

**Economic Effects of Trade Policies
on the Shrimp Fisheries of the
United States and the
Latin American Nations**

By

David A. Whitaker, Jr.

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Abstract of Dissertation Presented to the Graduate
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ECONOMIC EFFECTS OF TRADE POLICIES
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UNITED STATES AND THE
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By

David A. Whitaker, Jr.

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Chairman: Dr. Carter C. Osterbind
Major Department: Economics

The purpose of this dissertation is to examine the economic effects of United States trade policies on the shrimp trawling industries of the South Atlantic and Gulf States, and certain Latin American countries. The major hypothesis examined is that a free trade policy with respect to shrimp imports did not adversely affect the domestic shrimp industry in recent years, and further that a restrictive trade policy would not contribute greatly to the future prosperity of the domestic industry. A secondary hypothesis is that United States trade policy has facilitated development of the shrimping industry in Latin America.

A supply and demand framework is utilized in analyzing recent conditions in the shrimp fishery. Arguments based on estimated supply and demand relationships are utilized in predicting the effects of alternate trade policies on the shrimp industry and the implications of their use. The common property or open access nature of the shrimp resource plays an important role in the study. Common property

resources are subjected to special problems associated with freedom of entry of fishing firms into the exploiting industry and a tendency toward overinvestment.

It is concluded in the study that the growing demands for shrimp products offset the steadily increasing flow of imports and generally rising level of domestic production. In one period imports appear to have been instrumental in bringing about lower domestic prices, but in general prices tended to be more closely related to domestic production. The influence of a relatively fixed abundance of shrimp in the domestic shrimping grounds, and the freedom of entry nature of the industry combine to create a situation in which a restrictive trade policy can contribute little to improving the long run profitability of the industry.

The duty free status of shrimp has stimulated the development of Latin America's shrimp export industries in two ways. First, the free access to the growing United States market provided a convenient outlet for foreign shrimp producers. Secondly, since no penalty other than transportation cost was attached to foreign landings, United States investors were encouraged to develop foreign operations near the heavy concentrations of shrimp along the Central American and South American coasts.

CHAPTER I

INTRODUCTION

Purpose of the Study

The purpose of this study is to examine the economic effects of United States trade policy on the South Atlantic and Gulf Coast shrimp industry and the shrimp industries of certain Latin American countries which supply a large share of the United States market. Specifically, it is concerned with the determination of the influence of unrestricted imports of shrimp and shrimp products on price, output, employment, income, and investment in the primary phase of the shrimp industry and the potential impact of alternative policies which restrict shrimp imports. Primary emphasis is placed on the events of the 1957-1968 period.

The 1957-1968 period is used since it represents a time span in which imports grew rapidly after having been rather stable during the earlier 1950's. Additionally, extensive Gulf Coast shrimp data are available after 1957.

The hypotheses to be examined are that a United States free trade policy for shrimp did not adversely influence price, employment, investment, and supply conditions in the United States shrimp industry during the 1957-1968 period, and that a restrictive trade policy

would not contribute to future stability and progress in the industry. A secondary hypothesis is that the U.S. free trade policy has facilitated development of the Latin American shrimp industry.

Validation of the Study

Why study trade policy alternatives for a "healthy" fishery? The shrimp industry has not had to face many of the problems of the other fisheries, such as depletion of the resource, foreign competition in the fishing grounds, obsolescence of equipment and craft, or a generally declining market. The ground fish industry has been plagued with some of these difficulties and has turned to government in an effort to obtain a more restrictive trade policy in order to preserve the domestic market and value of the landings. Additionally, some of these fisheries have found some form of regulation necessary to prevent destruction of the resource. Is the shrimp industry different or has it avoided the problems only because it is a relatively new, unexploited fishery? Could the shrimp industry remain generally profitable if imports were substantially increased? For example, it is estimated that the Brazilian fishery, if developed, could produce a volume of shrimp equal to that of the remainder of Latin America.¹ Could a proportionate share, relative to imports

¹Richard S. Croker, "The Shrimp Industry of Central America, the Caribbean Sea, and Northern South America."

from the remainder of Latin America, be absorbed by the United States market? Or one might consider the future consequences of Asian imports, which have grown 780 percent during the past twelve years.²

Related to the above questions is the problem of identifying the source of difficulties within a fishery. Some of the symptoms of overfishing, overcapacity, and saturation of the domestic market by competing imports may be similar from the fisherman's point of view. In these cases there is a need to identify the source of the difficulty, since different solutions would be in order.

Such a study appears germane at this time for a number of other reasons. First, the shrimp fishery is the largest United States fishery in terms of dollar volume. Total value of the shrimp catch in 1967 was \$103,100,000, making it the first fishery to reach the \$100 million category. The next largest fisheries in dollar volume of catch in 1967 were salmon with \$48,600,000 and tuna with \$44,514,000. Still, the shrimp industry has been the

Bureau of Commercial Fisheries, United States Department of the Interior, Foreign Fisheries Leaflet 74 (Washington: Government Printing Office, 1967), p. 118.

²United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, S-12 (March, 1969), p. 14.

object of comparatively little economic research relative to the other fisheries.³

It is not only the size of this fishery which makes it interesting, but also the composition of the supply to the domestic market. In 1968, shrimp imports accounted for over half of the available supply. Twelve years earlier, imports represented slightly over one-third of the total supply. During this period, domestic landing of shrimp increased about 23 percent while imports increased 200 percent.⁴ No consistent upward trend was observable for domestic production, which fluctuated widely during the period, but one was apparent for imports. The increasing market share of imported shrimp suggests that trade policy and its effectiveness are potentially very important to the industry.

Another interesting aspect of the shrimp fishery is that while there has been no upward trend in landings there has been a rising trend in investment in boats and vessels. Over the 1957-1966 period the number of vessels and boats operating as shrimp trawlers in the South Atlantic and Gulf Coast region increased from 6,808 to

³Charles H. Lyles, Fisheries of the United States... 1967, Bureau of Commercial Fisheries, United States Department of the Interior (Washington: Government Printing Office, 1968), pp. 2-3.

⁴United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 18.

9,361.⁵ In addition to the increase in numbers, new vessels have been larger and more expensive to equip in recent years. In most recent years the larger number of craft has shared a total catch smaller than the 1954-1956 average catch. This implies that returns to fishermen would be declining. The declining share of the catch per craft may have been at least partially offset in terms of revenue by rising prices over the period. Exvessel prices fluctuated widely, however, and it is questionable whether or not any real gains resulted, since the slight upward trend would hardly offset the effect of inflation on costs. Shrimp fishermen recognized in 1960 that the production segment of the shrimp industry was in danger of becoming relatively less profitable and attempted to slow the flow of imports through a restrictive trade policy.⁶ Their efforts were unsuccessful, but the question remained as to whether or not a restrictive trade policy would have been an appropriate solution to the problem.

⁵United States Bureau of Commercial Fisheries, Fishery Statistics of the United States, Statistical Digest Number 44 (1957) pp. 374-376; 60 (1966) pp. 506-508.

⁶National Shrimp Congress, Incorporated, Brief on Behalf of the Domestic Shrimp Industry (Tallahassee: National Shrimp Congress, Incorporated, 1961) pp. 251-252. Reprinted in United States Congress, House of Representatives, Committee on Ways and Means, Tariff Treatment of Shrimp Imports, Hearings before the Committee, 87th Congress, 1st Session, on H.R. 6168, August 8, 1961 (Washington: Government Printing Office, 1961).

Another reason for the study is suggested by the above data concerning the number of fishing units. Fisheries are a common property resource, that is, there is no single owner and the fish belong to anyone who takes them. In general, entry into industries involving common property resources is not restricted. Such is the case in the shrimp fishery. H. Scott Gordon, Anthony Scott and others have suggested that the tendency in the common resource case is for an excessive number of firms to enter the industry and eventually eliminate the rent attributable to the free resource.⁷ The result is an overexpanded industry in which a larger quantity of resources is used to obtain the same product which could be obtained with a smaller investment. In view of the Scott and Gordon analyses, which are reviewed later, the question arises as to the effect trade policy is likely to have with respect to entry of new firms in a common property resource industry. Or more simply, does a restrictive trade policy lead to an uneconomic expansion of the domestic fleet in response to an artificially created rent?

During the 1957-1968 period, the demand for shrimp increased steadily. Per capita consumption of shrimp

⁷H. Scott Gordon, "The Economic Theory of a Common Property Resource," Journal of Political Economy, LXII (April, 1954), 124-142. Anthony Scott, "The Fishery: The Objectives of Sole Ownership," Journal of Political Economy, LXIII (April, 1955), 116-124.

increased 75 percent, from .96 to 1.68 pounds.⁸ The domestic shrimp fishermen could not, or did not, expand production proportionately, so that imports were needed to meet demand. Under these, or similar conditions, what trade policy is appropriate? Would a restrictive trade policy stifle increasing demand for shrimp and prevent development of a market for years in which larger quantities of shrimp were landed domestically? And would the same trade policy be applicable during "good" and "bad" years?

United States commercial policy toward Latin American countries in recent years has involved the goal of assisting them in their economic development.⁹ The role which trade policy can play in economic development is not well understood, and much additional work is needed in this area. This study examines only a very limited aspect of the problem. Specifically, it examines the impact of a restrictive and a free trade policy on the development of the shrimp industries of Latin American countries. In order to simplify the argument it is assumed that development of this industry is desirable and contributes to the economic growth of these countries.

⁸United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 18.

⁹John F. Kennedy, Message to Congress on the Reciprocal Trade Agreements Program, January 25, 1962. United States House of Representatives (House Document Number 314) 87th Congress, 2d Session. (Washington: Government Printing Office, 1962), pp. 5-6.

Finally, United States processors, as well as producers, have organized foreign operations to furnish shrimp to home plants or to process shrimp for importation.¹⁰ This creates a vested interest in a particular trade policy which may not be consistent with the needs of strictly domestic producers. There is a need for a better understanding of the motives and conditions which lead to this type of foreign investment. Of special interest here is the role of trade policy in influencing the investment decision.

Definitions of Terms

In order to increase the clarity of the study, some of the frequently used terms which are common to the topic under consideration are defined.

The shrimp industry is defined to include all primary producers involved in the process of fishing for shrimp. The close interdependence of local wholesalers, packing houses, freezers, and fishermen is recognized, but these firms will be specifically mentioned if they are included in the discussion.

The South Atlantic and Gulf Coast shrimp industry includes that portion of the shrimp industry located within the states bordering the Gulf of Mexico plus the Carolinas

¹⁰Crocker, op. cit., p. 4.

and Georgia. More than 80 percent of the domestic catch is landed in this area.

A fishery enterprise is defined by Overden as "that combination of factors operating as a fishing unit, directly engaged in catching the fish and bringing it to land."¹¹ In the general literature the term "fisherman" is used loosely to mean the fishing enterprise. Shrimp are considered as fish for purposes of this definition.

Distributors are firms engaged in the movement of shrimp from the dock to retailers. These include cooperatives, local wholesalers, and secondary wholesalers. Processors are those firms which normally alter the form of the shrimp in order to preserve it or otherwise prepare it for the market. Breeding, canning, drying, and freezing firms would be called processors.

Another term used frequently in this study is trade policy. Basically the term refers to a country's control over goods that cross its borders in trade. Traditionally, trade policy has referred specifically to the country's regulation of trade by tariffs, quotas or embargos, and exchange controls. But other devices may achieve essentially the same results, e.g. export subsidies, "Buy

¹¹A.E. Overden, Costs and Earning Investigations of Primary Fishing Enterprises (Rome: Food and Agricultural Organization of the United Nations, 1961), p. 11.

American¹² legislation, landing laws, and defense provisions.¹² Usage here will include policies which act to control the flow of goods in the broader sense. Specific policies will be reviewed in Chapter II.

Organization

This study seeks to analyze the behavior of an industry under alternative trade policies. Chapter II provides the less familiar reader with some background relative to the shrimp fishing and marketing process, trade policy pertinent to shrimp products, and some theoretical aspects of economics applicable to the fishery. Chapter III discusses recent development of the shrimp industry under a non-restrictive trade policy and establishes relationships between market conditions, the supply of shrimp, and the economic behavior of fishermen. In Chapter IV these relationships are used to estimate the response of the United States and Latin American shrimp industries to hypothetical, alternative trade policies.

Chapter V summarizes the conclusions of the study and explores possible policy implications for the future.

Procedure

In order to know how the domestic shrimp industry would be affected by various trade policies, something

¹²Roland L. Kramer and others, International Trade (Cincinnati: South-Western Publishing Company, 1959), p. 291.

must be known about the behavior of domestic and foreign supply and demand. The approach used in the study is to estimate the nature of the elasticities of supply and demand based on the experience of 1957-1968 and use these in analyzing industry changes. In the case of supply it is necessary to use assumptions supported by theoretical considerations to explain the relationship between price and market quantities found in historical data. For demand some regression estimates of elasticities have been made by others, which are used along with those by the author.

This approach, although subject to limitations, is used for several reasons. First, different elasticities of demand or supply would imply a different response by the industry to price changes and hence to trade policy designed to influence price. Secondly, elasticity influences, and is influenced by, the share of the market controlled by domestic and foreign producers. This is an area in which trade policy exerts its influence and is therefore important in evaluation of the influence of trade policy on output, price, revenue, etc. Finally, this approach facilitates organization of the data into manageable categories.

Development under a non-restrictive policy is implicit in examination of the 1957-1968 period. Hypothetical restrictive policies must be analyzed abstractly, using empirical supply and demand relationships developed in Chapter III.

Consequences of restrictive and non-restrictive policies for Latin American suppliers are discussed, but a lack of data makes a thorough examination of their influence impossible. However, it should be possible to infer the direction, if not the magnitude, of the stimulus of shrimp exports on investment, employment, and exchange earnings.

Most of the data used are available from the Bureau of Commercial Fisheries in its many publications. While some field visits were made, no attempt was made to obtain significant quantities of original data.

Recent Literature

Several important general economic studies of the shrimp industry have been made in recent years. In 1959 the Bureau of Commercial Fisheries completed a series of studies surveying the shrimp fisheries of the United States, Latin America, and other areas.¹³ These studies were primarily descriptive and did not attempt to subject the industries to any form of economic analysis. They did, however, include a considerable amount of descriptive economic data.

¹³United States Bureau of Commercial Fisheries, Survey of the United States Shrimp Industry, Volume I and II, (Washington: Government Printing Office, 1958, 1959). United States Fish and Wildlife Service, Survey of Shrimp Fisheries of Central and South America (Washington: Government Printing Office, 1957).

A more thorough economic study of the United States southern shrimp industry was made by C.C. Osterbind and R.A. Pantier in 1961,¹⁴ in which emphasis was placed on the financial problems facing shrimp fishermen as a result of the price decline of the late 1950's. The Osterbind and Pantier study represents the most comprehensive compilation of cost and operations data published for the 1955-1959 period.

An analysis of the utilization of shrimp vessels in the Gulf area was made by Lassiter in 1964.¹⁵ The purpose of this study was to determine if shrimp vessels could be used more efficiently by changing their operation schedules or engaging in other fishing activity.¹⁶ Lassiter concluded that a large part of the shrimp fleet was under-utilized during the "off season" and was not being used in alternative fisheries. Alternative fishing activities were limited by a lack of knowledge, skills, and equipment needed in other fisheries.¹⁷

¹⁴C.C. Osterbind and Robert A. Pantier, Economic Study of the Shrimp Industry in the Gulf and South Atlantic States (Gainesville: Bureau of Economic and Business Research, University of Florida, 1961).

¹⁵Roy L. Lassiter, Utilization of U.S. Otter-Trawl Shrimp Vessels in the Gulf Area, 1959-1961 (Gainesville: Bureau of Economic and Business Research, University of Florida, 1964).

¹⁶Ibid., p. 111.

¹⁷Ibid., pp. 4-5.

The problem of a trade policy for the shrimp industry came under intensive review in 1960-1961 as a result of attempts to impose a tariff and quota on shrimp imports. The arguments for both sides of the controversy were brought together in hearings before the United States House of Representatives Committee on Ways and Means.¹⁸ These hearings included not only testimony given before the Committee, but also briefs prepared by shrimp fishermen's organizations, an exporter to the United States market, and the Tariff Commission. Both the pro and con briefs present a strong case supporting the point of view of the interest group concerned. In the case of the fishermen's document it was held that the import segment creates instability in the domestic market. The brief by El Salvador suggested that the problem was not created by imports, but by overexpansion of the domestic industry. Additionally, El Salvador's representative pointed out that the proposed legislation was contrary to the basic trade policy of the United States and the General Agreement on Tariffs and Trade. The less biased report of the Tariff Commission surveyed the changing situation in the shrimp industry and the consumer market. The Tariff Commission concluded that a more restrictive trade policy would arrest the expanding

¹⁸United States Congress, House of Representatives, Committee on Ways and Means, Tariff Treatment of Shrimp Imports, Hearings before the Committee, 87th Congress, 1st Session, on H.R. 6168, August 8, 1961 (Washington: Government Printing Office, 1961).

domestic demand without substantially altering the shrimp landings of the United States fleet. These Hearings represent a thorough statement on tariff policy for the shrimp industry for the pre-1961 period.

CHAPTER II

THE SHRIMP FISHERY: BACKGROUND AND POLICY FRAMEWORK

This chapter provides background material in three areas which will facilitate understanding the analytical work in later chapters. First, there is a survey of the Gulf and South Atlantic shrimp fishery and a brief description of the marketing channels for shrimp products. No attempt will be made to provide details of processes at each level of distribution, since this has been done elsewhere.¹ Secondly, United States trade policy relevant to the shrimp industry is presented. This review also includes broad agreements which indicate the overall trade philosophy of the government. Finally, some theoretical topics relevant to the economics of fisheries are put forward.

¹ United States Bureau of Commercial Fisheries, Survey of the United States Shrimp Industry, Volumes I and II (Washington: Government Printing Office, 1958, 1959). United States Congress, House of Representatives, Committee on Ways and Means, Tariff Treatment of Shrimp Imports, Hearings before the Committee, 87th Congress, 1st Session, on H. R. 6186, August 8, 1961 (Washington: Government Printing Office, 1961).

Shrimp Production and Distribution

Shrimp and its closely related species are found in most parts of the world, ranging from tropic waters to the coasts of Alaska. Considerable variations in size are found among regions which influences the commercial development of the fishery. Shrimp are found on both coasts of the United States, but the most important fishery has developed along the South Atlantic and Gulf coasts.²

The Gulf and South Atlantic shrimp fishery provides over 80 percent of the shrimp caught by United States fishermen. It extends along the Atlantic coast from North Carolina to Florida and around the Gulf to Texas. Prior to 1950 most of this fishery lay within ten miles of the coast; however, in the early 1950's fishermen entered two offshore areas, Dry Tortugas and the Gulf of Campeche, which had not been exploited previously. These areas have continued to produce relatively large quantities of shrimp.³

²United States Bureau of Commercial Fisheries, Survey of the United States Shrimp Industry, Volume I, (Washington: Government Printing Office, 1958, 1959). United States Fish and Wildlife Service, Survey of Shrimp Fisheries of Central and South America (Washington: Government Printing Office, 1957), pp. 4-7.

³Ibid., p. 4.

There are five important commercial varieties of shrimp which are taken in the Gulf of Mexico and South Atlantic Ocean. In recent years brown shrimp (Panaeus aztecus) has accounted for about 60 percent of the total catch. The pink shrimp (Panaeus duorarum) and white shrimp (Panaeus setiferus) provided about 25 and 15 percent respectively of landings. Two less important species, sea bobs (Xiphopeneus Krogori) and royal red shrimp (Hymenopenaeus robustus) contributed less than 1 percent to domestic landings.⁴ The latter variety, although desired for its large size, has not been taken in great quantities primarily because of the difficulties involved in fishing at the depth, 175 to 300 fathoms, at which it is found. Sea bobs, on the other hand, are small and less desirable than the other varieties.

These shrimps, except the royal red, spawn offshore. Spawning begins in early spring, but may continue until September, depending on the species and environmental conditions. Each female produces a large number of eggs; however, mortality is high so that a small percentage (estimates suggest less than 3 percent) reach maturity. After hatching, the larval shrimp move toward the shallow, brackish, inland waters along the coast. As they develop they migrate back to the deeper coastal waters, and by

⁴United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, S-12 (March, 1969), p. 10.

the time maturity is reached most of the shrimp are again in the open ocean. Growth is rapid during the summer months, in which many of the juvenile shrimp reach lengths of two inches just two months after spawning. After six months the shrimp have grown to about six inches. Shrimp may live as long as sixteen months, but in general they should be considered an annual.⁵

The adult shrimp prefer to live on muddy bottoms in relatively shallow water. Many such areas exist along the continental shelf of southern North America, especially along the coasts of Louisiana, Texas, and Florida. Similar grounds with high concentrations of shrimp are found off the coasts of Mexico.⁶

The spawning and development cycle accounts for the seasonal nature of the shrimp landings. Since the various species reach maturity at different times of the year, seasonal patterns will vary throughout the fishery. For example, pink shrimp catch reaches a peak during the winter and is concentrated in the Florida and Campeche area. The more plentiful brown shrimp reach a peak in late summer and autumn and are more highly concentrated in

⁵William W. Anderson, "The Shrimp and the Shrimp Industry of the Southern United States," Fishery Leaflet Number 472, Bureau of Commercial Fisheries (Washington: Government Printing Office, 1963), pp. 2-3.

⁶United States Bureau of Commercial Fisheries, Survey of the United States Shrimp Industry, Volume I, op. cit., p. 18.

the Louisiana, Texas, and Mexican area. Fishing for juvenile brown shrimp reaches a peak in June or July, while the young white shrimp are more plentiful in the late fall.⁷ This pattern of development has encouraged migration of shrimp fishermen over wide areas of the South Atlantic and Gulf of Mexico.⁸ It is not unusual for fishermen based in Jacksonville, Florida, to participate in the brown shrimp fishery off the Texas coast.

In general, the larger the shrimp the more valuable they are commercially. A general pattern of prices becomes established which relates the various size categories. Very small shrimp, used principally for canning, sell at a considerable discount relative to larger classifications. The price pattern is not fixed and appears to vary with changes in supply and demand.⁹

Fishing Craft and Gear

A number of different types of fishing gear are used to capture shrimp; however, the otter trawl is by far the most important and accounts for 97 percent of total catch.¹⁰

⁷Ibid., p. 39.

⁸Ibid., pp. 41-42.

⁹United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 12.

¹⁰United States Bureau of Commercial Fisheries, Fishery Statistics of the United States 1966, Statistical Digest Number 44 (1957) p. 505.

The otter trawl is a large, bag-like net held open in front by two diverting planes called doors, and is towed by a powered craft. Smaller craft use relatively small nets, while the larger vessels frequently use two nets, each of which may be seventy feet wide at the mouth. At one time a single large net was common, but changing to double nets resulted in economies in initial purchase, repair, and, in some cases, labor used to handle the nets on board. While fishing, other trawl gear is towed at low speed near the bottom. Tickler chains or similar devices arranged in advance of the net disturb shrimp resting on the bottom, causing them to rise and be caught by the following net. The trawl is recovered by winches on board the craft and emptied at intervals depending on the abundance of shrimp being caught.

In addition to the otter trawl, haul seines, bag nets, beam trawls, pots and traps, push nets, cast nets, and bush traps are used to catch shrimp. These devices are usually employed in shallow water by fishermen using small boats and do not contribute a large share to the commercial output of shrimp. These techniques produced 6.4 million pounds in 1966.¹¹

Individual states place restrictions on types of gear which can be used in the area they control, but gear used for catching shrimp in open water is not restricted.

¹¹Ibid., p. 505.

Craft used in the shrimp fishery are classified as boats (capacity less than five net tons) and vessels (capacity of five net tons and over). The Bureau of Commercial Fisheries classifies only those boats or vessels using otter trawl gear for statistical purposes, but these account for nearly all of the United States shrimp landings. Boats are usually less than thirty feet in length and are used primarily on inland or coastal waters near the shore. Vessels, on the other hand, are from thirty to eighty feet in length and have much greater cruising ranges. Most vessels are less than seventy tons (gross), but the larger craft may exceed 150 gross tons and be capable of staying at sea for extended periods. The average gross tonnage for vessels in the Gulf and South Atlantic is about thirty tons, but the 10-19 and 60-69 ton classes predominate in numbers.¹²

Shrimp vessels in the Gulf and South Atlantic are typically of wooden hull construction, although steel hulls have been increasing in popularity among fishermen. Fish Boat magazine in its annual survey of new boat construction revealed that steel construction increased from 40 percent of the total in 1965 to 60 percent in 1966 and 52 percent in 1967.¹³ The wooden vessels, which are somewhat less

¹²Ibid., pp. 505-506.

¹³"U.S. Fishing Vessel Construction," Fish Boat, X (December, 1965), pp. 47-64; XI (December, 1966), pp. 58-75; XII (December, 1967), pp. 43-67.

expensive initially, require more maintenance and have a shorter average life. Diesel engines provide power for essentially all of the shrimp vessels which operate on the open seas. Larger engines have been installed in recent years and appear to improve the performance of vessels. Other modern equipment of several types has been increasingly important to fishermen. For example, freezing equipment has been installed on many vessels in order to preserve the quality of the catch. Addition of this equipment permits longer trips and reduces losses from the deterioration which occurs with prolonged ice packing. Improved electronic navigational and communications equipment, such as radio telephone, loran, and depth recorders, add to the safety and efficiency of the vessel. Radar has not been found to be of great value to the shrimp fisherman.¹⁴

Typically, three men are employed on a shrimp vessel, a captain and two crew members. This size crew is sufficient to man some of the newer vessels which are somewhat larger. On medium size vessels two crew members may be able to operate the equipment using modern power devices, but a third member is frequently desired to assist in separating the shrimp from the nets and trash, especially during the

¹⁴United States Bureau of Commercial Fisheries, Survey of the United States Shrimp Industry, Volume I, op. cit., pp. 94-103.

peak season.¹⁵ In general, a share system is used to pay men employed on the vessels. The share system, which is based to a large extent on local custom, may be altered to fit the situation of particular vessels. For example, if the owner is not the captain he may furnish ice, fuel, and gear. In return the owner receives one-half to two-thirds of the sales proceeds from the catch. The remainder is divided among the captain and crew, perhaps favoring the captain with the larger share. The crew is responsible for repairing the nets, a measure which serves to reduce gear destruction and loss. Cannery owned vessels usually have the proceeds divided into five shares; one each for the cannery, captain, two crew members, and the rig (until paid for). On craft owned by the captain, the captain may receive the owner's 50 percent share, plus one-third or more of the remaining share, i.e., he may take about 80 percent of the proceeds and divide 20 percent between the two crew members. Adjustments are made in shares depending on variations in crew size. A variety of share agreements are used throughout the South Atlantic and Gulf area, so that no one type can be presented as typical.¹⁶ The share system has several important economic implications which will be examined later.

¹⁵United States Tariff Commission, Shrimp (Washington: Government Printing Office, 1961), p. 28. Reprinted in Tariff Treatment of Shrimp Imports.

¹⁶Ibid., p. 29.

The Marketing of Shrimp

Two factors which have been of primary importance in the development of the processing and marketing system for shrimp are location of the resource and its perishable nature. During the early portion of the twentieth century, when the Gulf shrimp fishery was developing, ice was used to preserve the product. Since shrimp packed in ice deteriorates in quality after about five or six days, it was necessary that the shrimp be sold fresh for consumption or else be processed by canning or drying. Canneries and drying plants tended to locate near the principal ports in order to obtain the shrimp while they were still fresh. Later, as freezer plants were built, they also located near the ports so that they could obtain fresh shrimp while it was still in good condition for freezing. Today the majority of plants processing most of the domestic catch are located in Texas, Louisiana, Georgia, Florida, and states adjoining the Gulf.¹⁷

Physical Distribution

The first step in the distribution of shrimp takes place at the landing facility sometimes called a shoreside packing house. Packing houses receive the shrimp from the

¹⁷United States Bureau of Commercial Fisheries, Survey of the United States Shrimp Industry, Volume I, op. cit., pp. 2, 242.

boats and in most cases wash, grade, weigh, and package it. These facilities vary widely, but frequently they are small units operated only during the season. Ownership of the packing houses also varies. They may be operated by independents, boat or fleet owners, processors, or cooperatives. Ownership may determine from whom shrimp will be purchased. For example, fleet owned houses may receive shrimp only from their own vessels, whereas some independents may buy from any vessel. Usually more than one type of buyer is found in a port. A packing house owner's compensation is based on the number of functions his plant performs. In some cases he may not receive payment until the shrimp have been prepared and delivered. Or the packing house may purchase the shrimp outright, taking title to them and paying the vessel captain a price discounted enough to pay the landing fees, if any are charged. The fee and arrangement for paying it vary throughout the Gulf.¹⁸

Packing houses and processors use several criteria in setting the price which they will pay. For example, published wholesale prices in major market areas, trend in cold storage holdings, quantity of shrimp in the area, and price recently paid there are considered in setting local prices.¹⁹ These factors do not appear to bear equally on

¹⁸United States Tariff Commission, op. cit., p. 32.

¹⁹United States Congress, House of Representatives, Committee on Ways and Means, op. cit., p. 460.

pricing decisions and vary in importance with changing conditions. The pricing mechanism will be discussed further in Chapter III.

Once the shrimp have been washed, graded, weighed, and packaged, they are ready to move along to the next step in the distribution system which will be determined by the planned utilization of the shrimp. Figure 1 illustrates a generalized view of the flow of shrimp from fishermen to consumer; of course, exceptions exist. Broken lines indicate where brokers facilitate the movement of shrimp through the marketing channel, although they may not take possession or title. The figure does not show the integration of firms which perform more than one of the functions or trade in more than one form of processed product.

The marketing of shrimp has been altered by the increased use of refrigeration facilities during the past twenty years. Shrimp markets which were once confined to the coastal areas were expanded to include the entire country. Although the influence of the trend toward prepackaging of meats and seafoods on shrimp distribution will not be explored here, a general reading of advertisements in food trade periodicals suggests that it has been important in the retail merchandising of many shrimp products.

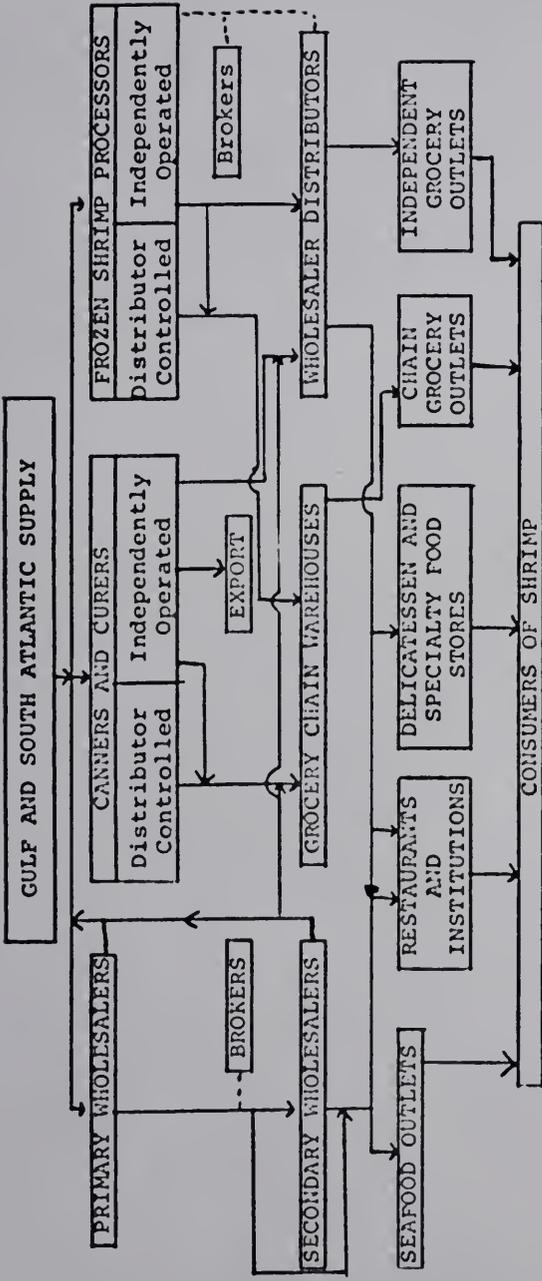


FIGURE 1
SHRIMP MARKETING CHANNELS

The Figure is based on information derived from Survey of the United States Shrimp Industry, Volume II, and Tariff Treatment of Shrimp Imports cited in the text.

The relative importance of each marketing channel depends on the demand for the various processed forms of shrimp. The marketing of fresh and frozen shrimp is by far the most important, since it handled 89 percent of total product in 1967. The canning segment has a smaller, but somewhat more stable output. Cured shrimp, which have a very specialized demand, represent a very small portion of total product.²⁰

The solid lines representing the physical flow of shrimp products might also represent transportation facilities, especially motor truck, among middlemen at various levels. The perishable nature of shrimp requires rapid transportation and, in most cases, refrigerated facilities. Smaller refrigerated vans may be used for local transfer while larger equipment would be needed to handle shipments to major market centers. Railroad transportation, once important, is no longer used extensively for shipping shrimp.

Storage facilities may be required at each level of distribution. This is especially important, since cold storage is required for the various frozen products. Public cold storage warehouses are used extensively by processors, wholesalers, and jobbers. For example, public cold storage

²⁰United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 20.

holdings of shrimp were 62 million pounds in December, 1968.²¹ An additional undetermined amount of frozen shrimp was held in private warehouses, but figures are not available since these holdings are not reported to the Bureau of Commercial Fisheries. Frozen holdings fluctuate during the year, absorbing larger quantities during season and distributing them through the remainder of the year. During the peak season monthly stock levels sometimes reach as much as 20 percent of the annual supply. This stock will be discussed later in relation to supply, since it has the potential for influencing prices and buying decisions of middlemen.

The primary wholesalers shown in Figure 1 are usually the initial purchasers of the shrimp. They may be packing houses with large volumes or assemblers of shrimp landed at smaller packing houses. Shrimp to be sold fresh will be rushed on to the market by the local wholesaler, but frozen shrimp can readily be sold by description in more distant markets or to secondary wholesalers. Secondary wholesalers typically handle larger volume and consolidate holdings in central market areas, such as Chicago and New York. Imports may act as a source of supply for the secondary wholesaler in addition to his domestic volume.²²

²¹Ibid., p. 17.

²²United States Bureau of Commercial Fisheries, Survey of the United States Shrimp Industry, Volume II, op. cit., pp. 6-11.

Shrimp canneries obtain their supplies from their own fleets, packing houses, and primary assemblies. They prefer fresh shrimp whenever possible, since they make a better canned product than previously frozen shrimp. Canned shrimp are distributed in much the same way as other canned foods. In fact, canneries usually combine other food lines with their shrimp operations.²³

The development of quick frozen foods altered the nature of shrimp marketings. Unlike the highly perishable fresh shrimp, packaged frozen shrimp could be sold readily from freezers in any grocery store throughout a national market without quality deterioration. The result was a widening of the market and an increase in the number of available outlets. Figure 1 indicates that the marketing of frozen shrimp products is considerably different from that of fresh shrimp; it more closely follows the channel of other frozen foods as opposed to fresh products.

This section and Figure 1 are intended to illustrate the general distribution of shrimp. Related topics, such as pricing, will be covered in greater detail in Chapter III.

Trade Policy

Direct Trade Policy Factors

The foreign trade policy of the United States embodies at least four basic principles: (1) official encouragement

²³Ibid., pp. 4-5.

of international trade and cooperation on matters involving trade; (2) non-discrimination among trading partners; (3) elimination of quotas and exchange restrictions; and (4) use of tariff where protection is determined to be desirable. Yet a fifth principle is implied in item (4), that trade policy will not injure domestic industries.²⁴ Current policy based on these ideas evolved out of the experience of the 1920's and early 1930's and was expressed in the Tariff Act of 1930 and the Trade Agreements Act of 1934. The latter act, which has been a cornerstone of trade policy, has undergone considerable revision to reflect a growing preference in more recent years for multilateral agreements, as opposed to the bilateral agreements of the 1930's and 1940's. The present state of the evolving United States commercial policy is probably best exemplified in the General Agreement on Tariffs and Trade (GATT), to which it is a contracting party.

The purpose here is to select for discussion those specific and general aspects of trade policy which relate to the shrimp industry and trade in shrimp products. The most significant element in this policy was provided by the Tariff Act of 1930 (paragraph 1761) which placed shrimp in a duty

²⁴William B. Kelly, Jr., "Antecedents of Present Commercial Policy, 1922-1934, Studies in United States Commercial Policy, William B. Kelly, Jr., editor (Chapel Hill: University of North Carolina Press, 1963), pp. 3-68.

free category.²⁵ Only one group, representing Texas Fishermen's Organization, appeared before the Committee on Ways and Means to oppose the duty free status of shrimp. This group recommended a ten cents per pound duty in order to offset the lower cost of Mexican labor and equalize a cost differential created by a state tax on shrimp landed in Texas.²⁶ Despite this objection the duty free status was retained in the law and has continued to the present time.

A second basic element of United States trade policy is the avoidance of quantitative restrictions, that is, quotas and exchange restrictions. The United States position, which rejected the use of quotas, was formalized in the International Convention on the Abolition of Import and Export Prohibitions and Restrictions, ratified in 1929; however, no laws had to be altered in order to conform to the Convention.²⁷ The United States objection to quotas was based on the idea that although the tariff creates a price differential, the price system still operates. However, the price system cannot overcome the restrictive

²⁵United States Congress, House of Representatives, Tariff Act of 1930, House Document 476, 71st Congress, 2d Session (Washington: Government Printing Office, 1930), p. 102.

²⁶United States Congress, House of Representatives, Committee on Ways and Means, Tariff Readjustment Act 1929, Vol. VII, Hearings before the Committee on Ways and Means, 70th Congress, 2d Session. (Washington: Government Printing Office), pp. 4261-4262.

²⁷William B. Kelly, Jr., op. cit., p. 53.

effects of a quota, so the quota becomes discriminatory. The discriminatory mechanism varies depending on the nature of the quota limitation. For example, the quota may operate on a first received basis, which would discriminate against late arrivals of potential imports. The Convention failed as an international agreement, but the principle was retained and is expressed today in the General Agreement on Tariffs and Trade, Article XI.

No prohibitions or restrictions other than duties, taxes, or other charges, whether made effective through quotas, import or export licenses or other measures, shall be instituted or maintained by any contracting party on the importation of any product of the territory of any other contracting party or on the exportation or sale for export of any product destined for the territory of any other contracting party.²⁸

Three exceptions to the above rule are also provided by Article XI. First, temporary restrictions may be employed to relieve shortages of essential products in the exporting country. Secondly, restrictions may be imposed if necessary to facilitate classification, grading, and marketing of commodities. And finally, agricultural and fishery products may be exempted if their limitation is necessary to the enforcement of governmental programs, such as domestic production limitation, surplus disposal, or control of production of animal products primarily dependent

²⁸ General Agreement on Tariffs and Trade, Basic Instruments and Selected Documents, Volume I (Revised) (Geneva: The Contracting Parties to the General Agreement on Tariffs and Trade, 1955), pp. 22-23.

on imported materials.²⁹ One additional exception, provided by Article XII, permits quotas in the event of need for a balance of payment safeguard.³⁰ If quantitative restrictions are applied under the above exceptions, they should be assigned and administered in a non-discriminating manner. Article XIII provides that "In applying any quantitative restriction all countries should be treated equally" and the quota "should attempt to approximate the market share which would be expected to exist in the absence of restrictions."³¹

Another important aspect of United States trade policy is the "escape clause" which permits the government to rescind an agreement on tariff concessions which causes or threatens serious injury to a domestic industry. The principle was included in the Trade Agreements Act of 1934, and later included in General Agreement on Tariffs and Trade, Article XIX. Prior to 1958, the escape clause could not be applied to duty free products; furthermore, such products could not be transferred from a duty free status for this purpose. The Trade Agreements Act of 1958 revised the 1934 Act and permitted a 50 percent ad valorem duty on previously duty free items where injury to the domestic industry was threatened. The Trade Expansion Act of 1962

²⁹Ibid., p. 23.

³⁰Ibid., pp. 23-24.

³¹Ibid., p. 27.

continued this provision and also permitted implementation of a quota in cases where injury resulted from tariff cuts under the Act. As an alternative to imposing duties, the President could authorize economic assistance for the injured industry.³²

In practice, it has been difficult to apply the escape clause because of the problems involved in determining the presence, extent, and cause of injury to the industry. No request has been made by the shrimp industry for relief under the escape clause. However, in another fishery the request for restrictive action against imports of ground fish fillets was denied three times.³³

Among the less significant ingredients of commercial policy are export subsidies, which the General Agreement on Tariffs and Trade opposes but does not effectively regulate. These subsidies may be offset by countervailing duties, but these may not exceed the amount of the foreign subsidy. A similar offsetting duty can be imposed in the case of dumping. (General Agreement on Tariffs and Trade, Articles XVI and VI.)

³²Congress and the Nation (Washington: Congressional Quarterly Service, 1965), p. 203.

³³John M. Leedy and Janet L. Norwood, "The Escape Clause and Peril Points Under the Trade Agreements Program," Studies in United States Commercial Policy, William B. Kelly, Jr., editor (Chapel Hill: University of North Carolina Press, 1963), pp. 173-175.

Although the above list of trade policy elements is not complete, it provides the direct policy background in which the international trade of shrimp has taken place with respect to the United States and its trading partners. All of the listed policy elements have not been applied to the shrimp trade, but they have served as a potentially useful part of the generally established policy. The duty free status of shrimp, the absence of quotas or restrictions, and the non-discriminatory importing of shrimp have provided an essentially free trade policy for the shrimp industry for over forty years.

Indirect Trade Policy Factors

Some regulations outside the realm usually included in the category of trade policy have significant effects on international trade. Such controls as agricultural inspections, subsidies, and pure food regulations are usually put into this category, since their effect can be similar to a quota or tariff with respect to the volume of trade or goods included in international trade. This is the case with shrimp, though to a relatively minor degree. For example, only vessels constructed in the United States may be used by United States fishermen if the catch is to be landed in a domestic port.³⁴ The effect here is probably not a direct alteration of trade patterns, but an indirect

³⁴Congress and the Nation, op. cit., p. 1070.

modification of trade patterns caused by different cost structures in the trading countries. If domestic costs are higher because of the requirement, then imports will be given some advantage in this area. Incidentally, domestic shipbuilding facilities have remained relatively efficient in the building of shrimp vessels, and export sales are common.

Another regulation which attempts to preserve the market and fishing grounds for domestic fishermen is a requirement that vessels under foreign registry cannot land fish in the United States. Certain exceptions to this rule exist in territories where the fish is to be used for direct consumption.³⁵ The effect of this legislation is to require foreign vessels fishing near United States coasts to return to their home port or other foreign port in order to discharge their catch, which may then enter as imports. Additional travel time and expense thus incurred tends to discourage foreign vessels fishing in international waters near much of the United States coast.

Financial Aid to Fisheries

The Fish and Wildlife Act of 1956 (PL 84-1024) created a Bureau of Commercial Fisheries which is charged with protecting and assisting the fishing industry. This Act also provided a fund from which loans could be made for

³⁵46 USC 251 (1964 Edition).

financing and refinancing of operations, maintenance, replacement, repair, and equipment of fishing gear and vessels, and for research into the basic problems of fisheries.³⁶ Loans made under this authority are restricted to those of less than ten years' maturity at interest of at least three percent which could not reasonably be obtained from other sources. For this purpose Congress authorized ten million dollars to establish a revolving loan fund. In 1958 the limit was raised to twenty million dollars. By 1968, only thirteen million dollars had been appropriated, but because of the revolving nature of the fund, a total of \$24,402,660 in loans had been approved.³⁷

Another form of financial assistance to the fishing industry is the subsidy for construction of fishing vessels in shipyards in the United States.³⁸ This program may have some advantages for fisheries in which large vessels are required, but it has been of little, if any, importance to the shrimp industry, since the production of small vessels has remained relatively competitive in domestic shipyards.³⁹

³⁶70 United States Statutes 1121.

³⁷United States Bureau of Commercial Fisheries, "Summary of Status of Fisheries Loan Fund as of December 31, 1968" (Washington: Bureau of Commercial Fisheries, 1969), p. 6. (Mimeographed)

³⁸46 USC 1401-1413.

³⁹United States Bureau of Commercial Fisheries, "Status of Subsidy Applications as of December 31, 1968" (Washington: Bureau of Commercial Fisheries, 1969), p. 8. (Mimeographed) No subsidies were indicated for the South Atlantic and Gulf of Mexico region.

Also, this program is more properly a subsidy to shipyards and, except for the requirement that vessels be constructed domestically, would not seem to be necessary from a fisherman's viewpoint.

Finally, the Fishing Vessel Mortgage Program, created in 1960 by Public Law 86-577, provides government insurance of privately financed mortgages on new or used vessels.⁴⁰ Participation by shrimp vessel buyers has been extremely small, although the program is generally popular in the other fisheries.

Maintaining a "Free Trade" Policy

Legislation has been introduced in Congress from time to time to alter the essentially free trade status of shrimp. During the 1957-1965 period, over fifty bills to place a duty and/or quota on shrimp imports were introduced. The volume of these bills reached a peak during the 1959-1960 price decline.⁴¹ This prompted the Senate Finance Committee to request a Tariff Commission study of the situation. In 1961 similar bills were offered in the House of Representatives, resulting in a second study by the Tariff Commission. The bill (H.R. 6168) introduced by

⁴⁰16 USC 742e.

⁴¹United States Congress, House of Representatives, Committee on Ways and Means, op. cit., pp. 1-2.

Hale Boggs of Louisiana follows: ⁴²

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That Paragraph 1761 of the Tariff Act of 1930 (19 U.S.C. 1201, par. 1761) is amended by striking out "Shrimps, lobsters, and other shellfish" and inserting in lieu thereof "(a) Lobsters and other shellfish," and by adding at the end thereof the following new subparagraph:

"(b) Heads-off, shell-on, vien-in shrimps imported in any calendar year within the limits of the applicable quota fixed in paragraph 721(f)."

Sec. 2. Paragraph 721 of the Tariff Act of 1930 (19 U.S.C., sec. 1001, par. 721) is amended by adding at the end thereof the following new subparagraph:

"(f) Shrimps, fresh or frozen (whether or not packed in ice), or prepared or preserved in any manner (including pastes and sauces), 35 percentum ad valorem, but not less than 35 cents per pound; except that heads-off, shell-on, vien-in shrimps, not otherwise advanced in condition may be entered or withdrawn from warehouse for consumption free of duty in any calendar year in an amount not exceeding the total quantity of shrimps entered or withdrawn from warehouse for consumption in the calendar year 1960. The Secretary of the Interior is authorized and directed to allocate this duty-free quota among the countries supplying imports of shrimps to the United States in the calendar year 1960 in accordance with the volume of imports of shrimps received from each such country in that year; except that imports in any one month during the balance of the calendar year 1961 shall not exceed imports during the same month in the calendar year 1960."

Sec. 3. Nothing in this Act shall be deemed to affect any rights conferred by paragraph 1730

⁴²United States Congress, House of Representatives, Committee on Ways and Means, op. cit., p. 1.

(a) of the Tariff Act of 1930 (19 U.S.C., sec. 1201, par. 1730 (a)).

Sec. 4. The amendments made by this Act shall apply with respect to articles entered, or withdrawn from warehouse, for consumption, after the expiration of thirty days after the date of enactment of this Act.

Amendments to the bill were suggested by the participants in the hearings which would have permitted the Secretary of the Interior to adjust the quota to permit larger quantities of imports during periods when domestic production could not adequately satisfy domestic demand.

In general, shrimp fishermen's groups and their Congressional representatives supported the restrictive legislation. The fishermen's case was presented in a "Brief on Behalf of the Domestic Shrimp Industry" prepared by the National Shrimp Congress, Incorporated, an organization composed of five Gulf fishermen's groups.⁴³ The "Brief" was well documented and provides a rather complete explanation of the 1960 problem from the producers' viewpoint. They contended that imports and domestically produced shrimp were competitive, so that the larger increases in imports were causing all shrimp prices to be depressed. Therefore, the solution to the problem was to control imports in such a manner that domestic prices would remain high. Opponents held that imports were not very competitive with domestically landed shrimp, and that

⁴³ National Shrimp Congress, Incorporated, Brief on Behalf of the Domestic Shrimp Industry, Reprinted in Tariff Treatment of Shrimp Imports, op. cit., pp. 173-268.

United States production was inadequate to meet demands, therefore imports were necessary to provide for expanding consumption. Further, they suggested that an over-expansion of the domestic fleet relative to the size of shrimp resources had occurred and that declining earnings in 1959-1960 were a reflection of this overcrowding in the shrimp fishing industry. In addition to this argument, it was pointed out that the proposed restrictive policy would violate the General Agreement on Tariffs and Trade and be contrary to the general trade philosophy expressed in other agreements or laws.

House Rule 6168 died in the House Ways and Means Committee, as did the many similar bills introduced in recent years, as Congress reaffirmed a free trade policy with respect to shrimp.⁴⁴ Advocates of the tariff on shrimp have been less active since 1961, which is an interesting fact for later consideration.

Trade Policy and Economic Development

The role of commercial policy in economic development is not completely understood. Kindleberger states that "Commercial policy can hardly make much of a positive contribution to economic development . . . But commercial policy still falls short of refinement to the point where

⁴⁴ Congressional Record, 87th Congress, 1st Session, 1961, p. D602.

short run instability of prices of primary products exploited by underdeveloped countries can be overcome or where its effects on development in underdeveloped countries can be smoothly offset."⁴⁵ Still, both developed and underdeveloped countries must have a trade policy. The most generally accepted for both categories has been that of non-discrimination based on the most favored nation principle, rejection of quantitative restrictions, and general reduction of tariffs.

During the last decade this policy has been subjected to a considerable amount of criticism, especially by those concerned with economic growth and development. A new policy which Myrdal calls a "double standard of morality in international trade" has received wide advocacy from the developing nations.⁴⁶ The "double standard" policy proposes that developing nations be permitted to use restrictive measures in order to protect their foreign exchange earnings. This, Myrdal concludes, would not restrict total trade, since the earnings will surely be spent for development needs. On the other hand, developed nations with fewer serious foreign exchange problems would restrict total world trade if they used

⁴⁵Charles P. Kindleberger, Economic Development. (New York: McGraw-Hill, 1965), p. 320.

⁴⁶Gunnar Myrdal, An International Economy (New York: Harper and Brothers Publishing Co., 1956), p. 288.

protective devices.⁴⁷ The conclusion reached by Myrdal is that developed nations can aid underdeveloped nations by permitting the existence of a protective foreign commercial policy while liberalizing domestic trade policy.⁴⁸ A similar thesis was expressed at the United Nations Conference on Trade and Development in 1964. The fiscal policy statements called for more discrimination in favor of underdeveloped countries.⁴⁹ There may be a move toward granting preferences in international trade, but the initial response of the developed nations has been a reiteration of the non-discriminatory principles of the General Agreement on Tariffs and Trade.

Discussion such as those referred to above are set in a multi-national framework which includes many commodities with alternative sources. The aspect under study here is much narrower in that it deals with one commodity and a one way flow of goods. In this simple case, it may be easier to see that the immediate effect of trade is to provide foreign exchange earnings, which at best on the surface increase the underdeveloped country's potential for growth.

⁴⁷Ibid., pp. 288-289.

⁴⁸Ibid., p. 292.

⁴⁹United Nations Conference on Trade and Development, Trade and Development: Policy Statements, Volume II, Proceedings of the United Nations Conference on Trade and Development, Geneva, March 23-June 16, 1964. (New York: United Nations, 1964), pp. 60-61.

The realities of foreign trade practices are not always consistent with the policies described in the preceding pages. For example, quotas are rejected in principle, but applied in practice. The sugar quota of the United States has received much attention in recent years. Other items subject to quotas are listed in Chapter IV. Quotas are not always levied explicitly by the importer. Japan has imposed "voluntary export quotas" on certain goods traded with the United States. Recently requests have been made for extension of these "voluntary quotas" to other countries. "Voluntary quotas" are generally as unpopular as import quotas and are imposed under pressure from the importing country.

The escape clause has also been an unpopular part of United States foreign policy. The United States has been one of the more frequent users of the escape clause. Disposal of agricultural products abroad may also violate the spirit of the export subsidy and dumping provisions of GATT.

Indirect trade policies have played a role in recent foreign trade practice. The meat inspection provisions and proposals for fish inspections are discussed briefly in a later chapter. Although these regulations may be imposed in the interest of safeguarding the public from unsafe foods, they tend to be discriminatory in their impact on exporting countries.

Public Policy Toward Foreign Investment

In general, the government tried to provide a favorable climate for foreign investment during most of the study period 1957-1968. The United States policy was reviewed in a speech by Dean Rusk before the National Business Advisory Council in 1962.⁵⁰ He acknowledged the role business played in foreign investment and encouraged it to "expand its present important role in the world economy."⁵¹ The administration was aware of the short run balance of payments problems created by the outflow of capital, but believed that "In the longer term . . . the flow of earnings, foreign subsidiaries procurement from the United States, and more generally the global scope, vitality, and profitability of American firms all strengthen both the international position of the dollar and our domestic economy."⁵² This policy was modified somewhat by the interest equalization tax, which was used in an attempt to slow the pace of capital outflow and improve the balance of payments position in the 1960's.⁵³

⁵⁰ Dean Rusk, "Trade Investment and United States Foreign Policy," Department of State Bulletin (November 5, 1962), pp. 683-688.

⁵¹ Ibid., p. 684.

⁵² Ibid., pp. 684-685.

⁵³ Congress and the Nation 1965-1968, Volume II (Washington: Congressional Quarterly Service, 1969), pp. 143-144.

Secretary Rusk further indicated that "the United States Government is prepared to intervene on behalf of American firms and make strong representations to host governments in case of economically unjustified expropriation or harassment."⁵⁴ In addition to the above action, the government provides investment guaranty programs under the Mutual Security Act and the Federal Assistance Act. For a fee the businessman can obtain insurance against losses due to non-convertability of earnings, expropriation, and war damage. These programs indicate the interest of government in improving the climate for investment spending, especially in less developed countries.

Economics of a Fishery

In recent years a body of theory has been developed to explain behavior in an industry which uses a common property or, as some suggest, an open access resource.⁵⁵ By open access resource is meant that title to the resource in this case the fish cannot be claimed in advance of taking the resource. Individual, and frequently national, claims on the resource cannot be economically enforced if the

⁵⁴Ibid., p. 686.

⁵⁵James P. Crutchfield and Giulio Pontecorvo, The Pacific Salmon Fisheries (Washington: Resources for the Future, The Johns Hopkins Press, 1969), p. 11.

resource is mobile and undergoes its development in different geographical areas. International law may in fact prevent national enforcement of claims to the resources of the high seas. A second element which distinguishes the fishery from some other national resources is that it is capable of replenishment. This gives rise to the question of maintenance of the species and the influence of fishing on its reproduction and the general ecological balance of the fishery. Traditionally, the fisheries have not been regulated or managed by government in order to preserve or fully utilize the resource; however, there are exceptions, such as the Pacific halibut and salmon fisheries. The theory which will be discussed represents attempts to rationalize management of the fishery with a view toward its continued and/or efficient use. No attempt will be made to review the development of the theory of common property resources, since this information can be found elsewhere.⁵⁶ Instead, the theory will be summarized in its current form with

⁵⁶H. Scott Gordon, "The Economic Theory of a Common Property Resource: the Fishery," Journal of Political Economy, LXII (April, 1954), 124-142. Anthony D. Scott, "The Fishery: The Objectives of Sole Ownership," Journal of Political Economy, XLIII (April, 1955), 116-124. Ralph Turvey and Jack Wiseman (editors). The Economics of Fisheries (Rome: Food and Agriculture Organization of the United Nations, 1957). Ralph Turvey, "Optimization and Suboptimization in Fishery Regulation," American Economic Review, LIV (March, 1964), 64-76. Francis T. Christy, Jr., and Anthony Scott, The Common Wealth of Ocean Fisheries (Baltimore: Resources for the Future, The Johns Hopkins Press, 1965), pp. 6-16.

emphasis placed on those aspects which will aid in understanding developments in the shrimp industry.

The size, in numbers and weight, of the population of a fishery depends on the rates of regeneration and growth of the species, and on the rate of mortality caused by natural forces and fishermen. To some extent the fishermen capture fish which would otherwise die from natural causes and their efforts do not reduce the population; however, beyond this quantity fishing will reduce the total population. The quantity of fish taken can be maintained indefinitely if the natural mortality and fishing mortality are balanced by recruitment of new members of the species. The most likely outcome to be expected by the addition of a new predator, the fisherman, is the eventual reduction of the population in the fishery. The effect of fishing also depends on the ecological changes created by a smaller species population. For example, a decrease in the species may permit a competing species to over-run and destroy it.⁵⁷

The weight, but not necessarily the number, of fish may be reduced by increased fishing. This is a result of catching the fish before they mature and may eventually result in a decline in the yield of the fishery. Whether or not the removal of fish at an early age is harmful to

⁵⁷James Crutchfield and Arnold Zellner, Economic Aspects of the Pacific Halibut Fishery, Fishery Industrial Research, Vol. I, No. 1 (Washington: Government Printing Office, 1962), p. 11.

the species depends upon the ability of a smaller number of mature fish to produce sufficient eggs to replenish the population. If the species multiplies rapidly from a few members, then heavy fishing will probably not threaten the stock with depletion.⁵⁸ The size and type of fishing gear used largely determines the age at which the fish are caught. Similarly, it influences the overall quantity of fish taken by the fishermen.

The physical yield of a fisheries' stock which can be maintained depends on the amount of fishing effort, i.e., labor and capital, which is applied. Application of additional inputs of labor and capital to a given fish stock will cause the catch to increase but by successively smaller amounts until the maximum sustainable yield is obtained. After this point, additional fishing effort will result in a smaller yield since the population and the recruitment of new individuals will have been reduced. The maximum annual yield which can be sustained in the fishery is illustrated by AM at fishing effort level OA in Figure 2. From economic theory it may be recalled that the rent maximizing output for a monopolist is the point where revenue exceeds cost by the greatest amount. In Figure 2 this point is represented by DB where the rent maximized is CD. This rent is attributable to the resource and is the

⁵⁸Ibid., p. 12.

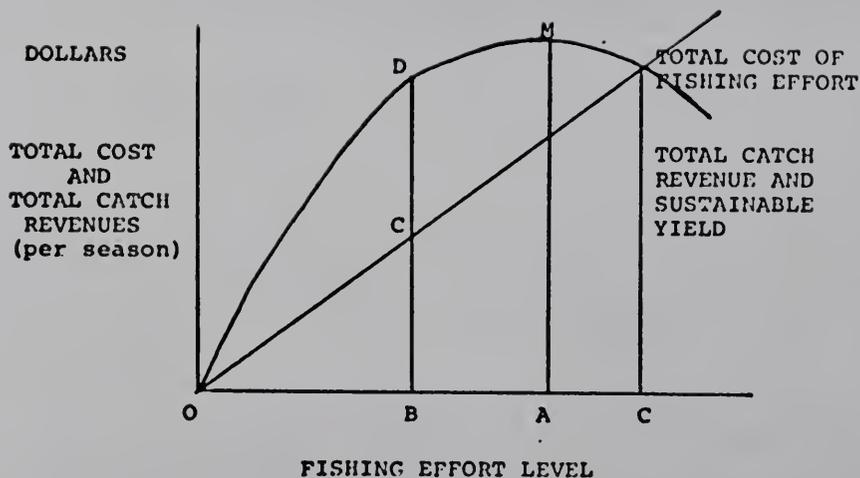


FIGURE 2

TOTAL REVENUES AND COSTS WITH RESPECT TO FISHING EFFORT

amount which could be earned by the owner if the rights to the fishery were appropriated. This point has been referred to as the maximum net economic yield. Extensive fishing effort applied beyond OA may result in a serious depletion of the fish stock. How far this process could go, assuming an increase in demand, is not certain. It has been argued that this process will not continue to the point of extinction of the resource.⁵⁹ Instead, it becomes unprofitable to seek out the smaller population or the industry accepts some regulation to restore the resource. Unprofitable "overfishing" of the type just described occurs beyond OC in Figure 2.

Before proceeding, it should be pointed out that the revenue and cost functions in Figure 2 are different from those usually found in economics textbooks and depend upon several implicit assumptions. Typical revenue and cost curves treat output as the independent variable, while fishing effort serves this purpose in Figure 2. In this case, output is reflected in the level of the revenue and cost curves. To obtain this result, it must be assumed that per unit costs are constant for fishing effort and that demand for the output is infinitely elastic so that price will not vary with the size of the catch. Fixed costs are assumed to be zero. In reality, these assumptions are unlikely to be true; however, the outcome in the event that

⁵⁹Christy and Scott, op. cit., p. 9.

costs are increasing or demand is not infinitely elastic would be to accentuate the conclusions of the model rather than repudiate them. The share system of wages, which can cause a considerable variation of cost with output, will be discussed later in the chapter.

The economic rent, which is represented by the excess of revenues over costs in Figure 2, serves as an incentive for more fishing units to enter the fishery. Each of the new units will be acting rationally as it tries to maximize its profits; however, as a whole the effect is dissipation of the rent caused by the increasing total costs and reduced catch. The total landings of fish may actually be less than the maximum sustainable yield, as indicated by Figure 2. Yet the smaller output is achieved through the application of additional resources to the fishery. As long as freedom of entry exists, the tendency will be for excessive fishing effort to be applied to the industry beyond the point of economic efficiency or maximum sustainable yield of the resource. This "overfishing" economic equilibrium depends on the particular relationship of cost and revenue curves postulated in Figure 2. If the slope of the cost function is increased, then the economic equilibrium may occur below the maximum sustainable yield. It is conceivable that the costs involved in taking the resource would be so great with a given technology that fishing would not be undertaken at all. The same result can be produced by a very low market price, which would

cover cost only at low levels of effort or would fail to cover costs at all. The conclusion which is most often drawn from this model is that economic efficiency or conservation of the resource to provide continued exploitation, whichever goal is chosen, can best be served by some management program to limit entry of firms into the fishing or restrict the fishing effort which is applicable to it.

The model described above can be used to show how the misallocation of resources can continue even though changes occur which maintain the rent at least temporarily. One of these changes is an increase in the demand for the product. Figure 3 shows the effect on revenue, yield, rent, and economic equilibrium of an increase in demand which results in a higher price.

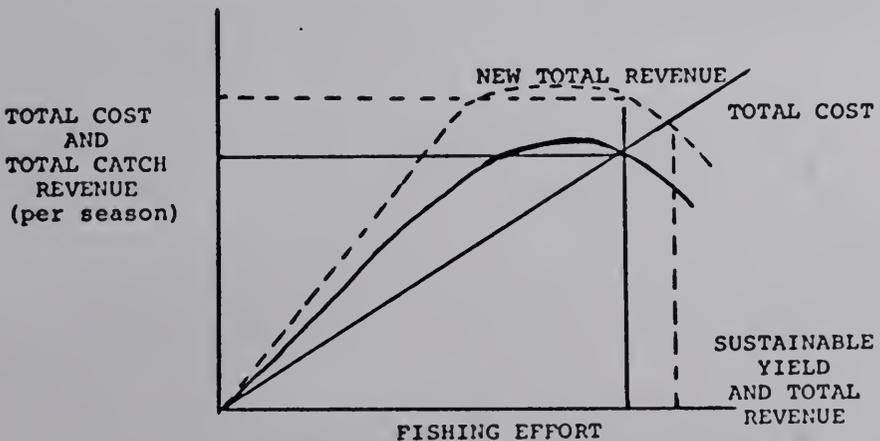


FIGURE 3
INCREASE IN DEMAND

Profits of $R'-R$ are restored to the industry and act as an incentive for new firms to enter. Fishing effort increases to OC' when money revenues are greater than previously, but costs are higher. The catch is likely to be even smaller than before the increase in demand. In the long run the fishermen are no more prosperous.⁶⁰ Technological changes can also alter the yield curve associated with various quantities of fishing effort. The consequence of improved technology is illustrated by the new yield curve in Figure 4. Initially, each fisherman is able to improve his catch; but the more efficient technique eventually results in a more rapid reduction in the fish population.⁶¹ Revenue yield is then reduced and consequently the fishery is capable of supporting fewer fishermen than it did using older techniques, which may help explain why some fishermen prefer to maintain a status quo with respect to fishing methods and gear. An alternate method of showing the effect of the technological change would be to lower the total cost curve in Figure 4; the conclusions would remain essentially the same. The effect of a subsidy on the industry might also be illustrated by the latter method.

The generalized model described above is subject to a number of limitations; however, it does offer an

⁶⁰Christy and Scott, op. cit., p. 12.

⁶¹Ibid., pp. 12-13.

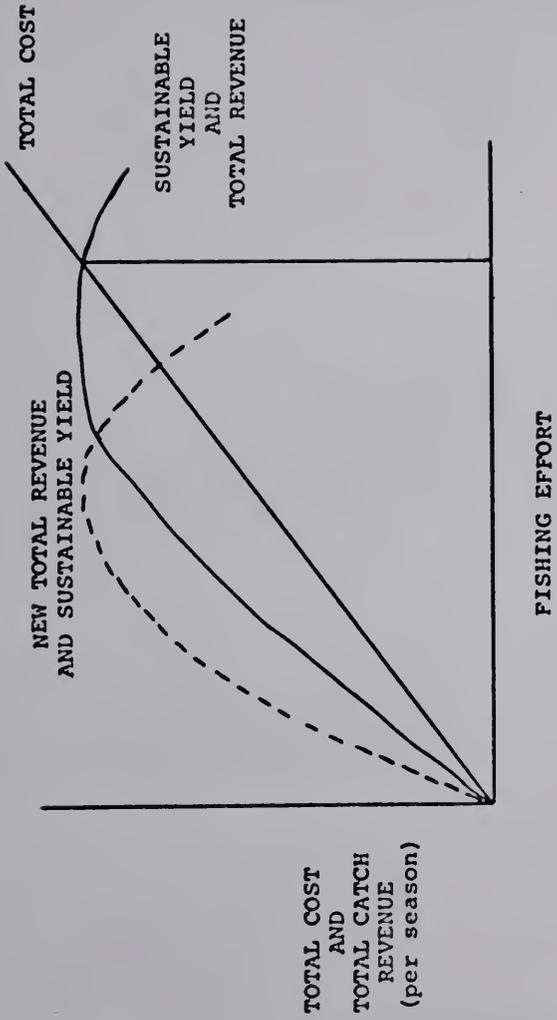


FIGURE 4

TECHNOLOGICAL CHANGE IN A FISHERY

explanation of the observable long run tendency of some fisheries to become chronically "sick" industries. The model rests heavily on assumptions concerning the nature of production functions for fisheries and the response of fish populations to increased fishing effort. In a recent empirical study which used a model similar to the one described above, the authors concluded that "the generalized model . . . works as a priori reasoning suggests it will."⁶² In applying a model to a particular fishery, one should take into account the nature of the production function for that industry. Unfortunately, these data are not readily available and perhaps cannot be obtained at all. It is possible that the general model with its familiar production function may need some modification for the shrimp industry, since the relevant time span for the development of the shrimp may be slightly over one year while a similar cycle for halibut may cover seven to fourteen years. In the observance of full information concerning the real production functions, the general model as described above will be used.

The most common use of the model has been to show how various management schemes might conserve the stock of fish, rent, or both. It appears that the model is also applicable in a discussion of trade policy. Unlike

⁶²Crutchfield and Pontecorvo, op. cit., p. 196.

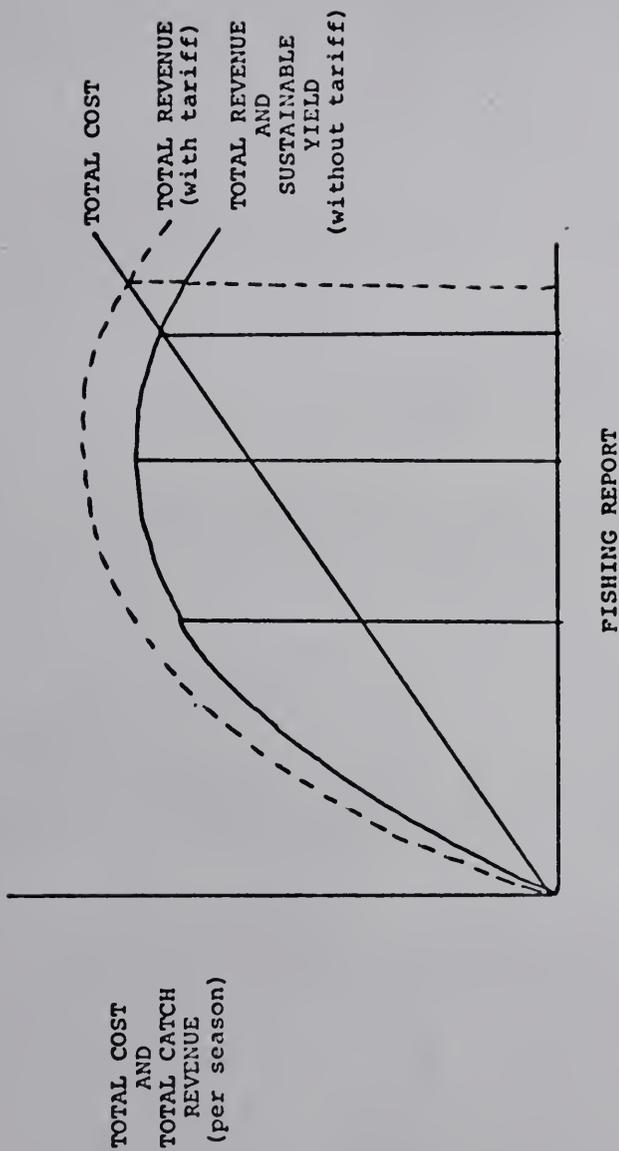


FIGURE 5
EFFECT OF A TARIFF

management policies, the intent of trade policy is to conserve the domestic market for domestic fishermen instead of restricting the landing of fish. In terms of the model, the impact on the fishermen may not be too dissimilar. For example, fishermen may observe the industry becoming unprofitable but be unable to identify the cause, since "overfishing" and a decline in market share may exhibit many of the same symptoms.

With respect to the model discussed above, the situation in which a tariff or import restriction program is used to support declining earnings in the domestic industry might be described as in Figure 5.⁶³ The restriction of imports resulting from the added cost of the tariff would be expected to raise the price in the domestic market. At least temporarily, fishermen could earn larger revenues since a rent would thus be created for the industry as a whole. However, the same forces as before would operate to attract additional investment, so that eventually the rent would be dissipated, additional investment would be undertaken, and the tariff might result in a smaller annual catch per vessel. Again, this is something of an

⁶³ Arlon R. Tussing and others, Alaska-Japan Economic Relations (College, Alaska: Institute of Social, Economic and Government Research, University of Alaska, 1968), pp. 37-38.

oversimplification. Some of the complications will be examined in conjunction with the application of a tariff as an alternative policy for the shrimp industry in a later chapter.

CHAPTER III

DEVELOPMENT OF THE SOUTHERN SHRIMP FISHERY, 1957-1968

The purpose of this chapter is to examine the development of the Gulf and South Atlantic shrimp fishing industry under an essentially non-restrictive trade policy which has existed since the fishery began. Included will be a discussion of the influence of imports on factors, such as employment, investment, and incomes of fishermen. The fishery background and policy perspective described in the preceding chapter provide the setting for the following discussions. Relationships established in this chapter will be used in future chapters to analyze the efficacy of alternative policies. As indicated earlier, a supply and demand framework is to be used throughout the study. The first portion of this chapter presents an analysis of supply conditions followed by a discussion of demand conditions for shrimp in recent years.

Supply of Shrimp

The total supply of shrimp available for a given period depends on the volume of landings, imports, and frozen stocks. Table I illustrates the annual quantity of shrimp supplied for the years under study. It should be

TABLE I
ANNUAL SUPPLY OF SHRIMP

Year	Quantity Available (Million Pounds)
1957	212.8
1958	241.2
1959	313.6
1960	289.5
1961	297.8
1962	355.9
1963	358.4
1964	376.7
1965	381.4
1966	434.0
1967	445.7

Bureau of Commercial Fisheries, Shellfish Situation and Outlook, S-12 (March, 1969), p. 18.

noted that the quantity of shrimp available in the market increased in all years except 1961. Over the time period shown the quantity of shrimp available more than doubled, which represents an average annual growth rate in excess of 6 percent. This growth rate exceeded that of any of the other major food fishes.

Sources of Growth

Increases in both domestic production and imports account for the overall increase in the availability of shrimp. Substantial increases in domestic production occurred in the Alaska, Pacific, and New England fisheries; however, these still provide less than one-fifth of total landings. The Gulf and South Atlantic fishery, with only

irregular increases in output, continued to supply the bulk of domestic shrimp. Import volume also continued to grow. The rising importance of imported shrimp as the major source of supply is shown in Figure 6. On the basis of heads-off weight equivalent, the market share of imports grew from 36 to 58 percent during the twelve year span. On the basis of dollar value, imports claimed an even larger market share, as indicated in Figure 7. This resulted in part from increased processing abroad which increased the value of shrimp in each pound of imports. Another factor influencing the shift in relative dollar values has been the increasing proportion of smaller lower value shrimp in the domestic catch.

Expanded imports from existing suppliers were supplemented by shipments from an increasing number of countries not previously selling in the United States. The number grew from thirty-eight exporters in 1957 to sixty-two in 1965. Asia, South America, and Africa posted the largest percentage gains in the United States market. North America, the largest supply area, experienced a decline from 80 to 55 percent in share of the total market it served.¹ North and South America are of special interest to this study, and the changes in production in each will be considered in greater detail later. Table II indicates

¹Charles H. Lyles, Historical Statistics: Shrimp Fishery, Bureau of Commercial Fisheries, United States Department of the Interior (Washington: Government Printing Office, 1967). pp. 28-31.

PER CENT
OF TOTAL
MARKET

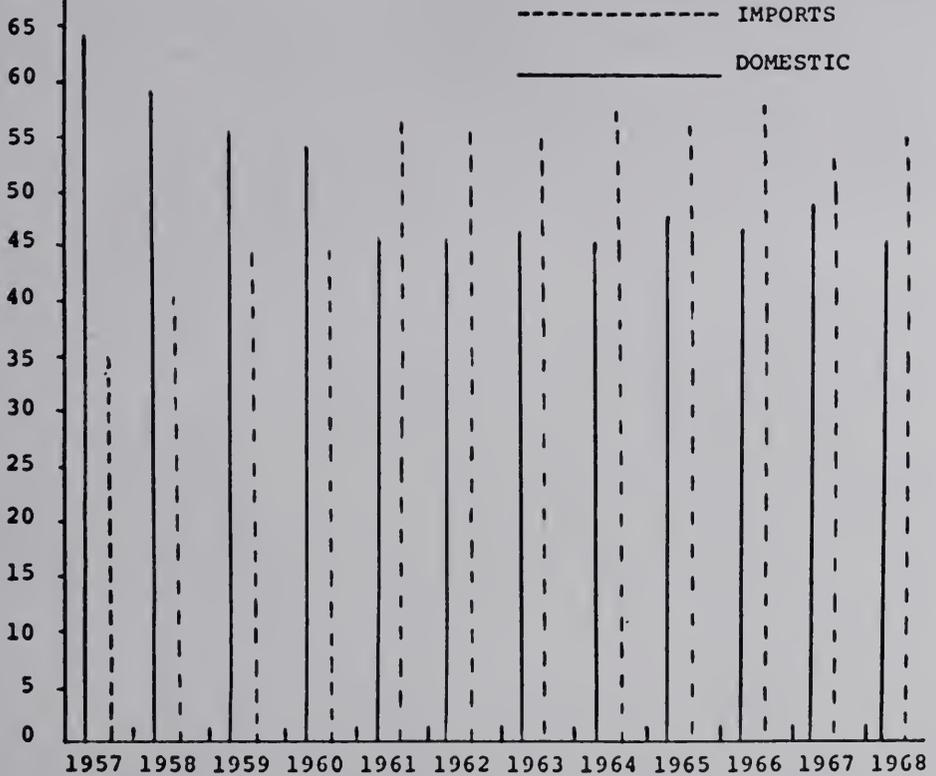


FIGURE 6

DOMESTIC AND IMPORT MARKET SHARES FOR SHRIMP

Charles H. Lyles, Fisheries of the United States...1967, Bureau of Commercial Fisheries, United States Department of the Interior (Washington: Government Printing Office, 1968), p. 50; and United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, S-12 (March, 1969), p. 18.

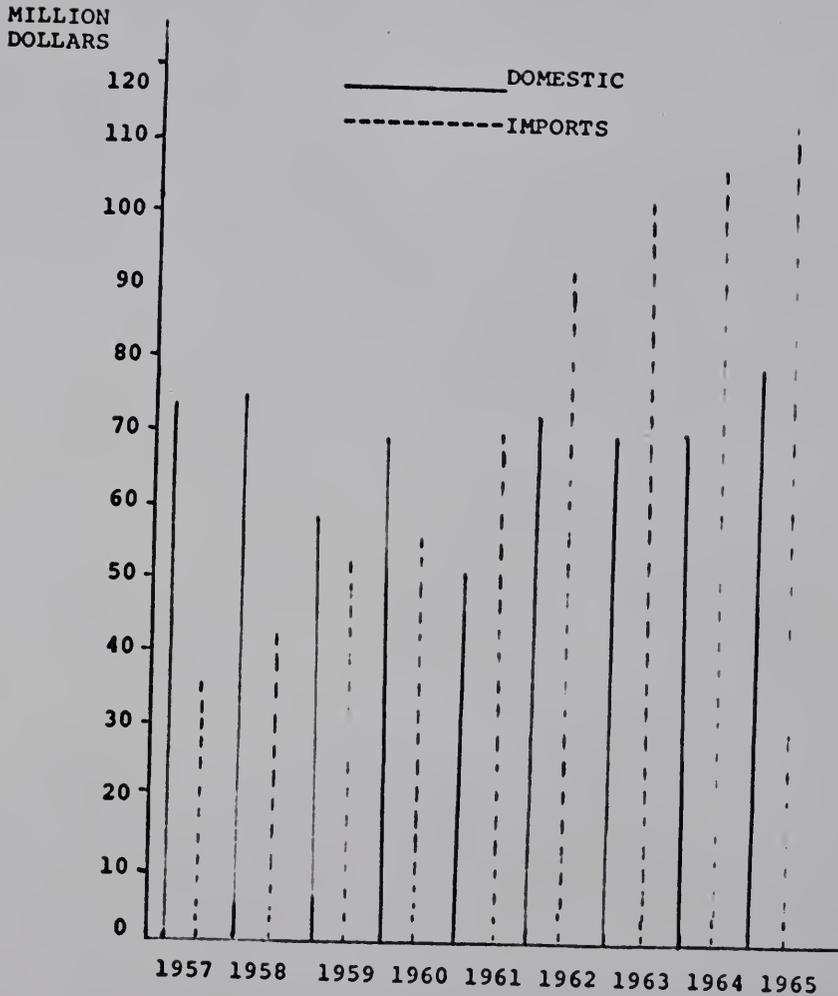


FIGURE 7

RELATIVE VALUE OF DOMESTIC AND
IMPORT MARKET SHARES

Charles H. Lyles, Fisheries of the United States. . .1967,
op. cit., p. 50; and United States Bureau of Commercial
Fisheries, Shellfish Situation and Outlook, op. cit., p. 18.

TABLE II
ORIGIN OF IMPORTS BY AREA AND NUMBER OF EXPORTING COUNTRIES*

Year	North America		South America		Europe		Asia		Australia and Oceania		Africa	
	Coun-tries	Per Cent	Coun-tries	Per Cent	Coun-tries	Per Cent	Coun-tries	Per Cent	Coun-tries	Per Cent	Coun-tries	Per Cent
1957	11	82	7	8	10	#	7	9	2	#	1	#
1958	13	80	7	8	12	1	7	11	1	#	2	#
1959	14	77	9	9	12	1	13	12	1	#	1	#
1960	13	80	9	10	9	#	14	8	2	#	2	1
1961	12	80	9	11	11	#	11	7	1	#	1	1
1962	13	72	10	14	9	#	13	12	1	#	3	1
1963	15	66	9	15	9	#	15	17	1	#	3	#
1964	15	65	9	17	11	#	16	17	2	#	4	#
1965	15	53	9	21	12	#	18	25	2	#	6	#
1966	NA	56	10	15	NA	1	NA	27	NA	NA	NA	#
1967	NA	55	9	17	NA	#	NA	25	NA	#	NA	#

*Charles H. Lyles, Historical Statistics: Shrimp Fishery, Bureau of Commercial Fisheries, United States Department of the Interior (Washington: Government Printing Office, 1967), pp. 28-31; Charles H. Lyles, Fisheries of the United States....1967, Bureau of Commercial Fisheries, United States Department of the Interior (Washington: Government Printing Office, 1968), p. 34.

#Less than 1 per cent.

the relative importance of United States suppliers by major areas in terms of number of suppliers and percent of imports.

Domestic Supply

The dominance of the Gulf of Mexico and South Atlantic regions in the domestic production of shrimp is shown in Table III. New England has experienced a rapid increase in landings, but in general the shrimp found in this area are smaller and are used to fill a particular demand. The Pacific, especially the waters near Alaska, has provided an increasing, though variable, quantity of shrimp in recent years. New England and Pacific shrimp fisheries have been excluded from this study, but this should not be taken as an indicator of importance. Both areas are estimated to have the potential to supply very large quantities of shrimp in the future.

Landings in the South Atlantic and Gulf states include quantities of shrimp caught in the high seas off the coasts of Mexico, Central America, and South America, as well as the contiguous waters. Fluctuations in landings data for this region may reflect conditions which exist over a very broad area. Landings for the South Atlantic and Gulf states are given in Table IV in terms of volume and value. It is difficult to identify a consistent growth pattern in the data. It can be observed that relatively low landings occurred during the earlier years, while higher landings were recorded toward the end of the

TABLE III

UNITED STATES SHRIMP LANDINGS BY AREA 1957-1968
(Million Pounds Heads-Off Weight)

Year	New England	South Atlantic	Gulf of Mexico	Pacific	Total [‡]
1957	*	17.0	99.2	4.9	121.4
1958	*	13.4	103.1	10.6	127.3
1959	*	15.5	115.2	12.3	143.0
1960	.1	18.6	122.4	7.4	148.5
1961	*	11.8	79.6	12.4	103.9
1962	.1	16.5	89.3	13.2	119.1
1963	.3	9.8	128.4	12.1	150.7
1964	.5	11.0	113.3	8.3	133.1
1965	1.2	16.7	122.9	11.5	152.3
1966	2.2	13.6	112.8	19.6	148.2
1967	4.0	13.1	141.4	31.0	189.5
1968 [ⓐ]	7.7	15.1	127.5	28.0	178.6

*Less than 50,000 pounds.

[‡]May not add due to rounding. Total includes quantities of shrimp from other areas.

[ⓐ]Preliminary.

Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 6.

TABLE IV
SOUTH ATLANTIC AND GULF STATES LANDINGS:
VALUE AND VOLUME 1957-1968*

Year	Volume (Million Pounds Heads-Off)	Value (000)
1957	116.2	\$ 72,438
1958	116.5	71,829
1959	130.7	56,875
1960	141.0	66,134
1961	91.4	50,589
1962	105.8	74,814
1963	138.2	68,785
1964	124.3	69,328
1965	139.6	80,067
1966	126.3	93,785
1967	154.5	90,300‡
1968	142.9	113,000‡

* Charles H. Lyles, Historical Statistics: Shrimp Fishery, op. cit., pp. 7-9; Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., pp. 6-7.

‡ Preliminary

period. This is a result of the period chosen.

Extending the series back to 1953 would reveal that the large landings of 1967 were some four million pounds less than the 1954 catch and about equal to the 1953 supplies.² A longer time span will be needed to verify whether or not the larger landings of recent years can be maintained.

Landings in individual states have mostly followed a pattern similar to that for the southern area. North and South Carolina, Georgia, Florida, Mississippi, and Texas experienced fluctuations in shrimp landings with no observable long run upward trend. On the other hand, Alabama more than doubled its landings, and fishermen landing shrimp in Louisiana increased their catch from 18 to 42.7 million pounds from 1957 to 1968. In some years the growth in these two states was offset by declines in others.³

A change in the size distribution of shrimp in the landings has occurred. The smaller sizes, 51 and over per pound, have increased as a percentage of total landings. During 1957-1960, these shrimp comprised on the average 20 per cent of the catch; however, the 1965-1968 average was 31 per cent.⁴ If this pattern continues, it could have a

²United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 10.

³Ibid., p. 10.

⁴Ibid., p. 10.

significant effect on the character of fishing enterprises and the nature of employment and investment in the shrimp fishery. In particular, it could encourage increased numbers of boats and casual fishermen as opposed to vessels with full time fishermen.

Shrimping craft

The general characteristics of shrimp craft were outlined in the preceding chapter. Attention is now turned to examining relationships among the number of craft and other variables, such as landings and price.

There are few artificial barriers to industry entry and exit; anyone who has a suitably equipped craft is permitted to fish for shrimp. Similarly, the craft may be withdrawn from the fishery at any time. This should not be taken to imply that financial, technical, and other barriers to enterprise do not exist. They have been discovered to be all too real by many who entered the industry.

The different roles of boats and vessels in relation to landings have not been thoroughly explored. In Survey of the United States Shrimp Industry, shrimp boats are loosely associated with the inshore shrimping areas while vessels are associated with offshore areas, although the relationship is not documented.⁵ Osterbind and Pantier

⁵United States Bureau of Commercial Fisheries, Survey of the United States Shrimp Industry, Volume I, (Washington: Government Printing Office, 1958), pp. 63-67.

recognized the problems of aggregating unlike craft, associating this total with total landings, and making generalizations based on the derived averages.⁶ The problems of aggregating unlike units constitute a serious limiting factor in broadly analyzing the shrimp industry. Data are not available for a separate analysis of boats and vessels; however, some indirect approximations of their relative roles are attempted to show the problems involved in treating all shrimp craft as homogenous units.

Table V shows the number of operating boats and vessels by state. Vessel figures for each state are not very meaningful for the present purpose because of duplication in counting caused by the migration of vessels from one area to another as the season progresses. The total exclusive of duplication figure is smaller than the sum of the state figures because a vessel landing shrimp in more than one state will be counted only once. Boats, which are less mobile, usually land shrimp in only one state. It can be observed from the table that a concentration of boats occurs in Louisiana and Texas, where an extensive inshore fishery exists. While boat operations cannot be associated only with shrimp taken in shallow inshore waters, there is some evidence that boats catch a substantial part of the small shrimp taken in these waters which is bought by the canneries. For example, in

⁶Carter C. Osterbind and Robert A. Pantier, Economic Study of the Shrimp Industry in the Gulf and South Atlantic States (Gainesville: Bureau of Business and Economic Research, University of Florida, 1961) pp. 22-23.

TABLE V
SHRIMP OTTER TRAWL BOATS AND VESSELS BY STATE*

State	Boats									
	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
North Carolina	561	405	426	427	321	379	319	349	356	564
South Carolina	91	149	167	167	133	141	106	63	36	29
Georgia	143	243	266	195	270	308	204	213	282	296
Florida	111	172	133	115	127	146	174	123	131	119
Alabama	209	210	201	206	192	231	247	231	206	203
Mississippi	375	347	368	385	346	356	357	360	396	380
Louisiana	1442	1488	1623	1999	1920	2443	2867	2967	3236	3261
Texas	378	422	487	421	429	803	919	695	845	861
Total Boats Exclu- sive of Duplication	3316	3427	3671	3903	3744	4815	5217	5001	5476	5707

TABLE V (continued)

Vessels

State	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
North Carolina	399	325	367	389	407	371	383	371	370	301
South Carolina	380	316	264	273	224	242	221	183	203	187
Georgia	284	346	328	307	312	324	363	333	325	314
Florida	1342	1447	1510	1300	1317	1216	1197	1208	1138	1191
Alabama	166	194	220	222	187	168	247	230	295	366
Mississippi	473	461	479	435	447	451	432	405	409	410
Louisiana	771	1001	1188	1235	962	905	1262	1343	1299	1342
Texas	1251	1632	1564	1521	1541	1275	1356	1387	1371	1409
Total Vessels Exclusive of Duplication	3490	3844	3946	3782	3513	3407	3504	3537	3622	3654
Total Boats and Vessels	6806	7271	7617	7685	7257	8222	8721	8538	9098	9361

*Compiled from data found in United States Bureau of Commercial Fisheries, Fishery Statistics of the United States, Statistical Digest Number 44 (1957), 49 (1958), 51 (1959), 53 (1960), 54 (1961), 56 (1962), 57 (1963), 58 (1964), 59 (1965), 60 (1966).

Louisiana there were 3,261 boats and 1,342 vessels operating in 1966. Incidentally, the boats accounted for slightly over half of total net capacity measured in yards at mouth. Shrimp taken from water of less than five fathoms accounted for 64.3 per cent of Louisiana landings. Approximately 75 per cent of this shallow water catch was composed of size count of 51 and larger shrimp which is demanded by canneries in the vicinity.⁷ Canneries purchased an amount of shrimp nearly equal to the landings in the shallow water portion of the fishery. But the relationships among inshore landing, small shrimp, boats, and in some instances cannery operations, can only be inferred. Concentrations of boats in areas where small shrimp landings are important, combined with the coincidental growth of small shrimp landings and number of boats, support this suggestion. To the extent that by and large the shrimp boats catch primarily small shrimp, their revenue per pound would be considerably less than that of vessels. It would be expected that costs of operating boats would be less as well. Aggregating boat and vessel data may be misleading, but it is a difficulty which cannot be avoided in using existing data.

The above discussion, to the extent that it is correct, implies that there are separate forces

⁷United States Bureau of Commercial Fisheries, Fishery Statistics of the United States, Statistical Digest Number 60 (1966), pp. 306-307.

influencing expansion of numbers of boats as opposed to vessels, such as local conditions influencing the availability of juvenile shrimp or demand conditions facing the canneries. Investment in vessels would be much less dependent on the restricted shrimping area and the limited market, since vessels are more mobile.

Factors influencing the decision of boat operators to enter the shrimping industry are difficult to identify. One possibility is suggested by an examination of Table VI. Based on the assumption that boats, especially in the Gulf, are associated primarily with the catching of small shrimp in coastal and inshore waters, it would be expected that the number of craft would tend to vary directly with landings of these shrimp. Such appears to be the case. In years when the catch of small shrimp is increasing, the number of boats is increasing also. The relationship is less consistent if large shrimp or total landings are considered. The absence of a lag might also be expected, since outfitting new boats or activation of idle boats could be undertaken on short notice. Additionally, the small shrimp season has two peak periods, one in summer and one in winter. Increased availability of small shrimp during the first period could induce preparation for the second session several months later. An abundance of small shrimp appears to act as an inducement to investment in shrimp boats.

TABLE VI

PERCENTAGE CHANGE IN BOATS ENGAGED IN SHRIMPING
AND LANDINGS OF SMALL SHRIMP BY YEARS

Year	Percentage Change in Operating Boats	Percentage Change in Landings of 51 and Larger Count Shrimp
1958	3.3	9.6
1959	7.1	4.8
1960	6.3	17.6
1961	-4.1	-35.4
1962	28.6	59.3
1963	8.3	24.3
1964	-4.1	-21.8
1965	9.5	30.2
1966	4.2	.2

*Bureau of Commercial Fisheries, Fishing Statistics of the United States, op. cit., passim; Bureau of Commercial Fisheries, Shellfish Situation and Outlook, S-12 (March, 1969), p. 10.

Entry of vessels into the shrimp fishery would be subjected to barriers similar to those facing boats, but greatly multiplied. Vessels are much more expensive to buy and maintain, so that a decision to enter the industry would require a larger capital outlay. Also, a more experienced and skillful crew must be found to operate the larger vessels capable of making trips to offshore shrimp grounds.

The decline and recovery in numbers of operating vessels during the 1960's is shown in Table V. It cannot be correctly said that growth in number of vessels has been consistent, because of the rapid decline in operating units which lasted from 1958 through 1962. In 1966 the number of

operating vessels was still less than that recorded in 1958, although high prices and landings have made the industry more attractive in recent years.

The relationship between volume of landings and number of vessels was not as consistent as it was for boats. Again, this might be expected because of longer construction and outfitting times, not to mention the longer planning and training periods needed. Some adjustment in the number of operating boats could come about through reactivation of idle, but seaworthy, vessels, which would have the opposite effect of shortening any lag. A much more likely explanation is that when investment in higher cost vessel is involved, other variables, such as price, revenue, and costs, must also be considered in entry or exit decisions.

From time to time throughout the study, it is necessary to use number of operating boats and/or vessels as an indicator of investment in the fishery. Several problems are involved in this representation. First, there is considerable variation in the number of fishing days, defined as twenty-four hours spent trawling, among vessels. Osterbind found a variation of less than five to greater than 120 days per year spent trawling for shrimp based on a selected sample. His data also indicated that vessels which were very productive one year might be idle the following year.⁸ Reasons for this were not given.

⁸Osterbind and Pantier, op. cit., pp. 54-55.

Secondly, the term "shrimp vessel" includes craft of many sizes, with varied types of equipment, capacity, and power. Finally, the age also affects the dollar value of vessels which enter or leave the shrimp fishery. All of the above factors must be kept in mind when average figures are used which treat vessels as homogenous units.

Employment

Employment in the primary shrimp fishing industry increased during the 1957-1966 period, but at a lower rate than the number of shrimping craft. The resulting decline in the numbers of fishermen per boat or vessel illustrated in Tables VII, VIII, and IX can be rationalized in three ways. First, the increase in casual fishermen relative to regular fishermen indicates that shrimping is increasingly becoming a part time operation for many. This suggests that capital in the form of less expensive boats is being used, since there is apparently no intention of year-round participation in shrimping. Secondly, powered equipment installed on vessels makes it possible for a smaller crew to operate the craft effectively, especially during the slow season, when cleaning the nets requires less time. Finally, there may be a shortage of crewmen who are willing to work, especially during the off season, so that some craft are necessarily undermanned.

The importance of shrimping to the Southern area in terms of jobs is indicated in Tables VII, VIII, and IX. These

TABLE VII
REGULAR FISHERMEN ON SHRIMP BOATS BY STATE*#

State	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
North Carolina	971	686	714	715	508	585	498	543	445	295
South Carolina	194	301	264	269	231	242	212	126	62	58
Georgia	168	177	200	113	118	159	129	182	244	241
Florida	165	309	199	154	186	189	227	176	202	180
Alabama	344	348	340	346	315	371	395	380	335	311
Mississippi	355	322	270	248	208	216	220	232	235	178
Louisiana	2829	2824	2789	2836	2668	2815	3098	2974	2997	2919
Texas	583	645	768	570	573	565	594	704	735	772
Total on Boats Exclusive of Duplication	5609	5612	5508	5222	4809	5111	5306	5318	5232	4944

*Bureau of Commercial Fisheries, Fishery Statistics of the United States, loc. cit..

#A regular fisherman earns more than half of his income from fishing while a casual fisherman earns less than half of his income from this activity.

TABLE VIII
CASUAL FISHERMEN ON SHRIMP BOATS BY STATE*†

State	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
North Carolina	—	—	—	—	4	4	4	4	54	371
South Carolina	—	—	—	—	—	—	—	—	10	—
Georgia	51	211	239	219	343	359	300	255	201	215
Florida	30	6	2	19	10	134	48	16	19	24
Alabama	37	43	34	33	40	20	26	27	34	43
Mississippi	120	145	185	215	200	214	220	205	220	285
Louisiana	—	13	35	306	503	789	1046	1118	1376	1220
Texas	76	87	50	87	75	413	413	292	476	406
Total on Boats Exclusive of Duplication	314	505	545	879	1175	1833	2117	1917	2390	2564
Fishermen Per Boat- Regular and Casual	1.8	1.8	1.6	1.6	1.6	1.4	1.4	1.4	1.4	1.3

*Bureau of Commercial Fisheries, Fishery Statistics of the United States, loc. cit..
 †A regular fisherman earns more than half of his income from fishing while a casual fisherman earns less than half of his income from this activity.

TABLE IX
FISHERMEN ON SHRIMP OTTER TRAWL VESSELS BY STATE

State	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
North Carolina	846	964	759	860	895	821	847	814	815	647
South Carolina	795	650	548	555	471	498	453	377	417	384
Georgia	574	708	667	621	631	659	727	667	650	623
Florida	3275	3667	3504	3074	3052	2809	2820	2910	2740	2799
Alabama	411	518	577	564	462	428	659	582	706	882
Mississippi	1218	1221	1216	1106	1152	1174	1157	1000	1010	1020
Louisiana	2095	2749	3235	3432	2613	2348	3380	3503	3341	3524
Texas	3685	4592	4222	4142	4268	3406	3824	3749	3657	3787
Total on Vessels Exclusive of Duplication	9117	9868	9958	9321	9070	8312	8897	8730	8859	8928
Fishermen Per Vessel	2.6	2.6	2.7	2.5	2.6	2.4	2.5	2.5	2.4	2.4
Total on Boats and Vessels	15,040	15,985	16,011	15,422	14,935	15,256	16,320	15,965	16,481	16,436

Bureau of Commercial Fisheries, Fishery Statistics of the United States, loc. cit..

data are similar to those for boats and vessels in that they involve duplication in cases where a craft and crew made landings in more than one state. The total exclusive of duplication figure is the best indicator of fishermen actively engaged and is a better measure of economic importance of the industry in terms of full time jobs.

Costs

Although it would be very useful to examine changes in boat and vessel operating costs occurring during the period under study, this cannot be done. Reliable data which would correspond with data in the Osterbind and Pantier study are not available for the latter part of the period. This represents a very important gap in information concerning the shrimp industry, since profitability and cost factors can only be inferred.

Prices and productivity

Exvessel prices have fluctuated widely during the period under study, but no secular upward trend is apparent. The indexes plotted in Figure 8 show the vacillation of exvessel prices.⁹ Three separate indexes are plotted to illustrate differences in price behavior of certain size

⁹Indexes computed on the basis of moving averages from unpublished monthly price data provided by the Bureau of Commercial Fisheries.

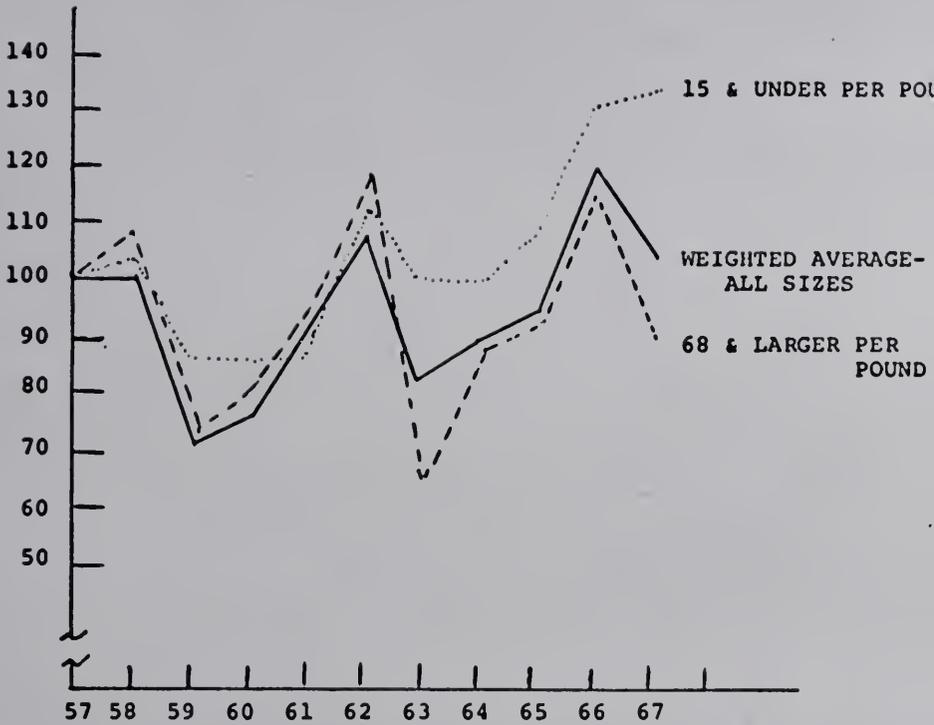


FIGURE 8

INDEXES OF EXVESSEL PRICE FOR
SELECTED SHRIMP SIZE COUNTS 1957-1967

categories. An upward price trend is suggested by the index for larger shrimp of size count fifteen and under. More extreme fluctuations are observable in the price of smaller shrimp. Both of these indexes tend to move about the weighted price index for all shrimp. The volume of smaller shrimp landed exerts a considerable influence on weighted average price. Incidentally, it is this problem of the influence of the size structure of landings on average price which limits its usefulness. Widening of the margin between prices paid for small shrimp relative to that paid for larger sizes is also indicated by Figure 8. Such a pattern has existed since 1962, when differences between the largest and smallest size categories was forty-five cents. By 1967 the gap had grown to eighty-eight cents.¹⁰ Depending on the abundance of particular sizes of shrimp, the effect on revenue of the above price relationship can be rather large.

The broad and frequent nature of exvessel price changes has already been indicated. Changes in the productivity of fishermen employed in the industry appear to be equally variable. Figure 9 shows the changes in physical and value productivity for shrimp fishermen during the 1957-1967 period. An index of exvessel price has been included to show the importance of price on value

¹⁰United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 12.

Footnotes to Figure 9

- * VALUE ADDED PRODUCTIVITY = $\frac{\text{TOTAL VALUE ADDED}}{\text{NUMBER OF PERSONS REGULARLY ENGAGED}}$
- # PHYSICAL PRODUCTIVITY = $\frac{\text{LANDINGS}}{\text{NUMBER OF PERSONS REGULARLY ENGAGED}}$
- @ WEIGHTED AVERAGE EXVESSEL PRICE

Compiled from data in United States Bureau of Commercial Fisheries, Fishery Statistics of the United States, Annual Volumes, 1957 - 1966.

INDEX 1957=100

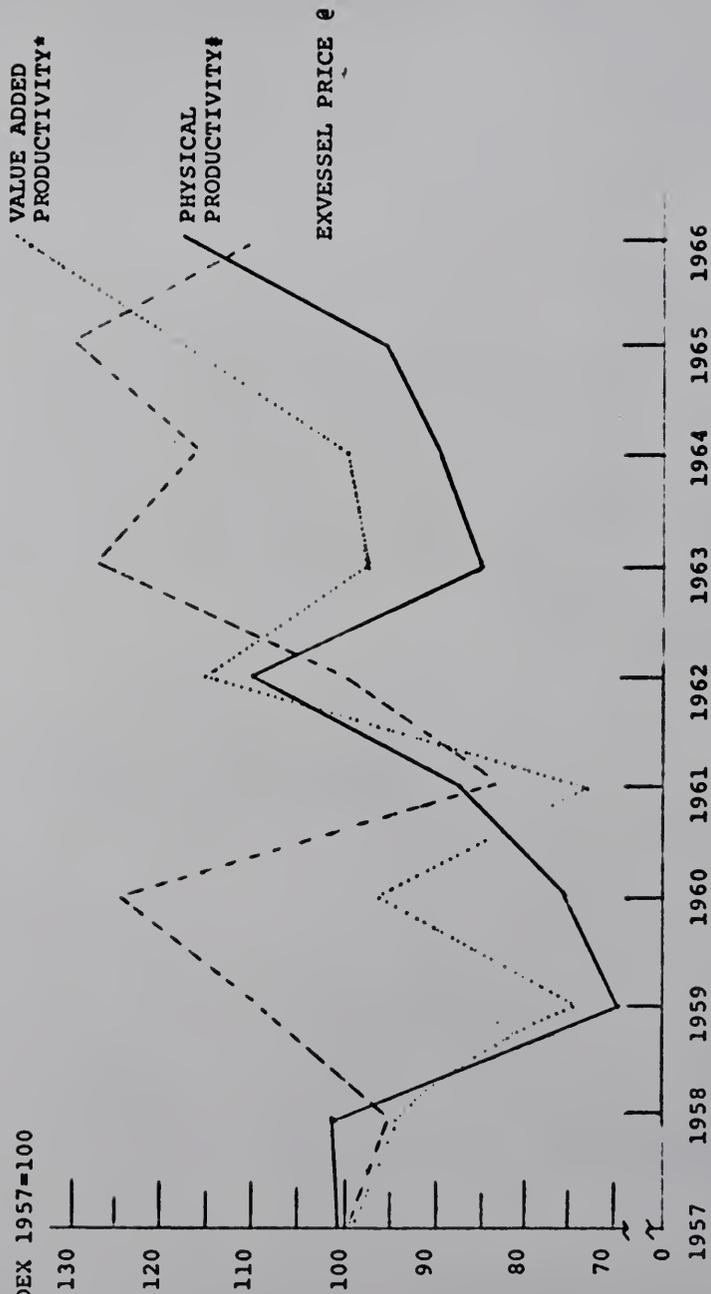


FIGURE 9

FISHERIAN PRODUCTIVITY AND PRICE

added. As before, no secular trend is observable, even though the period ended with higher prices and productivity than existed in 1957. The relatively small increase in price and productivity in the more recent years may be attributed to several factors. First, there was a significant increase in the numbers of casual fishermen, which were excluded from the productivity calculations. Their inclusion with an equal weight would have resulted in an even greater distortion of the results and would have indicated no increase in physical productivity per fisherman. Next, there was a decline of 854 in the number of regular fishermen between 1957 and 1966. Finally, there has been an average decline of four-tenths fishermen (regular and casual per craft.¹¹ All of these factors would tend to increase landings per regular fisherman, given a fixed or growing capital stock.

Exvessel price appears to play a dominant role in value added productivity and in some cases overcomes the effect of physical productivity changes. For example, in 1966 the decrease in output per fisherman was more than compensated for by price increases, which resulted in an increase in value added. A somewhat similar situation is observable for output and revenue per craft (Figure 10), with the exception that 1957 levels were not achieved again

¹¹See Table IX above.

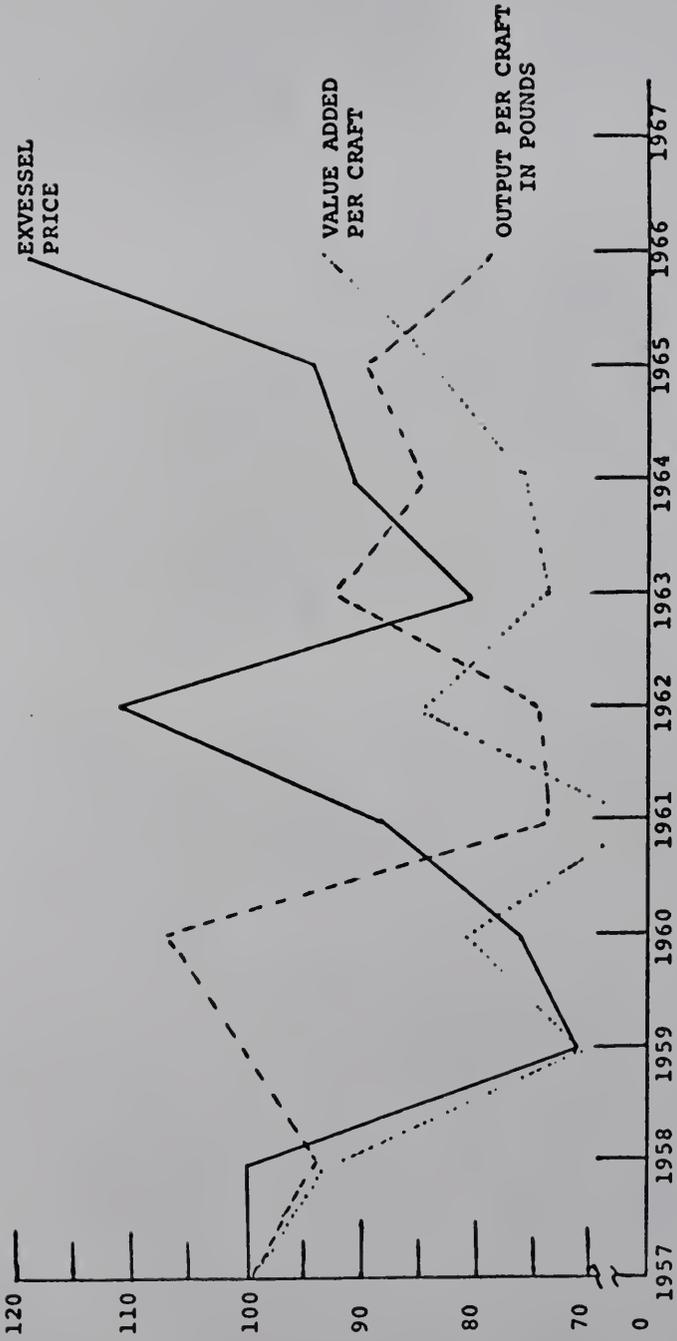


FIGURE 10

SHRIMP CRAFT PRODUCTIVITY

Compiled from data in United States Bureau of Commercial Fisheries, Fishery Statistics of the United States, Annual Volumes, 1957 - 1966.

during the period ending with 1966. These average data understate the situation, since increased numbers of casual fishing boats receive equal weight with full time larger vessels. Based on the averages used in Figure 10, shrimp craft revenues appear to have been increasing after 1963. This observation is consistent with the previously noted attraction of craft into the industry after 1963. The importance of exvessel price relative to landings is again apparent in the data of Figure 10.

Available data are not adequate to assess the importance of changes in revenue on employment, wages, investment, and return to capital invested in shrimp craft; however, some broad conclusions may be suggested. Wages in the shrimp fishery are determined by a share arrangement which varies from vessel-to-vessel and port-to-port. Prior studies have found that the crew share averages 30 to 32 percent of catch value.¹² Based on a rising value added per fisherman in recent years, an increase in the number employed in shrimping could be expected, but in fact the number has been stable or declining. This may indicate that earnings have increased at a slower rate than in alternate employments. From the owner's point of view one

¹²Carter C. Osterbind and Robert A. Pantier, op. cit., pp. 89-102; and United States Bureau of Commercial Fisheries, Survey of the United States Shrimp Industry, Volume I, op. cit., pp. 180-190.

might expect to find that increasing costs would have put pressure on profits; however, increasing investment in boats and vessels implies that shrimping has remained profitable. For example, 192, 356, and 355 vessels were under construction or delivered to shrimp fishermen in 1965, 1966 and 1967 respectively. These were modern, well equipped craft. According to an annual survey by Fish Boat magazine, about half of the vessels were of steel construction with an average length of nearly seventy feet.¹³ This investment in new vessels, which amounted to about 25 percent of existing capacity in terms of numbers, strongly implies that shrimping operations were profitable or expected to be profitable.

Price elasticity of domestic supply

The most common assumption regarding the elasticity of supply of fishery products, or for that matter most agricultural products, in the short run or intermediate period is that supply is inelastically given in the market.¹⁴ There appears to be considerable justification for making this assumption with respect to the domestic shrimp supply function. First, the existence of high fixed costs suggests that, given the choice of whether or not to

¹³"U.S. Fishing Vessel Construction," Fish Boat, X (December, 1965), pp. 47-64; XI (December, 1966), pp. 58-75; XII (December, 1967), pp. 43-67.

¹⁴For example see Frederick W. Bell, The Economics of the New England Fishing Industry: The Role of Technological Change and Government Aid (Boston: Federal Reserve Bank of Boston, 1966), p. 38.

continue shrimping, owners would continue in an effort to cover these fixed costs. In their empirical study Osterbind and Pantier constructed a break-even chart for a sample of shrimp vessels, which illustrated that the ratio of fixed to variable costs depended heavily on the vessel's volume of landings and the price received for the shrimp.¹⁵ In order to give an example of the cost relationship, the point of break even is assumed and at this point fixed costs are 50 percent of the total; these figures are reasonably close to the Osterbind and Pantier findings. Variable costs, of course, would also be 50 percent of total costs at this point. Variable costs are assumed to be distributed on the basis of 30 percent to crew share and 20 percent to other variable expenses. It is the marginal costs which now determine whether or not the vessel should continue shrimping. All of the variable costs associated with additional fishing cannot be determined in advance because of the lay system, which relates crew earnings to the volume of landings and price received. If the additional effort is unsuccessful then variable costs will be rather low, because crew share, which was 30 percent of total costs at the break even point, will not be paid for the additional, but unsuccessful, effort. On the other hand, if they are successful then fixed costs are spread over a larger volume

¹⁵Osterbind and Pantier, op. cit., 145-157.

of output, variable costs decline as a percent of total costs, and profits might be expected to increase.¹⁶ Both of the above possibilities appear to argue in favor of continued shrimping even if landings and/or prices fluctuate over a rather broad range. In general, there would probably be a limited amount of shifting to another fish product to offset temporary unfavorable situations because of gear modification and crew training required and problems associated with selling other fish once they are landed.¹⁷

Another factor which suggests an inelastic total supply function involves the relationship between landings and fishing effort. Rather large annual fluctuations in shrimp landings were apparent in the data presented earlier. The number of fishing units participating in the shrimp fishery does not vary by as much as, or perhaps even in the direction of, landings. If the number of craft is taken as a crude measure of fishing effort, then one might reasonably conclude that a given volume of landing could be obtained using fewer vessels. For example, annual landings

¹⁶The risk sharing aspect of the lay system is dealt with in Hubertus Zoetewij, "Fishermen's Remuneration," The Economics of Fisheries, Ralph Turvey and Jack Wiseman, editors (Rome: Food and Agriculture Organization of the United Nations, 1957), pp. 18-34. However, Zoetewij's discussion is in terms of the influence on investment decisions rather than short run operations decisions.

¹⁷Roy L. Lassiter, Utilization of U. S. Otter-Trawl Shrimp Vessels in the Gulf Area, 1959-1961 (Gainesville: Bureau of Business and Economic Research, University of Florida, 1964), pp. 4-5.

increased by 31 percent in 1963 while the number of craft increased by only 6 percent, and in 1961 there was a 55 percent decline in landings accompanied by a 4 percent decline in the number of fishing units.¹⁸ Of course these comparisons involve a number of complicating factors, such as treating boats and vessels equally, but it appears that landings can fluctuate rather widely for a given number of fishing units or vice versa. To the extent that the above observations are representative of real conditions, a given supply of shrimp can be expected to enter the market even if the amount of fishing effort varies; therefore, supply would be inelastic. It would also appear that as more shrimp are caught it becomes increasingly difficult to maintain vessel catches, so that during periods of relative scarcity the supply of shrimp becomes somewhat more inelastic at higher prices as a result of increasing effort expended per unit of shrimp caught.¹⁹

The importance of the natural abundance of shrimp in the fishery in determining market supply is also indicated by the wide fluctuations in fishermen and craft productivity shown in Figures 9 and 10. Labor productivity would be expected to change slowly in magnitude and have a long run

¹⁸ Computations based on data found in Tables III and VIII above.

¹⁹ Francis T. Christy, Jr. and Anthony Scott, The Common Wealth of Ocean Fisheries (Baltimore: Resources for the Future, The Johns Hopkins Press, 1965), pp. 8-9. This reference deals with the general case for a fishery.

trend. Similarly, the productivity of a vessel or boat would be expected to be nearly constant from one year to the next, other things remaining equal. The third variable, the abundance of shrimp, apparently fluctuates from one season to the next and exerts a substantial influence over unit and total landings. Thus, the availability of shrimp may thwart efforts of fishermen to increase landings; or, conversely, it may cause excessively large landings with a resulting decline in price. This would favor a shifting supply function from year to year rather than a more elastic curve. Indeed, the apparent existence of a given abundance of shrimp in the known grounds during a given time period would tend to support the inelasticity argument.

Supply of Imports

The concept of the supply of imports concerns the willingness and ability of other countries to export products to a particular country. The question at hand is, of course, the willingness and ability of Latin American countries to export shrimp to the United States. From the United States' point of view, imports represent one component of supply. The purpose here is to describe the flow of shrimp imports into the United States during the 1957-1968 period and to examine forces influencing this flow. Finally, an estimate of the elasticity condition of the supply of imports will be made.

Several difficulties are involved in obtaining prices in order to make comparisons between imports and domestically produced shrimp. Since most imports are landed in a frozen, heads-off, shell-on state, it would appear that domestic wholesale prices rather than exvessel prices would be appropriate. Some error may result because of transportation costs between major wholesale centers and ports of entry, but this should not be large. A second difficulty arises in trying to obtain prices paid by importers for the shrimp. Data on prices of foreign shrimp transactions are not available, but an estimate of the landed value can be made based on the declared weight and value given in the monthly publication, United States Imports.²⁰

This price figure is subject to distortion based on size structure, quality variations, and extent of processing not indicated by tariff classification; however, it should serve as a guide to the direction of change and as a general basis for comparison with domestic prices. Vertical integration may also cause some additional variation between landed value and value added up to that point. There is no way to account for this difference.

²⁰United States Bureau of the Census, United States Imports (Washington: Government Printing Office, 1967).

Table X lists value added at port of entry as described above for selected exporters and selected years. United States wholesale price is included for comparison. The short term movement of these prices and domestic wholesale price appear to be rather highly correlated.²¹ A comparison of monthly prices, imports, stocks, and landings reveals that major wholesale price changes occurred most frequently with changes in domestic landings and stocks.²² If this interpretation is valid, it would imply that although imports comprise over half the market, imports fall under an umbrella of domestic price. A later discussion of concentration of firms in the importing of shrimp supports this conclusion.

Yeager and Tuerck state that "The reasons for cheaper foreign goods are less important than the fact that they are offered at a lower price."²³ They further suggest

²¹A simple regression of monthly import value added for imports from Mexico on United States wholesale price revealed a simple correlation coefficient (R^2) of .82 and a significant regression coefficient ($T=101$).

²²United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., pp. 17, 21; and unpublished monthly data provided by the Bureau of Commercial Fisheries.

²³Leland B. Yeager and David G. Tuerck, Trade Policy and the Price System (Scranton: International Textbook Company, 1966), p. 43.

TABLE X
ESTIMATED UNIT VALUE OF SHRIMP IMPORTS FOR
SELECTED COUNTRIES, BY MONTHS 1958, 1959, 1967

Year and Month	Mexico	Panama	El Salvador	Ecuador	United States Wholesale Price
			(cents per pound)		(26-30 Chicago)
1958					
January	42.9	79.6	57.4	83.9	85
February	45.2	78.4	52.2	71.7	94
March	41.6	73.1	63.0	68.9	94
April	35.0	71.1	62.7	75.8	88
May	40.2	70.9	61.1	66.7	91
June	38.3	71.5	58.6	70.6	98
July	41.6	71.3	54.2	70.3	94
August	41.2	71.8	55.0	65.8	86
September	41.9	71.2	58.7	70.5	89
October	44.8	---	57.1	67.0	83
November	44.3	73.8	58.0	68.1	86
December	43.6	79.2	56.9	64.8	90
Year Average	42.4	73.3	58.4	70.4	90

TABLE X (continued)

Year and Month	Mexico	Panama	El Salvador (cents per pound)		Ecuador	United States Wholesale Price (26-30 Chicago)
1959						
January	43.1	79.6	62.5	70.6	89	89
February	43.4	75.7	63.5	74.7	87	87
March	39.8	69.3	74.9	69.7	86	86
April	42.0	76.6	81.9	60.5	83	83
May	41.7	71.1	76.9	64.6	76	76
June	41.8	75.7	69.6	62.5	78	78
July	40.1	65.1	69.7	60.5	77	77
August	35.0	67.1	72.0	59.4	69	69
September	41.0	72.7	67.6	62.9	63	63
October	34.2	69.6	68.5	56.6	62	62
November	44.3	62.8	68.5	58.1	62	62
December	43.4	65.2	69.4	59.3	64	64
Year Average	40.5	71.1	58.4	62.5	75	75
1967						
January	80	74	91	84	111	111
February	81	74	90	93	116	116
March	80	70	91	89	117	117
April	79	77	91	74	118	118
May	79	78	92	73	120	120
June	81	83	86	91	122	122
July	79	89	86	109	103	103
August	76	85	85	98	85	85
September	79	78	89	102	88	88
October	81	88	73	110	94	94
November	81	94	75	106	101	101
December	80	103	84	98	104	104
Year Average	79	83	86	94	107	107

United States Congress, House of Representatives, Committee on Ways and Means, Tariff Treatment of Shrimp Imports, op. cit., p. 318; United States Imports, op. cit., pp. 59-73.

that import price be taken as an offer price representing value added up to the present stage.²⁴ These assumptions are necessary in this study because varied conditions in the United States and individual Latin American countries make cost comparisons of fishing operations ambiguous. But the primary reason for utilizing these assumptions is that comparable data in the countries are not available and estimates based on existing data result in broad ranges which are not useful for making comparisons. For example, 1964 average vessel productivity estimates for selected Latin American countries ranged from 20,000 to 100,000 pounds of heads-off shrimp per year.²⁵

Although an analysis of foreign advantages in the shrimp fishing industry is not possible, some non-quantitative factors considered below give an apparent advantage to foreign producers of shrimp and shrimp products. These are generalizations and do not apply precisely to all countries.

One indisputable advantage of Latin American countries is the availability of large shrimp in size classifications of twenty per pound and under.²⁶ About

²⁴Ibid., p. 43.

²⁵Computed from estimates of total landings and number of vessels found in Richard S. Croker, "The Shrimp Industry of Central America the Caribbean Sea and Northern South America," Bureau of Commercial Fisheries, United State Department of the Interior, Foreign Fisheries Leaflet 74 (Washington: Government Printing Office, 1967), pp. 19, 26.

²⁶Ibid., pp. 27, 38, 46, 47, 56, 114.

10-15 percent of United States landings are of this size.²⁷ These shrimp have enjoyed an exceptionally strong demand and brought higher prices in United States' markets, as previously indicated. Table XI illustrates the importance of large shrimp in selected Latin American countries' exports. A second advantage is derived from being located in the proximity of the resource. This facilitates fishing operations because shorter trips are possible, but more important is the fact that it means the shrimp will lie within waters controlled by the foreign country. This makes it possible for the resource to be reserved for domestic fisherman, since shrimp do not range over extremely wide areas. Resource proximity is also important because shrimp is a "weight loss commodity," that is, it undergoes a considerable loss of weight during the early stages of preservatives and processing, so that transportation costs of the final product are reduced. This would encourage landing and some processing in the foreign country. Weight loss may be about 35 to 40 percent in the case of heads-off shrimp and as much as 65 percent for peeled, cooked shrimp.²⁸ Breeding has the opposite effect of increasing the weight which may help to explain why most breeding is done after

²⁷United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 10.

²⁸Ibid., p. 14.

TABLE XI

IMPORTANCE OF LARGE SHRIMP IN EXPORTS FOR
SELECTED LATIN AMERICAN COUNTRIES

Country	Number of Shrimp Per Pound	Percent of Total Shrimp Exports to the United States
Colombia	Under 20	90
Costa Rica	Under 20	100
Ecuador	Under 20	100
French Guiana	Under 25	80
Panama	Under 35	98

Richard S. Croker, op. cit., passim.

the shrimp are imported.²⁹

One further locational advantage has been derived by some Latin American countries, such as Guiana, Barbados, Brazil, French Guiana, Honduras, and Nicaragua, in that they started with relatively unexploited shrimp fisheries during a period when demand for shrimp was generally high.³⁰ An advantage is derived from an unexploited fishery because it is usually more productive and more profitable in early stages of development than after landings have reached

²⁹United States Tariff Commission, op. cit., p. 39.

³⁰Richard S. Croker, op. cit., pp. 101, 118, 113, 63, 69.

maintainable levels. Greater profitability is a result of larger catches with relatively small applications of capital. As indicated earlier in the model, the tendency is to continue investment beyond the most economically efficient range, with a resulting decline in profitability.³¹

Transportation of the frozen shrimp to the United States used to be expensive, since they had to be moved to airports, where they were then shipped by air freight. Now shipment is usually by refrigerated trailers hauled on ferries to Miami, Florida, or New York City. Refrigerated cargo ships are also used, though less extensively. Mexican shrimp are usually transported overland and enter the country through the border states, especially Arizona. According to Croker the transportation cost is approximately four or five cents per pound depending on the destination. Air freight rates are about one cent higher.³²

Before discussing the elasticity of supply of imports it would be desirable to examine cost and availability conditions for labor and capital in the Latin American shrimp fisheries, but this cannot be done based on existing data. Only fragmentary data exist, and even these are not available or consistent for all of the countries involved.

³¹Francis T. Christy, Jr. and Anthony Scott, op. cit., pp. 13-14.

³²Croker, op. cit., pp. 42, 57, 58.

Elasticity of supply of imports

It is unrealistic to assume that imports flow into a country on some autonomous basis unrelated to price. Instead, it would seem more reasonable to expect the flow of imports to be related to prices in domestic and foreign markets. The complete decision on where to sell the product requires that something be known about demand, but the elasticity of supply of imports can provide information for the importing country concerning the likely response to various demand situations. Since trade policy alters the demand situation, some knowledge of the elasticity of supply would be useful in evaluating possible effects of alternative policies. For example, the elasticities of supply for domestic and for imported shrimp determine how a decrease or increase in demand caused by policy alterations will be distributed between domestic and foreign suppliers and the resulting change in market shares.

The computation of elasticity of supply of imports figures involves the same difficulties as making estimates of domestic supply elasticity. In fact, the necessary data, including cost data, are less reliable, if they exist at all, for foreign shrimp fishermen than for domestic fishing units. Also, the lay system is common in foreign countries as well as the United States, so the problem of costs being related to revenue cannot be avoided. A cost approach to estimating the elasticity of the supply appears fruitless.

In the absence of reliable cost data, the most reasonable assumption about the elasticity of supply of shrimp imports appears to be that it is relatively inelastic in the short run and intermediate period. This is contrary to the assumption made in a number of studies dealing with tariffs and trade that the supply of exports from other countries is infinitely elastic. It is consistent with the conclusion of Kreinin, who reasoned that the dominant position of the United States in the export trade of many countries made the infinite elasticity assumption unsatisfactory.³³ Infinite elasticity of the supply of imports means that production can be expanded substantially at constant costs. This may be true for some commodities, but it is doubtful that this potential exists in most of the Latin American shrimp fisheries. Shrimp vessels are costly and in most cases must be purchased abroad from limited foreign exchange earnings. This is, of course, only one of a number of projects, so that increases in expenditure for this purpose would bid available funds away from other purchasers. If the funds were available for expansion of the shrimp fishery at all, they would probably be at a higher price. An infinitely elastic supply function would also require that an unemployed work force be

³³Mordechai E. Kreinin, *Alternative Commercial Policies - Their Effect on the American Economy* (East Lansing: Michigan State University, 1967), p. 38.

available to provide workers for expansion of the industry. Most Latin American countries may meet this requirement for less skilled crew members, but, with the exception of Mexico, qualified boat captains and engineers are difficult to obtain. Croker reports substantial numbers of United States, Japanese, and Mexican citizens acting as captains on vessels in the remaining Latin American countries.³⁴

Another factor which suggests an inelastic supply of imports function for Latin American suppliers is the lack of alternative uses for the shrimp. The perishable nature of shrimp requires that it be frozen or processed if consumption is delayed. Initial freezing can be accomplished, but distributive facilities for frozen foods are not yet very extensive in most of Latin America. Export alternatives may not be much better. The dominant position of the United States as the major market is such that it is doubtful of world markets could absorb any substantial diversion of shrimp from this market. For Latin American producers as a whole, there would appear to be no adequate alternative to selling in the United States market. This does not mean that prices in the United States market will be generally lower than the limited alternatives. On the contrary, the attractive prices here may have been partially responsible for the slow development of domestic markets in

³⁴Croker, op. cit., passim.

Latin America. Markets for the very small shrimp, which are less desirable for export, have expanded, especially along the coasts.³⁵ Without developed alternative markets, shrimp prices in the United States markets might vary over a rather wide range without substantially altering the quantity of imports.

Finally, the same factors relative to the role played by natural abundance of shrimp in the fishery during a given season on the elasticity of domestic supply are equally applicable to developed shrimp fisheries in other countries; i.e., in a given time period supply will depend greatly on the availability of shrimp to harvest regardless of price conditions.

J.E. Meade in his classic study on trade observes that:

A country's elasticity of supply of exports will, therefore, be low if both in production and in consumption there is little substitutability between its export products and its non-export products on the other hand.³⁶

Shrimp in Latin American countries would appear to fit into Meade's classification as an export good with a low elasticity of supply, so that from the United States viewpoint the supply of imports for shrimp is relatively inelastic.

³⁵Richard S. Croker, op. cit., pp. 47-48, 110.

³⁶James E. Meade, The Balance of Payments (Volume I of The Theory of International Economic Policy, 2 volumes: New York: Oxford University Press, 1951-1955), p. 238.

Demand

In recent years, together with rising income levels, the demand for shrimp has continued to increase. This shift in demand has manifested itself in the growth of per capita consumption at higher prices and in increased imports. The per capita consumption of shrimp products is shown in Table XII. It would be desirable to obtain the dollar amount of consumers' expenditures for shrimp; however, the product mix has changed during the period, causing an average price needed for the computation to be misleading. Secondly, a price schedule for shrimp purchased at restaurants is not available. Since a larger volume of shrimp is consumed in restaurants, an average retail price would again be misleading. However, it would appear, based on the movement of the shrimp retail price index, that the larger per capita quantities were purchased at higher prices, especially in the more recent years.³⁷ It can also be observed from Table XII that per capita shrimp consumption has been growing at a higher rate than all fish and shellfish.

The increase in the quantity of imports has already been discussed. It would appear that only a general increase in the demand for shrimp products could have absorbed three

³⁷Charles H. Lyles, Historical Statistics: Shrimp Fishery, op. cit., p. 24.

TABLE XII
PER CAPITA CONSUMPTION OF SHRIMP AND CERTAIN OTHER FISH

Year	Shrimp (Heads-Off Weight in Pounds)	Groundfish and Ocean Perch Fillets (Edible Meat in Pounds)	All Fish and Shellfish (pounds)
1957	.96	1.54	10.2
1958	.98	1.50	10.6
1959	1.22	1.46	10.9
1960	1.28	1.44	10.3
1961	1.27	1.62	10.7
1962	1.22	1.69	10.6
1963	1.35	1.63	10.6
1964	1.45	1.72	10.5
1965	1.51	1.80	10.9
1966	1.50	1.87	10.6
1967	1.61	1.79	10.6
1968	1.80	NA	NA

Charles K. Lyles, Fisheries of the United States....1957, op. cit., p. 61; Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 18.

times as many imports in 1968 as in 1957 without a depressing effect on prices. The hypothesis that the growth of imports kept prices from rising rapidly and actually encouraged the higher consumption levels will be discussed later.

Consumption

The topic of consumption has already been introduced, but considerable detail may still be added which is relevant to the problem at hand.

Consumption figures for shrimp on a monthly basis are not available; however, on an annual basis it can be assumed that consumption will be approximately equal to the year's landings and imports plus any changes in the level of frozen and processed stocks. Some error results from changes in unreported stocks held in private storage and retail inventories. This procedure is less satisfactory on a monthly basis, since the quantity of frozen stocks outside public warehouses (if behavior of reported stocks is any indicator) may fluctuate rather widely. Data for "wholesale disappearance" or "apparent consumption" are provided by the Bureau of Commercial Fisheries as an estimate of the consumption variable.³⁸ However, this approximation suffers from the fact that on a monthly basis it aggregates shrimp used in canning into a single month while in reality

³⁸ Computed on the basis of total available minus accountable uses equals apparent consumption. United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 18.

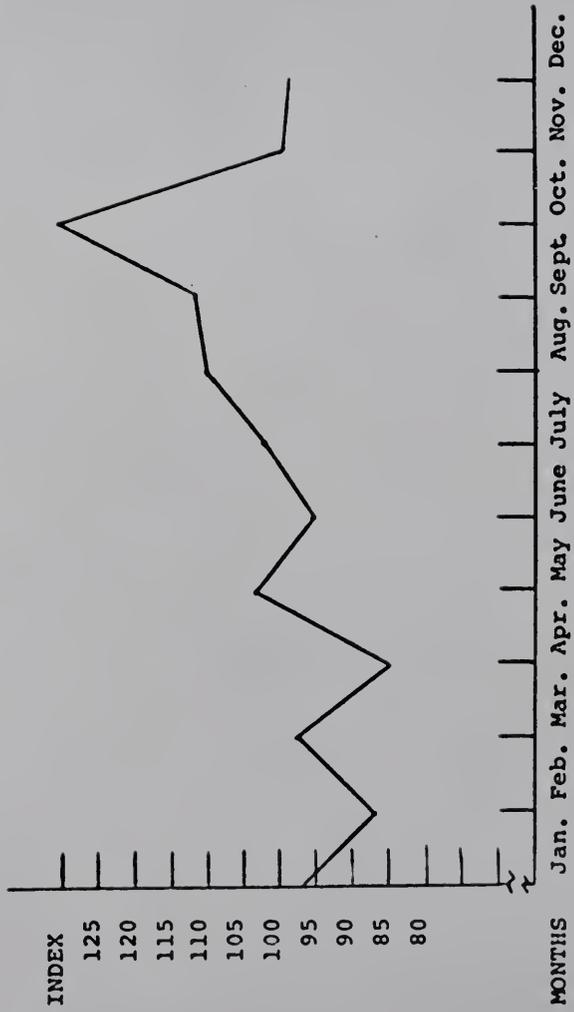


FIGURE 11

INDEX OF APPARENT CONSUMPTION

Computed on the basis of moving averages from unpublished monthly apparent consumption data provided by the Bureau of Commercial Fisheries.

the processed commodity will be consumed over a longer time period or exported. For example, it would appear that all shrimp canned in June is consumed in June. These distortions create problems in the use of short time periods for statistical demand analysis. Additionally, there is a problem of explaining the large increase in apparent consumption indicated in Figure 11 during October when the landings of larger size shrimp usually reach a maximum. There is a rapid buildup of stocks in public warehouses during this month which is reported.³⁹ It seems reasonable that private warehouses holding unreported stocks, e.g. those of chain food stores, would also replenish their stocks at this time. This replenishment would have to be counted for statistical purposes as apparent consumption during the month of October. An equally disturbing distortion of the consumption pattern would occur in June, when heavy landings of small shrimp occur, if the quantity canned were not accounted for in the computation. On an annual basis some of these difficulties in computation disappear, since stocks have time to be moved from warehouses to consumers either through processors or directly.

Table XIII lists estimates of annual consumption of shrimp. Consumption has doubled since 1957 and the growth

³⁹United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 17.

TABLE XIII
ANNUAL CONSUMPTION OF SHRIMP IN THE UNITED STATES

Year	Consumption (Million Pounds Heads-Off)	Per Cent Changes from Preceding Year	Index (1957=100)
1957	177.5		100
1958	195.2	10.0	110
1959	238.7	2.2	134
1960	251.2	5.2	142
1961	246.5	-1.9	139
1962	249.0	1.0	140
1963	279.7	12.2	157
1964	289.3	3.5	163
1965	314.5	8.7	177
1966	313.5	-.3	177
1967	341.8	9.0	193
1968	360.8	5.6	203

Computed from data available in Shellfish Situation and Outlook, May 1969
using the following formula: $\text{Total Available} - \text{Ending Stocks} - \text{Total Exports} =$
Consumption

TABLE XIV

PROCESSED SHRIMP BY METHOD OF PREPARATION*
(million pounds product weight)

Year	Raw Headless	Peeled & Deveined	Breaded	Canned	Other
1957	58.3	10.8	51.1	9.1	4.3
1958	63.3	9.7	60.9	14.3	4.3
1959	61.6	13.0	69.8	13.8	4.2
1960	78.1	22.2	70.3	14.3	6.6
1961	46.8	19.8	73.8	9.3	6.2
1962	51.2	21.2	76.8	13.2	6.0
1963	66.4	24.5	74.9	15.9	5.7
1964	64.5	26.7	91.3	9.7	8.3
1965	64.4	27.6	98.1	15.6	10.7
1966	62.2	30.1	104.9	14.2	10.2
1967	100.8	39.1	94.2	16.9	12.3
1968					

*Bureau of Commercial Fisheries, Shellfish Situation and Outlook, S-12
(March, 1969), p. 20.

pattern has been interrupted by only minor annual declines. The lower consumption levels of 1961-1962 probably resulted from the fact that reduced landings caused a relative scarcity during these years. The average annual growth in the consumption of shrimp during the period was about 6 percent with a yearly high and low of 12.2 and -1.9 percent respectively.

The increase in consumption of shrimp has been accompanied by a change in the composition of shrimp products sold in the market. In Tables XIV and XV it can be seen that consumption of more highly processed shrimp has been increasing. Some double counting is involved in the tables, since raw, headless shrimp may undergo additional processing and be counted in another category. This is also true for other categories listed in the tables; however, this tends to understate rather than overstate the amount of shrimp which reaches the consumer in more advanced stages of processing. Peeled and deveined shrimp (both cooked and uncooked) along with breaded shrimp have been among the faster growing of shrimp products in recent years. The increase in peeled shrimp is apparent in import figures; however, breaded shrimp have remained a comparatively small part of the "other" category in Table XV. Additional weight added by breading has probably influenced this growth pattern.

TABLE XV
 SHRIMP IMPORTS BY PRODUCT*
 (million pounds product weight)

Year	Raw Headless	Peeled	Canned	Other
1964	112.1	30.0	3.0	9.5
1965	114.3	34.9	2.2	11.7
1966	129.9	39.2	1.5	7.9
1967	131.9	40.8	2.2	11.2
1968	128.0	49.0	4.3	8.2

*Bureau of Commercial Fisheries, Shellfish Situation and Outlook, S-12 (March, 1969), p. 14.

Derived Demand

Consumer demand for a variety of shrimp products gives rise to special derived demands for certain kinds of shrimp suitable for each use. Very small shrimp, for example, have been used chiefly for canning and were supplied to meet this particular segment of overall demand. With the increase in consumption of peeled and deveined shrimp, the smaller sizes have still another special demand. These changes in the final consumer demand alter the demand at the fishing level.

Another potentially important factor influencing demand at the primary level is the substitutability of imported shrimp and domestically landed shrimp. It was pointed out earlier that the origin of shrimp may be impossible to determine at the consumer level. Likewise,

at the wholesaler or processor level domestic and imported shrimp are substitutable.⁴⁰ At all levels reference must be made to similar sizes and qualities of shrimp. Small domestic shrimp and large imported shrimp are obviously not close substitutes for most purposes. Also, shrimp from certain countries where preservation facilities are inadequate are recognized as being of poorer quality than domestic or other imported shrimp and so would not be substitutable for all uses. Readers may find fresh domestic shrimp more desirable because of the loss of liquids during freezing and thawing process, but if they are not available or the price is comparatively high imported shrimp may be substituted.⁴¹ The extent to which substitution has influenced the domestic industry will be discussed later.

Still another special demand for shrimp is the demand for shrimp to store for future sale. The seasonal nature of shrimp production causes an increased availability of larger shrimp (fifty and under per pound) during the latter half of the year with a corresponding period of low production in the first half.⁴² Since consumption is not

⁴⁰United States Tariff Commission, op. cit., p. 37.

⁴¹Ibid., pp. 36-37.

⁴²Edward J. Barry, "Gulf Fisheries (Selected Areas) - 1967." (New Orleans: United States Bureau of Commercial Fisheries Market News Service, 1968), pp. III-IV.

assumed to be equally seasonal, this production pattern gives rise to the need for storing substantial quantities of shrimp. M.J. Brennan, who made a major contribution to the "supply of storage" theory, distinguishes two motives for holding stocks or inventories.⁴³ First, processors and wholesalers may carry stocks in order to avoid the inconvenience of having to adjust production schedules or being unable to fill orders from regular customers. This motive would encourage the holding of stocks even though a future price increase was not anticipated. That is, some yield to the holder is gained by the "convenience" of having the commodity available. Secondly, Brennan concludes some holders of stocks will be motivated by the expectation of profits resulting from anticipated price changes at some future date. Speculators of this type would demand that the return from stocks yield at least the cost of storage plus some premium for risk. There is probably little difference between the two motives in the case of shrimp, since the stocks are seldom hedged and either type holder could benefit from the price increase.

The separate effects on the demand for shrimp for storage for either motive are not directly observable in the price and stocks data. There is, however, some

⁴³Michael J. Brennan, "The Supply of Storage," American Economic Review, Volume XLVII (March, 1968), pp. 50-72.

support for the hypothesis that frozen stocks play an important role in wholesale and exvessel pricing. First, a large portion of consumption is from inventories during January through June. This may not be apparent in the annual stock variations; but, based on monthly data for the 1957-58 period, frozen stocks provided between 6 and 27 percent of the estimated amount of shrimp consumed during the first half of the year.⁴⁴ Frozen stocks perform the useful function of distributing the fall catch into the low production spring season and would be expected to moderate price fluctuations to the extent that the storage mechanism operates successfully.

A second possible role of frozen stocks is to act as a gauge which indicates a shortage or excess of shrimp in the market. If the carry-over from the preceding season is too great, a depressing effect on all price levels would be expected, modified of course by the nature of expectations concerning the next season's catch and the availability of imports. For example, there was a record 55.8 million pounds of frozen shrimp in storage on January 1, 1964, which was accompanied by depressed prices in the market. Although landings and imports, which would

⁴⁴United States Bureau of Commercial Fisheries, unpublished monthly apparent consumption data; Charles H. Lyles, Historical Statistics: Shrimp Fishery, op. cit., pp. 10-15; and United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., 17.

influence withdrawals from frozen stocks, were available in much the same quantities as in 1963, prices did not recover significantly until stocks had reached more nearly customary levels in October. On the other hand, stocks somewhat below the level of previous years were available in January, 1966, and remained below prior comparable periods for most of the year. Imports and landings increased somewhat relative to previous years, but prices advanced strongly throughout the year and remained relatively high until heavy accumulations of frozen stocks occurred in mid-1967.⁴⁵

The implication of the above events is that the level of stocks in relation to customary levels will influence exvessel and wholesale prices. Stock to apparent consumption ratios were not very useful in examining the above relationship, although in general a low ratio could be associated with a period of higher prices.

The above discussion is only a cursory treatment intended to suggest the importance of frozen stocks on demand at the fishing level, since a supply of storage is accompanied by a demand for storage, i.e., shrimp to store.

An empirical verification of the application of supply of storage theory to shrimp distribution and pricing

⁴⁵United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 17.

is a task beyond the scope of the present study, but one which is needed. It is believed that such a study could contribute much to an understanding of price behavior at the wholesale and exvessel level.

Elasticity of Demand

In November, 1968, the Bureau of Commercial Fisheries sponsored the Demand Conference Workshop in an effort to obtain equations which would be useful in making market projections for various fish products. A number of demand equations for fish, shellfish, and shrimp were prepared and submitted for evaluation at the conference. Two of these equations for shrimp which follow usual demand estimating techniques are presented below. First, David Elkin derived an equation of the following type to estimate consumer demand for shrimp.⁴⁶

$$Y = a + bX_1 + cX_2 + dX_3 + eX_4 + fX_5 \quad \text{where}$$

Y = per capita consumption

X_1 = wholesale price, Chicago 26-30 count, frozen shrimp

X_2 = second quarter dummy = 1

X_3 = third quarter dummy = 1

X_4 = fourth quarter dummy = 1

X_5 = annual price trend, first quarter = up 1 each quarter

⁴⁶Equation forty-four submitted by David B. Elkin for the Demand Conference Workshop (unpublished demand equations, Bureau of Commercial Fisheries, Washington, November, 1968).

The price coefficient is -1.34836, which reveals the proper sign, and is statistically significant with a t value of -6.0848. The elasticity of demand based on the above equation is -0.38 at the mean.

A somewhat similar equation by John Doll includes income.⁴⁷

$$Y = .06 - 0.144X_1 + 0.168X_2 + 0.002X_3 + 0.038X_4 + 0.039X_5$$

(t values) (4.63) (11.89) (.24) (3.88) (3.95)

where

Y = wholesale disappearance per capita

X₁ = wholesale price

X₂ = disposable income per capita

X₃ = second quarter dummy variable

X₄ = third quarter dummy variable

X₅ = fourth quarter dummy variable

Again the coefficients have the expected signs and are statistically significant at the 5 percent level. The multiple correlation coefficient (R^2) is .828. Price elasticity of demand derived from this equation is -.41 at the mean, which is close to that found by Elkin. Income elasticity is greater than one (1.14), indicating that purchase of shrimp increases with income. This is to be expected, since in general shrimp is thought of as a "quasi-luxury" good.

⁴⁷Equation forty-seven submitted by John Doll for the Demand Conference Workshop.

Other demand equations submitted for the conference tended to display similar results even when annual data were used or alternate variables included.⁴⁸ A price elasticity of demand for shrimp of less than one was indicated in every case where the price or quantity coefficients were significant. The price inelasticity is somewhat disturbing, since a priori reasoning would lead to the expectation that, if shrimp were really a "quasi-luxury" good with some close substitutes, demand would be elastic. Although a single explanation is not verifiable there are several which seem plausible. First, changes in shrimp product consumption have occurred which may have altered its "quasi-luxury" nature. For example, the increase in consumption of frozen breaded shrimp may involve a less elastic demand than consumption of peeled and deveined cocktail shrimp. Secondly, the consumption data which are subject to the limitations mentioned earlier may bias the estimates so that the elasticity estimate is not representative of the true consumer demand. Finally, the estimates are subject to the familiar difficulties associated with demand functions derived using least squares techniques, e.g., identification and autocorrelation, where time series data are involved.⁴⁹

⁴⁸Equations forty-three through fifty-three submitted for the Demand Conference Workshop (unpublished demand equations, Bureau of Commercial Fisheries, Washington, November, 1968).

⁴⁹Karl A. Fox, Intermediate Economic Statistics (New York: John Wiley and Sons, 1968), pp. 190-199, 373-381.

In order to examine demand nearer the production level, a regression equation was fitted to quarterly exvessel price, freezings, and income data for 1957-1967. The equation obtained with standard errors of the regression coefficients is given below:

$$Y = 32 - .000011X_1 + .00026X_2 - .039X_3 + .035X_4 - .108X_5$$

(.101) (.0000034) (.000052) (.041) (.054) (.047)

where

Y = unweighted quarterly exvessel price of 31-40 count shrimp

X_1 = quarterly United States freezings of shrimp in thousands of pounds

X_2 = quarterly per capital income

X_3 = second quarter dummy variable

X_4 = third quarter dummy variable

X_5 = fourth quarter dummy variable

The multiple correlation coefficient is .67, which indicates that additional variables influence exvessel price.

Data on exvessel prices were obtained from unpublished records of the Bureau of Commercial Fisheries. Freezings data were compiled from Historical Statistics: Shrimp Fishing and Gulf Fisheries.⁵⁰ Exvessel price of 31-40 count shrimp and freezings were used in order to reduce the impact of small shrimp on price structure and landings.

⁵⁰Charles H. Lyles, op. cit., pp. 10-15; Edward J. Barry, op. cit., 1967, p. XII; and 1968, p. XIII.

The coefficients of the equation are of the expected sign and statistically significant at the 5 percent level. Price elasticity of demand calculated at the mean is 2.45, indicating that demand for medium and larger sizes of shrimp is elastic at the primary fishing level.⁵¹ The consistency of this with earlier findings at the consumer level will be explored in Chapter IV. This estimate is subject to the statistical limitations cited earlier in connection with demand analysis.

Demand for Imports

There exists, in the case of a product for which the total demand cannot or otherwise is not met from domestic production, a demand for the commodity from outside the system. This demand for externally produced commodities can be called the demand for imports. It should not be assumed that demand will first be satisfied from domestic supplies and only then from foreign sources, for these demands exist concurrently as a part of total demand for the good. As it is used here, demand for imports refers to the demand for shrimp caught by foreign producers, with special reference to Latin America.

Substitutability between imported and domestically produced shrimp was discussed earlier under the assumption

⁵¹The following means were used in the elasticity computations: price - .628 dollars; freezings - 23246 thousand pounds; and income - 2175 dollars per capita.

that equal sizes and grades were being compared. A high degree of substitutability would imply that closely related demand functions exist for imported and domestic shrimp. But all shrimp are not of equal size and quality, as indicated above. Imports from Latin America include quantities of large shrimp for which smaller domestic shrimp are not readily substitutable for many uses. At the same time, larger shrimp may be substitutable for smaller size categories in most uses, so that substitutability is not symmetrical.⁵² A relationship of this type suggests that demand for the more desirable large shrimp with fewer direct substitutes would be less elastic than that for smaller varieties.

Another form of differentiation of product in the case of imports involves the fact that large volume lots of imported shrimp are available on a rather stable basis. Seasonal fluctuations exist, but are proportionately much smaller than those of domestic landings. This permits access by wholesalers to stable supply lines, which in turn permits them to serve large institutional buyers on an uninterrupted basis.⁵³ Comparable domestic shrimp may be available in large quantities only in specific parts of the season. Dependence on domestic suppliers would result in seasonal shortages for buyers, especially in the case of larger size counts.

⁵²Statement of Elizabeth Guhring, Hearing before the Committee on Ways and Means, House of Representatives, op. cit., pp. 71-72.

⁵³Ibid., p. 71-72.

Another element of import demand which distinguishes it from domestic demand is the degree of concentration of firms which trade in this market. Data are not available to the author to measure the extent of this concentration, but several factors point to its existence. A survey conducted by the Tariff Commission in 1960 revealed that sixty-three firms accounted for 92 percent of total shrimp imports.⁵⁴ As late as 1965, two importers handled the output of fifteen of the nineteen producers on Mexico's west coast. It was also estimated that two importers served Mexican producers who controlled about two-thirds of the daily shrimp freezing capacity.⁵⁵ The import demand situation is also influenced by the substantial investment in the Latin American fisheries by United States firms. Again, data are not available to measure the extent to which domestic operations of these firms are dependent on foreign supplies of raw shrimp, but integration of the domestic and foreign operations cannot be ignored in any consideration of import demand.

⁵⁴United States Congress, House of Representatives, Committee on Ways and Means, Tariff Treatment of Shrimp Imports, op. cit., p. 578.

⁵⁵"Directory of Mexican Shrimp Producers" Fish Boat, X (June, 1965), p. 41-42.

Elasticity of Import Demand

The effect of price and/or trade policy changes on the volume of shrimp imports depends on the elasticity of demand for imports. Statistical estimation of the elasticity of demand for imports is subject to a number of limitations, including those mentioned earlier in relation to demand functions.⁵⁶ The statistical difficulties are compounded by a lack of the necessary price data. In the case of shrimp, international prices must be estimated from customs declarations which only approximate the value added up to that stage of distribution. Attempts by the author to use regression equations in estimating import elasticity did not yield significant results. One interesting aspect of the regression results was that wholesale price or an index of wholesale price was not correlated with the quantity of imports in a significant way. A major difficulty in using this technique appears to be that supply and demand shifts for imported shrimp over the past ten years have tended to obscure price elasticities in the data.

An indirect method of estimating import demand elasticities used by Stern resulted in the following general equation:⁵⁷

⁵⁶For a thorough discussion of the problem see Guy H. Orcutt, "Measurement of Price Elasticities in International Trade," Review of Economics and Statistics, XXXII (May, 1950), pp. 117-132.

⁵⁷Robert M. Stern, "The U.S. Tariff and the Efficiency of the U.S. Economy," American Economic Review Papers and Proceedings, LIV (May, 1964), pp. 450-470.

$$\text{elasticity of import demand} = \frac{\text{domestic consumption}}{\text{imports}} \times \text{elasticity of demand} + \frac{\text{domestic supply}}{\text{imports}} \times \text{elasticity of domestic supply}$$

If the earlier domestic elasticity assumptions are realistic and the relevant market shares are given, then an application of the formula suggests that import demand elasticity would be less than that of domestic demand. If the consumer demand elasticity of $-.41$ is accepted then import demand would be less than unity when computed on an annual basis for recent years when imports claimed over 50 percent of the market. This conclusion is consistent with the finding of de Vires in his classic study of price elasticities of 176 commodities:

Commodities whose imports supply a relatively large share of the U.S. market tend to have relatively low elasticities of import demand; while commodities whose imports supply a relatively small share of the market have a relatively high elasticity.⁵⁸

This generalization cannot confirm the expectation that the demand for imports is less elastic than demand for domestic production; however, it does tend to support such a conclusion.

Summary of Supply and Demand

Measurement techniques for supply and demand elasticities still leave much to be desired. Estimates based on statistical analysis given above suggest that consumer demand is inelastic while producer demand is

⁵⁸Barend A. de Vires, "Price Elasticities of Demand for Individual Commodities Imported into the United States," International Monetary Fund Staff Papers, I (April, 1951), p. 413.

elastic. At the same time substitutability and market imperfections suggest that import demand would be less than demand at the domestic producer level. Supply elasticities could not be derived by statistical methods, but on an a priori basis the assumption of inelastic supply functions for both domestic and imported shrimp seems reasonable. These assumptions, although subject to the limitations noted earlier, are used in the following discussions of trade policy.

Some Effects of a Non-restrictive Trade Policy 1957-1968

Shrimp imports increased by 186 percent during the 1957-1968 period. Details of this rapid growth were presented earlier in the chapter. Attention is now directed toward the question of the role of trade policy in this growth. The question cannot be answered directly, since a number of factors other than trade policy have contributed to the inflow of shrimp products.

Continued increases in imports suggest that trade policy has been at least a permissive factor; that is, trade policy did not influence entry of goods in such a manner as to make the imports unprofitable. Since no duties were imposed, the entry of imports was not penalized. Additionally, the policy did not penalize an investor or operator who decided on a foreign base for his shrimping operations. For example, the Barbados fleet is essentially

a United States fleet operating from a foreign base.⁵⁹ Products of these foreign operations enter the United States as imports at no relative disadvantage except for transportation costs. A tariff or other restrictive policy would place these imports at a disadvantage and influence the decision as to whether or not a fleet should be established abroad.

Influence of Imports on the Domestic Shrimp Fishery

Although a number of areas of influence might be relevant, consideration in this section is limited to the influence of trade policy on exvessel price, output, income, employment, and investment in the domestic industry. It is necessary to attempt to distinguish the response of the industry to other factors, such as abundance of shrimp and cost changes, from the response to the flow of imports.

There are several possible outcomes that might be considered with respect to the influence of unrestricted imports on domestic prices and output. First, shifts in demand may occur to offset the increase in supply, so that prices need not change. On the other hand, if the change in supply exceeds the growth in domestic demand, output and price would be expected to decline. Although supply and demand functions for particular years are not known, it may be useful to examine the relationship of prices and

⁵⁹Richard S. Croker, op. cit., pp. 101-102.

quantities exchanged in the market during the period under study.⁶⁰

The twelve years are divided into three categories as follows: years in which exvessel prices declined, years in which they advanced, and years in which exvessel prices remained stable except for normal seasonal fluctuations. Three years (1959, 1963, 1967) fall into the first category of declining prices. Common characteristics may be found among these three years. In each year the total quantity of shrimp available in the market increased substantially over the preceding year. Since the short run supply function for shrimp is assumed to be inelastic, the price change would be primarily a result of the shift in supply created by an unusual abundance of shrimp in the fishery plus any change in demand. In each case the increase in the quantity of shrimp was in excess of 50 million pounds as indicated earlier in Table I. In two of the three years most of the new shrimp entering the market was provided from domestic landings. The percentages were 68 and 80 for 1963 and 1967 respectively. Imports provided 65 percent of new shrimp in 1959. Frozen stocks were generally higher during these

⁶⁰ Charles H. Lyles, Historical Statistics: Shrimp Fishery, op. cit., p. 19; United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 21; and unpublished monthly apparent consumption data provided by the Bureau of Commercial Fisheries.

three years and did not decline seasonally as expected. These observations suggest that an annual increase of about 50 million pounds was too great for the market to absorb without falling prices. There is at least one observable difference in price behavior among these three years. In 1959, when imports accounted for the major share of the increased availability of shrimp, prices declined steadily from January throughout the year. On the other hand, when domestic landings provided most of the increase in 1963 and 1967, prices fell during the second half of the year as unusually heavy landings were realized. Although no conclusive finding is warranted based on this observation, the above would suggest that unusually high imports at the end of 1958 and throughout 1959 did precipitate a price decline which was reinforced by the increase in domestic landings. Another salient fact about the 1959 and 1967 situations is that prices of large size count shrimp, which are highly represented in imports, declined more sharply during the earlier year while they remained strong during the later year. This also suggests a relatively more important role for imports in the 1959 price decline.

Five years may be grouped as periods when exvessel prices generally increased. These include 1961, 1962, 1964, 1966, and 1968. One of these, 1961, fails to fit the general pattern described below largely because of the fact that 1959 and 1960 were years of substantial accumulations in frozen stocks. Record frozen stocks in January, 1960, were

halved by mid-year, but reached new highs before the end of the season. For the remaining four years in this category the annual increase in the availability of shrimp ranged from 2.5 to 11.7 million pounds. Exvessel prices advanced based on these relatively small increases over preceding years. Domestic landing decreased in all these years except 1962, which was well below 1960 levels, so that the small increases came from imports and frozen stocks.

Four years fall into the classification of general stable prices: 1957, 1958, 1960, and 1965. In this group 1957 does not follow the general pattern, probably because it also followed several years in which landings had been unusually large. During the other three years the change in availability fluctuated between 18 and 25 million pounds, which was sold without causing prices to decline significantly. The increase in volume during these four years is near the annual growth in consumption forecasted by the Bureau of Commercial Fisheries on the basis of population and past consumption trends.⁶¹ The above relationship suggests that increments in supply of approximately 20 million pounds leave current market prices relatively unchanged except for seasonal fluctuations. Imports provided about 50 percent of the increase in available shrimp during these years. It

⁶¹United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 19.

should not be assumed that stable prices are always desirable. For example, 1960 prices were stable, but at depressed levels.

It is not possible to show conclusively that imports displaced domestic production. From the data it cannot be determined whether landings were low because of a scarcity of shrimp in the grounds, low prices, or high imports. It would appear, however, that imports played a more important role in the 1959 price decline than in later years.

Income and Employment

To the extent that the above reasoning is valid the effect of imports would be reflected in the short run, in price rather than output. A longer run result might be a reduction in the number of fishermen participating in the shrimp fishery, but it is not clear that this would substantially alter output. Data are available for an examination of the impact of price changes and resource availability on income over a two year period.⁶² These data represent only the early period of this study, but have the advantage of including 1959.

In the Osterbind and Pantier study, revenue, cost, and profit data are given for a selected group of Gulf shrimp vessels. This vessel sample is divided into two groups on the basis of quantity of shrimp caught: vessels with high

⁶²Carter C. Osterbind and Robert A. Pantier, op. cit., pp. 89-105.

landings (exceeding 60,000 pounds in 1959) and those with medium landings (less than 60,000 pounds in the same year). Table XVI summarizes some of the results of the Osterbind research. A comparison of yearly figures reveals the inverse movement of average price and quantity landed for very successful vessels. Profits increased on a slightly lower total revenue as a result of larger volume in 1959. Osterbind and Pantier concluded that prices as low as those existing in 1959 would have been unprofitable based on 1958 landings.⁶³

Fishermen who were less successful, i.e., those in Table XVI with medium volume landings, were unable to compensate completely for the decline in gross receipts by increasing volume. The result was an average loss of 5.6 percent in 1959. Profits and losses were not evenly distributed among the vessels. Those craft having lower landings in either category tended to encounter smaller profits or larger losses. In both of the landing categories above, crew share declined in 1959.⁶⁴ The sample referred to above represents only the most successful vessels from the standpoint of landings volume in 1959, which implies that many vessels were in a position of having relatively lower landings.

⁶³Ibid., p. 83.

⁶⁴Ibid., p. 105.

TABLE XVI

AVERAGE RECEIPTS, COSTS, AND PROFITS FOR A SELECTED SAMPLE OF SHRIMP VESSELS

	HIGH VOLUME LANDINGS 1958		MEDIUM VOLUME LANDINGS 1958		MEDIUM VOLUME LANDINGS 1959			
	\$	¢	\$	¢	\$	¢		
Gross Receipts	\$41,249	100.0	\$39,510	100.0	\$32,247	100.0	\$25,039	100.0
Total Variable Costs	22,473	54.5	22,898	58.0	14,115	50.0	13,439	53.7
Total Fixed Costs	17,948	43.5	15,561	39.4	13,675	43.4	12,205	48.7
Net Profits	828	2.0	1,042	2.6	1,574	4.9	1,397	(-5.6)
Average Price Per Pound	.69		.514		.706		.518	
Average Landings in Pounds	59,809		76,825					

Compiled from data found in Carter C. Osterbind and Robert A. Pantier, op. cit., pp. 89-105.

Excepting very successful boats with high landings to offset the price decline, the sampled fishermen experienced a reduction in revenue, profit, and crew share, according to the study.⁶⁵ To the extent that imports influenced the price decline they resulted in lower earning for domestic fishermen. The above results regarding the influence of price on incomes of fishermen and revenue of vessels are consistent with those reflected in Figures 9 and 10, which show the relatively more important influence of price on value added.

A consistent relationship among number of fishermen employed, landings, and price is not apparent from an examination of the available annual employment statistics. Inability to identify boat and vessel revenues makes it⁶⁶ impossible to associate employment with annual earnings fluctuations caused by price or quantity changes. Therefore, the role of commercial policy in this area cannot be evaluated for the period in question.

Investment in Shrimp Trawling Craft

The empirical problems associated with identifying the causes of fluctuations in numbers of shrimp boats and vessels was discussed earlier in the chapter. The influence of imports on these fluctuations would be expected to operate

⁶⁵Ibid., p. 105.

⁶⁶See Tables VIII and IX above.

through the price and revenue relationships which make investment more or less profitable. In addition to these supply factors the cost side of the question must also be considered. Imports per se would have only an indirect effect on costs of craft and equipment. It is possible that the demand for vessels to be used abroad might contribute to any increase in the cost of shrimp trawling vessels, but these secondary effects are not considered here.

Foreign Investment in the Development of the Latin American Shrimp Export Industry

The United States consumes about one-third of the world production of shrimp while it produces about one-fifth to one-sixth.⁶⁷ This means that the United States must look abroad to a source of supply. On the other hand, producing countries find the United States a ready market for their products once they have developed a fishing industry to exploit their shrimp resources. Table XVII shows the product weight and value of shrimp imports from Latin America. During the late 1950's and early 1960's there was some concern that Latin American Shrimp fisheries

⁶⁷ Food and Agriculture Organization of the United Nations, Yearbook of Fishery Statistics, Volume XXIV (Rome: Food and Agriculture Organization of the United Nations, 1968), p. c-62; and United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 18.

would develop and keep the United States market depressed. The data in Table XVII indicate that the rapid growth experienced by North American exporters in the 1950's became stabilized during the 1960's near a volume of 100 million pounds. An increased amount of processing along with volume accounts for the increase in value. South American countries were relative late-comers to the United States market, although they exhibited substantial development in the 1960's. With the exception of Venezuela and a part of the Surinam fleet, these shrimp fisheries were developed primarily to export to the United States.⁶⁸ Mexico developed its shrimp trade with Japan to a volume of 16 million pounds in 1967. Future potential for growth of these exports is uncertain.

The relative importance of Latin American shrimp sales to the United States is shown in Table XVIII. It can be seen that shrimp exports provide significant dollar earnings for several of the countries, especially Mexico, French Guiana, Barbados, Guyana, and Panama. Since exports to the United States represent about 40 percent of the overall foreign trade of these countries, shrimp may be somewhat less important than indicated by the above figures.

United States investors have participated extensively in the development of the Latin American shrimp export

⁶⁸Richard S. Croker, op. cit., p. 5.

TABLE XVII

UNITED STATES SHRIMP IMPORTS FROM LATIN AMERICA*

(Product weight - million pounds)

Year	North# America	South* America	Value (dollars)
1957	57.5	5.4	\$31,235,194
1958	67.9	6.8	36,509,056
1959	81.7	9.9	42,999,306
1960	90.8	11.8	50,146,016
1961	100.6	13.9	67,949,605
1962	101.6	20.1	88,595,570
1963	100.4	23.5	84,296,608
1964	99.9	25.8	89,566,663
1965	86.3	34.8	86,431,070
1966	99.5	26.9	NA
1967	104.5	33.2	NA
1968	94.5	36.4	NA

*Compiled from Charles H. Lyles, Historical Fishery Statistics: Shrimp Fishery, op. cit., pp. 27-31; and United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, op. cit., p. 14.

#North America includes imports from all countries north of Panama which includes the area of Central America, the Caribbean islands, and other islands in the South Atlantic region. South America includes imports from countries located on the South American continent proper south of Panama.

TABLE XVIII

RELATIVE IMPORTANCE OF SHRIMP IN LATIN AMERICAN
EXPORTS TO THE UNITED STATES, 1965

Country	Value of Shrimp Exports (dollars)	Total Exports to U.S. (million dollars)	Shrimp as a Per Cent of Total Exports to U. S.
Barbados	\$11,657,040	\$ 5	33.1
Colombia	1,365,961	227	0.5
Costa Rica	868,267	57	1.5
Ecuador	4,427,865	106	4.2
French Guiana	2,598,850	3	86.6
Trinidad & Tobago	137,467	142	.1
Guigana	6,127,566	21	29.2
Honduras	1,068,551	72	1.5
Mexico	43,064,055	638	6.8
Nicaragua	2,295,919	36	6.4
Panama	7,419,368	60	12.3
Surinam	1,111,964	333	3.3
Venezuela	7,976,410	1,018	.8
El Salvador	33,581,662	48	7.5
Guatemala	961,956	67	1.4
Total	84,644,941	2,583	3.3

United Nations Statistical Yearbook, 1967 (New York:
United Nations, 1968).

industry. The extent of this investment is indicated in Table XIX. Data in the table are crude estimates of physical plant and equipment owned or partially owned by United States investors. Dollar values of the investment cannot be determined because of age, diversity, and condition of the physical plants involved. Even with these limitations the large role played by United States capital is apparent. Technical assistance accompanied the direct investment in most cases, since the local workers were not qualified shrimp fishermen. Foreign managers from the United States or Mexico were frequently hired to operate the freezing plants. Less skilled workers were usually hired from the local population. As experience has been gained, local cities and investors have increasingly replaced foreigners.⁶⁹ Countries with Pacific coast shrimp fisheries are indicated by an asterisk in Table XIX. United States investors have financed freezing plants in these countries, but have generally avoided investing in vessels on the Pacific coast.

Investors argued during the 1961 tariff hearings that they had undertaken investment in Latin America's shrimp fishery under the assumption that the non-restrictive policy would continue and furthermore that a change in

⁶⁹Ibid., p. 6.

TABLE XIX

ESTIMATES OF UNITED STATES DIRECT INVESTMENT IN THE
LATIN AMERICAN SHRIMP FISHING INDUSTRY

Country	Year	Operating Vessels	United States Ownership	Freezers Operating	United States Ownership or Interest
Barbados	1966	32	32	1	0
Colombia*	1966	62	15	5	1 (50%)
Costa Rica*	1965	52	0	3	2
Ecuador*	1965	68	0	5	2
Trinidad	1966	63	40	2	0
Guyana	1966	81	75	2	1
Honduras*	1965	30	15	3	1
Nicaragua*	1965	60 (approx.)	U.S. & Mexican charter vessels	2	2
Panama	1965	200 (approx.)	14	6	1
Surinam	1965	25	15	1	1
Venezuela	1965	69	15	7	0
El Salvador	1965	67	14	2	1
French Guiana	1966	67	67	2	2

Richard S. Croker, *op. cit.*, *et passim*.

*Country has a Pacific Coast shrimp fishery.

Note: Estimates above were based on an interpretation of Croker's work. Errors are the responsibility of this author.

this policy would cause the ventures to fail.⁷⁰ The reason for the potential failure of the investments most often cited was that restriction would stop the flow of shrimp into the United States, and without an alternative market the shrimp could not be profitably distributed.⁷¹ For firms with domestic and foreign facilities this could entail a conflict of interest.

The Latin American shrimp fishing and processing industry has developed primarily to sell in the United States. Development of this import source appears to have been advantageous from the viewpoint of the United States consumer and desirable from the viewpoint of the nations involved.

⁷⁰Ibid., pp. 109-113.

⁷¹Statement by E. S. Schweig, Hearing before the Committee on Ways and Means, House of Representatives, op. cit., pp. 110-111.

CHAPTER IV

ALTERNATIVE TRADE POLICIES

This portion of the study deals with restrictive trade policies and the contribution they could make, if any, toward reaching desired objectives for the shrimp fishery. It is not the purpose of this chapter to develop and recommend a particular policy but rather to contemplate the effects of hypothetical restrictive policy measures on factors related to the shrimp fishery. The supply and demand framework used in Chapter III is continued here and expanded to include departures from a free market with respect to foreign trade. In order to examine the influence of alternative trade policies this chapter is divided into three major sections. First, objectives are listed which have some applicability to the shrimp fishing industry. Secondly, theoretical aspects of trade restriction based on supply and demand relationships for a single commodity are presented. Finally, estimates of the effects of restrictive policies on shrimp imports, domestic shrimp fishery, Latin American shrimp fisheries, and related topics are presented.

In making estimates of the effects of restrictive policies, assumptions are made concerning supply and demand

elasticities. These assumptions are supported by available data and a priori reasoning in Chapter III. These assumptions appear to the author to be reasonable. Other assumptions are selected in some cases to demonstrate the importance of the assumption on the estimate. Since imports of shrimp products have had a duty free status in the United States, additional assumptions concerning tariffs and quotas are necessary. In order to further simplify the discussion, secondary effects of imports, such as employment increases as a result of spending foreign exchange in the importing country, are ignored.

The existence of a public policy implies that objectives exist and that the policy influences events in such a manner as to approach the objective. The classical economic objective of a free trade policy is to increase the real output of a given quantity of resources by obtaining foreign goods with the expenditure of fewer resources than when the goods are produced at home. This goal emphasizes economic efficiency and freedom of operation of market and pricing mechanisms. Such a policy also encourages specialization according to comparative advantage, which indirectly facilitates economic growth to the extent that trade increases. In a competitive market a free trade policy is consumer oriented in that buyers have access to products produced more

efficiently in another location.¹ Advocates of a free trade policy sometimes fail to point out that individuals and firms in an industry whose product is displaced by imports may be injured by the policy.

A restrictive policy with respect to imports also implies that certain objectives have been chosen. Objectives in the case of the protectionist are seldom so explicitly stated as the free trade goal above, because it is likely that they will vary from one industry or product to another. Returning to the commodity under study, what objectives may give rise to demands for a restrictive policy with respect to shrimp imports? Two categories of objectives are suggested: biologic and economic. Biological objectives include conservation of the natural resource and maximization of the sustainable yield from a replenishable resource. That is, each year fishermen would take only those quantities of shrimp which would result in the largest long run physical yield from the fishery. The role for trade policy in this area appears to depend on the level of effort being expended, as indicated in Chapter II.

Economic objectives include maintenance of income and employment in the industry by reserving the home market for domestic producers. Maintenance of price is a key part of

¹Mordechai E. Kreinin, Alternative Commercial Policies-Their Effect on the American Economy (East Lansing: Michigan State University, 1967), pp. 13-14.

this policy, since price and income are closely related. Another objective may be to provide for progress and development in the industry. Policies designed to reach the latter goal may cause some units of the industry to become unprofitable or unable to compete, which introduces the much larger problem of providing alternate economic opportunities for those who are displaced. From a broader social point of view it may be desirable to maximize the rent from utilization of the resource, since this results in increased efficiency in the fishery, that is, it prevents the excessive application of labor and capital to the industry as described by the model in Chapter II. Again, the direct role for trade policy in the maximization of rent depends on the effort being expended. It is suggested by the model represented by Figure 5 that a tariff may, in fact, worsen the situation by encouraging more investment.

Other policy objectives sometimes enter the discussion of trade policy, but fit neither of the categories mentioned. For example, protection of consumer interests through quality inspections may be the means of excluding imports. On the other hand, protection of consumer interests might also include keeping prices at a reasonable level. Another objective might be to insure that everyone who wants to earn, or has customarily earned, his livelihood by fishing is permitted to continue to do so. Practically, this may mean the same thing as maintenance of employment in the fishery.

Those familiar with fishery management discussions will recognize that some of these objectives have been borrowed from the management area. This appears to be a field of inquiry where trade policy has some applicability, in that a rational management policy must take imports into consideration--especially in the case of a shared fishery, where other nations have access to the ocean's resources.

Some incompatibility exists among the objectives cited above; for example, the fisherman's and consumer's concept of a reasonable price may be at variance. Also, Chapter II illustrated that maximization of yield and maximization of rent generally are not consistent goals.

Which objectives are likely to be emphasized if a restrictive policy is to prevail? It would appear that some concept of fishermen's welfare with respect to income, employment, and return on investment would be weighted heavily in a decision to undertake a restrictive policy. Many of the attempts to impose the import restrictions mentioned in Chapters I and II were initiated and supported by fishermen's representatives, which indicates that they have a special interest in this policy.

H. Scott Gordon observed in a review of the Canadian fish trawling industry that "fishermen who can have no property right in the resource may attempt to acquire a kind of property right in the market for fish through restrictions on fishing methods different from their own and by means of

tariffs² The important share of the market for shrimp held by imports suggests that the above statement has some validity here. Fishermen, who find landings and revenue beyond their control, may seek to increase the value of landings by reserving the market for their own output.

There are several conditions which may arise in the shrimp industry which might initiate demands for restrictive policy. For example, during the late 1950's the shrimp trawling industry faced declining prices, value added per fisherman, value added per craft, and profits during a period when physical output per fisherman or craft was increasing. At the same time, the number of fishermen and craft was increasing rapidly, as indicated earlier in Chapter III. Imports were increasing their market share at a much higher rate than the early 1950's.³ Regardless of factors bringing about the price and earnings decline, from the fishermen's viewpoint a reduction of imports appeared to be a desirable solution. A recurrence of the conditions encountered in 1957-1960 has not been experienced, but the conditions described above are of the type which could be expected to

²H. Scott Gordon, "Obstacles to Agreement on Control in the Fishing Industry," The Economics of Fisheries (Rome: Food and Agriculture Organization of the United Nations, 1957).

³Charles H. Lyles, Historical Statistics: Shrimp Fishery, Bureau of Commercial Fisheries, United States Department of the Interior (Washington: Government Printing Office, 1967), pp. 6-8, 25-31.

bring imports under criticism again.

From the fisherman's point of view it is the decline in price and revenue which is important.⁴ These declines can occur not only because of excessive imports in the market but also as a result either of abundant domestic landings or perhaps an increase in the number of fishing units. Identification of the source of the price decline is extremely important in deliberations concerning trade restrictions, lest trade policy be used as a means of subsidizing an inefficient, over-expanded industry at home.

Theory of Trade Restriction for a Single Commodity

The following survey of supply and demand theory applied to trade restriction for a single commodity in a partial equilibrium setting is taken from International Trade Theory and Economic Policy by Jaroslav Vanek.⁵ Review of the theory at this point will facilitate an orderly discussion of the effects of policies later in the chapter.

The general case of the imposition of an ad valorem tariff is presented in Figure 12. The market demand curve

⁴National Shrimp Congress, Incorporated, Brief on Behalf of the Domestic Shrimp Industry, Reprinted in Tariff Treatment of Shrimp Imports, op. cit., pp. 47-48. United States Congress, House of Representatives, Committee on Ways and Means, Tariff Treatment of Shrimp Imports, Hearing before the Committee, 87th Congress, 1st Session, on H.R. 6168, August 8, 1961 (Washington: Government Printing Office, 1961), p. 1.

⁵Jaroslav Vanek, International Trade Theory and Economic Policy (Homewood; Richard D. Irwin, Inc., 1962), pp. 284-287.

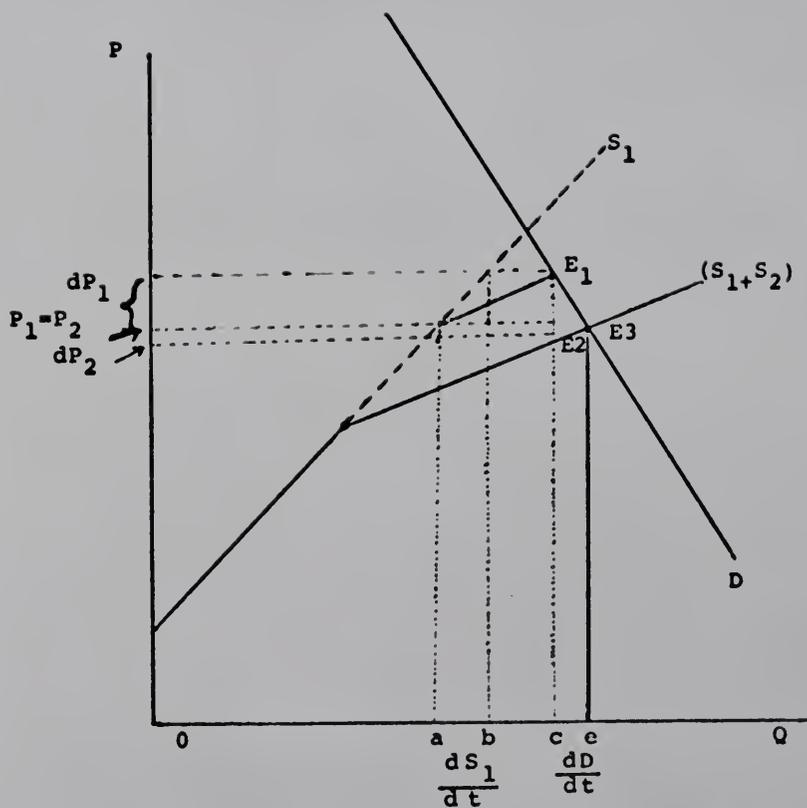


FIGURE 12

MARKET EFFECTS OF A TARIFF

for the product is represented by DD. Market supply is obtained by adding domestic and foreign supply to form S_1 plus S_2 . An ad valorem tariff of $t \cdot 100$ per cent, where t is defined as $E_1 E_2 / c E_2$, is levied on the product. Given the relationships indicated in the figure, the tariff would cause domestic price to rise by dP_1 and foreign price to decline by dP_2 . Prior to imposition of the tariff, domestic and foreign prices were equal at E_3 .⁶

The effect of the tariff on domestic price depends on the tariff rate, initial equilibrium price and quantity, and supply and demand elasticities. Given information about these items, the effect of the tariff on domestic price can be approximated by the relation

$$dP_1 = P \cdot t \cdot A$$

$$\text{where } A = \frac{-s_2 Q_2}{Q_1 (d-s_1) + Q_2 (d-s_2)}$$

Q_1 and Q_2 represent domestic and foreign quantities in the initial equilibrium position, while s_1 and s_2 are the corresponding supply elasticities. The domestic elasticity of demand is indicated by d . The value of A reflects the incidence of the tariff on domestic and foreign prices in the vicinity of equilibrium based on the given elasticities. Domestic price would be expected to increase with the levying of a tariff unless the elasticity of demand were infinite.

⁶Ibid., p. 284.

⁷Ibid., pp. 285-286.

The change in foreign price would be equal to the difference between the domestic price change and the tariff. This change can be approximated by

$$dP_2 = P \cdot t (A-1)$$

The complete adjustment falls on the foreign producer if s_1 is infinite. On the other hand, if s_2 is infinite foreign price will not change with imposition of the tariff.⁸

Additional relationships derived from the theory include

$$dD = d \cdot t \cdot D \cdot A.$$

which reflects the change in quantity demanded. Changes in domestic and foreign quantities supplied are indicated by

$$dQ_1 = s_1 \cdot t \cdot Q_1 \cdot A$$

and

$$dQ_2 = s_2 \cdot t \cdot Q_2 (A-1)$$

respectively. The latter is termed the import effect and can also be represented by

$$dQ_2 = dD - dQ_1.⁹$$

The model above can be used to analyze a specific tariff by shifting the supply curve imputable to imports upward by the amount of the tariff. The relations described apply to the specific as well as the ad valorem tariff.¹⁰

⁸Ibid., p. 286.

⁹Ibid., p. 286.

¹⁰Ibid., p. 287.

The analysis of Figure 12 can also be used to show the effect of a quota placed on imports of the commodity. If E_3 represents the initial equilibrium with imports of ac , a quota of bc will be necessary to raise the domestic price to the new, competitive equilibrium E_1 . In the absence of collusion or government license fees, importers will receive increased revenues equal to the tariff proceeds indicated earlier. Other effects of the quota will be similar to those of a tariff.¹¹

Effects of Alternative Trade Policies

The impact of a restrictive trade policy would be felt in the areas of imports, domestic production, foreign investment, balance of payments, and domestic economic activity associated with the affected industry. This portion of the chapter deals with possible effects of a restrictive trade policy for shrimp in each of the areas mentioned.

Effects of a Restrictive Policy on United States Imports

The theoretical treatment of a tariff given above indicates that the direct effect on United States imports would depend on the amount of the tariff, domestic and foreign supply elasticities, domestic demand, and the market shares of domestic and foreign producers. Although the above model presents the tariff in a static, partial equilibrium setting, it is nevertheless useful in a

¹¹Ibid., p. 288.

discussion of the response of imports to a restrictive policy.

A United States tariff on shrimp

The most frequently used restrictive measure employed by the United States is the tariff. An ad valorem tariff of 35 percent on imported shrimp is hypothesized at this point in order to evaluate its influence on the shrimp fishing industry. This particular rate is chosen in order to make comparisons with the conclusions of the participants in the 1961 tariff hearings.¹²

The 1961 tariff proposal was different in that it also provided for a duty free quota and a 35 cents per pound specific duty if the price should fall below one dollar per pound.¹³ Theoretical treatment of the two tariffs would be similar with a built-in price differential of at least 35 cents, which would increase for prices in excess of one dollar. The effect of a quota will be discussed independently. While a particular tariff rate has been chosen for illustrative purposes, the handling of the problem is general in order that alternative rates may be examined.

¹²United States Congress, House of Representatives, Committee on Ways and Means, Tariff Treatment of Shrimp Imports, Hearings before the Committee, 87th Congress, 1st Session, on H.R. 6186, August 8, 1961 (Washington: Government Printing Office, 1961).

¹³Ibid., p. 1.

How would the imposition of the hypothetical tariff affect United States import prices? The model above suggests that the full price adjustment will fall on the foreign producer if the elasticity of domestic supply is infinite. On the other hand, the full adjustment will be on domestic prices if foreign supply is infinitely elastic.¹⁴ These supply and demand elasticities are examined in Chapter III, where it is concluded that a reasonable assumption in the absence of empirical verification is that domestic and import supplies are relatively inelastic, in which case the tariff would not be expected to fall entirely on either domestic or foreign price, but would be distributed between them. Using the relations indicated in the above model it appears that for a given demand and market share, the lower the elasticities of supply the greater the portion of the tariff which will be reflected in domestic prices relative to foreign prices. Demand also exerts some influence over the relative change in domestic and import prices resulting from a tariff. The value of Λ in the model is larger if demand is inelastic, and consequently import price adjustment is smaller, other things remaining constant. If demand is elastic the share of the tariff reflected in import prices is greater than in the case where demand is inelastic. Finally, the import market share contributes to the determination of the distribution of the tariff between

¹⁴Jaroslav Vanek, op. cit., p. 284.

domestic and foreign prices. The model suggests that a larger share of the market supplied by imports, other things remaining equal, will result in a smaller value for A and lead to more of the tariff being reflected in import prices.

Utilizing the assumptions of Chapter III, supply appears to be somewhat inelastic for domestic and foreign producers. Demand functions estimated at the consumer level indicate an inelastic demand with a value in the neighborhood of $-.4$. Although such a finding might be explained, the quasi-luxury nature of the product suggests a more elastic demand. A demand function computed for data representing transactions nearer the domestic fishing level resulted in a demand elasticity of -2.45 . Market shares shifted in favor of imports during the first five years of the study, but stabilized at about 45 percent to 55 percent in favor of imports in the later years.¹⁵ The following approximations are based on the assumption that these values are reasonably realistic in the neighborhood of equilibrium.

The first set of assumptions uses the demand elasticity of $.4$ and import and domestic supply elasticities of $.8$. The values for supply elasticities are arbitrarily selected to conform to the assumption of inelastic supply made earlier. Application of these data to the theoretical relation above ($dp = P \cdot t \cdot A$) suggests that in recent years about 62 percent of the tariff would have been reflected in foreign prices,

¹⁵See Figure 11.

while domestic price might have been expected to increase approximately 38 percent. For example, if pre-tariff domestic prices were one dollar per pound and the tariff rate 35 percent, import prices would have been reduced by 22 cents per pound. Since the value of the elasticity of supply is not known, several alternatives are considered. Supply elasticities of $-.4$, indicating more inelastic supply functions result in about 71 percent of the tariff being reflected in foreign prices. Even if, contrary to the assumption made in Chapter III, supply were elastic with a value of 2.0 , foreign prices would absorb about 52 percent of any tariff. So long as demand is rather inelastic, over half of a tariff would be reflected in foreign price changes even though the leasticity of supply varies from inelastic to elastic.

Up to this time the elasticity of demand of $-.4$ has been used in estimating the manner in which a tariff would affect import prices. What differences might be encountered if the elasticity of demand were closer to the -2.45 suggested in Chapter III? In general, the more elastic the demand function, with supply elasticity given, the larger the share of the tariff reflected in import prices. Assuming the elasticity of demand to be -2.5 and elasticity of supply $.8$ results in an estimate of 86 percent of the tariff being absorbed by foreign prices. Additional combinations were tried using the general equations above. The results suggest that approximately 52 to 92 percent of a tariff would be reflected in a lower price received by foreign producers.

The range can be narrowed to about 62 to 92 percent if the elastic supply assumption is not evaluated in combination with an inelastic demand. Table XX lists some of the possible combinations used in the above computations.

Based on the above estimates, if the 35 percent ad valorem tariff were levied at a time when the market price (import price and domestic market level equivalent) was one dollar, the foreign price would be expected to fall by an amount in the range of 18 to 32 cents. One would also expect that a fall in price would result in a smaller quantity of imports being supplied to the market. The effect on foreign supply or import effect is given in the equation:¹⁶

$$dQ_2 = s_2 \cdot t \cdot Q_2 (A - 1)$$

Since the values of elasticity of import supply (s_2) and A are determined by earlier assumptions, the import effect is evaluated for each of the conditions used above in similar estimates of the effect of a tariff on import price. The values are only estimates, so several alternatives are presented to show the importance of the assumed values. Table XXI presents a summary of the results obtained by applying the given values to the import effect equation. An average of 1962-1968 imports from Latin America was used to represent Q_2 , but annual values could be applied, since $A-1$, s_2 , and t combine to represent a percentage change in imports from an assumed equilibrium point.

¹⁶Jaroslav Vanek, op. cit., p. 286.

TABLE XX

ESTIMATES OF TARIFF REFLECTED IN IMPORT AND DOMESTIC PRICES FOR SELECTED SUPPLY AND DEMAND ELASTICITIES

Elasticity of Demand (d)	Elasticity of Supply (s_1 and s_2)	Percent of Tariff Reflected in Foreign Price (A-1)	Percent of Tariff Reflected in Domestic Price (A)
- .4	.4	-.71	.29
- .4	.8	-.62	.38
- .4	2.0	-.52	.48
-2.5	.4	-.92	.08
-2.5	.8	-.86	.14
-2.5	2.0	-.75	.25

The results in Table XXI indicate rather wide fluctuations in imports depending on the elasticity assumptions. As expected, inelastic supply and demand functions result in the smallest quantity change, while more elastic functions indicate a large adjustment in the quantity of imports. It can also be observed that the volume of imports is more sensitive to changes in import supply elasticity than demand elasticity.

The range of the estimates can be reduced considerably if the earlier arguments favoring an assumption of inelastic supply are accepted. The new range involves a reduction of imports of 12.6 to 30.6 million pounds as a result of tariff implementation.

TABLE XXI

ESTIMATES OF THE IMPORT EFFECT OF A 35 PERCENT
AD VALOREM TARIFF ON SHRIMP UNDER VARYING CONDITIONS

Imports from Latin American (million pounds product weight) (Q ₂)*	Per cent of Tariff Reflected in Foreign Price (A-1)	Elasticity of Import Supply (S ₂)	Demand Elasticity (d)	Change in Quantity of Imports (million pounds product weight) (dQ ₂)
127	-.71	.4	-.4	-12.6
127	-.62	.8	-.4	-22.1
127	-.52	2.0	-.4	-46.3
127	-.92	.4	-2.5	-16.4
127	-.86	.8	-2.5	-30.6
127	-.75	2.0	-2.5	-66.8

*Average of 1962-1968 imports from Latin America. United States Bureau of Commercial Fisheries, Shellfish Situation and Outlook, S-12 (March, 1969), p. 14.

In summary, under the applied assumptions and static, partial equilibrium conditions a 35 percent ad valorem tariff on shrimp is predicted to cause foreign price to decline by 52 to 92 percent of the dollar value of the tariff. Under the conditions assumed above, import volume would be expected to decline by something in the range of 12.6 to 30.6 million pounds. Results listed in Table XX also suggest that domestic prices would be expected to reflect increases of roughly 8 to 48 percent of the tariff value.

While the Tariff Commission did not make quantitative projections of the effects of the 1961 tariff proposal, the general predictions with respect to direction of movement of prices and volume of imports are consistent with the above estimates. That is, generally higher domestic prices, a declining volume of imports, and a shifting of a part of the tariff to foreign producers were predicted.¹⁷

Constructed import values presented by the National Shrimp Congress, advocates of the tariff, implied an increase in import prices equivalent to the full amount of the tariff.¹⁸ These values were then compared with domestic prices to indicate that domestic producers would have a

¹⁷United States Congress, House of Representatives, Committee on Ways and Means, Tariff Treatment of Shrimp Imports, Hearing before the Committee, 87th Congress, 1st Session, on H.R. 6168, August 8, 1961 (Washington: Government Printing Office, 1961), pp. 125, 127-129.

¹⁸National Shrimp Congress, Incorporated, op. cit., pp. 78, 83-84.

substantial price advantage. But if the higher foreign price were to shift part of that demand to domestic producers, then domestic price increases would be anticipated. In the case of frozen headless shrimp this would mean that less than half of the tariff would be reflected in domestic price increases, depending on the extent of the shifting of demand.¹⁹

The effects of a tariff suggested in Tables XX and XXI are only approximations which, it can easily be seen, depend heavily on the assumptions one accepts. However, these estimates will be used in the remainder of the study.

A United States quota on shrimp

The purpose of a quota is to limit directly the volume of a commodity which may be imported during a specified time period.²⁰ As discussed in Chapter II this form of restriction is rejected as a part of trade policy in the General Agreement on Tariffs and Trade, but with certain exceptions permitted.²¹ The United States has used

¹⁹Ibid., p. 78.

²⁰Leland B. Yeager and David G. Tuerck, Trade Policy and the Price System (Scranton: International Textbook Company, 1966), p. 4.

²¹General Agreement on Tariffs and Trade, Basic Instruments and Selected Documents, Volume I (Revised) (Geneva: The Contracting Parties to the General Agreement on Tariffs and Trade, 1955), pp. 23-24.

the quota as a means of restricting imports of some items, such as stainless-steel table flatware, cattle, some fish products, whiskbrooms, peanuts, and butter. A complete listing would include a number of other products.²²

There are some similarities in the effects of a quota and a tariff. If the quota were set precisely so that it limited imports to the same extent as a tariff, prices would be expected to increase for domestic producers and fall for foreign suppliers (in the absence of collusion). However, given the same volume of imports, the revenue which before had accrued to the government would now go to importers. One means for removing these quota profits would be for the government to sell import licenses at auction. If this were done, effects of the tariff and an equivalent quota would then be similar.²³ If imports are very price-sensitive, a lower rate of duty is needed to accomplish the same cutback of imports as a definite quota.²⁴ The opposite is true for those imports which are less sensitive to price changes, i.e., those which have inelastic supply and demand functions. One of the great difficulties in using a quota to restrict imports is that nobody knows precisely how price-sensitive import demand is and therefore what an equivalent quota

²²Leland B. Yeager and David G. Tuerck, op. cit., p. 4.

²³Jaroslav Vanek, op. cit., p. 288.

²⁴Leland B. Yeager and David G. Tuerck, op. cit., p. 53.

would be.²⁵ Analysis of a quota depends on the same kinds of assumptions made earlier in the analysis of a tariff.

In practice, the lack of information about the price elasticities of an imported good is sometimes ignored and an arbitrary base accepted for the quota. Such was apparently the case for shrimp when the recommended quota for shrimp was not to exceed "the total quantity of shrimps entered or withdrawn from warehouse for consumption in the calendar year 1960."²⁶ This quota was recommended in combination with a tariff, which suggests that the objective was to arrest the declining market share of domestic producers.

The analysis of a tariff-quota combination would be similar to that made above for a tariff, except that a duty free situation would prevail below specified values. This does not take into account the problems associated with administration of the quota after foreign supply exceeded the duty free amount. The 1961 proposal would have divided the quota among suppliers based on their 1960 exports to the United States. New suppliers apparently would have been excluded.²⁷ Such actions are inconsistent with the non-discrimination provisions of Article XIII of GATT.²⁸

²⁵Ibid., p. 49.

²⁶United States Congress, House of Representatives, Committee on Ways and Means, op. cit., p. 1.

²⁷Ibid., p. 1.

²⁸General Agreement on Tariffs and Trade, op. cit., p. 27.

Since the foreign supplies of shrimp continued to expand rapidly after 1960, one might conclude that had the tariff quota been imposed there would have been considerably competition for the quotas and that the tariff provision would have come into play as a limiting factor in controlling imports.

Response of foreign suppliers

Based on the estimates in Tables XX and XXI it would appear that the hypothetical United States tariff would bring about substantial reductions in prices received and quantities sold in the United States market. Because costs for the foreign producers are not available, it is impossible to determine whether or not a given tariff would make all these shrimping operations for the United States market unprofitable. The inelastic supply of imports assumption made earlier appears reasonable because most of Latin America's exports are sold in the United States market, and a diversion to other world markets would be very unlikely.²⁹ This reasoning leads to the conclusion that rather substantial price cuts would be made in order to continue selling the shrimp.

²⁹Richard S. Croker, The Shrimp Industry of Central America, the Caribbean Sea, and Northern South America, Bureau of Commercial Fisheries, United States Department of the Interior, Foreign Fisheries Leaflet 74 (Washington: Government Printing Office, 1967), pp. 5, 15, 25, 29, 37, 39, 46, 47.

Without some data to indicate the efficiency of foreign suppliers, one can only speculate on the adjustment which might occur in the foreign fisheries. If shrimp trawling utilizing modern technology could not provide the shrimp as cheaply as the coastal canoe fishermen then there might be a regression to more primitive, lower cost, and less efficient techniques. On the other hand, shrimp fishermen might respond by increasing the capital intensity of their operations in order to reduce costs, thus enabling them to compete at the artificially low price created by a tariff. In any case, to the extent that the quantities indicated in Table XXI cannot be directed abroad or sold profitably in domestic markets, it would appear that unemployment and a reduction in shrimp fishing effort would occur.

Effects of a Restrictive Policy on the Domestic Shrimp Industry

Attention is now turned from a consideration of the impact of a restrictive policy on imports and import prices to the effect of similar policies on the domestic shrimp fishing industry. The static, partial equilibrium analysis is continued, using the model described at the beginning of this chapter. Some aspects of the fishery model described in Chapter II are also needed in evaluating the possible domestic adjustment to hypothetical policies. It was suggested at the beginning of this chapter that the establishment of a policy meant that objectives had been accepted,

either explicitly or implicitly. In the following analysis several possible objectives are discussed in order to reflect the policy differences involved.

The chief objective of the 1961 tariff-quota proposal was to "restore stability to the market."³⁰ Another purpose was to free price from abnormal pressures of "excessive imports and cold storage holdings."³¹ Finally, it was suggested that expansion of consumption was desirable and would be facilitated by the restrictive policy.³² The meaning of "restore stability to the market" is not completely clear, but further reading of testimony related to the proposal leads one to believe that price stability, or at least higher prices resulting from a restricted flow of shrimp into the markets, was the desired goal. This appears to be a reasonable interpretation in view of the previously discussed deterioration in prices during 1959-1960. Another possible interpretation is that a stable market share was desired, although this is not stated.

In the case of the shrimp fisherman, whose costs and revenues depend not only on quantity of shrimp caught but also on the price received, it is difficult to think of the problem of restriction in terms of stabilizing only volume or price. Indeed, for the whole market stabilization of one

³⁰National Shrimp Congress, Incorporated, op. cit., p. 76.

³¹Ibid., p. 76.

³²Ibid., p. 77.

variable is dependent on what is happening to the other. However, from the individual fisherman's viewpoint the market price may be taken as given since he is only one of many sellers, which makes it appear that his success at catching shrimp determines his receipts. For the individual fisherman, stabilization of market price might appear to be an independent objective.

In the following discussion of hypothetical policies it is assumed that the objective is to stabilize revenue at a profitable level for the industry as a whole. The problems of volume and price stabilization will be included in the discussion of the above objective. Secondly, restrictive policies and their relation to achieving an efficient allocation of resources to the industry are considered.

A United States tariff

For purposes of discussion the assumed imposition of a 35 per cent ad valorem tariff is continued. This makes it possible to use the values computed for Table XX, since that portion of the tariff not reflected in foreign prices is observed in higher domestic price, i.e., that part of the tariff not passed along to importers and foreign producers once a new equilibrium is established will be passed along to consumers. It should be remembered that the model does not deal with long run considerations, such as a possible shift in consumption patterns which may offset the tariff.

Approximations of the influence of the hypothetical tariff under varying supply and demand conditions are

presented in Table XXII. The share of the tariff reflected in domestic price increases appears to depend heavily on the elasticity of demand. However, the ability of the domestic industry to respond to the higher price depends on the elasticity of supply. In no case is the expansion of domestic production adequate to offset the reduced imports indicated in Table XXI. Theoretically, the industry would expand production from about 1 to 32 million pounds in response to higher domestic prices permitted by the tariff. It is under an elastic supply condition that the substantially increased volume occurs, but in Chapter III it was suggested that such an elastic condition is unlikely to exist in fact.

Under all of the conditions assumed in the construction of Table XXII, there would be an increase in total revenue received by the domestic producers, the result of the increased domestic price and the somewhat larger output. In the short run the fishermen would increase their fishing effort as a result of the higher price in order to improve their earnings. From the short run point of view, the adjustment would appear to be complete, but the new, artificially high price also has some longer run implications. In order to make predictions about this matter, it is necessary to consider some additional adjustments which the domestic industry might make.

TABLE XXII

EFFECT OF A 35 PERCENT AD VALOREM TARIFF ON DOMESTIC PRICE, SUPPLY AND DEMAND UNDER DIFFERENT SUPPLY AND DEMAND ELASTICITIES *

Elasticity of Supply	Elasticity of Demand	Change in Domestic Price#	Change in Domestic Output (million lbs. heads off)@	Change in Quantity Demanded (million lbs. heads off)
.4	- .4	.29	3.9	- 9.0
.8	- .4	.38	10.1	-11.8
2.0	- .4	.48	32.0	-14.9
.4	-2.5	.08	1.1	-15.4
.8	-2.5	.14	3.7	-27.2
2.0	-2.5	.25	16.7	-48.6

*Computations based on equations discussed in the text.

#Expressed as a per cent of the tariff.

@Computations based on a domestic output at an initial value of 95 million pounds. This figure represents the average 1962-1968 landings of 51-and-smaller size count shrimp.

Response of the domestic shrimp industry to a tariff

From the viewpoint of domestic fishermen the imposition of a tariff would result in a larger market share for them to fill and a higher price for their shrimp. The tendency indicated in Table VIII and Figure 10 in such a situation is for the number of craft participating in the shrimp fishery to increase. Some of the conclusions of the fishing model described in Chapter II appear to be applicable at this point, but qualifications are in order. First, the model is a generalized model for a natural resource capable of reproduction. It is based on the

reasoning that more intensive harvesting of the resource causes the total weight received to be less because immature members of the species are not permitted to develop and the number of the species available for reproduction is reduced.³³ These propositions may be applicable to the shrimp fishery, but empirical verification of these assumptions is not available. Secondly, the selling price is assumed to be constant in the model. Such is unlikely to be the case for shrimp, but if only a small range near the existing level of output for one season is considered, the tendency within the industry might be predicted from the model. Finally, constant costs are assumed with respect to additional effort. Again the applicability of this condition depends largely on the range of effort and output to be considered. By restricting the range to be considered, the assumption may be acceptable. Granted that these questions exist for the shrimp fishery, as well as for some other fisheries, the fishing model is used to evaluate the qualitative response to the hypothetical tariff.³⁴

The application of a tariff is predicted to increase the price received by the domestic producer and, at least

³³Vernon L. Smith, "Economics of Production from Natural Resources," American Economic Review, LVIII (June, 1968), pp.

³⁴James P. Crutchfield and Giulio Pontecorvo, The Pacific Salmon Fisheries (Washington: Resources for the Future, The Johns Hopkins Press, 1969), pp. 104-105.

temporarily, make the industry more profitable. Fishermen would respond immediately by increasing effort expended in fishing the stock of shrimp more intensively. In addition, if the tariff is expected to be permanent, new entrants would be encouraged to buy craft in order to take advantage of the higher prices. This means that a larger number of craft would now share the revenues from the fishery. Individual craft catch is highly dependent on the natural abundance of shrimp in a given time period, so that a larger number of vessels would not assure a proportionately larger harvest of shrimp. The conclusion indicated by the model in Figures 4 and 5 is that, even if price does not fall, the rent or unusually high profit would be lost because an excessive number of firms would enter the fishery.

These conclusions support the contention of the El Salvador Fishermen's Association that a tariff-quota would have permitted only a temporary recovery by the United States shrimp trawling fleet in the early 1960's.³⁵ The freedom of entry nature of the industry would force the gains to be distributed to increasing numbers until the fishermen were again receiving only minimum returns, which would keep them fishing.

³⁵International Economic Consultants, Incorporated, Brief of El Salvador Fishermen's Association (Washington: International Economic Consultants, 1960), p. 146. Reprinted in United States Congress, House of Representatives, Committee on Ways and Means, op. cit., pp. 133-171.

To return to the initial objective, that of stabilizing revenue, it would appear that the tariff would be only a short run benefit for improving revenue for the existing shrimping units. If time for increased investment in shrimp trawling craft is permitted, revenues per craft would, on average, be expected to fall.

The annual fluctuations in the availability of shrimp were described in Chapter III and the impact of these fluctuations on productivity and prices shown in Figure 10. Variations of this type indicate a shifting of the supply curve which was not fully accounted for in the supply and demand model used in estimating the quantitative effects of the tariff. Once the industry adjusted to higher prices, its operations would still be subjected to varying stocks of shrimp on the shrimp grounds, so that there is little reason to believe that a tariff would insure stable revenues or continuing profitability. However, it would give a wider range over which the vessel could remain profitable, at least until costs had increased in proportion to price. Similarly, a shifting of the demand function is not fully accounted for in the supply and demand model. An outward shifting of the demand function, such as that indicated earlier by the rise in per capita consumption, would tend to offset some of the tendencies just discussed and at least temporarily restore profits. Dynamic factors causing changes in the supply and demand relationships would continue to influence revenue levels.

Another dimension is added to the adjustment process by the extension of United States fishing interest into Latin American countries. In 1966 about 15 million pounds (8 percent) of shrimp imports were taken by United States flag vessels fishing off the coasts of Central and South America. Much of these catches was landed and frozen at United States owned and controlled plants in Guyana, French Guiana, Barbados, and Trinidad. Additional quantities were landed in Surinam and Colombia.³⁶ Other indicators of the extent of foreign operations and investment were presented in Chapter III. Trade policy alone is not sufficient to explain the total flow of investment to other areas; however, with respect to a single commodity it is possible that trade policy can be the determining influence.³⁷ If the hypothetical tariff above were applied to imports, the catch of United States vessels landed abroad would be subjected to a factor which would substantially increase the cost of the product by the time it reaches the United States market.

There are several alternatives facing the fisherman or firm having these foreign interests. First, operations could continue if a portion of the tariff could be absorbed by the operator in much the same fashion as a foreign

³⁶United States Bureau of Commercial Fisheries, Fishery Statistics of the United States, Statistical Digest Number 60 (1966), p. 276.

³⁷Leland B. Yeager and David G. Tuerck, op. cit., pp. 171-173.

producer. This may involve either a reduction in profits, if they are substantial relative to the tariff, or a reduction in costs. Inability to adjust to the tariff might mean exit from the industry. Another alternative would be to transport the shrimp directly to the United States without landing them in a foreign port. Shrimp caught in international waters could be handled in the same manner as the present catch from the Bay of Campeche.³⁸ Since some of the shrimp are taken in waters controlled by other nations, it would be necessary to have a license arrangement to permit trawling in these waters. Such licenses are currently used in Honduras to permit return of the shrimp to the United States without landing, but with payment of the appropriate export taxes.³⁹ If the tariff threatened the local shrimp trawling industry, foreign governments might be willing to accept a licensing arrangement in order to maintain revenues from this source. The economies involved in operating vessels in distant waters, with or without accompanying freezer ships, have not been documented in recent years, so that the profitability and extent of such operations can only be surmised. It would seem reasonable to expect that the decision making process would involve a comparison of increased costs from this kind of operation with the

³⁸United States Tariff Commission, op. cit., pp. 14-16.

³⁹Richard S. Croker, op. cit., p. 66.

potential loss of revenue associated with the tariff, balanced of course with preservation requirements and, in the case of vertically integrated firms, processing costs.

Still another alternative would be for the United States flag vessels to return to domestic ports and compete in the local fishing grounds. In the absence of legal entry into foreign waters, this would appear to be a likely alternative for the vessel operator. However, from the standpoint of the fisherman who had encouraged the tariff, this might be an undesirable alternative, since he would now have to compete with more vessels for his catch and presumably would receive a smaller share of total revenue.

Information regarding costs of various types of operations is not available, so that a thorough analysis of the alternatives facing domestic operators with foreign based activities cannot be made. At a minimum it would seem that, depending on the height of the tariff, foreign operations would become less profitable and hence less attractive. If a profitable mode of operations could be established to return shrimp caught off Latin American coasts to United States ports, a part of the impact of the tariff on quantities available in the market would be negated. That is, shrimp diverted from foreign ports to United States ports would become a part of domestic supply and tend to relieve the upward pressure on domestic prices indicated in Table XXII.

A quota and the domestic shrimp industry

Earlier the similarities and differences between a tariff and a quota were discussed. So long as the same information is available for the application of equivalent measures, the effects of quotas and tariffs in the market are similar. A precise quota, which barred as much of imports as the hypothetical tariff, would call forth a response similar to that described in the preceding pages.

A fundamental difference between the tariff and a quota is that a tariff does not absolutely limit importation of a commodity while a quota does. Once the quota is established a change in supply or demand does not necessarily result in adjustment in imported quantities in the markets, but the tariff can conceivably permit additional imports if prices advance to profitable levels. These shifts in supply and demand were not fully accounted for in the partial equilibrium model used in obtaining the approximations in Tables XX, XXI, and XXII. Some of the implications of admitting these changes to the discussion will be considered below.

Effects of Tariffs and Quotas on the Latin American Shrimp Trawling Industry

A discussion of the impact of a restrictive trade policy on Latin American shrimpers must be limited to hypotheses based on the reduced quantity of exports to the United States market. Local cost and price data are not available for making predictions concerning the number of

craft which would be forced to leave the industry. The inelastic supply curve implies that in the short run the shrimp would be provided to the market over a relatively broad price range. This does not say what would happen in the longer run when decisions would have to be made on whether or not to reinvest in shrimp trawlers. In addition to the above problem there is a lack of information regarding the pricing of shrimp as it moves from the foreign fishermen through the importer. Whether or not a part of the tariff could be absorbed by the various levels of distributors cannot be answered. Vertically integrated firms offer another difficulty in analyzing the importance of the tariff or quota, since the need for shrimp to support processing factories may permit some shifting of the incidence away from the fisherman.

The only conclusion which appears warranted on the basis of the analysis in the preceding part of this chapter is that an effective tariff or quota would result in a reduction of imports which would in turn cause a reduction in fishing effort in terms of employment and investment in the foreign fisheries. The dominant position of the United States as a market for Latin American shrimp exports would make it difficult to obtain other outlets, at least in a short time period, in order to maintain the fishery.

Other Policy Measures

Although tariffs and quotas are the chief means of implementing United States trade policy, there are some

measures which may achieve somewhat similar ends, at least from the domestic industry's viewpoint. For example, non-quantitative restrictions may be applied in the form of inspections and processing requirements. The potential of inspections to influence the level of imports is illustrated in the discussion of the Wholesome Fish Act of 1968.⁴⁰ The Senate bill (S.2958) provided for continuous inspection of fish similar to that required of other meats. It was pointed out by members of the domestic fishing and processing industries that the strict requirements would place them at a disadvantage relative to foreign producers and importers; therefore, they desired extension of the bill to cover imported fish products. Representatives of foreign fishing interests emphasized the discriminatory nature of inspection and environmental requirements. Some countries had acceptable inspection systems which met the proposed standards for United States firms, but others, such as Mexico, had none.⁴¹ Underdeveloped countries in particular objected to the extension of the bill to cover imports because they tended to be the major exporters of fishery products to the United States and also tended to lack the necessary inspection facilities. The above bill was rejected by the Senate

⁴⁰Congressional Quarterly Almanac, Volume XXIV, (Washington: Congressional Quarterly Service, 1968), pp. 606-607.

⁴¹Ibid., p. 674.

Commerce Subcommittee on the Consumer in 1968; however, it points out the problems involved in inspections.⁴²

The full impact of an inspection of shrimp, such as that suggested above, cannot be explored on the basis of available information. Mexico, the largest single supplier of imported shrimp, would be faced with the alternative of either undertaking the necessary expenditures to meet export requirements or finding alternative markets. The short run effects of the inspection requirement would be like the effects of a prohibitive tariff or an unrealistically small quota. On the other hand, failure to extend the requirements to cover imports might lead to an increase in imports and encourage foreign landings and processing, even by United States firms.

Subsidies

An alternative to restricting imports through tariffs or quotas is to permit duty free imports and to compensate the domestic industry if it is injured. This solution has been suggested in connection with the defense and infant industry arguments for protection.⁴³ The latter application is interesting because it is implied that the tariff or subsidy is temporary; that is, conditions render it impossible for domestic firms to compete in the present time

⁴²Ibid., p. 674.

⁴³Leland B. Yeager and David G. Tuerck, op. cit., pp. 128-220.

period, but the disadvantage is expected to disappear in the future as a result of other factors. It was suggested in Chapter III that similar conditions appear to develop periodically in the shrimp fishery, so that subsidies may offer a workable alternative to trade restriction.

A thorough analysis of subsidies for the shrimp trawling industry is a task of much greater scope than can be undertaken in this chapter. It is, however, a study which should be undertaken in the future in order that alternatives may be evaluated with respect to meeting as many of the policy objectives as possible.

Three subsidy programs available to domestic fishermen are described in Chapter II. The purpose of these subsidies is to promote progress and development in the fishery. All of these programs, however, are related to vessel improvement or construction, and are neither of the type nor the magnitude to be significant in stabilizing earnings during experiences similar to that of 1959-1960. In fact, during periods of low vessel productivity, the desirability of subsidizing entry of additional craft is questionable. A thorough study of fishing subsidies should attempt to resolve such inconsistencies.

Efficacy of Restrictive Trade Policies

In this chapter some of the potential effects of restrictive trade policy measures have been presented. While these results are tentative, they may be used in obtaining a better understanding of the role of trade policy

in relation to selected objectives for the shrimp fishing industry. The remainder of this section is devoted to a summary of the ability of restrictive policies to achieve desired ends.

Several possible policy objectives were suggested earlier. Four objectives are selected for further discussion here. One is to maintain a reasonable income level for shrimp fishermen, including a return to the vessel owner. The second is to encourage development and progress in the shrimp fishery in terms of employment and investment. The third is to provide adequate supplies of shrimp to consumers at reasonable prices. The fourth is to encourage the development of Latin American countries' shrimp resources as a part of the larger objective of assisting in their economic development.

One of the more frequently mentioned objectives of import restriction programs is to permit persons engaged in domestic production of the commodity to earn a reasonable income. Reasonable income means an income level close to that in available alternative occupations. The problem for shrimpers appears to lie in maintaining price during periods when market supply is too great. If a price decline is not offset by the increased volume of landings, then income declines for shrimp fishermen as a group. Figure 9 indicates that exvessel price declines usually result in decreases in value added per fisherman, which in turn result in a fall in

average earnings because of the lay system.⁴⁴ Table XX above indicates that exclusion of a part of the market supply under varied supply and demand elasticities results in higher prices. To the extent that a particular policy excludes an excessive supply resulting from imports or compensates for increases in domestic supplies by excluding an equivalent quantity of imports, price can be maintained. Therefore, earnings can be maintained. In a longer time period, adjustments in the volume of imports would be necessary in order to offset changes in demand. Of course, increased demand would result in a desirable improvement in fishermen's remuneration if supplies remained relatively constant.⁴⁵

It was argued by the National Shrimp Congress that imports were the source of increased supply during 1959-1960. Application of a tariff, quota or tariff-quota in cases where the above argument is correct could accomplish the desired end of maintaining income. However, during periods of substantial expansion of domestic supply, increased restriction of imports would be necessary. The net result would be stabilization of total supply by limiting imports to compensate for natural fluctuations in domestic output.

⁴⁴See, also, National Shrimp Congress, op. cit., pp. 47-48.

⁴⁵Ibid., p. 26.

Progress and development in the shrimp industry imply the continued employment of an adequate fleet of modern craft manned by trained crews. This trend is related to the first objective, because it is maintenance of earnings at competitive levels which attracts resources to the industry. The fishing model in Chapter II indicates that a number of situations can attract new fishing units into the fishery. For example, demand shifts resulting in price increases, technological change, and tariffs can cause increases in fishing effort and in the number of craft. It is also indicated that the increased fishing incentive is eventually eliminated by the attraction of new fishing units. The old and new fishermen must share the same stock, or perhaps a smaller stock if overfishing reduces the size and volume of shrimp, which brings about a lowering of unit returns, even if relatively higher prices are maintained. To the extent that the fishing model is applicable to the shrimp fishery, it is concluded that the effect of a tariff, or other restrictive measures, on revenue and profitability in the shrimp fishery is temporary. The theoretical tendency is towards a return to a minimum earnings situation, and the disappearance of any advantage created by the tariff.

The above discussion is based on an assumption of an inelastic import supply function and disregards the case where foreign supply is expanding. Can the domestic shrimp industry continue to develop if the import supply increases as foreign fisheries are developed? This situation is

analogous to that which has existed in the groundfish market for a number of years. The import share of groundfish and ocean perch fillets increased from 59.3 percent in 1957 to 80.0 percent in 1967.⁴⁶ Bell reports that competition for lower priced Canadian imports was primarily responsible for the declining market share. The lower price was made possible by a government subsidized expansion of the fishing fleet.⁴⁷ One effect of the altered market share on the United States fleet was a 25.5 percent reduction in the number of vessels between 1951-1962.⁴⁸ A tariff of .4 cents per pound was not sufficient to offset the Canadian advantage and, therefore, did not effectively limit imports.⁴⁹ Escape clause action to prevent injury to the domestic fleet was denied three times.⁵⁰ In spite of the unfavorable position of the domestic industry, it is interesting to note that Bell does not conclude that a tariff or quota is necessary to permit recovery of the domestic industry.

⁴⁶Charles H. Lyles, Fisheries of the United States... 1967, Bureau of Commercial Fisheries, United States Department of the Interior (Washington: Government Printing Office, 1968), p. 47.

⁴⁷Frederick W. Bell, The Economics of the New England Fishing Industry: The Role of Technological Change and Government Aid (Boston: Federal Reserve Bank of Boston, 1966),

⁴⁸Ibid., p. 3.

⁴⁹Ibid., pp. 32-33.

⁵⁰Ibid., p. 4.

Instead, he suggests modernization of the fleet in order to improve its productivity.⁵¹

The shrimp trawling industry's situation is different from the New England groundfishing industry in that essentially the same or superior technology is used in the domestic fishery. Secondly, underdeveloped countries located near shrimp resources are less likely to be able to subsidize the development of fisheries in a manner similar to Canada.

A number of aid possibilities exist if increased foreign supplies threaten the domestic industry. Undoubtedly, a tariff or quota could restrict the volume of shrimp and maintain or raise market price. However, this would not assure the creation of incentive conducive to long run development of the shrimp trawling fleet.

From the consumer's viewpoint, the attainment of industry related objectives may be of little interest so long as supplies of shrimp are available. Table XXII indicates that restrictive trade policies result in higher prices for shrimp. Whether or not the higher price paid by consumers is offset by welfare gains of fishermen is an unanswerable question. In addition to increased prices, elimination of some imports may mean a reduction in the availability of the more desirable large shrimp. In a partial analysis of the type used in this study, it appears

⁵¹Ibid., p. 165.

that consumer interests are not served by trade limitation.

United States imports of shrimp from Latin America potentially influence economic development in at least two ways. First, they provide a source of foreign exchange earnings. During the 1957-1965 period, approximately \$578 million worth of shrimp was imported from Latin America.⁵² Secondly, direct investment in vessels and processing facilities in Latin America is undertaken by United States citizens. The value of this investment is unknown, but based on limited information it appears to be substantial. It is presumed that secondary benefits to other Latin American firms would result from supporting the shrimp industry.

The contribution of the shrimp trade to the Latin American economies cannot be assessed in terms of employment, income, or exchange earnings. Employment and income data for this very specialized area are not available for the countries involved. The declared import value cannot be taken as the precise value of exchange earnings available to the foreign country because of varied policies on accounting for shipping charges and the existence of vertically integrated firms. The extent to which the individual governments tap shrimp exports as a source of revenue also varies. Some countries, including Surinam and

⁵²See Table XVII.

French Guiana, do not levy export taxes.⁵³ Nicaragua and El Salvador levy export taxes of 3 and 6 cents per pound, respectively.⁵⁴ Colombia utilizes exchange controls, which in April, 1966, amounted to a 14 percent ad valorem tax.⁵⁵ Incidentally, abandonment of these export taxes would tend to offset the effect of tariffs levied by the United States.

Earlier in this chapter, a tariff or quota is predicted to reduce both imports and the incentive for United States citizens to invest in developing foreign shrimping and processing facilities. One concludes that a restrictive policy is inconsistent with the objective of assisting the Latin American countries in their development, if only this industry is considered. Evaluation of the secondary effects of a change in policy on other sectors of their economies is beyond the scope of this study. A broader analysis of the problem would examine both these secondary effects and the influence of a policy change on the balance of payments of all countries involved.

⁵³Richard S. Croker, op. cit., pp. 108; 112.

⁵⁴Ibid., p. 50.

⁵⁵Ibid., p. 50.

CHAPTER V

SUMMARY AND CONCLUSIONS

The effects of United States trade policies on domestic and certain foreign fisheries are the primary concern of this study. Throughout the development of the domestic shrimping industry and the growth of the domestic market, a duty free status for shrimp has prevailed. The domestic shrimp grounds have been exploited in an effort to keep up with the expanding demand, but an increasing dependence on imports as a source of supply has been necessary since the mid-1950's. Limited supplies of shrimp in the domestic fishing grounds and relatively untapped grounds off Latin American coasts combined to encourage United States participation in the development of these foreign fisheries. These supplies, plus imports from other areas, appear to have been adequate to meet demand.

Under the above conditions, that is, expanding demand and increasing supplies, a duty free status for shrimp products appears to have been appropriate. In one period, 1959-1960, there are some indications that imports combined with very high domestic landings to bring about a rather serious price decline which adversely affected earnings of domestic fishermen. While prices in the following years were not stable, a repetition of the 1959-1960 problem did not

occur.

The 1959 price decline and the low landings of 1961 and 1962 brought about an adjustment which resulted in a reduced number of craft participating in the fishery. By 1966 the number of vessels still had not reached the 1959 peak. Another apparent change in the industry following 1959 was the increase in the number of boats and casual fishermen relative to vessels and regular fishermen. The significance of this trend is not clear because the distribution of the catch between vessels and boats is not known. Also, increases in productivity may counter the effect of less than full time employment or of increased numbers of boats relative to vessels. Additional studies are needed before the latter problem can be resolved.

The rapidly increasing market share of imports experienced in the late 1950's tended to stabilize after 1961. However, the premium prices paid for large shrimp and the increasing volume of small shrimp in the domestic catch caused the value of import share to continue to grow. Foreign producers appear to have had some cost advantages in the production of shrimp, although data are not available to substantiate this conclusion. During most of the period under study, prices appeared to respond primarily to changes in domestic production and inventory conditions, while foreign prices seemed to fall under the umbrella of domestic prices. Lack of competition in the import sector, including the effect of vertically integrated firms, may possibly account for part of

this price behavior. The whole area of pricing and the pricing mechanism for shrimp needs further study before conclusions can be reached on the above point.

Shrimp fisheries in Latin America have been developed as a result of the United States demand for shrimp. Direct investment by the United States, sometimes in competition with domestic interests, contributed substantially to this development. A trade policy permitting duty free entry of shrimp produced by these foreign operators contributed to the profitability of undertaking the foreign investment. To the extent that the free trade policy was permissive, it encouraged spending in Latin America. The value of the investment and the significance for economic development of exchange earnings generated through shrimp exports cannot be measured.

While no effort is made to support the case for a restrictive trade policy which would preserve the growing United States market for domestic fishermen, the potential effects of such a policy are estimated. A policy requiring tariff, quota, or inspection would increase domestic prices and adversely affect the Latin American fishermen. Whether or not such a policy is desirable depends on the objective chosen. For example, if the objective is to raise incomes in the domestic trawling industry, the restrictive policy could be successful, at least temporarily. It is less likely that long run gains for domestic shrimpers would be achieved because of problems created by the freedom to enter and leave the fishery.

The relatively fixed supply of shrimp available for exploitation by the southern fleet utilizing existing equipment limits the ability of fishermen to take full advantage of a restrictive policy. It is doubtful that domestic landings could be increased substantially in a given year, even at higher prices. On the other hand, the higher prices are likely to attract additional investments in craft in order to share the available shrimp, thereby reducing landings per unit. The problem becomes more acute if a poor year for landings follows the entry of new fishing units, because it accelerates the general decline in unit landings.

Neither a restrictive nor free trade policy appears to be capable of stabilizing earnings in the shrimp fishery. If this goal is given a high priority, some alternatives, such as subsidies or regulation, should be investigated.

Some of the other major fisheries, for example, the salmon and halibut industries, have been subjected to extensive regulation in order to maintain the fishing fleets and prevent depletion of the resource.¹ The problems of the New England groundfish industry have been documented by Bell.²

¹James P. Crutchfield and Giulio Pontecorvo, The Pacific Salmon Fisheries (Washington: Resources for the Future, The Johns Hopkins Press, 1969), p. 11. James Crutchfield and Arnold Zellner, Economic Aspects of the Pacific Halibut Fishery (Fishery Industrial Research, Vol. 1, No. 1, Washington: Government Printing Office, 1962), p. 11.

²Frederick W. Bell, The Economics of the New England Fishing Industry: The Role of Technological Change and Government Aid (Boston: Federal Reserve Bank of Boston, 1966), p. 38.

In comparison to these fisheries the shrimp fishery has been rather healthy, with the exception of 1959-1960. Some of its success may be attributable to the annual, prolific nature of the shrimp. A more likely explanation probably lies in the growing demand indicated earlier. The large expanding demand for shrimp could not be met by the domestic industry from the available resources. Under such conditions a policy which permitted imports to supplement domestic production was desirable. In most periods the increases in imports and domestic production have not been so large as to exceed the growth in demand.

In retrospect, it is very likely that the difficulties experienced in 1959-1960 by the domestic industry were caused in part by the increase in imports. However, before Congressional action was completed on the industry's request for protection, the landings and price situation had altered so greatly that distributors complained of shortages and prices had regained 1957 levels. The decline in vessels which continued through the period of rising prices indicates that not only low prices, but also low landings, can create an unprofitable situation for the vessel operators. Trade policy designed to remedy the first problem would contribute little to solving the latter. From the consumer's viewpoint, the protective policy would result in even higher prices during periods of reduced domestic landings. A Tariff-quota would be somewhat more flexible in the case where domestic production is unstable, but it has the disadvantage

of exporting (to developing countries) the difficulties associated with fluctuations in output.

It is predicted in this study that a restrictive policy will cause domestic prices to rise as well as cause a decrease in the quantity of shrimp demanded. However, there is no indication that such a policy is in the long run interest of the shrimp industry. In fact, it is contradictory to some broader objectives, such as foreign economic assistance. Under existing and likely future conditions, a duty free status for shrimp appears to be compatible with most of the policy objectives evaluated above.

Limitations and Areas for Further Research

In many ways this study is premature. Although the shrimp fishery is large, it has not been studied as extensively as some of the other fisheries. Much research is needed, especially in the areas of costs, fishing effort expended, nature of operations for boats and vessels, institutional characteristics of the industry, and biological characteristics of the common shrimp species. Supply and demand functions need further refinement before they are reliable enough to use as predictors for public policy. Another area which needs documentation is that of foreign shrimping operations by domestic firms. While it is generally understood that substantial United States participation in the Latin American fisheries occurs, there is little information to indicate the extent of such operations. Reliable work in some of the

above areas would make it possible for one to address himself directly to the subject of a public policy for the shrimp fishery, whether it be trade policy, management policy, or conservative policy.

The Bureau of Commercial Fisheries has increased the quantity of extremely useful time series data relating to the shrimp fishery, but there are some additional areas in which reliable, current data would be useful to researchers. Some of these are seasonal employment, fishing effort, wages, import prices, import sizes, number of fishing enterprises, distribution patterns, and consumption patterns. The advisability of obtaining these data on a regular, short term basis is questionable because of the expense involved, but periodic data in these areas would be especially useful in studying the fisheries. In fact, the broader studies needed for making rational policy decisions are dependent on surveys in these fundamental areas.

Much additional research needs to be done in the shrimp industry. As a relatively healthy fishery it may hold some answers to the difficulties which plague other fisheries, but equally important is the possibility that the serious problems of irrational policies in other fisheries can be avoided.

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BIOGRAPHICAL SKETCH

David Adair Whitaker, Jr., was born December 19, 1936, at Pulaski, Virginia. In June, 1954 he was graduated from Pulaski High School. He was awarded a Bachelor of Science degree from Virginia Commonwealth University in 1959. From 1959 until 1963 he served as an officer of the United States Navy. Following his release from active duty, he attended Virginia Polytechnic Institute and earned the Master of Science degree with a major in economics in March, 1965. After teaching one year at Old Dominion College, he enrolled in the Graduate School of the University of Florida where he has pursued his work toward the degree of Doctor of Philosophy.

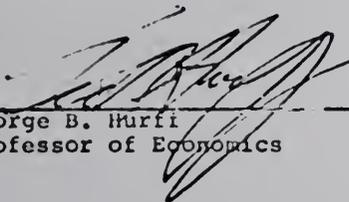
David Whitaker is married to the former Patricia Ann Barnes and is the father of two children. He is a member of Omicron Delta Epsilon.

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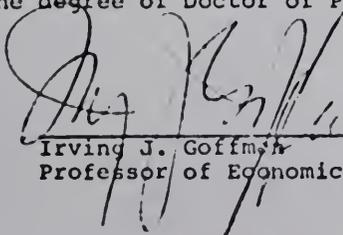
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George B. Murfi
Professor of Economics

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Irving J. Goffman
Professor of Economics

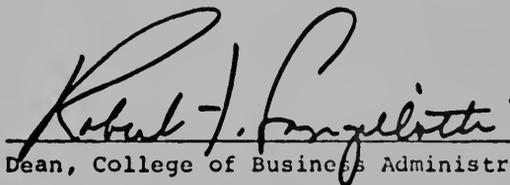
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Charles A. Matthews
Professor of Finance

This dissertation was submitted to the Dean of the College of Business Administration and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

March , 1971


Dean, College of Business Administration


Dean, Graduate School

