# The Structure and Performance of Wholesale Marketing of Finfish in Costa Rica

by

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## Contents

## Preface

This paper is one in a series of studies on small scale fisheries development in less developed countries. The research has been supported by a 211(d) grant from the United States Agency for International Development.

The data for the study were obtained from field surveys of the Costa Rican small scale fishery by the Departamento de Pesca y Caza Maritima and the University of Rhode Island. We are especially grateful the Eduardo Bravo and Milton Lopez and their staffs for their assistance in the field surveys, and to Harlan Lampe and William Kolberg who supervised the field work. The two main sources of information were the personal interviews of primary buyers and transporters operating the in Gulf of Nicoya region and the collection of purchasing receipts filled out by primary buyers over the five-month period of September 1976 to February 1977. Additional fishery statistics were also provided by the Departamento de Pesca.

## I. Introduction

In many countries of Central America, a large part of domestic fishery production is handled by the small scale or artisanal fishery sector. The artisanal fishermen use small boats of limited operational range and land their catches at landing places that often lack adequate marketing installations and facilities. For the most part, these fishermen are among the poorest sectors of society. Many live at the subsistence level in snal isolated villages scattered along the coast and lack many of the basic necessities of adequate housing, health care, and education.

The small scale fishing industry of Costa Rica has been described as a rather primitive operation characterized by a large number of middlemen, small output, high distribution costs, and relatively high consumer prices (Tilic and Artavia, 1971). The relatively high price of good quality fish limits the consumption by lower income groups and deprives them of an important source of animal protein (Lovel and Moss, 1971).

In recent years, the Government of Costa Rica, along with other governments of Central America, has expressed a strong interest and commitment to the development of the artisanal fishery sector. Among the expressed goals of development are the improvement of the standard of living of the small scale fishermen and the provision of fish to middle and lower income consumers at prices they can afford. One method of trying to meet both the needs of fishermen and consumers is by improving the marketing system. If fish can be moved from producers to consumers at lower costs while maintaining the same standard of services, both the fishermen and the consumers may stand to benefit.

Policy makers concerned with improving the performance of the marketing system are often concerned with the level of competition in the industry and the extent to which potential economies of scale are realized. The perfectly

competitive model is often used in economics as a standard by which the structure and performance of the market may be compared and evaluted. In a competitive market characterized by large numbers of buyers and sellers, low barriers to entry, and complete knowledge of the nature of alternative choices on the part of producers and consumers, there is an economically efficient allocation of resources. Since each firm maximizes its profits by equating the given price to its marginal cost, competitive prices correctly reflect both consumer demand and the cost of the resources employed.

In so far as the wholesale sector of the small scale fishery is competitive, its prices and marketing margins will reflect the true costs of providing its marketing services. If imperfect competition exists among the firms of the wholesale sector, the marketing margins may be higher than under more competitive conditions. Prices paid to the fishermen may be lower than the competitive equilibrium level and prices paid to the retailers may be higher than the competitive level. For these reasons policy makers concerned with the welfare of fishermen and consumers are interested in knowing more about the current level of competition in the wholesale sector and how it might be improved.

Marketing development programs are also concerned with potential economies of scale and the extent to which such economies are realized in the industry. To the extent that unit costs are lower for larger scales of production, economies of scale are said to prevail. If economies of scale exist in the marketing sector and if many firms operate at levels too low to secure the benefit of such economies, substantial marketing cost reductions may be obtained through a policy aimed at increasing the output of those firms currently operating at suboptimal scales. One means of ensuring that such cost reductions are passed on to the fishermen and consumers would be the pressure of competition.

A review of the literature on marketing in under-developed countries reveals two divergent views of the role played by the middlemen in traditional marketing systems. On one side is the popular view that the middleman is a central obstacle to development because he often exploits the producers and consumers of the products he handles. In some cases it is argued that there are only a few intermediates at certain marketing levels and through collusive action they are able to fix prices and extract excessive profits. In other cases it is argued that the unnecessarily long chain of middlemen from producer to the consumer results in high marketing costs. Middlemen are also accused of acquiring monopolisitc control by providing much needed credit to the producers and forming their creditors to sell them their product at relatively low prices (see Rao, 1973 and Fuentes, 1976).

On the other side of the argument are those who hold that the traditional marketing middleman has been unfairly maligned and that he usually plays a vital and necessary role the the marketing operations of the less developed countries. According to this point of view, most attacks on marketing middlemen are based on a misunderstanding of the variety of functions they perform and an exageration of their power. In general, fishermen and marketing middlemen are considered to have a mutually beneficial, symbiotic relationship which operates smoothly in a traditional environment (eg. see Bauer and Yamey, 1954; Lele, 1976, and Lawson 1977).

Despite the different and sometimes conflicting views about the conduct and performance of marketing middlemen in less developed countries, little research has been carried out on the structure and performance of the wholesale marketing sector in less developed countries. Much of the literature on marketing in less developed countries remains largely descriptive and barren of analysis.

The general objective of this study is to examine the market structure and performance of the wholesale sector of the small scale fishery of Costa Rica. Specifically, this study:

1. analyzes the current market structure of the wholesale sector of the small scale fishery and discusses its influence on market conduct and performance, and;
2. examines the level of potential economies of scale in the provision of marketing services at the wholesale level.

## II. Description of the Wholesale Sector

The wholesale sector is a large and vital part of an overall marketing system which provides for the flow of fresh fish from small scale fishermen to the consuming public. The movement of fish from producer to consumer involves the marketing services of primary buyers (port wholesalers), truckers, and retailers. The primary buyers buy the fish from the fishermen on the docks and beach landing sites and perform the services of assembly and storage. They next either sell the fish to transporters or transport the fish themselves to the retail outlets in the capital city of San Jose and other population centers in the vicinity of San Jose. The retailers then carry out the final marketing stage of selling the fish to the ultimate consumers.

### A. Primary Buyers

The primary buyers provide the first link in the marketing chain that carries the produce of the artisanal fishermen to the consuming public. They purchase the fish directly from the fishermen at the port or beach sites around the Gulf of Nicoya. Their installations for handling and storing fish before it is transported on to the retailers are in general rather modest. Their buildings are sometimes extensions added onto private homes or small lean-tos. Data gathered from interviews in 1976 indicated that the average building size was about 44 square meters and the average ice box and/or refrigerator capacity was about 5,000 pounds.

The data from daily purchasing receipts collected from the primary buyers between September 1976 and February 1977, revealed a total of 23 different primary buyers operating in the port of Puntarenas and in various outlying landings sites around the Gulf of Nicoya (see Figure 1). For the most part, these buyers are concentrated near the landing areas of Puntarenas,

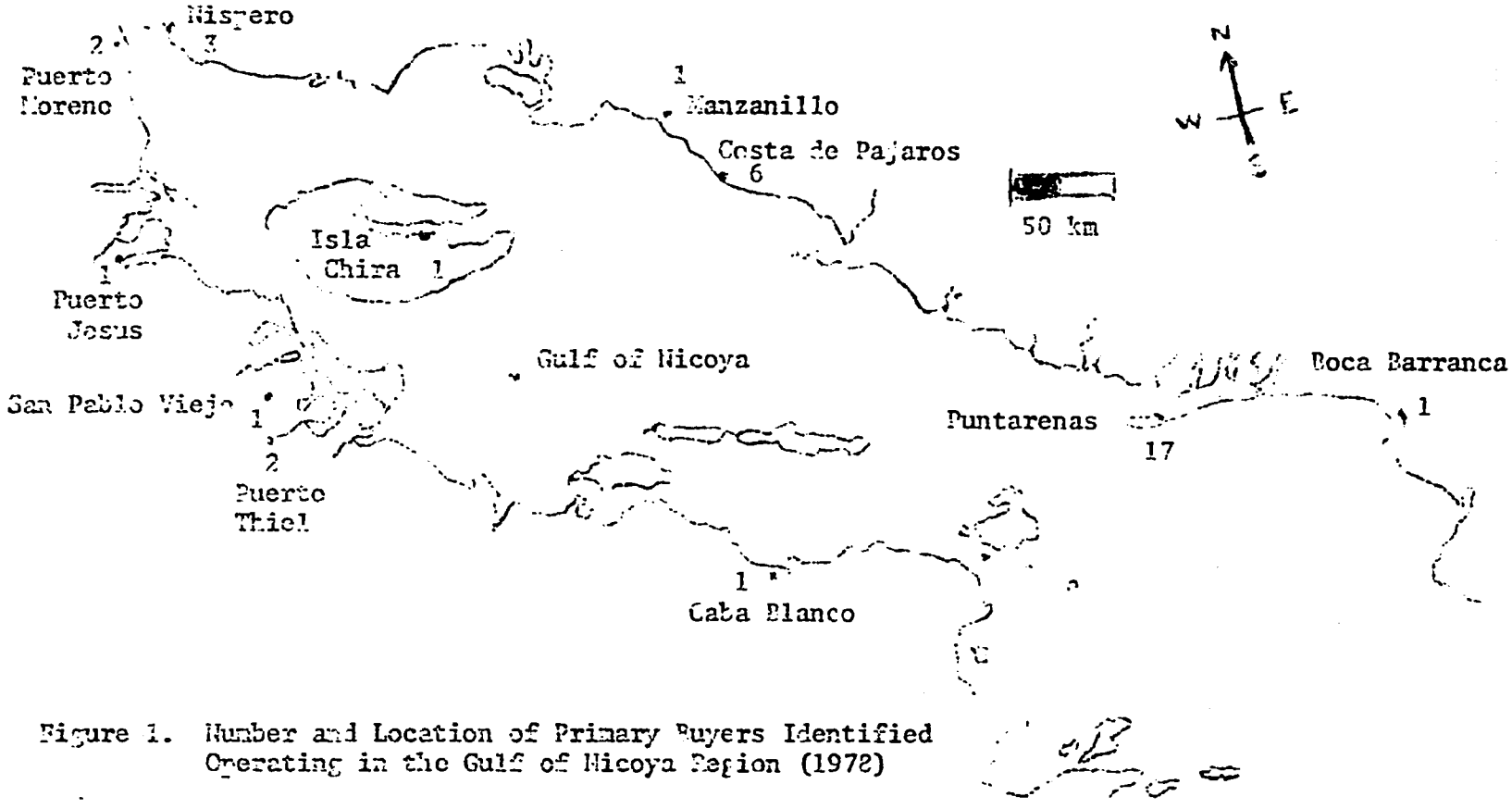



Figure 1. Number and Location of Primary Buyers Identified Operating in the Gulf of Nicoya Region (1972)

the principal port of both the artisanal and commercial fishing industries of Costa Rica. In addition to the 28 buyers originally identified in 1976, there are three new buyers who entered the industry since that time.

Several types of ownership may be distinguished among the primary buyers. 24 firms are owned by individuals and six by partnerships or corporations. There is one fishermen cooperative (COOPEPES) and one fishermen union (UNIPEPES). (The union is different from the cooperative in that it is not regulated by the bylaws and legal safeguards of an officially inscribed cooperative. The union is much smaller and united to a great extent by family relationships.)

One way of measuring the size of the various primary buyers is in terms of the amount of fish that they purchase. Due to gaps in data collection, there are weeks when the purchasing data are missing for some firms. For this reason, the ranking of firms in terms of the total purchase amounts recorded for each firm is not a reliable indicator of relative size in the industry. A better estimate of the relative differences in firm size is obtained by calculating the weekly average amount purchased by each firm, using only those weeks for which data are available. The ranking of the buyers in terms of their weekly average purchases along with the number of weeks recorded is given in Table 1.

Another index of relative size among the primary buyers is the icebox capacity of the individual firms. Table 2 lists the icebox capacity of the firms that have been interviewed. As one might expect, some of the firms with the largest holding cacacity are among those who are the largest weekly purchasers of fish; i.e., firms 1 and 9. However, the data also indicate that some of the buyers, such as firms 2 and 5, have lower than average capacity levels and some of the smaller weekly purchases,, such as firms 7 and 14, have larger than average holding capacities. This suggests that some firms are using their available capacities levels better than others.

TABLE 1

AVERAGE WEEKLY PURCHASES (lbs.)
(September, 1976 to February, 1977)

| Primary Buyer | Average Weekly Purchases (lbs.) | Percentage of Industry Purchases | Cummulative Percentage | Number of Weeks Recorded |
|---|---|---|---|---|
| 1 | 10,607 | 12% | 12% | 21 |
| 2 | 10,067 | 12 | 24 | 10 |
| 3 | 6,387 | 7 | 31 | 21 |
| 4 | 6,253 | 7 | 38 | 13 |
| 5 | 6,167 | 7 | 45 | 21 |
| 6 | 5,607 | 6 | 51 | 21 |
| 7 | 4,410 | 5 | 56 | 20 |
| 8 | 4,400 | 5 | 61 | 21 |
| 9 | 4,314 | 5 | 66 | 13 |
| 10 | 3,901 | 5 | 71 | 20 |
| 11 | 3,892 | 4 | 75 | 21 |
| 12 | 3,633 | 4 | 79 | 20 |
| 13 | 3,371 | 4 | 83 | 17 |
| 14 | 3,211 | 4 | 87 | 5 |
| 15 | 2,644 | 3 | 90 | 20 |
| 16 | 1,845 | 2 | 92 | 21 |
| 17 | 1,583 | 2 | 94 | 5 |
| 18 | 1,343 | 2 | 96 | 20 |
| 19 | 1,098 | 1 | 97 | 14 |
| 20 | 436 | 1 | 98 | 3 |
| 21 | 354 | * | - | 7 |
| 22 | 317 | * | - | 6 |
| 23 | 309 | * | - | 17 |
| 24 | 208 | * | - | 3 |
| 25 | 161 | * | - | 15 |
| 26 | 129 | * | - | 3 |
| 27, 28, 29 | only one week recorded | | | |

*Less than one percent.

TABLE 2

PRIMARY BUYER ICEBOX CAPACITY

| Buyer | Icebox Capacity (lbs.) |
|---|---|
| 1 | 16,600 |
| 7 | 8,500 |
| 6 | 8,000 |
| 9 | 8,000 |
| 14 | 8,000 |
| 15 | 6,400 |
| 4 | 6,000 |
| 12 | 4,300 |
| 3 | 4,500 |
| 5 | 4,000 |
| 11 | 4,000 |
| *30 | 3,500 |
| 16 | 3,300 |
| 2 | 3,000 |
| 8 | 3,000 |
| *32 | 3,000 |
| *33 | 1,900 |
| 13 | 1,500 |
| *31 | 700 |

Total Capacity Recorded: 98,700 lbs.
Average Firm Capacity: 5,195 lbs.
Standard Deviation: 3,620 lbs.

*Not included in the purchasing data collected during the period of September 1976 to February 1977.

Source: Personal interviews conducted by University of Rhode Island and Department of Fisheries of Costa Rica, 1978.

B. Species and Classification of Fish

A large variety of fish is purchased by the primary buyers operating in Puntarenas and other landing sites along the Gulf of Nicoya. Although not all the buyers use the same categories of classifying the fish they purchase, the majority follow a classification which combines size and type of species. The major classifications generally used on the wholesale level are: large first class fish (primera grande), small first class fish (primera pequena), classified fish (clasificado), small shark (cazon), two larger types of shark (posta blanca and posta negra), cola y agria and chatarra.

Table 3a presents the eight major species or classifications of finfish which the small scale fishermen landed in the region of Puntarenas during the period between September 1976, and February 1977, when purchasing data were collected. The largest amount of fish purchased by the primary buyers during this period fell under the category of "Cola and Agria." Small first class fish was a distant second in terms of the amount purchased (see Table 3b).

The large and small first class fish categories brought the fishermen the highest ex-vessel prices per pound, with a weighted average price of 3.31 colones and 2.50 colones, respectively (8.5 colones = U.S. $1.00). Cazon, Posta Blanca, Clasificado, and Cola and Agria fell in the middle price range of 1.36 to 1.40 colones per pound. Posta Negra had a weighted average price of .90 colones per pound while the commercially less attractive fish in the "Chatarra" category brought a weighted average price of .61 colones per pound (see Table 4a for the ranking of finfish according to their weighted average price).

Because of the relatively large amount purchased, the middle price fish category of Cola and Agria generated more revenue for the fishermen than any other species or category of fish landed during the survey period. Posta Negra and the species in the Clasificado category were the least important fish in terms of revenue paid out to the fishermen by the buyers (see Table 4b).

TABLE 3

a) Species and Classifications of Fish Purchased by the Primary Buyers

A. Primera Grande: corvina, robalo
B. Primera Pequena: corvina, robalo, pargo, aguada, cabrillo, mero
C. Clasificado: macarela, berrugate
D. Cazon
E. Cola y Agria: cola, agria, bagre, cuminate, pargo
F. Posta Blanca: posta blanca, posta gata
G. Posta Negra
H. Chatarra: jurel, liza, raya

b) Ranking of Finfish by Amount Purchased (Sept. 1, 1976 to Feb. 15, 1977)

| | Species | Weight (lbs.) | Percent of Total Amount Purchased |
|---|---|---|---|
| 1. | Cola y Agria | 441,340 | 35.9 |
| 2. | Primera Pequena | 229,399 | 14.9 |
| 3. | Chatarra | 212,139 | 13.9 |
| 4. | Cazon | 201,184 | 13.1 |
| 5. | Primera Grande | 171,631 | 11.2 |
| 6. | Posta Blanca | 113,935 | 7.4 |
| 7. | Clasificado | 46,365 | 3.1 |
| 8. | Posta Negra | 7,551 | .4 |

TABLE 4

a) Ranking of Finfish by Weighted Ex-vessel Average Price (Sept. 1, 1976 to Feb. 15, 1977)

| | | |
|---|---|---|
| 1. | Primera Grande | 3.31 |
| 2. | Primera Pequena | 2.60 |
| 3. | Cazon | 1.86 |
| 4. | Posta Blanca | 1.44 |
| 5. | Clasificado | 1.43 |
| 6. | Cola y Agria | 1.40 |
| 7. | Posta Negra | .93 |
| 8. | Chatarra | .61 |

b) Ranking of Finfish in Terms of Revenue to Fishermen

| | Species | Revenue | Percent of Total Revenue |
|---|---|---|---|
| 1. | Cola y Agria | 773,074 | 28.7 |
| 2. | Primera Pequena | 596,445 | 22.1 |
| 3. | Primera Grande | 568,240 | 21.1 |
| 4. | Cazon | 374,254 | 13.9 |
| 5. | Posta Blanca | 164,626 | 6.1 |
| 6. | Chatarra | 120,557 | 4.8 |
| 7. | Clasificado | 69,013 | 2.6 |
| 8. | Posta Negra | 7,406 | .3 |

## III. Market Structure of the Wholesale Sector

Economic theory and empirical studies suggest at least four critical structural variables that influence the level of competition and performance in a market. These structural characteristics are: the concentration of buyers and sellers, barriers to entry, product differentiation and vertical integration.

### A. Concentration

Market concentration is defined as the number and size distribution of sellers and buyers in the market. Both theory and empirical evidence suggest that the level of concentration within an industry affects the interdependence of action among firms. The greater the degree of concentration, the greater the east of oligopolistic (oligopsonistic) coordination and the consequent market performance which approaches that of the monopoly (monopsony) situation.

Concentration indexes have thus come to serve as proxies for market power, the extent to which individual firms are able to exert some influence over market prices. Available data on the number of buyers and the quantities of fish they purchase from the fishermen allow for a measurement of concentration on the buyers' side of the market. High concentration among the buyers would be an indication of oligoposony.

Since most of the fresh fin fish sold to fish retailers in San Jose passes through the hands of the primary buyers of the Gulf, the level of concentration on the buyers' side of the market probably also indicates the level of concentration on the sellers' side.

Indexes of concentration: Concentration ratios and curves are frequently used as partial indicators of the level of concentration that exists in the relevant market. A market concentration ratio is defined as the total industry sales or purchases accounted for by the largest few firms, ranked in order of market shares. Partial indexes of concentration typically report the percent of industry sales or purchases held by a portion of the firms in the market (for example, the 4,8,12 and 20 largest firms in the market). Summary indexes, on the other hand, include all the firms in the market.

The market concentration ratios for the primary buyers were calculated by measuring the percentage of the industry's average weekly amount purchased which is accounted for by each firm. That is:

$$\text{Market Share Ratio of Firm 1} = \frac{\text{Average Weekly Purchase}^{1} \text{ of Firm 1}}{\text{Average Weekly Purchase Amount of Industry}}$$

Table 5 presents the concentration ratios for the largest 4,8,12 and 16 firms, where the relevant geographical market is defined as including the region of the Gulf of Nicoya and the relevant market product is fresh fin fish. The largest four buyers purchased 38 percent of the industry's average weekly purchases, while the largest eight, twelve, and sixteen accounted for 62, 80, and 92 percent, respectively, of the industry's average purchases.

TABLE 5

CONCENTRATION RATIOS FOR THE FOUR, EIGHT, TWELVE, AND SIXTEEN LARGEST BUYERS*

| | |
|---|---|
| Largest Four Firms: | .381 |
| Largest Eight Firms: | .616 |
| Largest Twelve Firms: | .796 |
| Largest Sixteen Firms: | .923 |

*Based on purchasing data collected during the period September, 1976 to February, 1977.

[1]Purchase size was measured in terms of weight. Similar results were obtained when size was measured in terms of revenue.

While the concentration ratios apply to only a portion of all the firms in the industry, the Lorenz curve presents a summary indicator of concentration for the total industry. It indicates the disparity between the cumulative percentage of total purchases and the cumulative percentage of total firms in the industry. The Lorenz curve in Figure 2 indicates that 50 percent of the industry accounts for more than 80 percent of the total purchases. Both the concentration ratios and the Lorenz curve indicate that a rather large percentage of the fish purchases are made by a relatively small number of buyers.

When the relevant market is defined in terms of each specific category of fish, the results are quite similar. Table 6 indicates that the largest

TABLE 6

CONCENTRATION RATIOS FOR FOUR, EIGHT, TWELVE, AND SIXTEEN LARGEST PRIMARY BUYERS, BY SPECIES
(September, 1976 to February, 1977)

| Species | Largest: Four Firms | Eight Firms | Twelve Firms | Sixteen Firms |
|---|---|---|---|---|
| Primera Grande | 43.5 | 73.2 | 87.5 | 96.3 |
| Primera Pequena | 42.7 | 68.1 | 87.15 | 96.4 |
| Clasificado | 58.0 | 84.2 | 95.1 | 99.6 |
| Cazon | 56.8 | 85.5 | 95.9 | 98.3 |
| Cola & Agria | 36.1 | 63.6 | 84.8 | 93.8 |
| Posta Blanca | 80.5 | 92.3 | 98.1 | 99.8 |
| Posta Negra | 80.4 | 95.1 | 99.4 | 100.0 |
| Chatarra | 41.0 | 67.3 | 83.3 | 93.1 |

four buyers purchase from 36 to 80 percent of each category of fish. Concentration at the eight firm level ranges from 63 to 95 percent of total purchases. In every category of fish, a relatively small percentage of the buyers account for a large percentage of total purchases. The greatest concentration occurs in the market categories of Posta Blanca and Posta Negra and the least concentration in the market categories of Cola and Agria and Chatarra.

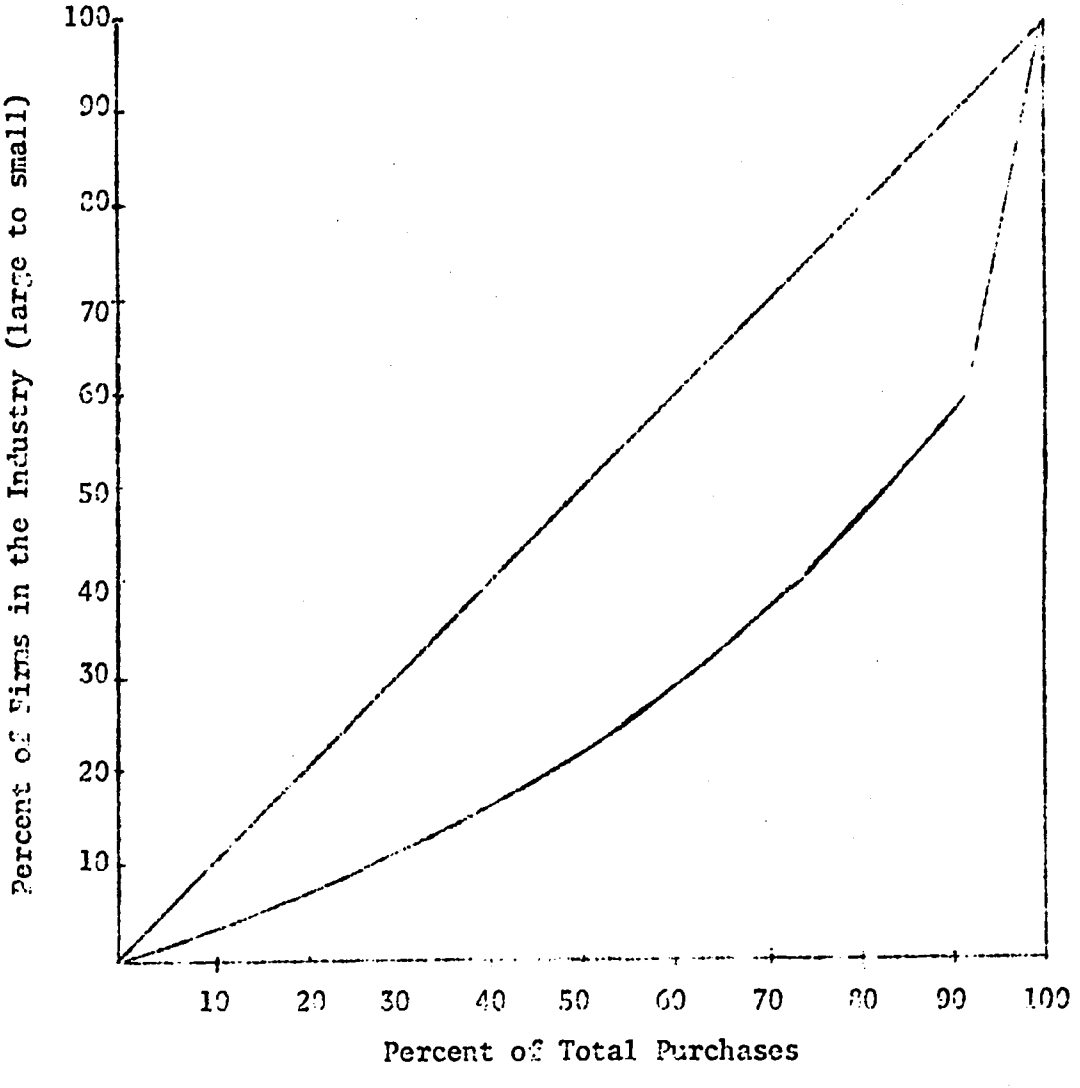



Figure 2. Lorenz Curve for Fin Fish purchased at Primary Buyer Marketing Level, Gulf of Nicoya region, 1977.

In order to evaluate the level of competition reflected in the concentration ratios of the primary buyers, it is useful to recall the general conclusions of economic theory and empirical studies. Oligopoly theory and most empirical studies predict a positive effect of concentration on prices and price-cost margins. There is, however, some disagreement about how much buyer concentration is necessary before non-competitive influences become sufficient to affect the conduct and performance. Theorists such as Chamberlin and Bain point to some critical level of concentration, while others, like Cournot and Stigler, suggest that margins rise at an increasing rate with concentration. In general, the theory states that as the number of buyers grows smaller there is greater opportunity for indirect or direct collusive behavior.

Empirical studies in the field of industrial organization suggest certain levels of concentration at which noncompetitive behavior begins an certain industries. Bain (1951) and Mann (1966) conclude that "a critical level" of concentration occurs roughly when 70 percent or more of the market is controlled by the eight largest firms. Rhoades (1973) finds a critical level of concentration where the largest four firms control 30 percent of the market. Kaysen and Turner (1965) propose that substantial oligopoly exists when the top eight firms handle 50 percent of the industry's sales and the largest 20 firms at least 75 percent.

When the relevant market is considered to be the market for fresh fin fish in the Gulf of Nicoya region, the four firm buyer concentration level meets the criteria of Bain, Mann, and Rhoades, but concentration at the eight firm level falls slightly below their criteria for a critical level of concentration. In terms of the Kaysen-Turner criteria, there exists a critical level of concentration at both the eight and twenty firm levels.

When the relevant market is considered in terms of the different categories of fish, the top four firms in each category are above the 30 percent concentration level. At the eight firm level, concentration is above 70 percent in 5 out of the 8 market categories. In every market category, the concentration at the eight and twenty firm level is well above the critical levels of concentration suggested by Kaysen and Turner.

The concentration levels suggest the existence of oligopsony power-market power on the buyers' side - when the relevant market is defined as one general market for fin fish and also when it is defined according to the different categories of fish. If it is assumed that most of the fish sold to the retailers in San Jose passes through the hands of these primary buyers of the Gulf of Nicoya, their market power on the buyers' side also reflects their market power on the sellers' side as well.

Some caution should be used in attempting to draw conclusions from the concentration indicators of the primary buyers. The period during which this data were gathered was relatively short - only about five months. It is too short a period to attempt to draw anything more than some general, tentative conclusions. Nevertheless, the relatively high level of concentration at the primary buyer level is at least a preliminary indication of market conditions which provide the opportunity for imperfect competition.

Concentration trends: At present, data concerning possible trends in the level of concentration are limited. In 1971, Tilic and Artavia reported that there were eight primary buyers operating in Puntarenas. Field studies carried out during the summer of 1976 revealed that the number of buyers in Puntarenas had risen to 15. Since that time at least three small firms (Firms 18, 20 and 27) have gone out of business and one large firm (Firm 6) has been bought out by another large buyer (Firm 5). In 1977, two small firms (Firms 30 and 34) entered the industry.

The three small firms who went out of business in the last two years represented less than 1 percent of the industry purchases during the 5 month survey period. The firm which was bought out (Firm 6), on the other hand, was the sixth largest buyer during that period with about 6 percent of the total purchases. Its takeover by Firm 5, the fifth largest buyer with 6.7 percent of the total purchases, indicates a significant increase in the concentration among the largest buyers since 1976.

B. Barriers to Entry

The extent to which monopoly or monopsony conditions are allowed to persist in the long run depends on the height of the barriers to entry. The static theories of competition and monopoly emphasize that the existing firms will be able to persistently earn pure profits only if the entry of new firms is somehow blocked. Some indication of potential barriers to entry existing at the primary buyer stage may be revealed by examining the amount of capital investment needed to enter the industry, the conditions of supply, and the entry and exit patterns observed in recent years.

Interview data collected in 1976 and 1978 indicate that some of the major capital investment items of the primary buyer include a small building, icebox and/or freezer facilities, and scales. The buildings owned or rented by the buyers are often quite modest, sometimes merely a small extension built onto a private home or a small wooden shed. The market price for such buildings ranges from 6,000 to 50,000 Colones (8.5 Colones = U.S. $1.00). Five of the 15 buyers interviewed rented the building in which they worked. Their rent ranged from 200 to 3,500 Colones per month. From 800 to 14,000 Colones were spent on refrigeration equipment and from 600 to 1,500 Colones on scales. Estimated total capital investments of the firms interviewed ranged from 2,000 to 37,800 Colones with the average investment at about 14,000 Colones.

Interview data indicate that the required investment capital needed to enter the industry is even higher than the figures quoted above because the majority of buyers also provide loans and advances to the fishermen. Some buyers in the outlying areas also sell fuel and trip provisions to the fishermen. Since the majority of the buyers provide one or more of these services, it is fair to assume that a new firm entering the industry would be required to provide some of these same services if it were to compete successfully with the other buyers. At present, there are no data concerning the amount of extra capital needed to provide these services.

Another factor which may add to the investment capital necessary to enter the industry is the fluctuation in the amount of fish supplied from week to week. Data on fish landings indicate that there are weeks when many buyers have very little fish to buy and sell, with the result that their revenues are very low during some periods. The cyclic conditions of fish supply may thus require buyers to have sufficient operating capital to be able to "ride out" periods of low supplies and low revenues.

One final factor may raise the amount of capital investment necessary for entry into the industry is the possible requirement of vertical integration in order to compete successfully as a primary buyer. If vertical integration is necessary to entry, the capital investment required must also include the investment needed to operate at the other stage(s) as well. The increase in the investment needed for entry may be a significant barrier to potential entrants.

In summary, a variety of factors including extra credit and supply services, cyclical supply conditions, and vertical integration may make the capital investment necesssary for entry at the primary buyer stage sufficiently high so as to constitute a significant barrier to entry.

C. Product Differentiation

Product differentiation refers to those real or perceived qualities of the market services of the buyers which differentiate them from their competitors. The important sources of market service differentiation among the buyers, alluded to above, are the geographical differences and the provis on of extra, ancillary services. By being conveniently located to fishermen, some buyers may be able to build up a specific clientele who view their marketing services to be significantly different from those buyers who are located farther away. In a similar fashion, buyers who provide loans and supplies to fishermen differentiate their services from those buyers who so not provide such services. These aspects of product differentiation are important structural variables in so far as they permit some buyers to raise prices above the general market level without losing their customers, something that would be impossible if the services of all the buyers are exactly the same.

Neither theory nor the currently available data permit any definite predictions about the difference in market price that results from product or service differentiation among the buyers. In general, however, it may be stated that the greater the amount of service differentiation among buyers the greater is the opportunity for buyers to exert influence over the prices they pay.

D. Vertical Integration

The last major structural characteristic to be considered is vertical integration within the marketing system of the small scale fishery. Vertical integration of primary buyers with other marketing stages by means of ownership or informalagreements is quite prevalent. Table 7 illustrates the extent of ownership integration at various states of the marketing system. About 60 percent of the primary buyers are identified as integrated backwards to the

TABLE 7

OWNERSHIP INTEGRATION OF MARKETING STAGES

| | | | |
|---|---|---|---|
| Integrated Stages: | Fishing Vessel - Primary Buyer - Transport - Retail | | |
| Firms: 5, 15, 31 | | | |
| Integrated Stages: | Fishing Vessel - Primary Buyer - Transport | | |
| Firms: 6, 12, 16, 18, 32, 39 | | | |
| Integrated Stages: | Fishing Vessel - Primary Buyer | | Retail |
| Firms: 1 | | | |
| Integrated Stages: | Fishing Vessel - Primary Buyer | | |
| Firms: 4, 7, 10, 30 | | | |
| Integrated Stages: | | Primary Buyer - Transport - Retail | |
| Firms: 8, 13, 14 | | | |
| Integrated Stages: | | Primary Buyer - Transport | |
| Firms: 2, 3, 11, 17 | | | |

TABLE 3

FISHING VESSEL AND PRIMARY BUYER INTEGRATION

| Primary Buyer -Code #- | Ownership | Union | Coop | Informal Agreement[1] | |
|---|---|---|---|---|---|
| 1 | 1 Launch | | | 15 Launches<br>7 Boats | Primary buyer agrees to buy fish from fishermen when there is an abundance. Fishermen agree to sell fish to primary buyer when there is scarcity. |
| 2 | | | | 15 Launches | Buyer provides financial assistance for ice and repairs to fishermen. Friendship bond. |
| 3 | | | | 3 Launches<br>2 Boats | Primary buyer pays a "good price." Long-time relationship between primary buyer and fishermen. |
| 4 | 3 Launches | | | 11 Launches | Small loans, repairs, advice of maintenance and repair of motors. Location of primary buyer in Barrio El Carmen is convenient for the fishermen. |
| 5 | 2 Launches | | | 20 Launches<br>5 Boats | Primary buyer pays "good price" to fishermen. |
| 6 | 4 Launches | | | 1 Boat | Long-time relationship. |
| 7 | | 8 Boats<br>4 Boats | | | |
| 8 | | | | 12 Launches | Buyer sells ice and food to fishermen and provides loans for repairs and trip expenses. Long-time relationship. |
| 9 | | | | 8Boats | Written Contract. |

TABLE 3 continued

| Primary Buyer | Ownership | Union | Coop | Informal Agreement[1] | |
|---|---|---|---|---|---|
| 10 | 1 Boat | | | | |
| 11 | 1 Boat | | | 5 Launches | Primary buyer sells food, fuel, ice and other trip supplies to the fishermen. |
| 12 | | | 10 Boats | | |
| 13 | | | | 15 Launches | Buyer supplies ice and fuel to fishermen and takes responsibility for the bank loans. |
| 14 | | | | 3 Boats | Long-time relationship. |
| 15 | 1 Launch | | | 5 Launches | Buyer brings ice and fuel to Nispera and lends money to fishermen for trip expenses. Loans are later deducted when fish is sold. |
| 16 | 1 Boat | | | 5 Launches<br>2 Boats | Primary buyer provides loans for fishermen under the condition they sell to him. Friendship bond. |
| 17 | | | | 5 Boats | Buyer provides the use of his wharf for fishermen. Long-time relationship. |
| 18 | 1 Boat | | | | No Data |
| 19 | No Data | | | | No Data |
| 30 | 1 Launch | | | 5 Boats<br>1 Launch | |
| 31 | 1 Launch<br>2 Boats | | | | |
| 32 | 1 Boat | | | 10 Boats<br>1 Launch | |
| 33 | 1 Launch<br>2 Boats | | | | |
| 39 | 2 Boats | | | | No Data |
| 40 | | | | 1 Launch | |
| Total | 25 | 12 | 18 | 162 | |

[1] All of the contract arrangements appear to be informal, verbal agreements except for Firm #9 which has a written contractural agreement with eight boats.

supply stage by means of vessel ownership. Nearly 70 percent of the buyers are integrated forward at the transport stage through the ownership of one or two trucks. Three buyers are completely integrated from the supply stage to the retail stage.

Vertical integration of marketing stages is further extended by means of informal agreements between various marketing stages. Table 7 describes the nature of these agreements between buyers and fishermen as well as the number of vessels included in such arrangements. In most cases, the arrangements are based on long term friendship, loan and supply services, and agreements to buy fish during periods when the market is glutted with fish. The data in Table 8 indicate that there are about 55 fishing vessels integrated with buyers through private ownership or through membership in the fishermen's cooperative and union. About 160 vessels are listed as having informal contractual arrangements with buyers.

Interview data gathered from buyers allows for a rough estimation of the percentage of weekly purchases supplied by means of ownership integration and informal contracts at the supply level. Table 9 presents the estimated percent and amount of the average weekly purchases supplied through the firms' own vessels and/or through informal agreements. About 25 percent of the industry's average weekly supply of fish comes from vessels which are owned by the buyers. The remaining 75 percent comes from other vessels which, for the most part, have informal agreements with the buyers.

The payment incentive for a primary buyer to integrate with the harvesting level - either through ownership or informal agreements - is to assure a minimum supply during those periods when fish landings were relatively low. Among the primary incentives for the fishermen to integrate at the buyer level is to obtain a guaranteed outlet for their fish during periods when landings were

TABLE 9

AMOUNT OF FISH SUPPLIED THROUGH OWNERSHIP INTEGRATION

AND INFORMAL AGREEMENTS

| Buyer Code # | Average Weekly Purchase (lbs.) | Estimated Amount From Own Vessel | | Estimated Amount Through Informal Agreements | |
|---|---|---|---|---|---|
| | | Percent | Weight | Percent | Weight |
| 1 | 10,607 | 3 | 318 | 97 | 10,289 |
| 2 | 6,387 | 0 | 0 | 100 | 6,387 |
| 3 | 6,167 | 0 | 0 | 100 | 6,167 |
| 4 | 5,607 | 81.2 | 4,553 | 18.8 | 1,054 |
| 5 | 10,057 | 13.3 | 1,389 | 86.2 | 8,678 |
| 6 | 4,410 | 82.6 | 3,643 | 17.4 | 767 |
| 7 | 4,400 | 100 | 4,400 | 0 | 0 |
| 8 | 3,892 | 0 | 0 | 100 | 3,892 |
| 9 | 6,253 | 0 | 0 | 100 | 6,253 |
| 10 | 3,901 | 33.3 | 1,299 | 66.7 | 2,602 |
| 11 | 3,633 | 16.7 | 607 | 83.3 | 3,026 |
| 12 | 4,314 | 100 | 4,314 | 0 | 0 |
| 13 | 3,371 | 0 | 0 | 100 | 3,371 |
| 14 | 2,644 | 0 | 0 | 100 | 2,644 |
| 15 | 1,845 | 16.7 | 308 | 83.3 | 1,537 |
| 16 | 1,343 | 12.5 | 168 | 87.5 | 1,175 |
| 17 | 3,211 | 0 | 0 | 100 | 3,211 |
| 18 | 1,098 | 100 | 1,098 | 0 | 0 |
| 19 | 1,583 | -- | -- | -- | -- |
| 20 | 309 | -- | -- | -- | -- |
| 21 | 161 | -- | -- | -- | -- |
| 22 | 354 | -- | -- | -- | -- |
| 23 | 319 | -- | -- | -- | -- |
| 24 | 436 | -- | -- | -- | -- |
| 26 | 208 | -- | -- | -- | -- |
| 27 | 129 | -- | -- | -- | -- |
| Total | | | | | |

Approximately 25% of weekly purchase from own vessel and 75% through informal contracts.

very high. In some cases, integration with the buyers by means of informal contracts is a means by which fishermen could avail themselves of credit and supply services provided by the buyers.

Studies of vertical integration in agricultural markets suggest several negative effects which may result when a large part of the market becomes vertically integrated. The formal and informal integration of the supply stage by buyers has the effect of "thinning out" the market alternatives for those fishermen who are not integrated. With the majority of the buyers in some way integrated at the supply level, non-integrated fishermen may find that there are few available buyers for their fish, especially during times of large fish landings.

In a similar fashion, the integration of the buyer and transport stages thins out the market for the independent truckers. If most of the buyers have their own trucks and/or contractual arrangements, the independent trucker may find it difficult to buy enough fish to justify travel expenses. The decrease of the number of truckers transporting fish may in turn limit the alternative sources of supply for the retailers. As the major share of the wholesale market is handled by a highly concentrated number of buyers who own their own trucks the retailers are faced with fewer alternative sources of supply than if there were a large number of non-integrated truckers.

The large amount of vertical integration may also serve to protect the high level of concentration at the buyer stage from the competition of potential entrants into the industry by raising the capital requirements for entry. For example, it was noted earlier that about 70 percent of the primary buyers are integrated at the transport level. The average capital investment at the transport level (estimated from the interviews of 23 truckers) is about 64,000 Colones. If in order to compete successfully at the primary buyer level, it is necessary to integrate with the transport level, the average capital investment needed to enter the industry rises from 14,000 to 78,000 Colones.

E. Oligopsony Power

The brief analysis of the structural variables of the small scale fishery suggest the existence of oligopsonistic market conditions. Oligopsony power is indicated by the relatively small number of buyers handling a large percentage of the fish purchased from the small scale fishermen of the Gulf of Nicoya. In some of the more isolated, outlying areas of the Gulf where only a few buyers operate, the degree of apparent oligopsony power is even greater.

Several factors appear to facilitate the existence of oligopsony power in the market of the small scale fishery. As indicated in the interviews of the primary buyers (Table 8), the provision of loans to the fishermen by the buyers is quite common. The terms of such loans often require the fishermen to sell their fish to their creditors. The provision of loans also encourages fishermen to continue to sell their fish to particular buyers because the terms of future credit arrangements are likely to become more favorable if the relationship between buyer and fisherman has been maintained for a long period of time.

The extensive integration of the primary buyer and transport levels reduces the possible market outlets available to the non-integrated fishermen and thus strengthens the bargaining position of the buyers. Furthermore, if vertical integration is necessary for successful competition at the primary buyer level, the necessary capital investment for such an integrated enterprise may be sufficiently high to present an effective barrier to potential entrants in the industry.

Microeconomic theory suggests that a relatively inelastic supply function in the fishery would make potential oligopsony gains on a per unit basis greater than they would be with a more elastic supply schedule (Wharton, 1962, p. 39). Although data are not currently available on the elasticity of supply for the small scale fishery of Costa Rica, there are, however, several factors

typical of small scale producers in less developed countries which may cause one to suspect a relatively inelastic supply function in the short run. Most of the fishermen are specialized producers who have no other alternative income-earning possibilities besides fishing. For the most part, they live close to the subsistence level and cannot afford to reduce their fishing effort in response to downward prices. Furthermore, the rapid deterioration of fish once landed, prevents the fishermen from withholding their fish from the market until prices are more favorable. When prices rise, the limited range of their fishing vessels and gear limits the extent to which the fishermen can increase their fishing effort.

Since much of the fish supply for San Jose comes from the Gulf of Nicoya, the power of the primary buyers on the buyers' side of the market may also indicate a corresponding power on the sellers' side. Those primary buyers who account for the largest share of purchases at the ex-vessel level may well account for a large share of the fish which is sold to the retailers of San Jose. The greater the inelasticity of the wholesale demand for fish, the greater would be the per unit oligopoly gains.

To the extent that significant oligopsony power exists at the primary buyer level, the price paid to the fishermen may be less than it would be under more competitive conditions. To the extent that the buyers also have oligopoly power, their selling price to the retailer may be higher than at the competitive market equilibrium. The market power to push prices down at the ex-vessel level and push prices up at the wholesale level would result in wholesale marketing margins which were higher than they would be under more competitive conditions.

## IV. Market Performance of the Wholesale Sector

The preceding section describes the marketing system of the small scale fishery and examines some of the major structural characteristics which affect its conduct and performance. In order to estimate the possible impact of such structural characteristics on market performance, this section investigates ex-vessel price differentials, the level of wholesale marketing margins and their cost components, and the extent to which potential economies of scale are utilized.

### A. Ex-Vessel Prices

Data on ex-vessel prices during the period September 1976 - February 1977 allow for a comparison of prices paid by the different buyers located in the Port of Puntarenas. If fishermen search for the best price for their fish, one expects prices paid at the ex-vessel level to be relatively similar from buyer to buyer, other things equal. Table 10 presents the prices paid by the different buyers in Puntarenas for the species of Corvina Grande, Cazon, and Chatarra. The data suggest that the monthly prices for these three categories of fish are often significantly different among the buyers. Of the three categories of fish, the prices for Corvina Grande varied the most among the buyers.

Such price differentials may be explained in part by the credit and supply services provided by the buyers. For example, some fishermen may continue to sell their fish to a particular buyer even though his prices are lower because of some agreement based on the provision of credit or other services. More investigation is needed before any conclusion can be made about the causes of the observed price differentials. Nevertheless, the data indicate that the decision of fishermen to sell to one buyer rather than another is based on factors other than strictly price considerations.

TABLE 10

EX-VESSEL PRICES PAID BY THE BUYERS OF PUNTARENAS FOR THE SPECIES OF CORVINA GRANDE, COLA & AGRIA, AND CHATARRA
(Sept. 1976-Feb. 1977)

| Firm | Species: Corvina Grande | | | | | Species: Cola & Agria | | | | | Species: Chatarra | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code # | Sept. | Oct. | Nov. | Dec. | Jan. | Sept. | Oct. | Nov. | Dec. | Jan. | Sept. | Oct. | Nov. | Dec. | Jan. |
| 15 | 2.85 | 2.55 | 3.20 | 2.93 | 4.00 | 1.34 | 1.30 | 1.20 | 1.47 | 1.20 | .60 | .60 | .59 | .66 | .33 |
| 9 | 3.16 | 3.20 | 3.54 | -- | -- | 1.34 | 1.46 | 1.53 | -- | -- | .70 | .75 | .70 | .70 | -- |
| 2 | 2.43 | 2.79 | -- | -- | -- | 1.34 | 1.41 | 1.46 | 1.55 | 1.60 | .60 | .60 | .60 | .63 | .60 |
| 13 | 3.27 | -- | 3.50 | 3.50 | 3.50 | 1.25 | -- | 2.00 | 1.04 | 1.70 | .60 | -- | .60 | .76 | .65 |
| 77 | 2.54 | 2.75 | 2.86 | 3.00 | 3.95 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | .41 | .40 | .39 | .45 | .41 |
| 4 | 3.11 | 3.32 | 3.86 | 3.72 | 4.14 | 1.17 | -- | 1.60 | 1.92 | -- | .61 | .60 | .60 | .60 | .60 |
| 20 | -- | -- | 2.40 | -- | -- | 1.27 | 1.40 | -- | -- | -- | .60 | .61 | .60 | .60 | .60 |
| 14 | -- | -- | -- | -- | -- | 1.21 | -- | -- | -- | -- | .02 | .70 | .68 | .55 | .70 |
| 17 | -- | 3.40 | -- | -- | -- | 1.70 | 1.40 | -- | -- | -- | .70 | .70 | .70 | -- | -- |
| Average | 2.75 | 3.03 | 3.10 | 3.47 | 3.05 | 1.35 | 1.42 | 1.04 | 1.62 | 1.52 | .65 | .63 | .62 | .64 | .59 |
| S.E. | (.37) | (.33) | (.53) | (.41) | (.26) | (.15) | (.06) | (.22) | (.21) | (.15) | (.13) | (.10) | (.09) | (.09) | (.13) |

Table 11 lists the average ex-vessel prices for firms in Puntarenas and in the outlying areas of the Gulf. For all classes listed, the average prices offered in Puntarenas are higher than in the outlying areas. However, this difference is statistically different for lower class fish only (the t statistics for the null hypothesis that the average prices are equal are given in parentheses). The added costs involved in transporting the fish from the outlying areas could account for this difference in prices. The lack of a significant difference for first class fish could be a result of the higher quality of the first class fish landed in the outlying areas. A great proportion of the landings in the outlying areas are first and second class fish caught with hand lines, while in Puntarenas the majority of fish landed are caught with gill nets. And it is well known that gill nets yield lower quality fish: after entrapment by the net the fish can remain dead in the warm water up to six hours, gills can be torn and scales ripped off. These quality differences should be more important for the value of higher class fish than lower class fish. Therefore, we observe the higher quality of the fish in the outlying areas almost off-setting the added transportation costs, while for lower class fish the prices are significantly reduced by the added transportation costs.

B. Marketing Margins

The difference between the amount consumers pay for the final product and the amount producers receive is generally referred to as the marketing margin. The ex-vessel/retail margin is the difference between the price paid by the consumer and the dockside value of an equivalent weight of the product. Within this margin are included the payments received by the various marketing agents that perform services in moving fish from fishermen to consumers. Such services include assembly, storage, transport and retailing. In the small scale fishery

TABLE 11

EX-VESSEL PRICES PAID BY THE PRIMARY BUYERS IN PUNTARENAS AND IN THE OUTLYING AREAS OF THE GULF OF NICOYA
(Sept. 1976-Feb. 1977)

| Firm | Weighted Average Ex-Vessel Prices (colones per pound) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Primera Grande | Primera Pequena | Clasificado | Cazon | Cola de Agria | Posta Blanca | Posta Negra | Chaterra |
| ---------- Puntarenas ---------- | | | | | | | | |
| 1 | 3.47 | 2.63 | 1.25 | 1.89 | 1.59 | 1.25 | .55 | .63 |
| 2 | 3.39 | 2.61 | 1.53 | 1.84 | 1.45 | 1.39 | .85 | .61 |
| 3 | 3.39 | 2.58 | 1.49 | 1.81 | 1.45 | 1.52 | 1.24 | .66 |
| 4 | 3.07 | 2.19 | 1.34 | 1.59 | 1.39 | 1.18 | 1.09 | .56 |
| 5 | 3.13 | 2.58 | 1.51 | 1.82 | 1.39 | 1.43 | 1.15 | .74 |
| 6 | 3.49 | 2.82 | 1.54 | 1.83 | 1.53 | 1.06 | .78 | .60 |
| 7 | 3.24 | 2.36 | 1.63 | 1.37 | -- | -- | -- | .59 |
| 8 | 3.01 | 1.74 | 1.61 | 1.92 | 1.66 | 1.53 | 1.02 | .70 |
| 9 | 3.30 | 2.73 | 1.63 | 1.79 | 1.39 | 1.11 | 1.30 | .67 |
| 10 | 3.38 | 2.21 | 1.50 | 1.93 | 1.52 | 1.45 | .90 | .75 |
| 11 | 2.85 | 2.14 | 1.57 | 1.61 | 1.41 | 1.22 | .48 | .39 |
| Average | 3.28 | 2.52 | 1.51 | 1.76 | 1.48 | 1.31 | .92 | .63 |
| ---------- Outlying Areas of the Gulf ---------- | | | | | | | | |
| 1 | 3.20 | 2.40 | 1.06 | 1.43 | 1.19 | .97 | -- | .50 |
| 2 | 3.40 | 2.48 | 1.30 | -- | -- | .86 | .60 | .57 |
| 3 | 2.72 | 2.28 | 1.21 | .84 | 1.23 | -- | -- | .49 |
| 4 | 3.26 | 2.20 | -- | -- | 1.25 | .59 | -- | .50 |
| 5 | 3.00 | 2.53 | 1.25 | .80 | 1.50 | -- | -- | -- |
| Average | 3.12 | 2.40 | 1.21 | 1.02 | 1.29 | .81 | .60 | .52 |
| t-values | (1.1) | (.75) | (4.52) | (5.34) | (2.92) | (4.38) | - | (2.16) |
| d.f. | 14 | 14 | 13 | 12 | 12 | 11 | - | 13 |

of Costa Rica, the ex-vessel/retail margin is made up of individual margins at the primary buyer, transport, and retail levels of the market. The difference between the ex-vessel price and the primary buyer's price is the primary buyer's margin. The difference between the primary buyer's price and the transporter's price is the transporter's margin. Finally, the retailer's margin is the difference between the transporter's price and the retailer's price.

Out of their respective marketing margins, the primary buyers, transport wholesalers, and retailers pay for the labor, equipment, capital, etc., employed in carrying out their market functions. These marketing costs also include payments for management, enterprise, and risk. Under competitive conditions, the net return on investment received by each intermediary is not larger than that needed to keep him in that particular line of business. If residual profits were larger, other firms would be attracted into the industry and profits would be reduced. If, however, oligopsony or other forms of imperfect competition exist in the market, the middlemen may be in a position to obtain a larger margin than would be possible if the number of buyers were greater and the competition sharper.

Table 12 presents the weighted average weekly prices during the five-week period for six major categories of fish: Corvina Grande, Primera Pequena, Corvina Pequena, Clasificado, Corvina Agria, and Chatarra. Table 13 presents the monthly average prices during the six-month period for the same species.

The wholesale prices listed in Tables 12 and 13 are the prices received by the transport wholesaler from the retailer. Thus, the margin between the ex-vessel price and the transporter's price represents the wholesale margin - the margin received by the primary buyer and the transporter stages combined. The price data currently available do not allow for separating out the margin accruing to the primary buyer or the transport marketing stage alone.

The graphical presentation of the weekly and monthly prices of several important categories of fish in Figures 3 and 4 indicates that ex-vessel prices remain relatively stable while wholesale and retail prices fluctuate rather sharply from period to period for all categories except Chatarra.

Marketing margins may be computed in both absolute cash terms and as percentages of retail prices. Tables 14 and 15 show the average cash margins for the different categories of fish. For most categories, the per pound retail margin is higher than the wholesale margin. Penn (1974, p. 14) suggests several possible reasons for retail margins being higher than wholesale margins: 1) fish are usually sold by retailers in quantities of less than 10 pounds in each transaction while they are sold by hundreds of pounds in each transaction at the wholesale level; 2) higher operating and overhead costs are usually present at the retail level; and 3) the greatest spoilage and shrinkage losses are often assumed by the retailer.

Despite the fluctuations of cash wholesale margins for individual categories of fish, the overall weighted average margin per pound of fish handled showed little variation during the six-month period (January through June, 1977). Over this period the weighted average price was .92 colones per pound with a standard deviation of .10 colones (Table 16). The rather steady wholesale margin for fish is explained by the fact that the reductions in margins for certain categories of fish were offset by increases in the marketing margins of other species.

TABLE 12

AVERAGE WEEKLY RETAIL, WHOLESALE, AND EX-VESSEL PRICES
(per pound)
(Sept. 5-Oct. 10, 1976)

| Species | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 |
|---|---|---|---|---|---|
| Corvina Grande | | | | | |
| Retail | 4.89 | 4.85 | 4.21 | -- | 5.01 |
| Wholesale | 3.74 | 3.78 | 3.51 | -- | 4.14 |
| Ex-Vessel | 2.79 | 2.87 | 3.17 | 3.01 | 3.17 |
| Primera Pequena | | | | | |
| Retail | 3.35 | 3.38 | 4.34 | -- | 4.86 |
| Wholesale | 3.24 | 2.96 | 2.85 | -- | 3.20 |
| Ex-Vessel | 2.55 | 2.44 | 2.68 | 2.59 | 2.59 |
| Corvina Pequena | | | | | |
| Retail | 4.47 | 4.76 | 4.69 | 5.01 | 4.76 |
| Wholesale | 2.46 | 2.50 | 3.00 | 3.51 | 2.20 |
| Ex-Vessel | 2.20 | 2.36 | 2.32 | 2.49 | 1.60 |
| Clasificado | | | | | |
| Retail | 3.75 | 3.44 | 3.25 | -- | 4.76 |
| Wholesale | 2.04 | 2.15 | 2.31 | -- | 2.20 |
| Ex-Vessel | 1.11 | 1.53 | 1.55 | 1.89 | 1.60 |
| Corvina Agria | | | | | |
| Retail | 4.51 | 3.70 | 3.71 | -- | 3.34 |
| Wholesale | 1.98 | 2.13 | 2.24 | -- | 2.30 |
| Ex-Vessel | -- | -- | -- | -- | -- |
| Chatarra | | | | | |
| Retail | 1.86 | 1.78 | 1.99 | 1.75 | 2.03 |
| Wholesale | 1.14 | 1.18 | 1.23 | 1.25 | 1.13 |
| Ex-Vessel | .69 | .68 | .71 | .66 | .66 |

TABLE 13

AVERAGE MONTHLY RETAIL, WHOLESALE, AND EX-VESSEL PRICES
(colones per pound)
(January-June, 1977)

| Species | Jan. | Feb. | March | April | May | June |
|---|---|---|---|---|---|---|
| Corvina Grande | | | | | | |
| Retail | 5.83 | 4.48 | 6.14 | 5.08 | 5.74 | 4.84 |
| Wholesale | 5.22 | 4.75 | 5.11 | 4.58 | 4.02 | 3.90 |
| Ex-Vessel | 3.35 | 3.74 | 4.00 | 3.80 | 2.83 | 2.74 |
| Primera Pequena | | | | | | |
| Retail | -- | 5.84 | 5.00 | -- | 4.60 | 4.33 |
| Wholesale | -- | 4.38 | 4.13 | 4.33 | 3.20 | 3.24 |
| Ex-Vessel | 2.90 | 2.94 | 2.98 | 2.80 | 2.21 | 2.10 |
| Corvina Pequena | | | | | | |
| Retail | 5.13 | 3.64 | 5.45 | 4.09 | 5.00 | 4.77 |
| Wholesale | 3.92 | 2.64 | 3.58 | 3.28 | 3.66 | 4.20 |
| Ex-Vessel | 2.01 | 2.26 | 2.98 | 2.89 | 2.21 | 2.10 |
| Clasificado | | | | | | |
| Retail | 4.48 | 4.95 | 3.36 | 4.38 | 3.64 | 3.50 |
| Wholesale | 2.56 | 2.17 | 2.47 | 2.69 | 2.44 | 2.16 |
| Ex-Vessel | 1.52 | 1.36 | 1.50 | 1.48 | 1.45 | 1.54 |
| Corvina Agria | | | | | | |
| Retail | 3.92 | 4.11 | 3.65 | 4.10 | 3.64 | 4.14 |
| Wholesale | 2.47 | 2.33 | 2.46 | 2.74 | 2.10 | 1.94 |
| Ex-Vessel | 1.46 | 1.48 | 1.72 | 1.54 | 1.39 | 1.28 |
| Chatarra | | | | | | |
| Retail | 2.29 | 1.80 | 1.68 | 2.39 | 2.00 | 2.00 |
| Wholesale | 1.22 | .93 | 1.02 | 1.00 | 1.07 | 1.04 |
| Ex-Vessel | .64 | .66 | .69 | .66 | .60 | .58 |

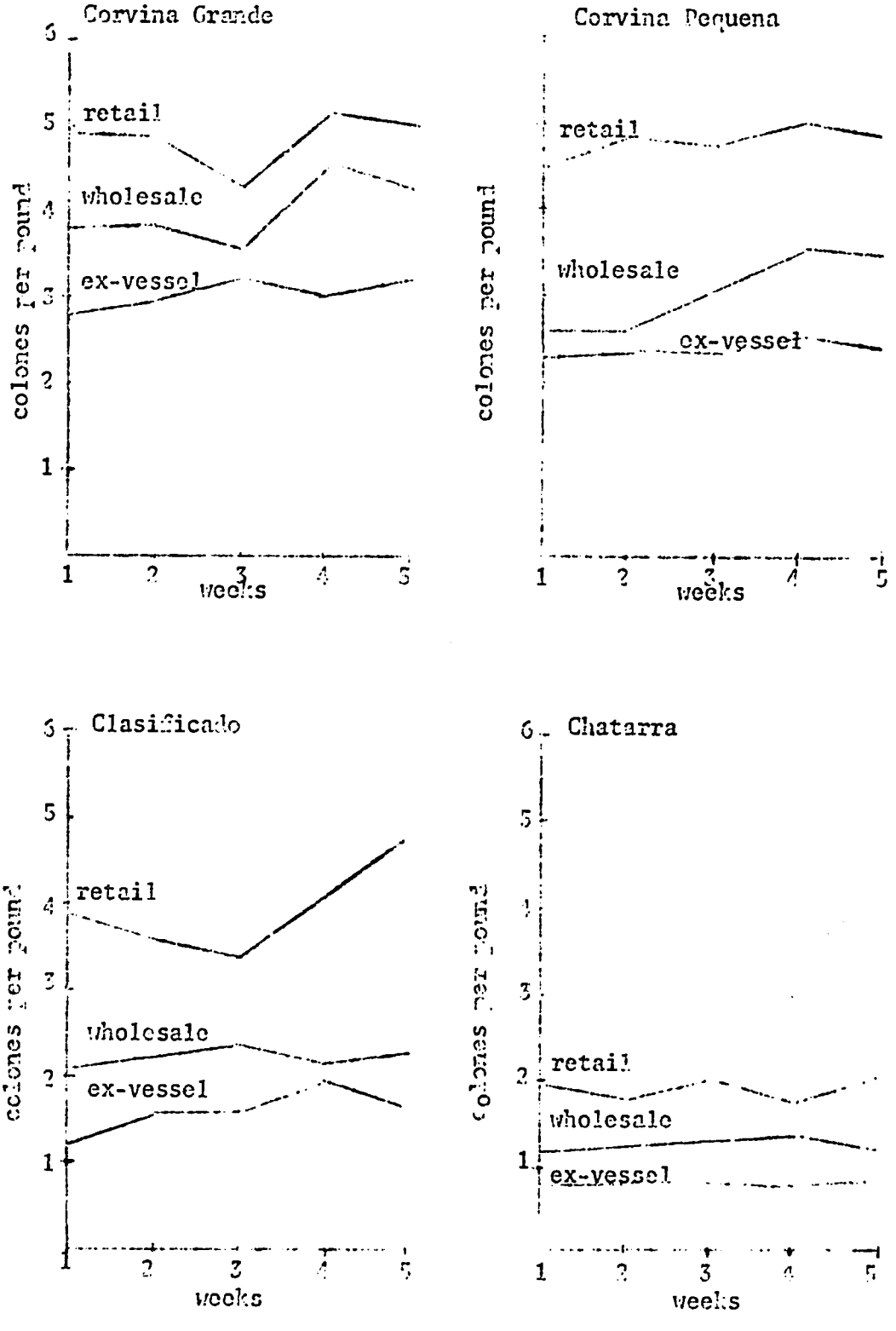



Figure 3. Ex-vessel, Wholesale, and Retail Prices, by Week (September 5-October 10, 1976).

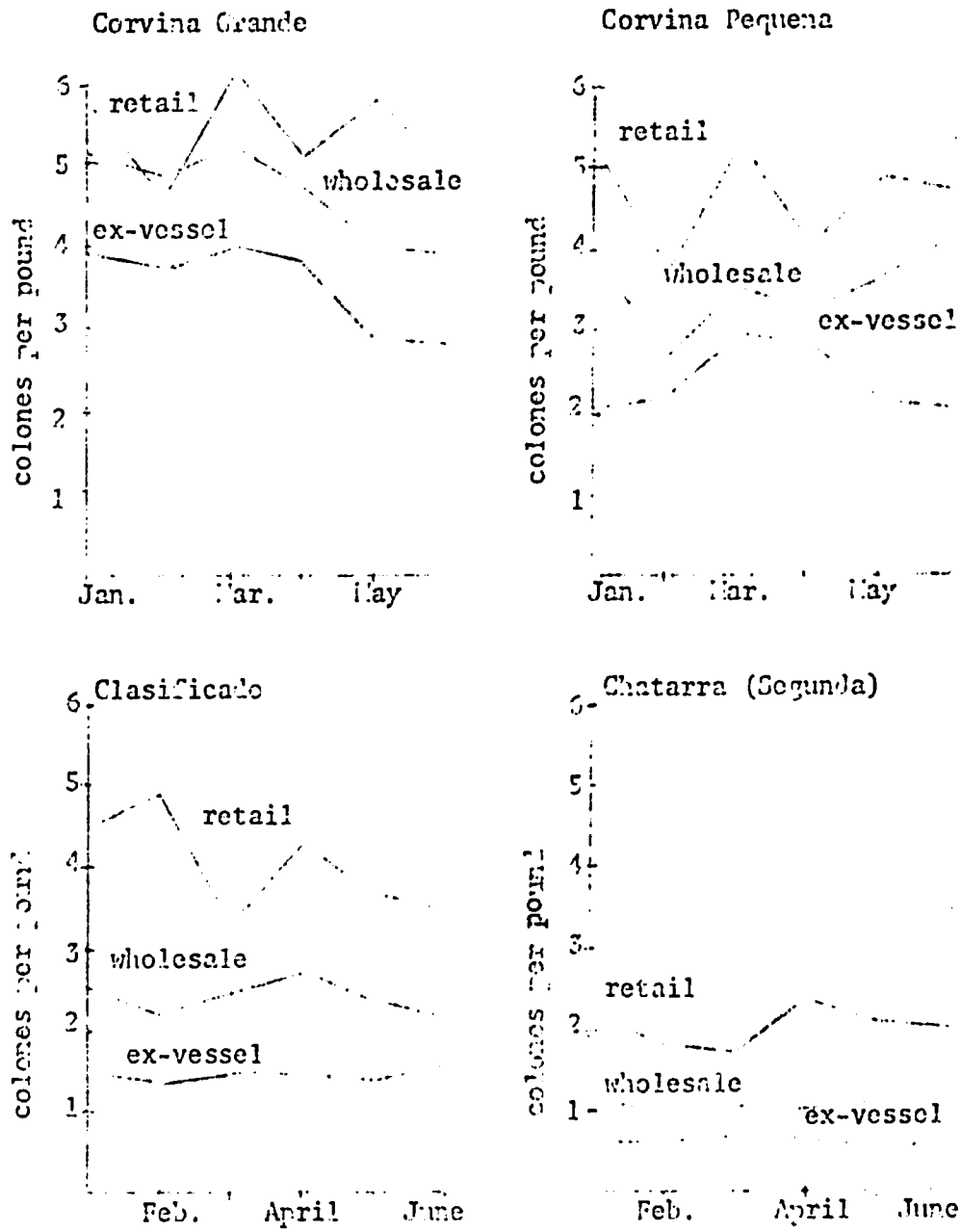



Figure 4. Ex-vessel, Wholesale, and Retail Prices, by Month (January through June, 1977).

TABLE 14

RETAIL AND WHOLESALE CASH MARKETING MARGINS PER POUND
(September 5-October 10, 1976)

| Species | 1 | 2 | 3 | 4 | 5 | Average |
|---|---|---|---|---|---|---|
| Corvina Grande | | | | | | |
| Retail Margin | 1.15 | 1.07 | .70 | -- | .97 | .95 |
| Wholesale Margin | .95 | .91 | .34 | -- | .97 | .97 |
| Primera Pequena | | | | | | |
| Retail Margin | .61 | .42 | 1.49 | -- | 1.66 | 1.04 |
| Wholesale Margin | .59 | .52 | .17 | -- | .61 | .50 |
| Clasificado | | | | | | |
| Retail Margin | 1.71 | 1.29 | .94 | -- | 2.56 | 1.62 |
| Wholesale Margin | .93 | .62 | .76 | -- | .69 | .73 |
| Corvina Agria | | | | | | |
| Retail Margin | 2.53 | 1.63 | 1.47 | -- | 1.04 | 1.67 |
| Wholesale Margin | -- | -- | -- | -- | -- | -- |
| Chatarra | | | | | | |
| Retail Margin | .72 | .60 | .76 | .50 | .99 | .70 |
| Wholesale Margin | .45 | .50 | .52 | .59 | .47 | .51 |

TABLE 15

RETAIL AND WHOLESALE CASH MARKETING MARGINS PER POUND
(January-June, 1977)

| Species | Jan. | Feb. | March | April | May | June | Average |
|---|---|---|---|---|---|---|---|
| Corvina Grande | | | | | | | |
| Retail Margin | .61 | -.33 | 1.03 | .50 | 1.72 | .94 | .74 |
| Wholesale Margin | 1.37 | 1.01 | 1.11 | .78 | 1.19 | 1.16 | 1.10 |
| Primera Pequena | | | | | | | |
| Retail Margin | -- | 1.46 | .87 | -- | 1.40 | 1.09 | 1.20 |
| Wholesale Margin | -- | 1.44 | 1.15 | 1.44 | .99 | 1.14 | 1.23 |
| Clasificado | | | | | | | |
| Retail Margin | 1.92 | 2.79 | .89 | 1.69 | 1.20 | 1.34 | 1.64 |
| Wholesale Margin | 1.04 | .91 | .97 | 1.21 | .99 | .62 | .94 |
| Corvina Agria | | | | | | | |
| Retail Margin | 1.45 | 1.78 | 1.19 | 1.36 | 1.54 | 2.20 | 1.59 |
| Wholesale Margin | 1.01 | .85 | .74 | 1.20 | .71 | .66 | .86 |
| Chatarra | | | | | | | |
| Retail Margin | 1.07 | .97 | .66 | 1.39 | 1.02 | .96 | 1.00 |
| Wholesale Margin | .58 | .27 | .33 | .34 | .47 | .46 | .41 |

TABLE 16

MONTHLY WEIGHTED* AVERAGE WHOLESALE MARGINS
(January-June, 1977)

| | Colones per Pound |
|---|---|
| January | 1.02 |
| February | .88 |
| March | .87 |
| April | 1.06 |
| May | .88 |
| June | .80 |
| Average | .92 |

(Standard Deviation: .10)

*Margins of the major categories of fish were weighted according to their percentages of the total purchases at the primary buyer level during the five-month survey period, Sept. 1976 to Feb. 1977. It is assumed here that the mix of different categories of fish purchased remains the same during these six months.

When marketing margins are expressed as percentages of the retail price, they indicate the share of the consumer's colone that accrues to the retail, wholesale and harvesting sectors. The distribution of the consumer's colone spent on fish is presented in Table 17.

TABLE 17

DISTRIBUTION OF THE CONSUMER'S DOLLAR SPENT ON FISH, ACCORDING TO THE AVERAGE PRICES OF THE FIVE-WEEK AND SIX-MONTH SURVEY PERIODS

| Market Functions | Corvina Grande | Primera Pequena | Corvina Pequena | Clasificado | Corvina Agria | Chatarra |
|---|---|---|---|---|---|---|
| | | | Sept. 5 - Oct. 10, 197 | | | |
| Retail | .20 | .24 | .37 | .40 | .43 | .37 |
| Wholesaling | .16 | .14 | .13 | .20 | -- | .27 |
| Harvesting | .64 | .62 | .50 | .40 | -- | .36 |
| Total | 1.00 | 1.00 | 1.00 | 1.00 | -- | 1.00 |
| | | | Jan.-June, 1977 | | | |
| Retail | .13 | .20 | .24 | .36 | .40 | .48 |
| Wholesaling | .21 | .24 | .24 | .25 | .22 | .20 |
| Harvesting | .66 | .56 | .52 | .39 | .38 | .32 |
| Total | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

Out of each colone spent by the consumer on fresh Corvina Grande during the six-month period, the retailer grossed 13 cents, the wholesaler 21 cents, and the fisherman 66 cents. By contrast, in the sale of fresh fish in the low-valued Chatarra category, the retailer retained 48 cents for each consumer colone spent, the wholesaler 20 cents, and the fisherman 32 cents. Penn (1974, p. 17) explains that "in general, market margins (except at the harvesting level) tend to be proportionately higher for lower priced fish as labor and overhead expenses are fixed for all products regardless of their differences in value." In addition, fish which are purchased more frequently by consumers may have a lower retail margin because of their large turnover of sales.

C. Fisherman's Share

The fisherman's share of the retail price varies according to the different categories of fish considered. During the five-week survey period, the average fisherman's share was 64 percent for Clasificado, 36 percent for Chatarra. The average fisherman's shares calculated over the longer six-month period revealed similar percentages for the same species and categories of fish. The weighted average fisherman's share for the seven major categories of fish (Primera Grande, Primera Pequena, Clasificado, Cola and Agria, Cazon, Posta Blanca, and Chatarra) landed during the six-month period was estimated to be approximately 41 percent. Thus, on the average, for each colone spent on fresh whole fish by consumers in retail fish outlets, fishermen received about 41 cents and the wholesale and retail sectors received 22 and 37 cents, respectively.

By way of comparison, over the last 30 years the U.S. fisherman's share of the retail price of fresh groundfish filets has averaged about 41 percent (Penn, 1974). Since fish filets require more processing at the wholesale level, it may be assumed that the fisherman's share of the retail price for fresh

whole fish would be somewhat larger than 41 percent. In the agricultural sector, U.S. farmers in recent years have received about 59 percent of the retail price for dairy products and about 55 percent for meat products (U.S. Department of Agriculture, 1978).

D. Marketing Cost Components

To develop a better understanding of the marketing margin at the wholesale level of the small scale fishery, the variable and fixed marketing costs of the primary buyers and transport wholesalers are examined. Estimates of various cost components at these two marketing levels are based on data gathered from interviews of 12 primary buyers and 23 transporter wholesalers conducted during the latter part of 1978.

Among the major cost components for the primary buyers are the variable costs for ice, maintenance and repair, and labor. The fixed marketing costs include depreciation, rent, and interest on investment. For the transporters, the major variable costs are ice, fuel, maintenance and repair, and labor. The fixed costs are comprised of depreciation, insurance, and interest on investment. (Tables I.A and I.B in Appendix I list the monthly variable and fixed costs for the primary buyers and transporters, respectively.)

For the primary buyers, the cost of ice represents the largest percentage of the total monthly costs. Table 13 indicates that about 44 percent of total monthly costs are expenditures on ice. The next largest cost component at this level is labor which accounts for about 28 percent of total monthly costs.

TABLE 18

MAJOR COST COMPONENTS AND THEIR AVERAGE PERCENTAGE OF TOTAL COSTS AT THE PRIMARY BUYER LEVEL (1978)

| | Average | (SD) |
|---|---|---|
| Ice | 44.2 | (15.5) |
| Maintenance & Repair | 4.3 | (1.99) |
| Labor | 28.1 | (9.11) |
| Capital Costs* | 17.2 | (11.5) |

*Capital costs include depreciation and interest on investment.

The largest cost component for the transporters is labor costs which account for about 41 percent of total monthly costs (see Table 19). Expenditures on repair and maintenance of the trucks and other equipment is the next largest cost item, accounting for about 18 percent of total monthly costs.

TABLE 19

MAJOR COST COMPONENTS AND THEIR AVERAGE PERCENTAGE TOTAL COSTS AT THE TRANSPORT WHOLESALE LEVEL (1978)

| | Average | (SD) |
|---|---|---|
| Labor | 40.7 | (12.5) |
| Maintenance & Repair | 17.6 | (8.4) |
| Capital Costs* | 17.2 | (6.5) |
| Ice | 12.5 | (5.6) |
| Fuel | 8.0 | (3.2) |

*Capital costs include depreciation and interest on investment.

A rough estimate of the marketing cost per pound of fish handled at the primary buyer and transport levels was obtained by dividing the average monthly costs of each firm surveyed by the average monthly amount (lbs.) of fish each handled. Marketing costs per pound of fish at the primary buyer level ranged from .19 to .71 colones; at the transport level costs ranged from .23 colones to 2.05 colones per pound (see Tables 20 and 21).

TABLE 20

COST PER POUND OF FISH HANDLED BY THE PRIMARY BUYERS

| Primary Buyer | Total Monthly Costs | Average Monthly Amt. of Fish Handled | Average Cost/Lb. of Fish Handled |
|---|---|---|---|
| | ---colones*-- | ------pounds------- | -----colones----- |
| 1 | 2,769 | 6,000 | .46 |
| 2 | 2,832 | 4,000 | .51 |
| 3 | 5,961 | 24,000 | .25 |
| 4 | 7,028 | 24,000 | .29 |
| 5 | --- | 6,000 | --- |
| 6 | 5,688 | 28,000 | .20 |
| 7 | 2,209 | 12,000 | .19 |
| 8 | 4,592 | 7,750 | .59 |
| 9 | 2,777 | 12,000 | .23 |
| 10 | 5,035 | 16,000 | .31 |
| 11 | --- | 8,000 | --- |
| 12 | 3,999 | 16,000 | .24 |

*3.5 colones = U.S. $1.00.

TABLE 21

COST PER POUND OF FISH HANDLED BY THE TRANSPORT WHOLESALERS (1978)

| Transport Wholesaler | Total Monthly Costs | Average Monthly Amt. of Fish Handled | Average Cost/Lb. of Fish Handled |
|---|---|---|---|
| | ---colones*-- | -------pounds------- | ----colones*---- |
| 1 | 15,945 | 39,200 | .41 |
| 2 | --- | 24,000 | --- |
| 3 | 8,186 | 12,000 | .68 |
| 4 | 4,973 | 6,000 | .83 |
| 5 | 7,904 | 17,600 | .45 |
| 6 | 8,691 | 12,000 | .72 |
| 7 | 4,234 | 2,800 | 1.51 |
| 8 | 6,357 | 28,000 | .23 |
| 9 | --- | 3,875 | --- |
| 10 | 6,932 | 15,000 | .46 |
| 11 | 7,309 | 12,877 | .57 |
| 12 | 2,940 | 1,562 | 1.88 |
| 13 | 4,928 | 2,400 | 2.05 |
| 14 | 4,322 | 3,875 | 1.11 |
| 15 | 5,104 | 16,000 | .32 |
| 16 | 9,005 | 7,200 | 1.25 |
| 17 | --- | --- | --- |
| 18 | --- | --- | --- |
| 19 | --- | 10,400 | --- |
| 20 | 2,624 | --- | --- |
| 21 | --- | 4,000 | --- |
| 22 | 5,315 | 15,250 | .35 |
| 23 | 7,014 | 13,000 | .54 |

*3.5 colones = U.S. $1.00.

E. Economies of Scale

The computation of per pound marketing cost for firms at various levels of output provides a basis for investigating possible marketing economies of scale at the primary buyer and transport marketing levels. By regressing the unit marketing costs on the level of output, the average marketing cost curve for each marketing level was estimated. The best fit was provided by the following log linear equations:

1. $\text{Log PBAMC} = \underset{(2.95)}{4.248} - \underset{(3.76)}{.5723}\ \text{Log Q}, \quad R^2 = .64$

2. $\text{Log TAMC} = \underset{(3.79)}{5.5724} - \underset{(9.5)}{.6550}\ \text{Log Q}, \quad R^2 = .87$

where: PBAMC = average marketing cost at the primary buyer level,

TAMC = average marketing cost at the transport level,

Q = quantity of fish handled,

and t-values are in parentheses.

The estimated average cost functions are graphed in Figures 5 and 6.

The falling unit costs associated with increasing scale may be the result of several factors. The equipment and special skills used at each level come in indivisible lumps and their fixed costs are advantageously spread over a relatively large output. Also, some equipment, such as refrigerators and iceboxes, may be scaled up at less than proportional increases in capital costs up to some critical capacity level. Also, the quantity of ice required appears to increase at a proportionately slower rate as the quantity of fish handled at the primary buyer level increases.

The average cost functions for ice at the primary buyer level was estimated by means of an ordinary least squares regression procedure. The log-linear function again provided the best fit.

3. $\text{Log AIC} = \underset{(8.53)}{5.277} - .767\ \text{Q}, \quad R^2 = .9$

where AIC = average ice cost per pound of fish handled.

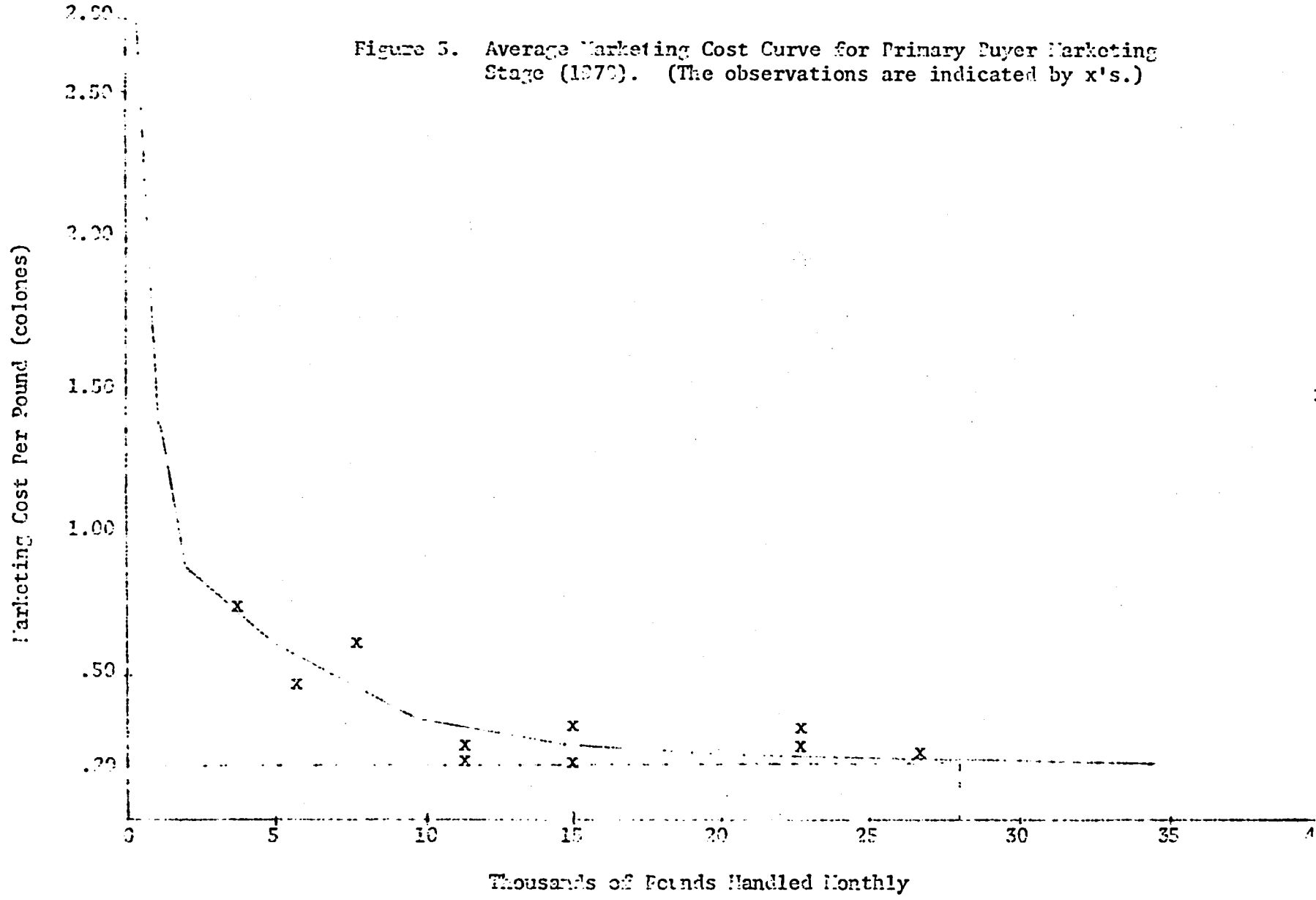
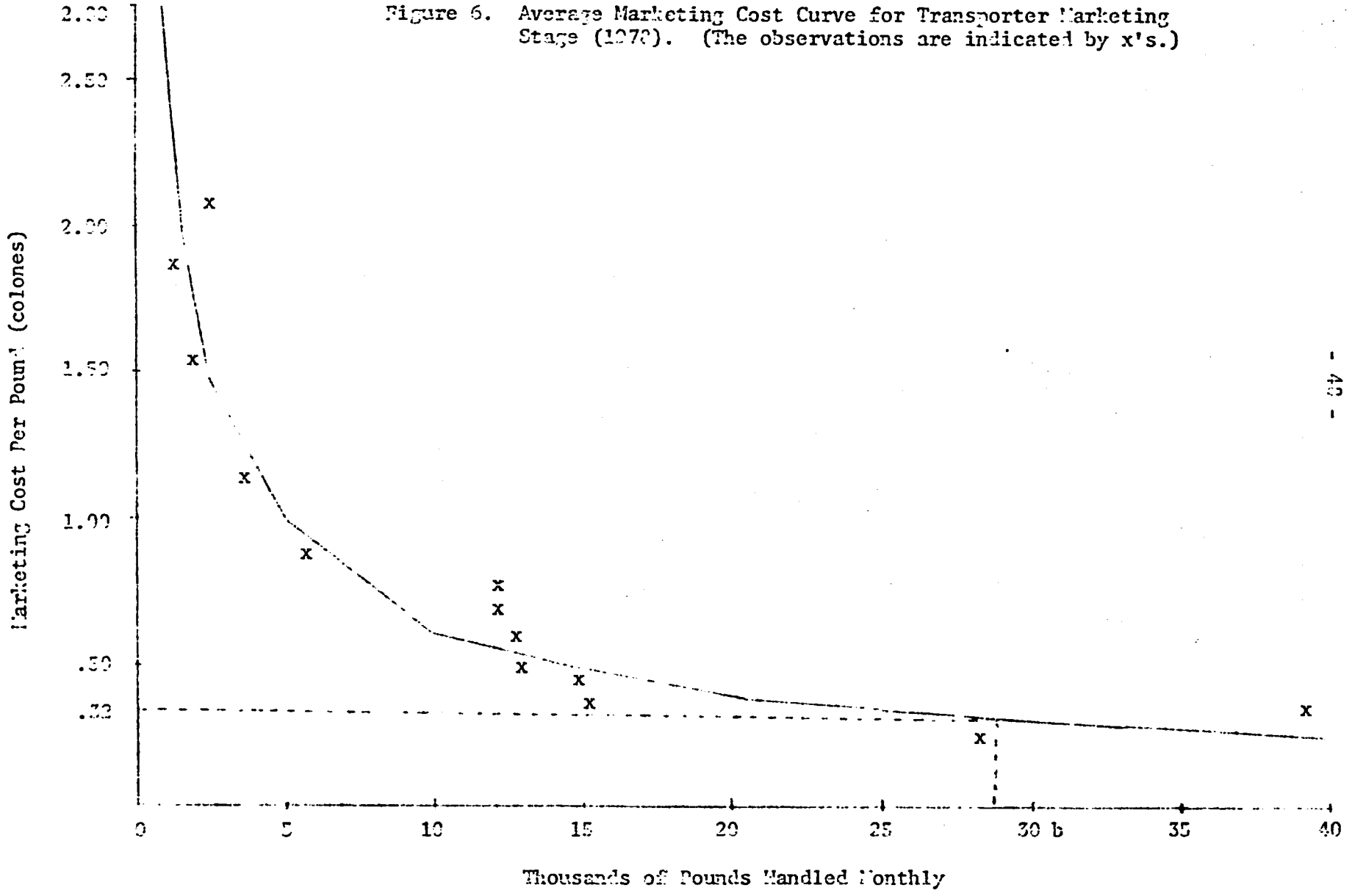



Figure 3. Average Marketing Cost Curve for Primary Buyer Marketing Stage (1979). (The observations are indicated by x's.)

Figure 6. Average Marketing Cost Curve for Transporter Marketing Stage (1970). (The observations are indicated by x's.)



The estimated function which is graphed in Figure 7 indicates the extent to which economies of scale are present for the use of ice at the primary buyer level. Since the unit cost of ice does not increase as buyers purchase increasing amounts of ice (i.e., there are no pecuniary economies), the economies of scale with regard to ice appear to result from the condition that the quantity of ice needed to maintain the fish increases at a decreasing rate as the quantity of fish handled increases. No significant indication of such economies could be found at the transporter level.

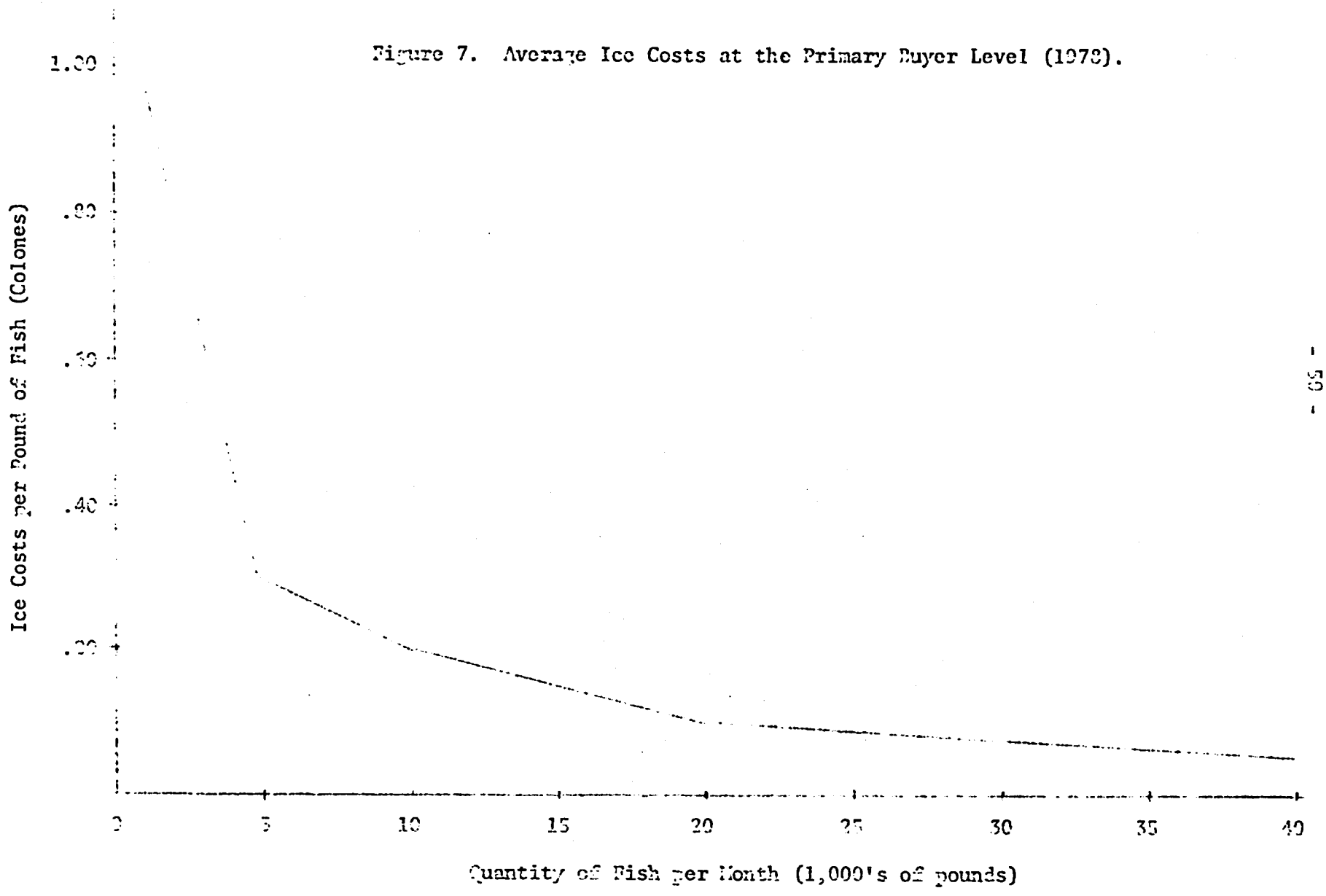
F. Minimum Optimal Scale

The output level at which scale economies become exhausted and the average cost curve becomes horizontal is referred to by economists as the "minimum optimal scale" (MOS). Estimation of the minimum optimal scale for the average marketing cost of the wholesale sector is problematic because the shape of the average cost curves beyond the empirical observations is uncertain. Although the log function provides a reasonably good fit of the empirical observations, it is uncertain if it can be extrapolated to predict average costs beyond observed output levels.

Economic theory suggests that a continuously falling long-run average cost curve provides conditions leading towards a "natural monopoly" in an industry. In such situations, a monopolist could expand to a scale which saturates the potential market demand because he could obtain lower unit costs than a group of smaller-scale competitors (Scherer, 1970, p. 520).

The present situation of the wholesale marketing sector where there are several large, medium, and small scale firms does not indicate the movement towards a natural monopoly. If the average cost curve of the wholesalers does, in fact, continue to fall beyond the observed output levels, certain institutional constraints or limited supplies may be preventing the largest firm from increasing its scale still further. On the other hand, if the average

Figure 7. Average Ice Costs at the Primary Buyer Level (1978).



cost curve actually begins to rise beyond the observed output levels, the firms with the lowest average costs may be operating at or near minimum average costs.

Scherer (1970, p. 21) suggests that such MOS estimation uncertainty can be resolved by defining the MOS as the output of the firms with the lowest unit costs on which operating data are available. Another approach to MOS estimation has been taken by the British research group of Pratten, Selberston, and Cockerill (Pratten, 1971). They have benchmarked their MOS estimates to that scale "above which any possible subsequent doubling in scale would reduce total average unit costs by less than 5% ..." (Pratten, 1971, p. 26).

Due to the lack of information on the shape of the cost curves beyond where there are empirical observations, Scherer's criteria appears the more convenient of the two for the MOS estimates in the present study. Based on his criteria, the MOS point at the primary buyer level and the transport levels is estimated to be at a monthly output of about 20,000 pounds. The minimum unit cost at the primary buyer level is about .20 colones per pound and at the transporter level it is approximately .32 colones per pound.

The estimated cost curves at the primary buyer and transport marketing levels provide some indications of firms operating well below the MOS point and at significantly higher unit costs. Of the ten observations at the primary buyer level (Figure 5), three are operating at less than one-third the MOS level and have unit costs from 225 to 350 percent higher than the minimum average cost. At the transport level (Figure 6), five of the fifteen observations are operating at less than one-third the MOS level and have unit costs from 350 to nearly 900 percent higher than the minimum average cost.

The analysis of the market structure in the previous section reveals that the majority of the primary buyers are integrated at the transport level. An estimate of the average cost curve faced by such integrated enterprises may be obtained by summing the unit cost curves at the primary buyer and transport

levels is given in Figure 8. Again using Scherer's criteria, the optimal scale occurs at about 28,000 pounds per month where the unit cost is about .52 colones per pound.

Economic theory suggests that if the marketing sector were perfectly competitive, their marketing margins would equal the cost of providing the marketing services (Shepherd, 1958, Ch. 2). Furthermore, competition would lead the firm in the long run to operate near the industry's minimum average cost. A comparison of the estimated minimum wholesale marketing cost per pound and the weighted average wholesale marketing margin for the wholesale sector provides an indication of the extent to which the performance of the wholesale sector deviates from the norm of perfect competition. The estimated average marketing margins charged by the wholesale sector during the period January-June, 1977 (see Table 16) was .92 colones per pound, which is about 77 percent over the estimated minimum cost of .52 colones per pound.

It is important to point out that these are only preliminary estimates based on very limited data. The intention here is to suggest a way of judging the industry's performance by use of the competitive market standards. More data over a longer period of time are needed to ascertain the level of accuracy of these present estimates.

It should be noted that the relatively large difference between the industry's marketing margin and its minimum average marketing cost may be a short-run phenomenon. In the long run the difference may grow smaller as suboptimal firms expand and new firms enter the industry. Time series data over a longer period of time are needed to judge whether the observed marketing performance is of a short-run or long-run nature.

It is also possible that the estimated costs of some firms are biased downward because some of the true opportunity costs of risk management or labor have been underestimated. Furthermore those firms observed operating

Figure 9. Estimated average cost curve for the integrated marketing stages of primary buyer and transporter (1973).

at higher average marketing costs may be able to survive because of locational advantages or other uniquely differentiated marketing services. If such firms can remain viable despite relatively high costs and prices, they must be meeting the need of some fishermen. In some cases, the benefits of such differentiated services may compensate or even outweigh the costs (Scherer, 1970, p. 496).

G. Inefficienty Costs and "Umbrella Prices"

With the present analysis of average costs at the wholesale level, two important economic issues become apparant: 1) some firms are handling sub-optimal quantities of fish; and 2) wholesale prices are sufficiently high to allow firms operating at relatively inefficient scales to survive the industry. Based on the monthly output levels of the primary buyers which were estimated from the purchasing receipts collected over a five-month period (Sept. 1976-Feb. 1977), the majority of the buyers are handling less than the minimum optimum quantity of 20,000 pounds and thus are incurring marketing costs above the minimum level. The largest two buyers in the industry operate at well above the estimated MOS point with output levels of over 40,000 pounds per month. The remaining firms in the industry are below the MOS level with estimated output levels which range from about 26,000 pounds to 1,000 pounds per month. Table 22 presents an estimate of the monthly cost of operating at suboptimal scales for 15 buyers whose monthly average output is below the MOS point. The estimated cost resulting from marketing operations at sub-optimal scale is about 62,125 colones (U.S. $7,275).per month.

TABLE 22

ESTIMATED MONTHLY COST FOR OPERATION AT SUBOPTIMAL SCALE IN THE WHOLESALE SECTOR OF THE SMALL SCALE FISHERY (1978)

| Firms Operating Above Minimum Optimum Scale | Amount Above Minimum Unit Cost | # of Pounds Handled/Month | Cost of Inefficiency |
|---|---|---|---|
| | -----Colones----- | | ---Colones--- |
| 1 | .03 | 25,548 | 766 |
| 2 | .04 | 25,012 | 1,000 |
| 3 | .04 | 24,663 | 987 |
| 4 | .08 | 22,423 | 1,794 |
| 5 | .14 | 17,640 | 2,470 |
| 6 | .14 | 17,600 | 2,464 |
| 7 | .16 | 17,256 | 2,761 |
| 8 | .22 | 15,604 | 3,433 |
| 9 | .22 | 15,568 | 3,425 |
| 10 | .25 | 14,532 | 3,633 |
| 11 | .30 | 13,434 | 4,045 |
| 12 | .33 | 12,844 | 4,239 |
| 13 | .34 | 10,576 | 3,596 |
| 14 | .81 | 7,380 | 5,979 |
| 15 | .96 | 6,332 | 6,079 |
| 16 | 1.05 | 5,372 | 5,641 |
| 17 | 1.35 | 4,392 | 5,929 |
| 18 | 2.20 | 1,704 | 3,995 |
| | | | 62,125 |

Estimated total monthly inefficiency cost, 62,125 colones (U.S. $7,375).

The existence of a large number of firms operating at suboptimal scales is an indication that the competitive market mechanism may not be working to bring marketing prices down toward the minimum average cost. There could be a "price umbrella" effect at the wholesale level where efficient firms (those operating at the MOS level) set their marketing prices at such a high level that inefficient firms (those operating below the MOS level) are also able to survive and prosper.

Although there is insufficient data currently available to explain the nature of the apparent price umbrella effect, the discussion of market structure in the previous section suggests several possible contributing factors. The high level of market concentration may allow for direct or tacit agreements among large buyers to set marketing prices well above their

average costs. The relatively high costs of entering the industry as an integrated enterprise and the added costs of providing ancillary supply and credit services to the fishermen may prevent new firms from entering the industry to compete for returns above average cost. Furthermore, the specialized services of certain firms such as credit provisions and convenient location may differentiate marketing services enough to discourage existing firms from competing with one another in terms of price.

H. Policy Considerations

Assuming that economies of scale exist at the wholesale sector of the small scale fishery and that there is some minimum optimal scale at which all economies of scale can be secured, a crucial question remains: Is there room for many firms in the market, each large enough to enjoy all scale economies? The answer depends on the size of the market and the minimum optimum size of output. Based on data collected during the five month survey period (September 1976 to February 1977) the average monthly amount of fish handled by the primary buyers of the Gulf of Nicoya is about 750,000 pounds. With the MOS at about 20,000 pounds, a maximum of about 13 firms would be able to operate in the industry at the minimum unit cost level.

The elimination of firms operating at less than the MOS level may be simultaneously desirable, in that unit cost savings would be realized, and undesirable, in that the reduction of firms may increase the level of market concentration and permit firms to increase their prices over the competitive level. In the present situation, however, there may be reason to expect that prices would change little, if at all, since the current prices already appear to be well above the minimum average cost. The argument for the tradeoff of increased market power for the economies of scale receives further support from Williamson (1968) who concludes that in most cases only a small reduction

in costs due to greater economies of scale would be necessary to offset any large increases in price that might result from a simultaneous increase in market power.

The difference between the current wholesale marketing margin and the estimated minimum average marketing cost indicates the level of cost savings that would potentially be passed onto the fishermen and/or consumers through a more competitive wholesale sector operating at the minimum optimal scale. Based on the very limited data available, the potential cost savings are estimated to be about .42 colones per pound of fish handled (the estimated average marketing margin of .92 colones per pound minus the estimated minimum average marketing cost of .52 colones per pound). With an estimated average of about 350,000 pounds handled per month, there would be a monthly savings of about 147,000 colones. Although complete or partial industry operation at the minimum optimal scale would reduce current marketing costs at the wholesale level, the extent to which cost savings would be passed on to the fishermen and/or consumers would depend on the level of competition in the market.

## V. Conclusions

This study suggests to policy makers that there is much room for improving the marketing efficiency and level of competition among the firms of the wholesale sector of the small scale fishery. If the estimated average marketing cost curve is accurate, significant marketing cost savings could be achieved by a policy which encourages firms to operate at the minimum optimal scale. To the extent that fishery policy can also stimulate greater competition among the buyers, such marketing cost savings would be passed onto fishermen and/or consumers and wholesale margins would become commensurate with the true cost of the marketing services.

These conclusions concerning the specific structure and performance of the wholesale sector are tentative. More indepth study using data covering a longer period of time is needed in order to verify these preliminary findings.

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TABLE 5.9

MONTHLY COSTS FOR PRIMARY BUYERS (1978)

| | Primary Buyer | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Variable Costs | | | | | | | | | | | | |
| Ice | 1,200 | 1,800 | 3,200 | 2,304 | 1,200 | 1,440 | 300 | 1,200 | 1,400 | 3,200 | 7,800 | 1,395 |
| Water | 50 | 25 | | 400 | | 22 | 55 | 49 | | 50 | | 101 |
| Electricity | 30 | 50 | | 120 | | 40 | 150 | 227 | | 15 | 3,600 | 83 |
| Boxes | | | 120 | | | | | | | 6 | 250 | |
| Plastic & Paper Supplies | 50 | | | | | | 30 | 200 | | | | |
| Telephone | | | | 750 | | | | | | | 500 | |
| Maintenance & Repair | 167 | *155 | *245 | 308 | --- | 255 | 50 | 330 | *237 | 118 | --- | *233 |
| Labor | 550 | **325 | 2,050 | 2,400 | **475 | 1,480 | **911 | 1,800 | 800 | 1,000 | 3,220 | 1,175 |
| Other | | | | | | | | | | | | |
| Total Variable Costs | 2,047 | 2,355 | 5,615 | 6,282 | --- | 3,237 | 1,496 | 3,806 | 2,437 | 4,389 | 15,370 | 2,987 |
| Fixed Costs | | | | | | | | | | | | |
| Depreciation | | | | | | | | | | | | |
| A) Building[a] | | | 22 | 62 | | | | | 35 | | | |
| B) Equipment[b] | 359 | 78 | 194 | 306 | 130 | 276 | 67 | 442 | 191 | 192 | 272 | 306 |
| Rent | 250 | 212 | | | | 2,000 | 666 | 212 | | | 3,500 | 500 |
| Insurance | | | | | | | | | | 140 | 500 | |
| Interest on Investment[c] | 113 | 20 | 130 | 378 | | 105 | | 132 | 114 | 264 | | 106 |
| Other | | 167 | | | | 70 | 70 | | | 50 | | |
| Total Fixed Costs | 722 | 477 | 346 | 746 | | 2,451 | 803 | 786 | 340 | 382 | | 912 |
| Total Costs (VC + FC) | 2,769 | 2,832 | 5,961 | 7,028 | --- | 5,688 | 2,299 | 4,592 | 2,777 | 5,035 | --- | 3,899 |

Source: Interviews conducted by Department of Fisheries of Costa Rica and University of Rhode Island, 1976-7.

Table A.I continued

NOTES

[a]The depreciation of the building is calculated by the equation: Year's depreciation = V(1) - V(2), where $V(1) = P(1+r)^{-t}$ and $V(2) = P(1+r)^{-t-1}$. The estimation of the rate of depreciation, r, is based on survey data concerning original value, present value, and age of building.

[b]Straight line depreciation assuming no salvage value is used for all equipment. This is calculated by dividing the original cost by the expected life of the equipment. The estimated life of the various items is as follows: icebox or freezer, three years; scale, one year for scales costing 400 colones or less and two years for scales costing more; baskets, two years; carts, four years; and other small items, one year.

[c]The interest rate on investment (opportunity cost) is estimated to be 12 percent, the interest rate of the Central Bank of Costa Rica in 1978.

*The estimate of monthly maintenance and repair costs is based on the regression of observed maintenance and repair costs on total capital investment. The estimated log function is: Log of maintenance and repair costs = 3.197 + .244 (log of total investment), (t-ratio .767, F-value .588, 4 observations).

**The estimate of monthly labor costs is based on the regression of observed monthly labor costs on monthly quantities of fish handled. The estimated log function is: Log of Labor costs = -2.00 + .939 (log of quantity), (t-ratio 5.767, F-value 33.26, $R^2$ .932, 7 observations).

TABLE A.II

MONTHLY MARKETING COSTS FOR TRANSPORT [illegible] (1976)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variable Costs** | | | | | | | | | | | | |
| Ice | 2,880 | *1 447 | 960 | 960 | 480 | 1,152 | *201 | 540 | 360 | 480 | 960 | 180 |
| Fuel | 1,050 | 368 | 480 | 475 | 550 | 378 | 420 | 401 | | 600 | 960 | 184 |
| Maintenance & Repairs | 3,220 | | 1,503 | 1,320 | 2,250 | 1,560 | 474 | 200 | 627 | 880 | 1,540 | 320 |
| Labor | 5,000 | 3,840 | 3,920 | 1,200 | **3 440 | 4,000 | **2,0[illegible] | **3,920 | **3,232 | 2,040 | **3 140 | **1,722 |
| Other | 90 | | 4 | | 17 | 20 | 12 | 4 | [illegible] | 417 | | 13 |
| Total Variable Costs | 12,346 | | 6,877 | 3,903 | 6 745 | 7,124 | 3,223 | 5,173 | | 5,581 | 3,036 | 3,439 |
| **Fixed Costs** | | | | | | | | | | | | |
| Depreciation | | | | | | | | | | | | |
| a) Truck(s)[a] | 675 | 762 | 412 | 347 | 363 | 514 | 382 | 450 | 503 | 404 | 474 | 172 |
| b) Equipment[b] | 472 | | 174 | 56 | 63 | 212 | 103 | 106 | 135 | 150 | 33 | 42 |
| Insurance | 600 | 336 | 33 | 162 | 33 | 147 | 147 | 95 | 233 | 240 | 120 | 33 |
| Interest on Investment[c] | 1,352 | 1,125 | 700 | 445 | 700 | 604 | 479 | 628 | 740 | 537 | 810 | 255 |
| Other | | | | | | | | | | | | |
| Total Fixed Costs | 3,099 | | 1,319 | 1,010 | 1,159 | 1,367 | 1,611 | 1,184 | 1,642 | 1,331 | 1,333 | 502 |
| Total Costs (VC*FC) | 15,045 | | 8,186 | 4,973 | 7,904 | 8,661 | 4,234 | 6,357 | | 6,[illegible]52 | 7,369 | 2,340 |

TABLE A.II.

MONTHLY MARKETING COSTS FOR [illegible] WHOLESALERS (1978)

| | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable Costs | | | | | | | | | | | |
| Ice | 144 | 360 | 1,080 | 2,000 | | | 440 | 320 | *360 | 1,024 | *807 |
| Fuel | 340 | 432 | 732 | 325 | | 1,470 | 668 | 340 | 550 | 635 | 860 |
| Maintenance & Repairs | 1,760 | 581 | 427 | 1,165 | 1,061 | 1,653 | 1,202 | 630 | 460 | 1,216 | 870 |
| Labor | 2,340 | 2,000 | 1,980 | 3,600 | 800 | 2,500 | 4,100 | 240 | **2,252 | 1,600 | 2,000 |
| Other | 64 | 15 | 60 | 335 | 30 | 595 | | 5 | | 31 | 220 |
| Total Variable Costs | 4,648 | 3,388 | 4,279 | 7,425 | | | 6,470 | 1,544 | 3,637 | 4,513 | 5,000 |
| Fixed Costs | | | | | | | | | | | |
| Depreciation | | | | | | | | | | | |
| A) Truck(s)[a] | 36 | 343 | 281 | 522 | 307 | 1,114 | 615 | 301 | 27 | 184 | 388 |
| B) Equipment[b] | 25 | 97 | 111 | 201 | 117 | 556 | | 83 | | 172 | 148 |
| Insurance | 39 | 39 | 33 | 228 | 29 | 208 | | 54 | 54 | 52 | 254 |
| Interest on Investment[c] | 180 | 455 | 490 | 629 | 470 | 1,650 | 900 | 562 | 180 | 394 | 572 |
| Other | | | | | | | | | | | |
| Total Fixed Costs | 280 | 934 | 915 | 1,580 | 923 | 3,528 | | 1,080 | | 802 | 1,348 |
| Total Costs (VC*FC) | 4,928 | 4,322 | 5,194 | 9,005 | | | | 2,624 | | 5,315 | 7,014 |

Table A.II continued

NOTES

[a]Depreciation of trucks is calculated by the equation, Year's depreciation = $V(1) - V(2)$, where $V(1) = P(1+r)^{-t}$ and $V(2) = P(1+r)^{-t-1}$. P is the original purchase price of the truck and t is the age of the truck. The rate of depreciation, r, is estimated at 15 percent, based on the average rate of yearly depreciation given by eight surveyed truck owners. The yearly depreciation value was divided by 12 to obtain the monthly truck depreciation.

[b]The depreciation of equipment other than trucks was estimated by means of a straight line depreciation, assuming no salvage value. This was calculated by dividing the original cost by the expected life of the equipment. The estimated life of the various items was as follows: icebox or freezer, three years; scale, one year for scales costing 400 colones or less and two years for scales costing more; baskets, two years; carts, four years; and other small items, one year.

[c]The interest rate on investment (opportunity cost) was estimated to be 12 percent, the interest rate of the Central Bank of Costa Rica in 1970.

*The estimate of monthly ice costs is based on the regression of observed monthly ice costs on monthly quantities of fish handled. The estimated log function is: Log of monthly ice costs = -.418 + .763 (log of Quantity) (t-ratio 3.621, F-value 13.11, $R^2$ .779, 11 observations).

**The estimate of monthly labor costs is based on the regression of observed monthly labor costs on monthly quantities of fish handled. The estimated log function is: Log of monthly labor costs = 3.340 + .296 (log of Quantity) (t-ratio 1.662, F-value 2.762, $R^2$ .507, 10 observations).