Costs and Returns Trends in the Gulf of Mexico Shrimp Industry, 1971-78

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The Gulf of Mexico Shrimp Industry

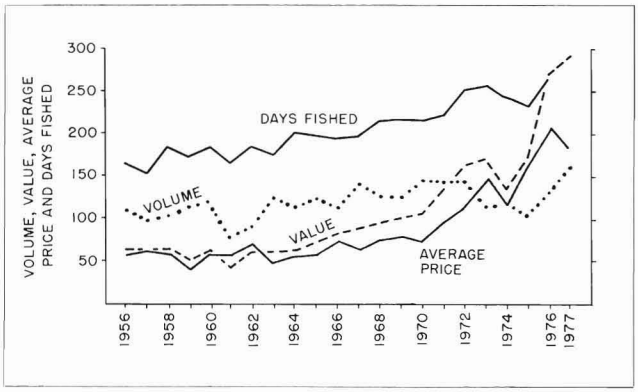
The Gulf of Mexico constitutes the most important fishing ground for United States fishermen in terms of value of catch, and shrimp fishing is the most important component of the Gulf fishery. For example, in 1977 U.S. fishermen landed over 5.1 billion pounds valued at $1,515 million, including 460 million pounds of shrimp heads on valued at $353.3 million. Of the latter figure, Gulf fishermen landed 276 million pounds (60.7 percent of the total U.S. shrimp catch in 1977) valued at $296.4 million (83.9 percent of the value of the total U.S. shrimp catch in 1977).

Total volume heads off and value of shrimp landings and average shrimp price for the Gulf of Mexico since 1956 are presented in Figure 1. These data include shrimp caught in both U.S. and Mexican waters. Mexico has instituted a 200-mile extended jurisdiction, and U.S. vessels are being phased out of Mexican waters by 1980. However, the effect of this on future landings by U.S. fishermen in the Gulf may not be severe, since recent research has determined that since 1956, U.S. landings from Mexican waters have been declining, while landings from U.S. waters have been in a general upward trend (Griffin, 1977). Specifically, annual U.S. landings from Mexican waters averaged about 22 million pounds from 1956 through 1960, but less than 10 million pounds from 1970 through 1975. Also, the proportion of U.S. Gulf landings coming from Mexican waters has never been high, and has represented only 6 or 7 percent in recent years.

As can be noted in Figure 1, both value of catch and average shrimp price have been highly variable, but the trends are upward. The days fished line provides an interesting basis for interyear comparisons (a day fished is 24 hours of fishing time). In 1959, for example, about 176,000 days fished produced total landings of about 115 million pounds. In 1973, landings were about the same, but the days fished exceeded 255,000. Also, since average size and power of vessels have increased during recent years, actual pressure on the fishery is even greater than the increase in nominal fishing days would indicate (Griffin et al., 1977).

Figure 1 also indicates the long term consistency of the Gulf fishery in producing shrimp. Landings have fallen significantly below 100 million pounds only twice, in 1961 and 1962. Research results indicate that variability from year to year in volume is highly correlated with environmental conditions in the estuaries when shrimp are young, and not from overfishing (Griffin et al., 1976). This basic dependability of the resource has made it possible for the Gulf shrimp fleets to weather the economic difficulties caused by periodic fluctuations in prices and input costs.

Figure 1.—Total U.S. Gulf of Mexico shrimp landings: Volume (million pounds), value (million dollars), average price (cents/pound), and days fished (thousands), 1956-77.



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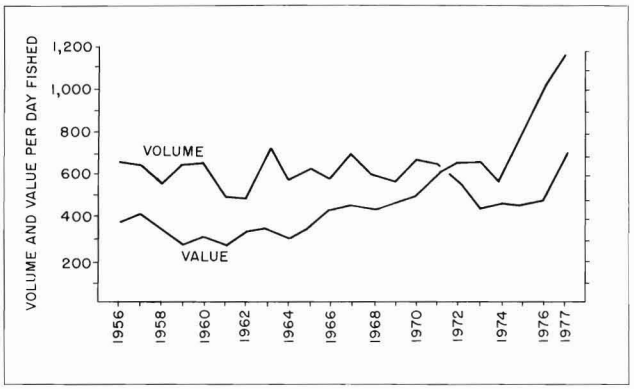

Figure 2.—Volume (pounds) and nominal value (dollars) of shrimp catch per day fished, 1956-77 (1977 values are estimated).

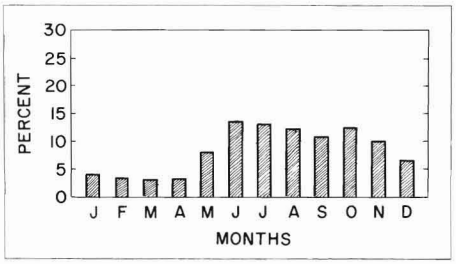

Figure 3.—Percent of annual pounds landed by months for all shrimp from all areas in the Gulf of Mexico, 1963-71. Source: Griffin et al. (1974).

Effects on fishermen of the trends represented in Figure 1 are reflected in Figure 2. The dashed line represents average value of catch per day fished, by year, for the Gulf shrimp fleet; the solid line shows average volume of catch in pounds per day fished. In spite of the increase in relative power and size of vessels, there has been little real change in average volume. However, average value shows a definite upward trend. Where the lines cross, in 1972, average price of shrimp exceeded $1 per pound for the first time.

Seasonal Variations in Catch

Seasonality is an important aspect of the Gulf shrimp fishery, particularly when investment decisions and financing arrangements are being considered. Figure 3 indicates for the Gulf as a whole the approximate seasonality of shrimp landings. From this, it is clear that the months from January to May typically do not provide particularly economical fishing conditions. Less than 15 percent of the annual catch is typically landed during the 4 months ending in April. Gulf fishermen are generally unable to turn from shrimping to other fishing activities during these periods due to the lack of a viable market for alternative species of fish or shellfish. Hence, operating losses are usually incurred during the period, with a substantial effect on profitability and clear implications for scheduling of financial obligations.

It should be noted that for those vessels that may fish primarily for pink shrimp in Florida waters, the seasonality is somewhat reversed, with peak landings in the period from December through May. Brown and white shrimp are predominant in Gulf landings, however. Hence the overall seasonality pattern is not substantially affected by pink shrimp landings.

Report Objectives

The objectives of this report are to: 1) Describe briefly the magnitude and past performance of the Gulf of Mexico shrimp industry; 2) describe recent financial performance of an "average" Gulf shrimp vessel, in terms of costs and returns and basic investment analyses; and 3) summarize data and analyses and discuss implications.

Data Description

The analyses presented in this report essentially represent a synthesis of the results of a series of economic studies of the Gulf shrimp fishery undertaken during recent years by Griffin (1977) and others (Griffin et al., 1974; Lacewell et al., 1974; Wardlaw and Griffin, 1974; Blomo and Griffin, 1978). The costs and returns financial data upon which these analyses are based were gathered through personal contact by researchers with shrimp vessel owners and/or captains operating out of ports in Florida, Mississippi, and Texas. Sample size for data collection varied from year to year. Surveys were undertaken to accumulate primary data for 1971, 1973, 1974, 1975, and 1977. Where required, costs and returns data were estimated for 1972, 1976, and 1978. Some general financial information was also obtained from officials of various lending institutions which have engaged in shrimp vessel financing. For the primary data, variable cost items were divided into: Ice; fuel; nets, supplies, and groceries; repair and maintenance; crew shares; payroll taxes and other employee-related expenses; and packing charges. Variable cost data reported by the vessel owners were used.

Fixed cost items included: Insurance, depreciation, interest, and opportunity cost. Fixed charges for insurance and overhead are reported data, while charges relating directly to investment—depreciation and interest for costs and returns budgets—were calculated in nominal dollars for new vessels. Specifically, the standard formula for straight-line depreciation is $D = (I - S)/L$, where D = yearly charge for depreciation, I = new vessel price, S = salvage value, and L = depreciable life in years.

New vessel prices were estimated from cost data collected from vessel owners. Typically, owners were asked to estimate replacement cost of their

vessels. Depreciation charges were calculated using straight line depreciation, typically with 8-year depreciable life and 35 percent salvage value.

The difference in expected terminal value and book value should be specifically recognized. As noted, book salvage value was usually taken as 35 percent of original cost, based on accounting practices in use for the fishery. However, expected terminal value is generally much higher. The reason for this difference is that even in periods of minimal new vessel price escalations, most vessel owners have been able to sell or trade their vessels at the end of their holding period for values of up to 100 percent of the original cost.

Interest charges for costs and returns budgets, and interest and principle payments for cash flow budgets were calculated using 67 percent debt financing at appropriate rates of interest; for 8 years, with 12 equally amortized payments per year. These terms were found to be representative from interviews with vessel owners.

Methods Used in Analysis of Data

All costs and returns and other financial data for vessels were handled in a standardized manner. A systematic procedure was established to assimilate and tabulate the data for the various analyses (Wardlaw and Griffin, 1974). Interest rate, percent financed, number of years financed, number of loan payments per year, depreciation method, crew share agreement, rate of packing charges, payroll tax rate, discount rate, planning horizon, and object year under consideration were standardized to represent some "average" vessel. This procedure is organized in a computer program format referred to as a budget-generator. The program reports results in the form of total costs and returns budgets, unit costs and returns budgets, and projected cash-flow budgets. Basic procedures used are as follows.

Costs and Returns Budgeting

Costs and returns budgets presented in this study are similar to annual income statements, with a subsection below each showing required return to equity capital and returns to owners' labor and management. The formula used in calculating opportunity cost (required return to equity capital) is $OC = E(R)$, where OC = annual opportunity cost, E = equity, and R = required rate of return to equity capital. Opportunity cost used in this study applies to equity capital only (vessels in the samples typically represented leveraged investments), and all returns are measured with respect to the equity capital used to gain ownership of income-generating assets. In economic and financial analysis, it is important to differentiate between required return on investment and returns to owners' labor and management.

The equity requirement for investment in vessels was assumed to be a pool of liquid assets which could have been invested elsewhere. The rate of return for this pool of equity capital should be based on the rate on the next best alternative use of this capital. However, after the investment is committed the required return to equity capital must be adjusted to take into consideration the associated loss of liquidity. In general, the more liquid an investment, the less the financial risk associated with it (Hopkin et al., 1973). In other words, since a loss of liquidity occurs after the purchase of a shrimp vessel, a financial "risk premium" must be added to the rate of return on an annual basis for the next best alternative use for the equity capital. The "risk premium" is somewhat arbitrary in that each vessel owner is in a unique situation and each has different risk-return preferences and investment alternatives. The risk premium was estimated at various levels between 1.1 and 2.0 percent for the different studies reflected in this report. Hence, required rate of return in each of the analyses drawn upon for this report is made up of a base rate, usually determined by the yield on Baa corporate bonds, plus the financial risk premium (Wardlaw and Griffin, 1974).

There are other types of risk, which reflect elements of uncertainty for the firm arising from other than purely financial considerations, such as market conditions, weather, environmental factors, etc. In this study, such business risk is assumed to exist but no attempt is made to quantify it.

Returns to owners' labor and management are simply excess returns over the fixed and variable costs. No absolute requirements were applied here, although each vessel owner must evaluate that item in terms of his own abilities.

Cash Flow Budgeting

A pro forma cash flow statement provides a means of projecting the timing and magnitude of cash inflows and outflows for the business over a given period of time (Hopkin et al., 1973). It identifies those periods that may exhibit a shortage of cash, and indicates needs for securing additional cash. The pro forma cash flow also helps identify those periods which exhibit an excess of cash above projected needs, thereby indicating opportunities for other investment (including early loan retirement) to best utilize that excess. Cash flow projections are presented for specific periods on both monthly and annual bases, and illustrate the demands on cash during a typical calendar year and over a planning horizon of 8 years.

Investment Analysis

Investigating the feasibility of any investment alternative is a very subjective undertaking. Each vessel owner must set those standards of performance for the investment which are most meaningful in terms of his own situation. However, without some set of established criteria for evaluation, no basis for decision would exist. For this study, two methods of discrimination were established: 1) Internal rate of return to original equity capital, and 2) payback period. For one analysis, net present value (NPV, or the net value in present dollars of the expected future income stream, using required rate of return as the discount rate) was applied.

Internal Rate of Return Criterion

Internal rate of return to equity capital analysis is a standard tool used to

evaluate investments, and is a measure of the time value of cash flows. The internal rate of return to equity is the discount rate necessary to set the sum of the present values of the net cash inflows per period equal to the original equity requirement (Hopkin et al., 1973). The formula used to calculate internal rate of return to equity is

$$I = \sum_{n=1}^{N} P_n(1+d)^{-n},$$

where I = initial investment (equity requirements), N = planning horizon in years, P_n = net cash inflow for a period n, d = discount rate which equates initial investment and present value of net cash inflows, or internal rate of return (IRR).

Payback Period

The payback period of an investment with respect to the equity requirement is the length of time that elapses between the intial investment and that period when the accumulated flow of undiscounted net operating returns generated by the investment equals the investment.

Results

Annual Costs and Returns

The results of annual costs and returns studies undertaken for the years 1971, 1973, 1974, 1975, and 1977 are summarized in Figure 4. A breakdown of costs and a presentation of differences in sample size, shrimp price, vessel financing, and depreciation among the five samples are presented in Table 1. In each case, the object year for figuring fixed costs is the fifth year of vessel ownership.

Profits were experienced by the average vessel in 1971, 1973, and 1977. However, substantial losses were incurred in 1974 and 1975, with 1974 a particularly bad year. A review of variable costs shows that average fuel costs (in recent years the largest single cost item except for crew shares) tripled between 1971 and 1974 and doubled between 1973 and 1974 (Table 1). The increasing input prices brought about by the energy crisis, accompanied by a decrease in average ex-vessel price received for shrimp between 1973 and 1974 and the decline in Gulf wide production in 1973, 1974, and 1975 (Fig. 1), produced a disastrous financial situation for Gulf shrimp fishermen. Those who were able to weather the situation in 1974 found conditions improving, but still uncertain in 1975. Although price of shrimp increased significantly, the industry was still faced with severe adjustments to increasing prices for the goods and services necessary to operate in the industry.

One feature of the analyses reflected in Table 1 which should be brought out is that in each case, the depreciation portion of fixed costs may be too high, resulting in underestimation of profitability. The reason for this is that whereas sample vessels were depreciated to 35 or 50 percent salvage value over 8 or 10 years, in practice, vessel owners have been able to command substantially higher prices for used vessels.

Figure 4 provides a meaningful interyear comparison of "average" Gulf vessels. However, there are also variations in average financial performance between vessels of different configuration. In Table 2 the 89 Texas and

Table 1.—Average variable and fixed costs in dollars for Gulf of Mexico shrimp vessels, 50-80 feet in length, all types of construction, 1971-77.

Item	1971	1973	1974	1975	1977
Variable costs					
Ice	1,387	1,579	1,541	1,766	2,788
Fuel	6,561	9,539	18,976	19,114	20,194
Net, supplies, groceries	2,358	6,747	9,885	11,211	13,131
Repair & maintenance	11,708	9,593	9,337	11,643	11,143
Crew shares	19,437	23,723	26,593	32,422	43,320
Payroll taxes	388	474	1,547	1,815	257
Packing	2,411	1,899	2,428	2,905	3,852
Subtotal	44,250	53,554	70,307	80,876	94,685
Fixed costs					
Insurance	3,632	4,291	4,306	4,840	5,677
Depreciation	6,333	8,177	11,228	12,607	14,623
Overhead	0	2,415	3,201	3,073	3,194
Interest	2,256	2,611	5,604	6,984	6,880
Subtotal	12,221	17,494	24,339	27,504	30,374
Total operating costs	56,371	71,048	94,646	108,380	125,059
Vessels in sample	25	103	109	101	81
Average shrimp price ($/lb.)	1.20	1.85	1.70	2.30	2.39
New cost of vessel	77,949	100,641	138,188	155,168	179,981
Percent financed	67	67	67	67	80
Depreciable life (years)	8	8	8	8	8
Salvage value (percent)	35	35	35	35	35
Required return rate[1] (percent)	10.25	9.50	13.00	14.00	15.00

[1]Reflects a base rate, determined by bond yields, plus a financial risk premium.

Sources: Blomo and Griffin (1978); Griffin (1977); Hayenga et al. (1974); and Lacewell et al. (1974).

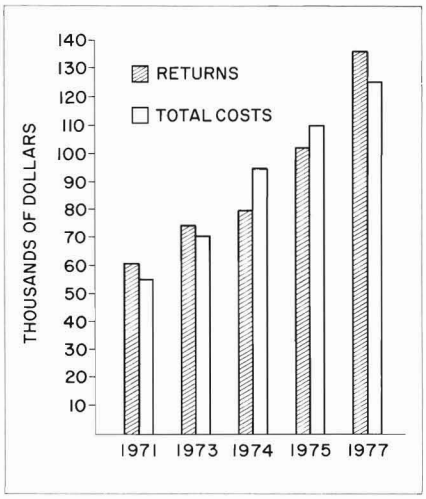

Figure 4.—Average annual costs and returns in nominal dollars for Gulf of Mexico shrimp vessels, 50-80 feet in length, all types of construction, 1971-77. Sources: Blomo and Griffin (1978); Griffin (1977); Hayenga et al. (1974); and Lacewell et al. (1974).

Table 2.—1977 average annual costs and returns for 89 Gulf of Mexico shrimp vessels in different size classes.

Item	28-35 feet	36-55 feet	56-80 feet
Receipts, shrimp sales	15,849	32,941	135,216
Variable costs			
Ice	494	1,143	2,788
Fuel	2,064	4,130	20,194
Nets, supplies, groceries	1,056	4,448	13,131
Repair & maintenance	1,407	3,312	11,143
Crew shares	11,532	11,062	43,320
Payroll expenses	843	0	257
Packing	155	1,125	3,852
Subtotal	17,551	25,220	94,685
Fixed costs			
Insurance	0	1,596	5,677
Depreciation	2,874	4,812	14,623
Overhead	145	74	3,194
Interest	1,352	2,264	6,880
Subtotal	4,371	8,746	30,374
Total operating costs	21,922	33,966	125,059
Profit or loss	−6,073	−1,025	10,157
Required return to equity	6,177	3,485	5,399
Return to owner management	−12,250	−4,510	4,758
Vessels in sample	3	5	81
Vessel value	35,377	59,228	179,981
Depreciable life (years)	8	8	8
Salvage value (percent)	35	35	35
Object year	5	5	5
Percent financed	80	80	80
Interest rate (percent)	9	9	9
Required return rate (percent)	15	15	15

Source: Data generated by Department of Agricultural Economics, Texas A&M University.

Florida vessels sampled for 1977 costs and returns information are considered in terms of hull size. Three of these vessels are between 28 and 35 feet in overall length, five are between 36 and 55 feet, and 81 are between 56 and 80 feet in length. Clearly, there are large differences in costs and returns due to size in this sample. The data reflected in Table 2 indicate that larger vessels are significantly better investments than smaller ones, based on the 1977 data.

Monthly Cash Flows

The monthly cash flow analysis for a 1971 sample of Gulf shrimp vessels is presented in Table 3. Monthly cash flow projections are important in scheduling the timing and magnitude of special expenditures and loan repayment capacity. As indicated in Table 3, the monthly flow of net returns is affected directly by the level of fishing activity; hence, positive returns are expected during peak shrimping months from June or July through December. From January to June returns above variable costs for the sample vessels are insufficient to cover the loan payment for an average vessel. Although these data reflect the performance of a small sample during one calendar year, results for data collected for the 1975 season were very similar, which indicates that this can be considered typical for the fleet. Implications for financial planning in the industry are clear.

Annual Cash Flows

In Table 4 an average annual cash flow for 81 vessels sampled for 1977 is presented. The cash flow is based on 80 percent financing for 8 years of a new 56-80 foot vessel with average cost of $179,981.

Costs and returns are assumed to continue during the period at constant 1977 levels. Since 1977 represented a respectable year in terms of profitability, this assumption results in a very favorable projected cash flow. However, initial investment is paid back and a positive cumulative cash position is achieved only in the final year of ownership. The assumption that the vessel can be sold at the end of the period at 100 percent of new cost provides a large increment to the cash position. Based on this analysis, internal rate of return is calculated a relatively high 27.79 percent.

This cash flow (Table 4) illustrates the results of an investment analysis based on a continuation of the rather favorable conditions of 1977. It is interesting to examine an annual, investment-period cash flow that considers annual variations in costs and returns. In Table 5, such an analysis is presented.

For this analysis, it is assumed that a new vessel is purchased in 1971, at average 1971 vessel cost; with 67 percent financing for 8 years and 12 equally amortized payments per year at 9 percent interest. Depreciation is straight-line over 8 years, and results are calculated using both 35 percent salvage value and 100 percent resale value in 1978. Actual results from the 1971, 1973, 1974, 1975, and 1977 vessel samples are used to estimate average costs and receipts for those years. Cost and receipt values for the missing years of 1972, 1976, and 1978 are estimated based on data from adjacent years. Results of this estimation are reasonably consistent with known conditions during those years, although overall results in the fishery in 1976 indicate that profitability for that year may be underestimated, based on an average of 1975 and 1977 costs and receipts.

The analysis shows that actual performance of an investment in a shrimp vessel is likely to be less successful than the case in Table 4 suggests. However, the actual performance with the 1971 base year still produces a positive net present value of cash flow and an acceptable internal rate of return. Of course, if the vessel can be sold at the end of the period at or near 100 percent of its original cost, the investment is very satisfactory, as shown in the final column of Table 5.

The analysis reflected in Table 5 also shows that average total cash inflow from shrimp catch doubled during the period. Likewise, total annual outflow increased by around 80 percent for an average vessel. Initial cash investment was paid back during the sixth year of vessel operation, assuming no significant cash withdrawals by ownership. Hence, payback was achieved during the operating life of the investment. However, a substantial portion of overall returns to the investment is tied to the ability to sell the vessel at the end of the period. (For example, if the average vessel in the Table 5 analysis had zero salvage value after 8 years, the net present value (1971 base) of the cash flow at a 10 percent cost of capital would have been a negative $1,240, and the internal rate of return to the investment would have been below 9 percent.)

Summary and Implications

A review of the results of the above discussion points up several key factors in the financial performance of Gulf of

Table 3.—Cash flow analysis in dollars of average returns, variable costs, and fixed payments by month for eight Gulf of Mexico shrimp vessels, 50-80 feet in length, all types of construction, 1971.

Category	Monthly summary of returns and expenses											
	Jan.	Feb.	Mar	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Production												
Pounds	2,787	2,825	2,589	2,434	3,707	4,361	7,754	8,382	6,402	6,959	5,385	4,348
Price per pound	1.08	1.10	1.20	1.28	1.35	1.07	0.95	1.14	1.25	1.39	1.47	1.54
Total receipts	3,009	3,107	3,107	3,115	3,654	4,667	7,367	9,556	8,003	9,673	7,916	6,696
Operating inputs												
Ice	78	72	107	108	99	140	261	112	114	152	139	68
Fuel	544	606	648	639	572	630	731	286	465	726	749	511
Nets	75	25	33	51	74	53	172	35	29	61	21	50
Supplies	112	64	403	262	184	122	170	97	143	235	222	71
Electricity	5	113	99	46	49	52	47	141	148	186	101	42
Repair & maintenance	979	779	1,169	1,342	814	1,266	551	878	993	929	1,223	1,021
Packing	154	136	127	59	126	151	375	451	305	487	248	264
Shares	1,053	1,087	1,087	1,090	1,279	1,633	2,578	3,345	2,801	3,386	2,772	2,344
Total	3,000	2,882	3,673	3,597	3,197	4,047	4,885	5,345	4,998	6,162	5,475	4,371
Return above variable cost	9	225	−566	−482	457	620	2,482	4,211	3,005	3,511	2,441	2,325
Accumulated returns above variable cost	9	234	−332	−814	−357	263	2,745	6,956	9,961	13,472	15,913	18,238
Fixed payments												
Insurance	308	308	308	308	308	308	308	308	308	308	308	308
Principal and interest[1]	1,062	1,062	1,062	1,062	1,062	1,062	1,062	1,062	1,062	1,062	1,062	1,062
Total	1,370	1,370	1,370	1,370	1,370	1,370	1,370	1,370	1,370	1,370	1,370	1,370
Net returns	−1,361	−1,145	−1,936	−1,852	−913	−750	1,112	2,841	1,635	2,141	1,071	955
Accumulated net returns	−1,361	−2,506	−4,442	−6,294	−7,207	−7,957	−6,845	−4,004	−2,369	−228	843	1,798

[1]Interest calculated at 8 percent
Source: Hayenga et al. (1974).

Table 4.—1977 average annual cash flow statement for 81 Gulf of Mexico shrimp vessels of 56-80 feet in length, all types of construction.

Year	0	1	2	3	4	5	6	7	8
Investment[1]	179,981	0	0	0	0	0	0	0	0
Down payment	35,997	0	0	0	0	0	0	0	0
Loan balance	143,984	131,197	117,022	101,616	84,765	66,333	46,172	24,120	0
Receipts from sales	0	135,216	135,216	135,216	135,216	135,216	135,216	135,216	135,216
Capital sales	0	0	0	0	0	0	0	0	179,981
Total cash inflow	0	135,216	135,216	135,216	135,216	135,216	135,216	135,216	315,197
Cash operating expenses[2]	0	103,556	103,556	103,556	103,556	103,556	103,556	103,556	103,556
Loan payments[1]									
Principal	0	12,877	14,085	15,406	16,851	18,432	20,161	22,052	24,121
Interest	0	12,436	11,228	9,906	8,461	6,880	5,151	3,260	1,191
Income taxes[3]									
On ordinary income	0	1,012	1,277	1,568	1,886	2,234	2,614	3,030	3,486
On recaptured depreciation[4]	0	0	0	0	0	0	0	0	25,736
Capital purchases[1]	35,997	0	0	0	0	0	0	0	0
Total cash outflow	35,997	129,881	130,146	130,436	130,754	131,102	131,482	131,898	158,090
Net cash inflow	−35,997	5,335	5,070	4,780	4,462	4,114	3,734	3,318	157,107
Cumulative position	−35,997	−30,662	−25,592	−20,812	−16,350	−12,236	−8,502	−5,184	151,923
Approximate internal rate of return (percent)									28

[1]Based on new vessel cost of $179,981; 80 percent financed for 8 years; 12 equally amortized payments per year, at 9.00 percent interest rate.
[2]Exclusive of principal and interest payments.
[3]Based on income tax rate of 22 percent.
[4]Based on sales price of $179,981
Source: Department of Agricultural Economics, Texas A&M University.

Table 5.—Estimated annual cash flow in dollars for an average 56-80 foot Gulf of Mexico shrimp vessel purchased in 1971 and operated 8 years.

	Beginning 1971	1971	1972[1]	1973	1974	1975	1976[2]	1977	1978[2]	1978[2,3]
Investment[4]	77,949	0	0	0	0	0	0	0	0	0
Down payment[4]	25,724	0	0	0	0	0	0	0	0	0
Loan balance[4]	52,225	47,415	42,192	36,522	30,366	23,683	16,427	8,549	0	0
Receipts from sales	0	60,742	67,439	74,135	78,864	101,324	118,270	135,216	118,270	118,270
Capital sales	0	0	0	0	0	0	0	0	27,282	77,949
Total cash inflow	0	60,742	67,439	74,135	78,864	101,324	118,270	135,216	145,552	196,219
Cash operating expenses[5]	0	47,882	54,071	60,260	77,814	88,789	96,172	103,556	96,172	96,172
Loan payments[4]										
Principal	0	4,810	5,223	5,670	6,156	6,683	7,256	7,878	8,549	8,549
Interest	0	4,129	3,717	3,269	2,783	2,256	1,683	1,061	386	386
Income taxes[6]										
On ordinary income	0	527	730	940	0	868	3,098	5,338	3,163	3,163
On recaptured depreciation	0	0	0	0	0	0	0	0	0	11,147
Capital purchases	25,724	0	0	0	0	0	0	0	0	0
Total cash outflow	25,724	57,348	63,741	70,139	86,753	98,596	108,209	117,833	108,270	119,417
Net cash inflow	−25,724	3,394	3,698	3,996	−7,889	2,728	10,061	17,383	37,282	76,802
Cumulative position	−25,724	−22,330	−18,632	−14,636	−22,525	−19,797	−9,736	7,647	44,929	84,449
Approximate 1971 net present value of cash flow at 10 percent required return (NPV)									11,965	29,960
Approximate internal rate of return (percent)									16	24

[1]Receipts and expenses estimated based on 1971 and 1973 average.
[2]Receipts and expenses estimated based on 1975 and 1977 average.
[3]Second 1978 column assumes vessel is sold in 1978 at 100 percent of 1971 purchase price.
[4]Financing based on 1971 average vessel price, 67 percent financed for 8 years, 12 equally amortized payments per year at 8.25 percent.
[5]Based on total costs from Table 2 (for 1971, 1973, 1974, 1975, and 1977), less depreciation and interest.
[6]Tax rate constant at 22 percent, depreciation straight-line, 8 years, 35 percent salvage value.

Mexico shrimp vessels. First, owners of these vessels are faced with highly variable cost/price relationships, which has tended to produce a "feast or famine" cycle in the industry in recent years. The fact that most vessels are tied almost entirely to only one type of fishing and one product accentuates the effects of changing prices on vessel owners. The result is a fairly high degree of short run uncertainty for producers.

A second key factor is the seasonality of production, with its implications on financing and investment. Related to seasonality is the dependence of the fishery on shrimp abundance. Although there continue to be periods of low or inconsistent abundance in the fishery, over the long term, the availability of shrimp seems to return to fairly stable levels given existing fishing pressure.

The vessel itself is a third important factor in considering financial worthiness in Gulf shrimping. Configuration, vessel financing, and resale value all have a large impact on shrimp vessel investment analysis. A related subject, which is beyond the scope of this paper but certainly of extreme importance in determining financial success for a vessel, is the quality of captain and crew.

In summary, it has been shown that profitability for Gulf shrimp vessels in recent years has been highly variable, due largely to changes in input costs; shrimp prices; landings; and the cost, financing terms, and configuration of vessels. It has also been shown that based both on the results of very good years and on the results of a number of highly varied years, ownership of a Gulf shrimp vessel can be a satisfactory investment over an extended ownership period.

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Literature Cited

Blomo, V. J., and W. L. Griffin. 1978. Costs and returns data: Florida based Gulf of Mexico shrimp trawlers. Sea Grant College Program, Tex. A&M Univ., TAMU-SG-79-604.

Griffin, W. L. 1977. Time trends in the harvesting sector of the Gulf of Mexico shrimp industry. Tex. A&M Univ., Dep. Agric. Econ., DIR 77-1, SP-2, 32 p.

———, M. L. Cross, and J. P. Nichols. 1977. Effort measurement in the heterogenous Gulf of Mexico shrimp fleet. Tex. A&M Univ., Dep. Agric. Econ., Dep. Tech. Rep. 77-5, 33 p.

———, ———, and G. W. Ryan. 1974. Seasonal and movement patterns in the Gulf of Mexico shrimp fishery. Tex. A&M Univ., Dep. Agric. Econ., Tech. Rep. 74-4.

———, R. D. Lacewell, and J. P. Nichols. 1976. Optimum effort and rent distribution in the Gulf of Mexico shrimp fishery. Am. J. Agric. Econ. 58:643-652.

Hayenga, W. A., R. D. Lacewell, and W. L. Griffin. 1974. An economic and financial analysis of Gulf of Mexico shrimp vessels. Tex. A&M Univ., Tex. Agric. Exp. Stn., Misc. Publ. 1138, 14 p.

Hopkin, J. A., P. J. Barry, and C. B. Baker. 1973. Financial management in agriculture. Interstate Printers and Publishers, Inc., Danville, Ill.

Lacewell, R. D., W. L. Griffin, J. E. Smith, and W. A. Hayenga. 1974. Estimated costs and returns for Gulf of Mexico shrimp vessels: 1971. Tex. A&M Univ., Dep. Agric. Econ., Dep. Tech. Rep. 74-1.

Wardlaw, N. J., III, and W. L. Griffin. 1974. An economic analysis of costs and returns for Gulf of Mexico shrimp vessels: 1973. Tex. A&M Univ., Tex. Agric. Exp. Stn., Dep. Tech. Rep. 74-3.