Estimated Costs, Returns, and Financial Analysis: Gulf of Mexico Shrimp Vessels

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INTRODUCTION

This report results from an economic evaluation of shrimp landings in the Gulf of Mexico based on data available from the National Marine Fisheries Service and is intended for financial institutions, shrimp vessel owners, and prospective shrimp vessel owners. The first part of this report indicates costs and returns of shrimp vessels in 1971. The second part is an investment analysis including cash flow and rate of return on a shrimp vessel entering the Gulf shrimping fleet. The last section reflects cost changes in the base 1971 data to account for cost levels experienced in early 1974.

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BUDGET ANALYSIS

Costs and returns for two shrimp vessel classifications based on length of vessel are compared on both annual cost and return basis and on the basis of cost per pound of shrimp landed. Annual cost and return estimates are presented in Table 1 and are based on 1971 data taken from 29 vessels in two classes, 53- to 65-foot and 66- to 72-foot. The average vessel in the 53- to 65-foot class landed 41,551 pounds of shrimp, which sold at nearly $1.13 per pound, yielding a gross revenue of $46,800. Variable costs to land these shrimp were $30,031. The largest variable cost items were crew and captain shares ($16,380), repairs and maintenance ($5,728), and fuel ($3,148). This left $16,769 income above variable costs. Annualized fixed costs based on 20-year vessel life, including depreciation, interest on investment and insurance, were $8,144, which resulted in total costs of $38,175 and net returns of $8,625.[1]

The 66- to 72-foot vessels landed more shrimp (56,933 pounds compared to 41,551 pounds) and received a higher price (nearly $1.23 compared to almost $1.13) than the smaller vessels. This higher price for shrimp for the larger vessels is due to their trawling in deeper water and landing larger shrimp. Gross returns for the larger vessel size were $69,869 in 1971. Variable costs were $51,632, which left $18,237 income above variable cost. However, the larger investment associated with the larger vessel resulted in an annual fixed cost of $10,421, which meant net returns for the 66- to 72-foot vessel were $7,816, or $809 less than for the 53- to 65-foot vessel.

Costs per pound of shrimp landed are estimated by taking total cost (by item) and dividing by the number of pounds landed. Table 2 indicates costs per pound of shrimp landed by the two vessel size classifications. Total variable costs for the 53- to 65-foot vessel were $0.72 per pound of shrimp landed. The crew and captain share was $0.39 per pound, repairs and maintenance $0.14, and fuel $0.08.

Fixed costs for the smaller vessels were $0.20 per pound of shrimp landed. Insurance was $0.08, interest cost just over $0.06 and depreciation just under $0.06. Total cost of a pound of shrimp landed in 1971 with a 53- to 65-foot vessel was about $0.92.

For a 66- to 72-foot vessel, variable costs per pound of shrimp were $0.91

Table 1.—Annual costs and returns for a typical Gulf of Mexico shrimp vessel, 1971.

Item	Vessel size 53-65 ft[1]	Vessel size 66-72 ft[2]
Gross receipts from production	$46,800[3]	$69,869[4]
Variable costs		
Ice	896	1,450
Fuel	3,148	7,107
Nets	704	680
Supplies	1,141	2,084
Electronics	662	1,028
Repair and maintenance	5,728	11,944
Packing	1,372	2,885
Shares	16,380	24,454
Subtotal	30,031	51,632
Income above variable costs	16,769	18,237
Fixed costs		
Depreciation	2,329	3,291
Insurance	3,152	3,697
Interest	2,663	3,433
Subtotal	8,144	10,421
Total costs	38,175	62,053
Net returns	8,625	7,816

[1]Data are from a sample of 8 vessels. Vessel life is based on 20 years and 2,500 fishing days. Straight line depreciation. Interest on investment based on an 8 percent annual rate. Captain and crew share is 35 percent of catch value.

[2]Data are from a sample of 21 vessels. Vessel life is based on 20 years and 2,500 fishing days. Straight line depreciation. Interest on investment based on an 8 percent annual rate. Captain and crew share is 35 percent of catch value.

[3]The 53- to 65-foot shrimp vessel landed an average 41,551 heads-off pounds of shrimp at an average price per pound of $1.126.

[4]The 66- to 72-foot shrimp vessel landed an average 56,933 heads-off pounds of shrimp at an average price per pound of $1.227.

[1]In establishing depreciation and interest charges, an investment of $56,584 is used for 53- to 65-foot vessels, and $75,820 for 66- to 72-foot vessels. In evaluating a particular vessel, the fixed costs should be recalculated using actual investment of the vessel.

Table 2.—Costs per pound of shrimp landed for a typical Gulf of Mexico shrimp vessel, 1971.

Item	Vessel size 53-65 ft[1]	66-72 ft[2]
Variable costs		
Ice	$0.0216	$0.0255
Fuel	0.0758	0.1248
Nets	0.0170	0.0119
Supplies	0.0275	0.0366
Electronics	0.0159	0.0181
Repair and maintenance	0.1379	0.2098
Packing	0.0330	0.0507
Shares[3]	0.3942	0.4295
Subtotal	0.7229	0.9069
Fixed costs		
Depreciation	0.0561	0.0578
Insurance	0.0758	0.0649
Interest[4]	0.0641	0.0603
Subtotal	0.1958	0.1830
Total costs[5]	0.9189	1.0899

[1]Based on 8 vessels and vessel life of 20 years.
[2]Based on 21 vessels and vessel life of 20 years.
[3]Crew and captain share is calculated as 35 percent of the value of the catch.
[4]Interest charge was calculated by (initial investment plus salvage divided by 2, and the result multiplied by 8 percent).
[5]Due to rounding off, the total may not equal a summation of all cost items.

and fixed costs were $0.18. Total cost per pound of shrimp landed was $1.09 for the 66- to 72-foot vessel, or $0.17 more than for the 53- to 65-foot vessel.

The average ex-vessel price of shrimp was $1.13 for the 53- to 65-foot vessel and $1.23 for the 66- to 72-foot vessel. Therefore, net revenue per pound of shrimp was $0.21 and $0.14 for the 53- to 65-foot and 66- to 72-foot vessels, respectively. The larger catch associated with the larger vessel resulted in total annual net returns being fairly comparable.

INVESTMENT ANALYSIS

Interviews with vessel builders indicated a typical 62-foot vessel costs about $72,000 fully rigged and ready to trawl. To trawl in deeper water and engage in longer trips, the initial investment for a vessel owner could increase to over $140,000. Such a vessel would be approximately 75 feet long and be equipped with a refrigeration unit.

In estimating the cash flow over the 20-year life of the vessel, two arrangements were investigated: (1) leveraged investment where the owner's investment was 20 percent of the purchase price and 80 percent was financed at 8 percent interest for 6 years, and (2) a situation in which the investment was equal to the purchase price. In both cases, an assumed $10,000 salvage value was included as income in year 20.

The annual cash flow data based on external financing are shown in Table 3 for the two vessel classifications. Annual cash flow to the owner of the 53- to 65-foot vessel in years 1 through 6 is $4,229, since $9,384 annual interest and loan repayment is deducted. However, after year 6, annual cash flow to the vessel owner increases to $13,613 and continues at this level through year 20. Vessel investment, based on a down payment of 20 percent of $56,584, would be $11,317. This means the payback period would be about 2.7 years.

For the 66- to 72-foot vessel, cash flow in years 1 through 6 is $1,797 and increases to $14,541 for years 7 through 20. For an investment of $15,164, the payback period would be an estimated 6.3 years.

Annual cash flow data without financing is presented in Table 4 for both vessel size classifications. This net cash flow to the vessel owner is an estimated $13,613 for a 53- to 65-foot vessel and $14,541 for a 66- to 72-foot vessel. Based on a purchase price of $56,584 for the smaller vessel, the payback period would be about 4.2 years. This is compared to 5.2 years for the larger vessel, which has an estimated purchase price of $75,820.

Table 3.—Investment analysis[1] for shrimp vessels using external financing, 1971 data.

Item	Vessel size 53-65 ft	66-72 ft
Annual cash flow summary		
Gross revenue	$46,800	$69,869
Cash operating expenses	33,187	55,328
Cash flow to owner for years 7-20[2]	13,613	14,541
Interest and loan repayment	9,384	12,744
Cash flow to owner for years 1-6[2]	4,229	1,797
Vessel owner investment[3]	11,317	15,164
Payback period	2.67 yr	6.30 yr

[1]This analysis is based on a leveraged investment of minimum down payment with external financing for the balance. A 20 percent down payment was assumed.
[2]The balance of the vessel purchase price (80 percent) is paid over a 6-year period and is deducted from owner returns. The $10,000 salvage value would also be income in year 20.
[3]Actual cash outlay for vessel purchase (investment) is 20 percent of purchase price.

Table 4.—Investment analysis for shrimp vessels[1] without external financing, 1971.

Item	Vessel size 53-65 ft	66-72 ft
Annual cash summary		
Gross revenue	$48,600	$69,869
Cash operating expenses	33,187	55,328
Net cash flow to owner[2]	13,613	14,541
Vessel owner investment	56,584	75,820
Payback period	4.16 yr	5.21 yr

[1]Based on a 20-year vessel life.
[2]The assumed value of $10,000 would also be added to income in year 20.

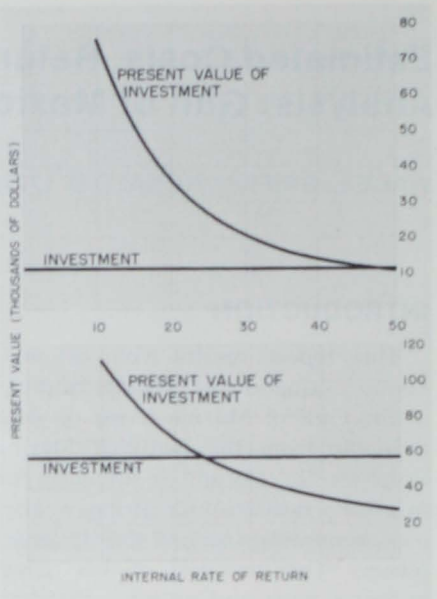

Figure 1.—Present value of expected stream of income for a 53- to 65-foot shrimp vessel at alternative discount rates assuming a 20-year operating life. External financing (top) of a shrimp vessel assumes 20 percent down and the balance financed for 6 years at 8 percent. Internal financing (bottom) assumes the owner pays the total vessel price at the time of purchase.

The data in Tables 3 and 4 provide the basis for a present value analysis. The present value of the stream of returns to the vessel owner is presented graphically in Figures 1 and 2 for small and large vessels, respectively, for any internal rate of return from 10 percent to 50 percent for an investment with and without financing. The rate of return on the investment is identified as that interest rate which equates the present value of the owner's net income stream to the owner's initial investment.

With external financing, the present value of the net cash flow generated by a 53- to 65-foot shrimp vessel (Fig. 1, top) is an estimated $75,000 at 10 percent, $50,000 at 15 percent, $35,000 at 20 percent, $20,000 at 30 percent, $14,000 at 40 percent, and $11,000 at 50 percent. Since the investment is an estimated $11,317, the internal rate of return would be just less than 50 percent. Therefore, if an investor's required rate of return

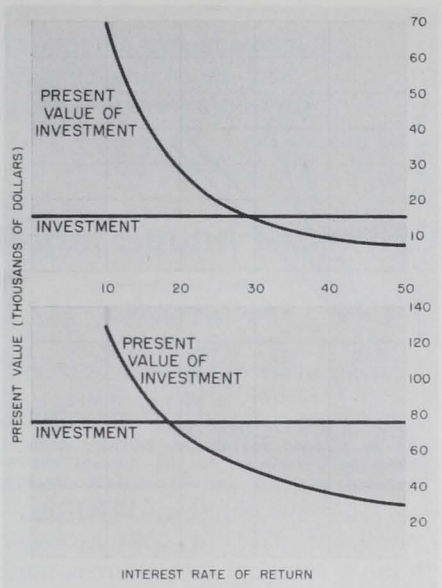

Figure 2.—Present value of expected stream of income for a 66- to 72-foot shrimp vessel at alternative discount rates assuming a 20-year operating life. External financing (top) of a shrimp vessel assumes 20 percent down and the balance financed for 6 years at 8 percent. Internal financing (bottom) assumes the owner pays the total vessel price at the time of purchase.

is less than the internal rate of return (50 percent in this case), the analysis indicates the investment would meet the return goals of the potential investor. With internal financing, Figure 1 (bottom) indicates that the internal rate of return is about 24 percent.

A similar present value analysis is presented in Figure 2 for 66- to 72-foot vessels. The internal rate of return with external financing is an estimated 30 percent. This is compared to 17 percent with total vessel price paid at the time of purchase. For both vessel size classifications, the rate of return on investment is higher using external financing. Comparing the two vessel classes, the internal rate of return is significantly larger for the 53- to 65-foot vessel using either type of financing.

Caution is advised in interpreting the present value analysis. First, the more risk involved in an investment, the larger the rate of return necessary to make a profitable investment. Second, the minimum internal rate of return required of an investment for a given risk level varies among investors. Lastly, this analysis is based on 1971 information. Shifts in shrimp catch or price, or in industry costs, will affect the results. For example, the addition of many vessels to the industry could be expected to reduce catch per vessel. These limitations should be kept in mind while reviewing the present value analysis presented.

Although the cash flow analysis used 1971 data and projected them for a 20-year period, it does provide a basis for considering investment in shrimp vessels. The reader is once again reminded of the sensitivity of the analysis to changes in catch, costs, and shrimp price. Also, the data are based on the assumption that the vessels are manned by experienced captains and crews. The vessel owner is vulnerable in that vessel performance is entirely dependent on the captain and crew. Therefore, the investor who is not intimately familiar with the shrimp industry is cautioned to study very carefully all the ramifications of vessel ownership prior to investment.

COSTS ADJUSTED TO SPRING 1974

The costs, returns, investment, and break-even analysis discussed up to this point refer to 1971 survey data. A preliminary survey conducted early in 1974 indicated that costs, other than fuel, increased by 19 percent since 1971. Fuel costs have increased twofold to threefold. To account for the upward shift in operating costs, the 1971 data were adjusted to show the break-even implications for shrimp vessels.

All costs except fuel and crew and captain shares were inflated 19 percent from 1971 levels. Fuel cost was

Table 5.—Annual costs and returns for a typical 53- to 65-foot Gulf of Mexico shrimp vessel, 1971 data adjusted to early 1974 conditions.

Item	1971		Estimated Spring 1974[1]	
	Actual	Break-even	Fuel cost doubled	Fuel cost tripled
Gross receipts from production[2]	$46,800	$33,530	$43,825	$48,668
Variable costs				
Fuel	3,148	3,148	6,296	9,444
Other	10,503	10,503	12,499	12,499
Shares[3]	16,380	11,735	15,339	17,034
Subtotal	$30,031	$25,386	$34,134	$38,977
Income above variable costs	16,769	8,144	9,691	9,691
Fixed costs	8,144	8,144	9,691	9,691
Total costs	38,175	33,530	43,825	48,668
Net returns	8,625	0	0	0
Actual price received per lb[4]	1.13			
Break-even price per lb[4]		0.81	1.05	1.17

[1]All variable costs except fuel and crew and captain shares were increased 19 percent.
[2]Based on annual catch of 41,551 pounds of head-off shrimp.
[3]Crew and captain shares are calculated as 35 percent of the value of the catch.
[4]Ex-vessel price per pound of heads-off shrimp.

Table 6.—Annual costs and returns for a typical 66- to 72-foot Gulf of Mexico shrimp vessel, 1971 data inflated to early 1974 conditions.

Item	1971		Estimated Spring 1974[1]	
	Actual	Break-even	Fuel cost doubled	Fuel cost tripled
Gross receipts from production[2]	$69,869	$57,845	$77,691	$88,625
Variable costs				
Fuel	7,107	7,107	14,214	21,321
Other	20,071	20,071	23,884	23,884
Shares[3]	24,454	20,246	27,192	31,919
Subtotal	$51,532	$47,424	$65,290	$76,224
Income above variable costs	18,237	10,421	12,401	12,401
Fixed costs	10,421	10,421	12,401	12,401
Total costs	62,053	57,845	77,691	88,625
Net returns	7,816	0	0	0
Actual price received per lb[4]	1.23			
Break-even price per lb[4]		1.02	1.36	1.56

[1]All variable costs except fuel and crew and captain shares were increased 19 percent.
[2]Based on annual catch of 56,933 pounds of heads-off shrimp.
[3]Crew and captain shares are calculated as 35 percent of the value of the catch.
[4]Ex-vessel price per pound of heads-off shrimp.

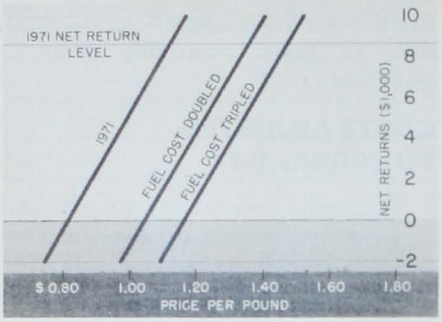

Figure 3.—Net returns and shrimp price relationships for 66- to 72-foot vessels. Costs, other than fuel, crew, and captain shares, were increased by 19 percent over 1971 costs. Price per pound is ex-vessel value for heads-off shrimp.

Figure 4.—Net returns and shrimp price relationships for 53- to 65-foot vessels. Costs, other than fuel, crew, and captain shares, were increased by 19 percent over 1971 costs. Price per pound is ex-vessel value for heads-off shrimp.

first doubled and then tripled for this analysis. Table 5 shows the break-even 1971 price based on operating a 53- to 65-foot shrimp vessel. It also shows the actual costs and returns of comparable vessels for 1971. The actual 1971 break-even price was $0.81 per pound. The estimated 1974 break-even price of shrimp is $1.05 per pound. With fuel costs doubled and other costs increased 19 percent, this is an increase of approximately 30 percent from the 1971 level. For the smaller vessels, with the same 19 percent increase in costs and fuel price tripled, the break-even price of shrimp increases to $1.17, or an increase of 44 percent compared to 1971.

Similar information on costs is presented in Table 6 for a 66- to 72-foot vessel. The 1971 break-even price of shrimp was $1.02 per pound. With costs increased 19 percent and fuel price doubled, the break-even price increases to $1.36, or 33 percent above 1971. Tripling of fuel costs increases the break-even price of shrimp to $1.56 per pound, 53 percent above 1971.

Figure 3 shows expected net returns for 66- to 72-foot vessels at alternative shrimp prices using the 1971 costs and with two levels of increased costs. In 1971, as indicated by the horizontal line, the $1.23 price received produced a $7,816 net return. However, that same annual net return with a 19 percent increase in costs and with fuel cost doubled would require shrimp prices of $1.56 per pound, and $1.77 with fuel cost tripled.

Data for the 53- to 65-foot vessel are shown in Figure 4. In 1971 a net return of $8,625 was obtained at a shrimp price of $1.13. To maintain this level of net revenue with a 19 percent cost increase, shrimp prices would have to be $1.36 per pound with fuel cost doubled, and $1.48 with fuel cost tripled.

Figures 5 and 6 contain a present value analysis for small and large vessels, respectively, which determines the break-even annual average price of shrimp that a vessel owner must have for various levels of return on investment. Figure 5 indicates a small vessel owner would have to receive $1.20 per pound to obtain a 20 percent return on investment with an externally financed vessel and fuel prices doubled at the 1971 level. This price increases to $1.30 per pound with fuel prices tripled. For a vessel internally financed, to obtain a 20 percent return on investment, a vessel owner would have to receive $1.35 and $1.50 per pound for double and triple fuel prices, respectively.

Figure 6 indicates that for a large vessel owner to make 20 percent return on investment with external financing, he would have to receive $1.50 and $1.70 per pound for double and triple fuel prices, respectively. For a vessel internally financed to achieve 20 percent return on investment a vessel owner would have to receive $1.70 and $1.90 per pound of shrimp with double and triple fuel prices, respectively.

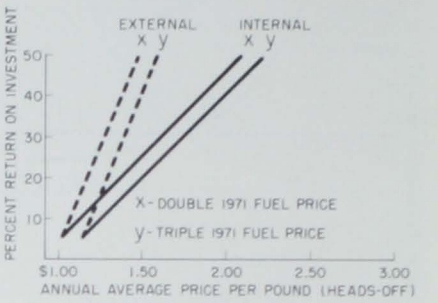

Figure 5.—Break-even price of shrimp for 53- to 65-foot vessels at various levels of return on investment for 80 percent external financing and 100 percent internal financing.

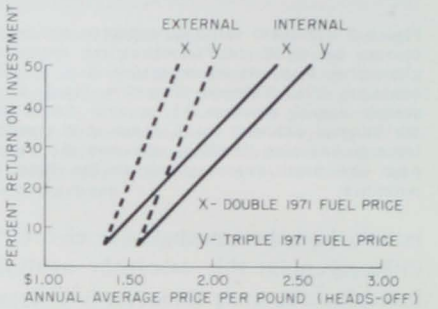

Figure 6.—Break-even price of shrimp for 66- to 72-foot vessels at various levels of return on investment for 80 percent external financing and 100 percent internal financing.

One other important segment of the financial analysis is to determine if vessel owners will be able to make payments when the vessel is externally financed for 80 percent of vessel cost. The break-even price per pound for heads-off shrimp for small vessel owners to just make payments for the first 6 years with costs increased 19 percent above 1971 and fuel costs doubled and tripled is $1.27 and $1.38, respectively. Similarly, for large vessel owners, the price of shrimp would have to be $1.57 and $1.76 per pound with double and triple fuel prices, respectively, to generate sufficient income to meet monthly vessel payments.

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