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Jackie Todd

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THE IMPACT OF THE 1985 FARM BILL ON THE U.S. OATS INDUSTRY

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Introduction

Upon cursory inspection, one would not expect the impact of the Food Security Act of 1985 on the oats industry to differ substantially from that of the 1981 Agriculture and Food Act: the policy mechanisms of target prices, loan rates, reduced acreage provisions and paid diversions are all maintained. Although the 1985 Farm Bill has higher acreage reduction requirements with declining loan rates and target prices, the negative impact of such provisions would certainly be diminished by the traditionally low program participation rates of the industry. However, the picture changes dramatically when one also takes into account the indirect impacts of the Bill on the oats industry through its effect on other key industries, in particular, the corn and dairy industries. Changes in the corn industry affect both the supply and demand for oats because of corn's role as the dominant U.S. feedgrain. On the supply side, corn competes with oats for cropland so changes in corn program parameters affect the acreage of oats planted for harvest. On the demand side, corn is the primary substitute for oats used as feed so any effects of government programs on the corn price also impact feed demand for oats. (Feed demand accounts for 80-85 percent of oats domestic demand). As dairy cows are the single largest consumer of oats for feed, farm legislation that has an impact on dairy cow numbers and milk prices will also impact the feed demand for oats.

Assumptions

The analysis contains three scenarios, each running from 1986-1990 and is conducted with the Food and Agricultural Policy Research Institute's (FAPRI) crop and livestock models. Scenario I is a pre-1985 Farm Bill baseline. Scenario II includes the combined effects of increased acreage reduction requirements and declining loan rates and target prices for oats and corn. Scenario III includes the policy provisions of Scenario II and adds to them the effects of the use of generic certificates and the Dairy Termination Program (DTP). Details of the assumptions under each scenario are given below and summarized in Table 1.

In Scenario I, a continuation of the 1981 Farm Bill is assumed with target prices fixed at $3.03 and $1.60 a bushel for corn and oats, respectively, and loan rates of $2.55 and $1.31 a bushel. These loan rates have been reduced by 4.3 percent in

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Jackie Todd is a Research Associate at the Food and Agricultural Policy Research Institute, University of Missouri-Columbia.

accordance with the Balanced Budget and Emergency Deficit Control Act of 1985 (Gramm-Rudman-Hollings) to yield effective loan rates of $2.44 and $1.25, respectively. A 10 percent acreage reduction program is assumed in effect for both feedgrains from 1986-1990, and a 10 percent paid diversion program is assumed from 1987-1990. It is anticipated that the over-supply of corn stocks will depress the corn price to the loan rate. In the dairy industry, the milk support price was assumed to decline 50 cents per year, following a trend begun in the Omnibus Budget Reconciliation Act of 1981 and the Dairy and Tobacco Adjustment Act of 1983. This decline in support price generates the blend price path shown in Table 1. The cow numbers shown in Table 1 reflect dairy cows on farms January 1 of the calendar year, plus additions to herd. The cow number assumptions were generated from the FAPRI dairy model, after adjusting current dairy projections through 1990 for the absence of the DTP.

In Scenario II, the dairy assumptions are unchanged from Scenario I. The increased acreage reduction and diverted acreage requirements of the 1985 Farm Bill are incorporated into this scenario, along with the decreasing loan rates and target prices. Under this scenario, a 17.5 percent acreage reduction requirement is assumed for corn and oats in 1986, increasing to 20 percent for the remainder of the period. A 2.5 percent voluntary paid diversion provision is assumed for both crops in 1986, increasing to 15 percent in 1987. For corn, the paid diversion is assumed to remain at 15 percent for the remainder of the period, while for oats, it is decreased to 10 percent. It is assumed that the Secretary of Agriculture will set target prices and loan rates at the minimum allowable under the 1985 Farm Bill. The corn price in this scenario is assumed to be at the effective loan rate in 1986 and 1987, but the combination of increased acreage reduction requirements that reduce supply and an increase in demand induced by low prices allow the farm price to edge above the loan rate for the remainder of the period.

Scenario III takes the 1985 Farm Bill acreage reduction requirements, target prices and loan rates discussed in Scenario II and adds to them the effects of the Dairy Termination Program or whole-herd buy-out and use of generic Payment-In-Kind certificates. Assumptions about dairy cow numbers under the whole-herd buy-out are included in Table 1. The buy-out is not expected to reduce production by enough to change the milk price, thus the milk price stream is the same for all three scenarios. Generic certificates are assumed to have a substantial negative effect on the price of corn. The corn price stream for this third scenario was generated by subtracting from the price stream of Scenario II a factor representing the expected impact of the use of generic certificates. (The dairy buy-out is assumed to have an insignificant effect on the corn price). It is assumed that the farm price of corn would have been about the loan rate without the use of generic certificates in the 1986 crop year. Assuming that the farm price with the use of generic certificates averages about $1.44, one can conclude that the use of generic certificates depresses the corn price by approximately 40 cents per bushel in crop year 1986. As demand reacts to these lower prices and corn

stocks fall, the impact of generic certificates should lessen so the factor is decreased by 5 cents per year.

The Empirical Model

Each scenario is examined from 1986 to 1990 using an econometric model of the oats industry. A graphical depiction of this model can be found in Figure 1. The model consists of six behavioral equations, two identities and several linkage equations. Demand equations were estimated for feed, food, seed and free stock demand. The OLS results are presented in Table 4. Exports and government stocks are exogenous.

As Table 2 shows, feed demand is specified as a derived demand equation with corn as its major competing input. The role of the dairy industry in oats feed demand is captured by the use of milk price as the output price and dairy cow numbers (dairy cows on farm January 1 plus additions to herd) representing the size of the industry.

The food demand equation is estimated per capita with the Consumer Price Index for Baked Goods and Cereals as output price. A competing input price was not included as many grains are used as both substitutes and complements for oats in cereal production making the coefficient on their prices insignificant. A trend variable was included to capture the effects of changing tastes which have resulted in a steady decline in the per capita consumption of oats cereals.

Seed demand is estimated as a function of own price and led planted acreage. As expected, the demand for seed is very price inelastic. Finally, in the free stock demand equation, the oats price multiplied by an interest rate is used to capture the opportunity cost of holding stocks. Government stocks and stocks under loan represent other alternatives to holding free stocks. Production represents transaction demand and led production, which is a proxy for future price, captures speculative demand.

Aggregate planted acreage equations for oats have previously been estimated by Ryan and Abel in 1973 and Baumes and Meyers in 1979. Ryan and Abel presented four equations that were estimated using ordinary least squares over a sample period from 1956 to 1971. Two equations are specified with an oats price variable (one using the loan rate and the other using lagged farm price), wheat acreage planted, wheat acreage diverted, a shift variable for 1968, trend and trend squared as the independent variables. The third and fourth planted acreage equations for oats both keep the oats loan rate as the supply inducing price, and add soybean acreage planted and corn acreage planted, respectively, to the independent variables listed above. All of the equations had R-square statistics of .98 and .99. Baumes and Meyers used a similar planted acreage specification and extended the sample period to 1950-1975. They spliced their direct price variable, resulting in a variable that was equal to the loan rate prior to 1972, and equal to the lagged farm price after 1972. The other independent variables were wheat acreage planted, wheat acreage diverted, a shift variable for 1968, a trend variable prior to

1968, and trend squared. Their equation also resulted in a high R-square (.98).

Major developments in the estimation of acreage planted equations for crops besides oats were influential in the specification of the oats model for this analysis. Hoffman (1973) developed a regional supply model for wheat. This disaggregation acknowledged that producers face a wide variety of economic situations and base their decisions on different economic variables. Gallagher (1978) included variable cost in his corn acreage equation.

The supply side of the model departs somewhat from most crop specifications by estimating oats harvested acreage equations rather than the traditional planted acreage equations. This treatment is made necessary by the instability of the oats harvested-to-planted acreage ratio, which diminishes the value of planted acreage in determining production. Table 3 shows the acres planted, acres harvested, and harvested-to-planted ratios for three major crops and oats. Whereas the harvested-to-planted ratios for corn, soybeans and wheat show little variation, the ratio for oats shows marked variation in recent years, falling in years when large amounts of major crop acreage are idled. The decline in the harvested-to-planted ratio is due to oats use as an inexpensive cover crop. As government programs will probably continue to require idling large amounts of major crop acreage, oats harvested acreage was estimated as the key behavioral supply equation rather than planted acreage.

Regional harvested acreage equations were specified for the Northern Plains and Corn Belt, as defined for oats by Economic Indicators of the Farm Sector. Lagged dependent variables were included in the specifications in accordance with Nerlove's partial adjustment model (1958). The expected price, expected yield, and variable cost variables found in Gallagher's model were collapsed into one expected net return variable for oats and one for the substitute crop for each region. This is done for several reasons. Expected net revenue accurately reflects the variables that a producer considers when making a supply decision. The incorporation of several economic variables into one also reduces multicollinearity problems and saves degrees of freedom. The expected price variable is the lagged regional farm price for program non-participants and the effective support rate for participants. The effective support rate is defined as the expected per bushel value of production (i.e., the greater of the lagged regional farm price and the regional loan rate) plus direct payments per bushel, factored down by the percentage of land left idled to qualify for government program benefits. Effective paid diversion variables, defined as the paid diversion rate times the percentage of land diverted, were included for the competing crops. The negative signs on the paid diversion variables for both regions indicate that as the effective paid diversion rates for major competing crops increase, more cropland is taken out of production and is not available for planting oats for harvest.

U.S. harvested acreage was estimated as a function of the sum of the regional harvested acreages, which together account

for about 80 percent of national oats production. The production equation is a simple acreage times yield identity; imports are exogenous.

Results

Table 4 summarizes results of the analysis for selected oats variables. Scenario I, which is the pre-1985 Farm Bill baseline, is the most advantageous to oats producers with an average net revenue per acre of $27.25 for program participants and $24.33 for non-participants. Scenario II, which includes the effects of the lower loan rates and target prices in the 1985 Farm Bill combined with the higher set-aside and diversion requirements has an average net revenue per acre of only $20.71 for program participants and $16.72 for non-participants. The lower net revenue for program participants is due to the declining target price protection and higher acreage-idling requirements under the 1985 Farm Bill. Non-participants in Scenario II are faced with an oats farm price that is, on the average, 9 percent lower than in Scenario I. This decline in oats price is due largely to the dramatic fall in corn price from Scenario I to Scenario II. As the tighter oats supply keeps the oats price from falling as sharply as the corn price, feed demand for oats falls 5.4 percent with the cross price effects outweighing the direct price effects.

Scenario III, which adds the use of generic certificates and the DTP to the assumptions of Scenario II, is the most damaging to oats producers. Although the participants' net revenue per acre is virtually unchanged from that of Scenario II due to identical oats program assumptions, the non-participants' average net revenue falls to just $9.82 per acre. The lower non-participants' net revenue stems from an average price level that is 8.5 percent below the level of Scenario II, and 17 percent below the level of Scenario I. The low returns for non-participants in Scenario III would, in the long run, force oats producers to become dependent on government programs to survive.

Feed demand falls by an additional 5.7 percent in this scenario, due to further increases in the ratio of oats price to corn price and declining dairy cow numbers. Production falls less than 2 percent relative to Scenario II as program participants are sheltered from the decline in prices. Stocks are at their highest in this scenario due to demand falling faster than supply.

Conclusions

The provisions in the 1985 Food Security Act dealing specifically with oats would have little impact on the industry, especially given the low rates of program participation in the oats industry. However, when the indirect impacts of the Bill through provisions affecting the corn and dairy industries are taken into consideration, the impact of the Bill is substantial. The decline in the size of dairy herds associated with the Dairy Termination Program, combined with a low corn price that causes

corn to be substituted for oats as feed, brings about a 17 percent decline in the farm price of oats. The average net revenue per acre for oats producers not participating in government programs falls 60 percent, forcing producers to become dependent on programs. If the oats industry is at all representative of industries of other minor commodities, then the results of this analysis have broad implications for the need to carefully examine the potential indirect effects of farm legislation dealing with major commodities.

TABLE 1: POLICY PARAMETERS AND EXOGENOUS ASSUMPTIONS

	1986	1987	1988	1989	1990
Corn target price ($/bu)					
Scenario I	3.03	3.03	3.03	3.03	3.03
Scenario II	3.03	3.03	2.97	2.88	2.74
Scenario III	3.03	3.03	2.97	2.88	2.74
Corn loan rate ($/bu)					
Scenario I	2.44	2.44	2.44	2.44	2.44
Scenario II	1.84	1.74	1.66	1.58	1.49
Scenario III	1.84	1.74	1.66	1.58	1.49
Corn price ($/bu)					
Scenario I	2.44	2.44	2.44	2.44	2.44
Scenario II	1.84	1.73	1.66	1.69	1.75
Scenario III	1.44	1.39	1.36	1.44	1.55
Corn set-aside percentage					
Scenario I	10	10	10	10	10
Scenario II	17.5	20	20	20	20
Scenario III	17.5	20	20	20	20
Corn paid diversion percentage					
Scenario I	-	10	10	10	10
Scenario II	2.5	15	15	15	15
Scenario III	2.5	15	15	15	15
Oats target price ($/bu)					
Scenario I	1.60	1.60	1.60	1.60	1.60
Scenario II	1.60	1.60	1.57	1.52	1.44
Scenario III	1.60	1.60	1.57	1.52	1.44
Oats loan rate ($/bu)					
Scenario I	1.25	1.25	1.25	1.25	1.25
Scenario II	.99	1.18	1.12	1.06	1.01
Scenario III	.99	1.18	1.12	1.06	1.01
Oats set-aside percentage					
Scenario I	10	10	10	10	10
Scenario II	17.5	20	20	20	20
Scenario III	17.5	20	20	20	20
Oats paid diversion percentage					
Scenario I	-	10	10	10	10
Scenario II	2.5	15	10	10	10
Scenario III	2.5	15	10	10	10
Cow numbers (mil.hd)					
Scenario I	14.707	14.778	14.797	14.785	14.435
Scenario II	14.707	14.778	14.797	14.785	14.435
Scenario III	14.643	14.394	14.017	13.609	13.412
Milk price ($/cwt)					
Scenario I	12.35	12.29	11.62	11.10	10.61
Scenario II	12.35	12.29	11.62	11.10	10.61
Scenario III	12.35	12.29	11.62	11.10	10.61

TABLE 2. Estimation Results of the Econometric Model for Oats, 1965-1985

Feed consumption = -196.79 - 80591.8 * deflated oats price + 23910.67 * deflated corn price + 42.28 * cow numbers + 9269.54
(-17.5)[a] (10.8) (10.3) (7.2)

* deflated milk price + 66.82 * dummy 1981/1982 - 155.09 * shift 1977
(6.2) (-12.9)

R^2 = .99 D.W. = 2.43

Per capita food consumption = 6.26 - 3.01 * deflated oats price + .0006 * deflated cpi for baked goods/cereals - .003 * time
(-2.2) (2.2) (-7.8)

R^2 = .86 D.W. = 1.69

Seed use = 2.94 - 155.45 * deflated oats price + 2.47 * led planted acreage - 9.00 * dummy 1982
(-0.7) (34.3) (6.9)

R^2 = .99 D.W. = 2.31

Free stocks = 67.48 - 195.94 * deflated oats price * interest rate - 0.21 * (govt. stocks + stocks under loan) + 0.33 * production
(-1.3) (-6.9) (9.2)

- 0.09 * led production - 34.98 * dummy 1975 + 30.31 * dummy 1978
(-3.3) (-3.0) (2.7)

R^2 = .93 D.W. = 2.12

Planted to harvested acreage linkage equation:

Planted acreage = (-16.39 + .002 * total set aside, diverted & conservation acreage for wheat & corn + .009 * total set-aside,
(3.6) (1.2)

diverted & conservation acreage for wheat & corn * shift 1980 + .009 * trend) * harvested acreage
(1.6)

R^2 = .85 D.W. = 2.07

TABLE 2 (continued)

Acreage harvested, corn belt (c.b.) = 799.51 + 0.86 * lagged acreage harvested, c.b. + 20.56 * oats expected net revenue, c.b. - 7.73
(13.9) (1.9) (-1.8)

* corn expected net revenue, c.b. - 948.78 * corn paid diversion + 1048.73 * dummy 1968 - 1122.59 * dummy 1972
(-2.0) (2.8) (-3.0)

R^2 = .98 D.W. = 1.99

Acreage harvested, northern plains (n.p.) = 1340.73 + 0.73 * lagged acreage harvested, n.p. + 46.40 * oats expected net revenue, n.p.
(3.8) (2.3)

- 23.20 * wheat expected net revenue, n.p. - 528.86 * wheat paid diversion + 884.15 * dummy 1970 - 1023.67 * dummy 1978
(-2.7) (-1.3) (1.4) (-1.7)

R^2 = .81 D.W. = 1.78

Acreage harvested, U.S. = 0.43 + 1.19 * (acreage harvested, c.b. + n.p.)
(66.8)

R^2 = .996 D.W. = 1.21

Expected net revenue = (1-participation %) * (lagged farm price * trend yield - variable cost/acre)

+ (participation %) * [effective support price * trend yield - (1 - set-aside % - diversion %) * variable cost/ acre]

[a]Values in parentheses are t-statistics

TABLE 3

U.S. PLANTED AND HARVESTED ACREAGE DATA FOR CORN, SOYBEANS, WHEAT AND OATS

	CORN			SOYBEANS			WHEAT			OATS		
	ACRES PLANTED	ACRES HARVSTD	% HARVSTD	ACRES PLANTED	ACRES HARVSTD	% HARVSTD	ACRES PLANTED	ACRES HARVSTD	% HARVSTD	ACRES PLANTED	ACRES HARVSTD	% HARVSTD
1969	64.3	54.6	84.9%	42.5	41.3	97.2%	53.5	7.1	88.2%	23.6	18.0	76.3%
1970	66.9	57.4	85.8%	43.1	42.2	98.1%	48.7	43.6	89.4%	24.4	18.6	76.2%
1971	74.2	64.1	86.4%	43.5	42.7	98.2%	53.8	47.6	88.5%	21.8	15.7	71.9%
1972	67.1	57.5	85.7%	46.9	45.7	97.5%	54.9	47.3	86.1%	20.0	13.4	67.1%
1973	72.3	62.1	86.0%	56.5	55.7	98.4%	59.3	54.1	91.4%	18.6	13.8	74.0%
1974	77.9	65.4	83.9%	52.5	51.3	97.8%	71.0	65.4	92.0%	17.0	12.6	74.1%
1975	78.7	67.6	85.9%	54.6	53.6	98.2%	74.9	69.5	92.8%	16.4	13.0	79.3%
1976	84.6	71.5	84.5%	50.3	49.4	98.3%	80.4	70.9	88.2%	16.6	11.8	71.2%
1977	84.3	71.6	84.9%	59.0	57.8	98.1%	75.4	66.7	88.4%	17.7	13.5	76.0%
1978	81.7	71.9	88.1%	64.7	63.7	98.4%	66.0	56.5	85.6%	16.4	11.1	67.8%
1979	81.4	72.4	89.0%	71.4	70.3	98.5%	71.4	62.5	87.4%	14.0	9.7	69.4%
1980	84.0	73.0	86.8%	69.9	67.8	97.0%	80.8	71.1	88.0%	13.4	8.7	64.7%
1981	84.1	74.5	88.6%	67.5	66.2	98.0%	88.3	80.6	91.4%	13.6	9.4	69.0%
1982	81.9	72.7	88.8%	70.9	69.4	98.0%	86.2	77.9	90.4%	14.0	10.3	73.5%
1983	60.2	51.5	85.5%	63.8	62.5	98.0%	76.4	61.4	80.3%	20.3	9.1	44.7%
1984	80.5	71.9	89.3%	67.8	66.1	97.6%	79.2	66.9	84.5%	12.4	8.2	65.8%
1985	83.3	75.1	90.1%	63.1	61.6	97.6%	75.6	64.7	85.7%	13.3	8.2	61.7%
1986	76.7	69.2	90.2%	61.5	59.4	96.6%	72.0	60.7	84.3%	14.8	6.9	46.6%
Coefficient of variation, 1980-1986			1.8%			0.5%			4.1%			16.8%

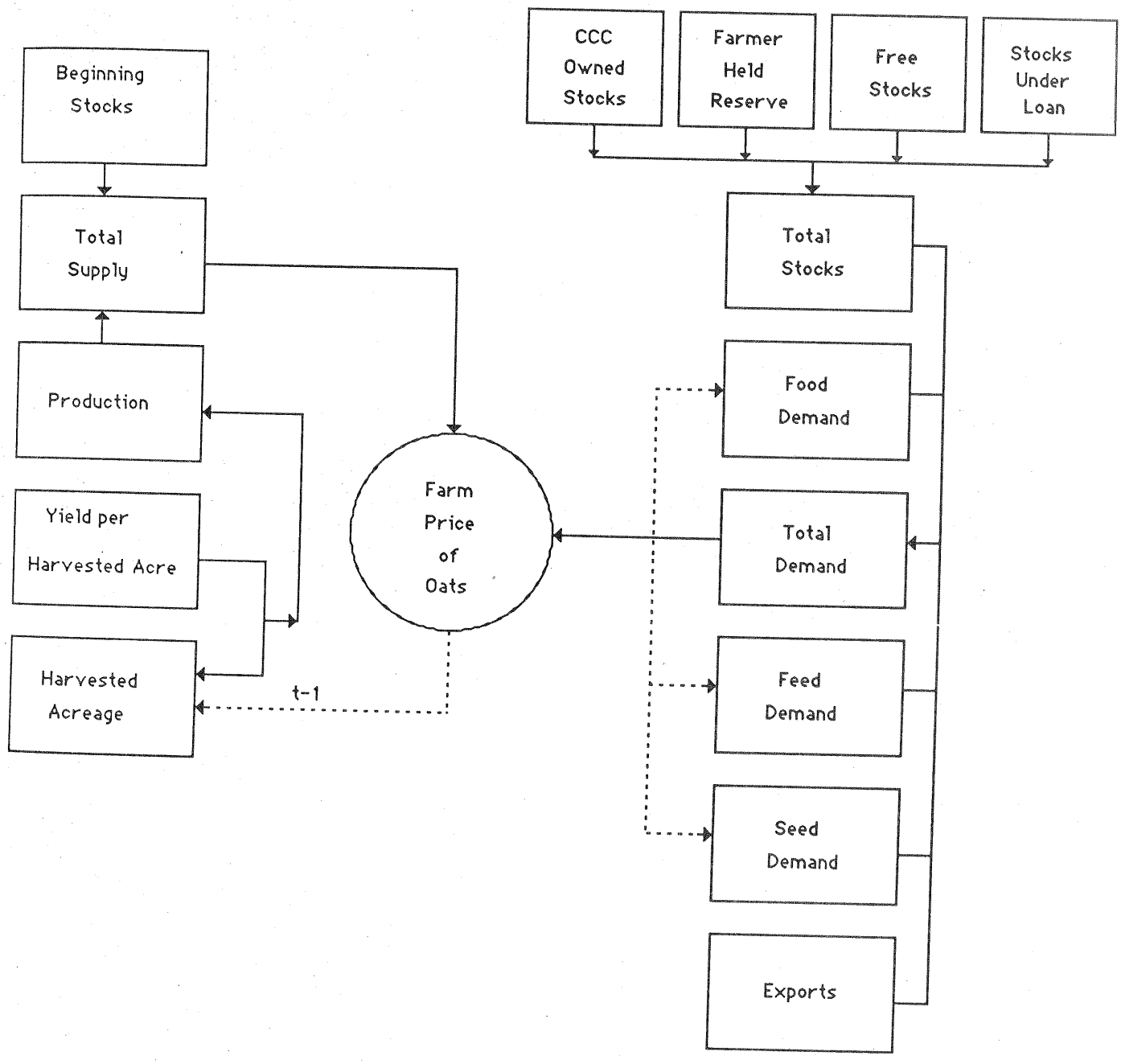
Harvested and planted acres are in million acres.

Source: Crop Production, USDA/SRS, various issues

Table 4: Simulated 1986-1990 Paths for Selected Oats Variables Under Three Scenarios

	1986	1987	1988	1989	1990
Oats price ($/bu)					
Scenario I	1.39	1.50	1.45	1.40	1.38
Scenario II	1.30	1.37	1.31	1.25	1.24
Scenario III	1.21	1.27	1.19	1.13	1.08
Oats production (mil. bu)					
Scenario I	400	434	444	438	432
Scenario II	385	428	432	423	414
Scenario III	385	422	419	413	407
Oats feed demand (mil. bu)					
Scenario I	432	403	391	385	366
Scenario II	409	380	365	368	348
Scenario III	400	364	343	329	327
Oats ending stocks (mil. bu)					
Scenario I	95	74	73	69	78
Scenario II	103	98	112	109	118
Scenario III	112	118	136	164	186
Participants' net revenue ($/acre)					
Scenario I	28.22	31.76	29.94	27.87	18.46
Scenario II	22.91	24.96	22.73	19.01	13.95
Scenario III	22.96	24.76	22.50	18.89	13.85
Non-participants' net revenue ($/acre)					
Scenario I	21.43	33.26	27.68	21.96	17.75
Scenario II	16.74	25.69	19.52	12.50	9.14
Scenario III	11.38	19.55	12.03	5.37	(0.77)

Figure 1. A Graphical Depiction of the Oats Model



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