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# Effects of Government Programs on Rice Production Costs and Returns, 1988

Michael Salassi  
Mary Ahearn  
Mir Ali  
Robert Dismukes

*In this report...Average production costs and returns per planted acre of rice are presented for 1988 with and without the direct effects of Government programs. When the direct effects of programs are included in the estimates, gross returns, production costs, and net returns are all higher. This analysis is the first time the U.S. Department of Agriculture (USDA) has prepared such estimates for any commodity because the necessary data were not available in the past. Such data are available only for rice.*

## Introduction

How costs and returns estimates will be used determines the most appropriate treatment of the direct effects of Government payments. USDA production costs and returns estimates have mainly been used for policy purposes. In 1973, Congress first required USDA to produce the cost estimates for the major program crops and dairy. The standard USDA estimates have been designed for policymakers to know what costs and returns would be in the absence of the direct effects of Government programs. If the direct effects of the programs were included in the estimates and then used for policy purposes to establish support levels, then an escalating effect would be built into the process of setting support levels because of the effect of the program benefits on costs. For example, the cost of land is determined by the ability of land to generate income. Because programs generate income for those who control land, programs will increase the cost of land. USDA estimates published to date have all excluded the direct effects of the programs on both the costs and returns for this reason. Not all indirect effects of

programs can be totally removed from the costs and returns estimates because of the strong effects these programs have on markets for production inputs, on the market for the commodities themselves, and on producer behavior.

Another important purpose of costs and returns estimates is to reveal something about the profitability of producing a particular commodity. For example, profitability of competing and alternative crops can be compared and the financial position of producers of these commodities can be gauged by costs and returns statements. For this purpose, the direct effects of programs should be included in costs and returns estimates. These effects are especially critical for rice because program participation rates regularly exceed 90 percent and because rice-producing farms often reorganize into smaller units to avoid payment limitations.

To receive Government payments under any of the commodity income programs, producers must put some of their land into conserving-use acres and maintain those "set-aside" acres in specific ways. Farmers incur costs to meet these program requirements. To make reliable estimates of costs and returns, one must have actual data on the costs incurred to be eligible to receive payments and on the amount of those payments. In the past, USDA did not collect data relating to Government programs when it collected cost data. USDA collects its primary data for estimating costs and returns of the commodities of interest on a 4-year rotating basis on special versions of the Farm Costs and Returns Survey (FCRS). The FCRS is a cooperative effort of the National Agricultural Statistics Service (NASS) and the Economic Research Service (ERS). The FCRS sample is drawn for the special

versions to statistically represent the major production regions for each commodity. Rice data were collected from 538 farmers in early 1989 for rice production in 1988. With the 1988 Rice Cost of Production questionnaire, USDA began the process of collecting the data necessary to estimate costs and returns both with and without the direct effects of Government programs. The 1990 Wheat Cost of Production survey was just completed and includes the necessary information on Government acres to do the same for wheat. In 4 years, estimates will be made both ways for all program crops.

## Methods

The standard USDA cost of production accounting methods for costs and returns have been followed in this report, except for new methods designed to include the direct effects of Government programs. The costs and returns are for both the farm operation and the landlord combined. This approach, combining operation and landlord costs and returns, is one of the differences between USDA estimates and those of land-grant universities. The universities generally focus only on the costs and returns of the farm operator, whereas the USDA's focus is upon the costs and returns of all factors of production, whether operator-supplied or landlord-supplied. The USDA estimates are made on a per planted acre of rice basis, but they can be converted to a per hundredweight (cwt) basis by dividing the estimates per planted acre by the yields per planted acre. USDA methods and format have been developed over time with input from the National Agricultural Cost of Production Standards Review Board established by the Agriculture and Food Act of 1981.

The set of estimates that includes the direct effects of Government programs includes all costs and returns associated with both the planted acres and the required set-aside acres. The costs associated with the set-aside acres affect almost all of the line items of costs published in the USDA statement. Only the new methods developed to incorporate the direct effects of programs are described below. For detailed information on estimation methods and data sources, see *Economic Indicators of the Farm Sector: Costs of Production-Major Field Crops, 1988* (ECIFS 8-4), forthcoming.

## Gross Value of Production

There are four components to the gross value of production when the direct effects of Government programs are included. The first component

represents the market value of production and is calculated as the yield per planted acre valued at the average harvest month market price, both of which are reported by NASS. Only this component of the gross value of production is included in the traditional estimates that exclude the direct effects of Government programs.

The second component of gross value of production is the Government payments to producers who participate in the rice program. These payments were estimated by valuing production at the deficiency payment rate of \$4.31 per cwt with adjustments made for program yields, the basis on which producers are actually paid, and program participation rates. Payments made under the 50/92 program are also included. The estimates do not make adjustments for payment limits. Payment limits would likely reduce the actual deficiency payments received by about 7 percent. The necessary data on complying rice acres and program yields are actual administrative record data from USDA's Agricultural Stabilization and Conservation Service (ASCS).

The third component is the proceeds from the marketing loan program operated by the Commodity Credit Corporation (CCC). Program participants can place their rice under CCC loan and then redeem it at less than the loan rate if world prices are below the loan rate. For example, the 1988 CCC loan rate was \$6.63 per cwt and the world market price of rice and the marketing loan repayment rate were less than \$6.63, thereby giving participants an opportunity to receive marketing loan gains. ASCS also provided data on marketing loan benefits.

The fourth component of the gross value of production is the income received from grazing or haying the acres put into conserving uses under the program.

## Variable Cash Costs, Capital Replacement, and Unpaid Labor

The rice version of the FCRS collected information from farmers on the field operations and inputs used on the acres of land that had to be "set aside" to participate in the rice program. The variable cash costs, capital replacement, and unpaid labor associated with maintaining the set-aside acres were estimated with methods similar to those used to estimate the cost of field operations and inputs on planted rice acres. When chemicals were custom applied to conserving-use acres, costs of both application and materials were included in chemicals. Seed costs for cover crops on

conserving-use acres were included in miscellaneous expenses.

### **General Farm Overhead and Interest**

Some costs are not specific to an individual commodity, but are whole-farm costs, such as utilities. These are termed general farm overhead costs in the USDA costs and returns statement. Cash interest expenses paid is also a whole-farm cost and is presented as a separate line item in the USDA statements. USDA allocates whole-farm expenses to individual commodities based on the commodity's share of the total value of the production. Because the inclusion of the direct effects of programs will affect the relative values of production for the various commodities, USDA's estimate of general farm overhead and interest will also change. Rice's share of the value of total production will increase, causing an increase in rice's share of the whole-farm expense items because rice production receives large benefits compared with other program commodities.

### **Taxes, Insurance, Cost of Operating Capital, and Cost of Nonland Capital**

For estimates including direct effects of programs, taxes and insurance on machinery are calculated in the same way as in the traditional estimates, except that the estimates account for the additional machinery use for the set-aside acres. The methods for calculating taxes on real estate and costs of operating and nonland capital are identical between the two sets of estimates, except that the estimates that include the direct effects of programs also include those costs for the set-aside acres.

### **Land Costs**

USDA estimates of land costs are for all planted acres of rice, whether owned by operator or landlord. USDA allocates a net return to land in a similar manner, whether the direct effects of programs are included or excluded. The rental value is a composite of cash and share rental values. Farmers reported the actual cash rent paid for their rice acres under cash agreements. They also reported the share of production that landlords received and the expenses the landlord paid under share agreements from which USDA calculates a net share rental rate. These two rates are weighted together based on the shares of land rented on a cash or share basis in an area to yield one composite rental rate. This weighted rate, minus real estate taxes that are included in the taxes and

insurance costs, is then applied to all acres, whether owned or rented.

The estimates including direct effects include a cost for the acres that are set aside as required by the program, but the standard USDA estimates include only costs for land planted to rice. In 1988, the rice program required that operators put 25 percent of their rice acres in conserving uses, although they had the option of putting up to 50 percent in conserving uses and receiving 92 percent, rather than 100 percent, of deficiency payments.

The second critical difference between the two sets of estimates is in the valuation of the production given to the landlord under share rental agreements. In USDA estimates that exclude the direct effects of the program, the landlord's share of rice is valued at the harvest period market price. This price is also used in those estimates to value the total production of rice. In the estimates that include the direct effects of programs, the landlord's share of production is valued in the same manner as is the gross value of production. The landlord's share for nonparticipating acres is valued at the harvest month price. The landlord's share of production on participating acres reflects the value of rice in the market, the value of its deficiency payments, and its value from the net marketing loan proceeds. Because deficiency payments are made based on the lower program yields rather than actual yields, the benefits of deficiency payments are limited to program yields. The two values of landlord's share, those from nonparticipating acres and those from participating acres, are weighted together based on their proportion of the total acres share rented. The data on program yields are actual administrative record data from the ASCS. NASS provides the data on planted rice acres. All other data necessary to calculate land costs come from the rice version of the 1988 FCRS.

### **Net Returns**

The USDA estimates include three estimates of net returns. Net returns after cash expenses equal the gross value of production less cash expenses. Net returns after cash expenses and capital replacement equal the gross value of production less cash expenses and capital replacement. Net returns after economic costs, or residual returns to management and risk, are calculated by subtracting all costs of operator- and landlord-supplied factors from the gross value of production. Calculating at least one of the factors as the residual satisfies the requirement that costs exactly equal returns.

Management and risk are generally chosen to be calculated as the residual by economic and accounting convention.

### **Comparison of Rice Cost and Return Estimates for 1988 With and Without the Direct Effects of Government Programs**

Gross value of production, production costs, and net returns per planted acre were all higher when the direct effects of Government programs were included (tables 1 and 2). The gross value of U.S. production was 60 percent higher. Net returns after economic costs, or residual returns to management and risk, went from -\$104.81 to \$48.55 per planted acre, an increase of \$153.36 when the direct effects of programs were included. The greatest effect on costs was on the cost of land, reflecting the strong influence of Government programs on land costs. Land costs alone accounted for almost 90 percent of the increase in economic costs. Land costs more than doubled from \$57.84 per planted acre of rice to \$121.15 per planted acre when the direct effects of the program were included.

The variable cash costs of maintaining conserving-use acres was \$1.37 for every planted acre of rice, less than 1 percent of all variable cash costs. The fixed cash costs increased by \$9.75 per planted rice acre when the direct effects of the programs were included. The greater effect on fixed cash costs stems from both overhead costs that are allocated to the additional acres in conserving uses and, more significantly, to the allocation of the general farm overhead and interest expenses on the planted acres that are based on rice's share in the total value of production, including the program benefits. Capital replacement is \$1.15 greater in the estimates that include the direct program effects. The opportunity cost for operating and nonland capital and unpaid labor combined increased less than 50 cents.

USDA estimates the costs and returns of producing rice for the four major rice regions (fig. 1). The Arkansas (non-Delta) region includes the Northeast and Grand Prairie areas of Arkansas. All rice-producing areas of California were grouped into one region. The Delta region includes southeastern Arkansas, northeastern Louisiana, and Mississippi in

the Mississippi River Delta. The Gulf Coast region includes southwestern Louisiana and the Upper and Lower Coast of Texas. (Appendix tables 1 and 2 provide estimates for the three Gulf Coast subregions.)

When the direct effects of the program were included, the net returns after economic costs went from losses in excess of \$85 per planted acre to positive returns of \$33 or more in every major rice region. The most significant increase in net returns was in California. Residual returns to management and risk went from being the lowest of all regions when the direct effects of programs were excluded (-\$151.54) to being the highest of all regions (\$86.19) when the effects were included. California has the highest land costs whether the direct effects are included or excluded, but the percentage increase in land costs when the direct effects of the program were included was much less in this region. The direct effects of the program are felt most strongly on the estimates of share rents, and California has less share renting than any of the regions. Because of California's greater yields, the gross value of production increased the most in this region when the direct effects were included.

The Delta and the Gulf Coast regions have residual returns to management and risk significantly below the U.S. average. These two regions have the lowest land costs whether direct program effects are included or not. However, they are also the lowest yielding rice regions. The three subregions of the Gulf Coast have considerable variation in costs and returns. Southwestern Louisiana had a residual return to management and risk of only \$8.63 per acre, even after receiving an estimated \$182.41 per acre in Government benefits. The Upper Texas Coast subregion had a residual return of \$56.63 per planted rice acre after the direct effects of the program were included. The Lower Texas Coast subregion averaged \$76.66 per planted rice acre. The yields and net returns in this subregion were second only to those in California.

Table 1--U.S. and regional rice production costs and returns excluding the direct effects of Government programs, 1988 <sup>1/</sup>

Item	U.S.	Arkansas (non-Delta)	California	Miss. River Delta	Gulf Coast
<u>Dollars per planted acre</u>					
Gross value of production:					
Market value	370.33	365.34	444.10	350.13	354.35
Total value	370.33	365.34	444.10	350.13	354.35
=====					
Cash expenses:					
Seed	22.16	20.24	21.93	21.25	25.23
Fertilizer	36.28	32.02	36.83	32.92	43.59
Chemicals	40.30	32.41	48.74	46.10	40.05
Custom operations	36.58	30.48	48.82	38.97	35.15
Fuel, lube, and electricity	46.93	48.82	48.13	43.43	47.08
Repairs	24.49	29.81	21.57	23.29	20.98
Hired labor	39.36	34.94	44.92	38.62	42.11
Purchased irrigation water	8.28	0.00	21.95	0.44	17.06
Drying	39.92	33.16	47.88	38.51	44.60
Miscellaneous	1.31	1.33	1.41	1.31	1.22
Technical services	0.48	0.15	1.15	0.85	0.22
Total, variable cash expenses	296.09	263.36	343.33	285.69	317.29
General farm overhead	21.50	17.19	37.03	20.23	19.37
Taxes and insurance	12.13	13.50	14.85	11.09	10.01
Interest on operating loans	14.04	11.21	23.96	11.12	14.49
Interest on real estate	9.42	11.27	22.55	4.69	4.40
Total, fixed cash expenses	57.09	53.17	98.39	47.13	48.27
Total, cash expenses	353.18	316.53	441.72	332.82	365.56
Returns less cash expenses	17.15	48.81	2.38	17.31	-11.21
Capital replacement	46.34	64.14	32.20	42.67	36.59
Returns less cash expenses and replacement	-29.19	-15.33	-29.82	-25.36	-47.80
=====					
Economic (full ownership) costs:					
Variable cash expenses	296.09	263.36	343.33	285.69	317.29
General farm overhead	21.50	17.19	37.03	20.23	19.37
Taxes and insurance	12.13	13.50	14.85	11.09	10.01
Capital replacement	46.34	64.14	32.20	42.67	36.59
Allocated returns to owned inputs:					
Return to operating capital	6.68	6.16	8.48	6.58	6.40
Return to other nonland capital	10.86	14.22	7.88	10.46	8.95
Net land rent	57.84	56.15	106.60	49.88	40.97
Unpaid labor	23.70	16.19	45.27	14.65	28.35
Total, economic costs	475.14	450.91	595.64	441.25	467.93
Residual returns to management and risk	-104.81	-85.57	-151.54	-91.12	-113.58
=====					
Harvest-period price (dollars/cwt.)	6.78	6.83	6.40	6.91	6.89
Yield (cwt./planted acre)	54.61	53.49	69.39	50.67	51.45
=====					

<sup>1/</sup> Sum of operator and landlord costs and returns.

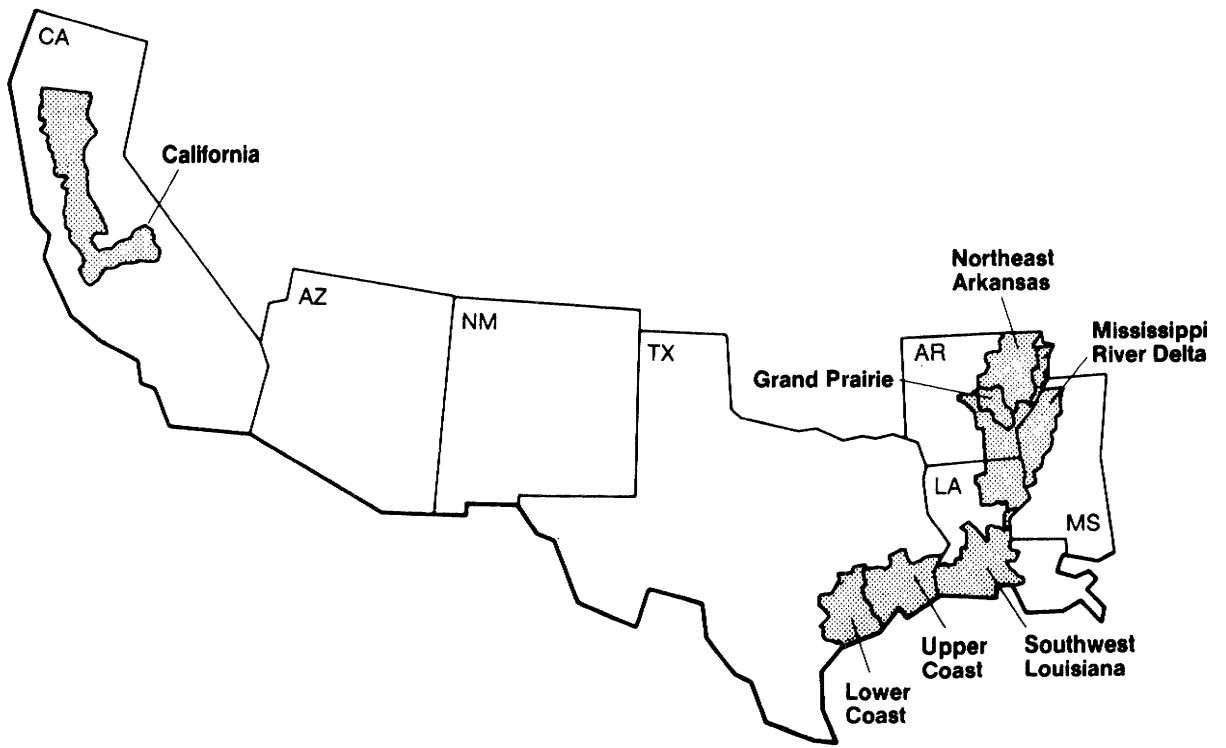
Table 2--U.S. and regional rice production costs and returns including the direct effects of Government programs, 1988 <sup>1/</sup>

Item	U.S.	Arkansas (non-Delta)	California	Miss. River Delta	Gulf Coast
<u>Dollars per planted acre</u>					
Gross value of production:					
Market value	370.33	365.34	444.10	350.13	354.35
Deficiency payments	204.03	192.65	299.15	175.13	191.41
Marketing loan proceeds	21.30	20.86	27.06	19.76	20.06
Haying/grazing on ACR acreage	.05	.03	.00	.18	.00
Total value	595.71	578.88	770.31	545.20	565.82
Cash expenses:					
Seed	22.16	20.24	21.93	21.25	25.23
Fertilizer	36.28	32.02	36.83	32.92	43.59
Chemicals	40.34	32.41	48.89	46.13	40.06
Custom operations	36.58	30.48	48.82	38.97	35.15
Fuel, lube, and electricity	47.43	49.29	48.39	44.27	47.46
Repairs	25.00	30.30	22.13	23.99	21.32
Hired labor	39.59	35.21	45.08	39.02	42.30
Purchased irrigation water	8.28	0.00	21.95	0.44	17.06
Drying	39.92	33.16	47.88	38.51	44.60
Miscellaneous	1.40	1.51	1.54	1.31	1.27
Technical services	0.48	0.15	1.15	0.85	0.22
Total, variable cash expenses	297.46	264.77	344.59	287.66	318.26
General farm overhead	25.05	20.89	44.73	23.22	21.03
Taxes and insurance	14.28	15.25	18.29	12.98	12.19
Interest on operating loans	16.33	13.62	28.94	12.77	15.78
Interest on real estate	11.18	13.70	27.23	5.39	4.79
Total, fixed cash expenses	66.84	63.46	119.19	54.36	53.79
Total, cash expenses	364.30	328.23	463.78	342.02	372.05
Returns less cash expenses	231.41	250.65	306.53	203.18	193.77
Capital replacement	47.49	65.30	33.12	44.41	37.33
Returns less cash expenses and replacement	183.92	185.35	273.41	158.77	156.44
Economic (full ownership) costs:					
Variable cash expenses	297.46	264.77	344.59	287.66	318.26
General farm overhead	25.05	20.89	44.73	23.22	21.03
Taxes and insurance	14.28	15.25	18.29	12.98	12.19
Capital replacement	47.49	65.30	33.12	44.41	37.33
Allocated returns to owned inputs:					
Return to operating capital	6.74	6.22	8.53	6.67	6.44
Return to other nonland capital	11.15	14.51	8.12	10.88	9.14
Net land rent	121.15	123.41	181.30	110.80	95.88
Unpaid labor	23.84	16.31	45.44	14.81	28.48
Total, economic costs	547.16	526.66	684.12	511.43	528.75
Residual returns to management and risk	48.55	52.22	86.19	33.77	37.07
Harvest-period price (dollars/cwt.)	6.78	6.83	6.40	6.91	6.89
Yield (cwt./planted acre)	54.61	53.49	69.39	50.67	51.45

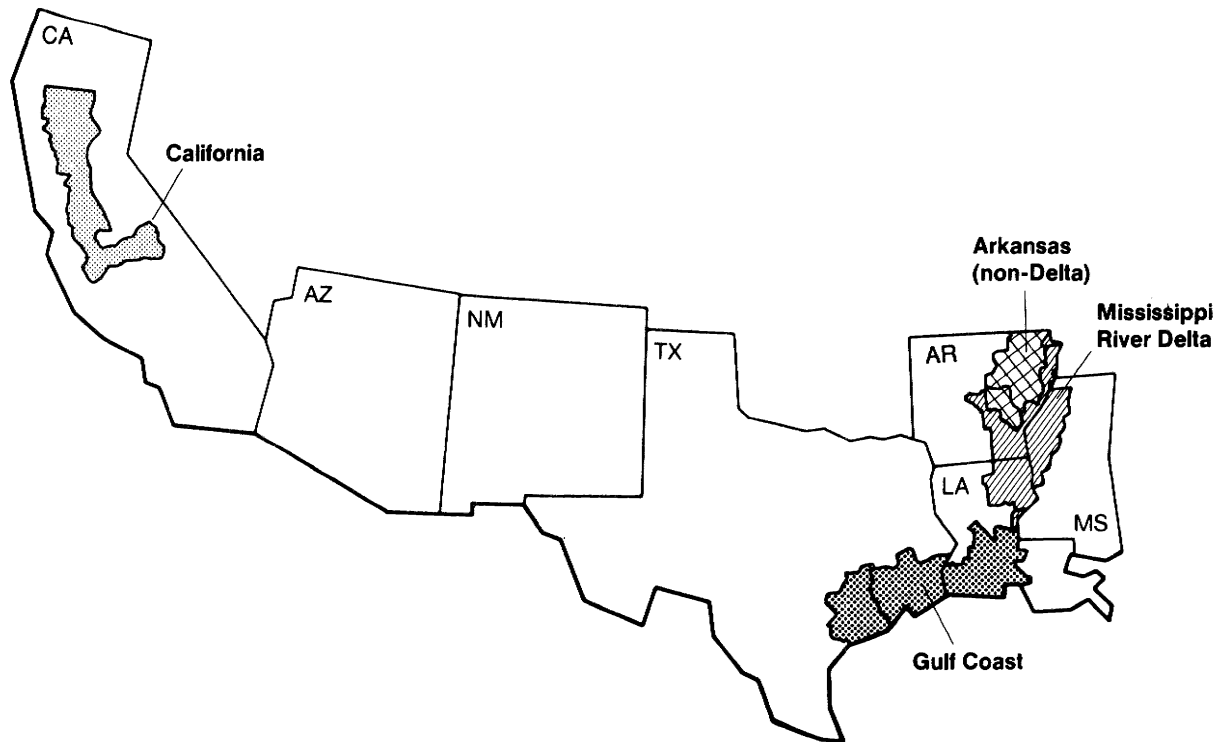
<sup>1/</sup> Sum of operator and landlord costs and returns.

Figure 1

### U.S. Rice Production Regions



### USDA Rice Costs-of-Production Regions





Appendix Table 1—Rice production costs and returns excluding the direct effects of Government programs for Gulf Coast production areas, 1988 <sup>1/</sup>

Item	Southwest Louisiana	Upper Texas Coast	Lower Texas Coast
<u>Dollars per planted acre</u>			
Gross value of production:			
Market value	299.09	357.99	455.71
Total	299.09	357.99	455.71
=====			
Cash expenses:			
Seed	28.72	22.36	20.72
Fertilizer	40.74	43.97	48.64
Chemicals	32.50	47.55	48.88
Custom operations	33.09	40.36	35.28
Fuel, lube, and electricity	41.70	29.02	70.19
Repairs	17.26	20.35	28.42
Hired labor	35.05	59.35	42.99
Purchased irrigation water	0.34	42.51	30.22
Drying	41.72	41.21	52.46
Miscellaneous	0.24	1.69	2.74
Technical services	0.14	0.49	0.16
Total, variable cash expenses	271.50	348.86	380.70
General farm overhead	16.66	30.98	16.17
Taxes and insurance	6.68	12.93	14.18
Interest on operating loans	12.81	15.98	16.58
Interest on real estate	4.69	6.21	2.54
Total, fixed cash expenses	40.84	66.10	49.47
Total, cash expenses	312.34	414.96	430.17
Returns less cash expenses	-13.25	-56.97	25.54
Capital replacement	26.96	30.32	59.23
Returns less cash expenses and replacement	-40.21	-87.29	-33.69
=====			
Economic (full ownership) costs:			
Variable cash expenses	271.50	348.86	380.70
General farm overhead	16.66	30.98	16.17
Taxes and insurance	6.68	12.93	14.18
Capital replacement	26.96	30.32	59.23
Allocated returns to owned inputs:			
Return to operating capital	5.52	7.30	7.43
Return to other nonland capital	6.65	7.46	14.34
Net land rent	47.28	28.66	37.95
Unpaid labor	27.59	27.17	30.61
Total, economic costs	408.84	493.68	560.61
Residual returns to management and risk	-109.75	-135.69	-104.90
=====			
Harvest-period price (dollars/cwt.)	6.81	6.95	6.95
Yield (cwt./planted acre)	43.92	51.51	65.57

<sup>1/</sup> Sum of operator and landlord costs and returns.

**Appendix Table 2—Rice production costs and returns including the direct effects of Government programs for Gulf Coast production areas, 1988 <sup>1/</sup>**

Item	Southwest Louisiana	Upper Texas Coast	Lower Texas Coast
	<u>Dollars per planted acre</u>		
Gross value of production:			
Market value	299.09	357.99	455.71
Deficiency payments	165.28	209.53	227.59
Marketing loan proceeds	17.13	20.09	25.57
Haying/grazing on ACR acreage	.00	.00	.00
Total	481.50	587.61	708.87
=====			
Cash expenses:			
Seed	28.72	22.36	20.72
Fertilizer	40.74	43.97	48.64
Chemicals	32.51	47.56	48.88
Custom operations	33.09	40.36	35.28
Fuel, lube, and electricity	41.99	29.72	70.51
Repairs	17.55	20.93	28.70
Hired labor	35.19	59.76	43.15
Purchased irrigation water	0.34	42.51	30.22
Drying	41.72	41.21	52.46
Miscellaneous	0.32	1.69	2.74
Technical services	0.14	0.49	0.16
Total, variable cash expenses	272.31	350.56	381.46
General farm overhead	18.61	32.29	17.49
Taxes and insurance	7.62	18.01	16.60
Interest on operating loans	14.30	16.68	17.92
Interest on real estate	5.23	6.50	2.74
Total, fixed cash expenses	45.76	73.48	54.75
Total, cash expenses	318.07	424.04	436.21
Returns less cash expenses	163.43	163.57	272.66
Capital replacement	27.59	31.52	59.84
Returns less cash expenses and replacement	135.84	132.05	212.82
=====			
Economic (full ownership) costs:			
Variable cash expenses	272.31	350.56	381.46
General farm overhead	18.61	32.29	17.49
Taxes and insurance	7.62	18.01	16.60
Capital replacement	27.59	31.52	59.84
Allocated returns to owned inputs:			
Return to operating capital	5.55	7.37	7.45
Return to other nonland capital	6.81	7.78	14.49
Net land rent	106.88	56.09	104.15
Unpaid labor	27.70	27.36	30.73
Total, economic costs	472.87	530.98	632.21
Residual returns to management and risk	8.63	56.63	76.66
=====			
Harvest-period price (dollars/cwt.)	6.81	6.95	6.95
Yield (cwt./planted acre)	43.92	51.51	65.57

<sup>1/</sup> Sum of operator and landlord costs and returns.

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U.S. Department of Agriculture, Economic Research Service. *Economic Indicators of the Farm Sector: Costs of Production--Major Field Crops, 1988*. ECIFS 8-4. Forthcoming.

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