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AFPC POLICY WORKING PAPER

EFFECTS OF DEBT AND FREEZING
TARGET PRICES AFTER 1990
ON ECONOMIC VIABILITY OF
REPRESENTATIVE CROP FARMS IN TEXAS

Department of Agricultural Economics
Texas Agricultural Experiment Station
Texas Agricultural Extension Service
Texas A&M University *system*

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Deliberations on the 1990 farm bill began early in 1989, and will intensify after the summer recess, according to key members of both the Senate and House Agricultural Committees. Naturally, the bench mark for this deliberation will be the current (1985) farm bill. What in the 1985 farm bill has worked well? What has not worked as intended? Will the Secretary of Agriculture use, or has he used, the discretionary authority granted the office by Congress? What are the perceived impacts of the 1985 legislation on producers, agribusiness, international trade, consumers, taxpayers, environmentalists, and rural communities? The answers to these questions will likely shape the 1990 legislation.

The objective of this report is to analyze the impacts of continuing the 1985 farm bill through 1994 on representative crop farms in Texas. Specifically, target prices will be held constant at 1990 levels for farm program crops, while market prices, loan rates, and other farm program provisions are allowed to fluctuate. Estimates of these factors were projected by the Food and Agricultural Policy Research Institute (FAPRI) at the University of Missouri and Iowa State University. The financial condition of six representative farms in five major crop areas of Texas is analyzed to determine the impact of continuing the current farm bill. Each farm is analyzed over a range of debt levels to determine the differential impacts of freezing target prices on farms with different debt structures. The simulation was accomplished using the Farm Level Income Tax and Policy Simulation model (FLIPSIM).

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Procedure

The representative farms used in the study are located in the Coastal Bend, Blacklands, Rolling Plains, Southern High Plains, and Northern High Plains of Texas (Figure 1). Two representative farms are used for the Southern High Plains, a medium- and a large-size farm, where total assets are used as a measure of size. Data used in analyzing farms were developed with the assistance of county extension agents, district-based economists, and producer panels with farming operations similar to the scale of farm being represented.

Production costs per acre on the representative farms are indicated in Table 1. Note that the costs per acre are substantially higher on the medium-scale Southern High Plains cotton farm (\$176.70) than on the large-scale operation (\$153.50). The difference is attributable to both technical and pecuniary economies.

The relatively high costs per acre for cotton on the Coastal Bend and Blacklands farms are a function, in part, of the higher yields in these regions. All costs of production were estimated based on information supplied by producer panels in the respective regions and were supplemented by budgets developed by extension management economists.

Yields on Texas farms are highly variable across regions and over time. Average yields for the farms are indicated in Table 2. Variability in yields are incorporated in the simulation model to reflect the historical yield risks faced by each farming region.

The characteristics of the representative crop farms are identified in Table 3. Most of the farms are in the 1,000-acre to 1,400-acre range, except the large Southern High Plains cotton farm (3,300 acres) and the Northern High Plains wheat-sorghum farm (2,240) acres. All of the farms are single-family operations which hire some labor to supplement that of the family. Total asset values range from about \$277,000 to \$688,000. All of the farms grow cotton with the exception of the Northern High Plains farm. The two Southern High Plains farms produce cotton exclusively.

Assumptions for farm program provisions and market prices over the period 1989-1994 were taken from the January 1989 FAPRI baseline (Tables 4-7). Note that from 1990 through 1994

target prices are frozen at the 1990 levels. Average market prices, as projected by FAPRI, are below the target price, total producer receipts are largely determined by the target price levels. Acreage reduction levels for grains declined from their 1988 levels due to an assumption of increased acreage in the conservation reserve program and tighter stocks.

Given the asset levels and assumptions regarding six levels of initial debt, the initial net worth for each representative farm is indicated in Table 8. Net worth, of course, declines as the debt-to-asset ratio increases from 0.2 to 0.7. These initial net worth levels provide a bench mark for comparing the 1989-1994 simulation results. The simulation model provides more than 100 output variables which are crucial in evaluating the impacts of frozen target prices on the representative farms. The key variables are summarized here:

- The average annual net cash income in 1989-1994 for farms with an initial 0.4 debt-to-asset ratio (Table 9 and Figure 2).
- The present value of net worth at the end of the 1994 simulation period, which corresponds to the year in which the 1990 farm bill would expire (Table 10). The present value of ending net worth is the farm's net worth at the end of 1994, discounted to 1989, using a 5 percent discount rate.
- The present value of ending net worth as a percent of initial net worth (Table 11 and Figure 3).
- The probability of decreasing equity (Table 12).
- The probability that the representative farm would earn a 5 percent or greater return on initial net worth (Table 13).

Results

The results of the simulations of representative farms over the period 1989-1994 are summarized in Tables 9-13 and in Figures 2 and 3.

Coastal Bend

The 1,200-acre Coastal Bend farm produces a combination of cotton, sorghum, and corn. For all debt levels, the average level of net cash income declines from the beginning to the end of the period under frozen target prices. For example, net cash income for the Coastal Bend farm having an initial 0.4 debt-to-asset ratio declines from \$41,070 in 1989 to \$8,310 in 1994 (Table 9 and Figure 2).

The decline in net cash income leads to a progressively larger reduction in the present value of ending net worth as the debt-to-asset ratio increases from 0.2 to 0.7. For example, for the farm having a 0.4 debt-to-asset ratio, average present value of ending net worth declines 13.5 percent from \$280,035 at the end of 1988 to \$242,240 in 1994 (Tables 8 and 10). If the debt-to-asset ratio were initially 0.7, the present value of ending net worth would decline by more than 70 percent.

The probability of the Coastal Bend farm earning a 5 percent return on equity falls as the debt level rises. For example, as the debt-to-asset ratio rises from 0.2 to 0.7, with frozen target prices, the probability of earning a 5 percent return declines from 94 percent to 28 percent (Table 13). Also, the probability that the farm will lose equity during the six-year period rises from 1 percent at 0.2 debt-to-asset ratio to 26 percent at the 0.7 debt-to-asset ratio (Table 12).

Blacklands

The 1,000-acre Blacklands farm producing a combination of cotton, sorghum, wheat, and corn and having a 0.4 debt-to-asset ratio experiences a decline in average net cash income from \$49,470 in 1989 to \$22,760 by 1994 (Table 9 and Figure 2). The initial net worth increases from \$289,674 to \$296,670, at the 0.4 debt level (Tables 8 and 10).

The probability of this farm earning a 5 percent return on initial equity is 97 percent at the 0.4 debt level (Table 13). At the 0.7 initial debt-to-asset ratio, the probability of earning a 5 percent return on equity with frozen target prices falls to 47 percent. The probability of the farm losing equity is fairly low with debt-to-asset ratios below 0.5.

Higher debt levels, however, result in a significant chance that the farm will experience a decline in equity (Table 12).

Rolling Plains

The 1,300-acre Rolling Plains farm produces a combination of cotton (909 acres) and sorghum (390 acres). With a debt-to-asset ratio of 0.4, it experiences a slight increase in average net cash income from \$21,660 in 1989 to \$23,180 in 1994 (Table 9). This leads to a decline in the present value of ending net worth of only 6 percent from an initial level of \$189,990 to \$179,510 at the 0.4 debt level (Tables 8 and 10). With a 0.2 percent debt-to-asset ratio, the present value of ending net worth stays nearly even. The probability of earning a 5 percent return on initial equity is a respectable 84 percent at the 0.2 debt level (Table 13). As debt levels increase to 0.4 and 0.7, the probability of earning a 5 percent return on initial equity falls to 71 and 43 percent, respectively. The probability of decreasing equity is also relatively small, rising to only 23 percent at the 0.7 debt-to-asset ratio (Table 12).

Southern High Plains

Due to economies of size, the medium- and large-size cotton farms experience substantially different economic results under frozen target prices.

The medium-size cotton farm (1,360 acres) does not fare well in that at the 0.4 debt-to-asset ratio, the average cash income declines from \$22,790 in 1989 to a negative \$19,340 in 1994 (Table 9). This leads to a 62 percent decline in the present value of initial net worth from \$169,470 at the end of 1988 to \$64,280 in 1994 (Tables 8 and 10). The probability of this farm earning a 5 percent return on initial equity is only 35 percent at the 0.4 debt level (Table 13). Even at 0.2 debt-to-asset, the medium-size Southern High Plains cotton farm has only a 48 percent chance of earning a 5 percent return on initial equity. The probability of decreasing equity rises to 36 percent at the 0.7 debt-to-asset ratio (Table 12).

In contrast, the large cotton farm (3,300 acres) realizes a higher present value of ending net worth at all debt levels. The present value of ending net worth *increases* by 35 percent with a 0.2 debt-to-asset ratio, and by 51 percent with a 0.6 debt-to-asset ratio even though target prices are frozen (Tables 8 and 11). The probability that the large farm will earn a 5 percent return on initial net worth ranges from 97 percent with a 0.2 debt-to-asset ratio to 72 percent with a 0.7 ratio (Table 13). Even at the 0.7 debt-to-asset level, there is only an 8 percent probability of decreasing equity (Table 12). Net cash income, however, declines from \$96,700 in 1989 to \$61,600 by 1994 (Table 9). It was assumed that this farm was organized such that deficiency payments did not exceed the \$50,000 limit.

Northern High Plains

The 2,240-acre wheat and sorghum farm experiences a decline in average net cash income with a 0.4 debt-to-asset ratio from \$25,250 in 1989 to a negative \$49,300 in 1994 under frozen target prices (Table 9). The result is a 60 percent decline in the present value of ending net worth from \$258,445 to \$104,230 (Tables 8, 10, and 11). The probability of this farm earning a 5 percent return on initial net worth is only 20 percent at the 0.4 debt level (Table 13). Ending debt levels in 1994 are likely to be substantially higher than the initial debt-to-asset ratios in 1989. The probability of the farm losing equity ranges from 22 to 62 percent as the debt-to-asset ratio goes from 0.2 to 0.7 (Table 12).

Summary and Implications

With target prices held constant at 1990 levels, net cash farm income is shown to decline for all but the Rolling Plains representative farm over the six-year study period (Table 9 and Figure 2). The Northern High Plains farm and Southern High Plains medium farm are shown to have negative returns by 1994.

The present value of ending net worth, as a percent of beginning net worth, was calculated for six debt levels (Table 11 and Figure 3). Only the large Southern High Plains

farm showed increasing values of this measurement. Two farms, medium Southern High Plains and Northern High Plains farms, exhibited substantial declines in equity as debt levels rose.

At the lowest debt level, four of the representative farms had better than a 50 percent chance of earning a 5 percent return on investment (Table 13). At the 0.6 debt level, however, three farms had better than a 50 percent chance of earning a 5 percent return on investment. At the 0.7 debt level, only the large Southern High Plains representative farm had better than a 50 percent chance.

These results indicate the risky condition of the financial recovery in agriculture. Producers with relatively high levels of debt are still in a delicate situation. If market prices remain below target prices in the 1990s and target prices remain at the 1990 level, many producers may lose substantial amounts of equity, and the financial stability of all regions will be weakened.

Table 1. Per-Acre Costs of Production for Representative Crop Farms in Five Regions of Texas.

Crop	Coastal Bend	Blacklands	Rolling Plains	Southern <u>High Plains</u>		Northern High Plains
				Medium	Large	
----- (\$/acre) -----						
Irrigated Cotton	--	--	--	176.70	153.30	--
Dryland Cotton	186.56	171.50	72.10	92.90	83.82	--
Irrigated Sorghum	--	--	--	--	--	179.40
Dryland Sorghum	70.00	72.64	37.60	--	--	--
Irrigated Wheat	--	--	--	--	--	131.10
Dryland Wheat	--	76.75	36.70	--	--	34.67
Dryland Corn	112.50	90.00	--	--	--	--

Costs include only cash expenses to produce and harvest the crops (ginning is included in the harvest expense), but excludes interest and labor expenses. Due to the cash cost nature of the values in the table, machinery depreciation and share rent costs are excluded. Interest, labor, fixed, and machinery costs are calculated separately for the farms in the FLIPSIM model.

Table 2. Crop Yields Per Acre for Representative Crop Farms in Five Regions of Texas.

Crop	Coastal Bend	Blacklands	Rolling Plains	Southern <u>High Plains</u>		Northern High Plains
				Medium	Large	
Irrigated Cotton	--	--	--	430	430	--
Dryland Cotton	600	500	300	270	270	--
Irrigated Sorghum	--	--	--	--	--	53
Dryland Sorghum	36	47.5	--	--	--	--
Irrigated Wheat	--	--	--	--	--	65
Dryland Wheat	--	35	20	--	--	21
Dryland Corn	80	100	--	--	--	--

Yields are as follows: Cotton, Pounds/Acre; Sorghum, Cwt/Acre; Wheat, Bushels/Acre; Corn, Bushels/Acre.

Table 3. Characteristics of Representative Crop Farms in Five Regions of Texas.

Crop	Coastal Bend	Blacklands	Rolling Plains	Southern High Plains		Northern High Plains
				Medium	Large	
Cropland (Acres)	1200	1000	1300	1360	3300	2240
Owned (Acres)	300	250	325	340	825	560
Leased (Acres)	900	750	975	1020	2475	1680
Assets (\$)	473,600	475,290	316,650	277,450	688,160	418,741
Land (\$)	342,500	250,000	162,500	116,800	283,400	188,000
Machinery (\$)	126,100	195,290	124,150	130,650	331,950	170,241
Other (\$)	5,000	30,000	30,000	30,000	72,810	60,500
Crop Mix (Base Acres)						
Irr. Cotton	0	0	0	448	1088	0
Dry. Cotton	456	400	909	911	2211	0
Irr. Sorghum	0	0	0	0	0	560
Dry. Sorghum	589	440	0	0	0	0
Irr. Wheat	0	0	0	0	0	560
Dry. Wheat	0	50	390	0	0	1120
Dry. Corn	95	100	0	0	0	0

Under assets, land includes the market value of cropland. Machinery includes the market value of all farm machinery and irrigation equipment. Other assets consist of pastureland, livestock, off-farm investments, and cash or near-cash investments.

Table 4. Wheat Farm Program Provisions and Market Price, Actual for 1987 and 1988 and Projected for 1989-1994.

Year	Target Price (\$/bu)	Loan Rate (\$/bu)	Market Price (\$/bu)	Acreage Reduction Program (% of Base)	Paid Diversion (% of Base)	Diversion Payment (\$/bu)
1987	4.38	2.28	2.57	27.5	0.0	--
1988	4.23	2.21	3.68	27.5	0.0	--
1989	4.10	2.06	3.52	10.0	0.0	--
1990	4.00	2.29	3.16	5.0	0.0	--
1991	4.00	2.31	3.01	5.0	0.0	--
1992	4.00	2.42	3.26	5.0	0.0	--
1993	4.00	2.49	3.27	5.0	0.0	--
1994	4.00	2.42	3.32	5.0	0.0	--

Source: FAPRI Ten-Year International Agriculture Outlook; February 1989.

Table 5. Grain Sorghum Farm Program Provisions and Market Price, Actual for 1987 and 1988 and Projected for 1989-1994.

Year	Target Price (\$/cwt)	Loan Rate (\$/cwt)	Market Price (\$/cwt)	Acreage Reduction Program (% of Base)	Paid Diversion (% of Base)	Diversion Payment (\$/cwt)
1987	5.14	3.11	3.04	20.0	15.0	3.39
1988	4.96	3.00	4.09	20.0	10.0	2.77
1989	4.80	2.79	3.61	10.0	0.0	--
1990	4.64	2.64	3.59	12.5	0.0	--
1991	4.64	2.55	3.61	12.5	0.0	--
1992	4.64	2.70	3.64	12.5	0.0	--
1993	4.64	2.71	3.66	12.5	0.0	--
1994	4.64	2.71	3.77	12.5	0.0	--

Source: FAPRI Ten-Year International Agriculture Outlook; February 1989.

Table 6. Cotton Farm Program Provisions and Market Price, Actual for 1987 and 1988, Projected for 1989-1994.

Year	Target Price (cents/lb)	Loan Rate (cents/lb)	Market Price (cents/lb)	Acreage Reduction Program (% of Base)	Paid Diversion (% of Base)	Diversion Payment (cents/lb)
1987	79.40	52.30	63.50	25.0	0.0	--
1988	75.90	51.80	51.90	12.5	0.0	--
1989	73.40	50.00	50.00	25.0	0.0	--
1990	72.90	50.00	50.00	25.0	0.0	--
1991	72.90	50.00	51.30	25.0	0.0	--
1992	72.90	50.00	53.20	20.0	0.0	--
1993	72.90	50.00	59.30	20.0	0.0	--
1994	72.90	50.00	60.70	20.0	0.0	--

Source: FAPRI Ten-Year International Agriculture Outlook; February 1989.

Table 7. Corn Farm Program Provisions and Market Prices, Actual for 1987 and 1988, Projected for 1989-1994.

Year	Target Price (\$/bu)	Loan Rate (\$/bu)	Market Price (\$/bu)	Acreage Reduction Program (% of Base)	Paid Diversion (% of Base)	Diversion Payment (\$/bu)
1987	3.03	1.82	1.94	20.0	15.0	2.00
1988	2.93	1.77	2.52	20.0	10.0	1.75
1989	2.84	1.65	2.15	10.0	0.0	--
1990	2.75	1.58	2.09	12.5	0.0	--
1991	2.75	1.55	2.09	12.5	0.0	--
1992	2.75	1.58	2.12	12.5	0.0	--
1993	2.75	1.59	2.13	12.5	0.0	--
1994	2.75	1.59	2.16	12.5	0.0	--

Source: FAPRI Ten-Year International Agriculture Outlook; February 1989.

Table 8. Initial Net Worth for Representative Farms in Five Regions of Texas, Assuming Alternative Debt-to-Asset Positions.

Farm	Initial Debt-to-Asset Ratio					
	0.2	0.3	0.4	0.5	0.6	0.7
----- (\$) -----						
Coastal Bend	373,380	326,708	280,035	233,363	186,690	140,018
Blacklands	386,232	337,953	289,674	241,395	193,116	144,837
Rolling Plains	253,320	221,655	189,990	158,325	126,660	94,995
S. High Plains-Med.	225,960	197,715	169,470	141,225	112,980	84,735
S. High Plains-Lg.	565,725	495,009	424,294	353,578	282,863	212,147
N. High Plains	344,593	301,519	258,445	215,371	172,297	129,222

Table 9. Average Annual Net Cash Farm Income for Representative Farms in Five Regions of Texas, Assuming 40% Debt and Frozen Target Prices.

	1989	1990	1991	1992	1993	1994
----- (\$) -----						
Coastal Bend	41,070	23,100	23,740	28,860	19,100	8,310
Blacklands	49,470	35,840	38,930	42,000	34,230	22,760
Rolling Plains	21,660	16,860	20,470	32,000	26,930	23,180
S. High Plains-Med.	22,790	2,720	-4,270	200	-4,500	-19,340
S. High Plains-Lg.	96,700	83,150	71,270	90,750	80,350	61,600
N. High Plains	25,250	-1,500	-12,170	-13,450	-31,460	-49,300

Table 10. Present Value of Ending Net Worth (PVENW) for Representative Farms in Five Regions of Texas, Assuming Alternative Debt-to-Asset Positions and Frozen Target Prices.¹

Farm	Initial Debt-to-Asset Ratio					
	0.2	0.3	0.4	0.5	0.6	0.7
----- (\$) -----						
Coastal Bend	359,250	302,750	242,240	180,770	109,520	36,930
Blacklands	403,920	350,690	296,670	239,910	178,660	108,770
Rolling Plains	252,730	215,860	179,510	139,800	102,280	56,170
S. High Plains-Med.	145,850	108,990	64,280	24,950	-350	-29,250
S. High Plains-Lg.	761,710	681,360	599,000	513,570	427,350	319,410
N. High Plains	227,040	172,040	104,230	31,950	-24,280	-52,590

¹Present value of ending net worth is the farm's net worth at the end of 1994, discounted to 1989, using a 5 percent discount rate.

Table 11. Present Value of Ending Net Worth in 1994, as a Percentage of Beginning Net Worth, for Representative Farms in Five Regions of Texas, Assuming Alternative Debt-to-Asset Positions and Frozen Target Prices.

Farm	Initial Debt-to-Asset Ratio					
	0.2	0.3	0.4	0.5	0.6	0.7
----- (percent) -----						
Coastal Bend	96	93	86	77	59	26
Blacklands	105	104	102	99	93	75
Rolling Plains	100	97	94	88	81	59
S. High Plains-Med.	65	55	38	18	0	-35
S. High Plains-Lg.	135	138	141	145	151	151
N. High Plains	66	57	40	15	-14	-41

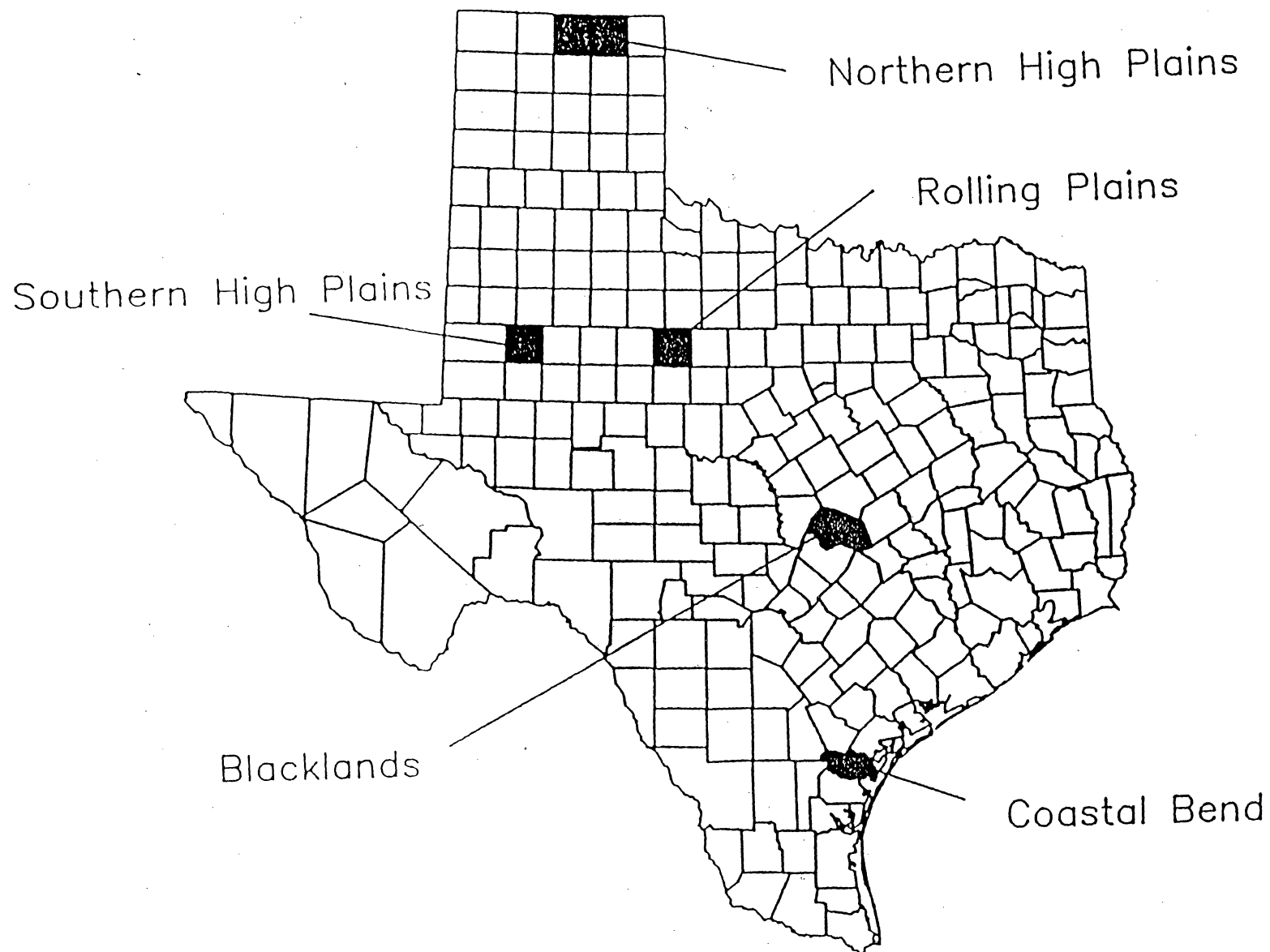
Table 12. Probability of Decreasing Equity for Six Representative Texas Farms, Assuming Alternative Debt-to-Asset Positions and Frozen Target Prices.

Farm	Initial Debt-to-Asset Ratio					
	0.2	0.3	0.4	0.5	0.6	0.7
	----- (percent) -----					
Coastal Bend	1	2	3	10	19	26
Blacklands	0	0	2	5	19	37
Rolling Plains	4	9	11	12	14	23
S. High Plains-Med.	9	11	20	28	32	36
S. High Plains-Lg.	1	1	3	3	5	8
N. High Plains	22	27	38	51	57	62

Table 13. Probability of the Representative Farms Earning a 5 Percent Return or Greater on Initial Net Worth in Five Regions of Texas, Assuming Alternative Debt-to-Asset Positions and Frozen Target Prices.

Farm	Initial Debt-to-Asset Ratio					
	0.2	0.3	0.4	0.5	0.6	0.7
	----- (percent) -----					
Coastal Bend	94	86	68	55	38	28
Blacklands	100	99	97	93	76	47
Rolling Plains	84	80	71	59	51	43
S. High Plains-Med.	48	41	35	26	19	15
S. High Plains-Lg.	97	97	93	89	86	72
N. High Plains	41	28	20	11	6	5

Figure 1. Study Areas for Representative Crop Farms.



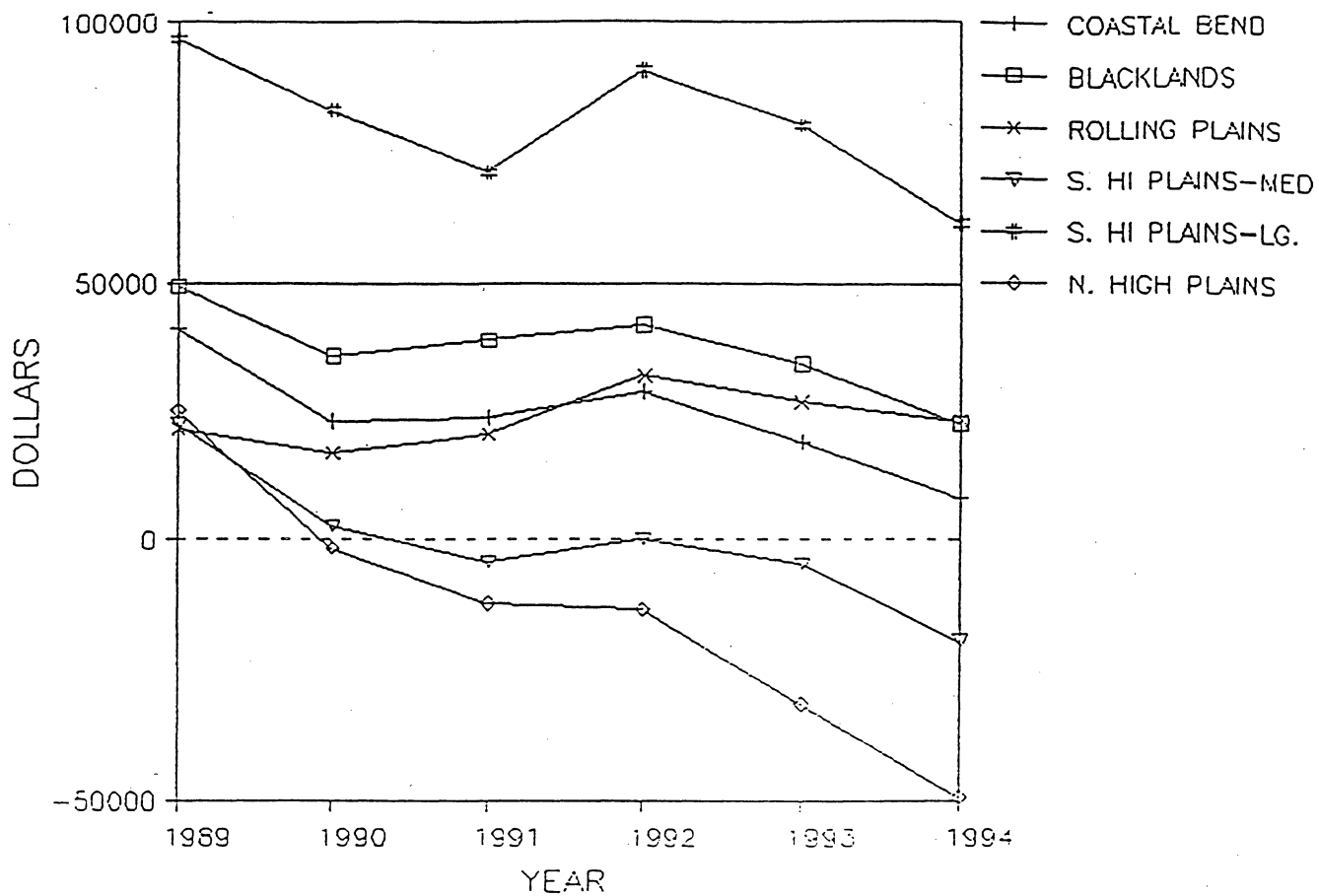


Figure 2. Average Annual Net Cash Farm Income for Six Representative Texas Farms, Assuming 40% Debt and Frozen Target Prices.

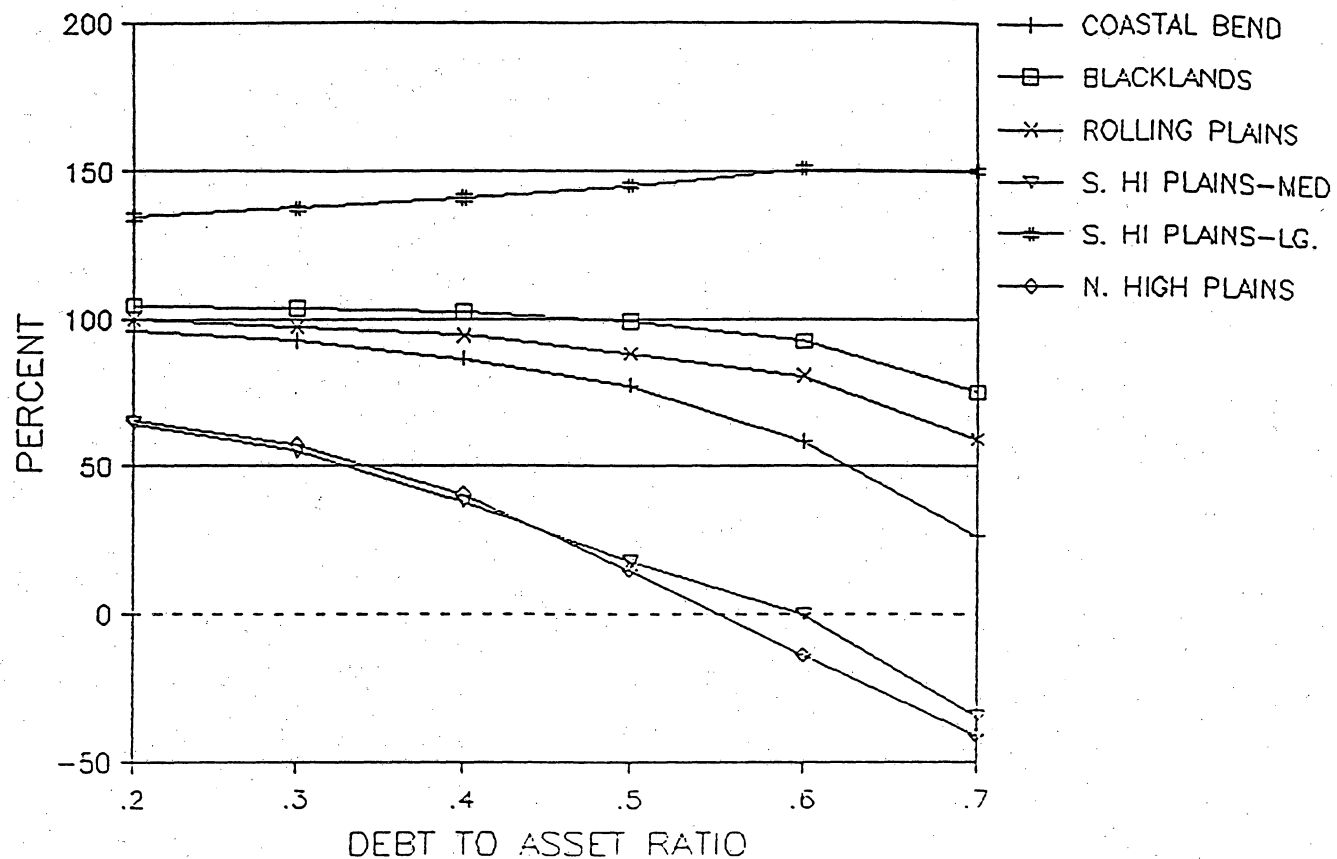


Figure 3. Real Value of Ending Net Worth in 1994 Expressed as a Percentage of Initial Net Worth for Representative Crop Farms in Five Regions of Texas, Assuming Frozen Target Prices and Alternative Initial Debt-to-Asset Ratios.

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