# PRICES, MARKETING MARGINS, AND STRUCTURAL CHANGE IN THE KING MACKEREL MARKETING SYSTEM*

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The age-old conflict between producers and market middlemen in the food industry has surfaced in the finfish industry with respect to market prices, producer prices, and marketing margins. Unrest among fishermen (producers) about the performance of the marketing system for various species of finfish has sparked numerous protests in the United States. Some protests have ended in lawsuits; in other cases, marketing cooperatives and/or marketing associations have been formed to integrate several steps in the marketing process. These events have been common in the Florida Atlantic Coast marketing system.

The conflict over prices and margins has stimulated considerable economic research in the area of price spreads for many food commodities. However, only limited descriptions and no analyses have been done to examine marketing margins for finfish. The objective of this article is to determine the functional relationship between the marketing margin and market prices, volume marketed, change in market structure, and the cost of marketing services.

The empirical analysis is limited to king mackerel (*Scomberomorus cavalla*) landed on the Florida Atlantic Coast. U.S. king mackeral comes from the southeastern states from Texas through North Carolina. Florida king mackeral landings were valued at $2.4 million in 1975 [6] and accounted for 93 percent of United States landings of this species. The Atlantic Coast of Florida produced more than 54 percent of U.S. landings.

## PRIMARY MARKET SYSTEM

Fishermen sell king mackerel to coastal wholesalers commonly called fish dealers or fish handlers. These wholesalers receive the product in gutted form and then box and ice the fish for shipping. The boxes of fish are trucked to buyers, primarily by independent truckers. A primary survey of Florida Atlantic Coast wholesale fish dealers showed that 65 percent of the king mackerel was shipped to the New York Fulton Fish Market. Secondary wholesalers on the New York market buy king mackerel from Florida wholesalers for resale or sell them on the market for Florida wholesalers on a commission basis. In this system, king mackerel actually do not change product form from the time they are unloaded from the fishing boats until they pass through the New York market.

During 1973, considerable changes occurred in the Florida Atlantic Coast finfish marketing system. Suits were initiated for price fixing among fish dealers and a class action suit of fishermen versus a fish dealer was initiated. In addition, a group of king mackerel fishermen formed a marketing association during June 1973 and a marketing cooperative began business in December 1974 in an effort to increase fishermen prices or reduce possible excessive marketing margins. One of the primary purposes of this article is to identify the effects of these structural changes in the market system.

A complete examination of prices and margins requires data for each level of the market system. Unfortunately, prices for each marketing level in the finfish marketing system are not available. The only available prices are at the producer level (sometimes referred to as the fishermen price, dockside price, or the ex-vessel price) and for the New York Fulton Fish Market. The New York price level represents the price received by secondary wholesalers as they sell to other wholesalers and retailers.

## THEORETICAL CONSIDERATIONS

Marketing margins for food commodities have been found to be a combination of absolute and constant percentage margins (for

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example, see [2, 3, 4, 5, 8]). Recent literature, however, shows theoretically that in a competitive food industry a simple markup rule such as a constant absolute and/or constant percentage margins cannot in general accurately depict the relationship between retail and primary producer prices [1]. The relationship between these prices depends on relative shifts in consumer demand, producer supply, and supply of marketing goods and services.

A marketing margin model which includes these theoretical components and other factors appropriate for the fresh king mackerel marketing system is:

$$(1) \quad M_t = a_1 + b_1P_t^r + b_2Q_t + b_3C_t + b_4D + b_5DT + b_6DT^2$$

where

$M_t$ = marketing margin

$P_t^r$ = terminal market prices

$Q_t$ = quantity supplied

$C_t$ = costs of marketing inputs and services

D = dummy shifter for structural shift in market structure

T = months after initial structural shift

t = time period in months and

r = identification symbol indicating terminal market level.

Fish dealers handling fresh fish often operate on a margin which does not cover average costs during particular months of the year.[1] Competition for fishermen's supply results in handlers absorbing much of the variation in price through variations in marketing margins while holding fishermen prices relatively constant. Consequently, and because independent fish dealers are price takers, the size of the margin between fishermen prices and terminal market prices from month to month depends on the level of terminal market prices, $P_t^r$.

Terminal market prices were assumed exogenous to the system for several reasons. A survey of fish dealers representing 85 percent of Florida Atlantic Coast king mackerel production indicated approximately 65 percent of local production was shipped to New York. Only approximately 50 percent of the king mackerel on the New York market were from the Florida Atlantic Coast. In addition, dealers surveyed indicated little relation between quantities shipped and New York prices. For these reasons and the competition for fishermen, $P_t^r$ was assumed independent of quantities produced in the Florida study area.[2]

The quantity landed by Florida fishermen was hypothesized to affect the marketing margins because of the usual expected negative relationship between quantity supplied and producer prices. $Q_t$ is assumed exogenous because of uncontrollable factors such as weather and biological patterns affecting quantity supplied. The sign of $b_2$ for the quantity variable in equation (1) is hypothesized to be positive because of the normally expected lower demand elasticity at the producer level and little or no relationship between Florida Atlantic Coast fishermen's supply[3] and New York market prices. Total or immediate adjustments to changes in $Q_t$ are expected because limited amounts of carryover are possible with perishable fish in the fresh fish market.[4]

Cost of intermediate goods and services used in the marketing system, $C_t$, is included to account for changing supplies of these inputs. The expected effect of increased costs on marketing margins is positive.

Coefficients $b_4$, $b_5$, and $b_6$ represent the effect of the change in market structure on marketing margins. The total effect on marketing margins is hypothesized to be related to the time period after the structural change. The margin is expected to change with time as a result of the success or failure of the marketing association initially, and, later, the success or failure of the marketing cooperative. The effects of drawn-out court procedures in the price-fixing cases also were expected to influence fishermen prices and marketing margins. The total effect of the structural change (TE) on the marketing margin derived from equation (1) is represented by equation (2).

$$(2) \quad TE = b_4 + b_5T + b_6T^2$$

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[1]A survey conducted by the author during 1974 showed fresh fish handler's margins did not cover average costs during the months of May, June, August, September, October, and November.

[2]The assumption that $P_t^r$ is determined exogenously was further supported with alternative modeling. $P_t^r$ was regressed on quantity of Florida landings and quantity of other fresh fish on the New York market. $R^2$ for this model was .16. Simultaneous equation models and estimation methods were unsuccessful.

[3]Florida West Coast landings were not included because (1) different marketing channels are used, (2) much of the West Coast product goes to the frozen market, and (3) there is a quality difference due in large part to method of catch.

[4]An estimated disributed-lag model showed no significant lagged effects.

A negative (positive) sign for $b_4$ suggests the structural change decreased (increased) the marketing margin. Whether the margin continues to decrease (increase) depends on the relative size and signs of coefficients $b_5$ and $b_6$.

Variables used in explaining margins in equation (1) can be used directly to explain variations in fishermen prices. The relationship between fishermen price ($P_t^f$) and terminal market price is given by

$$(3) \qquad P_t^f = P_t^r - M_t.$$

Substituting equation (1) into equation (3) gives equation (4)

$$(4) \qquad P_t^f = -a + 1\text{-}b_1)P_t^r - b_2Q_t - b_3C_t - b_4D - b_5DT - b_6DT^2$$

which expresses fishermen prices as a function of terminal market prices and factors determining marketing margins. With the exception of $P_t^r$, coefficients for all other variables in equation (4) take the sign opposite that indicated in equation (1).

## EMPIRICAL RESULTS

The data base used for the ordinary least squares regression estimates was monthly observations for the 60-month period from January 1971 through December 1975. Monthly average prices (cents per pounds) for Florida King mackerel sold on the New York Fulton Market were computed as a weighted average of daily prices [7]. Fishermen prices were computed from monthly volume and value of landings reported for the Florida Atlantic Coast [6]. Margins were estimated as the difference between $P_t^r$ and $P_t^f$. The monthly volume (millions of pounds) of king mackerel landings on the Florida Atlantic Coast was used for monthly values of $Q_t$. A quarterly index of costs of intermediate goods and services used by food marketing firms was used as a proxy for $C_t$.

June of 1973 was chosen as the date for the initial shift in the market structure. At that time, the marketing association was formed and was hypothesized to have its initial effect. The exact date at which the structural change had an effect on the market is uncertain because publicity before the actual formation of the association could have initiated changes or there could have been a lagged effect. The marketing cooperative began operation in December 1974. In addition, the price-fixing cases were in progress for the total study period after June 1973.[5] The dummy variable, D, was assigned a value of zero prior to June 1973 and a value of one for each month after May 1973. The variable representing months, T, took the values from 1 through 31 consecutively for the months June 1973 through December 1975.

Empirical estimates of coefficients and standard errors for the price model represented by equation (3) are presented in equation (5).

$$(5) \quad P_t^f = \underset{(26.2196)}{23.7642} + \underset{(.0766)}{.4957}\ P_t^r - \underset{(3.6538)}{7.2129}\ Q_t - \underset{(.2335)}{.1470}\ C_t + \underset{(3.3421)}{13.6105}\ D - \underset{(.8090)}{.7433}\ DT + \underset{(.0157)}{.0305}\ DT^2$$

The model explained approximately 84 percent ($R^2 = .8438$) of the monthly variation in producer prices. The margin model estimated from equation (5) and the relationship of equations (1), (3), and (4) is presented in equation (6).

$$(6) \quad M_t = -23.7642 + .5043\ P_t^r + 7.2129\ Q_t + .1470\ C_t - 13.6105\ D + .7433\ DT - .0305\ DT^2$$

The estimated coefficients in equation (6) are equal in absolute values but with different signs for all variables except $P_t^r$. The coefficient for $P_t^r$ in the price equation equals one minus the coefficient $b_1$ in the margin equation.[6]

Price changes in the New York market for Florida king mackerel have a significant and approximately equal effect on both the margin and the price received by fishermen. A one cent increase in New York prices is estimated to increase the marketing margin by .5043 cents and to increase the fishermen price by .4957 cents per pound. All of the price changes are not passed on directly to fishermen. The size of the margin is a function of New York prices and thus one component of the margin is a percentage of the terminal market price. The insignificance of the constant term implies there is no absolute margin component of the total margin.

Quantity landed by Florida producers also had a highly significant statistical effect on both the marketing margin and prices received

[5]The first case was completed in early 1975. The second case was completed in January 1977. A judgment was given to the class of fishermen in the second case and the first case is on appeal.

[6]It is interesting to note that a direct statistical estimate of the margin model (equation 6) gave the expected signs and values for each of the coefficients but $R^2$ was considerably lower at .6721.

by Florida fishermen. A change in monthly landings of 1 million pounds resulted in a 7.2129 cents per pound change in prices Florida fishermen received. This price change, however, is totally absorbed in the marketing margin given the present model specifications. Equation (6) shows a change in the margin of 7.2129 cents per pound per million pound change in landings. Because $P_t^r$ is included as an independent variable in both equations (5) and (6), the estimated margin and fisherman price effects of a change in landings are for given New York prices. Additional margin and price effects of quantity landed by the Florida Atlantic Coast fishermen may exist if there is a relationship between New York prices and Florida quantity landed. In this research, however, the author has not been able to establish a significant relationship between Florida landings and New York prices.

Costs of intermediate goods and services used in marketing food products did not have a significant statistical effect on the margin or fishermen prices. The signs, however, were as expected; an increase in $C_t$ was positively correlated with $M_t$ and negatively related with $P_t^f$. The insignificant coefficient probably reflects the limited amount of substitution between marketing inputs and fresh fish.

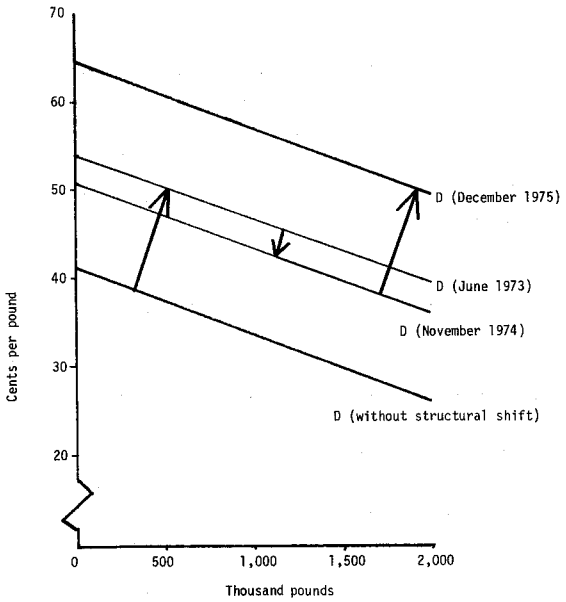
TABLE 1. ESTIMATED EFFECT OF STRUCTURAL SHIFT IN MARKET STRUCTURE ON FISHERMEN PRICES

| Time period (mo.)[a] | Estimated increase in fishermen price | Time period (mo.)[a] | Estimated increase in fishermen price |
|---|---|---|---|
| 1 | 12.9018 | 17 | 10.9738 |
| 3 | 11.6920 | 19 | 11.9784 |
| 5 | 10.7590 | 21 | 13.2652 |
| 7 | 10.1028 | 23 | 14.8180 |
| 9 | 9.7238 | 25 | 16.6530 |
| 11 | 9.6208 | 27 | 18.7648 |
| 13 | 9.7950 | 29 | 21.1534 |
| 15 | 10.2460 | 31 | 23.8188 |

[a]Month 1 is June, 1973.

The change in market structure had a highly significant effect on marketing margins and prices received by fishermen. Equation (2) was evaluated for given months after the structural change. Expected increases in fishermen prices due to the shifts are presented in Table 1. The increase in prices to fishermen was 12.9 cents during the first month after the shift. The price increase then decreased to a low of 9.6 cents 13 months after the shift but climbed to 23.8 cents by December 1975. The upward trend in prices after the thirteenth month coincides with the marketing cooperative beginning operation in the fourteenth month. The increase in latter months also may be due to the court cases which were settled in 1976 and 1977. This change is significant as the average fishermen price during the 60-month period was 42 cents per pound. Average price was 34 cents per pound before the shift and 50 cents per pound afterward. A simple comparison of the predicted increases in prices with the overall mean price suggests fishermen monthly price increases ranged from 25 to 50 percent as a result of the shift.

FIGURE 1. MONTHLY DEMAND FUNCTIONS AT DOCKSIDE FOR FLORIDA KING MACKEREL




The price effects associated with the structural change are illustrated as demand shifts in Figure 1. The initial demand equation illustrated for the period without the structural shift was evaluated for mean values of $P_t^r$ and $C_t$ and with zero values for D in equation (5). Appropriate data then were substituted for D and T in equation (5) to estimate demand equations for specific months after the shift. Demand at the fishermen level initially increased then declined until November 1974, after which time the function again increased.

## CONCLUSIONS

Marketing margins between Florida king mackerel fishermen prices and New York market prices contain a constant percentage margin component but no constant absolute margin component in the total margin. Changes in terminal market prices for fresh

king mackerel are shared equally between market middlemen and Florida fishermen. In addition, there is a significant positive relationship between fishermen supply and the size of the marketing margin. Fishermen prices move in the opposite direction of marketing margins when the supply of fish changes. The supply of marketing inputs had a positive but insignificant effect on marketing margins which was probably due to limited substitution between fresh fish and marketing inputs and services.

Market structural change which took place as a result of unrest among fishermen with respect to marketing margins and fisherman prices appears to have been successful. Highly significant increases in fishermen prices and decreases in marketing margins were achieved after the structural change. The initial decrease in margins declined for the first 13 months after the structural change but since then the margin has continued to decline significantly.

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