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EXPLORATION AND ANALYSIS OF PRODUCER PRICES OF OLIVES IN TUNISIA—A CASE STUDY PRICING IMPERFECTION

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Osama A. Al-Zand*

Although the olive crop is one of the most important crops in Tunisian agriculture, knowledge concerning its marketing, pricing, and channels of processing from primary producers to ultimate markets is deficient or non-existent. This situation is in contrast to the broadly known and more organized market of olive oil derived from Tunisian produced olives. The linkages between two separate markets, namely the primary market or market outlets for olives and the wholesale or final market for oil, are simply interpreted on the basis of available knowledge concerning the marketing of oil. This type of interpretation implies that the marketing and processing margin assessed by wholesalers and processors of olives is uniformly fixed and is independent of the level of both the primary price of olives and the corresponding price of oil.

The general objective of this paper is examination of the validity of the underlying assumptions concerning the relationship between the actual primary product price of olives and the corresponding wholesale price of olive oil, that is, determining whether the structure of the existing

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marketing system is allowing these two sets of prices to be sufficiently interdependent. Empirical findings to support or reject these underlying assumptions should have far-reaching implications of the role, efficiency, and equity of the present pricing system in linking primary producers of olives with the ultimate market for their product.

The expected type of relationship between primary and wholesale prices of olives and olive oil in Tunisia can be easily drawn since wholesale prices of olive oil are nationally regulated.^{1/} This relationship is often visualized as having a free competitive setting with efficient pricing throughout the marketing system. Under these assumed circumstances the resulting farm price of olives would be equal to the wholesale price of their corresponding oil yield minus the cost of processing and marketing. In other words, except for temporary situations, the allocations for marketing and processing margin would be fixed and independent of the level of both the primary and wholesale prices. This implies that any change in the level of either price would have an equivalent impact on the other price and a derived demand curve for the primary olive product can be established as a parallel to the given demand curve for the final oil product under all conceivable quantities. The vertical difference between the two demand curves would be equal to the normal fixed cost of marketing and processing. Consequently, given a fixed range of possible prices for the oil product at the wholesale market, the level, as well as the distribution of an observed sample of olive prices at the farm level, can be used as a major indicator of whether a parallel demand curve for olives and olive oil can be obtained. The empirical evidence which can be ascertained from these observed farm prices of olives can, therefore, be used to support or negate the free

competitive market assumptions which are presumably operating at the present time in the Tunisian system of olives and olive oil marketing.

Objectives and Procedures

Four specific objectives are sought in this paper. These are as follows:

(1) To explore the primary olive prices at the farm level as a true measure of the producer's return for his crop. This exploration attempt was undertaken via an actual on the spot survey of olive sale transactions which took place during the 1971/72 olive crop year.

(2) To relate these prices to their corresponding wholesale values calculated on the basis of the oil content of the olives. This would provide an empirical comparison of the nature of the relationship which may exist between the primary producer price of olives and the wholesale price of the oil product.

(3) To identify and analyze national and regional olive price discrepancies and distortions by testing the sensitivity of these prices to certain key elements which should determine their level and distribution under normal competitive marketing conditions.

(4) To define the nature of marketing implications, based on the above findings, and to advance appropriate policy recommendations for marketing reform and pricing efficiency throughout the entire industry.

The first step in undertaking a study of the pricing of a primary agricultural commodity at the farm level is to provide an adequate interpretation and definition of the type of marketing arrangements and systems in operation. This includes identification of the principal channels of marketing which normally connect primary producers of a product with

intermediate and final market outlets. The type of marketing channels employed by farm producers would obviously depend on the availability and cost of reaching these channels by the producers. For this reason, it is strongly relevant to explore the alternative market channels available and the degree of farmers' participation in them.

When evaluating the efficiency of agricultural pricing in terms of transmitting price information and incentives between primary producers and markets, an explicit specification must be made regarding the identity of the price receiver, the form of the product sold, and the location where the price is paid (or received). In this respect a clear distinction should be made between the agricultural producer of the primary olive product and others who deal with the primary or processed product at various stages of the marketing system such as dealers, middlemen, processors, and merchants. This distinction is critical in assessing the return to agricultural producers from the sale of their primary olive product, i.e., the return for their farm activities, in comparison to other prices or values which might be quoted as a return for handlers, and/or processors from the sale of olives and olive products.

Olives and their oil products are generally marketed through one or more of five different marketing outlets. These market outlets are as follows:

- (1) sale of the olive crop on the trees (Khadara),
- (2) sale of the harvested olives on the farm,
- (3) sale of olives in the product market,
- (4) sale of olive oil, the processed product, to the National Office of Oil (NOH) for domestic and export marketing by NOH, and

- (5) sale of olive oil via traditional arrangements for local and family consumption.

Each of the above market outlets constitutes an independent stage in the overall marketing system of the product(s). Consequently, the word "sale" is used throughout to indicate a transfer of ownership instead of a third party marketing on behalf of the original producers, such as in the case of marketing cooperatives. Marketing cooperatives for olives and their products are not common in Tunisia at the present time. The existence of these five outlets, however, does not necessarily imply that all olives go through the entire marketing channel. On the other hand, identification of the most predominantly used market outlet, in terms of the percentage of the product which goes through it, can be used as one of the most important indicators of the degree of production-marketing integration which might be feasible within this sector.^{2/}

Factors Affecting Olive Marketing in Tunisia

A large number of the agricultural products produced in developing countries reach the final domestic and export markets via multiple and often complex market channels. This is particularly true where organized markets and/or producers' marketing organizations, such as cooperatives, are either lacking or are deficient. This situation is evident in the marketing system and the arrangement currently in use for olives in Tunisia. Farmers or producers of this product tend to rely on a particular type of market outlet, depending on the various economic, managerial, and marketing factors affecting their production units in relation to the functions and role of the available markets and market institutions. When discussing

the present system of agricultural marketing of olives in Tunisia, several of these important factors should be identified.

First, olives are a highly perishable product.^{3/} The harvested crop requires immediate processing since the quality, and consequently the value, of the derived olive oil product depend on the time which elapses between actual harvesting and processing. In Tunisia this is a crucial factor where quality-preserving technologies, such as refrigeration, appropriate storage, and suitable transportation facilities, are lacking. The perishability of the olive crop implies that a farm producer must identify, or contract with, a processing facility or a marketing channel which will receive his crop immediately after harvesting. Otherwise, olive producers without an immediate market outlet or a processing facility to purchase or transform their crop would be subject to great risk of market vagaries or product deterioration. This situation might be complicated when harvesting has to be performed within a limited period of product maturity and under permissible climatic conditions.

The second important factor which affects the selection of a certain type of market outlet for olives is the availability of capital, labor, and management inputs at the farm level. Sizable amounts of these inputs are required to transform the raw olive crop into a commercially valuable olive oil product which can be traded over an extended period of time.^{4/} Producers with sufficient amounts of these inputs to undertake production and marketing of olives or their products, obviously are in a better position to subscribe to the most profitable market outlets, in contrast to those with only limited inputs. Consequently, small or subsistence producers of olives who do not have access to these marketing inputs can only rely on the most immediate market to sell their product as a cash crop.

The third important element which is often cited as a crucial determinant of olive market outlets in Tunisia is the nature of the land tenure system where this crop is produced. This factor determines the type of ownership and control over the crop and its marketing. This can best be illustrated by the case of absentee, multiple, or state ownership of a large number of olive production units where actual farm operators of these units are either tenants, laborers, or sharecroppers who usually have no control over the marketing of the crop. It has been observed that in a large number of these cases marketing decisions are often made to avoid a great amount of involvement and control over the crop after its maturity.^{5/}

The fourth important factor which normally affects olive marketing in Tunisia is the location of the farm with respect to the commodity's marketing and processing centers. Problems associated with road accessibility to farms, particularly during rainy seasons or in areas which are exposed to frequent flooding, are often cited as a major factor limiting the marketing choices available to these farmers. Olive farmers in isolated areas with no adequate transportation facilities of their own obviously are more restricted in marketing their product compared to those who have a close access to nearby marketing or processing centers.

Finally, the role which is traditionally played by the existing marketing institutions in their relation to farm producers of olives is also a factor in determining the type of marketing outlet used by these producers. The reliance of a large number of olive farmers with only limited resource endowments and marketing skills on certain types of marketing institutions is often explained by the fact that farmers receive other needed production services. Essential services, such as the provision of credit, production,

and food supplies, are usually performed by marketing entrepreneurs in order to maintain a steady cliental marketing relationship with farmers who demand, but are unable to obtain, these services from other channels. In this case, olives as a cash crop are presumably used by these marketing entrepreneurs as a collateral to insure collection of their credit from olive producers.^{6/}

Pricing of Olives

Hypothetical Price Relationship

A hypothetical price and price equivalent relationship for olives and olive oil at the various stages of the marketing channel can be established and used as a bench mark for evaluating the actual prices which might appear at these marketing stages.^{7/} This relationship can be clearly constructed on the basis of the fixed minimum wholesale prices of olive oil guaranteed by the Tunisian National Office of Oil (NOH). The difference between the wholesale price of olive oil and prices paid for olives in other marketing channels should represent the actual cost of transformation of the product from one stage to the next. The obvious assumption here is that the guaranteed olive oil price, which is known to all producers and handlers of the product, can be interpreted in terms of equivalent prices of olives at the various levels of the marketing system, given sufficient knowledge concerning the expected oil yield and the actual cost of transformation.

For the purpose of illustration, a hypothetical structure of olive and olive oil prices is shown in Table 1. The derived olive prices shown in this table are calculated on the basis of the following assumptions: (1) 20 percent oil yield, (2) 280 dinars per ton as a minimum wholesale price of oil, (3) transformation costs include 6 dinars for olive harvesting.

Table 1. Hypothetical price and price equivalent relationship of olives and olive oil in Tunisia at various stages of the marketing channel (20 percent oil yield).

Marketing Channel	Prices	
	Olives	Oil
	. . dinars per ton .	
Olive crop on the tree (Khadara) ^a	44	220
Harvested olives on the farm	50	250
Product market for olives	52	260
Olive oil wholesale market (fixed)	56	280
Olive oil domestic retail market (fixed)	80	400

^aAn olive production tax of about 2 dinars per ton is required at the farm level. An additional tax on the processor of about 2 dinars per ton of the olives is presumably levied as a service or income tax. In reality, however, the incident of this taxation is eventually carried to the original producers of olives as a commodity tax in the form of either a lower price for the product sold or a higher processing cost. The normal procedure is to collect the total charge of these taxes of 4 dinars per ton from the olive oil processors who are allowed to charge the total sum as a part of the per unit cost of processing. This system, despite its apparent inequities to farm producers of the product, is presumably designed to insure control and facilitate the collection of these commodity taxes. As a result of this, the total cost of processing which is often quoted as the official maximum which can be charged to farmers who choose to process their olives, is 8 dinars per ton instead of 4 dinars which is the average real cost of processing exclusive of all taxes (i.e., production, processing and/or income taxes). Recently this cost has been raised to 10 dinars per ton by a government order.

2 dinars for transportation, and 4 dinars for processing. A similar structure of feasible olive prices can be established for all conceivable oil yields and qualities.^{8/} In all of these hypothetical price relationships, the allowance for the marketing and transformation margin should remain constant and independent of the level of both the wholesale price of the processed oil product and other prices of the primary olive crop.

Under this hypothetical price structure, commercial producers of the primary olive crop would be indifferent to the extent of the marketing activities which they might be willing to undertake when dispensing their crop. Also, any discrepancies which might appear between prices at the first stage of the marketing channel and other intermediate or ultimate wholesale prices of the crop or its oil content should be temporary in nature.^{9/} This type of marketing structure implies that in the long run an efficient pricing system between primary producers and markets would prevail. These producers should be able to receive the full price incentive determined by the market regardless of the extent of their actual marketing participation.

Khadara Market System

The sale of oil olives while the fruit is still ripening on the trees (Khadara) is a well known marketing practice in the olive culture of Tunisia. This unique marketing system is also frequently used for selling other important tree crops such as citrus fruits, apricots, and almonds. Khadara transactions normally take place between private farmers or managers of state farms, as sellers of olives on the trees, and Khadars, as professional middlemen and/or processors who buy the crop for processing and commercial marketing. The formal format of sale resembles a public auction taking place

at a specific time and place, and with an auctioneer who conducts and reports the biddings.^{10/} Samples of the crop and estimates of the quantity of the harvest, however, are not offered at the time of the Khadara sale. These two important elements which determine the expected value of the crop are usually not disclosed to the public. This type of situation provides a great deal of speculation in the Khadara marketing institution in comparison with other forms of commercial public sales.

The reliance on the Khadara market system might be explained by various economic, management, and technical factors. Some of the more important factors which often compel the utilization of Khadara as a marketing outlet for olives are (1) the acute need for immediate cash income by a large number of small or subsistence producers who are primarily interested in securing their return from the crop and avoiding the climatic and market vagaries often associated with harvest time, (2) the relatively large labor requirements essential in undertaking a timely commercial harvesting, and (3) the incentives and management needs required to control and coordinate the harvesting operations with other transformation activities, i.e., assembly, transportation, and processing. The impact of one or more of these factors is apparently influencing a great number of primary producers of olives to depend on Khadara as a primary marketing outlet for their product.

Although there is no precise estimate of the utilization extent of the Khadara marketing institution in the total marketing system of olives in Tunisia, it is evident that Khadara is presently used by a large number of owners, controllers, and/or producers of olives who are either unable or unwilling to undertake further steps in marketing their crop beyond the

point of maturity.^{11/} For example, Khadara is heavily used by absentee or multiple owners of olive production units in order to avoid management problems and responsibilities which might be encountered when attempting to reach alternative markets. The types of farms included in this category are numerous, including a large number of extensive and relatively prosperous state farms and also other forms of private and public farm estates which are mutually owned by various individuals or which are designated for specific religious or common benefits (habous).

The Khadara sales and the corresponding farm prices derived from them, reported in this study, are based on a national survey of 105 Khadara state farm sale transactions which took place in major olive producing regions of the country. Data on each individual state farm sale conducted by the Office des Terres Domaniales (OTD) are collected at the time of these Khadara transactions. The estimates used concerning the expected size of the olive harvest and its oil yield are based on the accepted field estimates which were made available to the seller (OTD) at the time of sale. The final sale value of each Khadara includes all additional charges and taxes imposed as terms of the sale. The selection and reporting of a Khadara pricing sample is also based on a reasonable knowledge of market price indicators of olives, oil yields, and a minimum level of olive productivity of the trees offered for sale.^{12/}

Khadara Speculation

A high degree of speculation is normally attached to the Khadara system of marketing. Speculation is usually induced by the lack of sufficient and reliable information concerning the size of the olive crop, its oil yield, and the corresponding market value of the final olive oil product.

An estimate of the size of the olive harvest, at the time when the fruit is still ripening on the trees, on each farm offered for Khadara is arrived at only through visual inspection of the trees. The accuracy of the estimates made either by the farmer, farm manager, or the Khadar (buyer) cannot be verified. Consequently, an unknown margin of error always remains between the actual yield of olives after harvest and the corresponding estimate made before harvesting prior to the time of sale. In most cases appraisals of olive yields are made on an individual basis, resulting in a wide range of estimates depending on the skill and objectivity of the estimator.

Despite these shortcomings, estimates of the expected total yield of olives for each farm offered for Khadara have to be made prior to the time of sale. The estimation procedures are usually made on the spot via visual inspection of the reported number of productive trees and estimation of their corresponding levels of production. These estimations are often carried out either by considering the average yield of all the trees on the farm or by grouping a certain number of adjacent trees (Setour) and estimating their corresponding yields. The estimator presumably would look for the size of the trees, i.e., height, density, and circumference, or the number of producing branches and their corresponding yields. It has been said by olive traders that the more experienced estimators can arrive at a reasonable estimate closely approximating the actual level of olive yield per tree. This, however, cannot be confirmed unless the estimates are verified after harvesting. The probability of error obviously would increase when a large number of trees are involved and/or when an experienced and objective estimator cannot be found or used.

The other important factor which is often left to speculative predictions at the time of Khadara is the expected oil yield of olives offered for sale. In most cases oil yield estimates are made entirely on a subjective basis by the parties participating in the Khadara. A common practice in estimating general oil yields by a buyer is to crush a single olive between the fingers to feel the oil content. Obviously, buyers of olives with processing facilities of their own are more experienced in doing this type of oil test, as they have the chance to verify their estimates after actual crushing and processing. These buyers, and particularly those who bought the olive crop in earlier years, are better informed about previous average oil yields on a specific farm. Consequently, several speculative oil yields are often quoted depending on the scope and accuracy of information available. On the other hand, farmers or sellers of olives without access to processing facilities to test or verify the oil content of their olives must rely on a rather general estimate of the actual oil yield which cannot be confirmed at the time of sale.

Finally, farmers or sellers of olives via Khadara often do not have access to reliable information regarding the cost of transforming their olives into olive oil. This situation, of course, tends to intensify the degree of uncertainty about the actual value of the crop and, consequently, would increase the amount of speculation in determining its sale value at the farm. Numerous problems are usually cited in estimating the total cost of transforming an olive crop from a particular farm to the final olive oil available for the wholesale market. This is particularly true when estimating the management cost of these numerous operations from the farm to the market.

Table 2. Estimates of Khadara olive prices achieved in Tunisia during 1971/72 crop year.

Sfax	Sousse	Kairouan	Tunis	Nabeul	Jendouba	Beja	Bizerte
. dinars per ton.							
90	53	60	65	41	40	50	59
87	41	30	62	38	37	48	50
84	30	17	60	33	36	46	44
77	26	14	51	32	36	46	41
67	25		41	31	35	45	39
66			40	31	31	45	37
65			39	31	22	45	35
64			37	30		38	35
63			35	30		35	35
58			33	29		35	33
54			32	28		35	32
52			32	28		31	30
50			32	27		31	29
49			31	25		28	28
48			31	18		24	
46			31			9	
41			30				
40			27				
37			25				
29			24				
27			24				
26			21				
P* = 53	30	24	32	30	36	36	35
\bar{P} = 55	35	30	36	30	34	37	38
\bar{R} = 26%	23%	20%	19%	20%	20%	19%	18%
$\frac{\bar{P}}{\bar{R}}$ = 212	152	150	189	150	170	195	211

P* = Median price which is the middle value of the price distribution.

\bar{P} = Simple average price of olives in dinars.

\bar{R} = Reported percent average yield of oil.

$\frac{\bar{P}}{\bar{R}}$ = Price equivalent of olives in terms of corresponding oil yield, dinars per ton.

Khadara Prices of Olives

Table 2 shows the final estimates of Khadara prices of olives sold in Tunisia during the 1971/72 crop year. These estimates were made from the state farm sales between the Office des Terres Domaniales (OTD) and private buyers contracted as Khadara. Each price estimate is based on an individual sale of an entire olive crop on a farm. That is, the price is calculated using the final sale value of the crop, including taxes, insurance, and other expenses, divided by the best estimate of the total expected volume of harvested olives. Crop estimates of individual farms were made by the OTD prior to the time of sale.^{13/} The resulting prices shown in Table 2, which are based on an actual national survey of contract sales of olives, are considered the best indicative approximation of farm or producer prices.

Several key observations can be drawn when evaluating the general level and distribution of the price data shown in Table 2. First, the observed range of these prices can be related to the feasible price boundaries allowed under the present system of market and price control for oil. The boundaries of olive prices can be easily established when sufficient knowledge concerning oil yields and prices is specified. Oil yields of olives sold under the reported Khadara system ranged between a minimum of 17 percent to a maximum of 28 percent, while the range of the guaranteed wholesale price of olive oil is fixed by the National Office of Oil as between 250 and 280 dinars per ton. Given these ranges of oil yields and prices, along with reasonable estimates of the cost of olive transformation, feasible price boundaries of olives can be shown in the following diagram.

Table 3. Feasible boundaries of olive prices under specific wholesale prices of oil, oil yields, and the costs of olive transformation. a/

Oil Yield Percent	Guaranteed Wholesale Price of Oil (Dinars/Ton)				
	250	255	260	270	280
17	X				X + 5
↓					↓
28	X + 28				X + 36

a/ It is assumed that each percentage point of oil yield of olives should pay out between 25 to 28 dinars per ton of olives at the reported levels of oil yield. For calculation purposes of these boundaries see O. Al-Zand, Producer Prices for Olives and Olive Oil in Tunisia, Staff Paper P71-21, Department of Agricultural and Applied Economics, University of Minnesota, October 1971, p. 14.

The above diagram shows that the maximum feasible price disparity of olives should not exceed 36 dinars per ton. This price difference is between the value of olives which have the lowest oil yield (17 percent) of the lowest quality (lampante at 250 dinars per ton) and the value of olives which have the highest oil yield (28 percent) of the highest quality (super at 280 dinars per ton).

It is obvious that the maximum feasible price disparity between olive prices of extreme oil yield and quality indexes is significantly lower than the actual price disparities shown in Table 2. For example, an inter-regional comparison between the highest price achieved in Sfax and the lowest price reached in individual producing regions reveals a minimum disparity of 62 dinars per ton (highest price in Sfax minus the lowest

price in Bizerte) and a maximum disparity of 81 dinars per ton (highest price in Sfax minus the lowest price in Beja). The overall average of these price disparities is about 70 dinars per ton, or about twice the maximum price disparity allowed for olives of extreme quality differences. At the regional level, Sfax prices show the maximum disparity among producing regions of 64 dinars per ton.

Olive price dispersions among regions is also shown to be reflected by the large differences between the maximum prices achieved in the high priced region (Sfax) compared to the other producing regions. For example, the maximum olive price achieved in Sfax is 39 percent higher (or 25 dinars per ton) than the next highest price paid for olives in other regions. On the other hand, olive price dispersions among regions are shown to be more uniform at the lower end of the price range.

Second, considerable difference is also evident in the overall price level of olives which are sold in various parts of the country. The price level of olives sold in each region is shown as either the medium (P^*) or the simple average of the Khadara prices reported in these regions (\bar{P}). Since these prices are shown without their corresponding oil yields, (\bar{P}) or (P^*) can be considered as the best possible approximations of the overall prices of all olives sold in each region as a homogenous product. A significant difference in the price level is particularly evident when comparing average price indicators achieved in Sfax with those reached in the rest of the country. The Sfax price is about 38 percent higher than the average price realized in other producing regions. This significant price difference must be viewed on the assumption that the overall average oil yield of olives produced in each region is comparable.^{14/}

Furthermore, regional price distortions continue to be strongly evident when comparing average regional prices corrected by corresponding oil yields $\left(\frac{P}{R}\right)$. In this case the corresponding oil equivalent prices of olives can be considered as the standardized price of all olives as a homogenous product. Consequently, these prices should be compared directly. This implies that when the price of the final olive oil product is fixed, it must follow that the standardized regional prices of olives should be more or less uniform. The resulting prices shown in Table 2, however, exhibit a great degree of incompatibility, particularly when comparing the standardized average price achieved in Sfax with those in other producing regions. In this situation the Sfax price continues to maintain its high premium over all other regional prices except Bizerte. This Sfax premium amounts to about 40 percent in comparison with prices received in Sousse, Kairouan and Nabeul.

Finally, the price series values shown in Table 2 fall in a limited range. For example, 65 percent of the total observed prices (or 68 out of the 105 price observations) fall on or below 40 dinars per ton. This tendency is significantly stronger in the seven producing regions, excluding Sfax, where 76 percent of the observed prices are equal to or less than 40 dinars per ton. This group of prices, which can be called mode prices, might be considered the most representative of the level of prices possible under the Khadara marketing system.

Analysis of Prices

The Khadara prices of olives reported in Table 2 are analyzed using three kinds of tests to attempt evaluation of the sensitivity of these prices to actual marketing conditions. Each test will utilize the best

available estimates of costs, prices, and price deviations which are most feasible in the real market situation of olives and olive oil in Tunisia. The sensitivity of Khadara prices of olives is tested by relating these prices to:

- (1) the corresponding yield and value of oil,
- (2) the existing market prices of olives, and
- (3) a reasonable allowance of possible price distribution.

Oil Yield and Value

Although all the value of oil olives produced and sold as such is derived from the value of their oil content, the exact oil yield of olives is usually not known by the farmer or seller of the product at the time of sale. Independent estimates of oil yield are made, however, by expected buyers-processors of Khadara via individual inspection of olives at the farm. The estimates, of course, are not revealed by these buyers at the time of Khadara.

On the other hand, more general historical estimates are often quoted by producers indicating the level of oil yield previously obtained on their farms. These estimates are considered as the minimum base yield of oil which should be obtained from olives produced on these farms in any given year. Oil yields of olives sold by OTD farms via Khadara are obtained directly from the individual producers or managers. These yields are considered the best average indicator of the oil yield of olives sold as they are accepted by OTD at the time of sale. The sensitivity of the resulting Khadara prices are tested against the corresponding value equivalent of oil obtained from these quoted yields.^{15/}

Whenever the oil yield of olives can be determined, its corresponding

value can simply be derived, since minimum producer prices of olive oil are fixed. These prices are paid to producers or sellers of olive oil according to quality. Five distinct grades of quality are fixed in terms of the free fatty acid content of the olive oil offered for sale to the National Office of Oil. Consequently, for each quality of olives measured in terms of its oil yield, there is a range of five possible prices or values reflecting the difference in the grade of the oil sold.^{16/}

Khadara prices of olives are examined in terms of their corresponding values, which are measured on the basis of the given yields and the assumed cost of transforming olives from the farm into the olive oil product. The results are shown in Table 4.

The range of prices achieved in each yield category is compared with a range of prices calculated on the basis of specific assumptions regarding the value and cost of the olive oil content expected from each yield. The number of actual price observations which fall outside the calculated range are rejected as being economically unrealistic in terms of the value of the olive oil product (last column). According to this criterion, Table 4 shows that 68 of the Khadara prices reported, or 65 percent of all price observations, are rejected as being unrealistic. This represents a significant portion of the price observations reported. It also can be seen in Table 4 that in the most frequently quoted average oil yield category of 20 percent, the number of price observations rejected is more than three times the number of price observations which are accepted. It is recognized that this result might be partly a reflection of some degree of misrepresentation of this average yield category since it is often used as a general base of the quality of olives sold via Khadara transactions. This

Table 4. Test of actual Khadara prices of olives against calculated normal value of their oil equivalent according to respective yields, 1971/72 crop year.

Oil yield percent	Minimum-maximum price range of corresponding		Number of Khadara price observations	Minimum-maximum Khadara price ratio percent	Number of Khadara price observations	
	Khadara prices observed	Calculated prices ^{a/}			Accepted ^{b/}	Rejected ^{c/}
17	25-41	29-40	4	61	2	2
18	9-62	32-43	25	14	13	12
19	21-48	34-46	7	43	2	5
20	14-65	37-49	41	22	10	31
21	32-32	39-52	1	100	-	1
23	25-67	44-58	10	38	3	7
24	26-84	46-61	5	31	2	3
28	37-90	56-73	12	41	5	7
Total number			105		37	68
Percent of total					35	65

^{a/} The normal calculated price range is based on the following value and cost assumptions: (1) whole-sale price of olive oil ranges between 240 and 300 dinars per ton, (2) harvesting cost is 6 dinars per ton, (3) transportation cost of olives is 1.5 dinars per ton, (4) processing cost is 5 dinars per ton, (5) value of olives by-products (grignons), estimated at 30 percent of the crushed olives, is 5 dinars per ton. See O. Al-Zand, Prix a la Production des Olives et de l'Huile d'Olive en Tunisie, Rapport de Recherche en Economie Agricole No. 10, August 1971, p. 15.

^{b/} Number of actual price observations which fall within the calculated price range.

^{c/} Number of actual price observations which fall outside the calculated price range.

reservation, however, can be substantiated only when specification of this yield with respect to each transaction is verified. At the present time, however, this yield is the one most often quoted in many olive sale transactions. In the case of the Khadara sales reported, a 20 percent yield is quoted for about 40 percent of all transactions.

Another crucial indicator of the extent of Khadara price distortions can also be measured in terms of the minimum-maximum price ratio reported for each oil yield category. These ratios, Table 4 (column 5), should be compared to the normal standard ratio of 75 percent, which is based on the price range considered possible for each class of yield (column 3). It is evident from this comparison that in almost all cases the actual minimum-maximum Khadara price ratios are substantially lower than the normal 75 percent. This strongly points out that the Khadara pricing system permits considerably wider pricing extremes than what might be considered an acceptable normal range. This phenomenon further underlines the speculative elements existing in this system of marketing.

The comparability of the reported Khadara prices, as farm level prices, with the corresponding wholesale value equivalents can also be empirically evaluated by a simple regression technique. The following mixed results are obtained when regressing these calculated wholesale price equivalents on the corresponding Khadara prices reported in this paper:

$$\begin{aligned} (1) \quad \text{Tunisia} \quad W &= 34.6809 + 0.3095 F \\ R^2 &= 0.28 \quad N = 105 \quad (14.28) \end{aligned}$$

$$\begin{aligned} (2) \quad \text{Beja} \quad W &= 39.1340 + 0.1079 F \\ R^2 &= 0.20 \quad N = 16 \quad (15.27) \end{aligned}$$

- (3) Tunis $W = 37.4412 + 0.0938 F$
 $R^2 = 0.11 \quad N = 22 \quad (15.56)$
- (4) Sfax $W = 55.5666 + 0.1037 F$
 $R^2 = 0.09 \quad N = 22 \quad (12.17)$

Where:

W = wholesale price equivalent of olives,

F = Khadara farm price of olives,

R^2 = coefficient of determination,

N = number of price observations.

Numbers in parentheses are "t" values.

The above linear regression equations fail to reveal a significant correlation between farm and wholesale prices of olives. When regressing equivalent wholesale prices on all Tunisia Khadara prices reported, only 28 percent of the variation in the wholesale price (R^2) can be explained by the variation in the corresponding Khadara price. In all of the above regression estimates, the size (slope) of the linear regression coefficient is significantly different from 1.0. This seems to imply that (1) farm prices are independent of wholesale prices, (2) marketing margins are not independent of these prices and, consequently, (3) there is strong evidence that price irregularities and/or distortions do exist in the present system of Khadara pricing.^{17/}

Market Prices of Olives

Khadara prices of olives can also be evaluated using the reference market prices quoted in each producing region at the time of Khadara.^{18/} Regional market prices are considered as another approximation of the market value of the primary product sold in the respective regions. These

prices may vary over the harvesting season, reflecting changes in the oil and moisture content of the olives, which in turn are subject to changing climatic conditions affecting the maturity and quality of the fruit. On the other hand, since the final market prices of olive oil are uniformly fixed across the country, a stable relationship should be expected between these prices and the actual market price of olives. Theoretically this requires that each class of olives of a specific oil content and of a certain quality should receive the same price regardless of its place of origin. That is, producers of olives and olive oil are facing an infinitely elastic demand for their products at a specific known price which is nationally fixed by the government.

The relationship between average market and Khadara prices of olives at the regional level is shown in Table 5. Except for Sfax and to a lesser degree for Sousse, these two sets of average prices of olives are consistent.^{19/} A positive difference between the market price in any given region and the corresponding Khadara price should be assigned as the olives transformation margin. This includes the cost of harvesting and transportation services required to bring olives to the market center. The normal cost estimated for these services is usually specified at 6 and 2 dinars per ton of olives for harvesting and transportation, respectively. The level of transformation shown implies that farmers in Kairouan, Tunis, Jendouba, Beja, and Bizerte do not have a strong price advantage in the market place in comparison to Khadara. On the contrary, the Khadara average price in Sfax is shown to be considerably more favorable to farmers than the average market price quoted in the market center of Sfax.

It must be emphasized here that any meaningful interpretation which

Table 5. Average market and Khadara prices of olives and the transformation margin recorded at the beginning of the 1971/72 olive crop year.

Region	Market price	Khadara price	Transformation margin
 dinars per ton.		
Sfax	51	55	-4
Sousse	35	35	0
Kairouan	35	30	5
Tunis	46	36	10
Jendouba	41	34	7
Beja	46	37	9
Bizerte	46	38	8
Tunisia (Average)	43	38	5

can be drawn from comparing Khadara prices with the reported regional market prices of olives ought to be carefully considered. The reported market prices are not necessarily representative of the actual farm price in any particular region. This is explained by the fact that most olives brought to the market place, particularly in the Sfax market center, are marketed via professional dealers or Khadars for their own benefit. On the other hand, both the average market and the Khadara prices shown in Table 5 might be considered by farmers as the optimum commercial value of their crop at the market place. The difference between these two price indicators does not appear to be sufficiently adequate to provide strong incentives to olive farmers to market their output in the market place instead of direct selling through Khadara. This is in addition to the fact that organized marketing centers for olives are not always available.

The comparison of average market and Khadara prices of olives in Tunisia might also reveal that buyers of the commodity can interchangeably utilize both channels to obtain olives for immediate processing or subsequent selling, depending on the local price condition and the cost of transformation services. In this case, market prices of olives which appear in the market center can only be regarded as an extension of Khadara, the more dominant system of price making of olives in Tunisia.

Khadara Price Distribution

Khadara price distribution provides another test of the responsiveness of these prices to the actual market values of olive oil in Tunisia. This distribution can be constructed on the basis of corresponding value prices which in turn are based on the actual oil yield value of olives sold by each individual Khadara transaction.

The distribution of Khadara prices around their corresponding value price equivalents is shown in Table 6. It is shown on the basis of the difference between each Khadara price and its corresponding value price. This difference is expressed in terms of a percent deviation of the Khadara price in comparison with the corresponding value price. The number of Khadara price observations which fall within a specific range of corresponding value prices (negative or positive) is indicated. For example, in the Sfax region the Khadara price distribution for 22 cases shows that 16 price observations, or 73 percent of all Khadara prices reported in that region, are inferior to their corresponding value prices (f^-). The rest of the 6 prices, or 27 percent of all prices, are superior to their corresponding value prices (f^+). The distribution of prices within the positive and negative distribution ranges is also shown. For example, 5 of the Khadara prices reported in Sfax are shown to be more than 40 percent inferior when compared with their value equivalent. On the other hand, only one price observation falls on the corresponding positive side. The absolute (n) and relative distributions (n/f and n/F) of Khadara prices with respect to their corresponding values are shown for all major olive producing regions of Tunisia.

The overall Khadara price distribution shows a strong negative bias. When comparing all Khadara prices reported with their corresponding values, Table 6 shows that 77 percent of these prices are below their value in oil equivalent terms. Khadara prices which are more than 20 percent below their corresponding values account for 49 percent of all prices. On the positive side, only 23 percent of all Khadara prices are above their corresponding values of which only 10 percent are more than 20 percent superior to their value equivalent.

Table 6. Distribution of Khadara prices of olives in terms of the corresponding value equivalent of oil yields, 1971/72 crop year. ^{a/}

Governorate	Percent negative deviation			Total negative frequency f^-	Percent positive deviation			Total positive frequency f^+	Total frequency F
	60-40	40-20	20-0		0-20	20-40	40-60		
Sfax	n	5	3	8	16	2	3	1	22
	n/f	31	19	50	100	33	50	17	100
	n/F	23	14	36	73	9	14	4	27
Sousse	n	3	1	0	4	0	0	0	4
	n/f	75	25		100				
	n/F	75	25		100				
Kairouan	n	2	1	0	3	0	1	0	4
	n/f	67	33		100	100			100
	n/F	50	25		75	25			25
Jendouba	n	1	2	4	7	0	0	0	7
	n/f	14	29	57	100				
	n/F	14	29	57	100				
Tunis	n	1	9	7	17	2	1	2	22
	n/f	6	53	41	100	40	20	40	100
	n/F	4	41	32	77	9	5	9	23
Nabeul	n	3	10	2	15	0	0	0	15
	n/f	20	67	13	100				
	n/F	20	67	13	100				
Beja	n	1	6	2	9	7	0	0	16
	n/f	11	67	22	100	100			100
	n/F	6	38	12	57	44			44
Bizerte	n	0	3	6	9	2	1	1	13
	n/f	33	67		100	50	25	25	100
	n/F	23	46		69	15	8	8	31
Tunisia	n	16	35	29	80	13	6	4	103
	n/f	20	44	36	100	57	26	17	100
	n/F	15	34	28	77	13	6	4	23

^{a/}The value of oil yield is calculated on the basis of 280 dinars per ton, taking into consideration 6 dinars per ton olives as harvesting cost. The oil yield value equivalent formula is shown in O. Al-Zand, Prix a la Production des Olives et de l'Huile d'Olive en Tunisie, Ministère de l'Agriculture, Bureau du Plan et du Développement Agricole, Rapport de Recherche en Economie Agricole No. 10, p. 15.

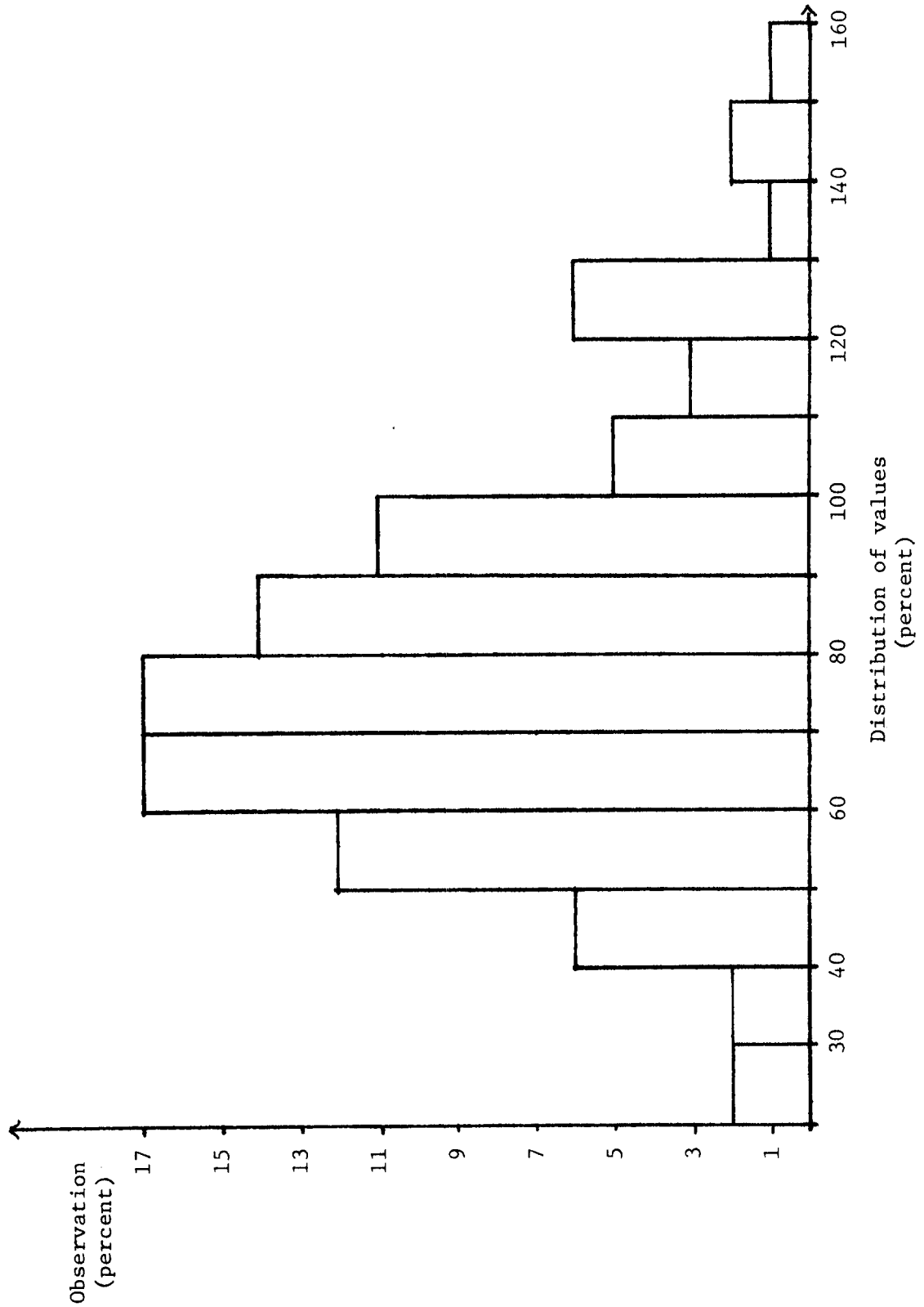
The central tendency of the Khadara price distribution shows that only 31 percent of the observations reported are within a 20 percent range of equivalent norm value prices. Half of these observations are within a 10 percent range. This can be compared with normal statistical distribution of value prices where 67 and 95 percent of expected prices would fall within 17 and 34 percent of the average price, respectively.^{20/}

The percentage distribution of Khadara prices and their corresponding olive oil values are pictured graphically in Figure 1.^{21/} This figure clearly shows that about 80 percent of all Khadara price observations are inferior to their corresponding values (i.e., the 100 percent mark).^{22/} The entire price distribution is also shown to be negatively distorted by about 20 percent when contrasted with a normal distribution.

Conclusions

The principal objective of this study was to explore and analyze actual producers' prices and the price formation of olives in Tunisia as a primary agricultural crop sold at the farm level. An on the spot survey of olive sale transactions contracted as Khadara during the 1971/72 crop year was used as the prime source in identifying the actual level and distribution of primary producer prices of olives. Despite its many shortcomings and speculative nature, Khadara is currently used in Tunisia as a traditional marketing institution and is the most direct market outlet for a large number of producers who need to sell their crop for immediate cash. This outlet is often offered as the only market alternative where adequate incentives, credit, marketing facilities, and management skills are not available for undertaking further steps in marketing olives beyond direct selling

Figure 1. Percent Khadara price distribution and corresponding values in olive oil equivalents.



after crop maturity. In these cases, Khadara provides an essential market security for the highly perishable agro-industrial oil olives.

The general level and distribution of producers' prices derived from the reported Khadara transactions show a considerable disparity from the feasible range of olive prices calculated on the basis of the given yields and the regulated olive oil prices. The difference between maximum and minimum prices achieved is shown to be significantly higher than the possible price differences which can be explained by the extreme olive quality differences in terms of oil yield and grade. Interregional price comparisons reveal a sizable distortion between Khadara prices in different regions. These distortions are strongly evident when average regional prices were corrected by corresponding oil yield levels. Price distortions are particularly noticeable when comparing the relatively high prices paid for olives in Sfax with those paid in other important producing regions. The general tendency of the Khadara prices shown indicates that about 65 percent of them are equal or inferior to 40 dinars per ton. This percentage goes up to 76 percent when Sfax prices are excluded.

Detailed analysis of Khadara prices suggests that they are largely independent when related to their corresponding oil yields, market values, and the most probable normal statistical distribution. Simple linear regression analysis of Khadara and corresponding wholesale prices fail to reveal any statistically significant relationship between these two sets of prices. In all the cases tested the slope of the regression coefficient obtained was significantly different from 1.0. This result can be advanced as strong evidence of price incompatibility at different stages of the market channel. This is a clear indication of serious pricing inefficiencies

within the olive oil industry. A further test, using oil yields and values as price indicators, shows that 65 percent of Khadara farm prices do not conform with the range of value prices allowed for each yield category fixed on the basis of oil quality differences. Almost half of these nonconforming prices fall within the most commonly quoted olive oil yield category of 20 percent.

Except in the case of Sfax, the relationship between Khadara prices reported and the casual market prices of olives quoted at the time of Khadara appears to be consistent. This consistency provides another indication of the influence of the Khadara marketing practice on the entire olive market price situation and is explained by the dominance of this practice in comparison with product market sales. Consequently, the relative discrepancy between market producer prices of olives (Khadara price minus the marketing margin required to bring olives to the product market) and the wholesale price equivalent of olives in terms of their oil yield and value remains the same.

Finally, the overall distribution of Khadara prices along their corresponding mean values indicates that 80 percent of these prices are distributed (Figure 1) to the left side of the 100 percent value equivalent (i.e., negatively skewed). About 50 percent of these prices are shown to be more than 20 percent inferior to their corresponding values. This type of skewed distribution is, of course, significantly different from any normal price variance which might be expected if price errors or distortions are randomly distributed (i.e., have no negative or positive biases).

Policy Implications

The foregoing producers' price exploration and analysis should be considered as a first step only in evaluating the overall market structure, systems, operations, and performance affecting the pricing of a primary agricultural product at the farm level. Further research analysis is required to examine the role and efficiency of the existing marketing institutions, including Khadara, for the purpose of introducing possible marketing reforms and more efficient pricing systems for primary producers.

This study underscores the critical need for more reliable information and systematic reporting on actual farm prices of olives as the vital primary product of the olive oil economy. Adequate price information should be of considerable value to farm producers, dealers, and processors of olives in planning and determining their production and marketing activities. Government policy makers also need this type of information when assessing the efficiency of the existing marketing system and programs in terms of transmitting price incentives to the primary producers of the product.

Responsive and adequate farm prices should be of considerable value in facilitating the achievement of various policy objectives. The most important objectives in traditional olive culture are (1) to integrate small and subsistence producers of the primary product into a national commercial marketing system, (2) to give adequate incentives to expand the level of production and improve quality, (3) to introduce more appropriate resource allocation in terms of more equitable price sharing, and (4) to encourage a more efficient system of marketing and processing practices from the standpoint of timing, space allocation, and technology of the transformation operations.

The producers' price analysis shown in this paper points out the existence of two distinct and largely unrelated markets -- one for the primary olive product and the other for the processed olive oil product. This implication is supported by the great degree of variability in the marketing margin exhibited in the sample studied between corresponding prices at the primary and processed levels. This variability is particularly evident in the areas where primary product markets are completely unorganized (i.e., all regions except Sfax). Excessive allowances for marketing margins, beyond the actual cost of transformation, implies that a pure profit is accruing to middlemen by way of price manipulation at the primary product level. If price discrepancies between these two markets are maintained in the long run, it implies that certain key market characteristics and/or imperfections, other than those which are assumed in a free competitive market, are affecting pricing behavior at the primary level.

In a noncompetitive setting, two major hypotheses can be advanced to explain the resulting pricing behavior. First, a variable and largely excessive marketing margin can only be maintained through monopolistic pricing and market power exercised by buyers of the product at the primary level. This hypothesis can be supported by the existing market structure influencing the price making forces of olives operating at the farm level in contrast to the ultimate market situation of the final olive oil product. Various degrees of monopsony pricing techniques are possible, given the nature of the olive market structure. This structure is characterized by (1) a large number of small scale or subsistence producers who are scattered over wide geographical areas across the country, (2) lack of effective marketing or producer cooperatives to undertake the selling of olives on

behalf of the primary producers or to strengthen their bargaining power as sellers of a cash crop, (3) absence of adequate knowledge concerning the cost of transformation and the net ultimate value of the product at the final market, (4) the relatively high degree of risk associated with the perishability of olives along with the requirements for numerous and rather costly processing and transformation services, (5) lack of widespread and organized product market centers at the primary stage, and (6) a highly restricted entry to the processing and marketing industry for primary producers of olives because of cost and technical barriers.

The analysis of producers' pricing performance shown in this study can be used as strong evidence to support the existence of monopsony pricing behavior in the primary market for olives in Tunisia. Further data and information concerning the above structural characteristics of the primary olive market are required to provide additional evidence of the monopsony pricing hypothesis.

Policy measures implied from this situation suggest the need for effective modifications of the most critical market structure elements associated with monopsony pricing behavior by marketing firms and institutions. Policy measures and programs to institute marketing cooperatives or comparable mutual marketing schemes to market the product on behalf of the primary producers should be of considerable value to enhance the bargaining power of these producers and make the prices received by them more responsive to market values. Another urgently needed measure to improve the marketing system of olives in Tunisia is implementation of a market information scheme for the purpose of assembly and dissemination of key market data on a timely and regular basis. This should include knowledge

of the availability and cost of marketing inputs to producers, such as cash credit and transportation facilities. All these institutional processes can be evolved from the present marketing and pricing system without drastically changing the entire market structure or the principles upon which it is based.

The second hypothesis which can be advanced in analyzing the resulting producer prices of olives is that only regional pricing distortions exist presently when comparing the Sfax market price with those of the other producing regions of the country. The implication of this hypothesis suggests that Sfax market prices are sufficiently adequate in terms of their responsiveness to actual market conditions and in the transference of their full incentives to primary producers of the product in comparison to those existing in other regions. If this is the case, policy measures should be directed toward introducing the positive aspects of commercial olive marketing in Sfax into the other producing regions. The Sfax market is considered here as a model in focusing policy measures for overall improvement of the olive marketing system. Some of the positive elements of the olive market structure which can be explored for policy decisions are (1) the commercial market organization and the system of marketing information dissemination, (2) the allocation of marketing and processing facilities in relation to the size of the crop marketed, (3) the extent of cooperative marketing or production-processing integration, (4) the nature of management skills and entrepreneurial abilities available, and (5) the control methods exercised in coordinating harvesting and processing operations.

In summary, any policy implications which can be derived from this

study greatly depend on the nature and extent of pricing inefficiencies or distortions which might be visualized when evaluating primary producer prices of olives resulting from the present system of marketing via Khadara. It is clearly evident, however, that a provision of more responsive market alternatives to primary producers of this product for more efficient and equitable pricing should be considered a principal policy goal.

FOOTNOTES

- 1/ During the early 1960's a new market organization for the Tunisian olive oil economy was introduced. The apparent objective was to maintain a production and export advantage in olive oil as an important domestic food commodity and as a principal source of foreign exchange earnings. Government regulations were designed to guarantee the flow of olive oil exports despite production fluctuations and resulting deficits in domestic supplies. The organization primarily entailed state control of marketing, pricing, and exporting of olive oil as well as permitting state imports of cheaper substitute oils to supplement domestic requirements for edible purposes. A more significant step was taken in organizing the olive oil market beginning with the 1967/68 crop year when the entire wholesale pricing of olive oil was assumed by the National Office of Oil (NOH). This included a guaranteed minimum price for the final olive oil product according to quality. These prices are to be announced at the beginning of each olive production year with a possible price supplement to be paid at the end of the marketing season. The NOH was made the sole national agency to purchase olive oil at these prices for domestic and export marketing. The market organization of olive oil, however, has had little implication for the primary producers and sellers of olives as an agricultural crop. Nevertheless, it has been assumed that market organization of the oil sector will eventually be reflected in the market for the primary olive

product. This opinion is obviously based on the understanding that a free competitive market force among marketing and processing institutions would fully transmit market changes and incentives to the primary producers of the olive crop.

- 2/ Although data does not exist at present to verify the most predominantly used market outlet by agricultural producers of oil olives in Tunisia, it is quite evident that selling of olives by farmers while the fruit is still ripening on the trees continues to be one of the most popularly used traditions in olive culture. This conclusion is based on the facts that (1) farmers continue to rely on this type of marketing institution despite the temporary ban placed on it during the 1968/69 crop year and (2) other intermediate and final market outlets are largely used by non-farmers, i.e., middlemen, agents, and/or owners and operators of olive oil processing facilities. Prices received or paid by these non-farmers are not considered as an adequate measure of farm price. A discussion of the Khadara market system of olives in Tunisia will follow in the latter part of this paper.
- 3/ When identifying appropriate marketing channels for perishables, a distinction can be made between two groups of commodities. The first group includes products which are directly edible with little or no processing required. This group includes products such as fresh fruits and vegetables which are primarily destined for immediate consumers' markets, e.g., citrus, apricots, table grapes, tomatoes, etc. The most essential market requirement for these kinds of products is to bring them over time and space to the ultimate consumer at the least possible cost and

delay. The second group of perishables includes the so-called agro-industrial products, which include oil olives, wine grapes, certain oil seeds, and sugar beets. These products require immediate and substantial processing and transformation services before they can be available for direct use. For these products the link between agricultural production and industrial processing is an essential factor in determining the ultimate value and marketability of the product. Coordination and/or integration between these two separate activities always should be beneficial in terms of quality and value of the product, regardless of who controls or owns the product, i.e., whether the farm producer or processor.

- 4/ The nature and cost of these marketing and transformation services in relation to the market value of the raw olive product will be discussed later.
- 5/ Almost all of the olive crop produced on state farms, Office des Terres Domaniales (OTD), in Tunisia in the last two years was sold directly to private buyers via Khadara. Khadara as a market outlet is also heavily used by a large number of absentee and/or multiple owners of olive plantations who usually do not take an active role in their farm production enterprise.
- 6/ There is insufficient information regarding the extent to which this practice is actually employed and its effect in dictating the type of marketing relationship most heavily used by these olive producers. However, it is conceivable, in a situation where cooperatives or other mutual government schemes to supply these services are either lacking

or are inaccessible to farmers with only limited assets, that individual marketing institutions and/or marketing entrepreneurs could play a significant role in determining the scope and type of market outlet to be made available for their clients.

- 7/ Although the price relationship discussed in this section is classified as hypothetical, it is, nevertheless, linked to the actual wholesale price of olive oil. This price is fixed by the government at the beginning of each crop year. The estimates of cost of transformation which are added to these prices are based on a partial survey of several processing and marketing facilities by the author.
- 8/ The wholesale price of olive oil used in Table 1 is the guaranteed minimum price for Super quality oil paid by the NOH. The guaranteed minimum producer-wholesale prices of olive oil (or price advances) are specified according to quality of oil measured in terms of maximum percent content of free fatty acids (ffa). These fixed prices are as follows: 280 dinars per ton for Super (0.7% ffa); 270 dinars per ton for Extra (1.0% ffa); 260 dinars per ton for Fine (1.5% ffa); 255 dinars per ton for Ordinary (3.3% ffa); 250 dinars per ton for Lampante (more than 3.3% ffa). This set of fixed prices has not changed over the last three years. A price supplement, however, in addition to the fixed minimum price is also paid at the end of the marketing season. These supplements have varied considerably from year to year and ranged between 5 and 30 percent of the original minimum fixed price.
- 9/ The implication here is, of course, given in the conventional free competitive market model. The critical assumptions made in this case

are (1) perfect knowledge about the market, (2) easy entry and/or exit into the processing and marketing industries, (3) absence of institutional or structural barriers in trading the product.

- 10/ The traditional Khadara transactions are usually conducted directly between a single buyer or processor and a farmer, based on a long established cliental relationship. In some cases the buyer provides other needed services to the farmer, such as credit. Information on this type of Khadara transaction is not available at the present time.
- 11/ Unofficial reports indicate that at least 50 percent of the olives produced in Tunisia are normally marketed through Khadara. This estimate is subject to verification. The popularity of the Khadara system is, however, clearly apparent at olive harvest time when a large number of public or private announcements concerning olive Khadara appear across the country.
- 12/ The number of trees on each farm offered for Khadara is usually known. A distinction is made between fully grown and productive trees (Walid) and young or less productive trees (Beshayer). The average minimum quantity yield of olives per tree offered in Khadara is assumed to be no less than 10 kilos. An olive production level of less than 10 kilos per tree is not considered commercially important and, consequently, all production estimates in this range are eliminated from the Khadara sample.
- 13/ In some cases, the OTD specifies a "target value" for each farm sale presumably based on the most "realistic" estimate of the crop on the

trees multiplied by a target unit price. Neither the value nor the price target is revealed to the expected buyer at the time of sale. There are also certain considerations which influence the final estimation of the target value, such as the availability and cost of labor required for harvesting, farm location, and the cost of transportation from the farm to the processing plant. The influence of these target estimates on the final sale transaction and/or their realization is not known.

14/ Although it might appear that the overall oil yield of olives produced in Sfax is higher than that of the rest of Tunisia, the actual difference in yields between regions or localities is not known exactly (or is not sufficiently accurate to be documented). Generally, however, the final oil yield of any particular olives depends on (1) variety, (2) degree of maturity, and (3) moisture content of the olives at harvest time. Consequently, olives of the same variety which are produced under similar climatic conditions should yield similar or at least a comparable quantity of oil regardless of their place of origin. In Tunisia, two principal varieties of oil olives are produced: "Chetwi," which is mainly cultivated in the northern part of the country, and "Chemlali," which is produced in the central and southern parts. Hence, it is reasonable to assume that oil yields should be comparable within adjacent producing areas of central and southern Tunisia where environmental conditions are almost identical (e.g., Sfax, Sousse, and Kairouan).

15/ Although the reliability of these oil yield estimates might be challenged, their quotation and/or acceptance by the seller as a base value in the

sale transaction merit their consideration as a key element in the Khadara institution as it is now practiced in the olive culture of Tunisia.

- 16/ At the beginning of each production season the Tunisian government announces the guaranteed minimum prices of olive oil according to quality. These fixed prices (or price advances) are paid by the National Office of Oil (NOH) upon receipt of the oil from the seller. A reference on the specification of these prices is noted in footnote 8/ above.
- 17/ Although this empirical test of the efficiency of Khadara pricing might not be complete, it does provide strong empirical evidence relative to the nature of the unsystematic relationship which presently prevails between the organized and totally regulated market prices of olive oil (final product), on one hand, and the less organized and largely unknown Khadara price of olives (primary product), on the other hand.
- 18/ Except for Sfax and Sousse, market prices reported are point prices which were quoted in the respective regions at the time of Khadara. This is explained by the fact that the Sfax market center is the only one of its type in all Tunisia. This market opens daily during the harvesting season and shipments of olives of different sizes are brought in from across the country for immediate selling. In this market, prices are "competitively" determined for individual transactions. Sousse has no organized market for olives similar to the one in Sfax. However, casual market centers are sometimes organized on a temporary

basis in order to receive small shipments of olives from local areas. The prices in these markets are determined solely by one or two buyers.

- 19/ The negative difference between average market and Khadara prices of olives might be attributed to better quality control of the oil expected from the harvesting-processing which is more feasible via Khadara purchase of olives which is in contrast to direct purchase of olives from the market where the quality of olives is less known.
- 20/ The calculation of a standardized distribution of normal prices (in terms of average of standard deviation over mean price) is based on the observed yields between 17 and 28 percent, the equivalent calculated prices between 43 and 74 dinars per ton harvested olives at 280 dinars per ton oil. This yields an average price of 58 dinars per ton olives with a standard deviation of 9.79 dinars or about 17 percent of the mean price. The statistical assumption in this test implies that measurement errors in the reported data should be randomly distributed.
- 21/ The "histogram" is used here to show the distribution and percent frequency of the Khadara prices along the 100 percent value equivalent of oil (i.e., Khadara price = value equivalent price). This graphic distribution displays the conformity (or deviation) of the Khadara prices reported to the normal distribution test along their corresponding values.
- 22/ The probability inference which might be drawn from this graphic distribution indicates that there is an 80 percent likelihood a Khadara price would be inferior to the corresponding value price, ceteris paribus.