Appendix E

Methodology and Detailed Results of Microeconomic Impacts of Technology and Public Policy for Crop Farms

Chapter 8 presented the summary results of the macroeconomic impacts of public policies and technology on the viability of crop farms. This appendix discusses in more detail the methodology used for the analysis and the specific results by area. For further information the reader is advised to read the individual commissioned papers published in a separate volume to this report.

The first step for each production area was to describe representative farms that included moderate, large, and very large farms. The second step involved a simulation of the representative farms using a Monte-Carlo, whole-farm simulation model (FLIPSIM V) under alternative farm policy, income tax, finance, and technology scenarios.

Simulation Model

The current version of the General Firm Level Policy Simulator—FLIPSIM V, developed by James Richardson and Clair Nixon at Texas A&M University—was used to simulate the three representative farms for selected policy and technology scenarios. The model is capable of simulating the annual functions of a crop farm, i.e., production, marketing, financial growth and decay, machinery depreciation and replacement, family consumption, fixed and variable costs, and participation in farm programs.

Each representative farm was simulated over the lo-year planning horizon beginning in 1982 and extending through 1992. The planning horizon was then repeated 50 times, using a different set of random cotton prices and yields for each iteration. At the end of each iteration, values for key output variables were calculated.

The model began each year of the planning horizon by determining the production costs for the current size of the farm, based on information provided for larger farms. Because the representative farms were permitted to grow over time, crop mix and per-acre production costs were forced to change to correspond to those for larger representative farms.

After determining the relevant crop mix and costs for the farm, the model selected the random crop prices and yields for that year. Random yields were drawn to reflect the historical variability typical of the study area,

FLIPSIM V simulated variable production costs for each crop by multiplying the per-acre input costs by planted acreages for the respective crops. Labor costs were calculated as the sum of full-time labor charges plus the cost of part-time labor. Part-time labor needs were based on the difference between hours of monthly labor available from full-time employees and nonpaid family members, and the monthly labor needs for all crops. Harvesting costs were the product of the per-unit harvest costs, random yield, and harvested acreage. Each farm's initial production and harvesting costs were expressed in 1982 dollars.

Annual crop yields were selected at random, based on the historical yield variability observed for the study area subject to the technology scenario being evaluated, the year of the planning horizon, and the size of farm. Under the base technology scenario it was assumed that the very largest farm would adopt the new technology first. The next smallest farm was assumed to adopt this technology in a similar pattern during subsequent years, and the smallest farm would make the adoption even later. The specific lag years for each commodity were based on the results of technology workshops discussed in chapter 3.

The model calculated property taxes based on the price of land and the property tax rate for the study area. Other fixed costs were determined by the analyst, The model amortized all outstanding loans under the assumption that they were simple interest mortgages. Annual interest rates for existing debt on land, machinery, and operating loans were, respectively, 8.5, 13.4, and 14.4 percent. Annual interest rates for new debts and refinanced loans (on long-term and intermediate-term assets) were 11.4 and 13.4 percent, respectively. Cash reserves and off-farm investments were allowed to earn 10 percent interest annually. The market value of farm machinery was updated under the assumption that the real market value of used equipment decreased 1 percent per year. The market value of cropland

was estimated using the historical relationship between the capital gains rate for cropland and the rate of returns for farms. The capital gains rate was a function of the capital gains rate for land in the previous year and the rate of return to production assets for the farm in the previous year,

The model next depreciated each piece of equipment on the farm for income tax purposes. Equipment purchased prior to 1981 was depreciated using the double-declining balance method and a 5-year to 7-year life. Equipment placed into use after 1980 was cost recovered assuming a 5-year life and the Accelerated Cost Recovery System (ACRS) rules. Regular-purpose and special-purpose buildings were depreciated using ACRS rules, or the double-declining balance method, where applicable. Equipment that had passed its economic life was traded for a replacement, if sufficient cash was available to cover the required downpayment. The cost of replacement equipment, expressed in 1982 dollars, was held constant throughout the planning horizon. First-year expensing and maximum investment tax credit (ITC) were calculated for all equipment purchases.

The fraction of each crop marketed in the current tax year was estimated internally, based on the operator's desired taxable income ($7,400), estimated cash receipts, and income tax deductions. If the market price was less than the effective loan rate for a crop, it was placed in a Commodity Credit Corporation (CCC) loan when available, rather than being sold. Stocks were released from the loan if the market price in the following year exceeded the loan rate plus interest. Deficiency payments were paid if the season average price was less than the target price.

The deficiency payment is a function of the payment rate, farm program yield, and harvested acreage. When an acreage set-aside or diversion program was simulated, the model reduced planted acreage the specified amount and accounted for increases in production on the more productive land left in production (slippage).

After simulating the farm policies specified by the user, the model determined the farm operator's year-end financial position, calculated family cash withdrawals, and calculated income taxes payable in the following year. Cash surpluses were deposited in an interest-bearing account at 10 percent interest. Year-end cash flow deficits were handled in the following order: 1) grant a lien on crops in storage at the operating loan interest rate, 2) refinance long-term equity, 3) refinance intermediate-term equity, and/or 4) sell cropland. If the operator was unable to cover the deficit in one of these ways, the farm was declared insolvent and the model proceeded to the next iteration after calculating the operator's accrued income and self-employment taxes.

Personal income taxes and self-employment taxes were calculated with the assumption that the operator was married, filed a joint income tax return, and itemized personal deductions. The regular income tax liability was computed using income averaging (if qualified) and the standard tax tables. The model selected the tax strategy that resulted in the lower income tax liability.

The farm was permitted to grow at the end of each year by purchasing cropland if the operator had cash available (after meeting all expenses) to cover a 30-percent downpayment for land and a 35-percent downpayment for any additional machinery necessary for the proposed larger farm. The operator was permitted to borrow against equity in land to meet up to 50 percent of the downpayment for land. The farm operation could also grow by leasing land if the operator had sufficient cash available to cover the 35-percent downpayment required for purchasing additional machinery needed to operate the larger farm. If machinery was purchased because of growth, the machinery was depreciated, the investment tax credit was calculated, and the operator's income taxes were recomputed.

After checking the farm's prospects for growth, the model updated the farm operator's balance sheet and cash flow statement and prepared to simulate the next year of the planning horizon. The steps in the simulation process described above are repeated for 10 years, or until the farm is declared insolvent. After completing each iteration, the model summarized the information for numerous key output variables and returned the farm to its initial economic situation (year one). This insured that the farm faced the same economic, policy, and physical relationships for each of 50 iterations analyzed.

Policy and Technology Scenarios

The three representative farms for each area were simulated for 10 years under the alternative scenarios described below. Seven farm policy scenarios (including a continuation of the 1981 farm bill), one income tax provision scenario, three financial bail-out scenarios, and three alternative technology scenarios were simulated for each farm. All policy values associated with each scenario were held constant across farm sizes to allow direct comparison of their impacts on different farm sizes. Each scenario is described in detail in this section.

Farm Policy Scenarios

1. **Base** Policy .—The base policy scenario involves continuation of the 1981 farm bill through 1992 and continuation of the income tax provisions under the 1982 Tax Act through 1992. Annual mean crop yields were assumed to increase based on expected adoption of new technology, as indicated in the previous section. For this scenario it was assumed the following farm policies were in effect:

- CCC loan program is available to producers.
- An acreage diversion/set-aside program in effect for 1983-85, was used, excluding payment in kind. No acreage diversion/set-aside program was in effect for 1986 through 1992.
- A target price-deficiency payment program is available for cotton in all years.
- The $50,000-payment limitation for deficiency and diversion payments is in effect.
- 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, 1984, and 1985 were set at their actual values. Loan rates and target prices for 1986 through 1992 were held constant at their 1985 levels.

It was assumed that the following options for depreciating machinery and calculating income taxes are used for the base scenario:

- Machinery and buildings placed in use prior to 1981 are depreciated using the double-declining balance method.
- Machinery and buildings placed in use after 1980 are depreciated using an ACRS method.
- The operator elects to claim first-year expensing for all depreciable items.
- The operator elects to take maximum ITC and reduce the basis.
- The operator adjusts crop sales across tax years to reduce current-year taxes.
- The operator may use either the regular income tax computation or income averaging to calculate Federal income tax liabilities.
- There is no maximum interest deduction for calculating taxable income.
- 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 through 1986 were used, and the *1986* values were held constant through 1992.
- The operator elects to trade in old machinery on new replacements at the end of each item's economic life.

2. A Twenty-Percent Acreage Reduction.—The provisions of the base policy scenario were modified by adding a 15-percent set-aside with a 5-percent paid diversion for cotton in 1986 through 1992. Reasonable slippage (70 percent for cotton) and program participation rates were used to estimate the resulting increase in mean prices in 1986 through 1992. All other provisions of the base scenario were used without change.

3. No Farm Program Payment Limitation.—All provisions of the base scenario were used except that there was no limitation on diversion and deficiency payments.

4. No Price Supports and No Deficiency Payments.—The CCC loan and target price provisions under the base scenario were assumed to have been eliminated for all years in the planning horizon (1983-92), Annual mean prices were decreased based on the expected impact of removing the price and income support programs. Relative variability in prices about their means was increased based on the work of Morton, Devadoss, and Heady as to the effects of no farm program on U.S. agriculture. To isolate the impact of price and income supports on the representative farms, the acreage diversion and set-aside programs in the base policy for 1983 through 1985 were assumed to remain in effect.

5. No Target Price/Deficiency Payment.—The target price and deficiency payment provision was assumed to be eliminated for all years of the planning horizon 1983 through 1992. All other provisions of the base scenario were used without change to isolate the effects of removing only the deficiency payment.

6. Target Farm Program Benefits.-All farm program and income tax provisions of the base scenario were used except that farms with more than $300,000 of sales were not eligible to participate in farm program provisions, This program restriction excluded the very large farms from participating directly in the program provisions (CCC loan, target price/deficiency payments, and set-aside/diversions). Mean prices and relative variability in prices were not adjusted because sufficient "smaller" farms were assumed to be participating in the farm program for the price support actions of the CCC loan to function normally.

7. No-Farm Program.-All farm program provisions outlined for the base scenario were eliminated for all 10 years of the planning horizon, Mean annual prices and relative variance in prices for the no-price and income supports scenario (4) were used due to eliminating provisions of the CCC loan.

Income Tax Scenarios

8. Reduced Income Tax Benefits and Base Farm Program.—The Federal income tax provisions in place for the base policy scenario were made more restrictive. All farm policy provisions of the base scenario were left unchanged. The more restrictive Federal income tax provisions included the following:

- Machinery and buildings were depreciated using the straight-line cost recovery method.
- First-year expensing provisions were eliminated for all depreciable items.
- ITC provisions were continued, but the maximum ITC provision was eliminated.
- The maximum annual interest expense that could be used to reduce taxable income was $15,600. This value represented the annual interest expense deductions a consumer might have for a home, automobiles, and the like.
- The 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 scenario were used as outlined earlier.

Financial Stress Scenarios

9. 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. Annual long-term and intermediate-term interest rates were increased to their average values (0.1139 and 0.1343, respectively) for 1980 to 1983 to represent a farm that had been forced to refinance its assets during the past 4 years. The farm program provisions associated with the base policy scenario were continued for this scenario,

10. Debt Restructure.—The length of intermediate-term loans was increased by 1 year, and a portion of intermediate debt was converted to long-term debt. The conversion of intermediate-term debt was permitted as long as the long-term debt-to-asset ratio did not exceed 0.65. For some farms, this allowed all intermediate-term debt to be converted to long-term debt, while for other farms this constraint substantially restricted debt conversion. Total debt loads and farm program provisions were the same as those used for the base finance scenario (9).

11. Interest Subsidy.—The annual interest rates, debt levels, and farm program provisions in the base finance scenario (9) 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 percent for long-term interest rates and 5.4 percent for intermediate-term interest rates. These interest rate reductions were the amounts necessary to reduce the respective interest rates (0.1 137 and 0.1343) to a 4-percent rate of interest.

No-New-Technology Scenarios

12. No-New-Technology and Base Farm Policy .—The Federal income tax and farm program provisions in the base policy scenario were simulated assuming no increase in mean yields over the planning horizon. For the no-new-technology scenarios, mean irrigated and dryland cotton yields for all 10 years were set equal to their respective means observed over the period 1974-83.

13. No-New-Technology and No Deficiency Payments.—The farm program provisions in the no-target-price / deficiency payments scenario (5) were simulated assuming the same average annual cotton yields used for the base no-new-technology scenario (12).

14. No-New-Technology and No-Farm Program.-All farm program provisions were eliminated (scenario 7), and annual average crop yields used for the base no new technology scenario (12) were assumed.

Evaluation Criteria

The FLIPSIM V model provides considerable detail about the 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 the solvency of the farm over 10 years, By repeating each scenario for 50 iterations, the model generates the information necessary for estimating values for key output variables. The means of these key output values are used to compare the economic impacts of selected policy and technology scenarios on representative farms. The following output variables for the model were selected to compare the impacts of the scenarios described in the previous section:

- *Probability of survival is* defined as the probability that the representative farm will remain solvent for 10 years. In other words, it is the probability that the farm operator will maintain at least the minimum financial ratios required by bankers in the local area for all 10 years of the planning horizon.
- *Probability of a positive net present value* is the probability that the representative farm will have a positive after-tax net present value. An

after-tax, real discount rate of 3 percent was used to calculate the farm's net present value. Thus this statistic indicates the probability of the representative farm providing at least a 3-percent real rate of return to the operator's initial net worth.

- *After-tax net present value (NPV)* is 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 (OF):

$$NPV = \sum_{t=1}^{T} \frac{CW_t - OF_t}{(1.03)^t} + \frac{NW_T}{(1.03)^T} - NW_0$$

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

- *Present value of ending net worth* is used to indicate the change in the farm's real net worth over the planning horizon. Net worth is affected by increases (or decreases) in asset (land, machinery, and livestock) value and retained earnings. This value can be compared directly with initial net worth to indicate the relative magnitude of real financial growth.
- *Acres owned, leased, and controlled* at the end of the planning horizon for each iteration indicate the impacts of alternative scenarios on the rate of growth for representative farms. These three statistics provide an indication of how the farm grew through either the purchase or lease of land.
- *Total long-term and intermediate-term debts* at the end of the planning horizon 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 either to rapid growth through purchasing land and machinery or to the farm operator being forced to refinance large cash flow deficits, When surplus cash is available, the operator is permitted to prepay intermediate-term debts first 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.
- *Ending equity ratio* is the farm's ending ratio of total net worth to total assets. This ratio provides a "bottomline" measure for comparing the representative farm's ending financial position across scenarios.
- *Average annual net farm income* is the average net farm income received by the operator 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 cash costs, and depreciation. This value excludes all nonfarm income and interest earned on cash reserves.
- *Average annual Government payment* is the average annual Government payment (deficiency and diversion payments) received over all years simulated.

Results of Analysis

Texas Southern High Plains Cotton Farms

The results indicate that under the most likely technology scenario and continuation of the provisions of the 1981 farm bill, all three representative cotton farms had a high probability of remaining solvent through 1992 (table E-l). Additionally, all three farms had an 88-percent or greater chance of receiving a reasonable return to equity. All three farms were able to grow over the 10-year planning horizon. The greatest percentage of increase in ending farm size was for the 1,088-acre farm, followed by the 3,383-acre farm and the 5,570-acre farm.

Imposing an acreage reduction program (acreage diversion and set-aside) increased net farm incomes and average net present value for all three farms, Acreage reduction programs increased the annual rate of growth more for the 1,088-acre farm than for the two larger farms.

Removing the deficiency payment program (income supports) reduced the probability of survival, net farm incomes, and annual growth rates for all three farms. The greatest percentage decrease in annual net farm income was experienced by the 1,088-acre farm, followed by the 3 ,383-acre farm. Similarly, the two smaller farms experienced greater reductions in their annual growth rates.

Removing both price supports (CCC loan) and deficiency payments reduced the probability of survival the most for the 1,088-acre farm (36 percent), whereas the probability of survival for the 5,570-acre farm fell only 2 percent. All three farms had slower rates of growth in the absence of price and income supports. The annual rate of growth for the 1,088-

Table E-1 .— Comparison of Selected Farm Commodity and Income Tax Policy Scenarios on Representative Texas Southern High Plains Cotton Farms

Criteria	Alternative scenarios 1	2	3	4	5	6	7	8
Moderate size (1,088 acres):								
Probability of survival	92.0	94.0	94.0	56.0	68.0	*92.0*	*42.0*	88,0
Present value of ending net worth ($1,000)	564.0	648.0	601.0	*242.0*	301.0	*564.0*	*167.0*	516.0
Ending farm size (acres)	1,558.0	1,635.0	1,648.0	1,216.0	1,274.0	1,558.0	1,213.0	1,565.0
Annual net farm income ($1,000)	8.3	13.3	11.9	*–28.9*	–21.7	*8.2*	–40.6	–6.0
Annual Government payment ($1,000)	26.0	22.2	29.5	*1.3*	1.1	*25.9*	0.0	25.8
Large size (3,333 ***acres):***								
Probability of survival	90.0	94.0	94.0	*72.0*	*82.0*	86.0	*62.0*	88.0
Present value of ending net worth ($1,000)	1,412.0	1,697.0	1,853.0	*931.0*	1,055.0	1,191.0	*801.0*	1,226.0
Ending farm size (acres)	4,289.0	4,455.0	4,577.0	*3,748.0*	3,857.0	3,985.0	*3,649.0*	3,965.0
Annual net farm income ($1,000)	33.4	53.6	83.3	*– 14.8*	3.6	12.9	*–39.7*	–7.2
Annual Government payment ($1,000)	38.0	35.1	83.3	*3.2*	3.0	16.8	*0.0*	37.9
Very large ***size*** *(5,570* **acres):**								
Probability of survival	94.0	96.0	98.0	*92.0*	96.0	88.0	*78.0*	94.0
Present value of ending net worth ($1,000)	3,027.0	*3,489.0*	4,047.0	*2,367.0*	*2,645.0*	*2,287.0*	*2,066.0*	2,583.0
Ending farm size (acres)	6,002.0	*6,047.0*	6,514.0	*5,781.0*	*5,848.0*	*5,727.0*	*5,736.0*	5,746.0
Annual net farm income ($1,000)	66.6	*100.6*	170.6	*–3.2*	*31.0*	*– 13.9*	*–40.5*	– 15.6
Annual Government payment ($1,000)	40.2	*39.1*	135.8	*4.8*	*4.6*	*0.0*	*0.0*	40.4

[a]The scenarios are:

1. Continuation of the 1961 farm bill and 1963 Federal income tax provisions.
2. A 20-percent acreage reduction in 1966-92.
3. No farm program payment limitation in 1963-92.
4. No price supports and no deficiency payment in 1963-92.
5. No target price/deficiency payment in 1963-92.
6. Target farm program benefits to farms that produce less than S300,000 in program crops.
7. No farm program in 1963-92.
8. Reduced income tax benefits and the base farm program.

The impact of price supports can be derived by subtracting scenario 5 from scenario 6.
The impact of income supports can be derived by subtracting scenario 6 from scenario 1.
The impact of income supports with a $50,000 payment limitation can be found by subtracting scenario 6 from scenario 4.

SOURCE: Office of Technology Assessment.

acre farm was reduced five times more than for the 5,570-acre farm.

Removing all farm program provisions reduced the probability of survival for all three farms. The probability of survival declined from 92 to 42 percent for the 1,088-acre farm and from 90 to 62 percent for the 3,383-acre farm. The probability of survival for the 5,570-acre farm remained above 75 percent. Average annual net farm incomes for all three farms were substantially less than zero, and average net present values were considerably lower than under the current farm program.

Imposing a more restrictive set of Federal income tax provisions on the three representative farms reduced the average annual rate of growth more for the two larger farms. Net farm incomes were also reduced more for the two larger farms. Growth occurred by leasing because higher taxes reduced available cash for land purchases (downpayments).

The results of analyzing the three farms, assuming they were highly leveraged, reveal that debt restructuring would not greatly help these farms (table E-2). Although their probabilities of survival would not be increased, the farms would be able to remain solvent 1 to 3 years longer. A 2-year interest subsidy would provide greater benefits to net present value, net farm income, and ending net worth than would a debt restructure program.

Yield-enhancing technology anticipated over the next 10 years for cotton did not significantly change the average annual growth rates of the representative farms (table E-3). Changing the farm program or Federal income tax provisions had a greater impact on farm growth.

In conclusion, the results indicate that moderate (1,088-acre) cotton farms in the Texas Southern High Plains depend more on farm program provisions for their continued growth and economic viability than do larger farms. Larger farms are better able to survive without farm program benefits because of lower production costs (dollars/lb), higher average cotton lint prices, and a greater asset base from which to meet cash flow deficits. The loss of any farm program provision reduces the economic viability and

Table E-2.—Comparison of Selected Financial Bailout Scenarios for Three Representative Texas Southern High Plains Cotton Farms[a]

	Alternative scenarios for 1,088-acre farm			Alternative scenarios for 3,383-acre farm			Alternative scenarios for 5,570-acre farm		
Criteria	9	10	11	9	10	11	9	10	11
Probability of survival	64.0	66.0	72.0	58.0	50.0	60.0	66.0	64.0	66.0
Present value of ending net worth ($1,000)	304.0	314.0	343.0	604.0	600.0	733.0	1,310.0	1,356.0	1,619.0
Ending farm size (acres)	1,414.0	1,434.0	1,443.0	3,770.0	3,841.0	3,821.0	5,733.0	5,976.0	5,772.0
Annual net farm income ($1,000)	–5.4	–6.4	1.3	–9.1	–21.2	6.9	–41.8	–57.3	–6.3
Annual Government payment ($1,000)	24.4	24.8	24.7	36.8	36.4	37.2	41.1	41.3	41.6

[a]The scenarios are'
9 Continuation of the 19S1 farm bill and the 1983 Federal tax provisions for a highly leveraged farm.
10 Restructure of debt for a highly leveraged farm.
11 Interest rate subsidy (buy-down) in the first 2 years for a highly leveraged farm

SOURCE Office of Technology Assessment

Table E.3.—Comparison of Selected Policy Scenarios Assuming No New Technology for Three Representative Texas Southern High Plains Cotton Farms[a]

	Alternative scenarios for 1,088-acre farm			Alternative scenarios for 3,383-acre farm			Alternative scenarios for 5,570-acre farm		
Criteria	12	13	14	12	13	14	12	13	14
Probability of survival	92.0	68.0	42.0	88.0	78.0	60.0	94.0	90.0	76.0
Present value of ending net worth ($1,000)	552.0	290.0	161.0	1,325.0	966.0	738.0	2,807.0	2,322.0	1,843.0
Ending farm size (acres)	1,590.0	1,280.0	1,206.0	4,273.0	3,818.0	3,633.0	5,960.0	5,816.0	5,724.0
Annual net farm income ($1,000)	7.0	–22.2	–41.0	25.4	–3.6	–45.5	47.0	0.2	–65.9
Annual Government payment ($1,000)	26.3	1.1	0.0	37.9	3.0	0.0	40.5	4.8	0.0

[a]The scenarios are:
12 Continuation of the 1981 farm bill and the 1983 Federal tax provisions, assuming no-new-technology scenario.
13 No target price deficiency payment program, assuming no new technology scenario
14 Deficiency plus diversion payments and any other Government payments received for Government loans and storage costs

SOURCE" Off Ice of Technology Assessment

growth rate of the 1,088-acre farm more than the larger farms; however, all size farms are negatively affected.

Southern High Plains Wheat Farms

Three different size wheat farms in the Southern High Plains, representative of a majority of the commercial agricultural production for the region, were analyzed. The farms initially operating 1,280 acres, 1,920 acres, and 3,200 acres, reflected debt-to-asset ratios typical of farms in the area, owned the necessary machinery complement, and farmed both owned and leased cropland.

Analysis results indicate that under the most likely technology scenario and a continuation of the provisions of the 1981 farm bill (base scenario), all three representative wheat farms had a high probability of remaining solvent through 1992 (table E-4), Additionally, all three farms had a high probability of generating a reasonable return on equity and were able to grow over the 10-year planning horizon. The greatest percentage increase in average ending farm size was for the 1,280-acre farm, followed by the 1,920-acre operation.

Imposing an acreage reduction program (acreage set-aside and paid diversion) increased net farm incomes and average net present value for all three farms. Acreage reduction programs increased average ending farm size slightly more for the 3,20()-acre farm than for the 1,280-acre farm.

Removing the deficiency payment program (income supports) reduced the probability of survival for only the 1,920-acre farm. Although each farm suffered a reduction in average annual net farm income, the reduction was significantly greater for the 1,280-acre farm. Average annual growth rates declined more for the two smaller farms.

Removing both price (CCC loan and farmer-owned reserve) and income supports (deficiency payments) reduced the probability of survival for both the 1,280-acre and 1,920-acre farms. All three farms experi-

Table E-4.—Comparison of Selected Farm Commodity and Income Tax Policy Scenarios on Representative Southern Plains Wheat Farms[a]

Criteria	Alternative scenarios 1	2	3	4	5	6	7	8
Moderate size (1,280 acres):								
Probability of survival,	100.0	100.0	100.0	*76.0*	100.0	100.0	***48.0***	100.0
Present value of ending net worth ($1,000)	803.0	1,032.0	811.0	*283.0*	*426.0*	761.0	***189.0***	710.0
Ending farm size (acres)	1,901.0	1,955.0	1,901.0	1,565.0	1,648.0	1,910.0	1,478.0	1,757.0
Annual net farm income ($1,000)	2.6	***18.3***	3.1	*–33.6*	–21.4	–0.9	*–41.6*	–8.3
Annual Government payment ($1,000)	30.9	***31.5***	31.6	*2.5*	2.5	27.7	*0.0*	29.4
Large size (1,920 acres):								
Probability of survival.	100.0	100.0	100.0	50.0	90.0	96.0	***32.0***	100.0
Present value of ending net worth ($1,000)	1,028.0	***1,359.0***	1,117.0	294.0	475.0	***696.0***	***179.0***	***833.0***
Ending farm size (acres)	2,765.0	***2,890.0***	2,755.0	*2,234.0*	2,339.0	***2,618.0***	***2,093.0***	***2,499.0***
Annual net farm income ($1,000)	***9.0***	***28.5***	17.3	*–52.5*	–34.9	***– 17.6***	***–67.9***	***–21.8***
Annual Government payment ($1,000)	39.0	***39.1***	44.7	*4.2*	3.7	***16.2***	***0.0***	***37.3***
Very large size (3,200 acres):								
Probability of survival.	100.0	100.0	100.0	100.0	100.0	100.0	***92.0***	100.0
Present value of ending net worth ($1,000)	1,936.0	*2,204.0*	2,231.0	1,096.0	1,412.0	1,087.0	***925.0***	1,657.0
Ending farm size (acres)	4,218.0	*4,365.0*	4,483.0	*3,552.0*	3,834.0	*3,494.0*	***3,472.0***	*3,805.0*
Annual net farm income ($1,000)	48.9	*59.5*	78.4	*–7.8*	15.6	*– 13.6*	***–25.1***	*28.1*
Annual Government payment ($1,000)	44.2	*45.0*	76.9	*5.8*	5.9	*0.0*	***0.0***	*44.1*

[a]The scenarios are:
1. Continuation of the 1961 farm bill and 1983 Federal income provisions.
2. A 20-percent acreage reduction in 1966-92.
3. No farm program payment imitation in 1963-92.
4. No price supports and no deficiency payment in 1983-92.
5. No target price/deficiency payment in 1983-92.
8. Target farm program benefits to farms that produce iess than $300,000 in program crops.
7. No farm program in 1963-92.
8. Reduced income tax benefits and the base farm program.

The impact of price supports can be derived by subtracting scenario 5 from scenario 6.
The impact of income supports can be derived by subtracting scenario 6 from scenario 1.
The impact of income supports with a $50,000 payment limitation can be found by subtracting scenario 6 from scenario 4

SOURCE: Office of Technology Assessment.

enced slower rates of growth as a result of eliminating price and income supports. Average ending farm size ranged from 19 to 16 percent less than under the base scenario. All three farms experienced negative annual net farm incomes on the average.

Removing all farm program provisions reduced the probability of survival for all three wheat farms. Probability of survival (100 percent under the base scenario) declined to 48 percent for the 1,280-acre farm, 32 percent for the 1,920-acre farm, and 92 percent for the 3,200-acre farm. Average ending net worth for the farms declined over the period, owing to a decline in land values.

Imposing a more restrictive set of Federal income tax provisions on the three representative wheat farms slowed the average annual growth rate more for the two larger farms. Farm growth occurred more by leasing cropland than by purchasing land, owing to reduced cash reserves. The 3,20()-acre farm experienced the greatest absolute reduction in annual net farm income (about $20,000), followed by the 1,920-acre farm.

A 2-year interest rate subsidy program would provide greater benefits to highly leveraged wheat farms than would a debt restructure program. Probability of survival for a highly leveraged 1,920-acre wheat farm was increased from 40 to 80 percent by an interest rate subsidy (table E-5).

Yield-enhancing technology anticipated over the next 10 years will likely contribute to farm growth. The greatest benefit will accrue to those farms initially adopting the new technology (table E-6).

In conclusion, the results of this analysis indicate that moderate wheat farms—1,280 to 1,920 acres—in the Southern High Plains depend more on farm program provisions than do larger farms for their continued growth and economic viability. The loss of any farm program provision, however, negatively affects farms of all sizes.

Corn-Soybean Farms in the Corn Belt

All three Illinois farms had a survival probability at or near 100 percent under the entire range of farm program (and no program) alternatives considered here (table E-7). But the probability of positive after-tax net present value dropped dramatically (particularly for the medium [640-acre] and large [982-acre]

Table E-5.—Comparison of Selected Financial Bailout Scenarios for Three Representative Southern Plains Wheat Farms[a]

	Alternative scenarios for 1,280-acre farm			Alternative scenarios for 1,920-acre farm			Alternative scenarios for 3,200-acre farm		
Criteria	9	10	11	9	10	11	9	10	11
Probability of survival	86.0	98.0	100.0	40.0	70.0	80.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	289.0	408.0	383.0	258.0	399.0	406.0	1,248.0	1,373.0	1,348.0
Ending farm size (acres)	1,434.0	1,549.0	1,552.0	1,994.0	2,058.0	2,118.0	3,779.0	3,978.0	3,891.0
Annual net farm income ($1,000)	–22.5	–21.2	– 14.3	–37.9	–35.1	–24.1	17.1	12.4	27.5
Annual Government payment ($1 ,000)	25.2	26.4	26.8	34.8	35.2	35.6	43.9	44.1	44.0

[a]The scenarios are
9 Continuation of the 1981 farm bill and the 1983 Federal tax provisions for a highly leveraged farm
10 Restructure of debt for a highly leveraged farm
11 Interest rate subsidy (buy-down) in the first 2 years for a highly leveraged farm

SOURCE: Office of Technology Assessment

Table E-6.—Comparison of Selected Policy Scenarios Assuming No New Technology for Three Representative Southern Plains Wheat Farms[a]

	Alternative scenarios for 1,280-acre farm			Alternative scenarios for 1,920-acre farm			Alternative scenarios for 3,200-acre farm		
Criteria	12	13	14	12	13	14	12	13	1 4
Probability of survival	100.0	90.0	32.0	100.0	44.0	10.0	100.0	82.0	28.0
Present value of ending net worth ($1,000)	726.0	325.0	134.0	780.0	229.0	81.0	1,131.0	562.0	220.0
Ending farm size (acres)	1,859.0	1,632.0	1,430.0	2,605.0	2,304.0	2,048.0	3,699.0	3,542.0	3,322.0
Annual net farm income ($1,000)	– 1.3	–28.9	–46.8	– 10.9	–52.9	–77.1	–2.1	–45.4	–85.8
Annual Government payment ($1,000)	30.7	2.5	0.0	38.1	3.9	0.0	43.7	5.9	0.0

[a]The scenarios are:
12 Continuation of the 1981 farm bill and the 1983 Federal tax provisions, assuming no-new. technology scenario
13 No target price deficiency payment program, assuming no new technology scenario
14 Deficiency plus diversion payments and any other Government payments received for Government loans and storage costs

farms) when farm program benefits were reduced or removed. In fact, even the loss of target price / deficiency payment programs dropped the probability of positive after-tax net present value into the range of 4 to 6 percent for these two representative farms. As a general rule, the largest farm fared the best with the loss of farm programs because it operates with a substantial acreage of rented land and suffers relatively less from the economic drag of servicing a high real estate debt load. Moreover, this very large unit had much less economic incentive to grow in size than do the two smaller farms.

All three Nebraska farms also had a survival probability at or near 100 percent under the entire range of program and no-program alternatives (table E-8). The loss of farm program benefits had its greatest adverse impact on the very large (2,085-acre) farm, probably because this unit has large machinery investments and uses much more full-time hired labor. In fact, the probability of realizing positive after-tax net present value dropped to the 8 to 12 percent range for this very large operation when program benefits were withdrawn or dramatically reduced. Economic performance measures for the medium (672-acre) and large (920-acre) farm also deteriorated under the latter condition. Overall, the generally stronger economic viability of the Nebraska farms (compared with Illinois farms) was attributable to much lower land prices and the lower debt servicing costs that result.

A modest reduction in income tax benefits did not have major economic impacts on the moderate and large farms in either Illinois or Nebraska. It has its greatest impact (a reduction of $5,800 in net farm income compared with that of the base scenario) for the very large (2,085-acre) farm in Nebraska. Even here, however, the impact was very small compared with the loss of economic benefits from either the target price / deficiency payment program or the entire complement of existing price and income supports.

Increasing debt loads to a level of 60 percent of machinery value and 55 percent of land value resulted in a heavy economic dragon all three Illinois farms, but somewhat less so for the Nebraska farms (tables E-9, E-10). This difference results mainly from

Table E-7.—Comparison of Selected Farm Commodity and Income Tax Policy Scenarios on Representative Corn-Soybean Farms in East Central Illinois[a]

Criteria	Alternative scenarios							
	1	2	3	4	5	6	7	8
Moderate size (640 acres):								
Probability of survival	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	703.0	743.0	703.0	***568.0***	593.0	669.0	563.0	719.0
Ending farm size (acres)	902.0	904.0	902.0	***824.0***	837.0	907.0	834.0	893.0
Annual net farm income ($1,000)	23.2	29.9	23.2	***10.2***	11.8	19.1	11.1	19.0
Annual Government payment ($1,000)	11.6	9.8	11.6	***0.7***	0.7	8.6	0.0	11.7
Large size (962 acres):								
Probability of survival	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	975.0	970.0	991.0	*645.0*	*693.0*	801.0	*622.0*	*852.0*
Ending farm size (acres)	1,374.0	1,364.0	1,388.0	1,139.0	1,180.0	1,355.0	*,134.0*	1,217.0
Annual net farm income ($1,000)	24.3	22.9	26.4	14.3	5.2	8.0		24.9
Annual Government payment ($1,000)	22.6	16.6	24.3	1.0	1.0	7.8	*0.0*	21.9
Very large size (1,630 acres):								
Probability of survival	100.0	100.0	100.0	100,0	100.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	1,267.0	1,348.0	1,266.0	991.0	1,033.0	1,056.0	1,036.0	1,044.0
Ending farm size (acres)	1,945.0	1,932.0	1,942.0	1,856.0	1,859.0	1,908.0	1,876.0	1,784.0
Annual net farm income ($1,000)	51.8	62.2	52.4	31.1	35.1	34.7	34.8	54.4
Annual Government payment ($1,000)	23.6	19.3	25.3	1.7	1.7	0.0	0.0	23.3

[a]The scenarios are:

1. Continuation of the 1981 farm bill and 1963 Federal income provisions.
2. A 20-percent acreage reduction in 1966-92.
3. No farm program payment limitation in 1983-92.
4. No price supports and no deficiency payment in 1983-92.
5. No target price/deficiency payment in 1983-92.
6. Target farm program benefits to farms that produce less than $300,000 in program crops.
7. No farm program in 1963-92
8. Reduced income tax benefits and the base farm program.

The impact of price supports can be derived by subtracting scenario 5 from scenario 6.
The impact of income supports can be derived by subtracting scenario 6 from scenario 1.
The impact of income supports with a $50,000 payment limitation can be found by subtracting scenario 6 from scenario 4.

SOURCE: Office of Technology Assessment

the much higher land prices on Illinois farms. Whereas survival probabilities dropped to as low as 72 percent for the 640-acre Illinois farm, they dropped only to 86 percent for the 672-acre Nebraska unit. Similarly, the probabilities for positive after-tax net present values dropped to as low as 16 percent for the 640-acre Illinois farm, but remained at 100 percent for all three Nebraska farms.

Because of the heavy real estate debt load on Illinois farms, these farms continued to have severe economic problems with either a debt restructuring or an interest rate subsidy type of financial bailout. Of the two, however, the interest rate subsidy was the most beneficial alternative, particularly for the smaller (640-acre and 982-acre) farms. Similarly, the interest rate subsidy **was** preferable (as compared with debt restructuring) for the two smallest Nebraska farms. Faced with substantial incentives for additional growth in size, these farms were not in a position to profit appreciably from debt restructuring. **A** financial bailout in the form of an interest rate subsidy improves net farm incomes and provides a "margin of safety" in the event of unexpected economic adversities.

The impact of eliminating new technology fell mainly on the very large farms (tables E-n and **E-12),** These farms tend to be the early adopters of new technology, which generally results in a very favorable benefit/cost ratio. One should keep in mind, however, that the simulation analysis conducted here did not permit feedback on the price effects from increased output levels.

Because of highland and machinery costs, the survival probability for new entrants in Illinois was very low (O to 4 percent). It was much higher (84 percent) for the base scenario on the 672-acre Nebraska farm. But this probability dropped to only 6 percent with the loss of all farm programs. Thus the economic survival of new entrants was particularly dependent on price and income benefits from farm programs (or of some other type of financial assistance).

As a practical matter, new entrants to farming can probably survive with high land prices and high interest rates only if they are able to lease most of their land resources or arrange for a postponement of a portion of their "early year" debt repayment obligations.

Table E-8.—Comparison of Selected Farm Commodity and Income Tax Policy Scenarios on Representative Irrigated Row Crop Farms in South Central Nebraska

Criteria	Alternative scenarios 1	2	3	4	5	6	7	8
Moderate size (672 acres):								
Probability of survival	100.0	100.0	100.0	***92.0***	100.0	100.0	90.0	100.0
Present value of ending net worth ($1,000)	670.0	***736.0***	***670.0***	***260.0***	476.0	***670.0***	264.0	***628.0***
Ending farm size (acres)	921.0	***909.0***	***921.0***	***882.0***	870.0	***921.0***	808.0	***917.0***
Annual net farm income ($1,000)	26.8	***31.0***	***26.8***	***–9.8***	10.6	***26.8***	– 11.4	***26.8***
Annual Government payment ($1,000)	17.3	***14.5***	***17.3***	1.0	1.0	***17.3***	0.0	***17.9***
Large size (920 ***acres):***								
Probability of survival	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	1,349.0	1,377.0	1,369.0	739.0	1,084.0	1,180.0	750.0	1,269.0
Ending farm size (acres)	1,257.0	1,253.0	1,257.0	1,242.0	1,240.0	1,257.0	1,243.0	1,234.0
Annual net farm income ($1,000)	58.4	60.9	57.4	0.1	35.7	37.4	–0.5	58.9
Annual Government payment ($1,000)	24.1	19.3	23.9	1.3	1.3	15.3	0.0	24.4
Very large size (2,065 acres):								
Probability of survival	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	2,259.0	2,374.0	***2,407.0***	1,013.0	1,863.0	1,270.0	1,007.0	2,072.0
Ending farm size (acres)	2,375.0	2,383.0	***2,384.0***	2,167.0	2,280.0	2,197.0	2,128.0	2,330.0
Annual net farm income ($1,000)	118.6	127.3	***134.6***	1.3	88.0	10.8	–0.1	112.8
Annual Government payment ($1,000)	35.9	31.5	***49.6***	3.0	3.0	0.0	0.0	35.9

[a]The scenarios are.
1 Continuation of the 1981 farm bill and 1963 Federal income tax provisions
2 A 20-percent acreage reduction in 1986-92
3 No farm program payment limitation in 1963-92
4 No price supports and no deficiency payment in 1983-92
5 No target price/deficiency payment in 1963-92
6 Target farm program benefits to farms that produce less than $300,000 in program crops
7 No farm program in 1963-92
8. Reduced income tax benefits and the base farm program
The impact of price supports can be derived by subtracting scenario 5 from scenario 6.
The impact of income supports can be derived by subtracting scenario 6 from scenario 1.
The impact of income supports with a $50,000 payment Imitation can be found by subtracting scenario 6 from scenario 4

SOURCE Off Ice of Technology Assessment.

Table E-9.—Comparison of Selected Financial Bailout Scenarios for Three Representative Corn-Soybean Farms in East Central Illinois[a]

Criteria	Alternative scenarios for 640-acre farm 9	10	11	Alternative scenarios for 982-acre farm 9	10	11	Alternative scenarios for 1,630-acre farm 9	10	11
Probability of survival	80.0	72.0	84.0	88.0	80.0	90.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	271.0	291.0	299.0	579.0	588.0	654.0	822.0	872.0	831.0
Ending farm size (acres)	653.0	689.0	662.0	1,046.0	1,062.0	1,073.0	1,795.0	1,740.0	1,712,0
Annual net farm income ($1 ,000)	–0.9	–3.3	3.8	2.0	–3.5	7.8	30.6	27.9	36.9
Annual Government payment ($1,000)	8.9	8.9	9.1	19.2	18.9	19.0	23.0	22.8	22.8

[a]The scenarios are:
9 Continuation of the 1981 farm bill and the 1963 Federal tax provisions for a highly leveraged farm
10 Restructure of debt for a highly leveraged farm.
11 Interest rate subsidy (buy-down) in the first 2 years for a highly leveraged farm

SOURCE Off Ice of Technology Assessment

Table E-10.—Comparison of Selected Financial Bailout Scenarios for Three Representative Irrigated Row Crop Farms in South Central Nebraska[a]

	Alternative scenarios for 672-acre farm			Alternative scenarios for 920-acre farm			Alternative scenarios for 2,083-acre farm		
Criteria	9	10	11	9	10	11	9	10	11
Probability of survival	96.0	86.0	98.0	100.0	100.0	100.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	353.0	334.0	387.0	871.0	876.0	893.0	1685.0	1820.0	1714.0
Ending farm size (acres)	822.0	822.0	854.0	1,195.0	1,146.0	1,205.0	2,399.0	2,392.0	2,421.0
Annual net farm income ($1,000)	5.9	2.9	11.3	22.6	16.7	28.2	58.9	77.2	72.1
Annual Government payment ($1 ,000)	16.7	16.8	17.0	23.0	22.6	22.9	36,0	36.0	36.1

[a]The scenarios are:
9 Continuation of the 1981 farm bill and the 1983 Federal tax provisions for a highly leveraged farm
10 Restructure of debt for a highly leveraged farm
11 Interest rate subsidy (buy-down) in the first 2 years for a highly leveraged farm

SOURCE Off Ice of Technology Assessment

Table E-11 .— Comparison of Selected Policy Scenarios Assuming No New Technology for Three Representative Corn. Soybean Farms in East Central Illinois[a]

	Alternative scenarios for 640-acre farm			Alternative scenarios for 982-acre farm			Alternative scenarios for 1,630-acre farm		
Criteria	12	13	14	12	13	14	12	13	14
Probability of survival	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	98.
Present value of ending net worth ($1,000)	699.0	589.0	561.0	862.0	604.0	540.0	915.0	694.0	672.0
Ending farm size (acres)	902.0	837.0	850.0	1,392.0	1,190.0	1,116.0	1,899.0	1,801.0	1,796.0
Annual net farm income ($1,000)	23.0	11.7	10.8	23.9	3.3	-0.8	25.3	9.8	6.1
Annual Government payment ($1,000)	11.6	0.7	0.0	22.9	1.0	0.0	22.9	1.7	0.0

[a]The scenarios are"
12 Continuation of the 1981 farm bill and the 1983 Federal tax provisions for a highly leveraged farm
13 Restructure of debt for a highly leveraged farm
14 Interest rate subsidy (buy-down) in the first 2 years for a highly leveraged farm

SOURCE" Off Ice of Technology Assessment

Table E-12.— Comparison of Selected Policy Scenarios Assuming No New Technology for Three Representative Irrigated Row Crop Farms in South Central Nebraska[a]

	Alternative scenarios for 672-acre farm			Alternative scenarios for 920-acre farm			Alternative scenarios for 2,085-acre farm		
Criteria	12	13	14	12	13	14	12	13	14
Probability of survival	100.0	100,0	90.0	100.0	100.0	100.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	670.0	475,0	263.0	1,230.0	985.0	671.0	1,812.0	1,388.0	680.0
Ending farm size (acres)	921.0	870.0	808.0	1,257.0	1,221.0	1,226.0	2,402.0	2,240.0	2,107.0
Annual net farm income ($1,000)	26.7	10.6	– 11.4	53.9	30.3	–2.6	77.5	51.0	– 10.9
Annual Government payment ($1 ,000)	17,3	0.9	0.0	23,9	1.3	0.0	35.7	3.0	0.0

[a]The scenarios are
12 Continuation of the 1981 farm bill and the 1983 Federal tax provisions, assuming no-new-technology scenario
13 No target price deficiency payment program, assuming no-new-technology scenario.
14 Deficiency plus diversion payments and any other Government payments received for Government loans and storage costs

SOURCE Office of Technology Assessment

General Crop Farms in the Delta Region of Mississippi

All three representative farms had a It) O-percent probability of survival under the entire range of policy alternatives in that equity in land and machinery did not fall below 30 and 35 percent, respectively (table E-13). 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. The remaining criteria in table E-I3 are indicative of farm size, wealth, and financial characteristics that are projected to occur on these representative farms over the 10-year simulation under each policy alternative.

The present value of ending net worth is one measure of real wealth accumulation. In comparing the policy scenarios for each size of farm, substantial greater growth in real net worth occurs on the representative farms under conditions that continue current farm commodity policy and income tax provisions with and without acreage reductions and farm program payments limitation (scenarios 1 to 3) and with a more restrictive set of income tax provisions (scenario 8). For the 1,443-acre farm real net worth increases by 105 to 151 percent under these program alternatives. The largest rate of growth in real net worth (a 151-percent increase from the initial situation) occurs for the alternative that continues the 1981 farm bill provisions, but with no farm program payments limitations (scenario 3). A policy that continues the current farm program but with a 20-percent acreage reduction in 1986 to 1992 results in a 135-percent growth in real net worth. Much lower growth rates in real net worth occur for the policy alternatives that eliminate various provisions of the current farm program, withdraws all farm program support, or targets 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,

A second noticeable pattern is the decline in the growth rate in real wealth as the size of the representative 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

Table E-13.—Comparison of Selected Farm Commodity and Income Tax Policy Scenarios on Representative General Crop Farms in the Delta of Mississippi

Criteria	Alternative scenarios							
	1	2	3	4	5	6	7	8
Moderate size (1,443 acres):								
Probability of survival	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	1,651.0	1,757.0	1,881.0	1,106.0	1,134.0	1,059.0	1,070.0	1,533.0
Ending farm size (acres)	2,009.0	2,057.0	2,093.0	1,625.0	1,645.0	1,581.0	1,590.0	1,913.0
Annual net farm income ($1 ,000)	38.9	40.4	64.6	– 14.2	–6.9	– 16.3	– 17.6	29.9
Annual Government payment ($1,000)	48.2	45.2	75.4	1.9	1.9	0.0	0.0	47.9
Large size (3,119 acres):								
Probability of survival	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	2,940.0	3,280.0	4,418.0	2,482.0	2,537.0	2,433.0	2,454.0	3,139.0
Ending farm size (acres)	3,327.0	3,340.0	3,877.0	3,119.0	3,135.0	3,119.0	3,119.0	3,135.0
Annual net farm income ($1,000)	38,3	65.1	148.0	–20.6	–8.2	–28.9	–25.1	21.8
Annual Government payment ($1,000)	49.9	49.1	160.6	4.7	4.8	0.0	0.0	49.9
Very large size (6,184 acres):								
Probability of survival	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	5,450.0	6,116.0	7,728.0	5,135.0	5,175.0	4,984.0	5,079.0	5,902.0
Ending farm size (acres)	6,248.0	6,254.0	6,530.0	6,270.0	6,245.0	6,242.0	6,267.0	6,203.0
Annual net farm income ($1,000)	41.9	118.2	227.1	– 19.7	–0.6	–42.9	–32.4	5.9
Annual Government payment ($1,000)	49.9	49.8	278.0	7.9	0.0	0.0	0.0	49.9

[a]The scenarios are'
1. Continuation of the 1981 farm bill and 1983 Federaincome provisions.
2 A 20-percent acreage reduction in 1986-92.
3. No farm program Payment limitation in 1983-92
4. No price supports and no deficiency payment in 1983-92.
5 No target price/deficiency payment in 1963-92.
6 Target farm program benefits to farms that produce less than $300,000 in program crops
7 No farm program in 1983-92.
8 Reduced income tax benefits and the base farm program

The impact of price supports can be derived by subtracting scenario 5 from scenario 6
The impact of income supports can be derived by subtracting scenario 6 from scenario 1
The impact of income supports with a $50,000 payment limitation can be found by subtracting scenario 6 from scenario 4

SOURCE: Office of Technology Assessment

equity to asset ratios differ. However, the results indicate that the policy alternatives involving farm program payments (scenarios 1 to 3 and scenario 8) 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 examining changes in farm acreage. The 1,443-acre farm experienced considerable growth in both owned land acreage and/or acreage leased under scenarios 1 to 3 and scenario 8. In contrast the two larger farms exhibited less than 7-percent growth in farm size under these scenarios, with the exception of the 3,119-acre farm under scenario 3 wherein payments limitations are removed. The 1,443-acre farm experienced a 10- to 14-percent 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 of Mississippi Region.

The two largest representative 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 1 to 3, and the use of accumulated cash to purchase machinery and equipment for expansion on leased land under scenarios 4 to 8. 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 representative farms tended to use income from both farm and nonfarm 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 representative general crops farms in the Delta of Mississippi Region are very dependent on farm program payments in maintaining net farm income. Policy alternatives involving relatively little or no Government payments (scenarios 4 to 7) resulted in negative average annual net farm incomes.

All three farms had a 100-percent chance of remaining solvent and having a positive after-tax net present value over the lo-year planning horizon for each financial bailput alternative (table E-14). Present value of ending net worth increased substantially on each farm with the largest rate of growth occurring under the debt restructuring alternative. Each representative farm expanded its acreage, both through purchasing and leasing, with the smallest farm exhibiting the most rapid rate of growth.

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

The no-new-technology scenarios had little effect on the probability of having a positive after-tax net present value on each farm (table E-15). It reduced slightly the probability under the policy of "No Farm Program." The 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, 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.

Rates of growth in cropland purchases, leasing and total farm acreage were almost identical under the two technology situations for a given representative 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 nearly identical for a given representative farm.

These results indicate that the most likely technology changes projected for the Delta of Mississippi Region 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 l0-year simulation period. The economic impact expected from new technology is rather minimal compared with the economic impact from changing the farm commodity price and income support programs.

Table E-14.—Comparison of Selected Financial Bailout Scenarios for Three Representative General Crop Farms in the Delta of Mississippi

	Alternative scenarios for 1,443-acre farm			Alternative scenarios for 3,1 19-acre farm			Alternative scenarios for 6,184-acre farm		
Criteria	9	10	11	9	10	11	9	10	11
Probability of survival	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	1,563.0	1,656.0	1,545.0	3,237.0	3,431.0	2,968.0	5,259.0	5,840.0	4,990.0
Ending farm size (acres)	2,109.0	2,115.0	2,025.0	3,845.0	4,719.0	3,685.0	6,606.0	7,656.0	6,453.0
Annual net farm income ($1,000)	35.5	29.4	37.7	30.1	20.4	33.8	3.7	–14.8	5.4
Annual Government payment ($1,000)	48.4	48.4	48.3	49.9	49.9	49.9	49.9	49.9	49.9

[a]The scenarios are:
9. Continuation of the 1981 farm bill and the 1983 Federal tax provisions for a highly leveraged farm
10. Restructure of debt for a highly leveraged farm.
11. Interest rate subsidy (buy-down) in the first 2 years for a highly leveraged farm.

SOURCE: Office of Technology Assessment.

Table E-15.—Comparison of Selected Policy Scenarios Assuming No New Technology for Three Representative General Crop Farms in the Delta of Mississippi

	Alternative scenarios for 1,443-acre farm			Alternative scenarios for 3,1 19-acre farm			Alternative scenarios for 6,184-acre farm		
Criteria	12	13	14	12	13	14	12	13	14
Probability of survival	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Present value of ending net worth ($1,000)	1,513.0	1,104.0	1,043.0	2,786.0	2,451.0	2,354.0	2,286.0	4,915.0	4,715.0
Ending farm size (acres)	2,006.0	1,638.0	1,587.0	3,343.0	3,148.0	3,119.0	6,322.0	6,277.0	6,261.0
Annual net farm income ($1,000)	38.6	–7.3	– 18.3	34.0	– 11.9	–29.9	15.1	–27.5	–57.7
Annual Government payment ($1,000)	48.2	1.9	0.0	49.9	4.8	0.0	49.9	7.9	0.0

[a]The scenarios are:
12. Continuation of the 1981 farm bill and the 1983 Federal tax provisions, assuming no-new-technology scenario.
13. No target price deficiency payment program, assuming no-new-technology scenario,
14 Deficiency plus diversion payments and any other Government payments received for Government loans and storage costs

SOURCE: Office of Technology Assessment.