

PN-AAN-669
6980135/62
ISN-31849

Data on Costs of Ivorian Rice Production

by

Charles P. Humphreys

Food Research Institute

Stanford University

July 1979

**This paper was prepared as part of a project
funded under Contract AID/AFR-C-1235 by the
United States Agency for International Development**

The tables in this note contain the detailed cost information used in the companion paper to analyze the economic efficiency of rice production in the Ivory Coast (1). These tables have been organized into four groups.

The first set of tables (series A and B) gives summary information to describe the alternative techniques of production, assembly, milling, and distribution. Table A1 provides the notation that is used throughout to identify the different techniques. The B series tables divide the total costs of each alternative into the following categories: skilled and unskilled labor; capital; land; imported inputs; and taxes and subsidies on both imported and domestic inputs. As explained in the Appendix of the related methodology paper, these data can be used by interested readers to verify or recalculate the measures of economic efficiency, such as net social profitability (2).

The next set of tables (series C, D, E, F, and G) provides detailed estimates for the major cost items of farm production, including land development (Table C), equipment operation (Tables D1 and D2), small farm tools (Tables E1 and E2), and estimates of farm labor times (Table F). The G series tables both explain the shadow prices used in evaluating social returns to rice production and give the market prices for rice used to estimate private returns. These costs are drawn upon mainly to estimate the farm production budgets.

The third set of tables (series H, I, J, and K) contains detailed budgets for each of the important production, assembly, milling, and distribution alternatives used in Ivorian rice production. All costs in these micro-level budgets have been divided into the categories necessary to construct the cost summaries in the B tables. Since micro-level costs may

vary considerably for different farmers, merchants, or millers using similar techniques, these costs represent normal operating expenses, based on realistic assumptions of technical input-output coefficients and local conditions. To the extent possible, all costs have been inflated or deflated to 1975-76. Although the labor, capital, and land costs given in the tables are the private costs of these domestic factors, the assumptions used to estimate the social opportunity cost of each factor are explained in the notes accompanying each budget. The sources from which the data in these tables were derived have also been listed in detailed notes. In general, these data are based on direct observations in the field and on actual operations in the Ivory Coast or have been estimated from information given by other sources.

The fourth and final set of tables (series L, M, N, O, P) report some of the major findings from the economic analysis of Ivorian rice production. The L tables show the importance of various rice production methods relying on different combinations of production, assembly, milling, and distribution techniques. The L1 table refers only to traditional farm production, together with various methods of assembly, milling, and distribution. The L2 table refers to all improved farm production that is milled by small-scale hullers for consumption within the rice-growing region. The L3 table also refers to all improved farm production, but which is milled by large-scale, government mills for consumption in Bouaké, the major internal consumption center. The L4 table again refers only to improved farm production milled by large-scale, government mills, but shipped to Abidjan, the port city, for consumption. These combinations are used consistently in the subsequent series.

The M series gives several indicators of the private and social profitability of rice produced under different methods. The N and O series of tables provide information that can be used to assess the sensitivity of the results to changes in the values of major parameters. Finally, the P tables report some macro-level indicators of the effects of different production methods on the government budget, foreign exchange, and employment.

CITATIONS

1 Charles P. Humphreys, "Analysis of Rice Production in the Ivory Coast," Stanford/WARDA Study of the Political Economy of Rice in West Africa, Food Research Institute, Stanford University, Stanford, September 1978.

2 John M. Page, Jr., and J. Dirck Stryker, "Comparative Costs and Incentives in West African Rice - an Introduction," Stanford/WARDA Study of the Political Economy of Rice in West Africa, Food Research Institute, Stanford University, Stanford, June 1978.

Table A-1.--Description of Techniques Used in Analysis

Designation	Description
F1	Traditional upland production, forest
F2	Improved upland production, manual, forest
F3	Improved irrigated lowland production, manual, forest
F4	Irrigated lowland production without modern inputs, manual, forest
F5	Improved irrigated lowland production, power-tiller, forest
F6	Improved irrigated lowland production, power-tiller and motorized thresher, forest
F7	Improved irrigated lowland production, power-tiller and cutter- binder, forest
F8	Improved irrigated lowland production, power-tiller, motorized thresher, and cutter-binder, forest
F9	Improved pump-irrigated production, tractor-combine, forest
F10	Traditional upland production, savannah
F11	Improved upland production, manual, savannah
F12	Improved upland production, ox-drawn, savannah
F13	Upland production without modern inputs, ox-drawn, savannah
F14	Improved upland production, tractor-combine, savannah
F15	Improved irrigated lowland production, manual, savannah
F16	Irrigated lowland production without modern inputs, manual, savannah
F17	Improved dam-irrigated production, manual, savannah
F18	Dam-irrigated production without modern inputs, manual, savannah
F19	Improved dam-irrigated production, tractor-combine, savannah
FM1	Assembly for on-farm consumption, forest and savannah
FM2	Assembly by farmers and government for government mills, forest and savannah
FM3	Private assembly for government mills, average distance, forest and savannah
FM4	Private assembly for government mills, long distance, forest and savannah
FM5	Private assembly for hullers, forest and savannah
M1	Hand-pounding, forest
M2	Hand-pounding, savannah
M3	Private small-scale steel-cylinder hullers, forest and savannah
M4	Large-scale government mills, forest and savannah
MC1	Distribution for on-farm consumption, forest
MC2	Distribution for on-farm consumption, savannah
MC3	Government distribution from forest to Abidjan
MC4	Government distribution from savannah to Abidjan
MC5	Government distribution from forest to Bouaké
MC6	Government distribution savannah to Bouaké
MC7	Private distribution from forest to Abidjan
MC8	Private distribution from savannah to Abidjan
MC9	Private distribution from forest to Bouaké
MC10	Private distribution from savannah to Bouaké
MC11	Private distribution for local consumption, forest
MC12	Private distribution for local consumption, savannah

Table B1.--Total Cost Summary of Farm Production Techniques*

(CFA francs per ha, unless otherwise indicated)

Technique	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market cost	Social minus private factor costs ^a	Total social cost ^b	Total social cost milled equivalent ^c	
						Tradables	Nontradables				(CFA francs/mt)	(\$US/mt)
F1	45,753	0	15,536	0	0	0	176	61,465	0	61,289	71,432	286
F2	54,303	10,634	22,820	5,303	11,382	-4,712	- 7,989	91,783	- 5,303	99,182	68,307	273
F3	111,570	17,861	52,770	12,379	18,113	-5,288	- 32,012	176,563	-12,380	201,483	87,222	349
F4	90,684	0	45,356	12,149	0	0	- 21,200	126,989	-12,149	136,040	85,884	344
F5	94,370	21,611	69,149	29,341	21,503	-5,378	- 35,323	196,442	-29,340	207,803	78,713	315
F6	91,220	21,619	69,659	29,341	24,803	-3,767	- 32,533	201,511	-29,341	208,470	78,966	316
F7	78,170	23,760	77,099	29,341	24,494	-3,516	- 33,383	197,135	-29,342	204,692	77,535	310
F8	75,020	23,773	78,210	29,341	27,794	-1,558	- 30,943	202,815	-29,370	205,975	78,021	312
F9	33,418	39,792	114,389	1,013	47,575	-1,497	-102,702	125,209	- 1,014	228,394	125,837	503
F10	26,520	0	7,663	0	0	0	99	34,264	0	34,165	58,203	233
F11	34,397	10,613	13,415	336	11,162	-4,814	- 8,686	56,670	- 336	69,834	70,539	282
F12	34,130	10,996	19,945	336	11,597	-4,684	- 10,716	61,497	- 335	76,562	64,446	258
F14	14,397	18,722	48,626	337	18,822	-3,483	- 27,617	70,051	- 337	100,814	76,374	305
F15	87,531	19,381	58,302	12,379	18,267	-5,064	- 36,036	154,760	-12,379	183,481	79,429	318
F16	70,364	0	50,146	12,221	0	0	- 25,200	107,531	-12,220	120,511	76,080	304
F17	91,728	20,742	93,617	17,221	18,715	-4,455	- 78,745	158,830	-17,221	224,809	85,155	341
F18	71,915	0	86,937	17,200	0	0	- 68,899	107,158	-17,201	158,856	89,145	357

* These production techniques are fully described in Table A. Cost data are based on information in the budgets in Tables H1-H17. Values for unskilled labor, skilled labor, capital, and land are based on private prices, exclusive of indirect taxes or subsidies. Tradable inputs are valued at c.i.f. import prices. These figures were taken from computer runs in September 1978, and, because of rounding or subsequent revisions, they may vary slightly from totals calculated from data which appear in the table H series.

^a This column measures the difference between private factor prices, exclusive of taxes, and factor costs at social opportunity costs. A minus sign indicates that market imperfections cause private prices to exceed social prices.

^b Total social costs equal the sum of factor costs at private prices and tradable inputs at c.i.f. prices, adjusted for taxes or subsidies and the difference between private and social factor costs explained in note a, above.

^c Paddy has been converted to rice using the government milling rate of 0.66 kg rice per kg paddy.

Table B2.--Total Cost Summary of Post-Harvest techniques*

Technique	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market cost	Social minus private factor costs	Total social cost	Total social cost milled equivalent	
						Tradables	Nontradables				(CFA francs/mt)	(\$US/mt)
FM1	0	0	0	1	0	0	0	0	0	0	0	0
FM2	3.07	2.34	3.08	0.12	1.72	0.33	- 1.10	9.56	0.12	10.21	15,470	61.88
FM3	1.89	4.03	1.98	0	1.37	0.73	0.35	10.35	0	9.27	14,045	56.18
FM4	1.86	5.44	2.46	0	2.14	1.08	0.61	13.58	0	11.9	18,030	72.12
FM5	2.16	2.89	1.85	0	0.86	0.51	0.23	8.5	0	7.76	12,317	49.27
M1	18.51	0	11.60	0	0	0	0.004	30.11	0	30.11	30,112	120.45
M2	18.17	0	12.24	0	0	0	0.005	30.42	0	30.42	30,416	121.66
M3	1.53	1.13	0.79	0	0.51	0.37	0.44	4.77	0	3.96	3,961	15.84
M4	2.78	3.18	3.86	0.18	3.43	1.24	-52.64	-39.97	-0.195	13.23	12,235	52.94
MC1	- 1.78	-8.59	- 6.07	0	0	0	0	-16.44	0	-16.44	-16,440	- 65.76
MC2	- 1.78	-9.47	- 6.33	0	0	0	0	-17.58	0	-17.58	-17,580	- 70.32
MC3	1.50	1.60	1.04	0	1.45	-1.45	- 5.49	- 1.35	0	5.59	5,590	22.36
MC4	1.50	1.60	1.04	0	1.95	-1.95	- 6.62	- 2.48	0	6.09	6,090	24.36
MC5	1.97	-1.33	- 0.09	0	1.05	-1.05	- 4.58	- 3.95	0	1.61	1,610	6.44
MC6	1.22	- 1.13	- 0.02	0	1.18	-1.18	- 4.86	- 4.79	0	1.25	1,251	5.00
MC7	2.92	- .60	1.05	0	1.14	0.51	0.38	5.40	0	4.51	4,510	18.04
MC8	3.79	- .60	1.31	0	1.64	0.73	0.53	7.39	0	6.14	6,140	24.56
MC9	1.94	-2.83	- 0.07	0	0.74	0.33	0.26	0.37	0	- 0.22	- 223	- 0.89
MC10	2.16	-2.83	- 0.01	0	0.86	0.38	0.30	0.86	0	0.18	180	0.72
MC11	0.68	-3.05	- 0.03	0	0.01	0.01	0.05	- 2.33	0	- 2.39	- 2,390	- 9.56
MC12	0.68	-3.93	- 0.29	0	0.01	0.01	0.05	- 3.47	0	- 3.53	- 3,530	- 14.12

* See the notes to Table B1.

"FM" refers to the paddy marketing and assembly activity. Values are expressed in CFA francs per kg paddy. Social costs in milled equivalent are converted from paddy using 0.66 kg rice per kg paddy for FM3 and FM4 and 0.63 for FM5.

"M" refers to rice milling. Values are expressed in CFA francs per kg rice.

"MC" refers to rice distribution from mills to consumers. All domestic factor costs have been reduced by the amount of labor, capital, and land used in landing and distributing imported rice, which will be saved by substituting local rice for imports.

Table B2 (continued)

These savings are summarized below, in CFA francs per kg rice:

<u>Alternatives</u>	<u>Unskilled land</u>	<u>Skilled land</u>	<u>Capital</u>
MC1	1.780	8.592	6.073
MC2	1.780	9.466	6.333
MC3, MC4, MC7, MC8	0.000	0.672	0.566
MC5, MC6, MC9, MC10	0.280	2.906	1.484
MC11	0.280	3.125	1.549
MC12	0.280	3.999	1.809

✓

Table C .--Costs of Land Development for Rice Production*

Type of land development	Type of production ^a	Initial cost (CFA francs/ha)	Average lifetime (years)	Average interest rate (percent)	Total annual annuity ^b (CFA francs per ha)	Crops per year	Cost per crop (CFA francs/ha/crop)	Subsidy per crop (CFA francs/ha/crop)
Forest, traditional upland	F1	13,500	2	15.000	8,304	1.0	8,304	0
Forest, improved upland	F2	18,000	2	15.000	11,072	1.0	11,072	0
Lowland with stumps	F3,F4,F15,F16	365,000	15	7.708	41,886	1.17/.99 ^c	35,800	22,645
Lowland without stumps	F5,F6,F7,F8	420,000	15	8.735	51,291	1.17 ^c	43,839	22,645
Pump irrigation, mechanized	F9	1,243,000	15.4	5.000	117,850	1.48 ^d	79,627	79,627
Savannah upland	F10,F11	7,000	4	15.000	2,452	1.0	2,452	0
Savannah, winch-cleared	F12	12,744	4	7.266	3,785	1.0	3,785	2,804
Savannah, mechanically cleared	F14	130,000	7	11.903	28,398	1.0	28,398	23,591
Savannah, dam irrigation	F17,F18	1,703,000	27	5.834	126,735	1.48 ^d	85,633	77,313

* These costs are based on information in the following sources: Charles P. Humphreys and Patricia L. Rader, Farm Survey, Gagnoa, 1977; Ivory Coast, Government of, Ministère de l'Agriculture, Direction Générale du Développement Agricole, Direction des Etudes et Programmes, Cellule Agro-économie, Le Role de l'Etat dans le Développement de la Production Rizicole, Abidjan, May 1976; Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne de Développement des Textiles (CIDT), "Cout de Production du Coton-Graine, Campagne 1976-1977," Reference: GE/kkv/626/77, Bouaké, 30 August 1977; CIDT, "Cout Total de la Culture d'un Hectare de Coton, Campagne 1975-1976," Reference GE/mbj/368/76, Bouaké, 16 June 1976; CIDT, Personal communication, Bouaké, December 1977; CIDT, Rapport Annuel 1975-1976; Rapport Général de Synthèse 1972-1976, Riz-Coton, Bouaké, May 1976; Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ, "Cout de l'Eau," Abidjan, 17 November 1975; SODERIZ, "Cout de Pompage," Reference No. 157/S/PI/JLI/ma, Abidjan, 31 January 1977; SODERIZ, "Note Concernant les Cout d'Entretien des Perimetres Irrigués," Reference No. 225/S/ DI/JLI/ma, Abidjan, 25 April 1977; SODERIZ, "Note Concernant les Prix Unitaires d'Amenagement pour la Riziculture Irriguée,"

Table C (continued).

Reference No. 153/S/DI/JLI/ma, Abidjan, 14 January 1977; SODERIZ, Personal communication, Abidjan, Gagnoa, Korhogo, and San Pedro, October 1977; SODERIZ, "Recapitulation 1er Tranche - Tronconnage en Régie Directe," San Pedro, 1975; SODERIZ, "Seminaire de Korhogo 15-18/9/76: Mise à Jour des Normes d'Amenagements et d'Infrastructures," Reference No. 115/JLI/ma, Abidjan, 14 September 1976; and World Bank, Regional Mission in West Africa, "Ivory Coast - Comparative Rice Study," by D. Aw and R. Gusten, Abidjan, October 1975.

^aSee Table A for a more complete description of these farm activities.

^bWhere land development is subsidized, this annuity is sum of the farmer's share (calculated at 15 percent annual real interest rate) and the government's share (calculated at 5 percent annual real interest rate).

^cThese figures refer to the forest (F3,F4) and savannah (F15,F16) zones, respectively. They are based on 1.3 crops per year in the forest and 1.1 in the savannah and 90 percent cultivable area.

^dThis figure is based on 1.85 crops per year and 80 percent cultivable area.

Table D1.--Costs of Equipment Operation*
(CFA francs per hour, unless otherwise indicated)

Equipment	Ha per year	Life-time (years)	Hours per year	Annuity ^a	Repairs	Fuel, oil ^b	Driver	Insurance ^c	Travel time	Administrative costs	Other	Total
Power-tiller, diesel, 15.5 hp	15	5	300	578	250 ^e	98	75	25	50	103		1,179
Mechanical thresher, gasoline, 4 hp	-- ^o	5	225	114	98 ^f	91	0	5	0	31		339
Cutter-binder diesel	25	5	200	929	402 ^e	130	75	40	50	188	1,879 ^g	2,117
Tractor, dryland diesel, 64 hp	70	5	750	616	261 ^e	479	326	26	60	171		1,939
Tractor, wetland diesel, 64 hp	70	5	750	678 ^h	288 ^e	479	326	29 ^h	63	180 ^h		2,043 ^h
Disk plow	70	7	--	815 ^h	707 ^{h,i}	0	0	47 ^h	0	157 ^h		1,726 ^h
Disk harrow	70	7	--	839 ^h	729 ^{h,i}	0	0	49 ^h	0	162 ^h		1,779 ^h
Tooth harrow	70	7	--	393 ^h	227 ^{h,j}	0	0	23 ^h	0	64 ^h		707 ^h
Seed drill	140	7	--	654 ^h	406 ^{h,k}	0	0	38 ^h	0	110 ^h		1,208 ^h
Fertilizer spreader	140	7	--	214 ^h	177 ^{h,f}	0	0	12 ^h	0	40 ^h		443 ^h
Sprayer	140	7	--	417 ^h	207 ^{h,l}	0	0	24 ^h	0	65 ^h		713 ^h
Trailor	--	7	400	451	112 ^m	0	0	26	0	59		648
Combine-harvester, dryland	135	5	400	4,990	3,457 ^h	863	326	216	345	985		11,182
Combine-harvester, wetland	265	5	400	5,889	4,079 ⁿ	863	326	255 ^h	399	1,141		12,952
Draft animals ^p	5	5	--	638 ^{h,q}	0	0	0	956 ^h	0	0	519 ^{h,r}	2,113
Harness ^p	5	2	--	686 ^h	)	0	0	0	0	0		783 ^s
Ox-plow ^p	5	7	--	2,284 ^h	)	0	0	0	0	0		2,607 ^s
Ox-harrow ^p	5	7	--	999 ^h	)	0	0	0	0	0		1,140 ^s
Ox-cart ^p	4	7	--	2,209 ^h	)	0	0	0	0	0		2,522 ^s

*The data in this table are derived from the following sources: Afrique Agriculture, No. 28, December 1977, p. 75; Yves Bigot, "La Mechanisation des Cultures en Region de Savanne de Cote d'Ivoire," Cahiers Ivorienne de Recherche Economiques et Sociale (Abidjan), No. 10, June 1976; C.I.A.O., "Catalogue," Abidjan, n.d.; Ivory Coast, Government of, Ministere de l'Agriculture, Societe pour le Developpement de la Riziculture (SODERIZ), "Attelage et Materiels de Culture-Attelee-Prix de Cession aux Paysans," Touba, 1976; SODERIZ, "Couts Elementaires Approximatifs d'un Attelage et Son Equipement pour la Campagne 1977," Touba, n.d.; SODERIZ, "Materiels Culture Atelee Touba, Prix de Cession aux Paysans," Abidjan, 15 January 1976 and 28 September 1977; SODERIZ, "Motoculteurs," No. 1225/DRC/76, Bouaké, June 1976; SODERIZ, personal communication, Abidjan and San Pedro, 1977; SODERIZ, "Plan de Financement d'une Exploitation en Culture Mecanisee," Reference DT/S-DP, Abidjan, September 1976; SODERIZ, "Prix de Cession des 23 Moissonneuses Batteuses Clayson Livrees en 1975," Reference DT/S/DP, Abidjan, 15 January 1976; SODERIZ, "Prix Differents Materiels Rendus Exploitation au 1/12/75,"

Notes to Table D1 (continued)

Reference SDACI/RS/GZ, Abidjan; SODERIZ, "Proposition pour un Reajustement des Coûts Standards des Tracteurs et Moissonneuses-Batteuses," Abidjan, n.d.; SODERIZ, Rapport Annuel, 1976, Abidjan, 1977; Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles (CIDT), "Calcul des Echeances - Paiement Matériel Culture Attelé," Bouaké, 4 February 1977; CIDT, "Coût de Production du Coton-Graine, Campagne 1976-1977," Reference GE/kkv/626/77, Bouaké, 30 August 1977; CIDT, "Coût Total de la Culture d'un Hectare de Coton, Campagne 1975-1976," Reference GE/mbj/368/76, Bouaké, 16 June 1976; CIDT, Agro-economie, Exploitations Cotonnières de Côte d'Ivoire, Bouaké, 1977; CIDT, personal communication, Bouaké, December 1977; CIDT, Rapport Annuel 1975-1976; Rapport Général de Synthèse 1972-1976, Riz-Coton, Bouaké, May 1976; Ivory Coast, Government of, Ministère du Plan, Exploitations Modernes Mécanisées en Zone de Savane de Côte d'Ivoire, by BNETD, BARA, CEEMAT, SEDES, 3 vols., Abidjan, December 1976; Pieces Imports-Exports, personal communication, Abidjan, 1978; and World Bank, Regional Mission in West Africa, "Ivory Coast - Comparative Rice Study," by D. Aw and R. Gusten, Abidjan, October 1975.

^aThe annuities are based on a 5 percent real interest rate.

^bFuel costs are based on a price of 65 CFA francs per liter of diesel, 100 CFA francs per liter of gasoline, and 208 CFA francs per liter of oil.

^cInsurance is valued at 1 percent of the equipment purchase price.

^dAdministrative costs are figured at 10 percent of operating costs.

^eThese repairs are based on a coefficient of 0.5 of the initial cost paid over the life of the equipment.

^fThese repairs are based on a coefficient of 1.0 of the initial cost, paid over the life of the equipment.

^gThis cost is for twine.

^hThese values are CFA francs per ha.

ⁱThese repairs are based on a coefficient of 1.05 of the initial cost, paid over the life of the equipment.

^jThese repairs are based on a coefficient of 1.7 of the initial cost, paid over the life of the equipment.

^kThese repairs are based on a coefficient of 0.75 of the initial cost, paid over the life of the equipment.

^lThese repairs are based on a coefficient of 0.6 of the initial cost, paid over the life of the equipment.

^mThese repairs are based on a coefficient of 0.3 of the initial cost, paid over the life of the equipment.

ⁿThese repairs are based on a coefficient of 0.8 of the initial cost, paid over the life of the equipment.

^oOutput is estimated at 0.2 mt paddy per hour.

^pOxen and equipment are often partly used for work other than cultivation. The following coefficients are used to account for share of time allocated to crop production: draft animals and harness, 0.85; ox-plow (ARARA) and ox-harrow, 1.0; and ox-cart, 0.75.

Notes to Table D1 (continued)

^qThis value is for interest charges only, since oxen are assumed not to depreciate in real value.

^rThis value includes veterinary service, medicine, salt, and herding. Three-fourths is subsidized.

^sThese values include repairs, which have been allocated to each implement in proportion to its annuity.

Table D2.--Investment Costs for Equipment*

Equipment	Value ^a (CFA francs)	Taxes (percent)
Power-tiller, diesel (15.5 hp)	751,000	11.1
Mechanical thresher, gasoline (4 hp)	111,000	10.5
Cutter-binder, diesel (10-15 hp, 1.27 m)	804,819	14.3
Tractor, dryland, diesel (64 hp)	1,977,554	19.8
Tractor, wetland, diesel (64 hp)	2,175,616	19.8
Disk plow (4 disks)	330,000	12.7
Disk harrow (20 disks)	340,000	12.7
Tooth harrow (SICAM H-80)	159,000	12.7
Seed drill (NODET, 3 m)	530,000	12.7
Fertilizer spreader	173,000	12.7
Sprayer	338,000	12.7
Trailer (6.5 mt capacity)	1,045,000	12.7
Combine-harvester, dryland (13 feet)	8,642,464	11.2
Combine-harvester, wetland (13 feet)	10,198,348	11.1
Draft animals (pair)	75,000	0.0
Harness ^c	7,500	0.0
Ox-plow (ARARA)	66,077	12.1
Ox-harrow	28,892	12.4
Ox-cart ^b	75,951	14.9

*For sources, see Table D1.

^aThis value does not take into account special credit schemes or purchase prices available only through government projects.

^bThe ox-cart is equipped with brakes, rubber tires, and wooden bed with sides.

Table E1.--Data on Small Farm Tools*

Tool	Number of tools per ha	Purchase price (CFA francs/tool)	Investment cost (CFA francs/ha)	Lifetime (years)
Axe (rainfed rice)	0.5	650	325	1
Spade ^a	0.25 ^b	750	188	1
Machette (rainfed rice, forest) ^c	0.9	606	545	1
Machette (rainfed rice, savannah) ^c	0.5	606	303	1
Machette (irrigated rice) ^c	2.1	606	1,273	1
Daba ^d (rainfed rice)	2.5	438 ^e	1,095	3
Daba ^d (irrigated rice)	4.2	679 ^e	2,852	3
Shovel ^c	0.25 ^b	850 ^e	213	3
Pick ^c	0.25 ^b	2,000	500	3
Rice pannicle knife	5.0 ^b	10	50	1
Sickles (rainfed)	1.0 ^b	150	150	2
Sickles (irrigated) ^c	1.3	320	416	3
Files (rainfed) ^c	0.5 ^b	300 ^e	300 ^f	0.5
Files (irrigated) ^c	1.0 ^b	300 ^e	600 ^f	0.5
Threshing basket	1.0 ^b	350	350	1
Earthen threshing floor	0.1	5,460 ^e	273	2

*The sources for information on tools include: Ivory Coast, Government of, Ministère de l'Agriculture, Direction Générale du Développement Agricole, Direction des Statistiques Rurales, Recensement Agricole, 3 volumes, Abidjan, September 1976; Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Centrale d'Achat "Tarif - C.A.P. 1975", Abidjan, no date; SODERIZ, Data forms for Terroirs-Tests, Touba, 1977; SODERIZ, Personal communication, Gagnoa, October 1977; Ivory Coast, Government of, Ministère de l'Economie et des Finances, Direction de la Statistique, Bulletin Mensuel de Statistique, Abidjan, monthly; and Charles P. Humphreys and Patricia L. Rader, Field surveys of farmers and markets, Gagnoa, 1977.

Footnotes for Table E1 (continued).

^aThis instrument is really a flattened and sharpened iron instrument attached to a long wooden pole, and it is used to fell palm trees. In French, it is called a "ciseau palmiste".

^bThis value has been estimated.

^cThese tools are considered to be imported, with taxes comprising 17.1 percent of final value. All others tools are considered to be made by artisans and not subject to taxation.

^dDaba is the local word for hoe.

^eThis value has been deflated from 1977 prices using the coefficient 0.84.

^fThis value equals the total annual cost to the farmer. It is the equivalent of assuming each file lasts 1 year, and assigning twice as many per ha.

Table E2.--Estimation of Small Farm Tool Cost^s

Farm production technique ^a	Tools used ^b (number per ha)	Total cost ^c (CFA francs)	Average life ^d (years)
F1,F2	2.5 dabas, 0.9 machette, 0.5 axe, 1 file, 5 rice knives, 0.25 spade, 1 basket, 0.1 threshing floor	3,675	1.38
F3,F4,F15,F16,F17,F18	4.2 dabas, 2.1 machettes, 1 file, 1.3 sickles, 0.25 shovel, 1 basket, 0.1 threshing floor	6,250	1.71
F5,F6,F7,F8	2.1 dabas, 2.1 machettes, 1 file, 1.3 sickles, 0.25 shovel, 1 basket, 0.1 threshing floor	4,824	1.52
F9,F14 ^e	1 machette, 1 sickle, 1 file	753	1.11
F10,F11	1.82 dabas, 1 machette, 0.5 axe, 1 sickle, 1 file, 1 basket, 0.1 threshing floor	2,746	1.47
F12	1 machette, 0.5 axe, 1 sickle, 1 file, 1 basket, 0.1 threshing floor	1,949	1.22

*See sources for Table E1.

^aThese techniques are described more fully in Table A.

^bTools are described in detail in Table E1.

^cThis total investment value is depreciated in all cases at a real annual rate of interest of 15 percent.

^dThe average life is calculated as the ratio of total investment cost to average annual cost where average annual cost equals the investment cost divided by the lifetime. In the case of files which have a life of 0.5 years, investment cost is set at twice the purchase price.

^eCosts for F9 are based solely on F14, with no adjustment made for the higher cropping intensity in F9.

Table F.--Recurrent Farm Labor Input^{*,a}

Labor task	Farm production technique ^b																	
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F14	F15	F16	F17	F18	
Soil preparation	0 ⁱ	0 ⁱ	50	50	2					0 ⁱ	0 ⁱ	12 ^j		50	50	50	50	
Nursery			2	2	2	2	2	2						2	2	2	2	
Seeding/transplanting	15	20	25	25	25	25	25	25	1	20	25	1	1	25	25	25	25	
Weedings	10	15	45	45	45	45	45	45	7	10	15	15	10	45	45	45	45	
Fertilizer application		3	3		3	3	3	3	)₄		3	3 ^j	1	3		3	
Pesticide application			2		2	2	2	2	)₄					2		2	
Fencing	10	10																
Guarding	20	15	10	10	10	10	10	10	10	20	15	15		10	10	10	10	
Water management			15	15	15	15	15	15	7 ^h					15	15	15	15	
Irrigation repair ^g			(8)		(8)	(8)	(8)	(8)	(8)					(8)	(8)	(8)	(8)	
Cutting ^c	)₅₂	13	21	14	24	24			)	)₂₄	9	11	)	21	14	24	16
Gathering ^c	)₅₂	13	21	14	24	24	12	12	)₅	)₂₄	9	11	)₃	21	14	24	16
Threshing ^d	9	15	25	17	28	21	28	21	)₅	6	10	13	)₃	25	17	28	19
Winnowing ^e	4	7	11	7	12	12	12	12	)	3	4	5	)	11	7	12	8
Drying		5	5	5	5	5	5	5			2	2		2	2	2	2	
Transport from field		5	5	5	5	5	5	5		2	5	2 ^j		5	5	5	5	
Total unskilled labor days	120	121	240	209	202	195	166	159	34	85	97	90	30	237	206	247	211	
(Total women days) ^f	(110)	(42)	(61)	(57)	(62)	(62)	(62)	(62)	0	(85)	(46)	(22)	(0)	(58)	(54)	(59)	(55)	
Power-tiller operation					20	20	20	20										
Binder operation							8	8										
Tractor operation									10.5				10.2					
Combine operation									3				1.5					
Total skilled labor hours	0	0	0	0	20	20	28	28	13.5	0	0	0	11.7	0	0	0	0	

*The sources for estimates of labor times are numerous, and often conflicting. The ones consulted and relied on most heavily are given below. Yves Bigot, "La Mécanisation des Cultures en Région de Savanne de Côte d'Ivoire," Cahiers Ivoiriens de Recherche Economiques et Sociale (Abidjan), No. 10, June 1976; Charles P. Humphreys and Patricia L. Rader, "Rapport sur la Transformation et la Commercialisation de Paddy et Riz par le Circuit Traditionnel au Mali," Abidjan, March-April 1977, draft; Charles P. Humphreys and Patricia L. Rader, Farm survey, Gagnoa, and San Pedro, 1977; Ivory Coast, Government of, Ministère de l'Agriculture, COMACI, "Coûts des Différentes Interventions Culturelles en Zone de Savane," Abidjan, April 1976; Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles (CIDT), Rapport Annuel 1975-1976; Rapport Général de Synthèse 1972-1976, Riz-Coton, Bouaké, May 1976; Ivory Coast, Government of,

Table F.(continued).

Ministère de l'Agriculture, Direction Générale du Développement Agricole, Direction des Etudes et Programmes, Cellule Agro-économie, Le Role de l'Etat dans le Développement de la Production Rizicole, Abidjan, May 1976; Ivory Coast, Government of, Ministère de l'Agriculture, Programme de Développement de la Riziculture Irrigué dans les Zones Forestière et de Bouaké, by BEI AGRER, Brussels, November 1970; Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), "Additif aux Contrats de Base - Cout de la Mécanisation 1976," Bouaké, January 1976; SODERIZ, "Contrat Riziculture et Prestations Mécanisées Complémentaires," Abidjan, 25 February 1976; SODERIZ, "Cout Mécanisation 1975," Abidjan, n.d.; SODERIZ, Direction Régionale, "Résultats Chiffrés des Terroirs de Touba - Année 1976," Bouaké, January 1977; SODERIZ, "Motoculteurs," Ref. 1225/DRC/76, Bouaké, June 1976; SODERIZ, Opération San Pedro, Rapport Annuel 1976, San Pedro, 1977; SIDERUZ, Personal communication, Abidjan, Gagnoa, and San Pedro, October 1977; SODERIZ, "Plan de Financement d'une Exploitation en Culture Mécanisée," Ref. DT/S-DP, Abidjan, September 1976; SODERIZ, Projet de Développement de la Riziculture des Bas-fonds en Zone Forestière - Addendum à l'étude de factibilité SODERIZ, Abidjan, 1975 or earlier; SODERIZ, Rapport Annuel 1976, Abidjan, 1977; Ivory Coast, Government of, Ministère du Plan, Département des Etudes de Développement, Essai d'Actualisation des Perspectives Décennals pour le Riz, Abidjan, 1968; Ministère du Plan, Département des Etudes de Développement, Sous Direction de la Plantification Economique, Travaux Préparatoires au Plan 1971-1975, 2^{ème} Esquisse: Les Objectives de Production Agricole - le Riz, Abidjan, 1969; Ministère du Plan, Exploitations Modernes Mécanisées en Zone de Savane de Cote d'Ivoire, by BNETD, BARA, CEEMAT, and SEDES, 3 vols., Abidjan, December 1976; and World Bank, Regional Mission in West Africa, "Ivory Coast - Comparative Rice Study," by D. Aw and R. Glusten, Abidjan, October 1975.

^a Unskilled labor input is in days of 5-8 hours. No adjustment has been made to man-day equivalents. Children sometimes do guarding, and women often seed, transplant, weed, winnow, and dry. Women are assumed to do all tasks in traditional production (F1 and F10). Skilled labor input is in hours. Harvesting labor is a function of the yields given in the Table C series.

^b For a complete description of these techniques, see Table A.

^c Except for traditional production, labor for cutting (sickle) and gathering is estimated at the rate of 12 labor days per mt paddy. In the forest zone, traditional pannicle harvesting with a finger-knife is estimated at the rate of 40 days per mt. In the savannah, one-half of traditional production is assumed to be cut with a sickle.

^d Threshing is estimated at the rate of 7 labor days per mt paddy, a rate which seems invariant regardless of the manual technique. In the case of pannicle harvesting and hand-pounding, threshing is an integral part of the milling; the times given here are estimates to make traditional and improved production comparable.

^e Winnowing is estimated at the rate of 3 labor days per mt paddy, and is always assumed to be manual.

^f Transplanting is not counted as a "woman-day" because wage rates for this task are comparable to those for men.

^g Maintenance of the irrigation system is in principle assured by the government and is excluded from the total.

^h Addition labor input is provided by the extension service to control the distribution of pumped water.

ⁱ Soil preparation time is included in seeding because the two tasks are performed concurrently.

Table F (continued).

^jThese tasks use oxen cultivation, at the rate of 2 men per ox-team, except for transport, where 1 man per ox-team is assumed.

Table G1.--Reference Prices for Imported Rice^{*a}

Consumption center	Relevant MC activities	Price (CFA francs/mt rice)
Abidjan, c.i.f.	n.a.	75,000
Abidjan, landed ^{b,c}	3,4,7,8	75,121
Bouaké ^{b,d}	5,6,9,10	77,699
Daloa (forest, local) ^{b,d}	11	77,824
Korhogo (savannah, local) ^{b,d}	12	78,324
Forest farms ^e	1	79,834
Savannah farms ^e	2	80,334

* C.i.f, import prices are based on Walter P. Falcon and Eric M. Monke, "The World Market for Rice in the 1980s," Stanford/WARDA Study of the Political Economy of Rice in West Africa, Food Research Institute, Stanford University, Stanford, forthcoming, and Charles P. Humphreys and Patricia L. Rader, "Background Data on the Ivorian Rice Economy," Stanford/WARDA Study of the Political Economy of Rice in West Africa, Food Research Institute, Stanford, June 1978, p. 12. Other prices are derived from the distribution costs estimated for the distribution budgets (the K series of tables).

^aThe rice contains 25-35 percent broken. Prices are for 1975 and exclude all indirect taxes and domestic costs.

^bThese prices are comparable to wholesale buying prices.

^cThis price includes the c.i.f. price plus the tradable component of transit costs.

^dIn addition to the c.i.f. value of rice, these prices include transit costs, transport, handling, storage costs and working capital for one month, and insecticide treatment.

^eFarmer prices include transit costs, transport, handling, storage costs and working capital for one month, insecticide treatments, official marketing margins, and an estimate of consumer shopping costs. These prices are used to analyze the profitability of rice production for hand-pounding and on-farm consumption.

Table G2.--Private Prices*

Marketing stage	On-farm, hand-pounding	Small-scale hullers	Far from government mills	Close to government mills
Farm price (CFA francs/kg paddy) ^a	52	50	60	65
Mill purchase price (CFA francs/kg paddy)	52 ^b	59	75	75
Mill selling price (CFA francs/kg rice)	103	99	87 ^c	87 ^c
Equivalent wholesale buying price (CFA francs/kg rice)	103	100/104 ^d	87 ^e	87 ^e

* Available price data are taken from Charles P. Humphreys and Patricia L. Rader, "Background Data on the Ivorian Rice Economy," Stanford/WARDA Study of the Political Economy of Rice in West Africa, Food Research Institute, Stanford University, Stanford, June 1978, p. 15, or Humphreys, Field observations, Abidjan, Bouaké, Gagnoa, and Man, 1976-77. Margins used to estimate prices not observed directly are based on data in the collection budgets (series I tables), the milling budgets (series J tables), and the distribution budgets (series K tables).

^aThe low price refers to isolated farmers (50 or more km from government mills). The higher price refers to farmers close enough to receive the official government price. Buyers paying the higher price are assumed to sell to government mills. Prices in this range have been reported by Ivory Coast, Government of, Ministère de l'Agriculture, Direction des Statistiques Rurales, Commercialisation des Produits Agricoles, Abidjan, monthly. For example, during 1976, the average paddy price in small markets was 53 CFA francs per kg.

^bThe collect and distribution activities are non-existent for hand-pounding.

^cGovernment milling costs are subsidized.

^dThe price of 104 implies a retail price of local rice of about 110 CFA francs/kg, which is actually observed in the markets. A price of 100 is used for rice custom-hulled rice for producers' home consumption, which is a price consistent with retail selling prices.

^eThe distribution cost (mainly transport to Abidjan) is fully subsidized by the Caisse Générale de Péréquation des Prix des Produits et Merchandises de Grande Consommation.

Table G3.--Shadow Prices of Primary Factors by Region^{*}

Primary factor	Region ^a	
	Forest	Savannah
Unskilled labor (<u>CFA francs/day</u>)		
Men	450	350
Women	350	275
Children	n.a.	n.a.
Skilled labor (<u>ratio of shadow to market wage</u>)	1.0	1.0
Capital (real percent interest rates)		
Government funds (SODERIZ)	5	5
Agricultural development bank funds - farmer loans	8	8
Investments by farmers using own funds	15	15
Short-term financing by farmers using own funds	25	25
Land (<u>CFA francs/hectare</u>)	0	0

* Wage data are based on extensive interviews with farmers and laborers by Charles P. Humphreys and Patricia L. Rader, Field survey, Gagnoa, 1977, and on Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), personal communications, Abidjan, Gagnoa, Man, and San Pedro, 1977. The difference between men and women is based on data from SODERIZ, Data forms for Terroirs-Tests, Touba, 1977. The interest rate information comes from: Ivory Coast, Government of, Banque Nationale pour le Développement Agricole (BNDA), "Barème des Taux Debiteurs Applicables à Compter du 1.07.75," Abidjan; Ivory Coast, Government of, Banque Nationale pour le Développement Agricole (BNDA) Personal Communication, Abidjan and Gagnoa, 1977 and 1978; and from information collected from farmers and merchants by Humphreys and Rader. For a more extensive discussion of shadow pricing, see J. Dirck Stryker, John M. Page, Jr., and Charles P. Humphreys, "Estimating Shadow Prices in West African Agriculture," Stanford/WARDA Study of the Political Economy of Rice in West Africa, Food Research Institute, Stanford University, Stanford, August 1978.

^aThe savannah zone is defined to include the following departments: Bondoukou, Bouaké, Bouna, Boundiali, Ferkessédougou, Katiola, Korhogo, Odienné, Séguéla, and Touba.

Table H1.--Farm Production Budget *

F1: Forest, traditional upland
(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	120	43,000							43,000
2. Seed ^a		2,753		1,097					3,850
3. Fertilizer									0
4. Insecticides									0
5. Herbicides									0
6. Interest and depreciation									
A. Working capital ^b				3,160				9	3,169
B. Small tools				2,976				167	3,143
C. Animals									0
D. Animal implements									0
E. Mechanical equipment									0
F. Land improvement				8,304					8,304
7. Operation and maintenance									0
A. Animals									0
B. Animal implements									0
C. Tractors									0
D. Combine-harvesters									0
E. Power-tillers									0
F. Mechanical equipment									0
G. Land improvements									0
8. Extension services									0
9. Fixed charges									0
10. Land rent									0
11. Other costs									0
Total costs		45,753	0	15,537	0	0	0	176	61,466

Yield (mt/ha) 1.3; farm market price 50/65^c; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 61,290; per metric ton milled product equivalent 71,434.

Table H1 (continued)

* The yield for F1 is based on: Ivory Coast, Government of, Ministère de l'Agriculture, Direction Générale du Développement Agricole, Direction des Statistiques Rurales, Recensement Agricole, 3 volumes, Abidjan, September 1976; and Ivory Coast, Government of, Ministère de l'Agriculture, Société d'Assistance Technique pour la Modernisation Agricole de la Côte d'Ivoire (SATMACI), Etude sur la Commercialisation et la Consommation du Riz en Côte d'Ivoire, by Société d'Etudes pour le Développement Economique et Sociale, Paris, January 1968. Labor costs are based on times and wages given in Table F. Interest and depreciation costs for tools and land are given in Tables C and E.

^a A seeding rate of 70 kg/ha is assumed, valued at 55 CFA francs/kg.

^b Working capital is calculated at a 25% real annual rate of interest over 3 months for labor and 6 months for seeds.

^c The following farm market prices are used in the calculations: government purchases- 65 CFA francs/kg paddy; on-farm consumption (hand-pounding)- 52 CFA francs/kg paddy; and sales to merchants for hulling- 50 CFA francs/kg paddy.

Table H2.--Farm Production Budget *

F2: Forest, improved upland
(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	121	50,250							50,250
2. Seed ^a		3,964	1,125	2,254	336	1,209	218	-18	9,088
3. Fertilizer ^b		89	3,156	2,694		9,545	-369	486	15,601
4. Insecticides									0
5. Herbicides									0
6. Interest and depreciation									
A. Working capital ^c				4,434				49	4,483
B. Small tools				2,976				167	3,143
C. Animals									0
D. Animal implements									0
E. Mechanical equipment									0
F. Land improvement				11,072					11,072
7. Operation and maintenance									
A. Animals									0
B. Animal implements									0
C. Tractors									0
D. Combine-harvesters									0
E. Power-tillers									0
F. Mechanical equipment									0
G. Land improvements									0
8. Extension services ^d			6,205	479		290	196	675	7,845
9. Fixed charges ^e							-4,889	-9,490	-14,379
10. Land rent					5,000				5,000
11. Other costs									
Total costs		54,303	10,486	23,909	5,336	11,044	-4,844	-8,131	92,103

Yield (mt/ha) 2.2; farm market price 50/60^f; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 99,742; per metric ton milled product equivalent 68,692.

Footnotes to Table H2

*The yield for F2 is based on Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), personal communications, Gagnoa and San Pedro, 1977; and SODERIZ, Crop cutting data forms, Gagnoa, 1976. Direct labor input is taken from Table F. Costs of seeds, fertilizers, and extension have been estimated from the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles, Bilan de l'Opération Engrais, Campagne 1976-1977, Bouaké, n.d.; Ivory Coast, Government of, Ministère de l'Agriculture, SODERIZ, Centrale d'Achat, "Tarif - C.A.P. 1975," Abidjan, n.d.; SODERIZ, "Coûts Forfaitaires SODERIZ, 1976," Abidjan, 1976; SODERIZ, personal communication, Abidjan, 1977; SODERIZ, "Prix de Revient des Engrais et Coût des Contrats de Base Riziculture en 1976," Abidjan, 2 November 1975; SODERIZ, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976; Société Ivoirienne d'Engrais, personal communication, Abidjan, 1978; and Société Tropicale d'Engrais et de Produits Chimiques, personal communication, Abidjan, 20 January 1978. Information for land investment and small tools is given in Tables C and E, respectively. Land rent is based on Charles P. Humphreys and Patricia L. Rader, Farm Survey, Gagnoa, 1977.

^a60 kg of selected seeds are used per ha.

^bApplication rates for fertilizers are 75 kg urea (46 percent) per ha and 150 kg complex fertilizer (10-18-18) per ha.

^cWorking capital equals the interest cost on labor over 3 months at 25 percent interest, and on seeds, fertilizers, and extension over 9 months at 5 percent interest.

^dExtension density is assumed to be 100 ha per agent. Costs include transport and immediate supervision.

^eFixed charges refer to the net farm-level subsidy, which equals the delivery cost of selected seeds, fertilizers, and extension minus the farmer participation fee of 22,750 CFA francs/ha. It is divided into subsidies on tradables and non-tradables in proportion to which tradables, plus indirect taxes on tradables, and domestic factors, plus indirect taxes on non-tradables, are of the total delivery cost, respectively. The subsidy includes a 10 percent exoneration from repayment owing to crop failures.

^fSee note c, Table H1.

26

Table H3.--Farm Production Budget *
 F3: Forest, improved lowland-irrigated
 (CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	240	101,900							101,900
2. Seed ^a		2,832	757	1,424	540	709	178	-381	6,059
3. Fertilizer ^b		89	3,162	2,688	0	9,545	-439	481	15,526
4. Insecticides ^c			1,262	819		6,919	1,749	321	11,070
5. Herbicides									0
6. Interest and depreciation									
A. Working capital ^d				8,496				151	8,647
B. Small tools				4,132				278	4,410
C. Animals									0
D. Animal implements									0
E. Mechanical equipment									0
F. Land improvement				34,078				1,722	35,800
7. Operation and maintenance									
A. Animals									0
B. Animal implements									0
C. Tractors									0
D. Combine-harvesters									0
E. Power-tillers									0
F. Mechanical equipment									0
G. Land improvements		6,749	1,422	787		361	-60	182	9,441
8. Extension services ^e			12,410	957		580	392	1,349	15,688
9. Fixed charges ^f							-7,186	-36,243	-43,429
10. Land rent					11,845				11,845
11. Other costs									
Total costs		111,570	19,013	53,381	12,385	18,114	-5,366	-32,140	176,957

Yield (mt/ha) 3.5^g; farm market price 50/65^h; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 202,078; per metric ton milled product equivalent 87,480.

Footnotes to Table H3.

*Yields for F3 are based on: Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Crop cutting data forms, Gagnoa, 1976; SODERIZ, Personal communication, Abidjan, Gagnoa, Korhogo, and San Pedro, October 1977; SODERIZ, Rapport Annuel, 1976, Abidjan, 1977; and Charles P. Humphreys and Patricia L. Rader, Field Survey, Gagnoa, 1977. Direct labor input is taken from Table F. Costs of seeds, fertilizers, insecticides, and extension services have been estimated from the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles, Bilan de l'Opération Engrais, Compagne 1976-1977, Bouaké, n.d.; Ivory Coast, Government of, Ministère de l'Agriculture, SODERIZ, Centrale d'Achat, "Tarif - C.A.P. 1975," Abidjan, n.d.; SODERIZ, "Coûts Forfaitaires SODERIZ, 1976," Abidjan, 1976; SODERIZ, personal communication, Abidjan, 1977; SODERIZ, "Prix de Revient des Engrais et Coût des Contrats de Base Riziculture en 1976," Abidjan, 2 November 1975; SODERIZ, Service Administratif - Centrale d'Achat: "Tarifs de Transport," Abidjan, 10 December 1976; Société Ivoirienne d'Engrais, personal communication, Abidjan, 1978; and Société Tropicale d'Engrais et de Produits Chimiques, personal communication, Abidjan, 20 January 1978. Costs of irrigation maintenance are based primarily on Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Centre de Formation, "La Riziculture en Côte d'Ivoire," Reference No. 23/CF/NDF, Bouaké, 14 January 1976, and SODERIZ, "Note Concernant les Coûts d'Entretien des Perimetres Irrigués," Reference 225/s/di/jli/ma, Abidjan, 25 April 1977. Information for land investment and small tools is given in Tables C and E, respectively. Land rent is based on Charles P. Humphreys and Patricia L. Rader, Farm Survey, Gagnoa, 1977.

^a40 kg of selected seeds are used per ha.

^bApplication rates for fertilizers are 75 kg urea (46 percent) per ha and 150 kg complex fertilizer (10-18-18) per ha.

^c28 kgs per ha of agranulated systemic insecticide called Furadan is applied in two doses.

^dWorking capital equals the interest cost on labor over 3 months at 25 percent interest, and on seeds, fertilizers, insecticides, irrigation maintenance, and extension services over 9 months at 5 percent interest.

^eExtension density is assumed to be 50 ha per agent. Costs include transport and immediate supervision.

^fFixed charges refer to the net farm-level subsidy, which equals the delivery cost of selected seeds, fertilizers, insecticides, irrigation maintenance, and extension services minus the farmer participation fee of 42,250 CFA francs/ha. It is divided into subsidies on tradables and non-tradables in proportion to which tradables, plus indirect taxes on tradables, and domestic factors, plus indirect taxes on non-tradables, are of the total delivery cost, respectively. The subsidy includes a 5 percent exoneration from repayment owing to crop failures.

^gThis yield takes some account of the fact that yields in the second cycle are about 1 mt per ha less than yields in the first cycle. As such it assumes that about 30 percent of the land is double-cropped.

^hSee note c, Table H1.

Table H4.--Farm Production Budget *

F4: Forest, irrigated lowland without modern inputs

(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
2. Seed ^a	209	88,350							88,350
3. Fertilizer		2,334		1,147	306			-536	3,251
4. Insecticides									
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^b				5,995				-67	5,928
B. Small tools				4,132				278	4,410
C. Animals									
D. Animal implements									
E. Mechanical equipment									
F. Land improvement				34,078				1,722	35,800
7. Operation and maintenance									
A. Animals									
B. Animal implements									
C. Tractors									
D. Combine-harvesters									
E. Power-tillers									
F. Mechanical equipment									
G. Land improvements									
8. Extension services									
9. Fixed charges								-22,645	- 22,645
10. Land rent					11,845				11,845
11. Other costs									
Total costs		90,684		45,352	12,151			-21,248	126,939

Yield (mt/ha) 2.4^c; farm market price 50/65^d; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 136,036; per metric ton milled product equivalent 85,881.

Footnotes to Table H4.

*Yields for F4 are based on the differences between fertilized and unfertilized production, as reported in: Ivory Coast, Government of, Ministère de l'Agriculture, Direction des Statistiques Rurales, "Enquete Riz dans la Zone Bandama-Solomougou, 1976," Abidjan, 1977, preliminary; "Enquête Riz Irrigué de 2ème Cycle 1975-1976, Zone Bandama-Solomougou," Abidjan, August 1976; Ivory Coast, Government of, Ministère de l'Agriculture, Direction de la Documentation et des Statistiques Rurales, Service Statistiques Rurales, Korhogo, "Riziculture de 1^o Cycle, Zone Bandama-Solomougou," no place, October 1974; Service Statistiques Rurales de Korhogo, "Enquête Riz 2ème Cycle, Zone Bandama-Solomougou, 1972-1973," Korhogo, 10 April 1973; Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Crop cutting data forms, Gagnoa, 1976; and SODERIZ, Rapport Annuel, 1976, Abidjan, 1977. Direct labor input is taken from Table F. Information for land improvement and small tools is given in Tables C and E, respectively. Land rent is based on Charles P. Humphreys and Patricia L. Rader, Field Survey, Gagnoa, 1977.

^a A seeding rate of 50 kg per ha is assumed, which is higher than for F3 because seeds are not tested. Costs are decomposed using the proportions of total costs for this technique, minus the cost of seeds.

^b Working capital equals the interest cost on labor over 3 months and on seeds over 6 months, calculated at a rate of 25 percent per year.

^c This yield is roughly two-thirds the yield on fertilized irrigated rice.

^d See note c, Table H1.

Table H5. Farm Production Budget*.

F5: Forest, irrigated lowland, power-tiller

(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	202	84,700							84,700
2. Seed ^a		2,832	757	1,424	540	709	178	-381	6,059
3. Fertilizer ^b		89	3,162	2,688	0	9,545	-439	481	15,526
4. Insecticides ^c			1,262	819		6,919	1,749	321	11,070
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^d				4,293				269	4,562
B. Small tools				3,471				306	3,777
C. Animals									
D. Animal implements									
E. Mechanical equipment				10,300				1,280	11,580
F. Land improvement				41,964				1,875	43,839
7. Operation and maintenance									
A. Animals									
B. Animal implements									
C. Tractors									
D. Combine-harvesters									
E. Power-tillers			3,760	2,700		3,400	1,320	820	12,000
F. Mechanical equipment									
G. Land improvements		6,749	1,422	787		361	-60	182	9,441
8. Extension services ^e			12,410	957		580	392	1,349	15,688
9. Fixed charges ^f							-8,587	-41,847	-50,434
10. Land rent					28,806				28,806
11. Other costs									
Total costs		94,370	22,773	69,403	29,346	21,514	-5,447	-35,345	196,614

Yield (mt/ha) 4.0^g; farm market price 50/65^h; ratios of shadow price to market price for unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 208,060; per metric ton milled product equivalent 78,811.

Footnotes for Table H5.

*Yields for F5 are based mainly on: Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Crop cutting data forms, Gagnoa, 1976; SODERIZ, Data forms for Terroirs-Tests, Touba, 1977; SODERIZ, Personal communication, Abidjan, Gagnoa, and San Pedro, October 1977; and SODERIZ, Rapport Annuel, 1976, Abidjan, 1977. Direct labor input is taken from Table F. Costs of seeds, fertilizers, insecticides, and extension services have been estimated from the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles, Bilan de l'Opération Engrais, Campagne 1976-1977, Bouaké, n.d.; Ivory Coast, Government of, Ministère de l'Agriculture, SODERIZ, Centrale d'Achat, "Tarif - C.A.P. 1975," Abidjan, n.d.; SODERIZ, "Coûts Forfaitaires SODERIZ, 1976," Abidjan, 1976; SODERIZ, personal communication, Abidjan, 1977; SODERIZ, "Prix de Revient des Engrais et Coût des Contrats de Base Riziculture en 1976," Abidjan, 2 November 1975; SODERIZ, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976; Société Ivoirienne d'Engrais, personal communication, Abidjan, 1978; and Société Tropicale d'Engrais et de Produits Chimiques, personal communication, Abidjan, 20 January 1978. Costs of irrigation maintenance are based primarily on Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Centre de Formation, "La Riziculture en Côte d'Ivoire," Reference No. 23/CF/NDF, Bouaké, 14 January 1976, and SODERIZ, "Note Concernant les coûts d'Entretien des Perimetres Irrigués," Reference 225/s/di/jli/ma, Abidjan, 25 April 1977. Information for land investment, power-tillers, and small tools is given in Tables C, D, and E, respectively. Land rent is based on Charles P. Humphreys and Patricia L. Rader, Farm Survey, Gagnoa, 1977. The fixed charges for the power-tiller are based on SODERIZ, "Additif aux Contrats de Base - Coût de la Mécanisation 1976," Bouaké, January 1976, and SODERIZ, "Motoculteurs," No. 1225/DRC/76, Bouaké, June 1976.

^a 40 kg of selected seeds are used per ha.

^b Application rates for fertilizers are 75 kg urea (46 percent) per ha and 150 kg complex fertilizer (10-18-18) per ha.

^c 28 kg per ha of a granulated, systemic insecticide called Furadan is applied in two doses.

^d Working capital equals the interest cost of labor over 3 months at an 8 percent real annual rate of interest, on costs of seeds, fertilizers, insecticides, irrigation maintenance, and extension services over 9 months at a 5 percent real annual rate of interest, and on costs of power-tillers over 6 months at a 5 percent real annual rate of interest. The working capital on labor assumes farmers obtain hungry-season loans from the Banque Nationale pour le Développement Agricole.

^e Extension density is assumed to be 50 ha per agent. Costs include transport and immediate supervision.

^f Fixed charges refer to the net farm-level subsidy, which equals the delivery cost of selected seeds, fertilizers, insecticides, irrigation maintenance, extension services, and power-tiller operation, minus the farmer participation fee of 42,250 CFA francs/ha and the charge for the power-tiller of 17,000 CFA francs/ha. It is divided into subsidies on tradables and non-tradables in proportion to which tradables, plus indirect taxes on tradables, and domestic factors, plus indirect taxes on non-tradables, are of the total delivery cost, respectively. The subsidy includes a 5 percent exoneration from repayment for current inputs (excluding power-tiller charges) in case of crop failure.

^g The yield for production using power-tillers has been somewhat arbitrarily assumed to exceed the yield of F3 by 0.5 mt/ha.

^h See note c, Table H1.

Table H6.--Farm Production Budget*

F6: Forest, irrigated lowland, power tiller and motorized thresher
(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	195	81,550							81,550
2. Seed ^a		2,832	757	1,424	540	709	178	-381	6,059
3. Fertilizer ^b		89	3,162	2,683	0	9,545	-439	481	15,526
4. Insecticides ^c			1,262	819		6,919	1,749	321	11,070
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^d				4,250				274	4,524
B. Small tools				3,475				306	3,781
C. Animals									
D. Animal implements									
E. Mechanical equipment				10,657				1,322	11,979
F. Land improvement				41,964				1,875	43,839
7. Operation and maintenance									
A. Animals									
B. Animal implements									
C. Tractors									
D. Combine-harvesters									
E. Power-tillers			3,760	2,700		3,400	1,320	820	12,000
F. Mechanical equipment ^e			712	2,164		1,471	718	468	5,533
G. Land improvements		6,749	1,422	787		361	-60	182	9,441
8. Extension services ^f			12,410	957		580	392	1,349	15,688
9. Fixed charges ^g							-8,842	-39,593	-48,435
10. Land rent					28,806				28,806
11. Other costs									
Total costs		91,220	23,485	71,885	29,346	22,985	-4,984	-32,576	201,361

Yield (mt/ha) 4.0^h; farm market price 50/65ⁱ; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 1, and foreign exchange 1; total social cost per hectare 209,575; per metric ton milled product equivalent 79,384.

Footnotes to Table H6.

*Yields for F6 are the same as for F5 and are based mainly on: Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Crop cutting data forms, Gagnoa, 1976; SODERIZ, Data forms for terroirs-tests, Touba, 1977; SODERIZ, Personal communication, Abidjan, Gagnoa, and San Pedro, October 1977; and SODERIZ, Rapport Annuel, 1976, Abidjan, 1977. Direct labor input and equipment times are taken from Table F. Costs of seeds, fertilizers, insecticides, and extension services have been estimated from the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles, Bilan de l'Opération Engrais, Campagne 1976-1977, Bouaké, n.d.; Ivory Coast, Government of, Ministère de l'Agriculture, SODERIZ, Centrale d'Achat, "Tarif - C.A.P. 1975," Abidjan, n.d.; SODERIZ, "Coûts Forfaitaires SODERIZ, 1976," Abidjan, 1976; SODERIZ, personal communication, Abidjan, 1977; SODERIZ, "Prix de Revient des Engrais et Coût des Contrats de Base Riziculture en 1976," Abidjan, 2 November 1975; SODERIZ, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976; Société Ivoirienne d'Engrais, personal communication, Abidjan, 1978; and Société Tropicale d'Engrais et de Produits Chimiques, personal communication, Abidjan, 20 January 1978. Costs of irrigation maintenance are based primarily on Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Centre de Formation, "La Riziculture en Cote d'Ivoire," Reference No. 23/CF/NDF, Bouaké, 14 January 1976, and SODERIZ, "Note Concernant les couts d'Entretien des Perimetres Irrigués," Reference 225/s/di/jli/ma, Abidjan, 25 April 1977. Information for land investment is given in Table C, for power-tillers and motorized threshers in Table D, and for small tools in Table E, respectively. Land rent is based on Charles P. Humphreys and Patricia L. Rader, Farm Survey, Gagnoa, 1977. The fixed charges for the power-tiller are based on SODERIZ, "Additif aux Contrats de Base - Cout de la Mécanisation 1976," Bouaké, January 1976, and SODERIZ, "Motoculteurs," No. 1225/DRC/76, Bouaké, June 1976. The fixed charge for the motorized-thresher is based on SODERIZ, Opération San Pedro, Rapport Annuel 1976, San Pedro, 1977.

^a40 kg of selected seeds are used per ha.

^bApplication rates for fertilizers are 75 kg urea (46 percent) per ha and 150 kg complex fertilizer (10-18-18) per ha.

^c28 kg per ha of a granulated, systemic insecticide called Furadan is applied in two doses.

^dWorking capital equals the interest cost on labor over 3 months at an 8 percent real annual rate of interest, on costs of seeds, fertilizers, insecticides, irrigation maintenance, and extension services over 9 months at a 5 percent real annual rate of interest and on costs of power-tillers and motorized threshers over 6 months and 1 month, respectively, at a 5 percent real annual rate of interest. The working capital on labor assumes farmers can obtain hungry-season loans from the Banque Nationale pour le Développement Agricole.

^eMechanical equipment is a motorized thresher, which is estimated to have a capacity of 0.2 mt paddy per hour.

^fExtension density is assumed to be 50 ha per agent. Costs include transport and immediate supervision.

^gFixed charges refer to the net farm-level subsidy, which equals the delivery cost of selected seeds, fertilizers, insecticides, irrigation maintenance, extension services, and power-tiller and thresher operation, minus the farmer participation fee of 42,250 CFA francs/ha, the charge for the power-tiller of 17,000 CFA francs/ha, and the charge for the motorized-thresher of 2,250 CFA francs/mt paddy. They are divided into subsidies on tradables and non-tradables in proportion to which tradables, plus indirect taxes on tradables, and domestic factors, plus indirect taxes on non-tradables, are of the total delivery cost, respectively. The subsidy includes a 5 percent exoneration from repayment for current inputs (excluding power-tiller and motorized-thresher charges) in case of crop failure.

34

Footnotes to Table H6 (continued)

^hThe yield for production using power-tillers has been somewhat arbitrarily assumed to exceed the yield of F3 by 0.5 mt/ha.

ⁱSee note c, Table H1.

Table H7.--Farm Production Budget*

F7: Forest, irrigated lowland, power-tiller and cutter-binder
(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	166	68,500							68,500
2. Seed ^a		2,832	757	1,424	540	709	178	-381	6,059
3. Fertilizer ^b		89	3,162	2,688	0	9,545	-439	481	15,526
4. Insecticides ^c			1,262	819		6,919	1,749	321	11,070
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^d				4,018				291	4,309
B. Small tools				3,475				306	3,781
C. Animals									
D. Animal implements									
E. Mechanical equipment				16,668				2,344	19,012
F. Land improvement				41,964				1,875	43,839
7. Operation and maintenance									
A. Animals									
B. Animal implements									
C. Tractors									
D. Combine-harvesters									
E. Power-tillers			3,760	2,700		3,400	1,320	820	12,000
F. Mechanical equipment ^e			2,144	1,616		2,984	2,200	560	9,504
G. Land improvements		6,749	1,422	787		361	-60	182	9,441
8. Extension services ^f			12,410	957		580	392	1,349	15,688
9. Fixed charges ^g							-8,933	-41,646	-50,579
10. Land rent					28,806				28,806
11. Other costs									
Total costs		78,170	24,917	77,116	29,346	24,498	-3,593	-33,498	196,956

Yield (mt/ha) 4.0^h; farm market price 50/65ⁱ; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 1, and foreign exchange 1; total social cost per hectare 204,701; per metric ton milled product equivalent 77,538.

Footnotes to Table H7.

*Yields for F7 are the same as for F5 and are based mainly on: Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Crop cutting data forms, Gagnoa, 1976; SODERIZ, Data forms for Terroirs-Tests, Touba, 1977; SODERIZ, Personal communication, Abidjan, Gagnoa, and San Pedro, October 1977; and SODERIZ, Rapport Annuel, 1976, Abidjan, 1977. Direct labor input and equipment times are taken from Table F. Costs of seeds, fertilizers, insecticides, and extension services have been estimated from the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles, Bilan de l'Opération Engrais, Campagne 1976-1977, Bouaké, n.d.; Ivory Coast, Government of, Ministère de l'Agriculture, SODERIZ, Centrale d'Achat, "Tarif - C.A.P. 1975," Abidjan, n.d.; SODERIZ, "Coûts Forfaitaires SODERIZ, 1976," Abidjan, 1976; SODERIZ, personal communication, Abidjan, 1977; SODERIZ, "Prix de Revient des Engrais et Coût des Contrats de Base Riziculture en 1976," Abidjan, 2 November 1975; SODERIZ, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976; Société Ivoirienne d'Engrais, personal communication, Abidjan, 1978; and Sociétéropicale d'Engrais et de Produits Chimiques, personal communication, Abidjan, 20 January 1978. Costs of irrigation maintenance are based primarily on Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Centre de Formation, "La Riziculture en Côte d'Ivoire," Reference No. 23/CF/NDF, Bouaké, 14 January 1976, and SODERIZ, "Note Concernant les coûts d'Entretien des Perimetres Irrigués," Reference 225/s/di/jli/ma, Abidjan, 25 April 1977. Information for land investment is given in Table C, for power-tillers and cutter-binders in Table D, and for small tools in Table E, respectively. Land rent is based on Charles P. Humphreys and Patricia L. Rader, Farm Survey, Gagnoa, 1977. The fixed charges for the power-tiller are based on SODERIZ, "Additif aux Contrats de Base - Coût de la Mecanisation 1976," Bouaké, January 1976, and SODERIZ, "Motoculteurs," No. 1225/DRC/76, Bouaké, June 1976.

^a40 kg of selected seeds are used per ha.

^bApplication rates for fertilizers are 75 kg urea (46 percent) per ha and 150 kg complex fertilizer (10-18-18) per ha.

^c28 kg per ha of a granulated, systemic insecticide called Furadan is applied in two doses.

^dWorking capital equals the interest cost on labor over 3 months at an 8 percent real annual rate of interest, on costs of seeds, fertilizers, insecticides, irrigation maintenance, and extension services over 9 months at a 5 percent real annual rate of interest and on costs of power-tillers and cutter-binders over 6 months and 1 month, respectively, at a 5 percent real annual rate of interest. The working capital on labor assumes farmers can obtain hungry season loans from the Banque Nationale pour le Développement Agricole.

^eMechanical equipment is a motorized cutter-binder.

^fExtension density is assumed to be 50 ha per agent. Costs include transport and immediate supervision.

^gFixed charges refer to the net farm-level subsidy, which equals the delivery cost of selected seeds, fertilizers, insecticides, irrigation maintenance, extension services, and power-tiller cutter-binder operation, minus the farmer participation fee of 42,250 CFA francs/ha and the charges for the power-tiller cutter-binder of 17,000 CFA francs/ha each. It is divided into subsidies on tradables and non-tradables in proportion to which tradables, plus indirect taxes on tradables, and domestic factors, plus indirect taxes on non-tradables, are of the total delivery cost, respectively. The subsidy includes a 5 percent exoneration from repayment for current inputs (excluding power-tiller cutter-binder charges) in case of crop failure. The fixed charge for the cutter-binder is assumed to be approximately equal to the real operating costs, since this equipment is not currently being used.

Footnotes to Table H7 (continued).

^hThe yield for production using power-tillers has been somewhat arbitrarily assumed to exceed the yield of F3 by 0.5 mt/ha.

ⁱSee note c, Table H1.

Table H8.--Fama Production Budget*

F8: Forest, irrigated lowland, power-tiller, motorized thresher, and cutter-binder
(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	159	65,350							65,350
2. Seed ^a		2,832	757	1,424	540	709	178	-381	6,059
3. Fertilizer ^b		89	3,162	2,688	0	9,545	-439	481	15,526
4. Insecticides ^c			1,262	819		6,919	1,749	321	11,070
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^d				3,975				296	4,271
B. Small tools				3,475				306	3,781
C. Animals									
D. Animal implements									
E. Mechanical equipment				17,025				2,386	19,411
F. Land improvement				41,964				1,875	43,839
7. Operation and maintenance									
A. Animals									
B. Animal implements									
C. Tractors									
D. Combine-harvesters									
E. Power-tillers			3,760	2,700		3,400	1,320	820	12,000
F. Mechanical equipment ^e			2,856	3,780		4,455	2,918	1,028	15,037
G. Land improvements		6,749	1,422	787		361	-60	182	9,441
8. Extension services ^f			12,410	957		580	392	1,349	15,688
9. Fixed charges ^g							-8,842	-39,593	- 48,435
10. Land rent					28,806				28,806
11. Other costs									
Total costs		75,020	25,629	79,594	29,346	25,969	-2,784	-30,930	201,844

Yield (mt/ha) 4.0^h; farm market price 50/65ⁱ; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 1, and foreign exchange 1; total social cost per hectare 206,212; per metric ton milled product equivalent 78,111.

39

Footnotes to Table H8.

*Yields for F8 are the same as for F5 and are based mainly on: Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Crop cutting data forms, Gagnoa, 1976; SODERIZ, Data forms for Terroirs-Tests, Touba, 1977; SODERIZ, Personal communication, Abidjan, Gagnoa, and San Pedro, October 1977; and SODERIZ, Rapport Annuel, 1976, Abidjan, 1977. Direct labor input and equipment times are taken from Table F. Costs of seeds, fertilizers, insecticides, and extension services have been estimated from the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles, Bilan de l'Opération Engrais, Campagne 1976-1977, Bouaké, n.d.; Ivory Coast, Government of, Ministère de l'Agriculture, SODERIZ, Centrale d'Achat, "Tarif - C.A.P. 1975," Abidjan, n.d.; SODERIZ, "Coûts Forfaitaires SODERIZ, 1976," Abidjan, 1976; SODERIZ, personal communication, Abidjan, 1977; SODERIZ, "Prix de Revient des Engrais et Coût des Contrats de Base Riziculture en 1976," Abidjan, 2 November 1975; SODERIZ, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976; Société Ivoirienne d'Engrais, personal communication, Abidjan, 1978; and Société Tropicale d'Engrais et de Produits Chimiques, personal communication, Abidjan, 20 January 1978. Costs of irrigation maintenance are based primarily on Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Centre de Formation, "La Riziculture en Côte d'Ivoire," Reference No. 23/CF/NDF, Bouaké, 14 January 1976, and SODERIZ, "Note Concernant les coûts d'Entretien des Perimetres Irrigués," Reference 225/s/di/jli/ma, Abidjan, 25 April 1977. Information for land investment is given in Table C, for power-tillers, motorized-threshers, and binders in Table D, and for small tools in Table E, respectively. Land rent is based on Charles P. Humphreys and Patricia L. Rader, Farm Survey, Gagnoa, 1977. The fixed charges for the power-tiller are based on SODERIZ, "Additif aux Contrats de Base - Coût de la Mécanisation 1976," Bouaké, January 1976, and SODERIZ, "Motoculteurs," No. 1225/DRC/76, Bouaké, June 1976. The fixed charge for the motorized thresher is based on SODERIZ, Opération San Pedro, Rapport Annuel, 1976, San Pedro, 1977.

^a 40 kg of selected seeds are used per ha.

^b Application rates for fertilizers are 75 kg urea (46 percent) per ha and 150 kg complex fertilizer (10-18-18) per ha.

^c 28 kg per ha of a granulated, systemic insecticide called Furadan is applied in two doses.

^d Working capital equals the interest cost on labor over 3 months at an 8 percent real annual rate of interest. Working capital on costs of seeds, fertilizers, insecticides, irrigation maintenance, and extension services is calculated over 9 months, on costs of power-tillers over 6 months, and on costs of motorized-threshers and binders over 1 month, all at a 5 percent real annual rate of interest. The working capital on labor assumes farmers can obtain hungry season loans from the Banque Nationale pour le Développement Agricole.

^e Mechanical equipment includes a motorized cutter-binder and a motorized thresher. The thresher has an estimated capacity of 0.2 mt paddy per hour.

^f Extension density is assumed to be 50 ha per agent. Costs include transport and immediate supervision.

^g Fixed charges refer to the net farm-level subsidy, which equals the delivery cost of selected seeds, fertilizers, insecticides, irrigation maintenance, extension services, and operation of power-tillers, motorized threshers, and binders, minus the farmer participation fee of 42,250 CFA francs/ha, minus the charges for the power-tiller and binder of 17,000 CFA francs/ha each, and minus the charge for the motorized-thresher of 2,250 CFA francs/mt paddy. It is divided into subsidies on tradables and non-tradables in proportion to which tradables, plus indirect taxes on tradables, and domestic factors, plus indirect taxes on non-tradables, are of the total delivery cost, respectively.

Footnotes to Table H8 (continued).

The subsidy includes a 5 percent exoneration from repayment for current inputs (excluding charges for power-tillers, binders, and motorized threshers) in case of crop failure. The fixed charge for the binder is assumed to be approximately equal to the real operating costs, since this equipment is not currently being used.

^hThe yield for production using power-tillers has been somewhat arbitrarily assumed to exceed the yield of F3 by 0.5 mt/ha.

ⁱSee note c, Table H1.

Table H9.--Farm Production Budget*

F9: Forest, improved pump-irrigation, tractor

(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	34	15,300							15,300
2. Seed ^a		5,310	1,420	2,670	1,012	1,329	333	-714	11,360
3. Fertilizer ^b		89	3,162	2,638		9,545	-367	481	15,598
4. Insecticides ^c		11	1,251	819		6,919	1,749	321	11,070
5. Herbicides ^d			754	649		5,672	1,461	303	8,839
6. Interest and depreciation									
A. Working capital ^e				3,766				477	4,243
B. Small tools				678				108	786
C. Animals									
D. Animal implements									
E. Mechanical equipment				21,380				3,432	24,812
F. Land improvement				63,790				15,845	79,635
7. Operation and maintenance									
A. Animals									
B. Animal implements									
C. Tractors			6,913	4,392		4,926	2,771	1,868	20,870
D. Combine-harvesters			5,246	7,495		6,955	2,331	1,859	23,886
E. Power-tillers									
F. Mechanical equipment ^f			607	642		845	208	178	2,480
G. Land improvements		5,928	1,249	691		317	-53	160	8,292
8. Extension services ^g			12,410	957		580	392	1,349	15,688
9. Fixed charges ^h							-17,346	-130,657	-148,003
10. Land rent									
11. Other costs ⁱ		6,780		3,861		10,490	7,021	2,250	30,402
Total costs		33,418	33,012	114,478	1,012	47,578	-1,500	-102,740	125,258

Yield (mt/ha) 2.75; farm market price 50/65^j; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 228,486; per metric ton milled product equivalent 125,887.

Footnotes to Table H9 (continued).

^hFixed charges refer to the net farm-level subsidy, which equals the delivery cost of selected seeds, fertilizers, insecticides, herbicides, irrigation maintenance, extension services, operation of mechanical equipment, and pumped irrigation water, minus the farmer participation fee of 42,250 CFA francs/ha, the fixed charge for mechanical equipment of 51,000 CFA francs/ha, and the fixed charge for irrigation water of 15,600 CFA francs/ha. The fixed charges are divided into subsidies on tradables and non-tradables in proportion to which tradables, plus indirect taxes on tradables, and domestic factors, plus indirect taxes on non-tradables, are of the total delivery cost, respectively. The subsidy does not include any exoneration from repayment for current inputs in case of crop failure. The addition of herbicides does not augment the farmer participation fee.

ⁱThe costs of pumped irrigation water is based on 2.027 CFA francs per meter cubed (M³) water and the use of 15,000 M³/ha. Annuity charges on the investment in pumping facilities is not included, because it is combined with the capital cost of land improvement. The recurrent pumping costs are derived from the following estimates (in CFA francs/M³ water):

repairs	0.563
fuel, oil	1.031
mechanic	0.140
insurance	0.045
administration	0.248

Repair costs assume 12.5 percent per year of the purchase price of the pump and installation. Fuel costs assume an output of 13.3 M³ water/hp/hour, or 0.016 liters fuel/M³ water, valued at 65 CFA francs per liter. Oil consumption is assumed to equal 0.045 fuel consumption, valued at 250 CFA francs per liter. The mechanic is costed in 1976 prices at 840,000 CFA francs per year, deflated by 0.926 to 1975. Insurance is estimated at 1 percent per year of the purchase price of the pump and installation. Administration is assumed to equal 10 percent of other operating costs, including the annuity on the investment. Other norms used in the calculation include:

size of pump	140 hp
capacity	500-700 liters/second
efficiency of water delivery	60 percent
water delivered per ha	15,000 M ³ /ha/crop
ha served per pump	250

^jSee note c, Table H1.

Footnotes to Table H9.

*Yields for F9 are based on results reported in Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Rapport Annuel, 1976, Abidjan, 1977. Direct labor input and equipment hours are taken from Table F. Costs of seeds, fertilizers, insecticides, herbicides, and extension services have been estimated from the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles, Bilan de l'Opération Engrais, Campagne 1976-1977, Bouaké, n.d.; Ivory Coast, Government of, Ministère de l'Agriculture, SODERIZ, Centrale d'Achat, "Tarif - C.A.P. 1975," Abidjan, n.d.; SODERIZ, "Coûts Forfaitaires SODERIZ, 1976," Abidjan, 1976; SODERIZ, "Note Indicative sur la Plaine Alloriale de l'Opération Yabra," Yamoussokro, 1976; SODERIZ, personal communication, Abidjan and San Pedro, 1977; SODERIZ, "Prix de Revient des Engrais et Coût des Contrats de Base Riziculture en 1976," Abidjan, 2 November 1975; SODERIZ, Rapport Annuel 1975, Abidjan, 1976; SODERIZ, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976; Société Ivoirienne d'Engrais, personal communication, Abidjan, 1978; Société Tropicale d'Engrais et de Produits Chimiques, personal communication, Abidjan, 20 January 1978; and SOPACO, personal communication, Abidjan, 1978. Costs of irrigation maintenance are based primarily on Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Centre de Formation, "La Riziculture en Côte d'Ivoire," Reference No. 23/CF/NDF, Bouaké, 14 January 1976, and SODERIZ, "Note Concernant les coûts d'Entretien des Perimetres Irrigués," Reference 225/s/di/jli/ma, Abidjan, 25 April 1977. Information for land investment is given in Table C. Data for tractors, combine-harvesters and motorized equipment is found in Table D. Details for small tools is given in Table E. The costs of pump operation are estimated from data in the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), "Coût de Pompage," Reference No. 157/S/DI/JLI/ma, Abidjan, 31 January 1977; SODERIZ, "Note Concernant les Coûts d'Entretien des Perimetres Irrigués," Reference 225/s/di/jli/ma, Abidjan, 25 April 1977; SODERIZ, personal communication, Abidjan, San Pedro, and Yamoussokro, 1977; and SODERIZ, "Seminaire de Korhogo 15-18/9/76: Mise à Jour des Normes d'Amenagements et d'Infrastructures," Reference 115/JLI/ma Abidjan, 14 September 1976. The fixed charges for mechanical services and pumped irrigated water are derived from: Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), "Note Indicative sur la Plaine Alluviale de l'Opération Yabra," Yamoussokro, 1976; SODERIZ, personal communication, San Pedro, October 1977; and SODERIZ, Rapport Annuel, 1975, Abidjan, 1976.

^a 75 kg of selected seeds are used per ha.

^b Application rates for fertilizers are 75 kg urea (46 percent) per ha and 150 kg complex fertilizer (10-18-18) per ha.

^c 28 kg per ha of a granulated, systemic insecticide called Furadan is applied in two doses.

^d Two herbicides are used: 2-4-D at 1.25 liters/ha, and Propanil at 8 liters/ha.

^e Working capital equals the interest cost on labor over 3 months at an 8 percent real annual rate of interest, on costs of seeds, fertilizers, insecticides, herbicides, irrigation maintenance, and extension services, over 9 months at a 5 percent real annual rate of interest, and on costs of mechanical services and pumped irrigation water over 3 months at a 5 percent real annual rate of interest. The working capital on labor assumes farmers can obtain hungry season loans from the Banque Nationale pour le Développement Agricole.

^f The mechanical equipment other than tractors and combine-harvesters includes disk plows (4 disks), disk harrows (20 disks), and tooth harrows. A trailer (6.5 mt capacity) is used 1.5 hours/ha.

^g Extension density is assumed to be 50 ha per agent. Costs include transport and immediate supervision.

Table H10.--Farm Production Budget *

F10: Savannah, unimproved upland
(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	85	23,375							23,375
2. Seed ^a		3,145		980					4,125
3. Fertilizer									
4. Insecticides									
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^b				1,977				6	1,983
B. Small tools				2,259				89	2,348
C. Animals									
D. Animal implements									
E. Mechanical equipment									
F. Land improvement				2,452					2,452
7. Operation and maintenance									
A. Animals									
B. Animal implements									
C. Tractors									
D. Combine-harvesters									
E. Power-tillers									
F. Mechanical equipment									
G. Land improvements									
8. Extension services									
9. Fixed charges									
10. Land rent									
11. Other costs									
Total costs		26,520		7,668				95	34,283

Yield (mt/ha) 0.89; farm market price 50/65^c; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 34,188; per metric ton milled product equivalent 58,202.

45

Footnotes to Table H10.

*Yields for F10 are estimated from data reported in Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles (CIDT), Rapport Annuel 1975-1976; Rapport Général de Synthèse 1972-1976, Riz-Coton, Bouaké, May 1976; Ivory Coast, Government of, Ministère de l'Agriculture, Direction Générale du Développement Agricole, Direction des Statistiques Rurales, Recensement Agricole, 3 volumes, Abidjan, September 1976; Ivory Coast, Government of, Ministère de l'Agriculture, Société d'Assistance Technique pour la Modernisation Agricole de la Côte d'Ivoire (SATMACI), Etude sur la Commercialisation et la Consommation du Riz en Côte d'Ivoire, by Société d'Etudes pour le Développement Economique et Sociale (SEDES), Paris, January 1968; Ivory Coast, Government of, Ministère de la Recherche Scientifique, Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT), Groupement d'Etude et de Recherche pour le Développement de l'Agronomie Tropicale (GERDAT), "Bakopla, Rapport Analytique 1975," Bouaké, June 1976; and GERDAT, "Tomono, Rapport Analytique 1975," Bouaké, September 1976. Labor costs are based on times and wages given in Table F. The seeding rate is based on World Bank, Regional Mission in West Africa, "Ivory Coast - Comparative Rice Study," by D. Aw and R. Gusten, Abidjan, October 1975. Interest and depreciation costs for land clearing and small tools are given in Tables C and E, respectively.

^aA seeding rate of 70 kg/ha is assumed, valued at 55 CFA francs per kg.

^bWorking capital is calculated at a 25 percent real annual rate of interest over 3 months for direct labor and 6 months for seeds.

^cSee note c to Table H1.

Table H11.--Farm Production Budget*

F11: Savannah, improved upland

(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	97	30,500							30,500
2. Seed ^a		3,718	1,371	2,254	336	1,209	218	-18	9,088
3. Fertilizer ^b		179	3,283	2,755		9,666	-314	518	16,087
4. Insecticides									
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^c				3,215				53	3,268
B. Small tools				2,259				89	2,348
C. Animals									
D. Animal implements									
E. Mechanical equipment									
F. Land improvement				2,452					2,452
7. Operation and maintenance									
A. Animals									
B. Animal implements									
C. Tractors									
D. Combine-harvesters									
E. Power-tillers									
F. Mechanical equipment									
G. Land improvements									
8. Extension services ^d			6,206	478		290	196	675	7,845
9. Fixed charges ^e							-4,913	-10,032	-14,945
10. Land rent									
11. Other costs									
Total costs		34,397	10,860	13,413	336	11,165	-4,813	-8,715	56,643

Yield (mt/ha) 1.5; farm market price 50/65^f; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 69,835; per metric ton milled product equivalent 70,540.

Footnotes to Table H11.

*Yields for F11 are based mainly on data from Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Personal communication, San Pedro, October 1977, and SODERIZ, Rapport Annuel, 1976, Abidjan, 1977. Direct labor input is taken from Table F. Costs of seeds, fertilizers, and extension services have been estimated from the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles, Bilan de l'Opération Engrais, Campagne 1976-1977, Bouaké, n.d.; Ivory Coast, Government of, Ministère de l'Agriculture, SODERIZ, Centrale d'Achat, "Tarif - C.A.P. 1975," Abidjan, n.d.; SODERIZ, "Coûts Forfaitaires SODERIZ, 1976," Abidjan, 1976; SODERIZ, personal communication, Abidjan, 1977; SODERIZ, "Prix de Revient des Engrais et Coût des Contrats de Base Riziculture en 1976," Abidjan, 2 November 1975; SODERIZ, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976; Société Ivoirienne d'Engrais, personal communication, Abidjan, 1978; and Société Tropicale d'Engrais et de Produits Chimiques, personal communication, Abidjan, 20 January 1978. Information for land investment and small tools is given in Tables C and E, respectively.

^a60 kg of selected seeds are used per ha.

^bApplication rates for fertilizers are 75 kg urea (46 percent) per ha and 150 kg complex fertilizer (10-18-18) per ha.

^cWorking capital equals the interest cost on labor over 3 months at a 25 percent annual rate of interest, and on seeds, fertilizers, and extension services over 9 months at a 5 percent annual rate of interest.

^dExtension density is assumed to be 100 ha per agent. Costs include transport and immediate supervision.

^eFixed charges refer to the net farm-level subsidy, which equals the delivery cost of selected seeds, fertilizers, and extension minus the farmer participation fee of 22,750 CFA francs/ha. It is divided into subsidies on tradables and non-tradables in proportion to which tradables, plus indirect taxes on tradables, and domestic factors, plus indirect taxes on non-tradables, are of the total delivery cost, respectively. The subsidy includes a 10 percent exoneration from repayment owing to crop failures.

^fSee note c, Table H1.

FD

Table H12.--Farm Production Budget *

F12: Savannah, improved upland, ox-drawn
(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	90	29,850							29,850
2. Seed ^a		3,718	1,371	2,254	336	1,209	218	-18	9,088
3. Fertilizer ^b		179	3,283	2,755		9,666	-314	518	16,087
4. Insecticides									
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^c				1,926				53	1,979
B. Small tools				1,766				99	1,865
C. Animals ^d				638				-23	615
D. Animal implements ^e				5,375				-674	4,701
E. Mechanical equipment									
F. Land improvement				3,449				336	3,785
7. Operation and maintenance									
A. Animals		245		1,078		76	37	39	1,475
B. Animal implements		138		228		359	88	63	876
C. Tractors									
D. Combine-harvesters									
E. Power-tillers									
F. Mechanical equipment									
G. Land improvements									
8. Extension services ^f			6,206	478		290	196	675	7,845
9. Fixed charges ^g							-4,913	-13,271	-18,184
10. Land rent									
11. Other costs									
Total costs		34,130	10,860	19,947	336	11,600	-4,688	-12,203	59,982

Yield (mt/ha) 1.8; farm market price 50/65^h; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 76,537; per metric ton milled product equivalent 64,425.

Footnotes to Table H12.

*Yields for F12 are based on results reported in Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles (CIDT), Rapport Annuel 1975-1976; Rapport Général de Synthèse 1972-1976, Riz-Coton, Bouaké, May 1976; Ivory Coast, Government of, Ministère de la Recherche Scientifique, Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (IRAT), Groupement d'Etude et de Recherche pour le Développement de l'Agronomie Tropicale (GERDAT), "Bakopla, Rapport Analytique 1975," Bouaké, June 1976. Direct labor input is taken from Table F. Costs of seeds, fertilizers, and extension services have been estimated from the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles, Bilan de l'Opération Engrais, Campagne 1976-1977, Bouaké, n.d.; Ivory Coast, Government of, Ministère de l'Agriculture, SODERIZ, Centrale d'Achat, "Tarif - C.A.P. 1975," Abidjan, n.d.; SODERIZ, "Coûts Forfaitaires SODERIZ, 1976," Abidjan, 1976; SODERIZ, personal communication, Abidjan, 1977; SODERIZ, "Prix de Revient des Engrais et Coût des Contrats de Base Riziculture en 1976," Abidjan, 2 November 1975; SODERIZ, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976; Société Ivoirienne d'Engrais, personal communication, Abidjan, 1978; and Société Tropicale d'Engrais et de Produits Chimiques, personal communication, Abidjan, 20 January 1978. Data for animals and animal implements are summarized in Table D. Information for land investment and small tools is given in Tables C and E, respectively.

^a60 kg of selected seeds are used per ha.

^bApplication rates for fertilizers are 75 kg urea (46 percent) per ha and 150 kg complex fertilizer (10-18-18) per ha.

^cWorking capital equals the interest cost on labor over 3 months at a 8 percent annual rate of interest, and on seeds, fertilizers, and extension services over 9 months at a 5 percent annual rate of interest. The interest on labor assumes that farmers obtain hungry-season loans from the Banque National pour le Développement Agricole (BNDA).

^dThe subsidy occurs because farmers are assumed to obtain financing during 4 years at a 3.5 percent real annual rate of interest instead of at the government project rate of 5 percent.

^eThe subsidy on animal implements occurs both because the purchase price of equipment is subsidized and because preferential interest (3.5 percent real annual rate) is provided on plows, harrows, and carts during the first 4 years. Otherwise, participating farmers are assumed to have access to credit from the government project at a real annual rate of 5 percent to finance this equipment.

^fExtension density is assumed to be 100 ha per agent. Costs include transport and immediate supervision.

^gFixed charges refer to the net farm-level subsidy, which equals the delivery cost of selected seeds, fertilizers, and extension services minus the farmer participation fee of 22,750 CFA francs/ha. It is divided into subsidies on tradables and non-tradables in proportion to which tradables, plus indirect taxes on tradables, and domestic factors, plus indirect taxes on non-tradables, are of the total delivery cost, respectively. The subsidy includes a 10 percent exoneration from repayment in case of crop failures.

^hSee note c, Table H1.

Table H13.--Farm Production Budget*

F14: Savannah, improved upland, tractor

(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	30	10,500							10,500
2. Seed ^a		3,718	1,371	2,254	336	1,209	218	-18	9,088
3. Fertilizer ^b		179	3,283	2,755		9,666	-314	518	16,087
4. Insecticides									
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^c				1,959				151	2,110
B. Small tools				678				108	786
C. Animals									
D. Animal implements									
E. Mechanical equipment ^d				14,622				2,511	17,133
F. Land improvement				22,328				4,946	27,274
7. Operation and maintenance									
A. Animals									
B. Animal implements									
C. Tractors			2,331	2,177		3,036	1,057	688	9,289
D. Combine-harvesters			5,004	1,864		3,540	2,037	1,050	13,495
E. Power-tillers									
F. Mechanical equipment ^d			770	815		1,084	268	228	3,165
G. Land improvements									
8. Extension services ^e			6,206	478		290	196	675	7,845
9. Fixed charges ^f							-6,948	-38,424	-45,372
10. Land rent									
11. Other costs									
Total costs		14,397	18,965	49,930	336	18,825	-3,486	-27,567	71,400

Yield (mt/ha) 2.0; farm market price 50/65^g; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 102,117; per metric ton milled product equivalent 77,361.

Footnotes to Table H13.

*Yields for F14 production are based on data given in Ivory Coast, Government of, Ministère de l'Agriculture, Campagne Ivoirienne pour le Développement des Textiles (CIDT), Rapport Annuel 1975-1976; Rapport Général de Synthèse 1972-1976, Riz-Coton, Bouaké, May 1976; and Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Rapport Annuel, 1976, Abidjan, 1977. Direct labor input is taken from Table F. Costs of seeds, fertilizers, and extension services have been estimated from the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Campagne Ivoirienne pour le Développement des Textiles, Bilan de l'Opération Engrais, Campagne 1976-1977, Bouaké, n.d.; Ivory Coast, Government of, Ministère de l'Agriculture, SODERIZ, Centrale d'Achat, "Tarif - C.A.P. 1975," Abidjan, n.d.; SODERIZ, "Coûts Forfaitaires SODERIZ, 1976," Abidjan, 1976; SODERIZ, personal communication, Abidjan, 1977; SODERIZ, "Prix de Revient des Engrais et Coût des Contrats de Base Riziculture en 1976," Abidjan, 2 November 1975; SODERIZ, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976; Société Ivoirienne d'Engrais, personal communication, Abidjan, 1978; and Société Tropicale d'Engrais et de Produits Chimiques, personal communication, Abidjan, 20 January 1978. Information about mechanical equipment is summarized in Table D. Information for land investment and small tools is given in Tables C and E, respectively. The fixed charges for the motorized operations is based on Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), "Additif aux Contrats de Base - Coût de la Mécanisation 1976," Bouaké, January 1976; and SODERIZ, "Contrat Riziculture et Prestations Mécanisées Complémentaires," Abidjan, 25 February 1976.

^a 60 kg of selected seeds are used per ha.

^b Application rates for fertilizers are 75 kg urea (46 percent) per ha and 150 kg complex fertilizer (10-18-18) per ha.

^c Working capital equals the interest cost on labor over 3 months at an 8 percent real annual rate of interest, on seeds, fertilizers, and extension services over 9 months at a 5 percent real annual rate of interest and on tractors, combine-harvesters, and mechanical equipment over 3 months at a 5 percent real annual rate of interest. The working capital on labor assumes that farmers can obtain hungry-season loans from the Banque Nationale pour le Développement Agricole (BNDA).

^d Motorized operations include plowing, harrowing, planting, spreading fertilizer, harvesting, and transport. The utilisation of mechanical equipment other than tractors and combine-harvesters has been costed on a per ha basis for disk plows (4 disks), disk harrows (20 disks), tooth harrows, seed drills (3 meters), and fertilizer spreaders. Trailors (6.5 mt capacity) are assumed to be used for one hour per ha.

^e Extension density is assumed to be 100 ha per agent. Costs include transport and immediate supervision.

^f Fixed charges refer to the net farm-level subsidy, which equals the delivery cost of selected seeds, fertilizers, extension services, and motorized operations, minus the farmer participation fee of 22,750 CFA francs/ha and the charge for the mechanical services of 35,750 CFA francs per ha. It is divided into subsidies on tradables and non-tradables in proportion to which tradables, plus indirect taxes on tradables, and domestic factors, plus indirect taxes on non-tradables, are of the total delivery cost, respectively. The subsidy includes a 10 percent exoneration from repaying the participation fee (excluding mechanization charges) if the crop fails.

^g See note c, Table H1.

Table H14 .--Farm Production Budget*

F15: Savannah, improved lowland, irrigation

(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	237	78,600							78,600
2. Seed ^a		2,796	793	1,424	540	709	178	- 381	6,059
3. Fertilizer ^b		179	3,283	2,755		9,666	- 314	518	16,087
4. Insecticides ^c		9	1,282	835		6,936	1,759	312	11,133
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^d				7,038				156	7,194
B. Small tools				4,132				278	4,410
C. Animals									
D. Animal implements									
E. Mechanical equipment									
F. Land improvement				40,274				2,035	42,309
7. Operation and maintenance									
A. Animals									
B. Animal implements									
C. Tractors									
D. Combine-harvesters									
E. Power-tillers									
F. Mechanical equipment									
G. Land improvements ^e		5,947	1,609	890		405	-68	207	8,990
8. Extension services ^f			12,410	958		550	392	1,350	15,660
9. Fixed charges ^g							-7,017	-40,615	- 47,632
10. Land rent ^h					11,845				11,845
11. Other costs									
Total costs		87,531	19,377	58,306	12,325	18,266	-5,070	-36,140	154,655

Yield (mt/ha) 3.5; farm market price 50/65ⁱ; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 183,480; per metric ton milled product equivalent 79,429.

Footnotes to Table H14.

*Yields for production technique F15 are based on data reported in Ivory Coast, Government of, Ministère de l'Agriculture, Direction de la Documentation et des Statistiques Rurales, Service Statistiques Rurales de Korhogo, "Enquête Riz 2ème Cycle, Zone Bandama-Solomogou, 1972-73," Korhogo, 10 April 1973; Ivory Coast, Government of, Ministère de l'Agriculture, Direction de la Documentation et des Statistiques Rurales, Service Statistiques Rurales, Korhogo, "Riziculture de 1^o Cycle, Zone Bandama-Solomogou," no place, October 1974; Ivory Coast, Government of, Ministère de l'Agriculture, Direction des Statistiques Rurales, "Enquête Riz Irrigué de 2ème Cycle 1975-76, Zone Bandama-Solomogou," Abidjan August 1976; Ivory Coast, Government of, Ministère de l'Agriculture, Direction des Statistiques Rurales, "Enquête Riz dans la Zone Bandama-Solomogou, 1976," Abidjan, 1977, preliminary; and Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Rapport Annuel, 1976, Abidjan, 1977. Direct labor input is taken from Table F. Costs of seeds fertilizers, insecticides, and extension services have been estimated from the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des textiles, Bilan de l'Opération Engrais, Campagne 1976-1977, Bouaké, n.d.; SODERIZ, Centrale d'Achat, "Tarif - C. 2. 1975," Abidjan, n.d.; SODERIZ, "Coûts Forfaitaires SODERIZ, 1976," Abidjan, 1976; SODERIZ, personal communication, Abidjan, 1977; SODERIZ, "Prix de Revient des Engrais et Coût des Contrats de Base Riziculture en 1976," Abidjan, 2 November 1975; SODERIZ, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976; Société Ivoirienne d'Engrais, personal communication, Abidjan, 1978; and Société Tropicale d'Engrais et de Produits Chimiques, personal communication, Abidjan, 20 January 1978. Costs of irrigation maintenance are based primarily on SODERIZ, Centre de Formation, "La Riziculture en Côte d'Ivoire," Reference No. 23/CF/NDF, Bouaké, 14 January 1976, and SODERIZ, "Note Concernant les coûts d'Entretien des Perimetres Irrigués," Reference 225/s/di/jli/ma, Abidjan, 25 April 1977. Information for land investment and small tools is given in Tables C and E, respectively. Land rent is estimated, but based on Charles P. Humphreys and Patricia L. Rader, Farm Survey, Gagnoa, 1977.

^a40 kg of selected seeds are used per ha.

^bApplication rates for fertilizers are 75 kg urea (46 percent) per ha and 150 kg complex fertilizer (10-18-18) per ha.

^c28 kg per ha of a granulated, systemic insecticide called Furadan is applied in two doses.

^dWorking capital equals the interest cost of labor over 3 months at a 25 percent real annual rate of interest, and on seeds, fertilizers, insecticides, irrigation maintenance, and extension services costs over 9 months at a 5 percent real annual rate of interest.

^eThe cost of maintaining the irrigation network has been based on unskilled wages of 350 CFA francs/manday, which are assumed to prevail in the savannah.

^fExtension density is assumed to be 50 ha per agent. Costs include transport and immediate supervision.

^gFixed charges refer to the net farm-level subsidy, which equals the delivery cost of selected seeds, fertilizers, insecticides, irrigation maintenance, extension services, and power-tiller operation, minus the farmer participation fee of 42,250 CFA francs/ha. It is divided into subsidies on tradables and non-tradables in proportion to which

Footnotes to Table H14 (continued).

tradables, plus indirect taxes on tradables, and domestic factors, plus indirect taxes on non-tradables, are of the total delivery cost, respectively. The subsidy includes a 5 percent exoneration from repayment for current inputs (excluding power-tiller charges) in case of crop failure.

^hThe yield for production using power-tillers has been somewhat arbitrarily assumed to exceed the yield of F3 by 0.5 mt/ha.

ⁱSee note c, Table H1.

Table H15.--Farm Production Budget*

F16: Savannah, irrigated lowland without modern inputs
(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	206	68,050							68,050
2. Seed ^a		2,314		1,216	377			-657	3,250
3. Fertilizer									
4. Insecticides									
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^b				4,577				-82	4,495
B. Small tools				4,132				278	4,410
C. Animals									
D. Animal implements									
E. Mechanical equipment									
F. Land improvement				40,274				2,035	42,309
7. Operation and maintenance									
A. Animals									
B. Animal implements									
C. Tractors									
D. Combine-harvesters									
E. Power-tillers									
F. Mechanical equipment									
G. Land improvements									
8. Extension services									
9. Fixed charges								-26,762	-26,762
10. Land rent					11,845				11,845
11. Other costs									
Total costs		70,364		50,199	12,222			-25,188	107,597

Yield (mt/ha) 2.4^c; farm market price 50/65^d; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 120,563; per metric ton milled product equivalent 76,113.

Footnotes to Table H15.

*Yields for F16 are based on the differences between fertilized and unfertilized production, as reported in: Ivory Coast, Government of, Ministère de l'Agriculture, Direction des Statistiques Rurales, "Enquete Riz dans la Zone Bandama-Solomogou, 1976," Abidjan, 1977, preliminary; "Enquete Riz Irrigué de 2ème Cycle 1975-1976, Zone Bandama-Solomogou," Abidjan, August 1976; Ivory Coast, Government of, Ministère de l'Agriculture, Direction de la Documentation et des Statistiques Rurales, Service Statistiques Rurales, Korhogo, "Riziculture de 1^o Cycle, Zone Bandama-Solomogou," no place, October 1974; Service Statistiques Rurales de Korhogo, "Enquête Riz 2ème Cycle, Zone Bandama-Solomogou, 1972-1973," Korhogo, 10 April 1973; Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Crop cutting data forms, Gagnoa, 1976; SODERIZ, personal communication, Korhogo, 1976; and SODERIZ, Rapport Annuel, 1976, Abidjan, 1977. Direct labor input is taken from Table F. Information for land improvement and small tools is given in Tables C and E, respectively. Land rent is based on Charles P. Humphreys and Patricia L. Rader, Field Survey, Gagnoa, 1977.

^aA seeding rate of 50 kg per ha is assumed, value at 65 CFA francs per kg. This rate is higher than for F15 because seeds are not tested. Costs are decomposed using the proportions of total costs for this technique, minus the cost of seeds.

^bWorking capital equals the interest cost on labor over 3 months and on seeds, over 6 months, calculated at a rate of 25 percent per year.

^cThis yield is roughly two-thirds the yield on fertilized irrigated rice.

^dSee note c, Table H1.

*
 Table H16.--Farm Production Budget
 F17: Savannah, improved dam irrigation
 (CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	247	82,025							82,025
2. Seed ^b		2,796	793	1,424	540	709	178	-381	6,059
3. Fertilizer ^c		179	3,283	2,755		9,666	-314	518	16,087
4. Insecticides ^d		9	1,282	835		6,936	1,759	312	11,133
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^e				7,257					7,423
B. Small tools				4,132				166	4,410
C. Animals								278	
D. Animal implements									
E. Mechanical equipment									
F. Land improvement ^f				75,151					85,633
7. Operation and maintenance								10,482	
A. Animals									
B. Animal implements									
C. Tractors									
D. Combine-harvesters									
E. Power-tillers									
F. Mechanical equipment									
G. Land improvements ^g		6,719	2,977	1,106		853	110	513	12,278
8. Extension services ^h			12,410	958		550	392	1,350	15,660
9. Fixed charges ⁱ							-6,979	-91,607	- 98,586
10. Land rent ^j					16,680				16,680
11. Other costs									
Total costs		91,728	20,745	93,618	17,220	18,714	-4,854	-78,369	158,802

Yield (mt/ha) 4.0^k; farm market price 50/65^l; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 224,805; per metric ton milled product equivalent 85,153.

85

Footnotes to Table H16.

*Yields for production technique F17 are based on results reported in Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Rapport Annuel, 1976, Abidjan, 1977, pp. 224-225. Direct labor input is taken from Table F. Costs of seeds, fertilizers, insecticides, and extension services have been estimated from the following sources: Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles, Bilan de l'Opération Engrais, Campagne 1976-1977, Bouaké, n.d.; SODERIZ, Centrale d'Achat, "Tarif - C.A.P. 1975," Abidjan, n.d.; SODERIZ, "Coûts Forfaitaires SODERIZ, 1976," Abidjan, 1976; SODERIZ, personal communication, Abidjan, 1977; SODERIZ, "Prix de Revient des Engrais et Coût des Contrats de Base Riziculture en 1976," Abidjan, 2 November 1975; SODERIZ, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976; Société Ivoirienne d'Engrais, personal communication, Abidjan, 1978; and Société Tropicale d'Engrais et de Produits Chimiques, personal communication, Abidjan, 20 January 1978. Costs of irrigation and dam maintenance are based primarily on SODERIZ, Centre de Formation, "La Riziculture en Côte d'Ivoire," Reference No. 23/CF/NDF, Bouaké, 14 January 1976, and SODERIZ, "Note Concernant les couts d'Entretien des Perimetres Irrigués," Reference 225/s/di/jli/ma, Abidjan, 25 April 1977. Information for land investment and small tools is given in Tables C and E, respectively.

^aThis production technique assumes 1.85 crops per year and that 80 percent of the land developed can actually be planted in rice.

^b40 kg of selected seeds are used per ha.

^cApplication rates for fertilizers are 75 kg urea (46 percent) per ha and 150 kg complex fertilizer (10-18-18) per ha.

^d28 kg per ha of a granulated, systemic insecticide called Furadan is applied in two doses.

^eWorking capital equals the interest cost on labor over 3 months at a 25 percent real annual rate of interest and on seeds, fertilizers, insecticides, irrigation and dam maintenance, and extension services over 9 months at a 5 percent real annual rate of interest.

^fEach dam is assumed to provide irrigation water for 200 ha, including dikes, drains, bunds and roads.

^gEstimation of the costs of guarding and maintaining the dams and associated irrigation networks is based on wage rates prevailing in the savannah and includes a 10 percent additional charge for administrative overhead.

^hExtension density is assumed to be 50 ha per agent. Costs include transport and immediate supervision.

ⁱFixed charges refer to the net farm-level subsidy, which equals the delivery cost of selected seeds, fertilizers, insecticides, irrigation and dam maintenance, and extension services, minus the farmer participation fee of 42,250 CFA francs/ha. The net subsidy is divided into subsidies on tradables and non-tradables in proportion to which tradables, plus indirect taxes on tradables, and domestic factors, plus indirect taxes on non-tradables, are of the total delivery cost, respectively. The subsidy does not include an exoneration from repayment for current inputs in case of crop failure.

Footnotes to Table H16 (continued).

^jThe land rent is calculated by assuming a rental cost of 25,000 CFA francs per ha and deducting from that the annuity value of the farmer's investment in land improvement.

^kThis yield is the average of the first crop (3.6 mt/ha) and the second crop (4.4 mt/ha).

^lSee note c, Table H1.

Table H17.--Farm Production Budget*

F18: Savannah, dam irrigated without modern inputs

(CFA francs/ha except labor-days)

Inputs	Unskilled labor		Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
	Labor-days	Market value					Tradables	Nontradables	
1. Direct labor	211	69,725							69,725
2. Seed ^a		2,190		2,627	524			338	5,679
3. Fertilizer									
4. Insecticides									
5. Herbicides									
6. Interest and depreciation									
A. Working capital ^b				5,025	17,204			- 261	21,968
B. Small tools				4,132				278	4,410
C. Animals									
D. Animal implements									
E. Mechanical equipment									
F. Land improvement				75,151				10,482	85,633
7. Operation and maintenance									
A. Animals									
B. Animal implements									
C. Tractors									
D. Combine-harvesters									
E. Power-tillers									
F. Mechanical equipment									
G. Land improvements									
8. Extension services									
9. Fixed charges									
10. Land rent ^c					16,680				16,680
11. Other costs									
Total costs		71,915		86,935	34,408			10,837	204,095

Yield (mt/ha) 2.7^d; farm market price 50/65^e; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0, and foreign exchange 1; total social cost per hectare 158,850; per metric ton milled product equivalent 89,141.

Footnotes to Tables H17.

*Yields for F18 are based on the differences between fertilized and unfertilized production, as reported in: Ivory Coast, Government of, Ministère de l'Agriculture, Direction des Statistiques Rurales, "Enquete Riz dans la Zone Bandama-Solomogou, 1976," Abidjan, 1977, preliminary; "Enquete Riz Irrigué de 2ème Cycle 1975-1976, Zone Bandama-Solomogou," Abidjan, August 1976; Ivory Coast, Government of, Ministère de l'Agriculture, Direction de la Documentation et des Statistiques Rurales, Service Statistiques Rurales, Korhogo, "Riziculture de 1er Cycle, Zone Bandama-Solomogou," no place, October 1974; Service Statistiques Rurales de Korhogo, "Enquête Riz 2ème Cycle, Zone Bandama-Solomogou, 1972-1973," Korhogo, 10 April 1973; Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Crop cutting data forms, Gagnoa, 1976; and SODERIZ, Rapport Annuel, 1976, Abidjan, 1977. Direct labor input is taken from Table F. Information for land improvement and small tools is given in Tables C and E, respectively.

^aA seeding rate of 50 kg per ha is assumed, which is higher than for F17 because seeds are not tested. Costs are decomposed using the proportions of total costs for this technique, minus the cost of seeds.

^bWorking capital equals the interest cost on labor over 3 months and on seeds over 6 months, calculated at a rate of 25 percent per year.

^cLand rent is calculated by assuming a charge of 25,000 CFA francs per ha per crop and deducting from it the annuity on the farmer's share of the land investment (8,320 CFA francs).

^dThis yield is roughly two-thirds the yield on fertilized irrigated rice.

^eSee note c, Table H1.

Table 11.--Budget for Collection*

FM2: Assembly by farmers and state agencies for delivery to government mills^a

(CFA francs per kg paddy)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
						Tradables	Nontradables	
1. Bags ^b		0.020	0.018		0.330	0.178	0.009	0.555
2. Handling ^c	1.056							1.056
3. Transport ^d		1.892	0.563		1.083	0.477	0.316	4.331
4. Personnel ^e	0.563	0.426					0.037	1.026
5. Capital charges ^f			1.791				-0.040	1.751
6. Storage ^g			0.401				0.063	0.464
7. Other ^h		0.005	0.004		0.048	0.016	0.002	0.075
8. Credit subsidy ⁱ							-0.176	-0.176
9. Losses ^j		1.447	0.563	0.120	0.256	-0.029	-0.256	2.101
TOTAL	1.619	3.79	3.340	0.120	1.717	0.642	-0.045	11.183

Price received at mill 75; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram paddy 10,586, per metric ton milled product equivalent 16,039, 64.1 US\$/mt.

*Costs are based primarily on Charles P. Humphreys and Patricia L. Rader, Field surveys of farmers merchants, and millers, Bongouanou, Gagnoa, and Man, 1977, and Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Direction Régionale-Sud, Personal communication, Gagnoa, 1977. Information for bags and insecticides also comes from SODERIZ, Central d'Achats, "Note sur les importations durant le 1^{er} semestre 76," Abidjan, 1976.

Footnotes to Table II.

- ^aThis method of assembly involves the delivery of paddy by farmers to government buying stations. The government rice agency then transports the paddy to its large-scale mills (M4).
- ^bThis charge implies about 5 rotations on bags costing government agencies about 250 CFA francs each. Each bag is assumed to hold 75 kg of paddy. It is assumed that all bags are furnished by the government agency.
- ^cHandling charges may be high (totaling 80 CFA francs per bag), perhaps reflecting the use of permanent employees by the government agency.
- ^dTransportation costs over 3 stages of assembly. The transport between fields and the place where merchants take possession is assumed to be either unimportant or included in farm production costs. Transport costs to storehouses are based on a distance of 15 km and a rate of 193 CFA francs per mt-km in 1977 (deflated to 1975 prices by 0.933). The transport from storehouses to the mill assumes an average distance of 100 km and a 1976 rate of 20 CFA francs per mt-km (deflated to 1975 prices by 0.926).
- ^ePersonnel costs cover skilled agents working for the government agency and an estimated return to farm labor (0.563 CFA francs per kg of paddy) for his role in delivery his paddy to the collection center. This return to farm labor is estimated on the basis of a gross margin of 5 CFA francs per kg of paddy for delivery to the collection centers, of which handling and transport account for only 2.979 CFA francs. The remainder covers working capital, estimate in note f below, with the return to farm labor being the residual.
- ^fCapital charges covers the share assumed by the farmer (calculated on 1 month at a 25 percent real annual rate of interest on paddy valued at 70 CFA francs per kg paddy, the price received by the farmer) and by the government agency (calculated on 1 month at a 2 percent real annual rate of interest on the value of paddy (70 CFA francs per kg) plus agency expenses).
- ^gThis value is estimated.
- ^hOther costs are assumed to cover the Malathion sprayed against weevils in government warehouses.
- ⁱThe credit subsidy equals the difference in the cost of working capital resulting from the government agency's access to preferential credit instead of the 5 percent interest rates used for normal government activities.
- ^jLosses are estimated at 3 percent of paddy valued at 70 CFA francs per kg, and costs are allocated assuming that all paddy is produced by improved upland techniques in the forest (F2).

Table I2.--Budget for Collection*

FM3: Private assembly for delivery to government mills, average distance^a

(CFA francs per kg paddy)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
						Tradables	Nontradables	
1. Bags ^b		0.039	0.035		0.212	0.231	0.017	0.534
2. Handling ^c	0.798							0.798
3. Transport ^d		1.893	0.563		1.083	0.476	0.316	4.331
4. Commissions ^e		1.667						1.667
5. Capital charges ^f			0.813					0.813
6. Storage ^g			0.173				0.027	0.200
7. Scales ^h		0.009	0.015		0.024	0.006	0.004	0.058
8. Losses ⁱ		1.455	0.495					1.950
TOTAL	0.798	5.063	2.094		1.319	0.713	0.364	10.351

Price received at mill 75; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram paddy 9.274, per metric ton milled product equivalent 14,051, 56.2 US\$/mt.

*These costs have been estimated primarily from data collected by Charles P. Humphreys and Patricia L. Rader, Field surveys of merchants, farmers, and markets, Bongouanou, Gagnoa, and Man, 1977. Additional information on transportation was obtained from Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Direction Régionale-Sud, Personal communication, Gagnoa, 1977, based on the cost moving 12,000 mt paddy from government collection centers to mills in 1976-1977. Additional information on bags was acquired from SODERIZ, Central d'Achats, "Note sur les importations durant le 1^{er} semestre 76," Abidjan, 1976.

65

Footnotes to Table I2.

^aCosts to private merchants are often higher than indicated in this budget owing to long waits to unload at the mill (as much as 0.5 CFA francs per kg of paddy per day), drying costs to reach acceptable moisture levels, and discounts in the buying price to account for impurities. For example, total discounts on the purchase price at mills were about 10 percent in 1976-1977.

^bCosts of jute-bags are based on a market price to private merchants of 400 CFA francs per bag, 10 rotations over 2-3 years, and 75 kg paddy per bag.

^cHandling charges are based on the following rates observed in 1977 and deflated to 1975 by a coefficient of 0.933 (in CFA francs per bag):

weighing and loading at the farm	25
unloading at merchant's storehouse	10
reloading at merchant's storehouse	10
unloading at government mills	25

^dTransportation costs cover 3 stages of assembly. The transport between fields and the place where merchants take possession is assumed to be either unimportant or included in farm production costs. Transport costs to storehouses are based on a distance of 15 km and a rate of 193 CFA francs per mt-km in 1977 (deflated to 1975 prices by 0.933). The transport from storehouses to the mill assumes an average distance of 100 km and a 1976 rate of 20 CFA francs per mt-km (deflated to 1975 prices by 0.926).

^eThe commission for the buying agent is based on 2 CFA francs per kg paddy, less costs of fuel for transport (0.048) and charges for handling (0.285).

^fCapital costs cover interest on working capital, calculated at a real annual rate of interest of 15 percent over 1 month on paddy valued at 65 CFA francs per kg.

^gThis cost is based on warehouse rental charges for 1 month.

^hThis cost is based on a daily cost of 500-600 CFA francs per day for scale rental, deflated to 1975 prices by 0.926, and an assumption that 8-10 mt of paddy are weighed each day.

ⁱLosses, including government dockings, are assumed to be only 3 percent of paddy valued at 65 CFA francs per kg, with costs distributed assuming the paddy is produced by the traditional upland, forest technique (F1).

Table I3.--Budget for Collection*

FM4: Private assembly for delivery to government mills, long distance
(CFA francs per kg paddy)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
						Tradables	Nontradables	
1. Bags		0.039	0.035		0.212	0.231	0.017	0.534
2. Handling	0.798							0.798
3. Transport ^a		3.333	0.928		1.907	0.839	0.557	7.564
4. Commissions		1.667						1.667
5. Capital charges ^b			0.813					0.813
6. Storage			0.173				0.027	0.200
7. Scales		0.009	0.015		0.024	0.006	0.004	0.058
8. Losses		1.455	0.495					1.950
TOTAL	0.798	6.503	2.459		2.143	1.076	0.605	13.584

Price received at mill 75; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram paddy 11.903, per metric ton milled product equivalent 18,035, 72.1 US\$/mt.

*These costs are the same as for technique FM3 (Table I2), except as noted. The sources are identical.

^aTransport between the point where a merchant takes possession and his storehouse is assumed to be 35 km, instead of 15.

^bThe cost of working capital is based on a value of paddy of 60 CFA francs per kg, which is consistent with the lower price paid by merchants to farmers who are more isolated.

Table I4.--Budget for Collection*
 FM5: Private assembly for delivery to small-scale hullers
 (CFA francs per kg paddy)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
						Tradables	Nontradables	
1. Bags		0.039	0.035		0.212	0.231	0.017	0.534
2. Handling	0.798							0.798
3. Transport ^a		1.083	0.322		0.620	0.273	0.181	2.479
4. Commissions		1.667						1.667
5. Capital charges			0.813					0.813
6. Storage			0.173				0.027	0.200
7. Scales		0.009	0.015		0.024	0.006	0.004	0.058
8. Losses	1.360	0.095	0.495					1.95
TOTAL	2.158	2.893	1.853		0.856	0.51	0.229	8.499

Price received at mill 59; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram paddy 7.76, per metric ton milled product equivalent 12,317, 49.2 US\$/mt.

*These costs are the same as for technique FM3 (Table I2) except as noted. The sources are identical.

^aSince small-scale hullers are widely dispersed, the only transport is between the point where the merchant takes possession and the collection center. A distance of 15 km is used, with a 1977 tariff of 193 CFA francs per mt-km (deflated to 1975 prices by 0.933).

Table J1.--Budget for Milling*

M1: Hand pounding, forest
(CFA francs per kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes (+) and subsidies (-)		Total market value
						Tradables	Nontradables	
1. Direct labor ^a	17.000							17.000
2. Fuel, oil								
3. Electricity								
4. Bags								
5. Interest and depreciation								
A. Building								
B. Equipment ^b			1.587					1.587
6. Maintenance and repair								
A. Building								
B. Equipment								
7. Working capital charges ^c			9.601					9.601
8. Insurance								
9. General overhead charges								
10. Internal transportation								
11. Direct taxes/subsidies								
12. Losses ^d	1.125		0.407				0.004	1.536
13. Sales of by-products								
Total	18.125		11.595				0.004	29.724

Milling outturn 0.69; percentage broken 40; price received ex-mill (CFA francs/kg) 106.9; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 1, foreign exchange 1; total social cost per kg milled rice 30.11, per mt milled rice 30,112, 120.45^e.

Footnotes to Table II.

*Data are taken largely from field observations by the authors and from Dunstan S.C. Spencer, Ibi I. May-Parker, and Frank S. Rose, "Employment Efficiency and Incomes in the Rice Processing Industry of Sierra Leone," African Rural Economy Program Working Paper No. 13, Department of Agricultural Economics, Njala University College, Njala, Sierra Leone and Department of Agricultural Economics, Michigan State University, East Lansing, Michigan 48824, June 1976.

^aThis labor cost assumes that 25 kg of paddy can be pounded per day by a female worker, valued at 300 CFA francs per day.

^bEquipment consists of a mortar and pestle, valued at 1500 CFA francs, having a life of 3 years, and possessing a capacity of 600 kg paddy per year. The capital recovery charge is based on an interest rate of 15 percent.

^cWorking capital charges are calculated on the basis of 25 percent interest, an average storage period of 6 months, and a paddy value of 53 CFA francs per kg.

^dLosses are assumed to be only 2 percent, owing to pannicle storage, valued at 53 CFA francs per kg paddy. Costs are distributed according to proportion derived from traditional upland forest production (Fl).

^eThis second value is in US\$ per mt.

Table J2.--Budget for Milling*

M2: Hand pounding, savannah

(CFA francs per kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes (+) and subsidies (-)		Total market value
						Tradables	Nontradables	
1. Direct labor ^a	16.923							16.923
2. Fuel, oil								
3. Electricity								
4. Bags								
5. Interest and depreciation								
A. Building								
B. Equipment ^b			1.685					1.685
6. Maintenance and repair								
A. Building								
B. Equipment								
7. Working capital charges ^c			10.192					10.192
8. Insurance								
9. General overhead charges								
10. Internal transportation								
11. Direct taxes/subsidies								
12. Losses ^d	1.255		0.371				0.005	1.631
13. Sales of by-products								
Total	18.178		12.248				0.005	30.431

Milling outturn 0.65; percentage brokens 40; price received ex-mill (CFA francs/kg) 112.0; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 1, foreign exchange 1; total social cost per kg milled rice 30.42, per mt milled rice 30,416, 121,66^e.

Footnotes to Table J2.

*Data are taken largely from field observations by the authors and from Dunstan S.C. Spencer, Ibi I. May-Parker, and Frank S. Rose, "Employment Efficiency and Incomes in the Rice Processing Industry of Sierra Leone," African Rural Economy Program Working Paper No. 13, Department of Agricultural Economics, Njala University College, Njala, Sierra Leone and Department of Agricultural Economics, Michigan State University, East Lansing Michigan 48824, June 1976.

^aThis labor cost assumes that 25 kg of paddy can be pounded per day by a female worker, valued at 275 CFA francs per day.

^bEquipment consists of a mortar and pestle, valued at 1500 CFA francs, having a life of 3 years, and possessing a capacity of 600 kg paddy per year. The capital recovery charge is based on an interest rate of 15 percent.

^cWorking capital charges are calculated on the basis of 25 percent interest, an average storage period of 6 months, and a paddy value of 53 CFA francs per kg.

^dLosses are assumed to be only 2 percent, owing to pannicle storage, valued at 53 CFA francs per kg paddy. Costs are distributed according to proportions derived from traditional upland savannah production (F6).

^eThis second value is in US\$ per mt.

Table J3.--Budget for Milling*
M3: Private small-scale steel-cylinder hullers, forest and savannah^a
(CFA francs per kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	<u>Taxes (+) and subsidies (-)</u> Tradables Nontradables		Total market value
1. Direct labor ^b	1.532	1.022						2.554
2. Fuel, oil ^c		0.083	0.103		0.437	0.359	0.079	1.061
3. Electricity								
4. Bags ^d								
5. Interest and depreciation								
A. Building ^e			0.230				0.037	0.267
B. Equipment ^f			0.406				0.122	0.528
6. Maintenance and repair								
A. Building								
B. Equipment ^g		0.030	0.048		0.076	0.019	0.013	0.186
7. Working capital charges ^d								
8. Insurance								
9. General overhead charges								
10. Internal transportation								
11. Direct taxes/subsidies							0.189	0.189
12. Losses ^d								
13. Sales of by-products								
Total	1.532	1.135	0.787		0.513	0.378	0.440	4.785

Milling outturn 0.63; percentage brokens 35; price received ex-mill (CFA francs/kg) 99; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 1, foreign exchange 1; total social cost per kg milled rice 3.96, per mt milled rice 3,961, 15.84^h.

Footnotes to Table J3.

*Data are taken from: France, Government of, Ministère de la Coopération, Memento de l'Agronome, Paris, 1974; Charles P. Humphreys and Patricia L. Rader, Field Survey, Bondoukou, Gagnoa, and Man, 1977; Charles P. Humphreys and Patricia L. Rader, "Rapport sur la Transformation et la Commercialisation de Paddy et Riz par le Circuit Traditionnel au Mali," draft, Abidjan, March-April 1977; Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Projet de Développement de la Riziculture des Bas-fonds en Zone Forestière - Addendum à l'étude de factibilité SODERIZ, Abidjan, no date; Motorenfabrik HATZ KG, Diesel Type E80G, E85G, E89G, Rott, West Germany, no date; S.A. Oni and J.K. Olayemi, "The Economics of Rice Milling in Kwara and North-Western States of Nigeria: A Comparative Analysis," in Socio-Economic Aspects of Rice Cultivation in West Africa, West African Rice Development Association (WARDA), Monrovia, February 1975; H. P. Rozeboom and R. E. Parker, "Economics of Small-Scale Rice Mills," Socio-economic Aspects of Rice Cultivation in West Africa, WARDA, Monrovia, February 1975; Société Abidjanaise de Construction Mécanique, Personal Communication, Abidjan, 1977; and Dunstan S. C. Spencer, Ibi I. May-Parker, and Frank S. Rose, "Employment Efficiency and Incomes in the Rice Processing Industry of Sierra Leone," African Rural Economy Program Working Paper No. 13, Department of Agricultural Economics, Njala University College, Njala, Sierra Leone and Department of Agricultural Economics, Michigan State University, East Lansing, Michigan 48824, and June 1976.

^a Values are calculated on the assumption that 250 mt paddy are milled each year.

^b Labor costs are based on 9 months of operation using 3 laborers, a skilled worker paid at 18,000 CFA francs per month, a semi-skilled worker paid 15,000 CFA francs per month, and an unskilled laborer paid 450 CFA francs per day during 234 days. No adjustment is made for differences in wages between the forest and the savannah.

^c Fuel and oil consumption are based on rates of 2.74 liters of diesel per hour, valued at 65 CFA francs per liter, and 0.06 liters of oil per hour, valued at 250 CFA francs per liter. Hourly output of rice is estimated at 150 kg, which is 75 percent of the maximum.

^d There are no charges for bags, working capital, or losses because the miller is assumed only to provide the milling service, for which he is paid daily. These charges are covered by the assembly and distribution activities.

^e The capital charge for buildings is based on an estimated rent of 3500 CFA francs per month.

^f Interest and depreciation is calculated on a total value of 559,354 CFA francs for the huller, locally manufactured, and an 11 horsepower diesel engine, imported. The lifetimes of both are assumed to be 10 years. An 8 percent interest rate is used, which assumes that millers have access to commercial credit.

^g Maintenance costs for equipment are calculated using 4 percent of the purchase price per year for the motor and 10 percent per year for the huller.

^h The second figure is in US\$ per mt milled rice.

12

Table J4.--Budget for Milling*

M4: Large-scale government mills, forest and savannah^a

(CFA francs per kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes (+) and subsidies (-)		Total market value
						Tradables	Nontradables	
1. Direct labor ^b	1.291	1.314					0.145	2.750
2. Fuel, oil								
3. Electricity		0.264	0.324		0.582	0.026	0.098	1.294
4. Bags ^c		0.095	0.077		1.415	0.873	0.039	2.499
5. Interest and depreciation ^d								
A. Building			0.321				0.076	0.397
B. Equipment			0.936				0.009	0.945
6. Maintenance and repair								
A. Building		0.095	0.091		0.076	0.027	0.014	0.303
B. Equipment ^e		0.027	0.020		0.733	0.274	0.006	1.060
7. Working capital charges ^f			1.445				- 0.529	0.916
8. Insurance		0.114	0.053		0.035	0.009	0.017	0.228
9. General overhead charges		0.189	0.088		0.058	0.015	0.029	0.379
10. Internal transportation ^g		0.835	0.248		0.477	0.211	0.139	1.910
11. Direct taxes/subsidies ^h								
12. Losses ⁱ -	1.768	0.589	0.864	0.194	0.420	-0.058	-11.061	-11.061
13. Sales of by-products ^j	-0.293	-0.337	-0.430	-0.018	-0.364	-0.132	- 0.398	3.379
Total	2.766	3.185	4.037	0.176	3.432	1.245	-11.355	3.486

Milling outturn 0.66; percentage brokens 30; price received ex-mill (CFA francs/kg) 87; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 1, foreign exchange 1; total social cost per kg milled rice 13.23, per mt milled rice 12,235, 52.94^k.

Footnotes to Table J4.

*Data are taken from: C.I.A.O., "Catalogue," Abidjan, no date; Ivory Coast, Government of, Ministère de l'Agriculture, DBPCG, Personal Communication, Abidjan, 1978; Ivory Coast, Government of, Ministère de l'Agriculture, Direction des Etudes et Programmes, Cellule Agro-économie, Le Role de l'Etat dans le Développement de la Production Rizicole, Abidjan, May 1976; Ivory Coast, Government of, Ministère de l'Agriculture, Société d'Assistance Technique pour la Modernisation Agricole de la Cote d'Ivoire (SATMACI), Opération-Riz, "Budget Prévisionnel Rizeries," Gagnoa, no date; Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), "Commercialisation et Usinage," Abidjan, monthly; SODERIZ, "Compte d'Exploitation Prévisionnel 75-76-77," Abidjan, no date; SODERIZ, Direction Sud, "Détail des Charges d'Exploitation Générale par Rizerie et par Kilo de Paddy Usiné sur la Période du 26-09-76 au 25-03-77," Gagnoa, 4 August 1977; SODERIZ, "Etablissement d'un Bareme d'Usinage," Abidjan, 10 January 1977; and SODERIZ, Personal Communication, Abidjan, 1977.

^aThese large-scale mills vary in age and size. Where possible, estimates are based on costs actually prevailing in recently installed OLMIA mills operating at about 80 percent of optimum capacity in the forest zone during 1976-1977, deflated to 1975 prices. Theoretical capacity averages about 4 mt of rice per hour for each mill.

^bSkilled labor is defined as permanent workers.

^cThis charge is for 60 kg plastic rice bags which are used only once. No charge is imputed to jute bags used for storing paddy.

^dCapital charges on mill investment is based on the following data (in millions of 1975 CFA francs per mt-hour):

equipment	16.54
transportation	0.27
assembly	0.88
building	7.41

Charges are based on an optimum capacity of 75 percent of rated (theoretical) capacity, 5500 hours of annual operation, lifetimes for machinery and buildings of 10 and 20 years, respectively, and a real interest rate of 5 percent per year.

^eEquipment repair costs assume that service personnel are included under labor.

^fWorking capital is calculated on the value of milled rice, assuming an average holding period of 3 months and a subsidized, real rate of interest of 2 percent per year.

^gThis charge represents the cost of transferring paddy between mills in order to equalize milling loads.

^hThis subsidy equals the subsidy from the CSSPPA that is in excess of real operating costs. It is calculated as the residual of the following costs (in CFA francs per kg of rice):

purchase of paddy	-113.636
milling costs	- 14.303
sale of rice	87.000
CSSPPA transfer	52.000
net subsidy	11.061

Footnotes to Table J4 (continuator)

ⁱ Losses are estimated to be 3 percent of paddy purchased. Costs are distributed assuming that all paddy is produced by the improved upland technique in the forest zone (F2).

^j The value of the sales of by-products is estimated assuming the flour is lost and only medium and fine brokens are sold. The following data apply:

by-product	percent of paddy weight	price (CFA francs/kg)	value per kg rice (CFA francs)
medium brokens	1.9	40	0.760
fine brokens	0.8	30	0.240
flour	7.0	6	0.420

^k The second value is in US\$ per mt of milled rice.

Table K1.--Budget for Distribution*

MC3: Government, forest - Abidjan

(CFA francs/kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
						Tradables	Nontradables	
1. Bags ^a								
2. Handling	0.680							0.680
3. Transport ^b		1.967	0.585		1.125	0.495	0.329	4.500
4. Insecticides ^c		0.007	0.006		0.076	0.024	0.003	0.117
5. Capital charges ^d			0.399				-0.036	0.363
6. Storage ^e			0.182				0.028	0.210
7. Losses ^f	0.822	0.300	0.456	0.082	0.249	0.002	-0.171	1.740
8. Credit subsidy ^g							-0.218	-0.218
9. Caisse de Péréquation subsidy ^h						-1.924	-5.468	-7.392
TOTAL ⁱ	1.502	2.274	1.628	0.082	1.450	-1.403	-5.533	0.000

Price received from wholesalers in consumption center 87; border price of comparable rice 75.12; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram milled rice 6.945, per metric ton milled rice 6,945, 27.8 US\$/mt.

Footnotes to Table K1.

*Most of the costs are based on Ivory Coast, Government of, Ministère de Commerce, Direction de Commerce Intérieur et de la Distribution, Personal communication, Abidjan, 1977. Additional data for transportation come from Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976.

^a Bag charges are included in government milling (M4), Table J4.

^b Transport is from Daloa to Abidjan, a distance of about 400 kilometers. Daloa is assumed to be the center of rice production in the forest zone.

^c Insecticide costs assume treatments every 3 months at 300-350 CFA francs per treatment and storage of paddy during 1 month. The distribution of costs among the categories is based on Malathion only.

^d Working capital equals the interest on the purchase price of rice (87 CFA francs/kg) calculated at a 5 percent real annual rate of interest during 1 month of storage. Roughly 10 percent of the capital cost is allocated to taxes/subsidies on nontradables on the assumption that paddy is produced by the F2 farm technique, assembled by FM2, and milled by M4.

^e Storage costs represent the annuity on warehouse facilities and based on a rate of 7 CFA francs per mt per day, for an average period of 1 month.

^f Losses of 2 percent are assumed, evaluated at the mill selling price of 87 CFA francs per kg rice and allocated to cost categories assuming that the paddy is produced by technique F2, assembled by FM2, and milled by M4.

^g The credit subsidy results because the Ministry of Commerce obtains credit for rice distribution from the Banque Nationale pour le Développement Agricole at a preferential real annual interest rate of 2 percent, instead of the 5 percent used to evaluate normal government sector activities.

^h The subsidy from the Caisse Générale de Péréquation des Prix des Produits et Marchandises de Grande Consommation is sufficient to cover all the costs of distribution. As a result, the buying and selling prices are equal for rice distributed by this technique.

ⁱ These totals represent actual costs of the activity. However, when domestic production substitutes for imports, it allows local resources that would be used to distribute imports to be saved. Therefore, in the calculations, these totals are adjusted to account for these savings by subtracting the following values:

unskilled labor	0.0
skilled labor	0.672
capital	0.566
land	0.0

The saving in tradable inputs used to distribute imported rice is already reflected in the comparable border price, having been added to the c.i.f. price of 75,000 CFA francs/mt.

Table K2.--Budget for Distribution*
 MC4: Government, savannah - Abidjan^a
 (CFA francs/kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
						Tradables	Nontradables	
1. Bags ^b								
2. Handling	0.680							0.680
3. Transport ^c		2.841	0.845		1.625	0.715	0.475	6.500
4. Insecticides ^d		0.007	0.006		0.076	0.024	0.003	0.117
5. Capital charges ^e			0.399				-0.036	0.363
6. Storage ^f			0.182				0.028	0.210
7. Losses ^g	0.822	0.300	0.456	0.082	0.249	0.002	-0.171	1.740
8. Credit subsidy ^h							-0.218	-0.218
9. Caisse de Péréquation Subsidy ⁱ						-2.629	-6.763	-9.392
TOTAL ^j	1.502	3.148	1.888	0.082	1.950	-1.888	-6.682	0.000

Price received from wholesalers in consumption center 87; border price of comparable rice 75.12; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram milled rice 8.57, per metric ton milled rice 8,570, 34.3 US\$/mt.

Footnotes to Table K2.

*Most of the costs are based on Ivory Coast, Government of, Ministère de Commerce, Direction de Commerce Intérieur et de la Distribution, Personal communication, Abidjan, 1977. Additional data for transportation come from Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976.

^aThis technique is identical to MC3 (Table K1) except for the transport charge.

^bBag charges are included in government milling (M4), Table J4.

^cTransport is from Korhogo to Abidjan, a distance of about 650 km. Korhogo is assumed to be the center of rice production in the savannah zone.

^dInsecticide costs assume treatments every 3 months at 300-350 CFA francs per treatment and storage of paddy during 1 month. The distribution of costs among the categories is based on Malathion only.

^eWorking capital equals the interest on the purchase price of rice (87 CFA francs/kg) calculated at a 5 percent real annual rate of interest during 1 month of storage. Roughly 10 percent of the capital cost is allocated to taxes/subsidies on nontradables on the assumption that paddy is produced by the F2 farm technique, assembled by FM2, and milled by M4.

^fStorage costs represent the annuity on warehouse facilities and based on a rate of 7 CFA francs per mt per day, for an average period of 1 month.

^gLosses of 2 percent are assumed, evaluated at the mill selling price of 87 CFA francs per kg rice and allocated to cost categories assuming that the paddy is produced by technique F2, assembled by FM2, and milled by M4.

^hThe credit subsidy results because the Ministry of Commerce obtains credit for rice distribution from the Banque Nationale pour le Développement Agricole at a preferential real annual interest rate of 2 percent, instead of the 5 percent used to evaluate normal government sector activities.

ⁱThe subsidy from the Caisse Générale de Péréquation des Prix des Produits et Marchandises de Grande Consommation is sufficient to cover all the costs of distribution. As a result, the buying and selling prices are equal for rice distributed by this technique.

^jThese totals represent actual costs of the activity. However, when domestic production substitutes for imports, it allows local resources that would be used to distribute imports to be saved. Therefore, in the calculations, these totals are adjusted to account for these savings by subtracting the following values:

unskilled labor	0.0
skilled labor	0.672
capital	0.566
land	0.0

The saving in tradable inputs used to distribute imported rice is already reflected in the comparable border price, having been added to the c.i.f. price of 75,000 CFA francs/mt.

Table K3.--Budget for Distribution*
 MC5: Government, forest - Bouaké
 (CFA francs/kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
						Tradables	Nontradables	
1. Bags ^a								
2. Handling	0.680							0.680
3. Transport ^b		1.267	0.377		0.725	0.319	0.212	2.900
4. Insecticides ^c		0.007	0.006		0.076	0.024	0.003	0.117
5. Capital charges ^d			0.399				-0.036	0.363
6. Storage ^e			0.182				0.028	0.210
7. Losses ^f	0.822	0.300	0.456	0.082	0.249	0.002	-0.171	1.740
8. Credit subsidy ^g							-0.218	-0.218
9. Caisse de Péréquation subsidy ^h						-1.344	-4.449	-5.793
TOTAL ⁱ	1.502	1.574	1.420	0.082	1.050	-0.999	-4.631	0.0

Price received from wholesalers in consumption center 87; border price of comparable rice 77.70; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram milled rice 5.63, per metric ton milled rice 5,630, 22.5 US\$/mt.

Footnotes to Table K3.

*Most of the costs are based on Ivory Coast, Government of, Ministère de Commerce, Direction de Commerce Intérieur et de la Distribution, Personal communication, Abidjan, 1977. Additional data for transportation come from Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976.

^a Bag charges are included in government milling (M4), Table J4.

^b Transport is from Daloa to Bouaké, a distance of about 250 km. Daloa is considered to be the center of rice production in the forest zone, and Bouaké is treated as the second major consumption center served by government distribution.

^c Insecticide costs assume treatments every 3 months at 300-350 CFA francs per treatment and storage of paddy during 1 month. The distribution of costs among the categories is based on Malathion only.

^d Working capital equals the interest on the purchase price of rice (87 CFA francs/kg) calculated at a 5 percent real annual rate of interest during 1 month of storage. Roughly 10 percent of the capital cost is allocated to taxes/subsidies on nontradables on the assumption that paddy is produced by the F2 farm technique, assembled by FM2, and milled by M4.

^e Storage costs represent the annuity on warehouse facilities and based on a rate of 7 CFA francs per mt per day, for an average period of 1 month.

^f Losses of 2 percent are assumed, evaluated at the mill selling price of 87 CFA francs per kg rice and allocated to cost categories assuming that the paddy is produced by technique F2, assembled by FM2, and milled by M4.

^g The credit subsidy results because the Ministry of Commerce obtains credit for rice distribution from the Banque Nationale pour le Développement Agricole at a preferential real annual interest rate of 2 percent, instead of the 5 percent used to evaluate normal government sector activities.

^h The subsidy from the Caisse Générale de Péréquation des Prix des Produits et Marchandises de Grande Consommation is sufficient to cover all the costs of distribution. As a result, the buying and selling prices are equal for rice distributed by this technique.

ⁱ These totals represent actual costs of the activity. However, when domestic production substitutes for imports, it allows local resources that would be used to distribute imports to be saved. Therefore, in the calculations, these totals are adjusted to account for these savings by subtracting the following values:

unskilled labor	0.028
skilled labor	2.840
capital	1.603
land	0.0

The saving in tradable inputs used to distribute imported rice is already reflected in the comparable border price, having been added to the c.i.f. price of 75,000 CFA francs/mt.

Table K4.--Budget for Distribution*
 NC6: Government, savannah - Bouaké^a
 (CFA francs/kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capita.	Land	Tradable input	Taxes and subsidies		Total market value
						tradables	Nontradables	
1. Bags ^b								
2. Handling	0.680							0.680
3. Transport ^c		1.486	0.442		0.850	0.374	0.248	3.400
4. Insecticides ^d		0.007	0.006		0.076	0.024	0.003	0.117
5. Capital charges ^e			3.999				-0.036	0.363
6. Storage ^f			0.182				0.028	0.210
7. Losses ^g	0.822	0.300	0.456	0.082	0.249	0.002	-0.171	1.740
8. Credit subsidy ^h							-0.218	-0.218
9. Caisse de Péréquation subsidy ⁱ						-1.522	-4.771	-6.293
TOTAL ^j	1.502	1.793	1.485	0.082	1.175	-1.122	-4.917	0.0

Price received from wholesalers in consumption center 87; border price of comparable rice 77.70; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram milled rice 6.039, per metric ton milled rice 6,039, 24.2 US\$/mt.

Footnotes to Table K4.

*Most of the costs are based on Ivory Coast, Government of, Ministère de Commerce, Direction de Commerce Intérieur et de la Distribution, Personal communication, Abidjan, 1977. Additional data for transportation come from Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture (SODERIZ), Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976.

^aThis technique is identical to MC5 (Table K3) except for the transport charge.

^bBag charges are included in government milling (M4), Table J4.

^cTransport is from Korhogo to Bouaké, a distance of about 300 km. Korhogo is assumed to be the center of rice production in the savannah zone, and Bouaké is treated as the second major consumption center served by government distribution.

^dInsecticide costs assume treatments every 3 months at 300-350 CFA francs per treatment and storage of paddy during 1 month. The distribution of costs among the categories is based on Malathion only.

^eWorking capital equals the interest on the purchase price of rice (87 CFA francs/kg) calculated at a 5 percent real annual rate of interest during 1 month of storage. Roughly 10 percent of the capital cost is allocated to taxes/subsidies on nontradables on the assumption that paddy is produced by the F2 farm technique, assembled by FM2, and milled by M4.

^fStorage costs represent the annuity on warehouse facilities and based on a rate of 7 CFA francs per mt per day, for an average period of 1 month.

^gLosses of 2 percent are assumed, evaluated at the mill selling price of 87 CFA francs per kg rice and allocated to cost categories assuming that the paddy is produced by technique F2, assembled by FM2, and milled by M4.

^hThe credit subsidy results because the Ministry of Commerce obtains credit for rice distribution from the Banque Nationale pour le Développement Agricole at a preferential real annual interest rate of 2 percent, instead of the 5 percent used to evaluate normal government sector activities.

ⁱThe subsidy from the Caisse Générale de Péréquation des Prix des Produits et Marchandises de Grande Consommation is sufficient to cover all the costs of distribution. As a result, the buying and selling prices are equal for rice distributed by this technique.

^jThese totals represent actual costs of the activity. However, when domestic production substitutes for imports, it allows local resources that would be used to distribute imports to be saved. Therefore, in the calculations, these totals are adjusted to account for these savings by subtracting the following values:

unskilled labor	0.028
skilled labor	2.840
capital	1.603
land	0.0

The saving in tradable inputs used to distribute imported rice is already reflected in the comparable border price, having been added to the c.i.f. price of 75,000 CFA francs/mt.

Table K5.--Budget for Distribution*

MC7: Private, forest - Abidjan

(CFA francs/kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
						Tradables	Nontradables	
1. Bags ^a								
2. Handling ^b	0.356							0.356
3. Transport ^c		1.967	0.585		1.125	0.495	0.329	4.500
4. Insecticides								
5. Capital charges ^d			0.619				0.014	0.633
6. Storage ^e			0.173				0.027	0.200
7. Losses ^f	0.595	0.074	0.242		0.017	0.011	0.010	0.950
TOTAL ^g	0.951	2.041	1.619		1.142	0.506	0.380	6.639

Price received from wholesalers in consumption center 104^h; border price of comparable rice 75.12; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram milled rice 5.753, per metric ton milled rice 5,753, 23.0 US\$/mt.

Footnotes to Table K5.

*Costs for private rice distribution are based on Charles P. Humphreys and Patricia L. Rader, Field survey of merchants, Bongouanou and Gagnoa, 1977, and Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976.

^aCharges for bags are included in private assembly costs (FM5), Table I4.

^bHandling charges assume 1 loading and weighing at 25 CFA francs per bag in 1977 (deflated to 1975 prices by the coefficient 0.855). Each bag is assumed to weigh 60 kg. Unloading costs are assumed to be borne by the retailer.

^cTransport is from Daloa to Abidjan, a distance of about 400 kilometers. Daloa is assumed to be the center of rice production in the forest zone. Rates are considered to be identical for both the government agencies and private merchants, both of whom utilize private transporters.

^dThe capital charge is the value of working capital for 1 month on rice worth 95 CFA francs per kg. A real annual interest rate of 8 percent is used, which assumes that merchants have access to commercial bank credit. The charge is allocated between capital and taxes/subsidies on nontradables, based on the assumption that paddy is produced by the F1 farm technique, assembled by FM5 merchants, and milled by M3 millers.

^eStorage costs represent the annuity charges on warehouses and are based on monthly private rental rates.

^fLosses are assumed to be 1 percent of rice worth 95 CFA francs. The charge is allocated to cost categories by assuming that paddy is produced by the F1 farm technique, assembled by FM5 merchants, and milled by M3 millers.

^gThese totals represent actual costs of the activity. However, when domestic production substitutes for imports, it allows local resources that would be used to distribute imports to be saved. Therefore, in the calculations, these totals are adjusted to account for these savings by subtracting the following values (CFA francs per kg rice):

unskilled labor	0.000
skilled labor	0.672
capital	0.566
land	0.000

The savings in tradable inputs used to distribute imported rice is already reflected in the comparable border price, having been added to the c.i.f. price of 75,000 CFA francs/mt.

^hThis price assumes that rice in the private channel sells at a premium of 10 percent above government rice, and that wholesale margins are included in the distribution activity.

Table K6.--Budget for Distribution*
 MC8: Private, savannah - Abidjan^a
 (CFA francs/kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
						Tradables	Nontradables	
1. Bags ^b								
2. Handling ^c	0.356							0.356
3. Transport ^d		2.841	0.845		1.625	0.715	0.475	6.500
4. Insecticides								
5. Capital charges ^e			0.619				0.014	0.633
6. Storage ^f			0.173				0.027	0.200
7. Losses ^g	0.595	0.074	0.242		0.017	0.011	0.010	0.950
TOTAL ^h	0.951	2.915	1.879		1.642	0.726	0.526	8.639

Price received from wholesalers in consumption center 104ⁱ; border price of comparable rice 75.12; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram milled rice 7.387, per metric ton milled rice 7,387, 29.5 US\$/mt.

85

Footnotes to Table K6.

*Costs for private rice distribution are based on Charles P. Humphreys and Patricia L. Rader, Field survey of merchants, Bongouanou and Gagnoa, 1977, and Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976.

^aThis technique is identical to MC7 (Table K5) except for the transportation charge.

^bCharges for bags are included in private assembly costs (FM5), Table I4.

^cHandling charges assume 1 loading and weighing at 25 CFA francs per bag in 1977 (deflated to 1975 prices by the coefficient 0.855). Each bag is assumed to weigh 60 kg. Unloading costs are assumed to be borne by the retailer.

^dTransport is from Korhogo to Abidjan, a distance of about 650 kilometers. Korhogo is assumed to be the center of rice production in the forest zone. Rates are considered to be identical for both the government agencies and private merchants, both of whom utilize private transporters.

^eThe capital charge is the value of working capital for 1 month on rice worth 95 CFA francs per kg. A real annual interest rate of 8 percent is used, which assumes that merchants have access to commercial bank credit. The charge is allocated between capital and taxes/subsidies on nontradables, based on the assumption that paddy is produced by the F1 farm technique, assembled by FM5 merchants, and milled by M3 millers.

^fStorage costs represent the annuity charges on warehouses and are based on monthly private rental rates.

^gLosses are assumed to be 1 percent of rice worth 95 CFA francs. The charge is allocated to cost categories by assuming that paddy is produced by the F1 farm technique, assembled by FM5 merchants, and milled by M3 millers.

^hThese totals represent actual costs of the activity. However, when domestic production substitutes for imports, it allows local resources that would be used to distribute imports to be saved. Therefore, in the calculations, these totals are adjusted to account for these savings by subtracting the following values (CFA francs per kg rice):

unskilled labor	0.000
skilled labor	0.672
capital	0.566
land	0.000

The savings in tradable inputs used to distribute imported rice is already reflected in the comparable border price, having been added to the c.i.f. price of 75,000 CFA francs/mt.

ⁱThis price assumes that rice in the private channel sells at a premium of 10 percent above government rice, and that wholesale margins are included in the distribution activity.

Table K7.--Budget for Distribution*

MC9: Private, forest - Bouaké

(CFA francs/kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
						Tradables	Nontradables	
1. Bags ^a								
2. Handling ^b	0.356							0.356
3. Transport ^c		1.267	0.377		0.725	0.319	0.212	2.900
4. Insecticides								
5. Capital charges ^d			0.619				0.014	0.633
6. Storage ^e			0.173				0.027	0.200
7. Losses ^f	0.595	0.074	0.242		0.017	0.011	0.010	0.949
TOTAL ^g	0.951	1.341	1.411		0.742	0.330	0.263	5.038

Price received from wholesalers in consumption center 104^h; border price of comparable rice 77.70; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram milled rice 4.445, per metric ton milled rice 4,445, 17.8 US\$/mt.

Footnotes to Table K7.

*Costs for private rice distribution are based on Charles P. Humphreys and Patricia L. Rader, Field survey of merchants, Bongouanou and Gagnoa, 1977, and Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976.

^aCharges for bags are included in private assembly costs (FM5), Table I4.

^bHandling charges assume 1 loading and weighting at 25 CFA francs per bag in 1977 (deflated to 1975 prices by the coefficient 0.855). Each bag is assumed to weigh 60 kg. Unloading costs are assumed to be borne by the retailer.

^cTransport is from Daloa to Bouaké, a distance of about 250 kilometers. Daloa is assumed to be the center of rice production in the forest zone, and Bouaké is treated as the second major urban consumption center that can be served by private trade. Rates are considered to be identical for both the government agencies and private merchants, both of whom utilize private transporters.

^dThe capital charge is the value of working capital for 1 month on rice worth 95 CFA francs per kg. A real annual interest rate of 8 percent is used, which assumes that merchants have access to commercial bank credit. The charge is allocated between capital and taxes/subsidies on nontradables, based on the assumption that paddy is produced by the F1 farm technique, assembled by FM5 merchants, and milled by M3 millers.

^eStorage costs represent the annuity charges on warehouses and are based on monthly private rental rates.

^fLosses are assumed to be 1 percent of rice worth 95 CFA francs. The charge is allocated to cost categories by assuming that paddy is produced by the F1 farm technique, assembled by FM5 merchants, and milled by M3 millers.

^gThese totals represent actual costs of the activity. However, when domestic production substitutes for imports, it allows local resources that would be used to distribute imports to be saved. Therefore, in the calculations, these totals are adjusted to account for these savings by subtracting the following values (CFA francs per kg rice):

unskilled labor	0.280
skilled labor	2.840
capital	1.603
land	0.000

The savings in tradable inputs used to distribute imported rice is already reflected in the comparable border price, having been added to the c.i.f. price of 75,000 CFA francs/mt.

^hThis price assumes that rice in the private channel sells at a premium of 10 percent above government rice, and that wholesale margins are included in the distribution activity.

Table K8.--Budget for Distribution*

MC10: Private, savannah - Bouaké^a

(CFA francs/kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
						Tradables	Nontradables	
1. Bags ^b								
2. Handling ^c	0.356							0.356
3. Transport ^d		1.486	0.442		0.850	0.374	0.248	3.400
4. Insecticides								
5. Capital charges ^e			0.619				0.014	0.633
6. Storage ^f			0.173				0.027	0.200
7. Losses ^g	0.595	0.074	0.242		0.017	0.011	0.010	0.950
TOTAL ^h	0.951	1.560	1.476		0.867	0.385	0.299	5.539

Price received from wholesalers in consumption center 104ⁱ; border price of comparable rice 77.70; ratios of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram milled rice 4.855, per metric ton milled rice 4,855, 19.4 US\$/mt.

Footnotes to Table K8.

*Costs for private rice distribution are based on Charles P. Humphreys and Patricia L. Rader, Field survey of merchants, Bongouanou and Gagnoa, 1977, and Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976.

^aThis technique is identical to MC9 (Table K7) except for the transportation charge.

^bCharges for bags are included in private assembly costs (FM5), Table I4.

^cHandling charges assume 1 loading and weighing at 25 CFA francs per bag in 1977 (deflated to 1975 prices by the coefficient 0.855). Each bag is assumed to weigh 60 kg. Unloading costs are assumed to be borne by the retailer.

^dTransport is from Korhogo to Bouaké, a distance of about 300 kilometers. Korhogo is assumed to be the center of rice production in the forest zone, and Bouaké is treated as the second major urban consumption center that can be served by private traders. Rates are considered to be identical for both the government agencies and private merchants, both of whom utilize private transporters.

^eThe capital charge is the value of working capital for 1 month on rice worth 95 CFA francs per kg. A real annual interest rate of 8 percent is used, which assumes that merchants have access to commercial bank credit. The charge is allocated between capital and taxes/subsidies on nontradables, based on the assumption that paddy is produced by the F1 farm technique, assembled by FM5 merchants, and milled by M3 millers.

^fStorage costs represent the annuity charges on warehouses and are based on monthly private rental rates.

^gLosses are assumed to be 1 percent of rice worth 95 CFA francs. The charge is allocated to cost categories by assuming that paddy is produced by the F1 farm technique, assembled by FM5 merchants, and milled by M3 millers.

^hThese totals represent actual costs of the activity. However, when domestic production substitutes for imports, it allows local resources that would be used to distribute imports to be saved. Therefore, in the calculations, these totals are adjusted to account for these savings by subtracting the following values (CFA francs per kg rice):

unskilled labor	0.280
skilled labor	2.840
capital	1.603
land	0.000

The savings in tradable inputs used to distribute imported rice is already reflected in the comparable border price, having been added to the c.i.f. price of 75,000 CFA francs/mt.

ⁱThis price assumes that rice in the private channel sells at a premium of 10 percent above government rice, and that wholesale margins are included in the distribution activity.

Table K9.--Budget for Distribution*
 MC11/MC12: Local consumption, forest and savannah^a
 (CFA francs/kg milled rice)

Inputs	Unskilled labor	Skilled labor	Capital	Land	Tradable inputs	Taxes and subsidies		Total market value
						tradables	Nontradables	
1. Bags ^b								
2. Handling ^c	0.356							0.356
3. Transport ^d								
4. Insecticides								
5. Capital charges ^e			0.619				0.014	0.633
6. Storage ^f			0.173				0.027	0.200
7. Losses ^g	0.595	0.074	0.242		0.017	0.011	0.010	0.950
TOTAL ^h	0.951	0.074	1.034		0.017	0.021	0.051	2.139

Price received from wholesalers in consumption center 99ⁱ; border price of comparable rice 77.8/78.3^j; rates of shadow price to market price for: unskilled labor 1, skilled labor 1, capital 1, land 0; total social cost per kilogram milled rice 2.077, per metric ton milled rice 2,077, 8.3 US\$/mt.

Footnotes to Table K9.

*Costs for private rice distribution are based on Charles P. Humphreys and Patricia L. Rader, Field survey of merchants, Bongouanou and Gagnoa, 1977, and Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture, Service Administratif - Centrale d'Achats, "Tarifs de Transport," Abidjan, 10 December 1976.

^aThese techniques are identical MC7, MC8, MC9, and MC10 (Tables K5, K6, K7, and K8, respectively) except for the transportation charge.

^bCharges for bags are included in private assembly costs (FM5), Table I4.

^cHandling charges assume 1 loading and weighing at 25 CFA francs per bag in 1977 (deflated to 1975 prices by the coefficient 0.855). Each bag is assumed to weigh 60 kg. Unloading costs are assumed to be borne by the retailer.

^dTransport charges are set equal to zero since the rice is assumed to be consumed in the town where it is milled. The towns used are Daloa (for MC11), the center of rice production in the forest zone, and Korhogo (for MC12), the center of rice production in the savannah zone.

^eThe capital charge is the value of working capital for 1 month on rice worth 95 CFA francs per kg. A real annual interest rate of 8 percent is used, which assumes that merchants have access to commercial bank credit. The charge is allocated between capital and taxes/subsidies on nontradables, based on the assumption that paddy is produced by the F1 farm technique, assembled by FM5 merchants, and milled by M3 millers.

^fStorage costs represent the annuity charges on warehouses and are based on monthly private rental rates.

^gLosses are assumed to be 1 percent of rice worth 95 CFA francs. The charge is allocated to cost categories by assuming that paddy is produced by the F1 farm technique, assembled by FM5 merchants, and milled by M3 millers.

^hThese totals represent actual costs of the activity. However, when domestic production substitutes for imports, it allows local resources that would be used to distribute imports to be saved. Therefore, in the calculations, these totals are adjusted to account for these savings by subtracting the following values (CFA francs per kg rice):

	<u>MC11 (Daloa)</u>	<u>MC12 (Korhogo)</u>
unskilled labor	0.280	0.280
skilled labor	3.059	3.933
capital	1.668	1.928
land	0.000	0.000

The savings in tradable inputs used to distribute imported rice is already reflected in the comparable border price, having been added to the c.i.f. price of 75,000 CFA francs/mt.

ⁱThis price assumes that rice in the private channel sells at a premium of 10 percent above government rice, and that wholesale margins are included in the distribution activity.

^jThe first price is for rice sold in Daloa, the second for rice sold in Korhogo.

Table 11.--Combined Production and Post-Harvest Activities*
for Traditional Production, 1975-76

Combinations of techniques ^a (F :FM:M :MC)	Description of techniques	Relative importance			
		Production ^b		Marketing ^c	
		(000 mt paddy)	(Percent)	(000 mt rice)	(Percent)
1 1 1 1	Forest, traditional upland; hand-pounded; on-farm consumption ^d	175	38	0	0
10 1 2 2	Savannah, traditional upland; hand-pounded; on-farm consumption ^{d,f}	70	15	0	0
1 5 3 11	Forest, traditional upland; huller; local consumption ^e	40	9	25	19
10 5 3 12	Savannah, traditional upland; huller; local consumption ^e	10	2	6	5
1 3 4 5	Forest, traditional upland; government mills; internal consumption	25	5	17	13
10 3 4 6	Savannah, traditional upland; government mills; internal consumption	10	2	7	5
1 3 4 3	Forest, traditional upland; government mills; Abidjan consumption	50	11	33	25
10 3 4 4	Savannah, traditional upland; government mills; Abidjan consumption	20	4	13	10
	Subtotals ^g	400	86	101	77
	National totals	465	100	131	100

*Total production figures are taken from Ivory Coast, Government of, Ministère de l'Agriculture, Direction des Statistiques Rurales, Statistiques Agricoles, Abidjan, 1976. Breakdowns of areas and yields are estimated mainly from information in Ivory Coast, Government of, Ministère de l'Agriculture, Compagnie Ivoirienne pour le Développement des Textiles (CIDT), Rapport Annuel 1975-1976; Rapport Général de Synthèse 1972-1976, Riz-Coton, Bouaké, May 1976, and Société pour le Développement de la Rizculture (SODERIZ), Rapport Annuel 1976, Abidjan, 1976. See also Charles P. Humphreys and Patricia L. Rader, "Background Data on the Ivorian Rice Economy," Stanford/WARDA Study of the Political Economy of Rice in West Africa, Food Research Institute, Stanford University, Stanford, June 1978.

Table L1 (continued)

^aSee Table A for a fuller description of these techniques. In all cases except on-farm consumption, collection (FM) is assumed to be performed by private traders over distances that are short enough to be paid for by the official rates.

^bProduction levels for 1975 are based on the yields reported in the farm budgets (the H series of tables) and the following areas harvested (in thousands of ha):

F1	221.7	F9	1.629	F15	1.189
F2	4.615	F10	109.124	F16	3.873
F3	2.787	F11	3.629	F17	1.328
F4	4.809	F12	2.303		
F5	0.896	F14	5.144		

F5 and F9 include small amounts of production in the savannah, and F10, F11, and F14 include small amounts of flooded paddy production.

^cThe following assumptions have been made about marketings: 60-70 percent of traditional production is hand-pounded and consumed on-farm, and two-thirds to three-fourths of the remaining is sold to the government, the rest being sold through private hullers. The allocation of government purchases between forest and savannah and the allocation of government sales between internal consumption and shipment to Abidjan are based on Ivory Coast, Government of, Ministère de l'Agriculture, Société pour le Développement de la Riziculture, "Commercialisation et Usinage," Abidjan, monthly. Approximately 70 percent of purchases are in the forest, and roughly two-thirds are shipped to Abidjan after milling. Internal consumption is defined to take place at Bouaké. Paddy has been converted to rice using the conversion coefficients given in the milling budgets (the J series of tables). The figures in the table have been rounded.

^dThese figures are based on the assumption that only traditional production is hand-pounded. The amount hand-pounded is calculated as the residual of total production in 1975 (465,000 mt of paddy) minus the assumed quantity milled by small-scale hullers (75,000 mt) and purchased by government mills (148,000 mt). This residual is allocated to the forest and savannah zones according to the yields given in the farm production budgets (the H series of tables) and the land areas given in note b, above.

^eThese figures assume that 50,000 mt paddy was purchased for small scale hulling and sold locally, all coming from traditional production. The allocation between forest and savannah is the residual after estimated government purchases and estimated on-farm consumption.

^fThis production includes flooded rice.

^gTotals may vary slightly owing to rounding.

Table L2.--Combined Production and Post-Harvest Activities for Improved Production Privately Hulled and Consumed Locally, 1975-76^a

Combinations of techniques (F : FM : M : MC)	Description of techniques	Relative importance			
		Production ^b		Marketing ^b	
		(000 mt paddy)	(Percent)	(000 mt rice)	(Percent)
2 5 3 11	Forest, improved upland	3	1	0	0
3 5 3 11	Forest, improved irrigated-lowland	3	1	0	0
4 5 3 11	Forest, irrigated-lowland without modern inputs	6	1	0	0
5 5 3 11	Forest, improved lowland-irrigated, power-tiller	1	0 ^c	0	0
9 5 3 11	Forest pump irrigated, tractor	1	0 ^c	0	0
11 5 3 12	Savannah, improved upland ^d	2	0 ^c	0	0
12 5 3 12	Savannah, improved upland, ox-drawn	2	0 ^c	0	0
14 5 3 12	Savannah, improved upland, tractor ^d	3	1	0	0
15 5 3 12	Savannah, improved irrigated-lowland	1	0 ^c	0	0
16 5 3 12	Savannah, irrigated-lowland without modern inputs	4	1	0	0
17 5 3 12	Savannah, improved dam-irrigation	2	0 ^c	0	0
18 5 3 12	Savannah, dam-irrigation without modern inputs	1	0 ^c	0	0
	Subtotals ^e	29	6	0	0
	National totals	465	100	131	100

^aSee notes a, b, and e of Table L1. Improved production is defined as using either modern inputs or irrigated land developed with government subsidies.

2

Table L2 (continued)

^bThese figures are based on the assumptions that: two-thirds of improved production using fertilizer is sold to the government; one-half of production without modern inputs but on land developed with government subsidies is sold to government; and three-fourths of mechanized production is sold to the government. The rice not sold to the government is assumed to be hulled in small-scale mills and consumed locally, probably by the farmers themselves. For this reason, marketings are shown as zero.

^cThe value is less than 0.5 percent.

^dThis production includes some flooded rice.

^eSlight variations may occur owing to rounding.

Table L3.--Combined Production and Post-Harvest Activities for Improved Production Milled Government for Internal Consumption, 1975-76^a

Combinations of techniques (F :FM:M :MC)	Description of techniques	Relative importance			
		Production		Marketing	
		(000 mt paddy)	(Percent)	(000 mt rice)	(Percent)
2 3 4 5	Forest, improved upland	2	0 ^d	1	1
3 3 4 5	Forest, improved lowland-irrigated	2	0 ^d	1	1
4 3 4 5	Forest, lowland-irrigated without modern inputs	2	0 ^d	1	1
5 3 4 5	Forest, improved lowland-irrigated, power tiller	0 ^c	0 ^d	0 ^c	0 ^d
9 3 4 5	Forest, pump-irrigation, tractor	1	0 ^d	1	1
11 3 4 6	Savannah, improved upland	0 ^c	0 ^d	0 ^c	0 ^d
12 3 4 6	Savannah, improved upland, ox-drawn	0 ^c	0 ^d	0 ^c	0 ^d
14 3 4 6	Savannah, improved upland, tractor	2	0 ^d	1	1
15 3 4 6	Savannah, improved lowland-irrigated	1	0 ^d	1	1
16 3 4 6	Savannah, lowland-irrigated without modern inputs	2	0 ^d	1	1
17 3 4 6	Savannah, improved dam-irrigation	1	0 ^d	1	1
18 3 4 6	Savannah, dam-irrigation without modern inputs	0 ^c	0 ^d	0 ^c	0 ^d
	Subtotals ^e	13	3	9	7
	National totals	465	100	131	100

^aSee note a and b of Table L2.

^bPaddy has been converted to rice using the coefficients in Table 3. Figures shown have been rounded.

^cBecause the estimated value is less than 500 mt, zero has been entered.

^dThis value is less than 0.5 percent.

^eSlight variations may occur owing to rounding.

Table L4.--Combined Production and Post-Harvest Activities for Improved Production Milled by the Government for Abidjan Consumption, 1975-76^a

Combinations of techniques (F :FM:M :MC)	Description of techniques	Relative importance			
		Production		Marketing	
		(000 mt paddy)	(Percent)	(000 mt rice)	(Percent)
2 3 4 3	Forest, improved upland	5	1	5	4
3 3 4 3	Forest, improved lowland-irrigated	5	1	5	4
4 3 4 3	Forest, lowland-irrigated without modern inputs	4	1	4	3
5 3 4 3	Forest, improved lowland-irrigated, power-tiller	1	0 ^b	1	1
9 3 4 3	Forest, improved pump-irrigation, tractor	2	0 ^b	2	1
11 3 4 4	Savannah, improved upland ^c	3	1	2	1
12 3 4 4	Savannah, improved upland, ox-drawn	2	0 ^b	1	1
14 3 4 4	Savannah, improved upland, tractor	4	1	3	2
15 3 4 4	Savannah, improved irrigated-lowland	2	0 ^b	1	1
16 3 4 4	Savannah, irrigated-lowland without modern inputs	3	1	2	1
17 3 4 4	Savannah, improved dam-irrigation	2	0 ^b	1	1
18 3 4 4	Savannah, dam-irrigation without modern inputs	1	0 ^b	1	1
	Subtotals ^d	34	7	22	17
	National totals	465	100	131	100

^aSee notes a and b of Table L3.

^bThis value is less than 0.5 percent.

^cThis production includes flooded rice.

^dSlight variations may occur owing to rounding.

101

Table M1.--Indicators of Private and Social Profitability for Traditional Production*

(CFA francs/kg milled rice, unless otherwise indicated)

Activity (F :FM:M :MC)	Area (000 ha)	Production (000 mt paddy)	Private cost	Social cost	Net private profitability	Net social profitability	Effective protection coefficient	Resource cost ratio
1 1 1 1	135	121	82.2	82.0	20.4	-2.1	1.284	1.026
10 1 2 2	79	46	72.1	71.9	30.5	8.5	1.276	0.895
1 5 3 11	31	25	91.0	88.7	8.0	-11.0	1.264	1.144
10 5 3 12	11	6	75.9	73.7	23.1	4.5	1.256	0.941
1 3 4 5	19	17	44.6	99.5	42.4	-21.8	1.112	1.307
10 3 4 6	11	7	31.7	87.1	55.3	-9.4	1.114	1.133
1 3 4 3	38	33	48.1	104.4	38.9	-29.2	1.160	1.429
10 3 4 4	22	13	34.8	92.7	53.2	-17.6	1.169	1.260

*The techniques are identical to those described in the Table L series. Production is based on data also given in Table L, converted to rice using the milling outturns in the milling budgets (Table J series). Figures for area and production may vary slightly from other tables because of rounding. Land area has been estimated from the production levels by using the yields given in the farm production budgets (Table H series).

Private costs include all taxes and subsidies; social costs both exclude taxes and subsidies and are based on the social opportunity cost of primary domestic factors. Private profitability equals gross revenue minus all input costs, at market prices. In calculating private profitability, domestic factor costs associated with rice imports have been subtracted from the costs of the distribution activity. Thus private profitability, as defined here, measures the net private returns to the sector as a whole as a result of import substitution. This profit will be larger than that derived directly from the budgets. Social profitability equals the price of imported rice minus all costs, evaluated at either world prices in the case of imports or social opportunity costs in the case of primary domestic factors. The effective protection coefficient is defined as the ratio of value added at domestic market prices to value added at world prices. The resource cost ratio equals the sum of all domestic factor costs, valued at social opportunity costs, over value added at world prices. For a more complete explanation of these concepts, see John M. Page, Jr. and J. Dirck Stryker, "Comparative Costs and Incentives in West African Rice - an Introduction," Stanford/WARDA Study of the Political Economy of Rice in West Africa, Food Research Institute, Stanford University, June 1978.

Table M2.--Indicators of Private and Social Profitability for Improved
Production Privately Hulled and Consumed Locally*

(CFA francs/kg milled rice, unless otherwise indicated)

Activity (F :FM:M :MC)	Area (000 ha)	Production (000 mt paddy)	Private cost	Social cost	Net private profitability	Net social profitability	Effective protection coefficient	Resource cost ratio
2 5 3 11	1	2	82.2	85.4	16.8	-7.7	1.347	1.114
3 5 3 11	1	2	96.0	105.3	3.0	-27.5	1.332	1.406
4 5 3 11	3	4	99.9	103.9	-1.0	-26.1	1.264	1.344
5 5 3 11	0 ^a	1	93.9	96.4	5.1	-18.6	1.329	1.276
9 5 3 11	0 ^a	1	88.2	145.7	10.8	-68.0	1.432	2.404
11 5 3 12	1	1	74.8	86.6	24.2	-8.4	1.382	1.130
12 5 3 12	1	1	69.0	80.3	30.0	-2.0	1.358	1.030
14 5 3 12	2	2	70.4	92.8	28.6	-14.5	1.363	1.236
15 5 3 12	0 ^a	1	85.2	96.2	13.8	-18.0	1.321	1.264
16 5 3 12	2	3	85.9	92.5	13.1	-14.2	1.256	1.186
17 5 3 12	1	1	77.8	102.0	21.2	-23.7	1.311	1.344
18 5 3 12	0 ^a	1	77.8	106.1	21.2	-27.9	1.256	1.365

* See Table M1.

^aThis value is less than 500 ha.

^bThis value is less than 500 mt rice.

Table M3.--Indicators of Private and Social Profitability for Improved
Production Milled by the Government for Internal Consumption*

(CFA francs/kg milled rice, unless otherwise indicated)

Activity (F :FM:M :MC)	Area (000 ha)	Production (000 mt paddy)	Private cost	Social cost	Net private profitability	Net social profitability	Effective protection coefficient	Resource cost ratio
2 3 4 5	1	1	36.2	96.4	50.8	-18.7	1.177	1.296
3 3 4 5	1	1	49.4	115.3	37.6	-37.6	1.162	1.594
4 3 4 5	1	1	53.1	114.0	33.9	-36.3	1.112	1.510
5 3 4 5	0 ^a	0 ^b	47.4	106.8	39.6	-29.1	1.158	1.462
9 3 4 5	0 ^a	1	42.0	153.9	45.0	-76.2	1.195	2.697
11 3 4 6	0 ^a	0 ^b	30.6	99.5	56.4	-21.8	1.216	1.364
12 3 4 6	0 ^a	0 ^b	25.1	93.3	61.9	-15.6	1.196	1.255
14 3 4 6	1	1	26.4	105.3	60.6	-27.6	1.189	1.486
15 3 4 6	0 ^a	1	40.4	108.3	46.6	-30.6	1.163	1.486
16 3 4 6	1	1	41.3	105.0	45.7	-27.3	1.114	1.384
17 3 4 6	0 ^a	1	33.5	114.1	53.5	-36.4	1.155	1.569
18 3 4 6	0 ^a	0 ^b	33.5	118.1	53.5	-40.4	1.114	1.568

* See Table M1.

^aThis value is less than 500 ha.

^bThis value is less than 500 mt rice.

Table M4.--Indicators of Private and Social Profitability for Improved
Production Milled by the Government for Abidjan Consumption*
(CFA francs/kg milled rice, unless otherwise indicated)

Activity (F : FM: M : MC)	Area (000 ha)	Production (000 mt paddy)	Private cost	Social cost	Net private profitability	Net social profitability	Effective protection coefficient	Resource cost ratio
2 3 4 3	2	5	39.7	101.2	47.5	-26.1	1.235	1.433
3 3 4 3	1	5	52.9	120.1	34.1	-45.0	1.219	1.746
4 3 4 3	2	4	56.6	118.8	30.4	-43.7	1.160	1.641
5 3 4 3	0 ^a	1	50.9	111.6	36.1	-36.5	1.216	1.608
9 3 4 3	1	2	45.4	158.7	41.6	-83.6	1.280	2.993
11 3 4 4	2	2	33.7	105.1	53.3	-30.0	1.289	1.531
12 3 4 4	1	1	28.2	99.0	58.8	-23.8	1.265	1.412
14 3 4 4	2	3	29.5	110.9	57.4	-35.8	1.263	1.670
15 3 4 4	1	1	43.5	114.0	43.5	-38.8	1.228	1.650
16 3 4 4	1	2	44.3	110.6	42.7	-35.5	1.169	1.525
17 3 4 4	1	1	36.6	119.7	50.4	-44.6	1.219	1.736
18 3 4 4	0 ^a	1	36.6	123.7	50.4	-48.6	1.169	1.718

* See Table M1.

^aThis value is less than 500 ha.

105

Table N1.--Elasticities of Net Social Profitability with Respect
to Yields and the Social Cost of Primary Inputs for
Traditional Production^a

Activity ^b (F :FM:M :MC)	Elasticities				
	Yields	Social costs			Land ^c
		Unskilled labor	Skilled labor	Capital	
1 1 1 1	32.083	-32.127	-4.073	-10.835	0.0
10 1 2 2	6.919	-7.360	-1.120	-2.266	0.0
1 5 3 11	6.758	-5.609	-0.244	-2.067	0.0
10 5 3 12	13.309	-11.670	-0.396	-3.772	0.0
1 3 4 5	3.238	- 2.755	-0.367	-1.135	0.0
10 3 4 6	6.118	- 5.521	-0.876	-2.144	0.0
1 3 4 3	2.421	- 2.069	-0.373	-0.891	0.006
10 3 4 4	3.270	- 2.967	-0.668	-1.205	-0.010

^aThese are point elasticity estimates, calculated for one percent changes in yields and social costs. As such, they are sensitive to the absolute value of net social profitability (NSP). As the value of the NSP approaches zero, the elasticity becomes very large.

^bSee Table L1 for a more complete description of these activities.

^cA value of 0.0 means that the elasticity was not calculated.

Table N2.—Elasticities of Net Social Profitability with Respect
to Yields and the Social Cost of Primary Inputs for Improved
Production, Privately Hulled and Consumed Locally^a

Activity ^b (F :FM:M :MC)	Elasticities				
	Yields	Unskilled labor	Skilled labor	Capital	Land
2 5 3 11	9.215	-5.833	-1.346	-2.622	0.0
3 5 3 11	3.289	-2.064	-0.392	-1.004	0.0
4 5 3 11	3.413	-2.513	-0.102	-1.291	0.0
5 5 3 11	4.392	-2.343	-0.605	-1.675	0.0
9 5 3 11	1.921	-0.309	-0.377	-1.026	0.0
11 5 3 12	8.722	-5.042	-1.553	-2.102	0.0
12 5 3 12	33.341	-17.762	-5.731	-10.498	0.0
14 5 3 12	5.463	-1.190	-1.148	-2.898	0.0
15 5 3 12	4.603	-2.525	-0.590	-1.678	0.0
16 5 3 12	5.560	-3.676	-0.127	-2.579	0.0
17 5 3 12	3.727	-1.774	-0.423	-1.712	0.0
18 5 3 12	3.317	-1.719	-0.064	-1.956	0.0

^aSee Table N1.

^bSee Table L2 for a more complete description of these activities.

Table N3.--Elasticities of Net Social Profitability with Respect
to Yields and the Social Cost of Primary Inputs for Improved
Production Milled by the Government for Internal Consumption^a

Activity ^b (F :FM:M :MC)	Elasticities				
	Yields	Social costs			Land
		Unskilled labor	Skilled labor	Capital	
2 3 4 5	3.614	-2.366	-0.820	-1.196	0.0
3 3 4 5	2.295	-1.479	-0.419	-0.784	0.0
4 3 4 5	2.343	-1.766	-0.221	-0.973	0.0
5 3 4 5	2.676	-1.478	-0.557	-1.129	0.0
9 3 4 5	1.634	-0.282	-0.393	-0.914	0.0
11 3 4 6	3.210	-1.923	-0.872	-0.951	0.0
12 3 4 6	4.079	-2.268	-1.119	-1.530	0.0
14 3 4 6	2.741	-0.650	-0.813	-1.594	0.0
15 3 4 6	2.566	-1.460	-0.543	-1.056	0.0
16 3 4 6	2.760	-1.878	-0.302	-1.421	0.0
17 3 4 6	2.318	-1.144	-0.443	-1.171	0.0
18 3 4 6	2.187	-1.170	-0.204	-1.386	0.0

^aSee note a, Table N1.

^bSee Table L3 for a more complete description of these activities.

Table N⁴.--Elasticities of Net Social Profitability with Respect
to Yields and the Social Cost of Primary Inputs for Improved Production
Milled by the Government for Abidjan Consumption^a

Activity ^b (F : FM:M :MC)	Elasticities				
	Yields	Social costs			
		Unskilled labor	Skilled labor	Capital	Land
2 3 4 3	2.592	-1.708	-0.698	-0.906	-0.128
3 3 4 3	1.919	-1.243	-0.414	-0.684	-0.110
4 3 4 3	1.947	-1.474	-0.250	-0.837	0.0
5 3 4 3	2.135	-1.187	-0.523	-0.935	-0.236
9 3 4 3	1.490	-0.261	-0.393	-0.848	0.0
11 3 4 4	2.331	-1.406	-0.751	-0.725	-0.017
12 3 4 4	2.675	-1.499	-0.882	-1.047	-0.019
14 3 4 4	2.113	-0.509	-0.725	-1.258	0.0
15 3 4 4	2.024	-1.159	-0.519	-0.860	-0.125
16 3 4 4	2.122	-1.452	-0.332	-1.122	0.0
17 3 4 4	1.892	-0.940	-0.440	-0.979	-0.131
18 3 4 4	1.817	-0.978	-0.242	-1.173	0.0

^aSee note a, Table N1.

^bSee Table L4 for a more complete description of these activities.

109

Table 01.--Net Social Profitability in Relation to the World Market Price
of Rice for Traditional Production
(CFA francs per kg milled rice)

Activity ^b (F :FM:M :MC)	World price ^a								
	\$200/mt	\$250/mt	\$300/mt	\$350/mt	\$400/mt	\$450/mt	\$500/mt	\$550/mt	\$600/mt
1 1 1 1	-39.2	-26.3	-13.9	-1.3	11.3	23.9	36.6	49.2	61.8
10 1 2 2	-28.6	-16.0	-3.4	9.3	21.9	34.5	47.1	59.8	72.4
1 5 3 11	-48.1	-35.5	-22.8	-10.2	2.4	15.0	27.7	40.3	52.9
10 5 3 12	-32.6	-20.0	-7.3	5.3	17.9	30.6	43.2	55.8	68.4
1 3 4 5	-59.0	-46.4	-33.8	-21.1	-8.5	4.1	16.7	29.4	42.0
10 3 4 6	-46.6	-34.0	-21.3	-8.7	3.9	16.5	29.2	41.8	54.4
1 3 4 3	-66.4	-53.8	-41.2	-28.5	-15.9	-3.3	9.3	22.0	34.6
10 3 4 4	-54.8	-42.2	-29.6	-16.9	-4.3	8.3	20.9	33.6	46.2

^aThis price is the f.o.b., Bangkok, price for Thai 5 percent broken. Ivorian imports of 25-35 percent broken are valued c.i.f. at \$50 less than the prices given here. In addition, the tradable component of the costs of landing and distributing imported rice are added to the c.i.f. price in calculating the values of net social profitability shown in the table.

^bThese activities are described in Table L1.

Table 02.--Net Social Profitability in Relation to the World Market Price
of Rice for Improved Production, Privately Hulled and Consumed Locally
(CFA francs per kg milled rice)

Activity ^b (F : FM: M : MC)	World price ^a								
	\$200/mt	\$250/mt	\$300/mt	\$350/mt	\$400/mt	\$450/mt	\$500/mt	\$550/mt	\$600/mt
2 5 3 11	-44.9	-32.3	-19.6	-7.0	5.6	18.2	30.9	43.5	56.1
3 5 3 11	-64.7	-52.1	-39.5	-26.8	-14.2	-1.6	11.0	23.7	36.5
4 5 3 11	-63.2	-50.6	-38.0	-25.3	-12.7	-0.1	12.5	25.2	37.8
5 5 3 11	-55.8	-43.2	-30.5	-17.9	-5.3	7.3	20.0	32.6	45.2
9 5 3 11	-105.4	-92.7	-80.1	-67.5	-54.9	-42.2	-29.6	-17.0	-4.4
11 5 3 12	-45.6	-33.0	-20.4	-7.7	4.9	17.5	30.1	42.8	55.4
12 5 3 12	-39.2	-26.6	-14.0	-1.3	11.3	23.9	36.5	49.2	61.8
14 5 3 12	-51.8	-39.1	-26.5	-13.9	-1.3	11.4	24.0	36.6	49.2
15 5 3 12	-55.2	-42.5	-29.9	-17.3	-4.7	8.0	20.6	33.2	45.9
16 5 3 12	-51.3	-38.7	-26.1	-13.4	-0.8	11.8	24.4	37.1	49.7
17 5 3 12	-60.9	-48.3	-35.6	-23.0	-10.4	2.2	14.9	27.5	40.1
18 5 3 12	-65.0	-52.4	-39.7	-27.1	-14.5	-1.9	10.8	23.4	36.0

^aSee Table 01.

^bThese activities are described in Table L2.

Table 03.--Net Social Profitability in Relation to the World Market Price
of Rice for Improved Production Milled by the
Government for Internal Consumption
(CFA francs per kg milled rice)

Activity ^b (F : FM: M : MC)	World price ^a								
	\$200/mt	\$250/mt	\$300/mt	\$350/mt	\$400/mt	\$450/mt	\$500/mt	\$550/mt	\$600/mt
2 3 4 5	-55.9	-43.3	-30.7	-18.1	-5.5	7.2	19.8	32.4	45.0
3 3 4 5	-74.9	-62.2	-49.6	-37.0	-24.4	-11.7	0.9	13.5	26.1
4 3 4 5	-73.4	-60.8	-48.2	-35.6	-22.9	-10.3	2.3	14.9	27.5
5 3 4 5	-66.4	-53.7	-41.1	-28.5	-15.9	-3.2	9.4	22.0	34.6
9 3 4 5	-113.7	-101.0	-88.4	-75.8	-63.2	-50.5	-37.9	-25.3	-12.7
11 3 4 6	-59.0	-46.4	-33.8	-21.1	-8.5	4.1	16.7	29.3	41.9
12 3 4 6	-52.9	-40.3	-27.6	-15.0	-2.4	10.2	22.8	35.4	48.1
14 3 4 6	-64.9	-52.3	-39.6	-27.0	-14.4	-1.8	10.8	23.5	36.1
15 3 4 6	-67.9	-55.3	-42.6	-30.0	-17.4	-4.8	7.9	20.5	33.1
16 3 4 6	-64.5	-51.8	-39.2	-26.6	-14.0	-1.3	11.3	23.9	36.5
17 3 4 6	-73.6	-61.0	-48.3	-35.7	-23.1	-10.5	2.1	14.8	27.4
18 3 4 6	-77.5	-64.9	-52.3	-39.6	-27.0	-14.4	-1.8	10.8	23.5

^aSee Table 01.

^bThese activities are described in Table L3.

1/2

Table 04.--Net Social Profitability in Relation to the World Market Price
of Rice for Improved Production Milled by the
Government for Abidjan Consumption

Activity ^b (F : FM: M : MC)	World price ^a								
	\$200/mt	\$250/mt	\$300/mt	\$350/mt	\$400/mt	\$450/mt	\$500/mt	\$550/mt	\$600/mt
2 3 4 3	-63.4	-50.7	-38.1	-25.5	-12.9	-0.2	12.4	25.0	37.6
3 3 4 3	-82.3	-69.7	-57.0	-44.4	-31.8	-19.2	-6.5	6.1	18.7
4 3 4 3	-80.1	-68.2	-55.6	-43.0	-30.4	-17.7	-5.1	7.5	20.1
5 3 4 3	-73.8	-61.1	-48.5	-35.9	-23.3	-10.6	2.0	14.6	27.2
9 3 4 3	-121.1	-108.5	-95.8	-83.2	-70.6	-58.9	-45.3	-32.7	-20.1
11 3 4 4	-67.3	-54.6	-42.0	-29.4	-16.8	-4.1	8.5	21.1	33.7
12 3 4 4	-61.1	-48.5	-35.9	-23.3	-10.6	2.0	14.6	27.2	39.9
14 3 4 4	-73.1	-60.5	-47.9	-35.3	-22.6	-10.0	2.6	15.2	27.9
15 3 4 4	-76.1	-63.5	-50.9	-38.3	-25.6	-13.0	-0.4	12.3	24.9
16 3 4 4	-72.7	-60.1	-47.4	-34.8	-22.2	-9.6	3.1	15.7	28.3
17 3 4 4	-81.8	-69.2	-56.6	-44.0	-31.3	-18.7	-6.1	6.5	19.2
18 3 4 4	-85.8	-73.1	-60.5	-47.9	-35.3	-22.6	-10.0	2.6	15.2

^aSee Table 01.

^bThese activities are described in Table L4.

Table P1.--Selected Indicators Related to Traditional Rice Production
(CFA francs/mt rice, unless otherwise indicated)

Activity (F :FM:M :MC)	Impact on government budget		Net foreign exchange earned or saved ^c	Unskilled employment (days/mt) ^d
	Revenue ^a	Expenditures ^b		
		Recurrent	Investment	
1 1 1 1	196	0	0	79,890
10 1 2 2	175	0	0	80,390
1 5 3 11	2,271	0	0	75,877
10 5 3 12	2,203	0	0	76,377
1 3 4 5	4,226	58,978	0	71,114
10 3 4 6	4,280	59,518	0	71,019
1 3 4 3	4,519	60,577	0	68,164
10 3 4 4	4,848	62,577	0	67,664

^aGovernment revenue equals the net indirect taxes embodied in the inputs used in rice production. It does not include the direct subsidies or taxes at the level of the farmer, merchant, or miller.

^bRecurrent government expenditures equal the direct subsidies to farmers, merchants, or millers on recurrent inputs used in rice production. The investment expenditure equals the government's share of the annuity (calculated at 5 percent real interest rate) on land development only. The annuity on mill investment is included in recurrent expenditures.

^cNet foreign exchange saved through import substitution equals value added at world prices. It is calculated as the difference between the import cost of rice at the place of consumption (c.i.f. price of rice plus the tradable component of landing and distribution) and the cost of imported inputs used in the domestic production of rice. This measure does not include the foreign exchange foregone by using domestic factors in rice rather than some other production.

^dThis estimate is based both on unskilled labor costs of farm production divided by the male wage rate of 450 or 350 CFA francs per day, for the forest or savannah zones respectively and on all other unskilled labor costs divided by 450 CFA francs per day.

Table P2.--Selected Indicators Related to Improved Production,
Privately Hulled and Consumed Locally^a
(CFA francs/mt rice, unless otherwise indicated)

Activity (F :FM:M :MC)	Impact on government budget		Net foreign exchange earned or saved	Unskilled employment (days/mt)	
	Revenue	Expenditures			
		Recurrent	Investment		
2 5 3 11	2,171	10,362	0	67,665	100
3 5 3 11	3,506	9,426	10,270	67,663	126
4 5 3 11	1,746	0	14,977	75,877	146
5 5 3 11	4,737	11,027	8,986	67,344	97
9 5 3 11	26,143	39,467	45,753	48,417	47
11 5 3 12	2,382	15,815	0	64,566	117
12 5 3 12	3,346	14,866	2,473	66,151	98
14 5 3 12	12,205	18,171	17,831	61,439	46
15 5 3 12	3,795	9,465	12,137	68,093	126
16 5 3 12	1,924	0	17,700	76,377	145
17 5 3 12	6,978	8,442	30,680	68,951	117
18 5 3 12	7,254	0	45,451	76,377	133

^aSee the notes to Table P1.

11/2

Table P3.--Selected Indicators Related to Improved Production
Milled by the Government for Internal Consumption^a

(CFA francs/mt rice, unless otherwise indicated)

Activity (F :FM:M :MC)	Impact on government budget		Net foreign exchange earned or saved	Unskilled employment (days/mt)	
	Revenue	Expenditures			
		Recurrent	Investment		
2 3 4 5	5,250	68,866	0	63,305	100
3 3 4 5	6,573	67,965	9,803	63,303	125
4 3 4 5	4,903	58,968	14,296	71,144	144
5 3 4 5	7,699	69,494	8,578	62,999	97
9 3 4 5	23,133	96,641	43,872	44,932	49
11 3 4 6	5,543	74,614	0	59,744	115
12 3 4 6	6,463	73,708	2,360	61,257	97
14 3 4 6	14,920	76,863	17,020	56,760	47
15 3 4 6	6,892	68,553	11,585	63,111	123
16 3 4 6	5,106	59,518	16,895	71,019	142
17 3 4 6	9,931	67,486	29,285	63,930	114
18 3 4 6	10,193	59,518	43,386	71,019	131

^aSee the notes to Table P1.

1/10

Table P4.--Selected Indicators Related to Improved Production
Milled by the Government for Abidjan Consumption^a

(CFA francs/mt.rice, unless otherwise indicated)

Activity (F :FM:M :MC)	Impact on government budget		Net foreign exchange earned or saved	Unskilled employment (days/mt)	
	Revenue	Expenditures			
		Recurrent	Investment		
2 3 4 3	5,543	70,475	0	60,325	99
3 3 4 3	6,866	69,574	9,803	60,323	124
4 3 4 3	5,196	60,577	14,296	68,164	143
5 3 4 3	7,992	71,103	8,578	60,019	96
9 3 4 3	28,426	98,250	43,872	41,952	48
11 3 4 4	6,111	77,673	0	56,389	116
12 3 4 4	7,031	76,767	2,360	57,902	98
14 3 4 4	15,488	79,922	17,020	53,405	48
15 3 4 4	7,460	71,612	11,585	59,756	124
16 3 4 4	5,674	62,577	16,895	67,664	143
17 3 4 4	10,399	70,635	29,285	60,575	115
18 3 4 4	10,761	62,577	43,386	67.664	131

^aSee the notes to Table P1.