattern. This entails a description of the rural maize marketing system and an evaluation of its effectiveness in terms of pricing efficiency. The extent to which prices received by small farmers are influenced by economic factors (i.e., time, space, and form considerations), market structure and conduct (e.g., number of buyers), as well as factors that reflect the special circumstances of the small farmer which may affect his market position (e.g., limited resources) is examined. An attempt is made to evaluate the degree to which marketing margins are consistent with costs. Finally, an overall evaluation of the marketing system is made in terms of the adequacy of the information and storage facilities and of the mechanisms by which marketing margins could be reduced through the restructuring of the marketing system.

Organization of the Research

The study is based principally on primary data obtained in a series of interviews with farmers, market intermediaries, and government officials in three municipalities in Northern Vera Cruz. Northern Vera Cruz was selected because it was believed to be an important surplus maize producing region, because farmers in the area can produce two maize crops a year and perhaps, most importantly, because of a long history of other research work in the area[2] done by the International Maize and Wheat Improvement Center (CIMMYT).

[1] CONASUPO, Programa de Asistencia de la Comercializacion Ejidal de Maiz, (Mexico, D. F.: 1975), p. 2-9.

[2] The fieldwork was accomplished in part, with assistance of the economics section at the International Maize and Wheat Improvement Center (CIMMYT). CIMMYT has maintained an agronomic research station in the area of the study for a number of years. Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT), CIMMYT Review 1975, (El Batan, Mexico: 1975).

For the purposes of the study, the universe of small farmers[1] was designated as the ejidatarios in the three municipalities. Information was gathered from a sample of these farmers on production, input use, seed information, sales, sales prices, and factors presumed to influence farm prices. Local buyers were identified in the interviews with producers, and also by questioning buyers as to whom were their competitors in the region. Local assemblers were questioned concerning resources used in performing marketing functions, their sales outlets, prices received, credit, costs of operations, and the impact of government marketing programs on their operations. In addition, property owners in the region were interviewed, as well as a number of small farmers with sales to the government marketing agency, CONASUPO.

MAIZE FARMING IN NORTHERN VERA CRUZ

Farmer Sampling

A representative sample of farmers in the region was interviewed to examine the effectiveness of the marketing system servicing them. The farmers were interviewed during the two periods of the year which coincide with the local harvests. Because there was no listing of all the farmers in the study area, a three-part sampling procedure was carried out. First, a random sample was drawn of the ejidatarios appearing in the 1970 Censo Ejidal (Ejido Census) for the three municipios of Teayo, Temapache, and Tihuatlan in the state of Vera Cruz. The 1970 census data indicated that approximately 90 percent of the maize grown in the area corresponded to the ejido production.[2] Second, in order to investigate the marketing system which deals with the 10 percent of the maize not produced on ejidos (that is, produced by private property landholders) a listing of private property owners was prepared. The private property landowners were identified through discussions with ejidatarios during the second interviewed period. A sample was drawn from the derived list. Finally, since no farmers were found who had sold to the government marketing agency (CONASUPO) during the first sampling period, a random sample of farmers with recorded sales to the agency was taken. These last two samples were

[1] Ejidos are the Mexican government's land reform unit. Ejidatarios, members of the ejidos, are granted usufruct rights to the land but are not allowed to sell, rent, or mortgage the property. Roughly half of Mexico's cultivated land is in ejidos. Size of the plots varies from region to region, but they are small. In general, ejido farming and marketing functions are performed individually. It has been estimated that about 2 percent of the total number of ejidos are collectives - none were encountered in the study area.

[2] Direccion General de Estadistica, V Censo Agricola-Ganadero y Ejidal 1970, Vera Cruz, (Mexico: Secretaria de Industria y Comercio, 1975) Table 7.

drawn to determine if differences existed in the marketing system that serviced private property owners from that serving ejidatarios, and to investigate whether contact with government programs influenced the relationships with other marketing participants.

Selected Characteristics of the Farmer Sample

Farm Size and Land Use

The average farm size in the 15 ejidos visited during the first harvest period was about 12 hectares per parcel. The range in size was considerable,[1] extending from 2.1 hectares to 21.5 hectares per ejidatario. Land use patterns (Table 1) for the sample area indicated the diversity of agricultural activities in the region and the intensity with which available land was used. For the first harvest, an average of 8.5 hectares per producer were involved in some cropping or livestock enterprise. Agricultural land was used principally for pasture, maize production, and fruit orchards. The average producer planted 2.8 hectares of maize.

For the second harvest, the average size of the[2] ejido parcel increased slightly, to about 13.4 hectares per ejidatario. On an average, ejido farmers employed 9.8 hectares in some cropping or livestock activity, while private property owners used about 22.4 hectares per producer. As in the first sample, pasture land, maize production and fruit trees were the major uses of the agricultural land (Table 1).

The average number of hectares per producer for the entire second sample in maize approached 3.0 hectares. Private property owners on an average planted 3.7 hectares in maize, while the average for ejidos was 2.9. Maize occupied 29.6 percent of the total land used in agriculture for the ejidatarios and about 25.8 percent of the total land in agriculture for the private owners. In general, private property owners employed more land for pasture (Table 1).

Farmers' Maize Storage and Marketing Activities

Storage facilities of the farmers were rather primitive. They included portions of the house, wooden bins raised off the ground or lean-tos where the corn was piled. Most of the maize was stored in the house, on the ear, with husks intact (Table 2).

[1] Direccion General de Estadistica, V Censo Ejidal, 1970.

[2] Ibid.

Table 1. Average Agricultural Land Use of Inteviewed Farmers. Northern Vera Cruz, Mexico. 1975/76

Items	Hectares planted in: Winter 1975[a] harvest — Ejidatarios	Hectares planted in: Spring/Summer[a] harvest — Ejidatarios	Hectares planted in: Spring/Summer[a] harvest — Private property owners
Maize	2.8	2.9	3.7
Annual/biannual[b] crops	0.6	1.1	1.2
Fruit trees[c]	3.1	2.8	6.8
Pasture	2.0	3.0	10.7
Total land used	8.5	9.8	22.4
Number of observations	58[d]	81	14[d]

SOURCE: Producer Interviews.

[a]The Winter 1975 harvest corresponds to plantings in the Spring/Summer 1975 production cycle. The Spring/Summer 1976 harvest corresponds to the Winter 1975 production cycle.

[b]Includes chiles, beans, tobacco, and pipian.

[c]Includes oranges, lemons, tangerines, bananas, mangos, and avocados.

[d]Two surveys from the first harvest and one survey from the second harvest did not have sufficient information to be included.

Table 2. Maize Storage Practices and Estimated Loss of Interviewed Farmers. Northern Vera Cruz, Mexico. Spring/Summer 1976

	Location of stored Maize		Method of storage				
	House	Storage bin	Husk intact	Husk intact with pesticide	Maize shelled in bags	Maize shelled loose	Total
Number of producers	77	17	39	51	3	1	94
Estimated loss of the storage maize (%)[a]			20.8	13.5	28.6	13.3	17.3[b]

SOURCE: Producer Interviews.

[a]Loss was defined to be unfit for human consumption.

[b]Weighted average loss - weighted by the volume stored.

The producers estimated that storage losses of the maize which was kept for domestic consumption or later sale was about 17.3 percent. This figure is slightly lower than the government estimates of producer storage losses (23 percent unfit for human consumption).[1] However, several qualifications of this figure should be kept in mind. First the producers were asked to estimate the amount of stored maize that was lost, i.e., unfit for human consumption. The survey showed that producers found it difficult to differentiate between loss for human consumption and a complete loss to the farm. In several instances, farmers mentioned that there was no loss, that all the maize was used either for human consumption or animal feed. That is, damaged maize was fed to animals in order to minimize the total loss to the household. Consequently, this figure should be viewed as an approximation of the actual loss.

[1]Ana Estela Lozana Hube, "Estimacion de los Danos Causados por Parasitos en el Maiz Guardardo en Bodegas Particulares: Estudio en Cinco Estados," Boletin ANDSA, Vol. 4, No. 44 (Dec. 1974): 5-6.

The average quantity of maize harvested by farmers during the two harvests was about 4.4 tons per cycle. Approximately 3 tons per cycle were sold, either immediately or after storage.

November and December were the peak sales months for the winter harvest both in terms of the quantity sold and the number of sales (Table 3). In the Spring/Summer harvest, the peak months were June and July (Table 4).

The average price received by farmers in the two periods were 1,832 pesos/ton on the first harvest, and 1,836 pesos/ton in the second. However, there existed a large degree of variability in producer prices both within and between the months in the two harvests. In general, after the principal harvest months, prices increased sharply.

Producers' Marketing Experiences and Perceptions

In an attempt to understand the environment within which economic transactions occur, the farmers in the study group were asked a series of questions about their marketing experiences, alternative markets, established patterns of trading, sources of price information, temporal selling patterns, and several hypothetical market situations.

Table 5 presents marketing characteristics of the farmers by classification and volume of production.[1] It should be recognized that the producer groups were not completely homogeneous. Variability occurred within the groups in number of hectares cropped to maize, marketings, and in total production. Nevertheless, average consumption as a percent of production declines rather uniformly with higher levels of production for the three classifications of farmers.

Farmers' responses to a series of questions concerning marketing experiences suggested that the larger producers were likely to have the best access to accurate price information; and most likely to have participated in government marketing programs, perceived a large number of alternative buyers for their commodity and appeared to be able to delay maize sales past the harvest period. In terms of marketed surplus, the large producer seems willing to increase marketings in response to changes in the quantity produced. Only the most commercial producers, or those with high levels of outside income, indicated that they would increase their sales of maize, which had been stored for domestic consumption, in response to a change in the post-harvest price.

[1] The classifications (ejidatarios, ejidatarios with sales to CONASUPO and private property owners) represent the samples selected during the second harvest. Although the limited number of observations in the latter two samples, the lack of homogeneity within the groups, and the fact that they were serviced by the same marketing system, imply that the categories should not be considered separately, a breakdown is presented to identify definable characteristics.

Table 3. Breakdown by Month of Maize Sales and Average Prices Received by Interviewed Farmers. Northern Vera Cruz, Mexico. Winter 1975.

Month	Total maize sold (kg)	Number of sales recorded	Average volume of sales (kg)	Average price (pesos/ton)	Standard deviation (pesos/ton)
October	15,200	7	2,171 .	1,830	197
November	47,958	23	2,085	1,760	130
December	76,922	41	1,876	1,770	130
January	34,280	12	2,857	1,895	96
February	23,300	9	2,589	2,020	140
March	8,500	5	1,700	1,980	40
April	5,200	4	1,300	2,030	130
Total	211,360	101	2,093	1,832	

SOURCE: Producer Interviews.

[a]Average prices are for shelled maize and include CONASUPO sales delivery prices. The exclusion of the CONASUPO observations reduces the average prices in November and December to 1,720 pesos per ton and 1,740 peso per ton, respectively. The standard deviations do not change appreciably, from 130 to 140 for November and from 130 to 150 for December.

Table 4. Breakdown by Month of Maize Sales and Average Prices Received by Interviewed Farmers Northern Vera Cruz, Mexico. Spring/Summer 1976 Harvest.

Month	Total maize sold[a] (kg)	Total volume sold[b] (kg)	Number of sales recorded	Average volume of sales[a] (kg)	Average price (pesos/ton)	Standard deviation (pesos/ton)
April	3,000	3,000	4	750	1,825	50
May	50,850	49,850	14	3,632	1,678	285
June	98,225	97,042	37	2,655	1,801	142
July	90,935	89,717	41	2,218	1,802	164
August	45,645	45,645	22	2,075	1,943	73
September	21,175	21,175	8	2,647	1,983	125
October	6,100	6,100	5	1,220	2,108	94
Total	315,930	322,529	131	2,412	1,836	—

SOURCE: Producer Interviews.

[a] Weight of shelled corn and ear-corn combined,

[b] weight of shelled corn only.

[c] Average prices include observations on all forms of sales, that is, shelled and ear-corn.

Table 5. Selected Characteristics of Interviewed Farmers. Northern Vera Cruz, Mexico. Spring/Summer 1976.

	Maize production (kg)	Number of obser-vat ions	Average ha in maize	Average product ion of maize (tons)	Average marketed surplus of maize (tons)	Average consumption as a % of product ion
Ejidatarios with sales to CONASUPO	2,000 & under	3	2.33 (0.58)[a]	1.03 (0.57)	0.17 (0.29)	83.8
	2,001- 3,500	2	2.25 (1.06)	3.00 -	1.25 (1.10)	58.3
	3,501- 6,500	3	3.00 (1.70)	4.56 (0.51)	3.23 (0.60)	29.1
	6,501-13,000	5	4.80 (3.30)	8.86 (1.72)	7.56 (1.00)	14.7
	13,001 & over	1	8.00	16.00	13.00	18.8
Private property owners	2,000 & under	3	1.31 (0.60)	1.12 (0.80)	0.33 (0.58)	69.7
	2,001- 3,500	6	2.40 (1.40)	2.80 (0.30)	1.66 (0.37)	40.7
	3,501- 6,500	2	4.50 (2.10)	5.81 (0.35)	4.50 (1.30)	22.6
	6,501-13,000	3	3.33 (1.50)	9.67 (2.08)	7.83 (0.76)	19.0
	13,001 & over					
Ejidatarios	2,000 & under	31	1.68 (1.21)	1.08 (0.58)	0.2S (0.45)	74.6
	2,001- 3,500	9	2.50 (0.61)	2.85 (0.46)	1.73 (0.60)	39.3
	3,501- 6,500	13	3.31 (2.01)	4.62 (0.70)	3.40 (0.95)	27.1
	6,501-13,000	11	4.21 (1.10)	9.52 (1.60)	7.61 (1.80)	20.0
	13,001 & over	2	7.50 (3.50)	20.71 (7.40)	20.01 (8.48)	3.6

SOURCE: Producer interview.

[a] Numbers in parentheses are standard deviations.

Responses by the subdivisions of ejidatarios, private property owners and ejidatarios with recent sales to CONASUPO did not reveal many sharp differences among the groups. However, several general tendencies appeared.

Ejidatarios with sales to CONASUPO, in general, checked more sources of price information and were more willing to increase their marketings in response to changes in price than the other two groups. Both private property owners and those ejidatarios who most recently sold maize to CONASUPO perceived a large number of local buyers, were able or willing to delay sales past the harvest period, and appeared slightly inclined to increase their marketings in response to changes in quantity produced. These farmers also possessed more access to transportation and had experienced more extensive contact with various participants of the marketing system than ejidatarios.

While ejidatarios were likely to have established selling patterns with specific local buyers and less likely to have checked alternative sources of price information than the other two groups, the interviews indicated that, regardless of the size of operation, there is a high level of intragroup discussion concerning market prices prior to sale.

THE RURAL MARKETING SYSTEM FOR MAIZE

Assembler Sample

The assemblers in the area were identified through the first set of interviews with the producers and through subsequent conversations with buyers concerning their competitors in the region. An effort was made to interview as many of the local buyers as could be identified. Information was gathered concerning resources used in performing marketing functions, marketing practices, outlets for their products, prices paid at various outlets, credit arrangements, costs of operations, and the impact of CONASUPO on their operations. During the time allocated to this portion of the study it was possible to interview 22 local assemblers. Subsequent information from CONASUPO indicated that this sample[1] reflected about 65 percent of the area total of 33 local buyers.

[1] This information was obtained from CONASUPO's local purchasing records. Additional interviews were carried out to ascertain the relationship between local buyers, mill operators, and itinerant truckers. Twelve mill operators, four in the small rural population centers and eight in Poza Rica were visited. Eight itinerant truckers were interviewed during the second harvest period in order to identify the maize purchase prices they paid local assemblers and producers.

The Marketing System

The municipios under study were serviced by a relatively large number of heterogeneous assemblers, performing a variety of marketing functions. The purchase of the 22 assemblers interviewed accounted for roughly 30 percent of the estimated local maize marketings in the Spring/Summer harvest (Table 6). Due to the possibility that production was declining, local assemblers probably were purchasing a larger proportion than is shown in the table.[1]

Table 6. Maize Purchases of Local Buyers Interviewed. Northern Vera Cruz, Mexico. Spring/Summer 1976 Harvest

Municipio	Estimated production of maize[a]	Estimated marketings[b]	Purchases reported by local buyers	Percent reported purchased by interviewed buyers of estimated marketings
	——(tons)——			
Teayo	1,860	1,291	391	30.3
Temapache	10,200	7,079	1,714	24.2
Tihuatlan	8,590	5,961	2,162	36.3
Total	20,650	14,331	4,267	29.8

SOURCE: Interviews with buyers.

[a] Direccion General de Estadistica, V Censo Ejidal 1970, Table 7. Comparison of 1970 production data with 1975 reported purchases must be viewed with caution. Production patterns and trends may change appreciably over a five or six year period. The comparison is made to provide an indication of the importance of marketing participants. 1970 Census data were used as it is the author's belief that this official source most closely reflects current maize production.

[b] Estimated marketings are calculated assuming that 69.4 percent of production is sold. This figure was derived from the sample of farmers.

[1] The number of buyers interviewed represented about 65 percent of the buyers in the area. All local buyers thus purchased about 46 percent of the estimated marketings in the Spring/Summer 1976 harvest. Farmer surveys indicated that about 32 percent of the maize sold during this harvest went to outside buyers. The allocation of the remainder of estimated marketings (100 - 78 = 22 percent) is unclear. In part, perhaps it may be explained by the decline in maize production reported by producer and assemblers throughout the region.

The majority of the local assemblers are located in the rural population centers of Castillo de Teayo, Alamo, and Tihuatlan, the principal cities of the municipalities of Teayo, Temapache, and Tihuatlan. Assembler activities are not limited to maize - it is common for the local buyer to handle beans and occasionally oranges.

The principal center of consumption in the region is the city of Poza Rica which borders on the study area.[1] The 120,000 inhabitants are serviced by approximately 95 relatively small local maize mills; these mills, in turn, provide a strong demand for local maize. Several mill owners estimated the average consumption in the city of Poza Rica to be about 60 tons per day. Many of the local buyers deliver maize on a regular basis to the Poza Rica mills. The Poza Rica market is linked to the rural population centers - Castillo de Teayo, Alamo, and Tihuatlan - by a paved two-lane extension of the national highway system.

The local rural road system, constructed and serviced by Pemex (the government owned oil company), is extensive and relatively well maintained. Almost all ejidos and villages are linked either to Poza Rica or to rural population centers by dirt or gravel roads that are passable except during periods of heavy rainfall. In most instances, trucks with capacities of up to 10 metric tons are able to reach the local villages.

CONASUPO maintains four warehouses in the study area. As mentioned previously, these outlets are designed to implement government support prices, purchase sufficient maize for the urban demand, and regulate the marketing system. BORUCONSA manages three warehouses, one in each of the rural population centers in the area, with a combined capacity of 4,500 metric tons. These operations attempt to provide purchasing points and marketing services for the small farmer. ANDSA operates the largest and most modern installation in the region. Its capacity approaches 3,500 metric tons and it is equipped with drying equipment and truck scales. Its objective is to meet the needs of the local assemblers and millers.

Both the nature of the marketing system and the flow of the product varies between the two harvests. The Winter harvest, which corresponds to the principal harvest period for the country, is the smaller of the two local harvests. The major buying force during the peak harvest months of November and December is CONASUPO. Local purchases in the Winter 1975 harvest were about 2,400 metric tons, with ANDSA accumulating 66 percent of CONASUPO's total purchases (Table 7).

The marketing flow during the Winter harvest is relatively simple and direct. Local assemblers act as intermediaries, buying and transporting maize to the local government warehouses. The proportion of maize purchased directly from producers is large. Maize purchased by CONASUPO is used to meet local needs in future periods as well as demands in other

[1] The city of Poza Rica is classified as a municipio. It consists essentially of an urban center and housing area. Agricultural production in the municipio is small.

regions. According to local buyers and producers, the Winter harvest was marked by fewer outside buyers and fewer shipments by local buyers to other consuming areas then the Spring/Summer harvest.

Table 7. Estimated Maize Marketings and CONASUPO Purchases Northern Vera Cruz, Mexico. Winter 1975 Harvest.

Municipio	Estimated production of maize (tons)[a]	Estimated[b] marketings (tons)	CONASUPO purchases: Affiliation	CONASUPO purchases: Purchases[c] (tons)	Percent of estimated marketings purchased by CONASUPO
Teayo	1,678	1,165	BORUCONSA	97	8.3
Temapache	8,938	6,203	BORUCONSA	502	8.1
Tihuatlan	8,148	5,655	BORUCONSA	193	3.4
			ANDSA	1,567	27.7
Total	18,764	13,023		2,359	18.1

SOURCE: Prepared for this study.

[a] Direccion General de Estadistica, V Censo Ejidal 1970, Table 7. The limitations of comparing 1970 production data with 1975 purchases already have been diseussed. See Table 6 footnote a.

[b] Estimated marketings are calculated assuming that 69.4 percent of production is sold. This figure was derived from the farm sample.

[c] Source was local CONASUPO purchasing records.

During the Spring/Summer harvest, the major competitors were the outside truckers. Inasmuch as wholesale prices paid to local assemblers by outside truckers exceeded the government support prices during this harvest, neither ANDSA nor BORUCONSA reported purchases. Outside buyers purchased directly from local assemblers at staging points, or occasionally from producers. These maize purchases moved to other consuming areas in the country. Shipments by the larger local assemblers to other regions were common. Local assemblers also sold maize to the mills in Poza Rica.

Several points may clarify the nature of this marketing system. First, due to the extensive rural road system, almost all producer transactions occur at the farm gate. On rare occasions', during periods of heavy precipitation, producers had to transport their marketable surplus to main rural roads. Second, there was virtually no local storage by assemblers or even by mill owners. Local assemblers based their operations on the rapid purchase and resale of maize, and they indicated that storing

grain was risky due to the high humidity, insect damage, lack of private drying facilities, and the uncertain market actions of CONASUPO. On the other hand, as was previously mentioned, it was common for a farmer to store small amounts of maize either for domestic consumption or for later sale. Third, the principal type of maize grown in the area was a white variety, highly valued on the local market and throughout Mexico. The local mill owners often were willing to pay premiums for white maize, rather than using the imported yellow maize frequently sold by CONASUPO. Finally, local assemblers maintained close contact with producers in the area, at least during the harvest periods. While some assemblers had predetermined routes, most farmers advised local assemblers about the location, volume, and date of sale of their maize, during the process of investigating price alternatives in the local rural population centers.

Description of the Interviewed Assemblers

Since the majority of the maize was produced on small farms, an "assembler" performed the functions of buying small lots of the commodity, assembling them for sale at staging points, or collecting for direct shipment to outside mills or warehouses. In carrying out these functions, assemblers assumed the risk of ownership and added to the value of the commodities by creating place utility. They contributed to form utility by grading and processing the commodity.[1] In addition, within the study area, assemblers were somewhat involved in providing credit to local producers.

The buyers encountered were relatively heterogeneous in terras of the size of their operations and the marketing functions they performed. They are classified, for the purposes of this study, into the two subgroups of assemblers and assembler/shippers. Those buyers who sold at least 60 percent of their maize at local warehouses or staging points are defined as assemblers. Their sales were to itinerant truckers who exported the maize to other regions of the country. The buyers who distributed more than 40 percent of the maize they purchased to the mills in Poza Rica, or to the warehouses and mills outside of Poza Rica, are called assembler/shippers. The sample included 22 buyers, 12 assemblers and 10 assembler/shippers.

The assembler/shippers who transported maize outside of the region generally were buyers with fairly large operations (180 metric tons in the Spring/Summer harvest). They used 3-ton trucks to help in the collection process and 10-ton trucks to deliver the maize. Their operations were located in the municipio of Temapache, the study market area farthest from Poza Rica. The assembler/shippers who shipped primarily to the Poza Rica market were located close to it. These buyers used 3-ton trucks and their

[1] Place and form utility refer to the value added to the commodity associated with the intermediary transportation and processing operations. Weldon J. Taylor and Ray T. Shaw, Jr., Marketing, An Integrated Analytical Approach, (Cincinati: South-Western Publishing Company, 1969), p. 281.

operations amounted to between 150 and 200 tons during the Spring/Summer harvest (Table 8).

Assemblers generally operated near their warehouses. They used one, or in some cases two, 3-ton trucks for transporting maize. Their operations were most commonly encountered in Teayo and Tihuatlan. Although the size of their businesses varied considerably, the average size during the Spring/Summer harvest was 210 tons (Table 9).

The buyers tend to purchase the bulk of the maize they handle directly from producers even though they provide different marketing services. A large proportion (73 percent) of the buyers indicated that they loaned an average of 1,400 pesos to producers, with the average loan period of 3.5 to 4 months. While no formal interest rates were charged, a number of buyers indicated that they lowered purchase prices to farmers who received loans from them, resulting in an implicit interest on the capital.

Most of the buyers in the area maintain contact with the mills and warehouses outside of the region, as well as with the mills in Poza Rica. The larger buyers, especially the assembler/shippers, reported that they maintain contact on a regular basis with outlets in Mexico City, Tampico, and Vera Cruz. Smaller volume assemblers obtain their price information from outside truckers, conversations with each other, and during the Winter harvest, from CONASUPO.

Since the majority of the buyers sold to CONASUPO in the Winter harvest, they attempted to maintain CONASUPO's quality standards. In the Spring/Summer harvest, when maize was not sold to CONASUPO, the principal factor causing a discount in the maize price was moisture content. At higher levels of moisture, especially during the first part of the harvest, buyers reported that discounts were taken because "they did not want to purchase water" and because they would have to dry the maize.

Most of the buyers' businesses are labor intensive. The collection operation usually involves a driver and two or three helpers. Work is highly differentiated-the helpers transfer the maize from the producers' bags to those of the buyer, weigh the grain, load the truck and help push the truck when it becomes stuck on bad roads. The principal job of the driver is to inspect the maize, sew up the bags, and drive.

The principal selling patterns of the market participants serving the study area are presented in Table 10. Throughout the year, the outside truckers and Poza Rica mills served as the principal outlet for the local buyers. However, there were considerable changes in selling patterns between harvests. During the Winter harvest, CONASUPO purchased about 63 percent of all the maize handled by local buyers. Outside truckers and local mills provided the other main outlets for maize during this period. In contrast to this, during the Spring/Summer harvest, the outside truckers were the most important outlet for the local buyers. In this period about 50 percent of the maize was sold directly to mills, either in Poza Rica or outside of the producing/consuming area of the study.

The prices during the second harvest were relatively stable (Table 11). During the peak months of the Summer 1976 harvest, the average price

Table 8. Purchase of Maize and Beans[a] of Assembler/Shippers[b] Interviewed. Northern Vera Cruz, Mexico. 1975/76.

Annual tons of maize purchased per buyer	Number of assembler/ shippers	Total maize purchases (tons)		Total annual purchases			
				Maize		Beans	
		Winter 1975	Spring/ Summer 1976	tons	'000 pesos	tons	'000 pesos
0-150	3	159.9	219.9	379.8	669.9	30.0	135.0
151-400	4	301.0	721.0	1,022.0	1,843.2	66.8	300.0
Over 400	3	519.9	831.9	1,351.8	2,383.2	22.5	101.4
Total sample	10	980.8	1,722.8	2,753.6	4,896.3	119.3	536.4
Average purchases per buyer		98.1	177.3	275.4	489.6	11.9	53.6

SOURCE: Interviews with buyers.

[a] Purchases of maize and beans reported are for the period from October/November 1975 through September 1976.

[b] Assembler/Shippers are defined as those buyers who distributed more than 40 percent of the maize they purchased to the mills of Poza Rica or warehouses and mills outside of the producing region.

Table 9. Purchases of Maize and Beans[a] of Assemblers[b] Interviewed. Northern Vera Cruz, Mexico. 1975/76.

Annual tons of maize purchased per buyer	Number of assemblers	Total maize purchases (tons)		Total annual purchases			
				Maize		Beans	
		Winter 1976	Spring/ Summer 1976	tons	'000 pesos	tons	'000 pesos
0-50	2	35.0	40.0	75.0	134.4		—
51-150	3	109.8	201.0	319.8	566.4	25.0	113.0
151-400	4	355.0	642.0	997.0	1,753.6	80.0	472.4
Over 400	3	853.1	1,602.0	2,455.1	4,173.7	202.5	911.4
Total sample	12	1,352.9	2,494.0	3,846.9	6,628.1	307.5	1,496.8
Average purchases per buyer		112.7	207.8	320.6	552.3	25.6	124.7

SOURCE: Interviews with buyers.

[a] Purchases of maize and beans reported are for the period from October/November 1975 through September 1976.

[b] Assemblers are defined as those buyers who sold at least 60 percent of purchased maize at the warehouse.

Table 10. Reported Sales by Outlets for the Maize Assemblers and Assembler/Shippers Interviewed.[a] Northern Vera Cruz, Mexico. 1975/76.

	Percent of volume sold by buyers to:				
	Outside truckers	CONASUPO	Poza Rica mills	Mills outside the region	Market plazas
Winter 1975 harvest					
Assemblers	19.2	51.9	15.0	13.9	—
Assembler/ Shippers	7.2	64.6	10.4	17.8	—
Total sample	14.2[b]	57.2	13.1	15.5	—
Spring/Summer 1976 harvest					
Assemblers	81.3		9.0	9.7	—
Assembler/ Shippers	12.5		21.7	63.2	2.6
Total sample	52.7[b]		14.3	31.9	1.1
Winter 1975 and Spring/Summer 1976 harvests					
Assemblers	59.5[b]	18.3	11.1	11.1	—
Assembler/ Shippers	10.6[b]	23.0	17.7	47.0	1.7
Total sample	39.2	20.2	13.8	26.1	0.7

Source: Interviews with buyers.

[a] See Tables 8 and 9 for distributions of Assemblers and Assembler/Shippers.

[b] When a combined figure is presented it is a weighted average.

received by assemblers and assembler/shippers varied between 1,980 pesos/ton for maize sold to outside buyers and about 2,020 pesos/ton for delivery to the mills. Resale prices increased slightly following the peak harvest months of June and July. This increase was evident in prices paid both by outside truckers and by the mills in Poza Rica to the local buyers.

Table 11. Average Maize Prices Received by Local Buyers. Spring/Summer 1976 Harvest.[a] Northern Vera Cruz, Mexico

Kind of buyer	Outlet	May	June	July	August	September
			(pesos per ton)			
Assembler[b]	Outside trucker	1,980 (8)[c]	1,980 (11)	1,990 (12)	2,050 (12)	2,150 (2)
Assembler	Poza Rica mills	2,040 (2)	2,010 (4)	2,040, (4)	2,100 (4)	2,210 (2)
Assembler/ Shipper[b]	Outside trucker	1,970 (5)	1,960 (6)	1,970 (6)	2,070 (6)	2,170 (1)
Assembler/ Shipper	Poza Rica mills	1,980 (6)	2,000 (6)	2,050 (6)	2,090 (6) .	2,270 (2)

SOURCE: Interviews with buyers.

[a] Weighted average prices.

[b] See Tables 8 and 9 for definitions of Assemblers and Assembler/ Shippers.

[c] Numbers in parentheses indicate the number of observations in that month reporting a sales price associated with the outlet. The number of sales prices reported in any one month may exceed the number of buyers within a category as buyers may sell to more than one outlet type.

The interviews with local buyers emphasized the complex nature of the factors that influence the rural marketing system for maize in this section of Northern Vera Cruz. Buyers indicated that producer prices are influenced by a myriad of factors. These include distance from the market, timing of the sale, services provided by the buyer (both in terms of credit and in terms of the level of processing the buyer provides), and grain quality, including moisture content. Evaluating the effectiveness of the marketing system necessitates an understanding of the impact these factors have on producer price, and a knowledge of the magnitude of marketing margins and the costs of the services that buyers provide. Subsequent sections develop a theoretical base for understanding the nature of the factors that influence producer price, investigate the systematic nature of pricing behavior, and examine the magnitude of marketing margins.

MARKET EFFECTIVENSS OF THE RURAL MAIZE MARKETING SYSTEM

The analysis of the effectiveness of the rural marketing system for maize considers several factors. Market performance is assessed by examining the systematic nature of prices generated within the marketing system, by analyzing marketing margins and by integrating these results with an assessment of market structure and conduct.

The principal criteria for examining the effectivenss of the rural marketing system involves a comparison of the actual market with a perfectly competitive market situation. A perfectly competitive market situation, implying an efficient pricing system, is recognizable by a consistency of variations in price with differentials in marketing costs and an absence of monopsonistic profits.

Several additional performance considerations and questions are discussed in less detail in the evaluative section on the marketing system for maize. These include: the ability of the marketing system to transfer price information effectively to the producer; the nature of market risks for the producers and the marketing firms; the minimization of unnecessary cross-hauling; the optimal market organization for reducing marketing costs, the quality of maize in the marketing channels, and the diffusion of marketing technology into the system.

Theoretical Model for Examining the Variation in Producer Prices

It is hypothesized that producer prices are related to two sets of factors: those related to the competitive model, and those related to structure and conduct variables. Both sets are being considered in an effort to isolate the variables associated with deviations from the competitive norm, if they do in fact exist. The traditional structure and conduct variables (e.g. number of buyers) are expanded in this analysis to include those factors which may reflect the special circumstances of the small farmer influencing his market position (e.g. limited resources, inadequate information) as well as those which relate to the interface between buyers and sellers (e.g. habit and trust resulting from established selling patterns).

The Perfectly Competitive Framework

The perfectly competitive model holds that prices should vary over time consistently with storage costs, over space consistently with transportation costs, and between forms consistently with processing costs or quality differences. The usual price pattern for a seasonal crop is for the price to rise through the year as a function of the cost of storing the

[1] Pricing efficiency studies can provide a "diagnostic tool" for encountering problem areas in the marketing system (Bressler and King, Markets, Prices and Interregional Trade, pp. 413-16).

commodity. Prices farmers receive for the sale of their commodities should be positively related to the passage of time, and should cover, on an average, the costs associated with storage.

Provided that competitive conditions prevail, spatial price relationships are determined largely by transfer costs between regions. Prices in small local markets should reflect the central market price, less the cost of transferring a unit of the commodity to the central market. Within a particular market area, variations in net farm prices should be consistent with the lowest costs of assembly or the cost of direct transportation to the local market. Assembly cost functions have been specified in considerable detail. The total variable costs associated with assembly are a function of distance, wages of the driver, operating cost per mile, number of stops and volume per stop, and the total volume of the trip. Assuming that within a particular environment, where the wages of the drivers, the type of truck (implying the operating cost per mile), and the total volume of the trips are similar, the collection costs become a function of the distance, the volume per stop, and the number of stops.

Collection costs will increase over a short distance at a rate which is more or less constant. Increasing volume, per stop and decreasing number of stops may result in lower assembly costs and may lead to a higher per unit farm price. Assembly costs may tend to increase in areas of low production density, reflecting an increased number of stops and additional search costs of a buyer to acquire the desired volume. In areas of high production density, certain costs such as gathering information and transportation on a per unit basis are reduced.

The preceding framework suggests that the prices farmers receive would be inversely related to the distance of the local market from the central market, inversely related to the round-trip distance from the farm site to the local market or warehouse, directly related to the volume of sales, and directly related to the density of production of a given area. While search theory suggests that production density may be positively related to price, the impact of production density is unclear. It can be hypothesized that production density is a proxy for local supply conditions. High local supply relative to outside demand may mean low prices in contrast to the high prices predicted by the above framework. The impact of production density is ambiguous and an empirical question.

The impact of the form of product on the prices that the producers receive has several dimensions. In a competitive atmosphere, the value of maize at each stage should approximate the farm equilibrium price for ear-corn, plus the cost of transformation or processing. In addition, maize prices should vary inversely with the levels of moisture content, impurities, and breakage, and directly with the level of processing performed by the producer.

Market Structure and Conduct, and the Interface with the Small Farmer

The degree of competition is an extremely important factor in determining price. A small number of buyers acting together can lead to an

appropriation of monopsonistic surplus. Acting in concert they can lower levels of producer prices and lower volumes of sales relative competitive situation.

Many of the dimensions of market conduct have been developed to consider the behavior of entire marketing systems in an industrial atmosphere, and focus on the level of advertising and promotional expenses. These factors are not directly applicable to the present commodity market situation where such expenses do not exist. Here, only two dimensions of market conduct are considered: credit, and those interactions that tend to stabilize market relationships and reduce the significance of price competition.

Credit extended by the buyers can be closely tied to the price that the producer receives. This often occurs in the case of the small farmer who lacks the resources needed for production or for family living. When a grain buyer extends credit to the farmer, and ties the credit to buying the harvest, the buyer is in a position to offer lower prices; these lower prices mask the effective interest rates charged to cover the costs of the loan (i.e., the interest, risk premium, and surveillance costs). It has been asserted that credit discounts, resulting from reduced producer prices, may exceed the market interest rate. These credit arrangements[1] afford the opportunity for the extraction of economic surplus.

Competitive pricing between buyers and sellers may be partially isolated from the market forces by relationships of trust, services provided over a long period of time, or by goodwill established between buyers and sellers. Buyers may benefit from securing regular sources of supply, reducing the danger of destructive price competition. Sellers must trust the weighing and grading practices of buyers. Trust may evolve over a long period of time out of a continuing relationship in which each party perceives mutual self-interest. Similarly, occasional free services provided by the buyer to the farmer may result in less price competition.

Finally, there may be a set of circumstances that limit the small farmers market position. Often the small farmer has a limited amount of total resources (capital stock, and cash flow). This scarcity may lead to the foregoing of potential markets in a temporal and spatial sense. In addition, the lack of resources may weaken the farmer's bargaining position <u>vis a vis</u> buyers, resulting in the producer selling quickly or in time of need at reduced prices.

The small farmer may have some difficulty in obtaining market information, and what he is able to get may not always be reliable. Improved information could provide some insight into the alternative prices and could strengthen the producer's bargaining position vis a vis the buyers.

Similarly, the small farmer may have limited experience with local buyers and with government warehouses resulting in a low level of awareness

Empirical Model

buyers and with government warehouses resulting in a low level of awareness of the marketing system. This may impede him from developing a stock of market knowledge which would permit him to most favorably analyze alternative sales opportunities for his commodity.

The systematic nature of the producer prices generated by the local maize marketing system during the two harvest periods under investigation is examined by a series of reduced form price dependent equations.

With slight variations, the following model is used:

$$PR_i = \beta_o + \beta_1 VOL_{i1} + \beta_2 PD_{i2} + \beta_3 DIST_{i3} + \beta_4 MKTA_{i4} + \beta_5 TIME_{i5} + \beta_6 FORM_{i6} + \beta_7 MOIST_{i7} + \beta_8 INFO_{i8} + \beta_9 NBUYERS_{i9} + \beta_{10} ESP_{i10} + \beta_{11} MKTEX_{i11} + \beta_{12} BCR_{i12} + \beta_{13} TOTRS_{i13} + \beta_{14} GSALE_{i14} + e_i$$

Where: i refers to the i^{th} sales transactions;

PR is the sale price in pesos per ton reported by the producer;

VOL is the volume of the sale in Kg/transaction;

PD is the production density of maize in the ejido or village where the sale occurred (tons of maize per ejido). This figure was calculated using the sample of producers in the locale as representative of the average maize producer. Then, the average production figures were multiplied by the reported number of producers planting maize. Transactions of the private property owners were assigned the production density of the nearest ejido visited;

DIST is the round-trip distance in kilometers from the nearest buyer's warehouse. Two interaction terms also are included. A distance-harvest period interaction term is included to reflect that during the peak harvest period, increased demand for relatively inelastic marketing services may mean higher opportunity costs for the buyer and lower prices for the farmer. A second interaction terra is included to reflect the distance-farm relationship to transporting ear-corn (a bulky commodity with low value per unit of volume relative to shelled and bagged maize);

[1] Harrison and Shwedel, Marketing Problems with Small Farm Agriculture, p. 2-4.

[2] Grindie, Bureaucrats in Mexico, pp. 82-90.

MKTA is a set of dummy variables used to identify the market areas around the principal population centers in the region - Temapache, Tihuatlan, Teayo and Poza Rica;

TIME is a series of dummy variables representing the month of sale. In the first harvest, the months of October through March are associated with zero - one variables with the month of April as the base. In the second harvest, the months of April through September are represented by zero - one variables with the month of October 1976 as the base;

INFO is an index of correct answers to a series of questions concerning the marketing system. The index is a sum. One point was assigned for correct specification of the location of the nearest government warehouse, knowledge of the guaranteed price, knowledge of the government marketing program designed to assist the small farmer (PACE), and knowledge of the guaranteed price for the upcoming harvest (Winter 1976). An additional point was given for each source of price information checked prior to sale;[1]

FORM is a series of dummy variables reflecting the different processing levels encountered in the study area related to the sale of maize. FORM 3, the sale of ear-corn and FORM 2, the sale of maize where the buyer has shelled the maize, are represented by zero - one variables with FORM 1, the sale of shelled maize, as the base;

[1] In essence, the index assumed a linear relationship between the knowledge of particular aspects of the marketing system, the sources of price information and the ability of a producer to adequately appraise his marketing alternatives.

This procedure is denoted as a summated rating scale. It assumes that the set of answers are of approximately equal value. The purpose of the scale is to place an individual on a continuum of the point in question, F. N. Kerlinger, Foundations of Behavioral Research 2nd ed., (New York: Holt, Rinehart and Winston, Inc., 1973), p. 496.

In a regression framework, the coefficient measures the average effect of a one unit change in the index on price. It assumes that a one unit increase in the information index results in the same effect on price regardless of the level of information index, Searle, Linear Models, pp. 135-37.

An alternative approach, using dummy variables to reflect different levels of information, allows for differential effects on price of additional information. This approach was not used because of the already large number of explanatory variables in the equations and the potential increase of six additional variables for the information dummy set (four correct answers and three sources of price information). While it is difficult to isolate the impact of a particular independent variable on a scatter diagram, examination of scatter diagrams of the level of the information index and producer price within each month for different forms of the commodity did not suggest any systematic relationship.

MOIST is a set of dummy variables associated with different levels of moisture content in the sale of maize. MOIST 4, approximately 20.5 percent moisture content, MOIST 3, 17 percent moisture content level and MOIST 2, 15.5 percent moisture content are represented by zero - one variables. The base[1] is MOIST 1, with a moisture content of 14 percent;

NBUYERS is a set of dummy variables reflecting the producer's perceptions of the number of buyers for his maize. One through 4 buyers, NBUYERS 1, and 5 through 10 buyers, NBUYERS 2, are represented by zero - one variables.[2] NBUYERS 3, greater than 10 buyers, is the base;

ESP is a zero - one variable used to examine the effect of established selling patterns to local buyers on price, where an established selling pattern is defined to exist if the producer sells 50 percent of his sales to the same buyer on a regular basis.

MKTEX is a zero - one variable used to assess the impact of market experience on price, where market experience is defined as an affirmative answer to the question. "Have you ever sold your beans or maize to CONASUPO?"

[1] In order to isolate the impact of moisture on the level of prices received, producers in the second interview were asked to identify, as best they could remember, the level of moisture of the maize sold in the second harvest. Farmers were presented with two samples of maize: one with 14 percent moisture content and the other with 17 percent moisture content. They were asked to indicate whether their maize, at the time of sale, was similar to either of the two samples, contained a moisture content in between the two, or was more than either sample.

Estimates of the moisture content were not obtained in the survey for the first harvest because a procedure had not yet been established for evaluating the moisture content.

[2] The number of buyers perceived by the producer was used as opposed to the actual number of local buyers in the respective market areas to reflect more clearly the effect of the total number of buyers (local and outside truckers) on price.

The use of categories for ranking the number of buyers has several limitations. It is realized that in certain instances two, three, or four buyers could reflect sufficient market alternatives to assure a competitive price. However, initial questioning of several farmers suggested that an open-ended question about the number of buyers was too difficult to answer. Rankings were established to elicit at least some perception of the farmer's alternatives. These limitations were evident, but it was felt that some information on this point was better than none.

BCR is a zero - one variable entered to account for the effect of credit received by producers from local buyers who purchase their maize;

TOTRS is the gross value of farm production outside of maize in pesos;

GSALE is a zero – one variable associated with the delivery of maize to the government warehouse;

and e is the error term associated with each transaction.

The statistical technique used to establish the relationship between producer price and the hypothesized variables is analysis of covariance (ANCOV). ANCOV is an extension of the ordinary least squares technique of multiple regression that combines analysis of variance and regression. By incorporating zero – one dummy variables into the regression framework, ANCOV provides simultaneous estimates of the effect of qualitative and quantitative variables on the dependent variable.

The Determinants of Producer Price

Analysis of covariance was used on the farm survey data to examine the variation in producer price. The results for each harvest period are presented in two equations. The first equation incorporates the variables most directly associated with the framework of the competitive model, i.e., using the temporal, form, and spatial variables. The second equation includes those variables which relate to market structure and conduct as well as those that may reflect the circumstances of the small farmer which may influence his market position.

The variables included in the equations for the two harvests differ slightly. In the first harvest, an estimate of the moisture content of the maize sold was not obtained and consequently could not be included in the analysis. Information on the form of sale also was not included for the first harvest because all but one individual sold shelled maize. The marketing experience variable – sale to CONASUPO – was not incorporated inasmuch as several of the producers delivered their maize to CONASUPO during the first harvest.[1] Similarly, no information on credit was included as no producers reported having received credit from local buyers for their summer plantings.

The estimates and supporting statistics indicate that the independent variables explain a large degree of variation in the level of producer prices (Tables 12 - 13). The adjusted R^2, a measure of the degree of explained variation given a large number of explanatory variables in an

[1] Inclusion of the market experience variable would have caused a high degree of collinearity between the variable and the dummy variable for sales to CONASUPO, which reflect delivery to a different market outlet.

equation, ranged from .57 for the first harvest, with all explanatory variables included, to .83 for the second harvest. The higher degree of explanatory power encountered in the second harvest was consistent with the more systematic nature of the data for the second harvest period. During the second harvest, a greater number of variables were recorded, e.g., differences in the form of sale, levels of moisture content, and credit arrangements between buyers and sellers, which improved the explanatory ability of the estimating equations.

Inclusion of the variables characterizing the market structure and conduct, and the farmers' levels of information, income and market experience, increase the degree of explanatory power of the model (measured in terms of adjusted R^2), in the second harvest. In several instances, the inclusion of these variables' for the first harvest resulted in changes in the signs and magnitudes of the estimated coefficients.

An inspection of the coefficients' t-values indicates that the largest degree of explained variation is associated with the temporal, spatial, and form variables. the importance of these variables is slightly masked by the inclusion of the Distance-Form 3 interaction. Without this interaction the t-value of Form 3 approaches 13.

In general, smaller t-values are associated with the market structure and conduct variables. For an example, notice the values of the information index and the measure of market experience in the second harvest. However, the number of buyers perceived in the immediate area by the producer does become statistically important in the second harvest.

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[1] An F test was performed for each of the two harvests to examine the hypothesis that the coefficients of the market conduct and structure variables were equal to zero. The F statistic is:

$$F_{(K-h,\ T-K-1)} = \frac{R_M^2 - R_H^2}{1 - R_M^2} \left(\frac{T-K-1}{K-h}\right)$$

where: M = the complete model (or combined model in this case)
H = the restricted model (or competitive model in this case)
K = number of independent variables in complete model
h = the number of independent variables in the restricted model
T = the number of observations
R^2 = unadjusted coefficient of determination

$$H_0 : \beta_{H+1} = \beta_{H+2} = \ldots \beta_K = 0; \quad H_A : \beta_{H+1} \neq \beta_{H+2} \neq \ldots \beta_K \neq 0 .$$

At the 5 percent level, we failed to reject the null hypothesis in the first harvest but rejected the null hypothesis in the second harvest.

	F Statistic	Critical Value
First Harvest	0.52	2.33 (5,80 d.f.)
Second Harvest	5.05	2.18 (7,103 d.f.)

Table 12. Analysis of Farm Price.[a] Northern Vera Cruz, Mexico. Winter 1975.

Independent variable	Competitive Model[b] Regression coefficient	t-values	Combined Model[c] Regression coefficient	t-values
Constant	2,081.32		2,079.38	
Time				
October 1[d]	10.10	0.13	0.75	0.01
October 2	- 339.71	-4.81	- 350.20	-4.67
November	- 273.73	-3.75	- 249.12	-3.23
December	- 239.06	-3.33	- 217.39	-2.90
January	- 139.47	-2.38	- 140.94	-2.32
February	- 35.52	-0.57	- 36.93	-0.58
March	- 46.34	-0.69	- 37.94	-0.55
April	—	—	—	—
Market Area				
Temapache	- 17.20	-0.48	- 17.16	-0.43
Tihuatlan	- 0.79	-0.02	7.86	-0.16
Teayo	97.32	1.73	95.81	1.37
Poza Rica	—	—		
Volume (kg)	0.00052	-0.10	0.0048	-0.80
Production density (tons)	0.018	-0.33	0.024	-0.40
Distance (km)	3.55	-2.10	3.71	-2.10
Distance-nonharvest interaction[e]	1.80	0.87	2.50	1.16
Market conduct and structure variables				
Information index			4.96	0.62
Established selling patterns (1,0)			- 22.87	-0.85
Outside income (pesos)			0.00031	0.62
Number of buyers[f]:				
Buyer 1			- 33.80	-0.86
Buyer 2			- 14.75	-0.42
Buyer 3			--	
CONASUPO sale (1,0)	27.80	0.54	- 19.96	-0.31
R^2	0.59		0.58	
Fg	10.67		7.89	
Number of observations	101.00		101.00	

Source: Prepared for this study from information taken from producer interviews.

[a] Producer price is in pesos per ton (mean value = 1,832, standard deviation = 172).

[b] Corapetitive model refers to the factors associated with the perfectly competitive framework (temporal, spatial, and form variables).

[c] Corabined model refers to the factors associated with the competitive model and market conduct and structure variables. Market conduct and structure variables also include those characteristics of the farmers which may influence price.

[d] October 1 reflects the 1st through the 19th October. October 2 reflects the remainder.

[e] The distance-nonharvest interaction for the observations that occurred outside of the peak harvest months is the product of 1 and the distance associated with the sale, otherwise zero.

[f] Buyer 1: 1-4 buyers; Buyer 2: 5-10 buyers; and Buyer 3: greater than 10 buyers.

gThe degrees of freedom for the equations are: competitive model (20,80) and combined (15,85).

Table 13. Analysis of Covariance of Farmer Price.[a] Northern Vera Cruz, Mexico. Spring/Summer 1976 Harvest.

Independent variable	Competitive Model[b] Regression coefficient	t-values	Combined Model[c] Regression coefficient	t-values
Constant	2,211.01		2,232.70	
Time				
April	- 277.62	-3.63	- 245.13	-3.18
May	- 283.99	-5.84	- 266.52	-6.04
June	- 309.47	-6.24	- 286.57	-6.31
July	- 311.78	-6.48	- 305.25	-6.99
August	- 184.41	-4.32	- 196.56	-5.08
September	- 154.33	-3.15	- 158.69	-3.57
October	--	--	--	--
Form				
Form 3[d]	- 417.12	-4.49	- 432.15	-5.13
Form 2	- 114.84	-3.72	- 99.40	-3.27
Form 1	--	--	--	--
Moisture content				
Moist 4[e]	- 135.69	-2.19	- 136.48	-2.40
Moist 3	- 32.05	-1.39	- 50.52	-2.26
Moist 2	12.22	0.42	15.25	0.56
Moist 1	--	--	--	--
Market Area				
Temapache	- 31.01	-0.96	- 29.02	-0.83
Tihuatlan	- 5.11	-0.11	- 20.00	-0.48
Teayo	69.24	1.43	23.20	0.51
Poza Rica	--	--	--	--
Volume (kg)	0.0102	3.37	0.0056	1.92
Credit (1,0)			- 91.30	-2.69
Production density (tons)	- 0.07	-1.69	- 0.071	-1.88
Distance (km)	- 2.30	-2.36	- 2.82	-2.97
Distance-Form 3 interaction[f]	- 0.063	-0.14	- 0.059	-0.15
Distance-nonharvest interaction[g]	- 1.05	-0.69	- 0.64	-0.47
Market conduct and structure variables				
Information index			4.78	0.92
Established selling patterns (1,0)			6.18	0.36
Market experience (1,0)			6.37	0.32
Outside income (pesos)			0.00027	1.16
Number of buyers:				
Buyer 1[h]			- 85.11	-3.73
Buyer 2			- 63.78	-3.58
Buyer 3			--	--
$\bar{R}^2$	0.79		0.83	
F[i]	26.53		25.77	
Number of observations	131.00		131.00	

SOURCE: Prepared for this study from information taken from producer interviews.

[a]Producer price is in pesos per ton (mean value = 1,836, standard deviation = 183).

[b]Competitive model refers to the factors associated with the perfectly competitive framework (temporal, spatial, and form variables).

[c]Combined model refers to the factors associated with the competitive model as well as market conduct and structure variables. Market conduct and structure variables also include those characteristics of the farmers which may influence price.

[d]Form 3: sale of ear-corn; Form 2: shelled by the buyer at the purchase point; and Form 1: shelled by the producer.

[e]Moist4: approximately 20.5 percent moisture; Moist 3: 17 percent; Moist 2: approximately 15.5 percent; and Moist 1: 14 percent moisture.

[f]Distance-Form 3 interaction for observations that were sold under Form 3 specification is the product of 1 and the distance associated with the sale, otherwise zero.

[g]Distance-nonharvest interaction for observations that occurred outside of the peak harvest months is the product of 1 and the distance associated with the sale, otherwise zero.

[h]Buyer 1: 1-4 buyers; Buyer 2: 5-10 buyers; and Buyer 3: greater than 10 buyers.

[i]The degrees of freedom for the equations are: competitive model (19,111) and combined (26,104).

Several similarities and contrasts in the two harvest are present in the equations. The signs of the coefficients show that price is inversely related to the distance from the local warehouse. Also note that production density appears to be negatively related to price, while an increase in the number of buyers appears to be positively related to price. The signs of the volume coefficients, the established selling patterns, and the market areas, however, differ for the two harvests. These and other results are discussed in more detail in the sections below.

Price Variation Through Time

The analysis of the variation of producer price over time is complicated by the fact that local buyers do not store maize. Nevertheless, a large portion of the farmer sample (50 percent) indicated that they did hold maize off the market at harvest for later sale. In this instance, perhaps the most appropriate indication of expected variation in prices can be obtained by considering local mill prices in Poza Rica for both harvests and CONASUPO's paying price during the first harvest.

The Poza Rica mills provide a relatively constant demand for maize throughout the year. During the harvest and immediate post-harvest period, this demand principally is met by locally produced maize. In the later post-harvest period, while local maize continues to be shipped to Poza Rica mills, a large proportion of the local demand is met by imports of maize from other regions.

This seasonal pattern of local purchases and imports suggests that prices paid by local mills during the harvest and immediate post-harvest periods, ceteris paribus, may be rather stable. In the post-harvest period, as the proportion of imported maize used by local mills increases average prices paid by the mills may increase more rapidly, reflecting storage costs in other areas and the transfer costs between regions.[1]

This scenario is consistent with the pattern of mill prices encountered in Poza Rica (Table 14).[2] During the peak sales months of the two harvest, November and December 1975 Winter Harvest, and June, July, and August 1976 Spring/Summer Harvest, prices were relatively stable. Outside of the harvest period, especially March, April 1975 Winter Harvest, and September, October 1976 Harvest, prices increased rapidly.

In a marketing system that generates systematic relationships, producer prices would be expected to follow the resale price (local mill

[1] Bressler and King, Markets and Trade, pp. 221-27.

[2] While the observed mill prices are consistent with the anticipated movement of prices, the increase in the level of maize price may be influenced by the level of price inflation that prevailed in Mexico during the period. Inflation in 1975-76 was 23 and 26 percent, Consumer price index. United Nations, Statistical Yearbook, (New York: U.N. Statistical Office, 1976), p. 635 and United Nations, Monthly Bulletin of Statistics, 31 (October 1977 - No. 10): 182.

prices) of the local buyer. A visual comparison of producer prices and mill prices in the Poza Rica market and CONASUPO's paying price is presented in Figures 1 and 2.

CONASUPO purchased maize in the first harvest at 1,860 pesos per ton for the months of November, December, and part of January. The average mill prices reflect the sales of maize which were delivered to the mill. The prices, for the first harvest were obtained by interviewing several larger mills. These mills provided information on the average prices that they paid during the period. For the second harvest, the prices were calculated as an average of the prices paid by the large mills as well as some small ones that were visited at random.

The "farm" prices (Figure 1 and 2) for the two harvests reflect the producer price received in the Poza Rica market area as estimated by equations in Tables 12 and 13 respectively. The farm price was arrived at by using the sample means values for distance, volume, production density, and CONASUPO sale. The farm price corresponds to the Poza Rica market area[1] (the base), moisture content 1 and Form 1.

In general, the largest difference between the mill prices and the farm price occurs in the months outside of the peak harvest months. Perhaps, outside of the principal harvest periods, when the price of maize may be higher than the guaranteed price, and when fewer outside buyers are in the area, the producer has less accurate information upon which to base his asking price.

Spatial Price Variation

A negative distance coefficient was encountered in the two harvests, both under specification of the competitive model and the combined model.[3] The magnitude of the coefficients in the two harvests, on the average, is lower than the results of the buyers' questionnaire with respect to discounts for distance. Average distance discounts reported by the buyers were approximately 4.4 pesos per kilometer roundtrip.[^]

[1] The predicted prices are used to represent the producer price the Poza Rica Market because of the unequal number of observations market area. Subsequent analysis of the marketing margins uses the price data to evaluate market performance.

[2] This point is discussed in more detail in the section on marketing margin analysis.

[3] The competitive model refers to the factors associated with the perfectly competitive framework (temporal, spatial, and form variables). The combined model refers to the factors associated with the competitive model and market conduct and structure variables.

[^] This estimate was for 2 tons 20 km/round-trip distance over dirt and gravel roads.

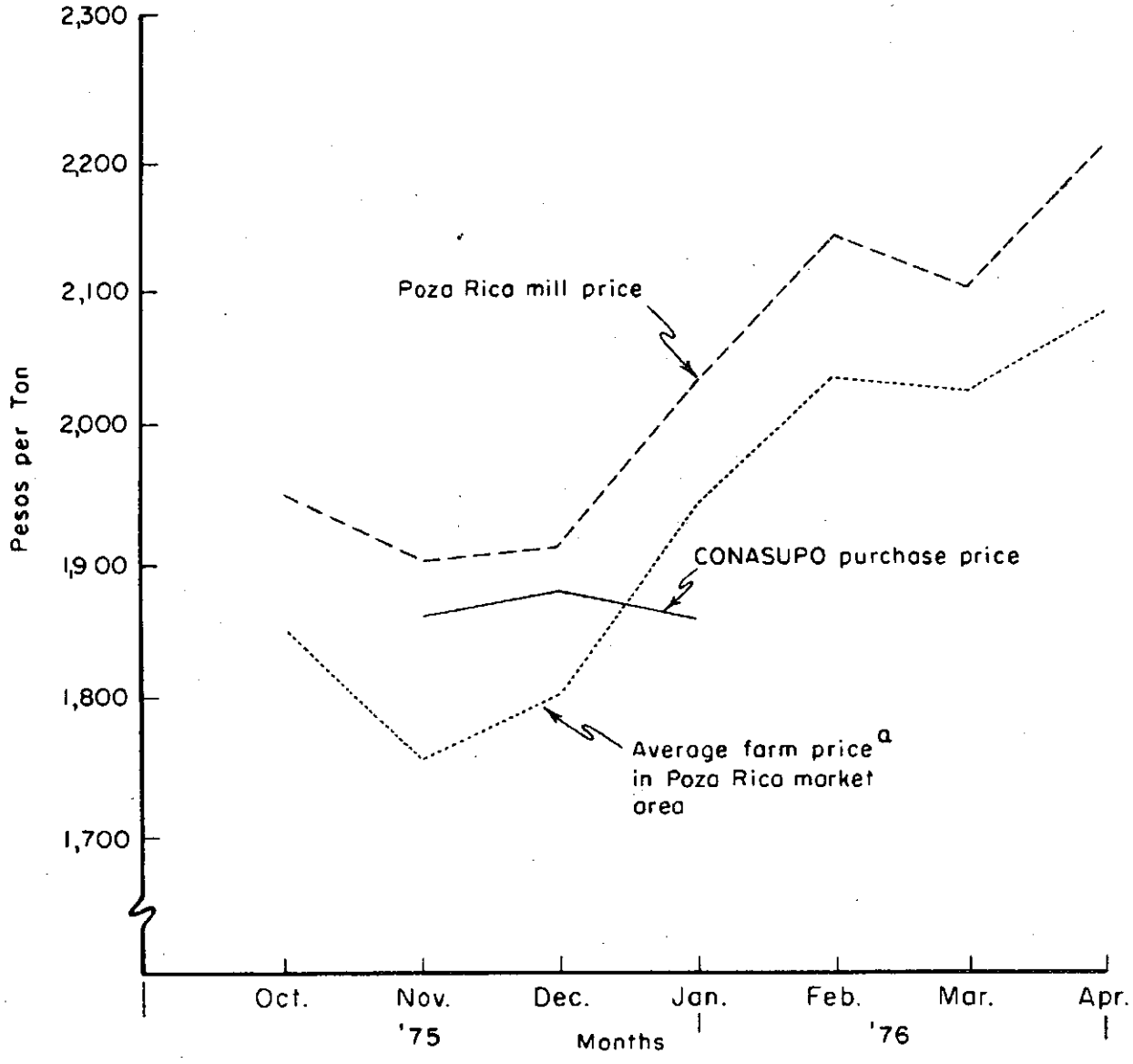
Table 14 Average Price Paid by Mills for Maize in Poza Rica.[a] Northern Vera Cruz, Mexico. 1975/76.

Month	Price per ton delivered maize	Month	Price per ton delivered maize.
October	1,950	May	2,010
November	1,900	June	2,000
December	1,910	July	2,020
January	2,020	August	2,080
February	2,150	September	2,200
March	2,100	October	2,400
April	2,200		

SOURCE: Interview with mill owners in Poza Rica.

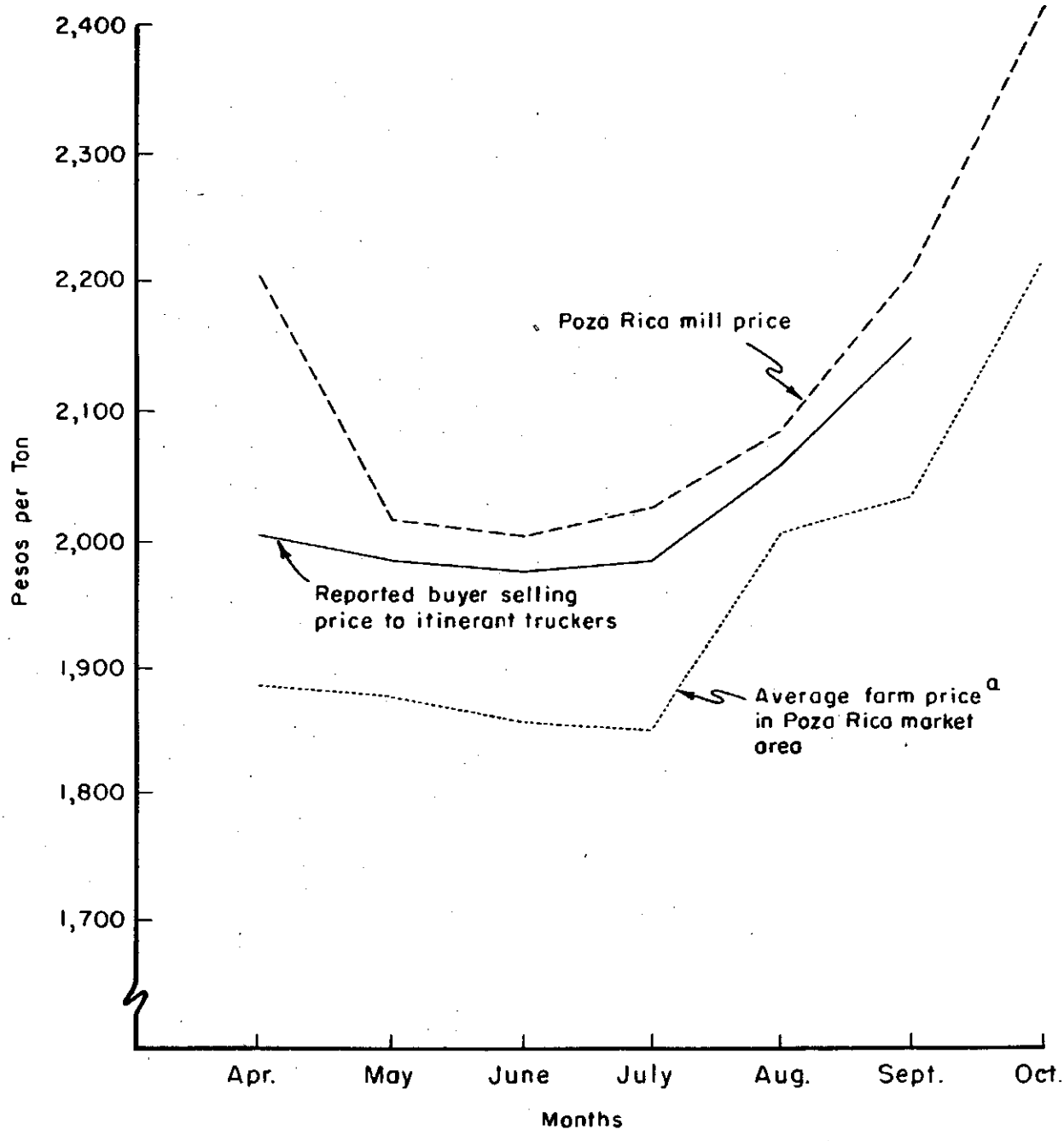
[a]Price from October 1975 to March 1976 reflects price reported of large mill in Poza Rica. From April 1976 to October 1976 reflects weighted average price of eight mills in Poza Rica.

FIGURE 1. AVERAGE MAIZE PRICES IN THE POZA RICA MARKET AREA: WINTER 1975 HARVEST, NORTHERN VERA CRUZ, MEXICO



[a] SOURCE: EQUATION 1, TABLE 12

FIGURE 2. AVERAGE MAIZE PRICES IN THE POZA RICA MARKET AREA: SPRING/SUMMER 1976 HARVEST, NORTHERN VERA CRUZ, MEXICO



[a] SOURCE: EQUATION I, TABLE 14

The results from the two harvests provide several interesting differences. Under the specifications of both models in the first harvest the distance coefficient is larger: 54 percent greater than for the corresponding Summer coefficient in the competitive model and 32 percent in the combined model. Similarly, the distance-nonharvest interaction changes signs between the first and the second harvest. That is, in the first harvest, the distance coefficient is larger in the harvest period than in the immediate post-harvest period. In the second, this is reversed and the distance coefficient increases after the peak harvest period.

There may be several explanations for the differences in magnitude of the distance coefficient and differences in signs of the distance-nonharvest interaction. During the Winter harvest, there are relatively fewer outside buyers than during the Summer. This could mean that prices were lower in the Winter harvest because the demand for inelastic marketing services increased the implicit opportunity cost of the buyers' time and increased the marketing margins. Alternatively, it can be suggested that with less outside competition, buyers find themselves in a better position to take advantage of potential monopsonistic power. In either case, the analysis implies that prices paid by buyers during the harvest period decrease when the number of outside buyers declines. Conversely, during the second harvest, when there are more outside buyers, the local buyer has to increase his prices in order to maintain a portion of the market. The impact of the outside buyer is of course limited by his relative lack of familiarity with the area and his lack of personal contact with the producers. In addition, the majority of outside buyers operate 10-ton trucks. Use of these trucks in the collection process may not be efficient. High implicit opportunity costs in terms of time and high real costs of maintenance resulting from the rural road system, may outweigh the potential savings of reduced purchase prices.

Differences in the coefficients among the market areas also were encountered between the two harvest periods. There were almost no differences in the prices associated with the market areas except for the Teayo market in the first harvest. This is consistent with the purchasing strategy of CONASUPO which attempts to maintain a constant price over space. In the first harvest, local buyers purchased maize and then sold it to a CONASUPO warehouse, all within a single market area. This practice was especially prevalent in Temapache and Tihuatlan.

In the second harvest, prices tended to decrease with distance from the central market area around Poza Rica except for the Teayo market. Table 15 compares the price differentials between market areas and the transfer costs between Poza Rica and the market areas. Due to the large standard error of the estimated dummy location variables, this comparison must be made with caution. However, the figures suggest that the average prices in the market areas are consistent with the transfer costs, with the exception of the Teayo market area.

The Teayo area presents an interesting anomaly. Prices for both harvests were highest in this area and the estimated price differentials exceeded the transfer costs from the other three centers to the Teayo

market.[1] During the first harvest, local producers and buyers indicated that production in the area was below normal due to unfavorable local weather conditions. This could have raised local prices, and possibly it led to maize being shipped into the area. Also, in this area, the buyers and ejidatarios interviewed were in close proximity to each other. Local buyers and producers indicated that maize was often delivered to the buyer's staging point after shelling instead of being delivered to the producer's home for storage and later sale. This suggests that the costs associated with these sales were lower and were passed along to the producer in the form of higher production prices. Finally, all ejidatarios interviewed in Teayo were from one ejido, limiting the scope of the observation.

The situation of Teayo's price structure provides room for speculation on the effectiveness of the marketing system in transferring information. During the harvests, local assemblers reported selling maize in Poza Rica, but none reported shipments of maize to Teayo, which appeared to be a deficit market for part of the time. The small size of Teayo (the population of the entire municipio is 13,000), the dispersed nature of the market (the largest town, Castillo de Teayo has 2,000 inhabitants), or the lack of communication between Teayo and the other marketing centers all could influence this.

It should also be noted that most of the buyers who maintained contact with warehouses or mills outside of their area, communicated with buyers in large consuming areas and not with buyers in other market areas. Prices in large producing areas and in the central market may be consistent with transportation costs, as would be expected. However, in small markets, anomalies may exist, due to lack of information about the market's prices or simply due to the small size of the market.

Form Price Variation

The estimated price differentials (Table 13) indicated that, on the average, the price farmers received for unshelled maize (Form 2) and the ear-corn (Form 3) was about 100 and 432 pesos per ton less, respectively, then the price for shelled maize (Form 1).

Using the information provided by several buyers, the cost of shelling maize was estimated at about 90 pesos per ton. This figure was slightly higher than the 80 pesos per ton estimated by CIMMYT for the area in 1975.[2]

[1] Transfer costs from Poza Rica, Alamo, and Tihuatlan were 12.87, 20.03, and 9 pesos per ton, respectively. The estimated price differentials in the first harvest between these points were: 97, 100, and 91 pesos per ton. In the second harvest, the estimated price differentials were 46.5, 58, and 75 pesos per ton.

[2] Richard K. Perrin, "Economic Analysis of CIMMYT on Farm Maize Trails in Vera Cruz, 1973-75," Appendix Table 1 (CIMMYT, unpublished manuscript).

Table 15. Comparison of Estimated Price Differentials Between Market Areas and Estimated Transfer Costs. Northern Vera Cruz, Mexico. Spring/Summer 1976 Harvest

Market area	Distance from Poza Rica (km)	Estimated[a] transfer costs	Estimated price differentials[b]	
			Competitive	Combined
Temapache	106	20.05	-31.01	-29.0
Tihuatlan	48	9.08	- 5.11	-20.0
Teayo	68	12.87	69.24	23.2

SOURCE: Producer interviews.

[a] Transfer costs were estimated using the truck rate schedules reported by local trucker. That is, within the region the rental cost of a 10-ton truck is 400 pesos. The rental cost of a 10-ton truck in Mexico City is 1,500 pesos. Assuming a constant marginal cost per km, an approximate km/cost can be determined. The distance between Poza Rica and Mexico is 581.44 km roundtrip. The cost per ton round-trip kilometer is 0.1892 pesos:

$$\left(\frac{1,500 - 400}{581.44} \div 10 = .1892\right).$$

[b] The estimated price differentials between the Poza Rica and the other market areas are the values of the market areas dummy variables. See Tables 12 and 13.

It is possible to indicate the reasonableness of the marketing margin associated with the sale of Form 3 maize by estimating the percentage of cob weight of the maize purchased as ear-corn. Assuming that 82.5 percent of the weight of the ear-corn is maize[2] and using the same average price of 1,945 pesos per ton, the differential between the price paid to the producer (1,945 - 432 = 1,513) and the monthly price less the discount for the cob weight (1,945 x .825 = 1,604.6) is approximately 92 pesos per ton. This is consistent with the cost of shelling.

Moisture Content

Producers were asked to identify samples of maize with varying levels of moisture that most nearly resembled the maize they had sold in the

[2] The estimate was provided by Daniel L. Galt, agricultural economist working on the problems of pest control in the study area.

second harvest period. The buyers implicit[1] moisture discounting schedule can be ascertained by examining Table 13.

No differentiation in producer price was observed for the moisture levels associated with Moist 1 (14 percent moisture content) and Moist 2 (15.5 percent moisture content). Only at levels of moisture of about 17 through 20 percent did the producers receive lower prices for their maize. Price discounts for Moist 3[2] (17 percent) and Moist 4 (approximately 20 percent moisture content) were 50 and 136 pesos per ton, respectively. These are fairly consistent with the price discounts that would be expected with increased levels of moisture. That is, working with the June price of 1,945 pesos per ton and ascribing it a moisture level 1 (14 percent) a decrease of about 68 pesos[3] per ton would be expected with a 17 percent moisture content level. The discount with moisture level 4 (20 percent) would be about 136 pesos per ton.[4] The relative consistency of the discounts with moisture levels appears to indicate that perhaps local buyers did not spend appreciable resources in drying the local maize prior to resale or that the buyers were able to pass along drying costs in the form of higher prices.[5]

[1] During the first harvest, the official CONASUPO discount schedule was based on a price of 1,900 pesos per ton for 14 percent moisture. For each degree of increase in moisture, the total weight was reduced by 10 kilograms. This is an effective reduction in price of 20 pesos per ton for each degree of increased moisture. It should be noted that the CONASUPO discounts reflect higher levels of moisture content but do not reflect the costs of drying maize to lower moisture levels acceptable for storage. This cost is paid by CONASUPO and is considered a subsidy to the customer.

[2] Most farmers dry their maize by doubling the stalk. At harvest, maize moisture content may vary from 18 to 22 percent (Hugh L. (took and Theodore Cook, Organization of Trade in a Tropical Municipality of Vera Cruz, Mexico, Research Paper No. 48, (Madison, Wisconsin: Land Tenure Clenter, 1972); Daniel L. Galt, agricultural economist working with CIMMYT in the study area, provided information concerning moisture content".

[3] 17 percent: $\frac{860kg}{830kg} = \frac{1,945}{x}$; $x = 1,877$; $1,945 - 1,877 = 68$ pesos/ton

[4] 20 percent: $\frac{860kg}{800kg} = \frac{1,945}{x}$; $x = 1,809$; $1,945 - 1,809 = 136$ pesos/ton

5 Given the large number of local buyers and outside truckers, it seems unlikely that local buyers were able to pass along additional costs. It seems more reasonable to assume that the buyer either sold it at a given level of moisture at lower prices and/or the wet maize was mixed with drier maize and the mixture was sold at some average price.

Price Variation and Credit

During the second harvest, 7 of the 94 producers received production credit from local buyers. No formal interest rates were charged, but prices were discounted. This practice was reported by both the local buyers and the producer. The estimated coefficient for the effect of credit arrangements on prices indicated that the producers received an average of 90 pesos per ton less than the market price for that time.

Given the figure above, and the particular circumstances of each loan, the amount and period of the loan, and the volume of the sale at the discounted price, it is possible to calculate an effective rate of interest for each individual loan. These rates ranged from 31 to 58 percent per year. The average interest rate, weighted by the volume of the quantity sold to the buyer, is approximately 41 percent per annum or 3.5 percent simple interest per month.[1]

Perrin calculated that the nominal interest rates paid by producers to local banks was between 25 and 41 percent per annum in 1975. The small amounts of the loans, fixed service costs, taxes, and the insurance payments that the producers had to pay on the principal of the loan caused the rate to be above the official government loan rate of 12 percent.[2] A comparison of Perrin's estimates with the nominal interest rates calculated in this study, suggests that although the interest rates are high they may be reflecting real costs as well as some monopoly profits.[3]

The Volume of Sale and Production Density

Originally, it was hypothesized that higher levels of production density and larger volume of sales would be associated with lower assembly

[1] This was a nominal interest rate which did not consider the rate of inflation for the period. Assuming an inflation rate of approximately 25 percent per annum, the real rate of interest charged producers was about 16 percent.

[2] Perrin, "Economic Analysis in Vera Cruz."

[3] Another way to consider the interest rates charged producers is to compare them with the interest rates that buyers had to pay to finance short term capital loans. The average short terms interest rate for buyers was about 18 percent per annum using this figure, local buyers were charging about 24 percent interest above their repayment costs. This return includes profit and had to compensate for the risk that the producer might lose his crop or not repay the principal on the loan as well as pay for costs of surveillance and administration of the loan.

costs, resulting in higher production prices in a competitive atmosphere. The results of the two harvests are not completely consistent with the above ideas and provide room for speculation as to the validity of the original hypothesis.

In the first harvest, the sales volume was negatively related to price, although not to any great extent. During the second harvest, the price-volume relationship was positive and fairly important. Perhaps these results can be explained by the characteristics of the two harvests and the volume of observed sales. During the first harvest, there were fewer outside buyers. In the series of interviews administered, the local buyers reported that volume premiums in general were not given. Buyers explained that it would be difficult to maintain producer goodwill if they paid different prices for different levels of volume. Due to their use of 3-ton trucks, they also believed that there were few economies for volume of sales beyond the capacity of their trucks, since they would have to make a second trip. This could explain, in part, the insignificant volume/price relationship in the first harvest.

The second harvest was associated with a larger inflow of outside buyers. Although they tended to purchase maize from local assemblers, some of them did buy maize directly from the farmers. These outside buyers operated 10-ton trucks, and were interested in filling their trucks as quickly as possible and returning to their point of departure. It is possible that these buyers were willing to pay more for greater volume sales. In response to the increased competition, the local buyers also may have been pressured to raise their prices during the second harvest in order to maintain trade with the larger producers.[1]

The level of production density was negatively related to price during both harvests. Re-examination of the local buyers' local operating procedures suggested that it was inappropriate to view production density in terras of search theory. Producers advised local buyers regarding the location and volume of their sales. This minimizes the costs of assembly and the search portion of the operating costs. Given this atmosphere, it might have been more appropriate to have considered production density as a measure of local supply relative to outside demand. Viewing the production density variable in this framework is more consistent with the signs of the estimated coefficients, which imply that in areas of high local supply relative to outside demand, prices will be lower. Thus, even on a micro-level, price is an interaction of the local supply and demand, and the producer's asking price may be influenced by the level of production of his fellow producers.

[1] Another explanation for the difference in results in the volume/price relationship between the harvest periods may be the greater variation in the volume of sales reported by producers in the second harvest. The average sale per transaction for the first harvest was 2,039 kg, with a standard deviation of 2,265. The average for the second harvest was about 2,400 with a standard deviation of 3,324. The increased variation in the volume sold, perhaps, made it possible to accurately measure the price/volume relationship in the second harvest.

This has several implications for the government marketing programs which are designed to benefit the small farmer by providing a uniform price structure in a spatial sense. The results of the equations - the signs of the volume coefficient and the production density coefficient - suggest that if the government is interested in maintaining a uniform price, its purchase activities should be increased in areas of high production density and small farm structure.

Additional Variables: Perception of Number of Buyers, Selling Patterns and Market Experience, Outside Income, and Level of Information

The number of buyers during the harvest period, as perceived by the producers, turned out to be an important factor in explaining the variation in producer price. The greater the number of buyers perceived by the producers, the higher the price received. This tendency was most evident during the second harvest, when the number of outside buyers actually increased.

These results appear to indicate a level of monopsonistic practices. However, closer examination of prices does not bear out this preliminary finding. First, in those areas where outside buyers entered in search of maize directly from producers, the price increased more than in the areas unaffected by outside competition. This would suggest that in several cases lower prices are associated with lower outside demand for the maize. Second, an analysis of the consistency of producers' perceptions within ejidos as to the number of buyers for their commodity also must temper the preliminary conclusion of the existence of monopsonistic practices. In several villages or ejidos the responses were consistent, with all of the producers agreeing to the classification of the number of buyers as either large or small. However, in some ejidos the responses were mixed. For example, two producers might indicate a large number of buyers while the others might indicate a small number. As a consequence, it seems more appropriate to consider this coefficient as a measure of the producers' isolation from the market rather than as an indicator of pure monopsonistic power. Such isolation may be exterior (i.e., the number of buyers in the market area reflecting isolation in space and time) or interior to the producer (i.e., the degree of market participation of the producer as an active pricing agent). This analysis suggests that while a level of monopsonistic power does exist, a portion of the price differences attributed to this market variable, actually may be associated with low levels of information or communication among producers in a particular locale.

Although the variable used to estimate the impact of established selling patterns and market experience did not influence the variation in producer price to any degree, established selling patterns still may play a role in affecting producer price. Several producers indicated that they did not always sell to outside buyers, despite the higher prices that they might pay, due to the services that the local buyers provided throughout the year. Such services included the transportation of consumption items from the rural population centers to local villages or ejidos, and loans in times of financial difficulty.

The level of outside income was positively related to the price producers received. In terras of the magnitude of the coefficients, it was clearly more important during the first harvest. An increase of 1,000 pesos of outside income increased the price of maize by 0.31 pesos per ton. Although it is difficult to isolate the exact rationale behind the impact of this variable, it could be posited that higher levels of income are associated with higher prices due to increased mobility and information. It also could mean that increased outside income isolates producers from the need to sell maize precipitously, and allows them to wait either for prices to rise or for a buyer to offer a more attractive price.

While the level of information was related positively to price received, the magnitude of the coefficient and of the t-value implied that it was not extremely important. It is possible that the variable used to isolate the level of information was not appropriately specified. The descriptive analysis of the level of information by different maize production units suggested that the level of information was positively associated with larger production units (and presumably larger volume of sales) and the level of outside incomes. Similarly, larger production units were more likely to perceive a greater number of buyers for their commodity. The levels of information and market awareness associated with the individual producer appear to be related to a series of interactions that may be difficult to isolate. Evidence of this complicated interrelationship can be seen by the decline in the importance of the volume variable in the second harvest (a 50 percent decrease in the coefficient associated with the volume sold per transaction) when the market structure and conduct variables, e.g., the number of buyers, outside income and the information index, are included.

Marketing Margin Analysis

The purpose of this section is to examine the marketing margins for the rural assembly of maize in northern Vera Cruz. The analysis is confined to the marketing margin[1] for maize produced and resold in the area by local buyers. More specifically, the margin under consideration is the difference between the farm gate price and the sale price within the buyer's own market area.[2] The cost structure for the most prevalent assembly opperation, 3-ton trucks, is used to estimate the profitability of local assembly operations.

[1] This amounted to about 75 percent of the maize purchased by the buyer sample for the two harvests considered.

The study is confined to local assembly because of the lack of resale price information for assembler/shippers. Prices reported by local buyers at distant markets (Mexico City, Villa Hermosa, and the port of Vera Cruz) ranged between 2,150 and 2,250 pesos per ton during the peak harvest period in the Spring/Summer 1976 harvest.

[2] This margin was selected because it most closely reflected local assembly operations; that is, farm purchase and resale either to the CONASUPO warehouse or resale at the buyer's warehouse to outside truckers within the local market area.

Tables 16 and 17 present the weighted average prices received by farmers and local buyers and the estimated marketing margins for the months of operation. The upper limit of the marketing margin, the buyer's resale price of maize, is different in the two harvests. In the Spring/Summer 1976 harvest, two sets of prices are used. The first set of prices is the weighted ayerage monthly sales prices reported by local buyers to itinerant truckers.[1] The second set of prices is an estimated buyer resale price for the entire region. The weighted average price is calculated by discounting the Poza Rica mill prices to the local market areas (Teayo, Tihuatlan, and Temapache) by the transfer costs weighted by the volume sold in that area.[2]

Two sets of prices also are used in the first harvest. The principal outlet for local sales by buyers during this harvest was CONASUPO. Hence, the actual monthly average prices paid by CONASUPO are used as a set of prices. The other set of prices is similar in nature to the weighted average regional price for the Spring/Summer 1976 harvest estimated by discounting the mill price by transfer costs.

The lower limit of the local maize marketing margin is the price paid to local producers. In the Winter harvest, the lower limit is the weighted average price paid producers for the maize sold in that month in the region. In the Spring/Summer 1976 harvest, the lower limit for each month is the weighted average[3] price of the volume of maize sold by producers as shelled maize, Form 1.

[1] At attempt was made to ascertain the accuracy of these prices by periodic discussions with itinerant truckers. In general, the prices reported by local buyers tended to slightly understate the prices reported by itinerant truckers.

[2] The basis for this procedure of estimating the prices that itinerant truckers paid to local buyers rests on the theory of the competitive market. Assuming that an itinerant trucker could buy maize in Poza Rica at or near the mill price, prices at which maize could be purchased in the other market areas would reflect the price in Poza Rica less the transfer costs from that market to Poza Rica. This procedure assumes a competitive situation in the market for the local resale of maize — that is, between local buyers and itinerant truckers. Given the large number of local buyers and the large inflow of itinerant truckers, this assumption does not appear unreasonable.

[3] Reported maize sales prices for Form 2 and Form 3 are converted to Form 1 by adding the dummy variable coefficients associated with buyer's discounts for these maize purchases. This procedure was used in order to examine the marketing margin for a relatively homogeneous product — shelled maize. As previously encountered, price differentials for the different forms of maize purchases were consistent with processing costs.

Table 16. Regional Assembler Prices and Margins. Northern Vera Cruz, Mexico. Winter 1975 Harvest.

	Oct.	Nov.	Dec.	Jan.	Feb.	March	April
					per ton)		
Mill price[a]	1,950	1,900	1,910	2,020	2,150	2,100	2,200
Mill price less transfer costs[b]	1,937	1,887	1,897	2,007	2,137	2,087	2,187
CONASUPO price[c]	-	1,860	1,880	1,880	-	-	-
Farm price[d]	1,843	1,714	1,741	1,885	1,973	1,994	2,057
CONASUPO margin[e]	-	146	139	-	-	-	-
Mill margin[f]	95	173	156	122	164	93	130

SOURCE: Prepared for this study.

[a] Weighted average prices paid for delivered maize in Poza Rica.

[b] Weighted average prices paid in Poza Rica less transfer costs to each market area weighted by the volume sold in that market.

[c] Weighted average price paid for delivered maize to the CONASUPO warehouse.

[d] Weighted average prices paid to farmers.

[e] Difference between CONASUPO paying price and farm price.

[f] Difference between mill price less transfer costs and farm price.

Table 17. Regional Assembler Prices and Margins. Northern Vera Cruz, Mexico. Spring/Summer 1976 Harvest.

	April	May	June	July	Aug.	Sept.	Oct.
	(pesos per ton)						
Mill price[a]	2,200	2,010	2,000	2,020	2,080	2,200	2,400
Mill price less transfer costs[b]	2,187	1,997	1,987	2,007	2,067	2,187	2,307
Buyers reported resale price to outside truckers[c]	2,000	1,980	, 1,980	1,990	2,060	2,150	
Farm price[d]	1,774	1,865	1,862	1,852	1,949	2,003	2,118
Margin with buyer reported price[e]	226	115	118	138	111	147	-
Margin with mill price less transfer cost[f]	413	132	125	155	118	184	269

SOURCE: Prepared for this study.

[a] Weighted average prices paid for maize delivered at the Poza Rica mills.

[b] Weighted average prices paid in Poza Rica less transfer costs to each market weighted by the volume sold in that market.

[c] Reported weighted average resale prices to itinerant truckers.

[d] Weighted average prices received by farmers (Form 1 - shelled maize).

[e] Difference between reported resale price and farm price.

[f] Difference between mill price less transfer costs and farm price.

Inspection of the marketing margins for the Winter 1975 harvest, show that the largest mill and CONASUPO margin occurred at the beginning of the harvest in the month of November. The size of the margins during this harvest appeared to fluctuate erratically.

In the Spring/Summer 1976 harvest, the magnitude of the marketing margins seemed more systematic. The greatest margins were encountered outside of the principal harvest months. This especially is the case in the months of April, September, and October. These systematic increases in the marketing margin outside of the harvest months may be explained by a number of factors. First, outside of the harvest period producers may not be aware of price movements. The presence of a large number of outside buyers in the area during the second harvest provides producers with information on market price. Outside of this period, producers may have less information. Alternatively, outside of the harvest period, collection costs may increase as the amount available for sale in any area declines. That is, the buyer may encounter high per unit transaction costs of operation. This may result in lower prices for the producer. During this period, this could be compounded by the lack of outside competition which may allow buyers to depress prices.

The average marketing margins for the two harvests weighted by the quantity sold in each month are presented in Table 18. The range of marketing margin varies between 127 to 148 pesos per ton.

Estimates of the Average Assembly Costs

The average costs of assembly were determined through initial discussions with buyers and later through more extensive interviews. Several trips were taken with local assemblers to examine the physical operations involved in collecting and transporting maize to the local warehouses. The costs for the different functions were derived by attempting to establish the physical (input) requirements necessary to transport a ton of maize from the farm purchasing point to the buyer's warehouse.

Table 19 presents the cost estimates. They are based on the predominant type of operation in the study area:[1] a 3-ton truck, a driver (usually the owner) and two or three laborers. The total costs of the operation are the sum of the fixed and variable costs. The fixed costs are defined to include depreciation and interest payments on buildings and trucks, as well as taxes on the truck. A value of 50,000 pesos was assigned to the truck. Its annual rate of depreciation was estimated using the case of a local buyer who recently sold his truck after a 6 year

[1] Operations varied in the number of laborers, but wage differentials made the total wage bills almost identical.

period. The value of an average warehouse (8,000 pesos) was determined by estimating the construction costs per square meter. The interest on the truck and the warehouse was calculated by using the values assigned and an interest rate of 1 percent per month - the bank savings account rate of interest during the period of the study. Depreciation on the warehouse was extended over a 15 year period with a zero salvage value.

The variable costs are related directly to the movement of maize. They include hired and owner operator labor, gas and oil, interest on short term working capital, and depreciation on bagging material. Hired labor was valued at 45 pesos per day each for 3 laborers. A value of 150 pesos per day was assigned for the owner's labor. Gas consumption was determined as 4 kilometers/liter at the rate of 2.15 pesos per liter. The interest payment was calculated as the actual interest rate charged by private banks for short term capital loans, 1.5 percent per month, on a working capital of 15,000 pesos. The depreciation on the bagging material was assumed to be half the value (17 pesos per bag) during the harvest period.

It is assumed that the truck is used for two typical 10-week extensive assembly periods of maize. These entail two collection trips per day, with an average of 2 tons per trip being assembled. It also is assumed that the buyer handles 50 tons of beans during the year. Hence, the total annual amount handled is 530 tons of maize and beans.

Given the above assumptions, the average estimated costs of operation for assembly and resale are almost 112 pesos per ton. A comparison with the estimated margins indicates an average return to capital and management of about 30 pesos per ton when the resale price source is independent of the buyer (Table 20).[1] Assuming an average capital investment of 74,000 pesos (Table 19) and an average handling of 480 tons of maize and 50 tons of beans,[2] the rate of return on capital and management is about 21.2 percent. Considering the interest rate charged for short term loans (18 percent per annum), and the figure paid on bank savings (12 percent per annum),[3] this figure does not appear to be excessive.

[1] This figure reflects the capital requirements for the predominant type of assembly operation in the area, i.e., investments in the trucks, warehouse, working capital, and scales (table 19).

[2] This assumes that the returns on beans and maize are approximately the same.

[3] Perhaps, this figure is slightly underestimated. Buyers work intensively in the two maize harvests (5/6 months) and bean harvest (1 month). During the remaining part of the year, their trucks are rented. An additional 100 tons of merchandise should be added to the 530 tons of maize and beans in order to account for this. Costs then are reduced per ton to 108.5 and average returns are increased by 4.3 pesos per ton. Using the CONASUPO figures (first harvest) and the prices estimated as mill price transfer costs, the return per ton becomes 33.95. This results in a 28.9 rate of return on capital and management.

Table 18. Marketing Margins of Local Assembly of Maize. Northern Vera Cruz, Mexico. 1975/76.

	Winter 1975 harvest	Spring/Summer 1976 harvest
	(pesos per ton)	
CONASUPO margin[a]	141.69	
Mill price less transfer costs margin[b]	147.66	143.40
Reported sale to outside buyers margin[c]	-	127.53
First harvest combined[d]	135.18	

SOURCE: Prepared for this study.

[a] Weighted average margin for December, November 1975 assuming maize that is resold is to CONASUPO.

[b] Weighted average margin for the entire harvest assuming maize resold at mill price less transfer costs.

[c] Weighted average margin for the entire harvest assuming maize resold at the resale price reported by local buyers to outside truckers.

[d] Weighted average margin assuming maize in December and November is resold to CONASUPO and the remainder is resold at mill price less transfer costs.

Table 19. Estimated Peso Costs per Ton of Assembly of Maize.[a] Northern Vera Cruz, Mexico. 1975/76.

Item	Description	Cost per ton pesos
Truck	Depreciation: 7,500 per annum Interest: 50,000 @ 1% per month Maintenance	26.87
Warehouse	8,000 value of warehouse with a 15 year useful life and an interest payment of 1% per month	2.80
Bagging material and scales	150 bags @ 17.00 per bag with 1/4 depreciation per harvest. Value of scale 1,000 with ten year depreciation	2.76
Working capital	15,000 @ 1.5% per month	2.82
Hired labor	3 persons @ 45 per day	33.75
Gasoline	22.25 km roundtrip, 4 km per liter @ 2.15 per liter	5.97
Own labor	150 per day	37.50
Total		112.47

SOURCE: Interviews with buyers.

[a]Based on 480 tons of maize per year and 50 tons of beans. Variable costs based on an average collection of 4 tons per day.

SUMMARY AND CONCLUSIONS

Despite its potential importance, there has been little systematic economic research in the developing world on small farm marketing behavior and the interactions of the small farmer and the marketing system. The purpose of this study was to explore the interrelationships of small farmers in low income tropical countries with the grain marketing system that most directly services them.

Understanding the environment within which the small farmer and the marketing system function is of particular importance in Mexico. Maize production, which primarily comes from small, non-irrigated, low income farms, has lagged behind national consumption since the late 1960's. Government officials speculate that the middleman's ability to maintain producer prices at artificially low levels is a major obstacle to increased production.

This study gives a description of the rural grain marketing system for maize and evaluates the market for pricing efficiency. Primary data were collected from maize farmers, local maize buyers, and officials involved in government marketing programs in three municipalities of northern Vera Cruz, Mexico for two harvests, Winter 1975/76 and Spring/Summer 1976.

To examine the ambience within which economic transactions transpire, the producers were asked a series of questions concerning their marketing experiences. For purposes of presentation and comparison, the responses of the second sample were stratified by the volume of production and subdivided into three groups: ejidatarios, private property owners, and ejidatarios with recent sales to the government marketing agent, CONASUPO. Producers responses suggested that large producers are likely to have the best access to accurate price information, and most likely to have participated in government marketing programs. These producers perceive a large number of alternative buyers for their commodity and appear willing and able to store maize for later sale. In terras of marketed surplus, the large producer seems willing to increase marketings in response to changes in the quantity produced. Changes in the post-harvest price of the commodity induce response among the most commercial farmers, or those with high levels of outside income. These indicated that they would follow a strategy of increasing sales of maize which had been stored for domestic consumption.

Inspection of the responses by the subdivisions of ejidatarios, private property owners and ejidatarios with recent sales to CONASUPO does not reveal many sharp differences among the groups. Nevertheless, several general tendencies appear. The ejidatarios with recent sales to CONASUPO check more sources of price information and are more willing to increase their marketed surplus in response to changes in price than the other two groups. Both private property owners and ejidatarios with recent sales to CONASUPO perceive a large number of buyers for their commodity, are willing and able to store maize for delayed sale, and appear inclined to increase

Table 20. Estimated Peso Return per Ton to Capital and Management of Local Maize Assembly. Northern Vera Cruz, Mexico. 1975/76.

	Winter 1975 harvest	Spring/Summer 1976 harvest
	(pesos per ton)	
CONASUPO margin[a]	29.24	
Mill price less transfer costs margin[b]	35.21	30.95
Reported sale to outside buyers margin[c]	—	15.08
First harvest combined[d]	22.73	

SOURCE: Prepared for this study.

[a] Return per ton assuming maize resold is to CONASUPO or at the same margin.

[b] Return per ton assuming maize is resold at mill price less transfer costs.

[c] Return per ton assuming maize is resold at the resale price reported by local buyers to outside truckers.

[d] Return per ton assuming maize in December and November is resold to CONASUPO and the remainder is resold at mill price less transfer costs,

their marketed surplus in response to changes in the quantity produced. These two groups also possess more mobility (that is, own more trucks) and experience more extensive contact with various participants of the marketing system in terras of their sales to CONASUPO and use of truck transport than ejidatarios. The ejidatarios are likely to have established selling patterns with specific local buyers. Compared to the other two groups, they are less likely to check alternative sources of price information, although their responses indicate that, regardless of the size of their operation, intragroup discussion on market prices occurs prior to sale.

Information on the rural marketing system from 1970 Census data indicated that per capita production exceeded consumption in the three municipalities. Farmers and assemblers, however, reported that maize production had been declining in the region since 1970. While the two municipalities are surplus areas, it is possible that Teayo, which registered an annual per capita production of 260 kilograms in 1970, is not.

During the study period, the principal consumption center in the region was the city of Poza Rica which bordered the study area. Its market is linked to the rural population centers by a paved two-lane extension of the national highway system. The local rural road system, that emanates from the rural population centers, is extensive and relatively well maintained. Almost all ejidos and villages are linked either to Poza Rica or to the other rural population centers by dirt or gravel roads that are passable except during periods of prolonged precipitation. Due to the extensive rural road system, most producer transactions occur at the farm gate. Occasionally, during periods of heavy precipitation, producers must transport maize to main rural roads.

CONASUPO maintains four warehouses in the study area, with a combined storage capacity of 8,000 metric tons. Private buyer storage is almost nonexistent in the study area and buyer warehouses in the region are simple - built of wood or concrete. Several of the buyers used portions of their homes to keep the maize prior to resale. The maize trade on the local level is based on immediate resale of maize. Turnaround time between purchase and resale during the peak of the harvest period is often as short as one day.

On-farm storage also is relatively primitive, consisting of portions of the farmer's house, wooden cribs built off the ground or storage bins over the household cooking areas. These facilities are usually large enough to store maize for domestic consumption, or for later sale.

The nature of the marketing system and the flow of the product varied between the two harvests. The Winter harvest, which corresponds to the principal harvest for the country, is the smaller of the two local harvests. The major buying agent during the peak harvest months is CONASUPO. The marketing flow is relatively simple and direct. Local assemblers act as intermediaries, buying and transporting maize to the local government warehouses. The number of transactions appeared to be small. According to local buyers and farmers, there were fewer outside buyers and fewer shipments by local buyers to other consuming areas in the Winter harvest then in the Spring/Summer harvest.

During the Spring/Summer harvest, the major competitors or agents in the market are the outside truckers. Inasmuch as the wholesale prices paid to local assemblers by outside truckers exceed the government support prices during this harvest, neither ANDSA nor BORUCONSA reported purchases. Outside buyers purchase directly from local assemblers at staging points, or occasionally from the producers. These maize purchases, in general, move to other consuming areas of the country. Shipments by large local assemblers to other regions are common. Local assemblers also sell maize to the mills in Poza Rica.

The maize buyers encountered in the study area are relatively heterogeneous in terms of the size of their operations and the marketing functions they perform. They were classified for the purposes of the study into two groups, assemblers and assembler/shippers. Assemblers were defined as buyers who sold 60 percent of their maize at local warehouses. Their sales were to itinerant truckers who exported the maize to other regions of the country. The buyers who distributed more than 40 percent of the maize they purchased to the mills in Poza Rica or to warehouses or mills outside of the market region, were defined as assembler/shippers. The distinction between the two groups was somewhat seasonal.

The assembler/shippers who shipped outside of the region were large operations, using 3-ton trucks for assembly and 10-ton trucks for delivery. The assembler/shippers who shipped to Poza Rica used 3 ton trucks for collection and distribution.

Assemblers operated primarily near their warehouses. Use of one or in some cases two, 3-ton trucks for transporting maize was common.

Regardless of the services provided, most of the operations were highly labor intensive and characterized by direct purchase of maize from producers. A large proportion of the buyers lent money to producers and tried to maintain contact with mills and warehouses outside of the region to assure themselves of adequate price information. Quality standards were not ridigly enforced. The principal factor causing a discount in the maize price was moisture content.

Pricing efficiency in a rural grain marketing system means that prices are consistent with costs, and that there are no monopsonistic profits. Evaluation of this efficiency entails an assessment of the systematic movement of producer prices and a delineation and comparison of average marketing margins for local maize assembly with unit costs of operation. The statistical methodology used to analyze the variation in producer price is an extension of ordinary least squares of multiple regression, analysis of covariance. To examine the consistency of the pricing efficiency analysis with market conditions, the market structure and conduct paradigm was used.

The results of the analysis of covariance revealed that a large proportion of the variation in producer prices was associated with the variables of the competitive model (i.e., temporal, spatial and form factors). The variation in producer price was fairly consistent with

differences in processing costs and the level of moisture content of the maize. In general, producer prices tended to move over time in a relatively systematic nature with the buyers' resale prices. The largest differentials between producer price and the buyers' resale price were discovered outside of the harvest period, perhaps a result of inadequate price information and/or high collection costs.

In a spatial sense, producer price in the first harvest during the peak sale months was fairly uniform except for the Teayo market. This is consistent with CONASUPO purchasing programs which are designed to maintain uniform prices among markets. During the second harvest, in two of the three local markets being studied, price differentials slightly greater than transportation costs were encountered as the distance from the central market increased. In the Teayo market, price exceeded the central market price less transfer costs suggesting that the marketing system was not transferring price information adequately or that Teayo was no longer a surplus area. Local assembers outside of the Teayo market, did not report sales in this market. This might have been due to the lack of information on market prices, or the Teayo market may have been too small to make the delivery or maize attractive there.

Only in the second harvest did market structure and conduct variables assume statistical importance in explaining the variation in observed price. During the Spring/Summer harvest, the seven producers who received credit from buyers received 90 pesos per ton less than the market price corresponding to their location and time of sale. The effective interest rate (weighted by the volume of quantity sold) received by the buyer was about 40 percent. Although this is high, it was similar to the nominal interest rates other studies estimate that small producers pay to public credit banks. These interest rates may reflect the real opportunity costs of capital as well as monopoly profits.

The other variable which appeared to influence the level of producer price was the producer's perception of the number of buyers for his product. The results of the analysis seemed to support the hypothesis that lower prices are related directly to the number of buyers in an area. That is, the greater the number of buyers perceived by the producer, the higher the price received. This tendency was most evident during the second harvest, when the number of outside buyers actually increased. At first glance this seems to indicate some monopsonistic behavior or a case of differential demands resulting from incomplete specification of the empirical model. Closer examination of the data on producer's perceptions of the number of buyers for their commodity within the same ejido, however, revealed a high degree of variability. For example, in a number of locations several producers perceived a limited number of buyers while the remainder perceived a large number of buyers for their commodity. Consequently, it may be more appropriate to consider the coefficient as a measure of the producer's isolation from the market rather than a reflection of pure monopsonistic power. A portion of the price differences attributed to this market variable actually may be associated with low levels of market information or with the degree of market participation of the producer as an active pricing agent.

This analysis of the systematic nature of producer prices reveals that while aberrations from the competitive pricing norm exist, the marketing system is working rather effectively. This is fairly consistent with the results of the market structure and conduct analysis of the local rural maize marketing system and the marketing margin analysis. Barriers to entry of potential competition, in terms of capital requirements and economies of scale, do not seem to be prohibitive. Higher barriers to outside competition were identified for securing information as to the location and timing of potential sales. Statistical analysis of the impact of establishing selling patterns with local buyers suggested that this variable did not influence the price producers receive. Several producers indicated that they did not sell to outside buyers, despite the higher prices sometimes offered, because of the services local buyers provided them throughout the year. These services included the transportation of consumption items from the rural population centers to local villages and readily accessible loans in times of financial difficulty.

The results of the marketing margin analysis suggested that large monopsonistic profits were not characteristic of the area's maize market. The average marketing margin expressed in terras of farm price was about 7.6 percent. An estimated weighted average rate of return on the buyers' capital and management was about 24 percent.

Although the marketing system appeared to be functioning rather effectively in terms of pricing efficiency, a number of problem areas exist. First, large marketing margins during the pre- and post-harvest periods suggest that producers' information is not adequate at these times. Earlier descriptive analysis of the relationship among the levels of information and the volume of production indicated that the smaller producer received a limited amount of accurate information on market price. Better price information could improve the position of the smaller producer and facilitate the workings of tlv *gmevdxj® babdv*u

Second, primitive on-farm storage facilities limit the producers' ability to store maize for later market sale and may cause the presence of lower quality maize in the marketing system. Producers estimated their storage losses to be 17 percent of the total amount of maize held for later sale or domestic consumption. A large portion of the producers interviewed indicated that the most important variable in deciding the timing of sale was the level of insect damage and disease. Maize was kept by the producer until he considered its potential market value to be at the point of decline. As a result, after the immediate harvest period much of the maize entering the marketing system was at the point of quality deterioration. Improved on-farm storage facilitates would enable the farmer to hold maize for sale in anticipation of higher post-harvest prices. In terms of the marketing system, it would make the flow of product more uniform and improve the quality of maize consumed off-farm.

Finally, this analysis has been within the framework of small farm production units and buyer assembly of small quantities of maize. It is possible to argue that larger volume operations would result in lower per unit transaction costs which may mean higher producer prices. Analysis of the producer data supports this position. During the second harvest, when average sales were larger, the volume coefficient became statistically significant and positively related to producer price. Perhaps, marketing

costs could be reduced by encouraging producers to pool their maize for larger volume sales.

The Mexican government has shown considerable interest in the situation of the small maize producer. It has established a network of storage facilities throughout the country to enforce its pricing policies. It also has purchased maize as a part of an effort to maintain a universal price as a form of subsidy, and to stimulate maize production. Yet, within the study area, only two percent of the ejidatarios sold maize to CONASUPO. In interviews, buyers reported that the CONASUPO price was a base price from which their margin was discounted. Given the relative efficiency of the marketing system in the study area, it appears that changes in government prices resulted in increased producer price. In this instance, the level of government prices provided an indirect benefit to the producers who did not participate directly by selling to CONASUPO.

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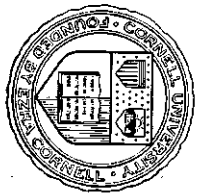
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