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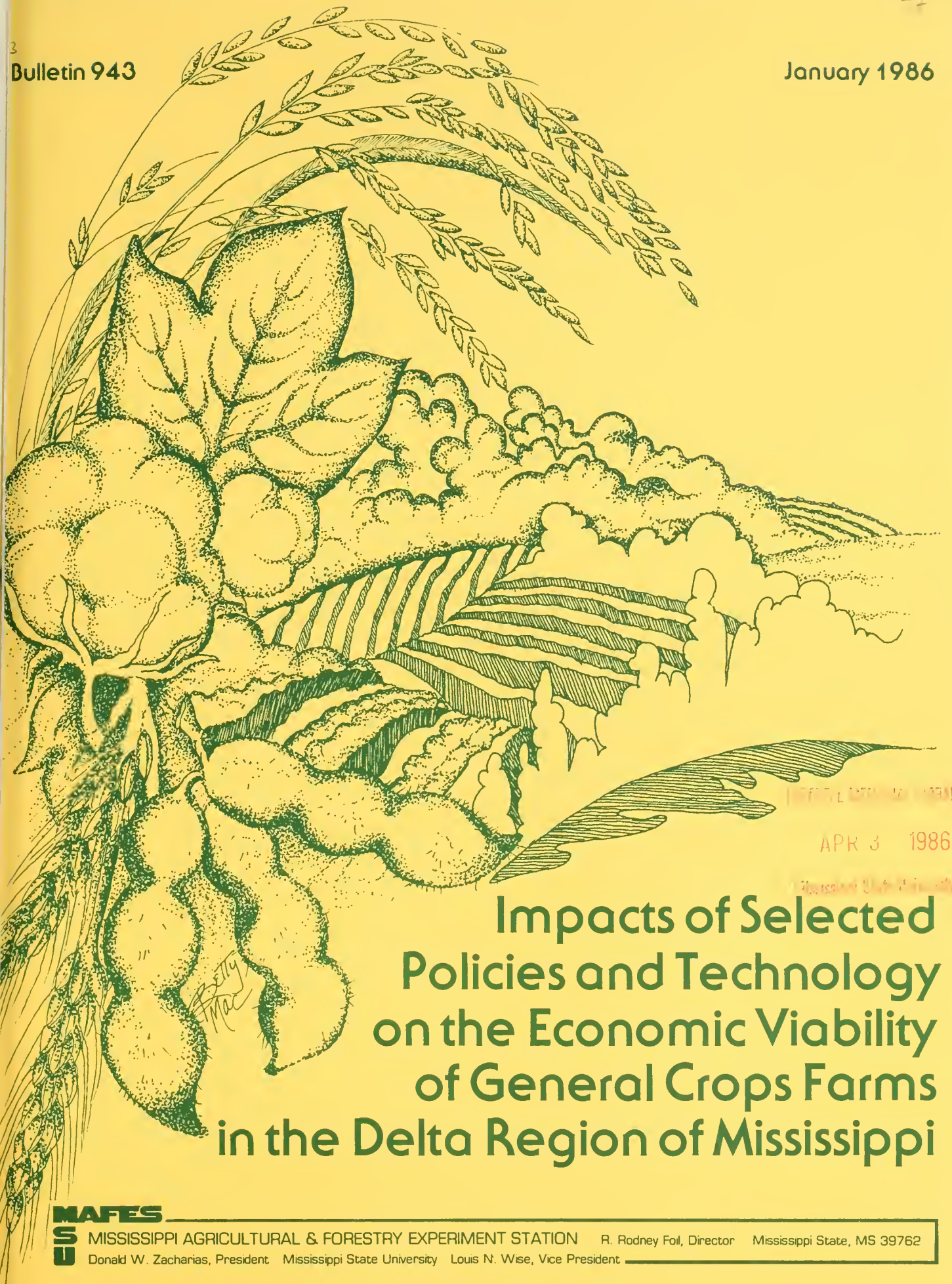

Impacts of Selected Policies and Technology on the Economic Viability of General Crops Farms in the Delta Region of Mississippi

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Summary of Study Procedures and Results

Purpose and Methods

This study analyzes the impacts of selected farm commodity programs, federal income tax provisions, and farm-level production technologies on the economic viability of representative crop farms in the Delta Region of Mississippi. Each farm produces cotton, rice, soybeans, and wheat. The sizes of farms were selected to represent a moderate-size (1,443-acre) farm, a large (3,119-acre) farm, and a very large (6,184-acre) farm.

Computer simulation was used to analyze the effects of seven alternative farm commodity programs under current income tax provisions, one alternative income tax situation, three financial stress conditions, and three alternative technology advance possibilities on the income, wealth, and growth characteristics of each farm. The specific simulations were as follows:

Farm Policy Scenarios

I. Base Policy–The Base Policy Scenario involves continuation of the 1981 Farm Bill through 1992 and continuation of the income tax provisions under the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA). Annual crop yields were projected under the most likely technology advance conditions.

II. A 20% Acreage Reduction–The provisions of the Base Policy were modified by adding a 15% set aside with a 5% paid diversion for cotton, rice, and wheat in 1986-1992.

III. No Farm Program Payment Limitation–All provisions of the Base Policy were used except that the $50,000 limitation on diversion and deficiency payments was removed.

IV. No Price Supports/No Diversion Payments–The Commodity Credit Corporation loan, Farmer-Owned Reserve, and target price provisions under the Base Policy were eliminated for all years in the 1983-1992 planning horizon.

V. No Target/Deficiency Payment–The target price and deficiency payment program under the Base Policy was eliminated for all years in the 1983-1992 period.

VI. Target Farm Program Benefits–All farm program and income tax provisions of the Base Policy were used except that farms producing more than $300,000 of program commodities annually, valued at their localized loan rate, were not permitted to participate in the program.

VII. No Farm Program–All farm program provisions under the Base Policy were eliminated for all 10 years of the planning horizon.

Income Tax Scenario

VIII. Reduced Income Tax Benefits and Base Policy Program–The federal income tax provisions under TEFRA for the Base Policy were made more restrictive with regard to depreciation, first year expensing, investment tax credit, annual interest expense, and recapture of depreciation deduction provisions.

Financial Stress Scenarios

IX. Base Finance Policy–Each farm's long-term debt to asset ratio was increased to 0.55 and its intermediate-term debt to asset ratio was increased to 0.60 to represent a highly leveraged farm. Annual long-term and intermediate-term interest rates were increased to their 1980-83 average values. The Base Policy provisions were used to represent the farm commodity programs.

X. Debt Restructure–The Base Finance Policy provisions were used, but the length of intermediate-term loans was increased 1 year (to 7 years) and a portion of intermediate-term debt was converted to long-term debt.

XI. Interest Subsidy–The Base Finance Policy provisions were simulated, but an interest subsidy of 3.4% for long-term interest rates and 5.4% for intermediate-term interest rates was provided during the first 2 years.

No New Technology Scenarios

XII. No New Technology and Base Policy–The federal income tax and farm program provisions in the Base Policy (Scenario I) were simulated assuming that no new technology would be introduced during the 1983-1992 period.

XIII. No New Technology and No Deficiency Payments–The farm program provisions under No Target Price/Deficiency Payments (Scenario V) were simulated assuming no new technology.

XIV. No New Technology and No Farm Program–All farm program provisions were eliminated (Scenario VII) and the farms were simulated assuming no new technology.

XV. New Entrant and Base Policy–The farm policy provisions of the Base Policy (Scenario I) were simulated assuming the farm operator on the moderate-size farm was a new entrant to farming.

XVI. New Entrant and No Deficiency Payments–

The farm program provisions under No Target Price/Deficiency Payments (Scenario V) were simulated for the moderate-size farm assuming the farm operator was a new entrant to farming.

XVII. New Entrant and No Farm Program—All farm commodity program provisions (Scenario VII) were eliminated for the new entrant on the moderate-size farm during all years of the planning horizon.

Simulation Results

The major findings from the simulation analysis are summarized for the various policy, finance, and technology conditions.

Farm Commodity Program Alternatives

All three representative farms in the Delta Region of Mississippi have a 100% probability of survival over the 10-year period (1983-1992) under the entire range of farm program (and no program) alternatives considered. Further, the probability of the farm operator having a positive after-tax net present value of realized and unrealized financial flows is at or near 100% under the range of farm programs considered. However, in the absence of some or all of the provisions in the current farm commodity program, each of the farms experienced negative annual net farm incomes. Even though they remained solvent over the 10-year planning horizon, these negative net farm incomes portend financial difficulties on each farm over extended periods of time.

Targeting of farm program benefits to farms that produce $300,000 or less in program crops has dramatic economic impact even on the moderate-size (1,443-acre) farm. As a general rule, the very large farm fares the best with the loss of all farm programs because it operates with substantial acreage of leased land, has much less economic incentive to grow in acreage size than the moderate or large farms, and uses more of the retained farm earnings and off-farm income to retire long-term land and intermediate-term machinery debts. The greatest economic incentives to grow in acreage occurred on the moderate-size (1,443-acre) farm for all farm commodity program options considered.

In general, it appears that the two largest farms had captured most of the economies to size available to them, and only the moderate-size farm faced potentials for substantial growth irrespective of the farm commodity policy followed. Continuation of current farm policy but without program payments limitations would provide for the greatest growth of this size farm, with the two largest farms exhibiting only modest increases in farm acreage.

Income Tax Provisions

The reduction in income tax benefits had its major adverse economic impacts for the very large (6,184-acre) farm through a reduction in net farm income of $36,000 annually compared to the Base Farm Policy Scenario (I). The moderate-size (1,443-acre) farm and the large-size (3,119-acre) farm also experienced annual net farm income reductions of $9,000 and $16,500, respectively. The farm operator's average present value of ending net worth on the moderate-size farm under the restrictive income tax provisions was 7% (or some $188,000) less than for the Base Farm Policy Scenario. In contrast, the large and very large farms experienced an increase in ending net worth of some 7% and 8%, respectively, under the restrictive income tax provisions as compared with the Base Farm Policy Scenario.

Each of the three farms failed to grow as rapidly in total acreage under the restrictive income tax provisions as under the Base Farm Policy Scenario, with the greatest impact occurring for the moderate-size and large-size farms. Although, a more restrictive income tax policy would adversely affect each of the three farms in the Delta Region of Mississippi, the impact is rather modest compared to the loss of economic benefits from withdrawing the price or income support payment programs or the entire complement of existing farm commodity programs.

Increased Debt Load, Financial Bailout

Increasing debt loads to a level of 60% (or 64% for the moderate-size farm) of machinery value and 55% of land value resulted in the heaviest economic drag on the very large farm whereby average annual net farm income drops to $3,700. This adverse economic impact results mainly from the much higher land and machinery interest payments as the debt to asset ratios are increased from 36% to 55% for land and from 48% to 60% for machinery. Because of this heavy debt load, the very large farm continues to exhibit low (or negative) average annual net farm income with either a debt restructuring or an interest rate subsidy type of financial bailout.

The interest rate subsidy was the most beneficial of the two alternatives with respect to annual net farm income, particularly for the moderate-size and large-size farms. However, the debt restructuring alternative provided the greatest incentive for additional growth in total acreage, particularly for these two sizes of farms that were in a position to increase their purchases of cropland. In general, the three farms under the higher debt loads would be able to survive and grow in total farm acreage over the 10-year planning period without either of the financial bailout alternatives used in the simulations.

No New Technology

The alternative of having "no new technologies" developed and available for adoption was simulated by holding mean crop yields constant at their 1983 levels, and assuming the distribution of yield on a year-to-year basis experienced during 1974-1983.

Since the yield increases under the "most likely technology" scenarios do have a favorable benefit/cost ratio, the "no new technology" scenarios have the effect of reducing annual net farm incomes on each farm. These reductions were a modest $300 and $4,300 annually on the moderate-size and large-size farms, respectively. However, for the very large farm with a much shorter time lag in adopting new yield-enhancing technology, the impact was to reduce annual net farm income by $26,800. These benefits from new technology were rather modest compared to the benefits from farm commodity price and income support programs. Moreover, the benefits from new technology could largely disappear for even the very large farms should the expected yield increases expand total output in relation to demand sufficiently to reduce cotton and grain prices.

New Entrants into Farming

High land and machinery costs faced by a new entrant on the moderate-size farm adversely impact on the average annual net farm income. Even though the probability of survival over the 10-year period is 100% under the Base Farm Policy (Scenario I), annual net farm income is a negative $18,800, which portends financial difficulty over a longer period of time. This probability of survival drops to 76% when the target price/deficiency payment provisions are withdrawn and to 62% with the loss of all farm commodity programs. Thus, the economic survival of new entrants into farming is particularly dependent on price and income benefits from farm commodity programs (or of some other type of financial assistance). In the absence of such programs, few new farm operators entering farming in the Delta Region of Mississippi would be expected to experience economic success over the next 10 years.

Economic Characteristics of Farms and Nature of the Study

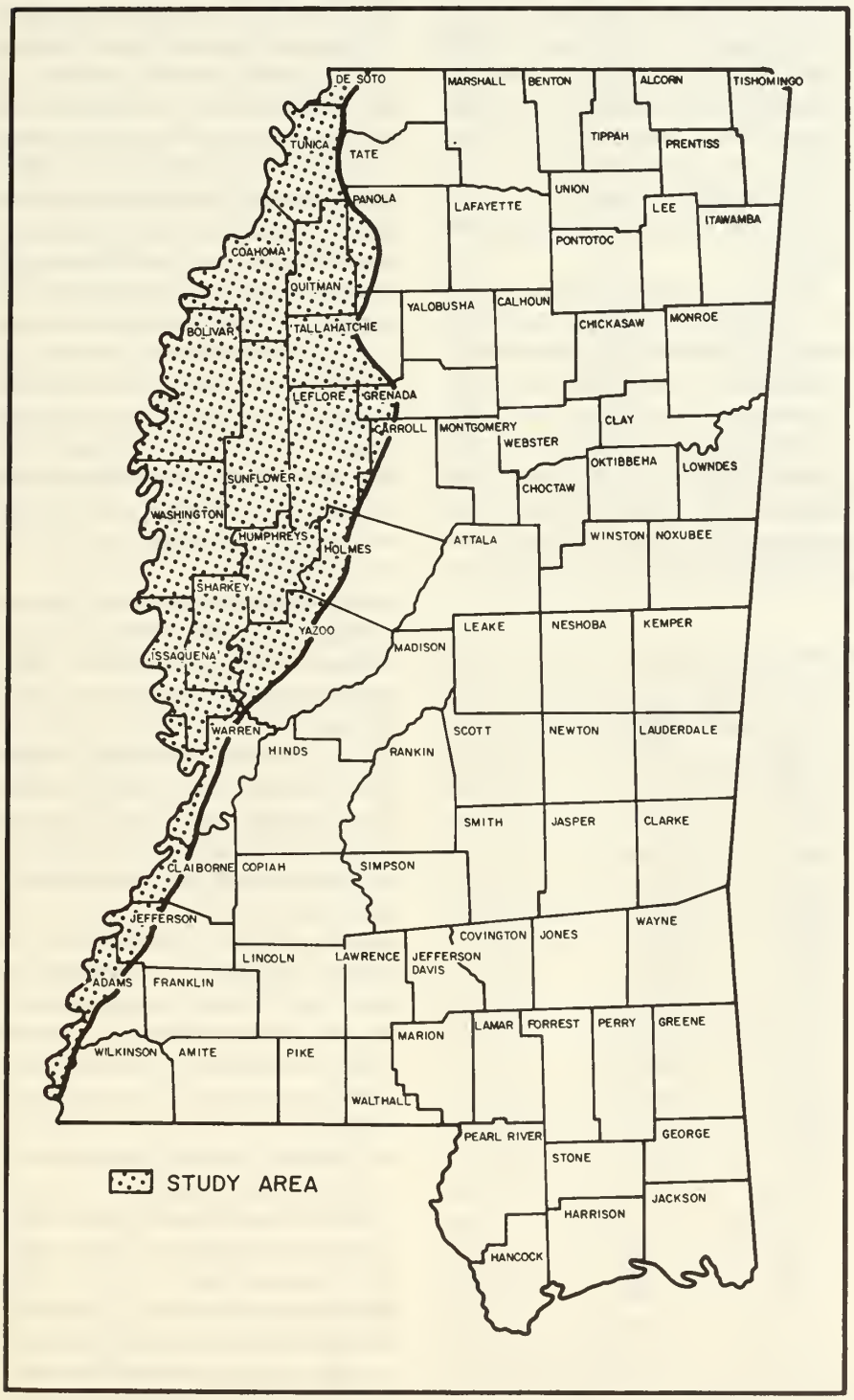

Figure 1. Farm Resources Survey Area in the Delta Region of Mississippi.

Introduction

The purpose of this study was to analyze the impacts of selected farm commodity programs, federal income tax provisions, and farm-level production technologies on the economic viability of representative crop farms in the Delta Region of Mississippi. A number of alternative farm commodity price and income support programs, income tax provisions, and technology scenarios were analyzed with respect to their impacts on the survival and growth of three general crops farms. Each farm produces cotton, rice, soybeans, and wheat. The sizes of farms were selected to represent a moderate, large, and very large farm in the region.

Method of Analysis

Two techniques were used to analyze the effects of the selected farm policy, income tax, and technology provisions. A mail survey was used to obtain information on resource characteristics, acreages devoted to specific crops, and ASCS-reported historic yields of crops receiving payment under current farm program provisions. These data were used to develop resource characteristics of the three representative farms. A whole farm simulation model was used to analyze the effects of alternative farm commodity policy, income tax, finance, and technology advance scenarios on the economic viability and growth characteristics of each farm. The Farm Level Income Tax and Farm Policy Simulator (FLIPSIM V) model

used in the farm simulations is described in detail by Richardson and Nixon (1).

Representative Farms

The mail survey was sent to all farms of 500 acres or more located in the Delta counties of Mississippi in the Fall of 1983 (Figure 1). A total of 116 respondents who produced all four crops on each farm was used in a cumulative frequency distribution analysis to group the farms into three distinct size categories. The "very large" farms approximate the largest 10% of farms from the survey; the "large" farms, the 70th to 90th size percentiles; and the "moderate-size" farms, the lowest 70th percentile of the 116 respondents with farms of 500 acres or more in size.

The three representative farms used for this analysis represent the average characteristics of farms in each size category. A total of 82 farms were in the size category of 500-2,499 acres; 21 farms were in the size category of 2,500-4,499 acres; and the remaining 13 farms were in a size category of 4,500 to slightly more than 10,000 acres. Information on the number of two-wheel and four-wheel drive tractors, combines, cotton pickers, managerial/supervisory workers, secretarial/office workers, shop workers, laborers tractor drivers, acres planted to each crop in 1983 (including PIK acres), etc., was obtained from the mail survey. The three farms developed for this study are a moderate-size farm (1,443 acres); a large farm (3,119 acres); and a very large farm (6,184 acres).

Table 1 provides a summary of the financial and resource characteristics for the three farms. The proportion of cropland owned increases from 37% for the smallest farm to about 50% for the largest farm. The machinery and equipment complement was optimized for the crop acreages on each farm using crop budget performance rates per acre typical of the Delta Region of Mississippi. The market value of machinery and equipment for each farm reflects the 1982 market value of the budgeted machinery complement.

The long-term and intermediate-term debt to asset ratios for the 1,443-acre farm and the 3,119-acre farm were obtained from USDA's 1979 Agricultural Finance Survey (2) and adjusted to reflect the equity levels as reported from the 116 farms responding to the 1983 mail survey. These debt ratios are the average for part-owner general crops farms in the Mississippi Delta Region that had debt on real estate in 1979. Financial ratios for the largest farm were developed by extending the ratios *on a per-acre basis* for a 3,457-acre farm as reported in the 1979 Agricultural Finance Survey and adjusted by the equity levels reported for the largest farm size group in the 1983 mail survey.

Average annual off-farm income adjusted to 1982 levels for the farms was obtained from the 1979 Agricultural Finance Survey. The off-farm income for the very large farm was the average of the amounts reported by eight of the 13 farm operators in this size category obtained through a telephone follow-up interview. Maximum annual family living expenses were assumed to be $27,000 to $45,000, depending on farm size. A marginal propensity to consume disposable income of 0.25 was used, after the minimum family living expense was satisfied, based on USDA estimates of regional consumption functions for the U.S.

Costs of producing the four crops in the Delta Region of Mississippi were estimated by using the Mississippi State University Budget Generator and 1982 prices on all input items. The 1982 annual variable costs of production were assumed to be the same for

Table 1. Financial and resource characteristics for three general crops farms in the Delta Region of Mississippi, 1983

Characteristics	Farm Size (acres)		
	1,443	3,119	6,184
Age of farm operator*	44	44	44
Family size*	4	4	4
Cropland acres owned	533	1,419	3,064
Cropland acres leased	910	1,700	3,120
Acreage of principal crops in 1983			
Cotton	395	1,088	2,250
Rice	305	574	871
Soybeans	640	1,190	2,539
Wheat (or other small grains)	82	247	180
Value of owned cropland ($1,000)	799.5	2,128.5	4,596.0
Value of farm machinery ($1,000)	378.9	786.7	1,209.8
Value of off-farm investments ($1,000)	129.1	210.3	358.7
Beginning cash reserve ($1,000)	31.9	71.1	141.6
Long-term debt ($1,000)	331.4	840.8	1,640.8
Intermediate-term debt ($1,000)	243.8	413.0	574.7
Net worth ($1,000)	748.6	1,921.5	4,047.5
Total equity to assets (fraction)	0.56	0.60	0.64
Long-term debt/asset (fraction)	0.41	0.40	0.36
Intermediate-term debt/asset (fraction)	0.64	0.52	0.48
Off-farm income ($1,000)	18.3	18.2	36.0
Minimum family living expense ($1,000)	18.0	24.0	30.0
Maximum family living expense ($1,000)	27.0	36.0	45.0
Marginal propensity to consume (fraction)	0.25	0.25	0.25
Number of full-time hired employees	4	10	19

* Values for the age and family size variables assumed for the purpose of simulating the effects of alternative farm program provisions for the farms.

the three representative farm sizes. Fixed expenses for machinery and equipment vary by farm size as the complement of machinery is different for each farm size.

The mix of acreages planted to each crop changes by farm size, as determined from the 1983 mail survey. In general, the acreage planted to cotton and soybeans increased relative to the acreage planted to rice and wheat as farm size increased. The 1,443-acre farm planted 73% of tillable cropland to cotton and soybeans, while the 3,119-acre and 6,184-acre farm planted 89% and 82%, respectively, of tillable cropland to cotton and soybeans. In the simulations, as the farm was allowed to grow in size to the next largest farm, the proportion of cropland planted to each crop was changed to reflect these relative differences in crop mix.

Table 2. Annual yields and prices for commodities produced on general crops farms in the Delta Region of Mississippi, 1974-1983.

Year	Cotton Lint	Cotton seed*	Rice	Soybeans	Wheat
	(Yield)				
	(lb/A)	(ton/A)	(cwt/A)	(bu/A)	(bu/A)
1974	691	0.54	50.78	21.1	24.9
1975	466	0.36	43.08	27.5	24.2
1976	461	0.36	47.63	23.6	29.8
1977	839	0.65	37.22	24.2	46.1
1978	908	0.70	41.57	24.8	39.5
1979	704	0.55	42.28	34.7	37.5
1980	540	0.42	38.83	17.0	34.1
1981	616	0.48	43.32	24.5	48.3
1982	1117	0.87	41.28	30.6	45.3
1983	657	0.51	41.47	21.6	40.4
	(Price)**				
	($/lb)	($/ton)	($/cwt)	($/bu)	($/bu)
1974	0.500	97.00	10.10	7.51	3.42
1975	0.497	97.00	9.10	4.55	2.62
1976	0.619	110.00	6.56	6.07	3.46
1977	0.528	77.00	8.12	6.25	2.03
1978	0.615	124.00	7.56	6.35	2.90
1979	0.613	134.00	9.81	6.51	4.10
1980	0.769	134.00	10.40	8.25	3.57
1981	0.569	80.00	10.90	6.20	3.19
1982	0.601	61.00	7.60	5.41	3.16
1983	0.661	165.00	8.48	8.06	3.50

* Cottonseed is a linear function of lint yield, averaging 1.55 pounds of seed per pound of lint.

** All prices are average cash prices in the Delta Region of Mississippi for the following months: cotton lint and cottonseed, November; rice, September; soybeans, November; and wheat, June.

Crop Yields and Prices

Crop yields from experimental plots at three locations in the Delta were used with ASCS-reported yields for farm program payments to each of the mail survey respondents to develop a 10-year yield history for the representative farms. No statistically significant differences were found among the yields for each farm size category. Thus, the same historical yield series was used for each representative farm. Estimated actual yields and prices for the representative farms are shown in Table 2.

The yields were used in a trend regression to develop the multivariate empirical probability distribution function described in Table 3. Judgments of the Office of Technology Assessment (OTA) commodity panels (3) regarding crop yield changes over the 1983-1992 period were used with the trend analysis to develop the annual mean yields over the period under the assumption of the most likely technology advances for each crop. Under this set of assumptions, mean cotton lint yields on farms in the Delta Region of Mississippi are expected to increase by 5%, or about 4 pounds per acre, annually through 1992. Rice yields are expected to increase by 9.2%, or about 44 pounds per acre annually, while wheat yields are projected to increase by 26.6%, or about 1.13 bushels per acre, each year. The per acre yield of soybeans is projected to increase by 8.1%, or about 0.23 bushel per acre, annually. These most likely yield advances involve various sets of technologies such as: (1) variety improvement through genetic engineering, photosynthesis enhancement, and plant growth regulators; (2) improved management of crop pests; (3) biological nitrogen fixation and use of chemical fertilizers; (4) soil, water, and crop management improvements; and (5) a host of other techniques, including labor-saving technologies, fuel savings, communications and information management, etc.

The annual deviations from the trend regression for 1974-1983 yields were expressed as a fraction of their respective mean in 1983 and then sorted to develop the deviations presented in Table 3. A similar analysis was carried out to develop the 1983-1992 deviations from mean prices presented in Table 4. The correlations among yields and prices shown in Table 5 were estimated using the deviations about the trend line for annual yields and prices for the 1974-1983 period. All prices were deflated to 1982 levels by the *Index of Prices Paid by Farmers* prior to fitting the trend line.

Capital Costs

Annual interest rates on existing debt for land, machinery, and

Table 3. Annual means and probability distributions for yields used in simulations for general crops farms in the Delta Region of Mississippi.

Year	Cotton Lint	Cotton seed	Rice	Soybeans	Wheat
	ANNUAL MEAN YIELDS				
	(lb/A)	(ton/A)	(cwt/A)	(bu/A)	(bu/A)
1983	699.90	0.54	42.75	24.96	37.01
1984	703.80	0.55	43.19	25.19	38.14
1985	707.80	0.55	43.63	25.42	39.27
1986	711.70	0.55	44.07	25.66	40.41
1987	715.70	0.55	44.51	25.89	41.54
1988	719.60	0.56	44.95	26.12	42.68
1989	723.50	0.56	45.39	26.35	43.82
1990	727.50	0.56	45.83	26.58	44.95
1991	731.40	0.57	46.26	26.81	46.08
1992	735.40	0.57	46.70	27.04	47.21
	DEVIATIONS FROM MEAN YIELDS (FRACTION)*				
1983	-.279	**	-.153	-.326	-.163
1984	-.256	**	-.068	-.155	-.160
1985	-.215	**	-.048	-.134	-.150
1986	-.214	**	-.035	-.043	-.075
1987	-.205	**	-.003	-.030	-.055
1988	-.011	**	.021	-.024	-.015
1989	.140	**	.042	-.004	.028
1990	.250	**	.053	.118	.095
1991	.314	**	.074	.210	.165
1992	.477	**	.116	.388	.330

* Deviations from a simple trend regression for 1974–1983 data expressed as a fraction of their respective means in 1983 and then sorted to develop the deviations shown.

** Cottonseed is perfectly correlated to lint inside the model.

Table 4. Annual means and probability distributions for prices used in simulations for general crops farms in the Delta Region of Mississippi.

Year	Cotton Lint	Cotton seed	Rice	Soybeans	Wheat
	ANNUAL MEAN PRICES*				
	($/lb)	($/ton)	($/cwt)	($/bu)	($/bu)
1983	0.69	111.75	10.14	6.66	3.95
1984	0.67	109.07	9.74	6.49	3.48
1985	0.65	106.47	9.50	6.34	3.39
1986	0.65	106.47	9.50	6.34	3.39
1987	0.65	106.47	9.50	6.34	3.39
1988	0.65	106.47	9.50	6.34	3.39
1989	0.65	106.47	9.50	6.34	3.39
1990	0.65	106.47	9.50	6.34	3.39
1991	0.65	106.47	9.50	6.34	3.39
1992	0.65	106.47	9.50	6.34	3.39
	DEVIATIONS FROM MEAN PRICES (FRACTION)**				
1983	-.164	-.490	-.360	-.409	-.394
1984	-.114	-.381	-.170	-.186	-.180
1985	-.069	-.344	-.104	-.138	-.082
1986	-.056	-.044	-.083	-.061	-.080
1987	-.028	.023	.053	-.048	-.034
1988	-.021	.114	.054	-.008	.025
1989	.047	.149	.060	.004	.099
1990	.084	.239	.098	.180	.161
1991	.151	.256	.151	.244	.233
1992	.171	.478	.302	.421	.251

* Prices are expressed in real 1982 dollars.

** Deviations from a simple OLS trend regression for 1974–1983 data expressed as a fraction of their respective means in 1983 and then sorted to develop the deviations shown.

operating loans were 9%, 12.5%, and 15%, respectively. Interest rates for new debts on land were 11.5% annually and refinancing of long-term real estate loans was allowed at interest rates of 13% annually. Similarly, new loans for machinery were at a 13.5% annual interest rate, with refinancing of intermediate-term loans allowed at a 14.5% annual interest rate. Cash reserves were assumed to earn 9.5% and off-farm investments 10% interest annually.

The farms were permitted to grow at the end of each year by leasing cropland, or by purchasing cropland–if the operator had cash available (after meeting all expenses) to cover a 30% down payment for land and a 20% down payment for any additional machinery purchases required to operate the proposed larger farm. Growth in farm size also required hiring of additional labor to operate the larger unit.

Table 5. Correlation of yields and prices for general crops farms in the Delta Region of Mississippi*.

	Cotton lint Yield	Cotton Seed Yield	Rice Yield	Soybean Yield	Wheat Yield	Cotton lint Price	Cottonseed Price	Rice Price	Soybean Price	Wheat Price
Cotton lint yield	1.0	.999	-.166	.374	.523	-.228	-.421	-.154	-.007	-.246
Cottonseed yield		1.0	-.156	.378	-.520	-.231	-.426	-.149	-.003	-.235
Rice yield			1.0	-.023	-.405	-.009	.160	.196	.309	.779
Soybean yield				1.0	.208	-.482	-.213	-.178	-.609	.028
Wheat yield					1.0	-.399	-.604	-.218	-.185	-.616
Cotton lint price						1.0	.637	-.422	.453	.368
Cottonseed price							1.0	.002	.437	.545
Rice price								1.0	.381	.204
Soybean price									1.0	.483
Wheat price										1.0

* The correlation matrix was estimated using deviation about a simple OLS trend line for annual yields and prices, 1974–1983. Prices were deflated to a 1982 = 100 base using the "Index of Prices Paid by Farmers" prior to fitting the trend line.

Policy and Technology Scenarios

The three general crops farms were simulated over a 10-year period (1983-1992) for a total of 14 alternative scenarios. These included seven alternative farm commodity program/income tax provision scenarios, one alternative income tax scenario, three financial stress scenarios, and three alternative technology scenarios. In addition, the moderate-size farm was simulated under the conditions of a new entrant into farming for three alternative farm commodity program/income tax provision scenarios. All assumptions regarding policy values for each scenario were the same for each representative farm to allow comparisons of their impacts on different sized farms. Each scenario is described in detail.

Farm Policy Scenarios

I. Base Policy–The Base Policy Scenario involves continuation through 1992 of both the 1981 Farm Bill and the income tax provisions under the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA). In addition, annual mean crop yields projected under the most likely technology advance alternative (Table 3) were used in the simulations. For this scenario it is assumed the following farm policies were in effect.

(1)The CCC loan program is available to producers for cotton, rice, soybeans, and wheat.

(2) A 3-year indirect farmer owned reserve (FOR) is available for wheat.

(3) An acreage diversion/set aside program is in effect for cotton, rice, and wheat during 1983-1985, using the actual acreage reduction levels and diversion payment rates specified for these years.

(4) A target price-deficiency payment program is available for cotton, rice, and wheat in all years.

(5) The $50,000 payment limitation for deficiency and diversion payments is in effect.

(6) Farms of all sizes are eligible to participate in these farm program provisions.

Values for loan rates, target prices, diversion rates, and diversion payment rates for 1983 and 1984 are set at their actual values expressed in constant 1982 dollars. Values for these variables for 1985 are set at their respective levels announced on or before September 14, 1984 by the Secretary of Agriculture. Loan rates and target prices for 1985 are held constant through 1992. No acreage reduc-

Table 6. National loan rates, target prices and acreage set aside/diversion rates for cotton, rice, wheat, and soybeans, 1977–1985.

Year	Loan rate	Target price	Set aside rate	Diversion	Diversion payment rate
			COTTON		
	($/lb)	($/lb)	(%)	(%)	($/lb)
1977	0.4463	0.4780			
1978	0.4800	0.5200			
1979	0.5023	0.5770			
1980	0.4800	0.5840			
1981	0.5246	0.7087			
1982	0.5708	0.7100	15	0	0.00
1983	0.5500	0.7600	20	5	0.25
1984	0.5500	0.8100	25	0	0.00
1985	0.5500	0.8100	20	5	0.25
			RICE		
	($/cwt)	($/cwt)	(%)	(%)	($/cwt)
1977	6.19	8.25			
1978	6.40	8.53			
1979	6.79	9.05			
1980	7.12	9.49			
1981	8.01	10.68			
1982	8.14	10.85	15	0	0.00
1983	8.14	11.40	15	5	
1984	8.00	11.90	20	5	0.00
1985	8.00	11.90	20	15	3.50
			WHEAT		
	($/bu)	($/bu)	(%)	(%)	($/bu)
1977	2.25	2.90			
1978	2.35	3.40			
1979	2.50	3.40			
1980	3.30	3.63			
1981	3.50	3.81			
1982	4.00[a]	4.05	15	0	0.00
1983	3.65	4.30	15	5	2.70
1984	3.30	4.38	20	10	2.70
1985	3.30	4.38	20	10	2.70
			SOYBEANS[b]		
	($/bu)				
1977	3.50				
1078	4.50				
1979	4.50				
1980	5.02				
1981	5.02				
1982	5.02				
1983	5.02				
1984	5.02				
1985	5.02				

[a] Farmer Owned Reserve entry price in 1982 exceeded the $3.55/bu. loan rate for wheat.
[b] Soybeans have been under a loan program only with no target price/deficiency payment program or acreage set aside/diversion provisions.

tion program was assumed to be in effect after 1985. Historical national loan rates, target prices (except for soybeans), acreage set aside/diversion rates, and diversion payment rates for program compliance over the 1977-1985 period are presented in Table 6. All dollar values in Table 6 are expressed in current dollars. The average relationship between real loan rates and real prices for 1977-1982 was computed for each commodity and used to estimate the real average annual prices shown in Table 4 that were used in the 1983-1992 simulations. (This was done to minimize the bias caused by setting mean prices too close to either the loan rate or the target price.) The loan rates and target prices, expressed in constant 1982 dollars and adjusted for grade and quality factors for the Delta Region of Mississippi, are presented in Table 7.

It was assumed the following options for depreciating machinery and calculating income taxes are used for the Base Policy Scenario.

(1) Machinery, livestock, and buildings placed in use prior to 1981 are depreciated using the double declining balance method.
(2) Machinery, livestock, and buildings placed in use after 1980 are depreciated using an accelerated cost recovery method.
(3) The farm operator elects to claim first year expensing for all depreciable items placed into use after 1980.
(4) The farm operator elects to take maximum investment tax credit (ITC) and thus reduce the basis for all depreciable assets placed in service after 1980.
(5) The farm operator adjusts crop sales across tax years to reduce current year taxes.
(6) The farm operator may use either the regular income tax computation or income averaging to calculate federal income tax liabilities.
(7) There is no maximum interest deduction for calculating taxable income.
(8) The actual self employment tax rates and maximum income levels subject to this tax for 1983 and 1984 are used. Announced values for these variables in 1985-1986 were used and the 1986 values were held constant through 1992.
(9) The farm operator elects to trade in old machinery on new replacements at the end of each item's economic life.

II. A 20% Acreage Reduction–The provisions of the Base Policy Scenario were modified by adding a 15% set aside with a 5% diversion for cotton, rice, and wheat in 1986-1992. Normal slippage of 70% for each of the crop and program participation rates were used to estimate the resulting real increase in mean prices for these crops in 1986-1992. All other provisions of the Base Policy Scenario were used without change.

III. No Farm Progarm Payment Limitation–All provisions of the Base Policy Scenario were used except that the $50,000 limitation on diversion and deficiency payments was removed.

IV. No Price Supports and No Diversion Payments–The CCC loan, FOR, and target price provisions under the Base Policy Scenario were assumed to have been eliminated for all years in the 1983-1992 planning horizon. Annual mean prices for all crops were decreased based on the new expected value of their respective probability distributions. Relative variability in prices about their means was increased based on the work of Morton, Devadoss, and Heady (4) as to the effects of no farm program on U.S. agriculture. Since all other provisions of the Base Policy Scenario were left intact, the acreage diversion and set aside programs in place for 1983-1985 were assumed to remain in effect.

V. No Target Price/Deficiency Payment–The target price and deficiency payment program was assumed to be eliminated for all years of the 1983-1992 planning horizon. All other provisions of the Base Policy Scenario were used without change.

VI. Target Farm Program Benefits–All farm program and income tax provisions of the Base Policy Scenario were used except that farms producing more than $300,000 of program commodities (cotton, rice, soybeans, and wheat) valued at their localized loan rate

Table 7. Localized loan rates and target prices for a general crops farm in the Delta Region of Mississippi*.

	Cotton lint		Rice		Soybeans	Wheat	
Year	Loan rate	Target price	Loan rate	Target price	Loan rate	Loan rate	Target price
	($/lb)	($/lb)	($/cwt)	($/cwt)	($/bu)	($/bu)	($/bu)
1983	0.55	0.75	8.54	11.97	4.89	3.53	3.92
1984	0.53	0.78	8.21	12.20	4.77	3.11	4.06
1985	0.52	0.76	8.00	11.91	4.66	3.03	4.03
1986	0.52	0.76	8.00	11.91	4.66	3.03	4.03
1987	0.52	0.76	8.00	11.91	4.66	3.03	4.03
1988	0.52	0.76	8.00	11.91	4.66	3.03	4.03
1989	0.52	0.76	8.00	11.91	4.66	3.03	4.03
1990	0.52	0.76	8.00	11.91	4.66	3.03	4.03
1991	0.52	0.76	8.00	11.91	4.66	3.03	4.03
1992	0.52	0.76	8.00	11.91	4.66	3.03	4.03

* Loan rates and target prices in effect for 1983–1984 and announced for 1985 were deflated to 1982 real dollars. These values were localized for the typical grade or quality of crop marketed in the Delta Region of Mississippi in 1982–1983.

were not permitted to participate directly in the program provisions (CCC loan, FOR, target price/deficiency payments, and set aside-diversions). Mean prices and relative variability in prices were not adjusted because sufficient numbers of farms with less than $300,000 of program commodity sales were assumed to participate in the farm program for the price support provisions of the CCC loan and FOR to function normally.

VII. No Farm Program—All farm program provisions outlined for the Base Policy Scenario were eliminated for all 10 years of the planning horizon. Mean annual prices and relative variance in prices for the No Price Supports and No Diversion Payments Scenario (IV) were used due to eliminating provisions of the CCC loan and FOR reserve under this scenario.

Income Tax Scenario

VIII. Reduced Income Tax Benefits and Base Policy Program—The federal income tax provisions in place for the Base Policy Scenario were made more restrictive. All farm policy provisions of the Base Policy Scenario were left unchanged. The more restrictive federal income tax provisions included:

(1) Machinery, livestock, and buildings were depreciated using the straight line cost recovery method.
(2) First year expensing provisions were eliminated for all depreciable items.
(3) Maximum investment tax credit (ITC) provisions were eliminated.
(4) The maximum annual interest expense which could be used to reduce taxable income was $15,600.
(5) The farm operator must sell obsolete machinery upon disposition rather than trading it in on new replacements, thus forcing recapture of excess depreciation deductions.

All other federal income tax provisions for the Base Policy Scenario were used as outlined earlier.

Financial Stress Scenarios

IX. Base Finance Scenario—Each farm's long-term debt to asset ratio was increased to 0.55 and its intermediate-term debt to asset ratio was increased to 0.60 to represent a highly leveraged farm. (If the farm's intermediate-term debt to asset ratio exceeded 0.60 based on the 1979 Ag Finance Survey, the greater value was used.) Annual long-term and intermediate-term interest rates were increased to their average values (0.1139 and 0.1343, respectively) for 1980-1983 to represent a farm which had been forced to refinance its assets during the past 4 years. These same interest rates were used for all three financial stress scenarios. The farm program provisions associated with the Base Policy Scenario were used for all three financial stress scenarios.

X. Debt Restructure—The length of intermediate-term loans was increased by 1 year to 7 years, and a portion of intermediate debt was converted to long-term debt. The conversion of intermediate-term debt to long-term debt was not permitted to increase the long-term debt to asset ratio above 0.65. For each of the representative farms, this constraint substantially restricted debt conversion. Annual interest rates, total debt loads, and farm program provisions were the same as those used for the Base Finance Scenario (IX).

XI. Interest Subsidy—The annual interest rates, debt levels, and farm program provisions in the Base Finance Scenario (IX) were simulated, but an interest subsidy was provided during the first 2 years. The interest subsidy took the form of an interest rate reduction equal to 3.4 percentage points for long-term interest rates and 5.4 percentage points for intermediate-term interest rates. These interest rate reductions were the amounts necessary to reduce their respective interest rates (0.1137 and 0.1343) to a 4% real rate assuming a 4% annual inflation rate.

No New Technology Scenarios

XII. No New Technology and Base Farm Policy—The federal income tax and farm program provisions in the Base Policy Scenario (I) were simulated assuming that no new technology would be introduced during the 1983-1992 period. For the Delta Region of Mississippi, mean annual yields were not expected to increase in the absence of any new technology being developed and adopted. Without new technology, existing knowledge and techniques would be adequate to only maintain the yield levels already achieved in the region. Thus, the mean annual yields for 1974-1983 were used in all three of the "No New Technology" scenarios. For these scenarios, mean yields for each year through 1992 for cotton, soybeans, wheat, and rice were those shown for 1983 in Table 3. Since the simulation analysis was stochastic, however, the actual yields (and prices) were drawn randomly (within the simulation model) from the sample of yields presented in the historical data (1974-1983) in Table 2.

XIII. No New Technology and No Deficiency Payments—The farm program provisions in the No Target Price/Deficiency Payments Scenario (V) were simulated assuming mean annual crop yields used in the No New Technology and Base Policy Scenario (XII).

XIV. No New Technology and No Farm Program—All farm program provisions were eliminated (Scenario VII) and mean annual crop yields used in the No New Technology and Base Farm Policy Scenario (XII) were used.

New Entrant Scenarios

XV. New Entrant and Base Farm Policy–The farm policy provisions of the Base Policy Scenario (I) were evaluated assuming the farm operator on the moderate-size farm was a new entrant. The farm operator was assumed to have the minimum equity in land (30%) and farm machinery (35%). All farm machinery was considered to have a 1982 new machinery cost. Annual interest rates for long-term and intermediate term loans were set at the average 1980-1983 interest rates. No off-farm investments or off-farm income were allowed. These assumptions regarding the farm operator's initial debt-asset position and sources of income were used for all three new entrant scenarios.

The farm operator was assumed to be purchasing 533 acres of cropland and leasing 910 acres. Because the farm operator was paying the full cost of all inputs (land, capital, machinery, and labor) this scenario provides an indication of the long-run survivability of the moderate-size farm under conditions of continuing the current farm policy and income tax provisions and conditions of the most likely technology advance scenarios.

XVI. New Entrant and No Deficiency Payments–The farm program provisions in the No Target Price/Deficiency Payments Scenario (V) were simulated under the conditions that the farm operator was a new entrant to farming.

XVII. New Entrant and No Farm Program–All farm commodity program provisions as in Scenario VII were eliminated during all years of the planning horizon for this scenario.

Evaluation Criterion

The FLIPSIM V model provides considerable detail as to the economic viability of a representative farm at the end of each iteration, e.g., ending leverage ratio, ending net worth, ending farm size, total assets, total debt, net present value, and whether or not the farm remained solvent for 10 years. By repeating each scenario for 50 iterations, the model generates the information necessary to estimate the probability distributions for key output variables. The means of these key output distributions are used to compare the economic impacts of selected policy and technology scenarios for each farm. The following output variables for the model were used to assess the impacts of the scenarios described in the previous section.

(1) Probability of survival–Defined as the probability that the farm will remain solvent for 10 years. It is the probability that the farm operator would maintain at least the minimum financial ratios (30% equity in land and 35% equity in farm machinery) for each of the 10 years of the planning horizon.

(2) Probability of a positive net present value–The probability that the farm will have a positive after-tax net present value. An after-tax, real discount rate of 3% was used to calculate the farm's net present value. With a 4% annual inflation rate, this is equivalent to a 7% nominal discount rate. This statistic indicates the probability that at least a 3% real rate of return is earned on the operator's initial net worth.

(3) After-tax net present value (NPV)–The present value of the operator's annual cash withdrawals (CW) plus the present value of the change in net worth (NW) minus the present value of annual off-farm income (OY):

$$NPV = \sum_{t=1}^{T} \frac{CW_t - OY_t}{(1.03)^t} + \frac{NW_T}{(1.03)^T} - NW_o$$

Cash withdrawals (CW) equal family living expenses plus state and federal income taxes and self-employment taxes. Initial net worth (NW_o) and ending new worth (NW_T) explicitly consider the value of off-farm investments and accrued taxes. A 3% after-tax, real discount rate was used to calculate net present value for each of the farms.

(4) Present value of ending net worth–Indicates the change in the real net worth of the farm over the planning horizon. Net worth is affected by increases or decreases in the value of land and machinery assets and by retained earnings. This value can be compared directly to the initial net worth of the farm given in Table 1 to indicate the relative magnitude of real financial growth.

(5) Acres owned, leased, and controlled at the end of the planning horizon–For each iteration these statistics indicate the impacts of the alternative scenarios on growth in land resources for the farms. These three statistics provide an indication of how the farm increased acreage, either by purchasing or leasing land. Also, they indicate whether the farm was forced to sell cropland to remain solvent.

(6) Total long-term and intermediate-term debts at the end of the planning horizon–The two measures provide an insight into the financial stress of the farm over the planning horizon. Increases in average ending debt from one scenario to another can be due to either rapid growth through purchasing land and machinery or the farm operator being forced to refinance large cash flow deficits. When surplus cash is available, the operator is permitted to first prepay intermediate-term debts and then prepay new long-term debts. Therefore, large ending intermediate-term debts indicate insufficient cash was available to reduce intermediate-term debt through prepayment of principal.

(7) Ending equity ratio–The

farm's ending ratio of total net worth to total assets. This ratio provides a "bottom-line" measure for comparing the farm's ending financial position across scenarios.

(8) Internal rate of return–For each farm, this measure is calculated at the end of each iteration. The internal rate of return is the discount rate which makes the present value of the operator's annual cash withdrawals and change in net worth equal zero. The variables previously outlined for the net present value formula are used to calculate internal rate of return.

(9) Average annual net farm income–The net farm income received by the farm operator averaged over all years simulated. Net farm income equals total farm receipts plus total government payments minus all cash production expenses, interest payments, labor costs, fixed costs (excluding principal payments), and depreciation. This value excludes all nonfarm income and interest earned on cash reserves.

(10) Average annual government payment–The annual government payments (deficiency and diversion payments) to the farm operator averaged over all years simulated.

Results from the Simulations

Farm Commodity Policy and Income Tax Alternatives

The results from simulating the effects of the seven alternative farm commodity policy scenarios and the alternate income tax provisions for the three farms in the Delta Region of Mississippi are presented in Tables 8, 9, and 10. Under the provisions of these eight policy alternatives, each farm had a 100% probability of survival in that equity in land and machinery did not fall below 30% and 35%, respectively. One of the principal reasons for the solvency of these farms over the 10-year planning horizon was the availability of off-farm income to meet some of the cash flow needs.

Each of the farms exhibited a very high probability (98% to 100%) of having a positive after-tax net present value under all policy scenarios involving eligibility for government program payments. Only the policy scenario with no farm income or price support (Scenario VII) for the 1,443-acre farm, and the policy scenarios with no target prices and deficiency payments (Scenario V) or targeting of farm program benefits to farms producing less than $300,000 in program crops (Scenario VI) for the 6,184-acre farm, exhibited a probability of having a positive after-tax net present value below 100% (Tables 8-10).

The remaining criteria in Tables 8-10 are indicative of farm size, wealth, and financial characteristics that are projected to occur on these farms over the 10-year simulation under each policy alternative. Rates of change (expressed as percentages from initial levels) in the values of these variables are presented in Table 11 for each of the farms.

The present value of ending net worth is one measure of real wealth accumulation. In interpreting these values in Table 11, two revealing features are

Table 8. Comparison of selected farm commodity and income tax policy scenarios for a 1,443-acre general crop farm in the Delta Region of Mississippi.

Criteria	Initial Situation	Alternative Scenarios*							
		I	II	III	IV	V	VI	VII	VIII
Probability of survival (%)	--	100	100	100	100	100	100	100	100
Probability of a positive after-tax net present value (%)	--	100	100	100	100	100	100	98	100
After-tax net present value ($1,000)	--	1,090.3	1,188.4	1,408.7	383.7	425.1	335.6	346.6	1,203.9
Average present value of ending net worth ($1,000)	748.6	1,650.8	1,757.3	1,880.7	1,105.5	1,134.0	1,058.7	1,069.7	1,532.9
Average ending cropland owned (acres)	533.0	651.4	709.0	801.8	533.0	539.4	533.0	533.0	555.4
Average ending cropland leased (acres)	910.0	1,358.0	1,348.4	1,290.8	1,092.4	1,105.2	1,047.6	1,057.2	1,358.0
Average ending cropland controlled (acres)	1,443.0	2,009.4	2,057.4	2,092.6	1,625.4	1,644.6	1,580.6	1,590.2	1,913.4
Average ending long-term debts ($1,000)	331.4	218.7	270.5	354.5	135.3	123.9	154.3	170.7	130.8
Average ending intermediate-term debts ($1,000)	243.8	40.2	63.1	36.8	89.7	90.4	101.5	91.1	13.0
Average ending equity ratio (fraction)	0.56	0.88	0.86	0.83	0.86	0.87	0.84	0.84	0.89
Average internal rate of return (fraction)	--	0.11	0.11	0.13	0.05	0.06	0.05	0.05	0.13
Average annual net farm income ($1,000)	--	38.9	40.4	64.6	-14.2	-6.9	-16.3	-17.6	29.9
Average annual government payments ($1,000)	--	48.2	45.2	75.4	1.9	1.9	1.9	0.0	47.9

* The scenarios are:

I -- Base Policy or continuation of the 1981 Farm Bill and 1983 federal income tax provisions.
II -- A 20% Acreage Reduction in 1986-1992.
III -- No Farm Program Payment Limitation in 1983-1992.
IV -- No Price Support and No Diversion Payment in 1983-1992.
V -- No Target Price/Deficiency Payment in 1983-1992.
VI -- Target Farm Program Benefits to farms that produce less than $300,000 in program crops.
VII -- No Farm Program in 1983-1992.
VIII -- Reduced Income Tax Benefits and the Base Farm Program.

noticeable. First, as one compares the eight policy scenarios for each size of farm, substantial greater growth in real net worth occurs on the farms under conditions that continue current farm commodity policy and income tax provisions with and without acreage reductions and farm program payments limitations (Scenario I-III) and with a more restrictive set of income tax provisions (Scenario VIII). For the 1,443-acre farm, real net worth increases by some 105% to 151% under these program alternatives. The largest rate of growth in real net worth (a 151% increase from the initial situation) occurs for the alternative that continues the 1981 Farm Bill provisions, but with no farm program payments limitations (Scenario III). A policy that continues the current farm program, but with a 20% acreage reduction in 1986-1992, results in a 135% growth in real net worth. Much lower growth rates in real net worth occur for the policy alternatives that elminate various provisions of the current farm program, withdraw all farm program support, or target the benefits to farms producing less than $300,000 of program crops. Similar patterns are evident in the effects of the policy alternatives on rates of growth in real net worth of the 3,119-acre farm and the 6,184-acre farm.

The second noticeable pattern in Table 11 is the decline in the growth rate in real wealth as the size of the farm increases from the 1,443-acre farm to the 6,184-acre farm for each of the policy alternatives. Comparisons among the different farm sizes must be made with caution because the initial total equity to asset ratios differ. However, the results indicate that the policy alternatives involving farm program payments (Scenarios I-III and Scenario VIII) induced a greater growth rate in real wealth on the moderate-size farm as compared with the two larger farms.

This pattern of growth is even more evident when one examines changes in farm acreage. The 1,443-acre farm experienced considerable growth in both owned land acreage and/or acreage leased under Scenarios I-III and Scenario VIII. In contrast, the two larger farms exhibited less than 7%

Table 9. Comparison of selected farm commodity and income tax policy scenarios for a 3,119-acre general crop farm in the Delta Region of Mississippi.

Criteria	Initial Situation	Alternative Scenarios*							
		I	II	III	IV	V	VI	VII	VIII
Probability of survival (%)	--	100	100	100	100	100	100	100	100
Probability of a positive after-tax net present value (%)	--	100	100	100	100	100	100	100	100
After-tax net present value ($1,000)	--	1,232.8	1,645.4	3,146.0	656.0	731.3	592.1	620.1	2,070.8
Average present value of ending net worth ($1,000)	1,921.5	2,940.1	3,279.8	4,418.0	2,482.2	2,537.4	2,432.5	2,453.7	3,138.8
Average ending cropland owned (acres)	1,419.0	1,431.8	1,451.0	1,777.4	1,419.0	1,425.4	1,419.0	1,419.0	1,419.0
Average ending cropland leased (acres)	1,700.0	1,895.2	1,888.8	2,100.0	1,700.0	1,709.6	1,700.0	1,700.0	1,716.0
Average ending cropland controlled (acres)	3,119.0	3,327.0	3,339.8	3,877.4	3,119.0	3,135.0	3,119.0	3,119.0	3,135.0
Average ending long-term debts ($1,000)	840.8	134.0	137.0	342.1	191.3	157.8	197.7	218.7	273.8
Average ending intermediate-term debts ($1,000)	413.0	255.3	189.2	5.2	251.8	276.8	279.7	252.1	225.9
Average ending equity ratio (fraction)	0.60	0.89	0.90	0.89	0.87	0.87	0.86	0.87	0.85
Average internal rate of return (fraction)	--	0.07	0.08	0.12	0.04	0.05	0.04	0.04	0.10
Average annual net farm income ($1,000)	--	38.3	65.1	148.0	-20.6	-8.2	-28.9	-25.1	21.8
Average annual government payments ($1,000)	--	49.9	49.1	160.6	4.7	4.8	0.0	0.0	49.9

* The scenarios are:

I -- Base Policy or continuation of the 1981 Farm Bill and 1983 federal income tax provisions.
II -- A 20% Acreage Reduction in 1986–1992.
III -- No Farm Program Payment Limitation in 1983–1992.
IV -- No Price Support and No Diversion Payment in 1983–1992.
V -- No Target Price/Deficiency Payment in 1983–1992.
VI -- Target Farm Program Benefits to farms that produce less than $300,000 in program crops.
VII -- No Farm Program in 1983–1992.
VIII -- Reduced Income Tax Benefits and the Base Farm Program.

growth in farm size under these scenarios, with the exception of the 3,119-acre farm under Scenario III wherein payments limitations are removed. The 1,443-acre farm experienced a 10% to 14% increase in acreage, whereas the two larger farms exhibited virtually no growth in farm acreage for the policy alternatives involving elimination of some or all the program payments provisions and when program payments are targeted to farms with less than $300,000 of program commodity sales. These results indicate that farm program payments are an important inducement to growth of moderate-size general crops farms in the Delta Region of Mississippi.

The two largest farms reduced a substantial portion of the long-term real estate debt under all scenarios. The 1,443-acre farm had a much lower rate of long-term debt payback, principally because growth in farm size occurred through purchase of additional cropland under Scenarios I-III, and the use of accumulated cash to purchase machinery and equipment for expansion on leased land under Scenarios IV-VIII. The 1,443-acre farm generally exhibited a larger liquidation of its intermediate-term debt than the two larger farms for each of the policy alternatives. Each of the farms tended to use income from both farm and non-farm sources to pay back existing debts, and the ratio of total equity to total assets increased appreciably on each farm for all of the policy alternatives.

The three general crops farms in the Delta Region of Mississippi are much very dependent on farm program payments in maintaining net farm income. This dependency is revealed in Tables 8, 9, and 10. When one examines the average annual net farm incomes and average annual total government program payments over the 10 years, the policy alternatives involving relatively little or no government payments (Scenarios IV-VII) resulted in negative average annual net farm incomes.

Summary of Results

All three farms had a 100% chance of remaining solvent (i.e., equity levels in land and machinery remained above 30%

Table 10. Comparison of selected farm commodity and income tax policy scenarios for a 6,184-acre general crop farm in the Delta Region of Mississippi.

Criteria	Initial Situation	Alternative Scenarios*							
		I	II	III	IV	V	VI	VII	VIII
Probability of survival (%)	--	100	100	100	100	100	100	100	100
Probability of a positive after-tax net present value (%)	--	100	100	100	100	98	98	100	100
After-tax net present value ($1,000)	--	1,619.6	2,465.4	4,742.5	1,182.6	1,267.8	966.9	1,108.9	3,139.4
Average present value of ending net worth ($1,000)	4,047.5	5,449.6	6,116.2	7,728.0	5,135.0	5,175.2	4,964.2	5,078.9	5,901.6
Average ending cropland owned (acres)	3,064.0	3,121.6	3,112.0	3,294.4	3,092.8	3,102.4	3,096.0	3,102.4	3,076.8
Average ending cropland leased (acres)	3,120.0	3,126.4	3,142.4	3,235.2	3,177.6	3,142.4	3,145.6	3,164.8	3,126.4
Average ending cropland controlled (acres)	6,184.0	6,248.0	6,254.4	6,529.6	6,270.4	6,244.8	6,241.6	6,267.2	6,203.2
Average ending long-term debts ($1,000)	1,640.8	106.4	57.3	110.9	144.2	129.0	173.5	227.0	261.0
Average ending intermediate-term debts ($1,000)	574.7	456.4	381.9	120.0	383.3	466.0	465.0	409.2	354.5
Average ending equity ratio (fraction)	0.64	0.91	0.92	0.94	0.91	0.91	0.90	0.90	0.89
Average internal rate of return (fraction)	--	0.05	0.06	0.10	0.04	0.04	0.04	0.04	0.08
Average annual net farm income ($1,000)	--	41.9	118.2	277.1	-19.7	-0.6	-42.9	-32.4	5.9
Average annual government payments ($1,000)	--	49.8	49.8	278.0	7.9	0.0	0.0	0.0	49.9

* The scenarios are:

I -- Base Policy or continuation of the 1981 Farm Bill and 1983 federal income tax provisions.
II -- A 20% Acreage Reduction in 1986–1992.
III -- No Farm Program Payment Limitation in 1983–1992.
IV -- No Price Support and No Diversion Payment in 1983–1992.
V -- No Target Price/Deficiency Payment in 1983–1992.
VI -- Target Farm Program Benefits to farms that produce less than $300,000 in program crops.
VII -- No Farm Program in 1983–1992.
VIII -- Reduced Income Tax Benefits and the Base Farm Program.

Table 11. Rates of change in selected farm size, wealth and financial characteristics under alternative farm commodity and income tax policy scenarios for general crops farms in the Delta Region of Mississippi.

Criteria	Initial Situation	Percentage change in variable level from initial situation for alternative scenarios*							
		I	II	III	IV	V	VI	VII	VIII
		1,443-acre farm							
Present value of ending net worth ($1,000)	748.6	120	135	151	48	51	41	43	105
Cropland owned after 10 years (acres)	533.0	22	33	50	0	1	0	0	4
Cropland leased after 10 years (acres)	910.0	49	48	42	20	21	15	16	49
Total cropland controlled after 10 years (acres)	1,443.0	39	43	45	13	14	10	10	33
Total long-term debts after 10 years ($1,000)	331.4	-34	-18	7	-59	-63	-53	-48	-61
Total intermediate-term debts after 10 years ($1,000)	243.8	-84	-74	-85	-63	-63	-58	-63	-95
Total equity to asset ratio after 10 years (%)**	56.0	88	86	83	86	87	84	84	89
		3,119-acre farm							
Present value of ending net worth ($1,000)	1,921.5	53	70	130	29	32	27	28	63
Cropland owned after 10 years (acres)	1,419.0	1	2	25	0	<1	0	0	0
Cropland leased after 10 years (acres)	1,700.0	11	11	24	0	<1	0	0	1
Total cropland controlled after 10 years (acres)	3,119.0	7	7	24	0	<1	0	0	<1
Total long-term debts after 10 years ($1,000)	840.8	-84	-84	-59	-77	-81	-76	-74	-67
Total intermediate-term debts after 10 years ($1,000)	413.0	-38	-54	-99	-39	-33	-32	-40	-45
Total equity to asset ratio after 10 years (%)**	60.0	89	90	89	87	87	86	87	85
		6,184-acre farm							
Present value of ending net worth ($1,000)	4,047.5	35	51	91	27	28	23	25	46
Cropland owned after 10 years (acres)	3,064.0	2	2	8	<1	1	1	1	<1
Cropland leased after 10 years (acres)	3,120.0	<1	<1	4	2	<1	<1	1	<1
Total cropland controlled after 10 years (acres)	6,184.0	1	1	6	1	<1	<1	1	<1
Total long-term debts after 10 years ($1,000)	1,640.8	-93	-96	-93	-91	-92	-89	-86	-84
Total intermediate-term debts after 10 years ($1,000)	547.7	-21	-34	-79	-33	-19	-19	-29	-38
Total equity to asset ratio after 10 years (%)**	64.0	91	92	94	91	91	90	90	89

* The scenarios are:

I -- Continuation of the 1981 Farm Bill and 1983 federal income tax provisions.
II -- A 20% Acreage Reduction in 1986–1992.
III -- No Farm Program Payment Limitation in 1983–1992.
IV -- No Price Support and No Diversion Payment in 1983–1992.
V -- No Target Price/Deficiency Payment in 1983–1992.
VI -- Target Farm Program Benefits to farms that produce less than $300,000 in program crops.
VII -- No Farm Program in 1983–1992.
VIII -- Reduced Income Tax Benefits and continuation of the 1981 Farm Bill.

** Values for all policy scenarios represent the percent equity in total assets after 10 years not the percentage changes in these equity to asset ratios.

and 35%, respectively) over the 10-year planning horizon.

The probability of having a positive after-tax net present value over the 10 years was 100% for the 1,443-acre farm and for the 3,119-acre farm for all policy alternatives involving farm program government payments. However, the probability of having a positive net present value over the 10 years was 98% on the 6,184-acre farm for the No Target Price/Deficiency Payment Scenario (V) and the policy involving targeting of farm program benefits to farms with less than $300,000 of program crops (Scenario VI).

Real ending net worth increased substantially (from 105% to 151%) for the 1,443-acre farm for the policy alternatives involving current farm program payments. Increases in real net worth occurred on the two larger farms under these policy alternatives, but at much lower rates of growth.

Policy alternatives involving farm program payments influence the growth in both acreage owned and leased on the 1,443-acre farm. Some growth in farm acreage occurred for this farm under the policy alternatives that eliminated or restricted farm program payments.

The 3,119-acre farm and the 6,184-acre farm experienced little or no growth in farm acreage under the policy alternatives that restricted or eliminated farm program payments.

The two largest farms reduced initial real estate debts substantially under all the policy alternatives considered. Payback occurred under these policy alternatives for the 1,443-acre farm, but at rates considerably less than those for the two larger farms.

The 1,443-acre farm generally paid back less of its initial real estate debt under the policy alternatives because expansion of farm size involved some purchase of additional cropland and purchase of additional machinery and equipment for expansion through leasing of cropland.

The two largest farms generally liquidated a smaller portion of intermediate-term debts than long-term debts under each of the policy alternatives.

The ratio of total equity to assets increased appreciable on each farm under each of the policy alternatives. This ratio increased by 27 to 33 percentage points from an initial level of 56% on the 1,443-acre farm; it increased by 25 to 30 percentage points from an initial level of 60% on the 3,119-acre farm; and by 25 to 30 percentage points from an initial level of 64% on the 6,184-acre farm.

Each of the farms is very dependent on farm program payments in maintaining reasonable levels of net farm income (i.e., returns to owned land, general farm overhead, and management and risk).

Stimulus to growth in real net worth and farm acreage is greatest for the 1,443-acre farm under provisions of current farm policy and income tax regulations. The results indicate that moderate-size farms are likely to expand to large-size farms but little expansion is likely to occur on farms that are already large.

Failure to maintain effective program payment limitations or removal of payment limitations substantially increase net farm income on each farm; but such program provisions would be expected to result in relatively large government program payment outlays to farm producers represented by these three general crops farms.

Financial Bailout Strategies

Two farm credit policy alternatives were considered for assisting highly leveraged farmers remain solvent. The first was a debt restructuring policy whereby intermediate-term debt was refinanced and the repayment period was lengthened. To simulate the effects of such a credit policy, the financial position of the three general crops farms in the Delta Region of Mississippi were modified to depict highly leveraged farms. The long-term debt to asset ratio for each farm was increased to 55%, the intermediate-term debt to asset ratios were set equal to 60% (or 64% in the case of the 1,443-acre farm), and annual interest rates on old loans were increased to their average values for 1980-1983 (11.37% for long-term and 13.4% for intermediate-term loans).

A second credit alternative was to provide the farm operators of the highly leveraged farms with an interest rate reduction (subsidy) to offset the effects of high real interest rates. To compare the effects of these two financial bailout alternatives, the three farms were simulated under conditions of continuing the 1981 Farm Bill provisions but with the higher debt to asset ratios and the higher interest rates on long-term and intermediate-term loans (Scenario IX). Then the length of the intermediate-term loans was increased by 1 year to 7 years, and a portion of intermediate-term debt was converted to long-term debt provided the long-term debt to asset ratio did not exceed 65% (Scenario X). The annual interest rates, total debt loads, and farm program provisions were the same as those used for the Base Finance Scenario (IX).

The second financial bailout alternative was simulated under the provisions of the Base Finance Scenario (IX), but with an interest subsidy provided during the first 2 years of the 10-year simulation period (Scenario XI). The interest subsidy was in the form of an interest rate reduction of 3.37 percentage points for long-term interest rates and 5.4 percentage

points for intermediate-term interest rates. These interest rate reductions were the amounts necessary to reduce long-term interest (11.37%) and intermediate-term interest (13.4%) to a 4% real interest rate, assuming a 4% annual inflation rate.

The results from simulating the effects of these financial bailout alternatives on the highly leveraged farms are presented in Table 12. All three farms exhibited a 100% probability of survival and a 100% probability of having a positive after-tax net present value over the 10-year planning horizon for each of the scenarios. Average net present value for the farm operator and average present value of ending net worth were greatest under the debt restructuring alternative (Scenario X) for each of the farms.

Real wealth increased on each farm for the three alternative scenarios. The 1,443-acre farm again exhibited the largest rates of growth in net worth (ranging from 135% for Scenario XI to 152% for Scenario X) as shown in Table 13.

Each of the farms grew in acreage with the 1,443-acre farm having the largest rates of growth and the 6,184-acre farm exhibiting the slowest rates of growth. Long-term debts increased on each farm under Scenario X because farm growth came about through substantial cropland purchases. The 3,119-acre farm and the 6,184-acre farm had much smaller increases in cropland purchases (and in leased land) under the policy of an interest rate subsidy (Scenario XI). Consequently, the long-term debt on these two farms was reduced under Scenario XI. A substantial portion of the intermediate-term debt was repaid for each farm under Scenarios IX and XI as compared to Scenario X, because increased investment in machinery and equipment is required to operate the relatively larger farm under Scenario X. Only about half of the intermediate-term debt was paid back on each of the farms under the debt restructuring scenario. Consequently, the ratio of total equity to assets increased the least under this debt restructure policy alternative when compared with the Base Financial Scenario (IX) or the Interest Subsidy Scenario (XI).

Summary of Results

All three farms had a 100% chance of remaining solvent and having a positive after-tax net present value over the 10-year planning horizon for each financial bailout alternative.

Average net present value and present value of ending net worth increased substantially on each farm with the largest rate of

Table 12. Comparison of selected financial bailout scenarios * for the general crops farms in the Delta Region of Mississippi.

Criteria	Alternative Scenarios for the 1,443-acre farm			Alternative Scenarios for the 3,119-acre farm			Alternative Scenarios for the 6,184-acre farm		
	IX	X	XI	IX	X	XI	IX	X	XI
Probability of survival (%)	100	100	100	100	100	100	100	100	100
Probability of a positive after-tax net present value (%)	100	100	100	100	100	100	100	100	100
After-tax net present value ($1,000)	1,097.2	1,178.5	1,080.9	1,918.4	2,103.5	1,656.5	2,386.1	2,955.0	2,119.1
Average present value of ending net worth ($1,000)	1,563.2	1,655.7	1,545.1	3,237.2	3,430.6	2,967.7	5,259.0	5,839.7	4,989.6
Average ending cropland owned (acres)	817.8	910.6	766.6	1,870.2	2,318.2	1,627.0	3,390.4	4,244.8	3,275.2
Average ending cropland leased (acres)	1,290.8	1,204.4	1,258.8	1,975.2	2,400.8	2,058.4	3,216.0	3,411.2	3,177.6
Average ending cropland controlled (acres)	2,108.6	2,115.0	2,025.4	3,845.4	4,719.0	3,685.4	6,606.4	7,656.0	6,452.8
Average ending long-term debts ($1,000)	648.1	840.7	520.5	1,571.4	2,449.9	1,111.5	2,484.4	4,251.9	2,047.4
Average ending intermediate-term debts ($1,000)	35.0	92.5	23.7	97.2	107.1	146.8	334.3	128.1	419.4
Average ending equity ratio (fraction)	0.73	0.68	0.77	0.69	0.61	0.74	0.69	0.61	0.71
Average internal rate of return (fraction)	0.12	0.12	0.11	0.10	0.11	0.09	0.07	0.08	0.06
Average annual net farm income ($1,000)	35.5	29.4	37.7	30.1	20.4	33.8	3.7	-14.8	5.4
Average annual government payments ($1,000)	48.4	48.4	48.3	49.9	49.9	49.9	49.9	49.9	49.9

* The scenarios are:

IX -- Continuation of the 1981 Farm Bill and 1983 federal tax provisions for a highly leveraged farm.

X -- Restructure debt for a highly leveraged farm.

XI -- Interest rate subsidy (buy-down) in the first 2 years for a highly leveraged farm.

growth in net worth occurring under the debt restructuring alternative (Scenario X).

Each farm expanded its acreage, both through cropland purchases and leasing of cropland, with the smallest farm (1,443-acre farm) again exhibiting the most rapid rate of growth.

Long-term debt increased on each farm due to cropland purchases, with the exception of the two largest farms under an interest subsidy policy (Scenario XI).

Intermediate-term debt was reduced for each farm under each financial bailout scenario. The moderate-size farm and the large farm reduced intermediate-term debt relatively more than the very large farm under these financial stress conditions.

The highly leveraged general crops farms in the Delta Region of Mississippi exhibit characteristics that indicate survival and growth under financial bailout policies. The implementation of the debt restructuring and interest subsidy policy alternatives would appear to stimulate substantial growth in farm size in this production region.

Impacts of No Technological Advance

Policy Scenarios I-XI were evaluated under the assumption of the most likely technology advance conditions whereby new technology would be introduced during the 1983-1992 period. Yield gains were projected as a result of "new technology" becoming available and being adopted on farms over the planning horizon based on the judgments of the OTA commodity panels.

The farms were simulated for three of the policy scenarios under the assumption that no new technology would become available for the crops over the 1983-1992 planning horizon. Mean crop yields for 1983-1992 were held constant at their historical 1974-1983 mean level. But since the simulations were stochastic, the actual yields were drawn randomly from the sample of yields for the 1974-1983 period. These yields were included for three farm commodity policy scenarios. Scenario XII assumes the Base Farm Policy Scenario (I) but with these lower mean yields; Scenario XIII assumes the "no target price or deficiency payment" situation (Scenario V) with the lower yields

Table 13. Rates of change in selected farm size, wealth, and financial characteristics under alternative financial bailout scenarios* for the general crops farms in the Delta Region of Mississippi.

Criteria	Initial Situation	Percentage change in variable level from initial situation for alternative scenarios		
		IX	X	XI
		1,443-acre farm		
Present value of ending net worth ($1,000)	656.7	138	152	135
Cropland owned after 10 years (acres)	533.0	53	71	44
Cropland leased after 10 years (acres)	910.0	42	32	38
Total cropland controlled after 10 years (acres)	1,443.0	46	47	40
Total long-term debts after 10 years ($1,000)	439.7 (519.7)[a]	47	62	18
Total intermediate-term debt after 10 years ($1,000)	227.3 (147.3)[a]	-84	-37	-90
Total equity to asset ratio after 10 years (%)[b]	49	73	68	77
		3,119-acre farm		
Present value of ending net worth ($1,000)	1,532.6	111	124	94
Cropland owned after 10 years (acres)	1,419.0	32	63	15
Cropland leased after 10 years (acres)	1,700.0	16	41	21
Total cropland controlled after 10 years (acres)	3,119.0	23	51	18
Total long-term debts after 10 years ($1,000)	1,170.7 (1,383.5)[a]	34	77	-5
Total intermediate-term debt after 10 years ($1,000)	472.0 (259.2)[a]	-79	-59	-69
Total equity to asset ratio after 10 years (%)[b]	48	69	61	74
		6,184-acre farm		
Present value of ending net worth ($1,000)	3,009.2	75	94	66
Cropland owned after 10 years (acres)	3,064.0	11	39	7
Cropland leased after 10 years (acres)	3,120.0	3	9	2
Total cropland controlled after 10 years (acres)	6,184.0	7	24	4
Total long-term debts after 10 years ($1,000)	2,527.8 (2,987.4)[a]	-2	42	-19
Total intermediate-term debt after 10 years ($1,000)	725.9 (266.3)[a]	-54	-52	-42
Total equity to asset ratio after 10 years (%)[b]	48	69	61	71

* The scenarios are:
IX -- Continuation of the 1981 Farm Bill and 1983 federal tax provisions for a highly leveraged farm
X -- Restructure debt for a highly leveraged farm
XI -- Interest rate subsidy (buy-down) in the first 2 years for a highly leveraged farm

[a] The initial situation was the same for the three financial bailout scenarios, except for the initial long-term and intermediate-term debts under Scenarios X which are given in the parentheses.

[b] Values for all scenarios represent the percent equity in total assets after 10 years not the percentage changes in these equity to asset ratios.

and Scenario XIV assumes the "no farm program" situation (Scenario VII), again with lower yields.

The results from the simulations are presented in Table 14. The "no new technology" scenarios had little effect on the probability of having a positive after-tax net present value on each farm. They reduced slightly the probability (to 96% and 98% for the 3,119-acre farm and the 6,184-acre farm, respectively) under the policy of No Farm Program (Scenario XIV). These probabilities of having a positive after-tax net present value did not change from the most likely technology situation on the 1,443-acre farm. The impacts of these modest technology-driven yield increases on product prices were not evaluated. Consequently, in the Base Farm Policy Scenario (XII), the moderate-size and large-size farms show small improvement in annual net farm income as a result of technological advance. The very large farm shows a substantial increase in net farm income since the technology adoption rate was much faster on this size of farm.

Table 15 provides a comparison of the rates of change from the initial situation in the farm acreage, wealth, and farm financial variables assuming no change in technology and the most likely technology advance for the three policy alternatives. The present value of the farm operator's ending net worth increased at a slightly faster rate on each of the farms under the "most likely technology" scenarios than under the "no new technology" scenarios. The rate of increase was much higher for the Base Farm Policy scenarios (Scenarios I and XII), than for the other farm commodity policy scenarios for each of the farms.

The results in Table 15 show that the rates of growth in cropland purchases, leasing, and total farm acreage were almost identical under the two technology situations for a given farm. However, the 1,443-acre farm exhibited substantially higher growth rates in farm acreage than the two larger farms. Also, the rates of payback on long-term and intermediate-term loans under the two technology situations were near identical for a given farm.

These results indicate that the most likely technology changes projected for the Delta Region of Mississippi are expected to have the greatest impact on growth in real wealth and farm acreage of the 1,443-acre farm. The 3,119-acre farm and the 6,184-acre farm are expected to exhibit little growth in farm acreage over the 10-year simulation period. The economic impact expected from new technology is rather minimal com-

Table 14. Comparison of selected farm policy alternatives assuming no new technology changes for the general crops farms in the Delta Region of Mississippi.

Criteria	Alternative scenarios* for the 1,443-acre farm			Alternative scenarios* for the 3,119-acre farm			Alternative scenarios* for the 6,184-acre farm		
	XII	XIII	XIV	XII	XIII	XIV	XII	XIII	XIV
Probability of survival (%)	100	100	100	100	100	100	100	100	100
Probability of a positive after-tax net present value (%)	100	100	98	100	100	96	100	100	98
After-tax net present value ($1,000)	1,052.8	394.0	319.6	1,066.0	640.0	514.5	1,396.3	945.9	695.5
Average present value of ending net worth ($1,000)	1,613.1	1,103.5	1,043.0	2,785.7	2,450.8	2,354.4	5,286.4	4,915.2	4,714.5
Average ending cropland owned (acres)	648.2	536.2	533.0	1,428.6	1,422.2	1,419.0	3,185.6	3,144.0	3,131.2
Average ending cropland leased (acres)	1,358.0	1,102.0	1,054.0	1,914.4	1,725.6	1,700.0	3,136.0	3,132.8	3,129.6
Average ending cropland controlled (acres)	2,006.0	1,638.2	1,587.0	3,343.0	3,147.8	3,119.0	6,321.6	6,276.8	6,260.8
Average ending long-term debts ($1,000)	215.7	124.2	181.1	136.4	204.9	303.4	286.5	293.6	415.4
Average ending intermediate-term debts ($1,000)	40.7	90.6	92.9	255.7	259.2	244.5	429.6	443.9	413.5
Average ending equity ratio (fraction)	0.88	0.86	0.83	0.89	0.87	0.84	0.89	0.89	0.88
Average internal rate of return (fraction)	0.11	0.06	0.05	0.06	0.04	0.04	0.04	0.04	0.03
Average annual net farm income ($1,000)	38.6	-7.3	-18.3	34.0	-11.9	-29.9	15.1	-27.5	-57.7
Average annual government payments ($1,000)	48.2	1.9	0.0	49.9	4.8	0.0	49.9	7.9	0.0

* The scenarios are:
XII -- Continuation of the 1981 Farm Bill and 1983 federal tax provisions, assuming no new technology scenario.
XIII -- No Target Price/Deficiency Payment program in 1983–1992, assuming no new technology scenario.
XIV -- No Farm Program in 1983–1992, assuming no new technology scenario.

pared with the economic impact from changing the farm commodity price and income support programs.

New Entrant into Farming

The simulation results for the alternative farm commodity policies assumed that the farms were operated by established farm operators. These simulations provide indications of the impacts of the alternative farm policies in the relative short-run. They do not provide information on the survivability and economic viability of potentially new entrants into farming.

To obtain some indication of the long-run effects of selected farm policies, the 1,443-acre farm was analyzed for three farm policy scenarios (I, V, and VII) assuming the most likely technology advance scenarios and assuming that the farm operator was a new entrant in farming.

The entering farm operator was assumed to have minimum equity in farmland (30%) and farm machinery (35%), and all farm machinery was considered to have a 1982 new machinery cost. Annual interest rates for current long-term loans and intermediate-term loans were set equal to the average interest rates for 1980-1983 (11.37% and 13.4%, respectively). The farm operator was assumed to be purchasing 533 acres of cropland and leasing 910 acres for a total of 1,443 acres.

The results from the simulations for a new entrant under the three policy scenarios are provided in Table 16. Under the Base Policy Scenario XV (continuation of the 1981 Farm Bill), the new entrant had a 100% chance of remaining solvent for 10 years, and the operator had a 100% probability of having a positive after-tax net present value. Net worth increased by 98% over the 10-year period, and the farm grew by 27% in total cropland acreage controlled after

Table 15. Rates of change in selected farm size, wealth, and financial characteristics under selected farm policy and technological advance alternatives for the general crops farms in the Delta Region of Mississippi.

Criteria	Initial Situation	Percentage change in variable level from initial situation for alternative scenarios*					
		Assuming most likely technology			Assuming no new technology		
		I	V	VII	XII	XIII	XIV
	----------1,443-ACRE FARM----------						
Present value of ending net worth ($1,000)	748.6	120	51	43	115	47	39
Cropland owned after 10 years (acres)	533.0	22	1	0	22	<1	0
Cropland leased after 10 years (acres)	910.0	49	21	16	49	21	16
Total cropland controlled after 10 years (acres)	1,443.0	39	14	10	39	14	10
Total long-term debts after 10 years ($1,000)	331.4	-34	-63	-48	-34	-62	-45
Total intermediate-term debt after 10 years ($1,000)	243.8	-84	-63	-63	-83	-63	-62
Total equity to asset ratio after 10 years (%)[a]	56.0	88	87	84	88	86	83
	----------3,119-ACRE FARM----------						
Present value of ending net worth ($1,000)	1,921.5	53	32	28	45	28	23
Cropland owned after 10 years (acres)	1,419.0	1	<1	0	<1	<1	0
Cropland leased after 10 years (acres)	1,700.0	11	<1	0	13	2	0
Total cropland controlled after 10 years (acres)	3,119.0	7	<1	0	7	<1	0
Total long-term debts after 10 years ($1,000)	840.8	-84	-81	-74	-84	-76	-64
Total intermediate-term debt after 10 years ($1,000)	413.0	-38	-33	-40	-38	-37	-41
Total equity to asset ratio after 10 years (%)[a]	60.0	89	87	87	89	87	84
	----------6,184-ACRE FARM----------						
Present value of ending net worth ($1,000)	4,047.5	35	28	25	31	21	16
Cropland owned after 10 years (acres)	3,064.0	2	1	1	4	3	2
Cropland leased after 10 years (acres)	3,120.0	<1	<1	1	<1	<1	<1
Total cropland controlled after 10 years (acres)	6,184.0	1	<1	1	2	2	1
Total long-term debts after 10 years ($1,000)	1,640.8	-93	-92	-86	-83	-82	-75
Total intermediate-term debt after 10 years ($1,000)	574.7	-21	-19	-29	-25	-23	-28
Total equity to asset ratio after 10 years (%)[a]	64.0	91	91	90	89	89	88

* The scenarios are:

I -- Continuation of the 1981 Farm Bill and 1983 federal tax provision, with most likely technology advance scenario.

V -- No Target Price/Deficiency Payment in 1983–1992, with most likely technology advance scenario.

VII -- No Farm Program in 1983–1992, with most likely technology advance scenario.

XII -- Continuation of the 1981 Farm Bill and 1983 federal tax provision with no new technology scenario.

XIII -- No Target Price/Deficiency Payment in 1983–1992, with no new technology scenario.

XIV -- No Farm Program in 1983–1992, with no new technology scenario.

[a] Values for all scenarios represent the percent equity in total assets after 10 years not the percentage change in these equity to asset ratios.

10 years. Much of the growth in farm acreage resulted from leasing additional cropland (31% increase) with some increase in purchased acreage (19%). Long-term debt increased 42%, while almost all (91%) of the intermediate-term debt was paid back. The total equity to asset ratio increased from the initial situation of 33% to an ending situation of 61% after the 10 years.

When the Target Price/Deficiency Payment Program Scenario (XVI) or the No Farm Program Scenario (XVII) alternatives were considered the probability of the farm operator remaining solvent dropped to 76% and 62%, respectively. The mean value for after-tax net present value was negative for the no farm program option. Owned cropland acreage decreased 53% under Scenario XVI and 51% under Scenario XVII as the new entrant was forced to sell off cropland in an attempt to remain solvent. Long-term debts were reduced by around 40% from their initial levels, while about half of the intermediate-term loans were repaid. The farm remained in operation an average of 9 years under Scenario XVI, and an average of 8 years under the No Farm Program Scenario (XVII).

Because the entering farm operator started with minimum equity in land and new farm machinery, full costs of using these resources were incurred. The relative low probabilities of survival for Scenarios XVI and XVII indicate the dependency of new entrants on an income and price support program. These results indicate that as long as resources remain valued at current levels in Delta Region of Mississippi agriculture, the industry will continue to depreciate out current investment and few new operators will enter farming in the absence of farm commodity price and income support programs.

As a practical matter, a new entrant into the region's agriculture with low equity can probably only survive by using mainly one or more of the following strategies: (1) by leasing land and/or machinery; (2) by achieving much higher than average crop yields; and/or (3) by arranging financing that postpones a part of the initial liability for principal and/or interest payments. The net farm incomes for Scenarios XVI and XVII are negative in large amounts (Table 16). Thus, even the successful implementation of these strategies is not likely to ensure successful establishment of this new entrant in farming for extended periods of time.

Table 16. Comparison of selected farm policy alternatives for a new entrant on the 1,443-acre general crops farm in the Delta Region of Mississippi.

Criteria	Initial Situation	Alternative Scenarios*			Percentage change from initial situation*		
		XV	XVI	XVII	XV	XVI	XVII
Probability of survival (%)	--	100	76	62	--	--	--
Probability of a positive after-tax net present value (%)	--	100	70	58	--	--	--
After-tax net present value ($1,000)	--	629.8	57.2	-35.7	--	--	--
Present value of ending net worth ($1,000)	498.3	984.9	395.4	319.0	98	-21	-36
Cropland owned after 10 years (acres)	533.0	636.4	249.2	260.4	19	-53	-51
Cropland leased after 10 years (acres)	910.0	1,193.8	1,209.8	1,182.6	31	33	30
Total cropland controlled after 10 years (acres)	1,443.0	1,830.2	1,459.0	1,443.0	27	1	0
Total long-term debts after 10 years ($1,000)	519.7	737.3	299.9	306.3	42	-42	-41
Total intermediate-term debts after 10 years ($1,000)	471.1	41.0	200.6	248.4	-91	-57	-47
Total equity to assets after 10 years (fraction)	0.33	0.61	0.51	0.47	--	--	--
Internal rate of return after 10 years (fraction)	--	0.11	0.00	-0.07	--	--	--
Average annual net farm income ($1,000)	--	-18.8	-76.8	-91.3	--	--	--
Average annual government payments ($1,000)	--	47.3	2.3	0.0	--	--	--

* The scenarios are:
XV -- Continuation of the 1981 Farm Bill and 1983 federal tax provisions
XVI -- No Target Price/Deficiency Payment Program for 1983-1992
XVII -- No Farm Program in 1983-1992

References

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