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Government commodity programs have attempted to control supplies of selected commodities by encouraging producers to voluntarily reduce their crop acreages. The Soil Bank Programs of 1956-58, 1961-70 Acreage Diversion Programs, and the Set-Aside Programs of 1971-73 and 1978-79, have offered producers payments to reduce their acreages of corn, grain sorghum, barley, oats and wheat.

Administration of the feed grain programs has been expensive, with corn program payments exceeding one billion during several years since 1965. If the U. S. is to continue spending large amounts of federal revenues on commodity programs similar to those used in the past, policy advisors must be able to convince legislators that these programs have been worthwhile. Thus evaluation of the past programs has been, and still is needed.

A major difficulty in analyzing the past programs has been the changes in the program specifications from year to year. Programs during different years have restricted farmer's decisions to different degrees and in different ways. The least restrictive programs offered price support loans, but placed no restrictions on acreage planted. The Set-Aside Programs required that a percentage of the farm's cropland be diverted from production, but did not require that corn acreage be reduced by the acreage set-aside. The diversion programs required that corn acreage be reduced by a specified amount. These changes in the programs suggest several areas for further investigation.

Differences in the nature of the acreage constraints suggest that producers' responses have varied also. Are more restrictive programs more effective in reducing the total acres of specific crops, or do they discourage participation, resulting in smaller reductions in acreage than less restrictive programs? Most empirical work has assumed that producers' responses have been stable over all post World War II programs.[2] If structural differences do exist, the effects of policy instruments under alternative structures must be examined separately. Thus the testing of possible structural changes arising from continually changing programs is essential to understanding the effects of the specific policy instruments.

Objectives

The purpose of this study is to analyze the post World War II feed grain programs as they have affected corn producers' planting decisions. To do so, an acreage response model which incorporates changes in the market and program specifications will be presented. The study will provide empirical estimates of the relationship between the individual policy instrument and corn acreage, and test for structural differences in the responses to different types of programs. State aggregate observations over the time period 1948-78 for Illinois, Indiana, Iowa, Minnesota, Missouri, and Ohio will be used. In an attempt to obtain the most efficient estimates, the use of pooled time series and cross-sectional observations will be considered, and its appropriateness tested.

Examination of the Feed Grain Programs

Incentives and constraints have been employed as policy instruments to achieve the twin goals of income support and supply control. When policymakers have determined that supplies of feed grains were too large, acreage constraints were imposed in an attempt to reduce supplies. Farmers were offered payments to farmers who abide by the acreage constraints. Since the programs have always been voluntary, program payments have served as price supports and as incentives to farmers to participate. The specific incentives and constraints which have been used for feed grains will now be described.

The most restrictive types of constraints used for corn acreage have been allotments and minimum diversion requirements. Allotments represented an upper limit on the number of acres of corn that could be planted if a producer wished to receive program payments. The diversion constraint required that producers reduce their corn acreage by a specified minimum amount to be eligible for payments. Base acreages, determined by historical plantings, were assigned for each farm, similar to allotments, and were used to calculate the number of acres to be diverted. Additional diversion of more acreage for payment was also permitted, up to a specified maximum level.

A third type of acreage constraint required that a specified percentage of the assigned base be set-aside from use in production of any crop. These constraints affected individual crops by reducing the total acres of cropland available on the farm, but did not constrain corn acreage specifically. Producers, upon meeting the minimum set-aside requirements, were permitted to set-aside further acreage for additional payments, up to a specified maximum level.

The policy instruments which constituted incentives were the government payments available to any producer who participated in the year's feed grain program. These payments have taken several forms. Price supports have been provided for corn producers through nonrecourse loans at harvest. Additional deficiency payments were available in the mid-seventies on a producer's specified farm program acreage, based on the announced target price.

When diversion requirements have been in effect producers were offered diversion payments on the normal production, based on 1959-60 average yields, of the land diverted. Additional diversion payments were offered for further reductions in acreage. Separate support payments were offered on all or part of the base acreage, according to the assigned normal production level.

Set-aside payments offered a payment on the normal production on the maximum of half of the base acreage, or on the acres set-aside under the program. Although only a minimum set-aside level was required to receive regular program payments, additional payments could be obtained by placing more acreage in the set-aside.

To understand the actual programs, it is necessary to examine how the different policy instruments have been combined to form the yearly feed grains programs. Price support loans for corn have been in effect every year since 1933. The other instruments have changed each year. The policy instruments in effect each year are summarized in Table I.

A General Categorization of Programs

Examination of the individual policy instruments and the yearly feed grain programs has helped to identify noticeable changes in the specification of acreage constraints over the past thirty years. Since the acreage constraints have restricted acreages in different ways, a

Table I. The Yearly Feed Grain Programs, 1948-78.

Year	Crops Included	Payments (Incentives)	Acreage Constraints	Additional Provisions
1948	C, GS, O, B[a/]	Support Loan[b/]	-	
49	C, GS, O, B	Support Loan	-	
50	C, GS, O, B	Support Loan	Allotment-Commercial Area	
51	C, GS, O, B	Support Loan	-	
52	C, GS, O, B	Support Loan	-	
53	C, GS, O, B	Support Loan	-	
54	C, GS, O, B	Support Loan	Allotments-Commercial Area	Cross Compliance
55	C, GS, O, B	Support Loan	Allotments-Commercial Area	-
56	C. GS. O, B	Support Loan, Minimum and Maximum Diversion Payment	Allotments, Soil Bank Minimum and Maximum Diversion	Commercial Area
57	C, GS, O, B		Allotments, Soil Bank Minimum and Maximum Diversion	Commercial Area Cross Compliance
58	C, GS, O, B		Allotments Soil Bank Minimum and Maximum Diversion	Commercial Area Cross Compliance
59	C, GS, O, B	Support Loans	-	
60	C, GS, O, B	Support Loans	-	
61	C, GS	Support Loan, Minimum and Maximum Diversion Payments	Minimum Diversion Maximum Diversion	
62	C, GS, B	Support Loan, Minimum and Maximum Diversion Payments	Minimum Diversion Maximim Diversion	
63	C, GS, B	Support Loan, Support Payments Minimum and Maximum Diversion Payments	Minimum Diversion Maximum Diversion	
64	C, GS, B	Support Loan, Support Payment Minimum and Maximum	Minimum Diversion Maximum Diversion	
65	C, GS, O, B, R	Support Loan, Support Payment Minimum and Maximum Diversion Payment	Minimum Diversion Maximum Diversion	Substitution

Table I. Continued.

Year	Crops Included	Payments (Incentives)	Acreage Constraints	Additional Provisions
1966	C, GS, O, B, R	Support Loan, Support payment Maximum Diversion Payment	Minimum and Maximum Diversion	Substitution
1967	C, GS	Support Loan Support Payment	Minimum Diversion	Substitution
1968	C, GS	Support Loan, Support Payment	Minimum and Maximum Diversion	Substitution
1969	C, GS, B	Support Loan, Support Payment Maximum Diversion Payment	Minimum and Maximum Diversion	Substitution
1970	C, GS, B	Support Loan, Support Payment Maximum Diversion Payment		Substitution
1971	C, GS, O, B	Support Loan Set-Aside Payment	Minimum Set-aside	
1972	C, GS, O, B	Support Loan Set-Aside Payment	Optional Minimum Set-aside	
1973	C, GS, B	Support Loan Set-aside Payment	Optional Minimum Set-aside	
1974	C, GS, B	Support Loan, Deficiency Payments	None	
1975	C, Gs, B	Support Loan Deficiency Payments	None	
1976	C, GS, B		None	
1977	C, GS, B		None	
1978	C, GS, B	Support Loan Support Loan, Deficiency Payments Set-aside Payments		

a/ C = Corn, GS = Grain Sorghum, O = Oats, B = Barley, R = Rye, W = Wheat

b/ For a detail description of the policy instrument see Cochrane and Ryan (1976).

producer's decision-making framework with regard to his acreage choices may be different under different types of programs. This issue will be examined by classifying the post war programs into three groups, based on the restrictiveness of the acreage constraints in effect. This three group classification will permit comparison of the different feed grain programs.

The first group which must be recognized includes the years when no acreage constraints were specified, and program payments were offered only to support incomes. The programs during the years 1948-49, 1951-53, 1959-60, and 1974-77 offered corn producers price supports in the form of nonrecourse loans. Deficiency payments were offered from 1974-77. No restrictions were placed on acreages to receive program payments. Since the only policy instruments used during these years were price supports, this group of programs has been titled the price support programs.

Another distinct group of programs includes the years when the feed grain programs constrained the total cropland available, but did not explicitly restrict corn acreage. The set-aside programs of 1971-1973, and 1978 have been included in this group. The substitution provision introduced in the 1965-70 programs greatly relaxed the restrictiveness of the allotment and diversion requirements. Since a producer could plant his entire corn and wheat allotments, minus the minimum diversion requirements, in either crop, the diversion requirements acted more as a cropland constraint than a specific corn acreage restriction. For these reasons, the 1965-70 programs have been included in the second group, along with the 1971-73 and 1978 set-aside programs.

The policy instruments for the years in this group can be specified in the same way for all years even though the names of the instruments have changed throughout the programs. To permit some consistency over the group, the titles given to the instruments used during the set-aside programs will be used throughout the group. The set-aside requirements of 1971-73, 1978, and the diversion requirements during 1965-70, both required that acreage be removed from crop production. Thus the minimum acres that must be removed will be called the minimum set-aside in this study to eliminate confusion. The maximum acres which can be removed from production for payment will be called the maximum set-aside. The payment rate on the land removed from production will be called the set-aside payment rate. Since the names of the policy instruments used during the set-aside programs will be used throughout this program group, it has been titled the set-aside program years.

The third and final group contains the years when strict corn acreage constraints have been used. During 1950, and 1954-55 strict allotments were in effect. During 1956-58, and 1961-64 allotments and acreage diversion requirements were used. Thus the presence of strict allotments on corn acreage justifies the grouping of these programs into a separate group. To permit easy identification of the policy instruments used during the years in this group, the names used in the acreage diversion programs of the sixties will be used. The allotments of 1950, and 1954-57 represent the maximum corn acreage permitted in these programs. The allotments minus the minimum diversion requirements represent the maximum corn acreage permitted for 1958 and 1961-64 program participants, since the minimum diversion required that corn acreage be reduced below the allotments by this amount. To facilitate the combining of these programs into a single group, the effective allotment was used, defined as the allotment minus the minimum diversion requirement. During the early fifties, when no minimum diversion requirements were in effect, the effective allotment was equal to the allotment, since the minimum diversion equaled zero. The maximum diversion for payment specified the maximum number of acres which could be diverted for payment. A diversion payment rate per bushel was paid on the normal production of the acres diverted. A support price was offered as a per bushel non-recourse loan on the corn acreage grown. Since these programs have constrained corn acreage through the use of allotments and diversion requirements, they have been titled the allotment-diversion programs. The three program groups and the corresponding policy instruments are summarized in Table II.

Specification of the Acreage Response Models

In the examination of the food grain programs it was proposed that the years with set-aside programs, allotment and diversion programs, and no acreage restrictions represent three distinct decision environments, and should be estimated separately. By estimating separate price and policy effects for each policy group the extent of the differences in the estimated effects can be examined. Furthermore, as demonstrated in Weaver (1978b) each of the programs presented the producer with a participation decision and resulted in a discontinuous relation between the chosen level of acreage planted and its determinants. That is, for a particular level of price supports and acreage restrictions there exists a wide range of expected prices for which the producer would find it

Table II. Summary of Feed Grain Program Provisions, 1948-78.

Group	Years	Incentives	Constraints
Price Support Programs	1948-49 1951-53 1959-60 1974-76	1. Nonrecourse loan 2. Target price (deficiency payments)	1. None
Cropland Set-aside Programs	1965-73 1978	1. Nonrecourse loan 2. Set-aside payment 3. Additional set-aside payment	1. Required set-aside of land from cropping 2. Additional set-aside, up to a maximum (optional
Crop-Specific Allotment Diversion Programs	1950 1954-58 1961-64	1. Nonrecourse loan 2. Support payment 3. Diversion payment 4. Additional diversion payment	1. Crop specific effective allotment (allotment-minimum diversion) 2. Additional diversion, up to a maximum (optional)

optimal to plant within the acreage restriction. In this case, the acreage decision would be functionally related to policy instruments, but not incentives offered by the market. Alternatively, as shown in Weaver (1978, a, b), the acreage decision may be functionally related to market incentives, but not policy instruments. Because the nature of the discontinuity in the acreage decision is critically dependent upon fixed factors and other technological characteristics which vary over farms, it can be expected that within a geographical area both cases could be observed. Thus, the geographical aggregate acreage response would be an aggregation over farms for which acreage was determined by market incentives and those for which acreage was determined by government policy instruments. We proceed by exploring an aggregate acreage response function in which both prices and policy instruments are allowed to determine state level corn acreage planted. Since there was no theoretical basis for determining the functional form, a linear relationship explaining corn acreage planted in terms of the exogenous prices and programs was employed as a first order approximation of the true relation. The following acreage supply function was estimated for each of the six corn belt states (Illinois, Indiana, Iowa, Minnesota, Missouri, and Ohio).

$$A = \begin{cases} \alpha_o + \alpha_1 P_C/P_S + \alpha_2 PF/PS + \alpha_3 T & \text{for group A years} \\ \beta_0 + \beta_1 P_C/P_S + \beta_2 PF/PS + \beta_3 T + \beta_4 D + \beta_5 \dfrac{G_s}{P_s} + \beta_6 MS & \text{for group B years} \\ \gamma_0 + \gamma_1 P_C/P_S + \gamma_2 PF/PS + \gamma_3 T + \gamma_4 \bar{A} + \gamma_5 \dfrac{PD}{PS} + \gamma_6 MD & \text{for group C years} \end{cases}$$

where: A = acreage cf corn planted in year t

group A = price support programs (1948-49, 1951-53, 1959-60, 1974-77)

group B = set-aside programs (1965-73, 1978)

group C = allotment-diversion programs (1950, 1954-58, 1961-64)

P_C = expected price of corn, year t.

P_S = expected price of soybeans, year t.

r_F = price of fertilizer, year t.

T = technology

D = set-aside acres required/1,000 acres, year t.

G_S = set-aside payment rate/bu (\$), year t.

M_S = maximum set-aside for payment/1,000 (acres), year t.

$\bar{A}$ = effective allotment/1,000 (acres), year t.

G_D = diversion payment rate/bu (\$), year t.

MD = maximum diversion for payment/1,000 (acres), year t.

ε_{it} = stochastic error terms, year t, state i

We will assume $E(e_t) = 0$

$E(e_t^2) = \sigma^2$

$E(e_t\ e_q) = 0,\ t \neq q$

ε_t is normally distributed.

We will assume that errors are contemporaneously uncorrelated across states.

Measurement of Prices

Since the price a producer expects to receive at harvest cannot be directly observed at the time of planting, an estimate of the expected future price must be used.

Future prices were used in this study to represent the market's estimate of the next year's cash price, following Muth's (1961) theory of rational expectations, see Weaver (1977) for further discussion. The future's price was observed on April 15 to obtain estimates of expected prices before planting. The price of a November soybean contract and a December corn contract were used, since they were the first contracts to take into account the supplies from the new harvest. A fertilizer price measure was also included in the acreage response specification, since changes in fertilizer prices were expected to influence acreage decisions.[3] Since the actual mixed fertilizers in use has changed over the past thirty years, the prices of six fertilizer components[4] were used in this study. However, to preserve degrees of freedom in representing these prices the first principal component of the six prices was included in the estimated models. Although state level price indexes could have been constructed the alternative of using principal components was chosen as a method which would better accommodate the requirement that readily available data be employed to allow the model's use for forecasting. Homogeneity of degree zero in prices was imposed on the equations through the introduction of relative prices where the expected price of soybeans (P_S) was chosen as the numeraire.

Policy Instruments

The policy instrument variables have been specified according to the announced feed grain programs. Set-aside and diversion payment rates were calculated as the announced percentage of the loan rate multiplied by the loan rate, and divided by the soybean futures price, to obtain the relative per bushel payment rate in dollars.

Acreage constraints and acreage planted were specified in thousands of acres, to reduce the differences in magnitude between total acres and payment rates. Set-aside requirements, including the minimum and maximum announced percentages, were multiplied by the total state base acres to obtain the total state set-aside constraints in acres. The effective allotment was calculated as the total state allotment or base minus the acres required for minimum diversion. Maximum diversion levels were specified as the maximum announced percentage multiplied by the base or allotment to reflect the total acres that could be diverted for payment.

Technology

To account for the changes in agricultural technology which have taken place since World War II, the U.S.D.A. regional total productivity index was also included in the estimated models. The measurement of total factor productivity involves the computation of an index of total output and an index of all inputs. The total productivity is then calculated as the ratio of the output index over the input index.

Omitted Factors

Several additional factors were considered for inclusion in the acreage response model, but were omitted from this preliminary study. These included total cropland, livestock feed requirements and additional input and output prices. To the extent that these omitted variables are correlated with the included ones, the estimates presented here may be biased. The examination of these factors is an area where further research is being conducted.

Estimation and Hypotheses Testing

The full model specified in the previous section of this paper was estimated for each of six midwest states. The appropriateness of pooling the state data was tested, but the parameters were not stable over the states, and thus were estimated individually for each state.[5] The effectiveness of the different programs was considered by testing whether either the policy instruments or market prices jointly explained a significant proportion of the variation in corn acreage planted. Joint F-tests indicated that groups of coefficients were significantly different from zero at $\alpha = .05$.

Although the policy instruments were found to jointly explain a significant proportion of acreage planted, the theory of discontinuous choice presented in Weaver (1978 a, b) suggests that diversion programs introduced a second source of discontinuity in the acreage relation. If, for instance, a participating producer diverted only the minimum acreage required, the maximum diversion level and the diversion payment rate would not be significantly related to corn acreage. This point is further elaborated in Weaver (1978a) and Krainik (1979). Its implication is that the entire set of policy instruments might not be determinants of acreage planted. Instead only a subset would be functionally related to acreage decisions.

To test if subsets of the policy instruments were significantly related to aggregate corn acreages, linear restrictions of the full acreage response model were tested against the full model. The final null hypotheses which could not be rejected at $\alpha = .05$ are presented in Table III, with the calculated F-ratios and critical F values.

Table III. Hypotheses Tests for Refinement of the Full Mixed Model.

	Illinois	Indiana	Iowa	Minnesota	Missouri	Ohio
H_o:	$\gamma_4=\gamma_6=0$	$\beta_4=\beta_6=\beta_6=0$	$\beta_4=\beta_5=0$	$\beta_4=\beta_5=\gamma_4=\gamma_5=\gamma_6=0$	$\beta_4=\beta_5=\gamma_4=\gamma_6=0$	$\beta_4=\beta_5=\gamma_6=0$
H_A	all not zero	all not zero	all	all not zero	all not zero	all not zero
F	.16	.75	.18	.12	.006	.44
d.f.	(2, 13)	(3, 13)	(2, 13)	(5, 13)	(4, 13)	(3, 13)
$F_{\alpha=.05}$	3.81	3.41	3.81	3.03	3.18	3.41
d.f.	(2, 13)	(3, 13)	(2, 13)	(5, 13)	(4, 13)	(3, 13)

Since these hypotheses could not be rejected, the final acreage response models were estimated with the restrictions of the null hypotheses imposed. These models are presented next, followed by a discussion of the results.

The final estimated models and relevant statistics are presented in Table IV. The overall fit of the models is generally quite good, and the F-ratios support the hypothesis that the estimated coefficients explain a significant proportion of the variation in corn acreage at $\alpha = .05$ in most of the estimated models. For each state, the standard error of the regression at the mean does not appear extremely high when compared to the mean value of corn acreage. Elasticities of acreage with respect to its determinants were measured at the means and are reported in Table V.

Multicollinearity

The presence of high R^2 values but few significant coefficients may be attributable to a high degree of collinearity among the independent variables in the sample data. When the proportion of the variation in each independent variable which could be explained by the other independent variables was examined, the proportions were high, especially during the allotment-diversion program years.[6] When high levels of multicollinearity are present, the estimated coefficients will be unbiased, but the estimated variances will be large.

Autocorrelation

Although autocorrelated disturbances are often a problem with time series estimation, the presence of first order autocorrelation in the

Table IV. Final Estimated Acreage Response Models

Price Support Programs (1948-49, 1951-53, 1959-60, 1974-77)	Illinois	Indiana	Iowa	Minnesota	Missouri	Ohio
Intercept	2618	1272	2386	-834	6,228	2,671
	(1.98)*	(1.08)	(.76)	(-.36)	(5.52)	(3.27)
Expected Relative Price Corn	2073	222	3055	4760	751	259
	(1.46)	(.18)	(.91)	(1.81)	(.56)	(.30)
Productivity Index	73	45	93	53	-29	11
	(7.95)	(5.65)	(4.35)	(3.87)	(-4.41)	(1.86)
Relative Price of:						
Sulphate of Ammonia	-.59**	-.17	-.88	-1.08	-2.01	-.12
Ammonium Nitrate	-.61	-.18	-.91	-1.09	-1.99	-.13
20% Super Phosphate	-.41	-.17	-.87	-1.05	-1.85	-.12
40% Super Phosphate	-.59	-.17	-.89	-1.06	-1.88	-.13
Muriate of Potash	-.59	-.17	-.89	-1.04	-1.95	-.12
	(-.74)	(-.08)	(-.47)	(-.85)	(-3.05)	(-.27)
R^2	.954	.925	.854	.797	.90	.549
F (4,7)	48.59	28.80	13.68	9.18	21.0	2.84
F (α = 05,4,7)	4.12	4.12	4.12	4.12	4.12	4.12
Mean of A_c	10,102	5,324	12,121	6,298	3,860	3,746
Standard error at the mean	261	230	615	425	246	155

Table IV. Continued.

Set-Aside Programs (1965-73, 1978)	Illinois	Indiana	Iowa	Minnesota	Missouri	Ohio
Intercept	13,958	3366	9923	3308	4149	1695
	(14.44)	(306)	(4.03)	(2.42)	(2.13)	(1.25)
Expected Relative Price Corn	7614	4104	2399	2984	2418	2225
	(10.13)	(4.18)	(1.51)	(2.48)	(1.99)	(2.76)
Productivity Index	-56	14	15	17	-21	10
	(-6.36)	(1.43)	(.69)	(1.78)	(-1.21)	(.80)
Relative Price of:						
Sulphate of Ammonia	-5.72	1.69	-5.11	-3.74	-1.69	-1.92
Ammonium Nitrate	-5.90	-1.76	-5.26	-3.78	-1.67	-2.0
Anhydrous Ammonia	-4.82	-1.47	-4.09	-2.99	- 590	-1.41
20% Super Phosphate	-5.60	-1.67	-5.01	-3.62	-1.41	-1.90
40% Super Phosphate	-5.73	-1.72	-5.16	-3.67	-1.58	-1.95
Muriate of Potash	-5.71	-1.71	-5.12	-3.58	-1.64	-1.89
	(-9.46)	(-1.78)	(-3.34)	(-3.56)	(-1.34)	(-2.59)
Minimum Set-Aside	.41	-	-	-	-	-
	(2.58)					
Relative Set-Aside Payment	-25,405	-20,201	-	-	-	-
	(-5.69)	(-3.87)				
Maximum Set-aside	-.04	-	-.19	-.18	-.12	-.10
	(-1.97)		(-5.21)	(-4.54)	(-1.52)	(-1.42)
R^2	.99	.9348	.9705	.9625	.8094	.8828
F	50.03	17.92	41.16	32.12	5.31	9.42
Degrees of Freedom	7,3	5,5	5,5	5,5	5,5	5,5
F (α = .05, d.f.)	8.89	5.05	5.05	5.05	5.05	5.05
Mean of A_c	10,336	5,302	11,351	5,808	3,022	3,384
Standard error at the mean	84	134	244	165	177	135

Table IV. Continued.

Allotment-diversion Programs (1950, 1954-58, 1961-64)	Illinois	Indiana	Iowa	Minnesota	Missouri	Ohio
Intercept	2,104	1,058	2,470	2,172	6,820	2,955
	(.76)	(.83)	(1.74)	(2.33)	(1.01)	(2.65)
Expected Relative Price Corn	5,331	3,856	1,632	3,249	412	2,624
	(1.96)	(2.97)	(1.15)	(2.62)	(.07)	(1.85)
Productivity Index	58	35	120	23	37	13
	(2.22)	(1.97)	(5.57)	(3.58)	(-.74)	(.86)
Relative Price Of:						
Sulphate of Ammonia	-7.87	-2.90	-12.61	-.30	-1.30	-5.05
Ammonium Nitrate	-7.89	-3.02	-13	-.31	-1.29	-5.24
Anhydrous Ammonia	-6.43	-2.52	-10.09	-.24	-1.09	-3.69
20% Super Phosphate	-7.47	-2.85	-12.38	-.29	-1.19	-4.98
40% Super Phosphate	-7.65	-2.95	-12.75	-.30	-1.21	-5.12
Muriate of Potash	-7.61	-2.93	-12.66	-.29	-1.26	-4.97
	(-1.15)	(-1.11)	(-5.29)	(-.15)	(-.17)	(-1.47)
Effective Allotment	-	-.23	-.18	-	-	-.54
		(-1.19)	(-2.35)			(-2.24)
Relative Diversion Payment Rate	-1987	-1345	-959	-	-1491	-1580
	(-2.38)	(-1.88)	(-1.26)		(-1.47)	(-2.59)
Maximum Diversion	-	-	-.15	-	-	-
			(-2.85)			
R^2	.7084	.7798	.9511	.7288	.7367	.9122
F	3.04	2.83	9.72	5.38	3.50	8.31
Degrees of freedom	5,5	6,4	7,3	4,6	5,5	6,4
$F(\alpha = .05\ df)$	5.05	6.16	8.89	4.53	5.05	6.16
Mean of A_c	8,837	4,658	10,432	5,736	3,725	3,329
Standard error at the mean	321	151	154	151	302	149

* t-statistics are reported in parentheses.

** Co-efficients of component fertilizer prices are based upon principal component results.

Table V. Acreage Elasticities at the Mean.

	Illinois	Indiana	Iowa	Minnesota	Missouri	Ohio
Price Support Years						
Expected Price Corn	.10*a/	.03*	.13*	-.38*	-.10*	.03*
Expected Price Soybeans	-.10*	-.03*	-.13*	.38*	-.10*	-.03*
Productivity Index	.63	.71	.70	.73	-.65	.23
Sulphate of Ammonia	-.03*	-.02*	-.03*	-.035*	-.03	-.035*
Ammonium Nitrate	-.04*	-.02*	-.03*	-.05*	-.04	-.05*
Anhydrous Ammonia	-.06*	-.03*	-.045*	-.06*	-.06	-.06*
20% Super Phosphate	-.02*	-.01*	-.02*	-.025*	-.02	-.025*
40% Super Phosphate	-.04*	-.02*	-.03*	-.05*	-.04	-.05*
Muriate of Potash	-.03*	-.015*	-.02*	-.03*	-.026	-.03*
Set-aside Years						
Expected Price Corn	.36	.30	.14*	.19	.37	.28
Expected Price Soybeans	-.36	-.30	-.14*	-.19	-.37	-.28
Productivity Index	-.54	.03*	.17*	.35*	-.13*	.33*
Sulphate of Ammonia	-.03	-.02*	-.02	-.03	-.03	-.03
Ammonium Nitrate	-.04	-.03*	-.04	-.05	-.04	-.04
Anhydrous Ammonia	-.05	-.03*	-.04	-.05	-.05	-.04
20% Super Phosphate	-.03	-.02*	-.02	-.03	-.03	-.03
40% Super Phosphate	-.05	-.03	-.04	-.05	-.04	-.05
Muriate of Potash	-.03	-.02	-.03	-.03	-.03	-.03
Minimum Set-aside	-.08	--	--	--	--	--
Set-aside Payment	-.15	-.20	--	--	--	--
Maximum Set-aside	-.02	--	-.10	-.12	-.13*	-.06
Allotment-diversion Years						
Expected Price Corn	.31	.44	.08*	.29	.67*	.44*
Expected Price Soybeans	-.31	-.44	-.08*	-.29	-.67*	-.44*
Productivity Index	.40	.36	.97	.32	.16*	.23*
Sulphate of Ammonia	-.05*	-.04*	-.07	-.003*	-.02*	-.09*
Ammonium Nitrate	-.07*	-.06*	-.10	-.004*	-.03*	-.13*
Anhydrous Ammonia	-.11*	-.08*	-.14	-.006*	-.04*	-.16*
20% Super Phosphate	-.05*	-.03*	-.06	-.003*	-.02*	-.08*
40% Super Phosphate	-.08*	-.06*	-.11	-.005*	-.03*	-.14*
Muriate of Potash	-.05*	-.04*	-.08	-.003*	-.02*	-.09*
Effective allotment	--	-.13	-.16	--	--	-.38
Diversion Payment Rate	-.06	-.05	-.02*	--	-.14	-.09
Maximum Diversion	--	--	-.07	--	--	--

a/ * Indicates that the estimated coefficient was not significant at $\alpha = .05$

estimated models could not be adequately tested for, due to the small number of observations, and the presence of gaps in the data series used for each program group. Thus the ordinary least squares estimates are presented here.

Discussion of Results

The estimated acreage relationships for each program group will not be examined. The estimated coefficients vary across the program groups and across the states. During the price support years, only the total productivity coefficient is significantly different from zero at $\alpha = .05$ for most states. An exception is the significance of the co-efficient of the first principal component of the fertilizer prices for the case of Missouri. As expected the signs of implied component co-efficients were negative; however, as may be noted in Table V, the implied elasticities of supply with respect to these prices are quite small. Thus, we may conclude that the current sample indicates that fertilizer price levels may not have played an important role in the allocation of land to crop alternatives during these years.

Set-Aside Program Years

The minimum required set-aside acres, the maximum set-aside for payment, and the set-aside payment rate were included for the cropland constraining program years. The minimum set-aside coefficient is not significantly different from zero at $\alpha = .05$ in any state except Illinois. These results indicate that the minimum set-aside requirement were not binding on corn acreage. In Illinois, the estimated minimum set-aside coefficient is positive, such that corn acreage increased as cropland constraints increased. Since the set-aside requirements only restricted total cropland, a participant's reallocation of land at a higher set-aside level could result in increased corn acreage. Alternatively, an increase in the required set-aside may have reduced the number of participants, and thus resulted in larger corn acreage also.

The estimated set-aside payment coefficient and maximum set-aside coefficient are significantly different from zero at $\alpha = .05$ in several states, which suggests some producers may have been willing to divert more than the minimum required. The set-aside payment coefficient and the maximum set-aside coefficient are negative, which indicates that some producers may have chosen to set-aside more than the minimum and decrease their corn acreage. An insignificant coefficient in other states suggests that producers there were not willing to set aside the maximum. In general it appears that producers who chose to participate were willing to set-aside more than the minimum requirement. When the set-aside payment and maximum set-aside were increased, producers may have increased their set-aside levels, and reduced their corn acreage. Yet when the minimum set-aside level was increased in Illinois, some producers may have chosen to increase their corn acreage. The results here suggest that policymakers, interested in reducing corn acreage through the use of cropland constraining programs, should set the minimum set-aside level low, and the maximum set-aside and set-aside payment rate high. In essence, we find that incentives rather than constraints are critical for control of acreage.

Finally, we note that despite the significance of various policy instruments during the set-aside years the associated elasticities of acreage planted are all quite small.

Focusing on the role of market related forces in determining acreage planted during the set-aside years, we see from Table IV that in general the expected price of corn relative to that of soybeans was generally significantly different from zero and large in magnitude. However, as Table V reports the implied elasticities of supply were small, though larger than during the price support years. This result implies producers were more responsive to changes in relative corn price when faced with the additional alternative offered by cropland diversion programs. As for the role of fertilizer prices, Table IV indicates that in general the co-efficient of the first principal component was significantly different from zero and negative. Elasticities reported in Table V, however, reiterate the result found for the price support years, namely supply of acreage to corn appears to have been inelastic with respect to fertilizer prices.

Allotment-Diversion Years

The insignificance of the estimated coefficient on the effective allotment for several states suggests that producers chose not to participate and thus planted more than their allotment, or to participate and plant less than their allotment by diverting more than the minimum. The negative coefficients for the effective allotments in Iowa and Ohio suggest that as allotments were increased, more producers found it profitable to participate in the programs, thus reducing their corn acreage to the level of the effective allotment. The theoretical foundation for this counter-intuitive result is explained in Weaver (1978b). The essence of the argument contained there is that if market incentives are low relative to incentives and constraints involved in government programs, then farmers may be expected not to participate. However, if constraints such as allotments were appropriately reduced, the profitability of participation could be increased sufficiently to encourage a reduction of acreage in order that compliance with the new constraint could be achieved.

The estimated coefficients for the diversion payment rate was significantly different from zero in most states, and negative, which suggests that some producers may have been willing to divert additional acreage above the minimum level as the payment rate increased, and thus reduced their corn acreage planted. The estimated coefficients for the maximum diversion level are insignificant in all states except Iowa, which indicates that the maximum diversion was not binding, and producers found it more profitable to divert less than the maximum. In Iowa the maximum diversion coefficient is significant and negative, which suggests that for some producers the maximum diversion level may have been binding, and thus producers chose to plant less corn when the maximum diversion level was increased.

Focusing on Table V, we see that elasticities with respect to policy instruments were, in general, quite small in magnitude. As pointed out in Weaver (1978b) this may be evidence that policymakers were unsuccessful in setting policy instruments at levels which would render them effective in determining acreage allocation.

In general, these results suggest that policymakers, interested in reducing corn acreage through the use of allotment-diversion programs should set the allotment level and the diversion payment rate high. This result reiterates the general finding for the set-aside program, i.e. incentives appear to dominate constraints as a means of controlling acreage.

Summary and Conclusions

The elasticity of corn acreage with respect to market prices and policy instruments varies across the states and programs, which supports the original premise that states and program subperiods should not be aggregated. In most states the corn price elasticity is larger in the presence of acreage constraining programs, which implies that producers were more responsive to changes in the relative corn price when faced with the additional alternative of diverting their cropland for payments. The greatest price responsiveness was found during the allotment-diversion programs in all states except Iowa. Since participation in these programs specifically restricted corn acreage, producers who wished to receive the loan rate instead of the market price were forced to meet corn acreage restrictions. Thus, as market incentives changed relative to government program incentives and constraints large acreage responses could be observed as farmers switched between participating and not participating in programs offered. During the set-aside programs, producers who wished to receive the loan rate instead of the market price were forced only to reduce their total cropland, and thus were given more flexibility in their corn acreage decisions. The price elasticities in Iowa vary only slightly during the different programs, and are not significantly different from zero, which suggests that market price changes have not had large impacts on corn acreage decisons.

The acreage response functions estimated here have provided initial estimates of the relationships between the set-aside and allotment-diversion programs and corn acreage for several major corn producing states. Both market prices and policy instruments were found to explain a significant proportion of the variation in corn acreage planted. In general, the elasticity of corn acreage with respect to the policy instruments at the mean was small, which indicates that large changes in the levels of the policy instruments were needed to bring about significant changes in acreage levels from the mean. Yet the significance of the individual policy instruments varied considerably across the six states examined. Finally, supply of acreage was found to be inelastic with respect to fertilizer prices.

Areas for Further Research

This study has helped to identify several areas where more empirical work is still needed. The diversity of the results for different states indicates the problems of designing national commodity programs which function effectively in the variety of producing conditions found across the U. S. The differences in acreage response are expected to be even greater between states more physically diverse than the ones examined here. Thus the effects of the set-aside and allotment-diversion programs in other states need to be estimated. If policymakers continue to use national commodity programs, the effects of these programs across the diverse producing conditions found in the U. S. must be understood.

The choice of which type of program should be used in the future cannot be determined from the results of this study alone, since the costs of alternative programs must also be considered. The effects of these programs on other crop acreages must also be considered, especially with the set-aside programs, to determine the full implications of using different acreage constraining policies. Considerable effort is still required before the full picture is understood. Yet it is only through better information that policymakers can be expected to improve the effectiveness of governmental actions towards obtaining policy goals.

Contributions of This Study

The effects of market prices and policy instruments on aggregate corn acreage have been estimated for three types of feed grain programs. The decision to estimate the effects of these programs separately was based on the hypothesis that the decision-making framework of producers has been altered by the enactment of different types of commodity programs. The results presented here support the hypothesis that the three types of feed grain programs have affected producer's acreage decisions differently.

The majority of the work done in the past has assumed a stable environment over all three types of feed grain programs. If one response function is estimated over several decision environments, the estimated results will be biased for all decision environments included. The results will only provide an average of the effects of all different programs. Such results have not provided policymakers with accurate information concerning the historical effects of actual programs which have been used in the past. The separate examination of different feed grain programs in this study has thus provided more detailed and accurate information for policymakers.

Comparison of the price elasticities for each program type has provided additional information about the programs and their effect on acreage decisions. For most states the price elasticity was considerably larger in the presence of acreage constraining programs, which suggests that set-aside and diversion programs have provided a relevant alternative to crop production, especially when expected market prices were low. These results also indicate that the effectiveness of acreage constraining programs was highly dependent upon the level of expected market prices as well as the levels of the policy instruments.

The separate estimation of the acreage response models for six mid-western states has identified noticeable differences in the relationships of corn acreages and government programs across states. While in general larger price elasticities were found during the acreage constraining programs, the price elasticities in Iowa were not significantly different during any of the program groups. These results suggest that producing conditions have varied across geographically neighboring states. If heterogeneity is extensive across the U. S. which these results suggest, then the estimated price elasticity obtained using U. S. aggregate data will be misleading. Since individual state responses have been shown to be different, U. S. aggregate price and policy instrument elasticities cannot be used to predict acreage response for individual states. If policymakers are concerned about the effects of commodity programs in individual states, then separate models for all states should be estimated.

Before the use of separate state models can be advocated, the benefits must be examined in light of the costs. Although the estimation of separate state models has demonstrated the benefits in accuracy, in parameter measurement, the costs of obtaining state-level data and estimates will be higher also. These trade-offs must be contended with in future policy research. Consideration of such issues may help to improve the usefulness of econometrics work in policy decisions.

FOOTNOTES

1. U. S. Department of Agriculture, ASCS, Farm Commodity and Related Programs, Agricultural Handbook No. 345 (Washington, D.C.: Government Printing Office, 1976) p. 124.

2. Houck et al. (1976), Penn and Irwin (1974), Lidman and Bawden (1974) have all assumed parameter stability over the programs. Weaver (1978) tested if the parameters were stable.

3. See Weaver (1979) for an example of results of general consideration of input prices.

4. The fertilizer prices used were sulphate of ammonia, ammonium nitrate, anhydrous ammonia, 20% superphosphate, 40% superphosphate, muriate of potash.

5. For more information on the principal components see Appendix B for detailed descriptions of the hypotheses tested, and F ratios see Amy Krainik M.S. thesis.

6. See Appendix C.

7. See Appendix D.

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Appendix A. Data Sources

1) Acres Planted:	USDA *Agricultural Statistics*, 1948-79 Washington, DC.
2) Futures Prices:	*Wall Street Journal*, April 15, 1948-78.
3) Fertilizer Component Prices:	USDA Statistical Reporting Service-Crop Reporting Board, *Agricultural Prices*, March 1948-78, Washington, DC
4) Total Productivity Index:	USDA, ERS, *Changes in Farm Production and Efficiency*, Statistical Bulletin No. 561, September 1976.
5) Base Acreages (1961-73)	USDA, ASCS, *1973 Set-Aside Programs Annual Summary*, Washington, DC.
6) Other program specifications: (allotments, diversion requirements, set-aside requirements, payment rates)	USDA, ESCS, CED, *The Feed Situation*, Washington, DC, various issues 1948-78.

Appendix B. Principal Components of Fertilizer Prices.

		Characteristic root[a]	Cumulative Fraction of Variance Explained[b]	Factor Loadings					
				Sulphate of Ammonia	Ammonium Nitrate	Anhydrous Ammonia	20% Superphosphate	40% Superphosphate	Muriate of Potash
Illinois	1	5.24	.873	.956	.986	.806	.936	.958	.954
	2	.57	.969	.198	.029	.584	-.335	-.240	-.152
	3	.12	.989	.150	-.147	-.063	-.045	-.128	.228
	4	.04	.996	.153	-.001	-.069	.027	-.004	-.118
	5	.01	.999	.016	.0[illegible]	-.026	-.093	.074	.012
Indiana	1	5.17	.862	.939	.978	.816	.924	.954	.948
	2	.61	.963	.248	.048	.562	-.365	-.271	-.150
	3	.14	.987	.177	-.174	-.088	-.068	-.096	.246
	4	.05	.996	.159	.0009	-.080	.026	.014	-.130
	5	.02	.999	.003	.094	-.051	-.060	-.018	.021
Iowa	1	5.20	.866	.955	.984	.764	.937	.965	.958
	2	.65	.975	.191	.063	.637	-.334	-.216	-.218
	3	.09	.989	.195	-.138	-.049	-.005	-.116	.109
	4	.04	.996	.108	.072	-.076	.026	-.006	-.141
	5	.02	.999	.027	.004	-.026	-.094	.076	.012
Minnesota	1	5.18	.863	.972	.980	.778	.941	.953	.931
	2	.59	.916	.111	.092	.622	-.291	-.247	-.187
	3	.14	.984	.060	-.114	-.005	-.117	-.119	.302
	4	.05	.993	.186	-.067	-.046	.046	-.061	-.069
	5	.02	.997	.049	.016	-.034	-.115	.087	-.014
Missouri	1	4.46	.743	.982	.972	.822	.901	.918	.950
	2	1.16	.936	.024	-.152	.392	.348	-.360	-.191
	3	.31	.987	.038	-.111	-.407	.205	.112	.225
	4	.05	.995	.174	-.069	-.013	-.046	-.093	.009
	5	.02	.998	.026	.112	-.060	.016	-.039	-.057

Appendix B. Continued.

		Characteristic root[a]	Cumulative Fraction of Variance Explained[b]	Sulphate of Ammonia	Ammonium Nitrate	Anhydrous Ammonia	20% Superphosphate	40% Superphosphate	Muriate of Potash
Ohio	1	5.01	.834	.946	.982	.691	.934	.960	.932
	2	.77	.962	.171	.091	.714	-.334	-.208	-.250
	3	.15	.987	.222	-.134	-.051	-.086	-.166	.212
	4	.06	.997	.155	.043	-.090	.004	.007	-.148
	5	.01	.999	.004	.001	-.013	-.081	.069	.014

[a] The characteristic root signifies the variance of the principle component.

[b] The cumulative fraction of the variance explained designates the proportion of the variation in the six fertilizer prices which is explained by the 1st principle component, the 1st and 2nd principle component, etc.

Appendix C. Proportion of the Variation in each Explanatory Variable Explained by the Other Explanatory Variables.

	Fertilizer Price Measures								
	Price Support Years			Set-aside Years			Allotment-Diversion Years		
Explanatory Variables	40% Super-phosphate	1st Principal Component	1st & 2nd Principal Component	40% Super-phosphate	1st Principal Component	1st & 2nd Principal Component	40% Super-phosphate	1st Principal Component	1st & 2nd Principal Component
Illinois:									
Expected Price Corn	.54	.41	.42	.95	.51	.58	.74	.72	.81
Productivity Index	.41	.68	.86	.94	.81	.90	.91	.98	.99
1st Principal Component-Fertilizer		.56	.60		.83	.97		.96	.99
2nd Principal Component-Fertilizer			.76			.88			.99
Price 40% Superphosphate	.31			.99			.80		
D or Ā				.95	.89	.93	.87	.94	.97
Gs or PD				.84	.85	.88	.80	.69	.70
MS or MD				.92	.77	.83	.89	.86	.90
Indiana:									
Expected Price Corn	.55	.42	.45	.97	.51	.55	.85	.76	.92
Productivity Index	.41	.66	.88	.94	.81	.90	.91	.98	.99
1st Principal Component-Fertilizer		.51	.55		.85	.98		.96	.99
2nd Principal Component-Fertilizer			.77			.89			.99
Price 40% Superphosphate	.33			.99			.82		
D or Ā				.98	.89	.94	.87	.94	.97
Gs or PD				.86	.85	.88	.80	.69	.70
MS or MD				.94	.78	.82	.89	.86	.90
Iowa:									
Expected Price Corn	.54	.42	.42	.98	.57	.57	.78	.62	.78
Prodictivity Index	.41	.67	.83	.96	.79	.91	.92	.96	.96
1st Principal Component-Fertilizer		.54	.54		.85	.97		.85	.99
2nd Principal Component-Fertilizer			.76			.86			.99
Price 40% Superphosphate	.37			.99			.83		
D or Ā				.97	.86	.90	.87	.86	.95
Gs or PD				.84	.84	.87	.79	.60	.84
MS or MD				.95	.76	.83	.90	.87	.94

Appendix C. Continued.

Explanatory Variables	Price Support Years: 40% Super-phosphate	Price Support Years: 1st Principal Component	Price Support Years: 1st & 2nd Principal Component	Set-aside Years: 40% Super-phosphate	Set-aside Years: 1st Principal Component	Set-aside Years: 1st & 2nd Principal Component	Allotments-Diversion Years: 40% Super-phosphate	Allotments-Diversion Years: 1st Principal Component	Allotments-Diversion Years: 1st & 2nd Principal Component
	Fertilizer Price Measures								
<u>Minnesota</u>:									
Expected Price Corn	.59	.54	.54	.91	.59	.60	.86	.53	.62
Productivity Index	.51	.75	.89	.77	.74	.97	.96	.98	.99
1st Principal Component-Fertilizer		.58	.66		.78	.97		.89	.90
2nd Principal Component-Fertilizer			.88			.96			.96
Price 40% Superphosphate	.34			.98			.92		
D or A				.91	.88	.88	.90	.97	.97
Gs or PD				.82	.83	.83	.77	.54	.71
MS or MD				.94	.62	.63	.87	.91	.95
<u>Missouri</u>:									
Expected Price Corn	.55	.41	.45	.82	.51	.57	.92	.78	.93
Productivity Index	.42	.44	.89	.85	.81	.89	.96	.97	.97
1st Principal Component-Fertilizer		.09	.62		.88	.96		.98	.98
2nd Principal Component-Fertilizer			.86			.77			.89
Price 40% Superphosphate	.39			.97			.85		
D or A				.89	.91	.93	.93	.89	.97
Gs or PD				.84	.84	.86	.83	.90	.93
MS or MD				.91	.88	.83	.89	.88	.89
<u>Ohio</u>:									
Expected Price Corn	.52	.42	.45	.94	.50	.62	.84	.64	.70
Productivity Index	.41	.71	.75	.93	.82	.86	.90	.98	.98
1st Principal Component-Fertilizer		.60	.66		.81	.97		.94	.97
2nd Principal Component-Fertilizer			.68			.88			.94
Price 40% Superphosphate	.30			.99			.90		
D or A				.97	.90	.93	.84	.93	.95
Gs or PD				.84	.84	.89	.75	.58	.79
MS or MD				.92	.88	.82	.91	.86	.93

Appendix D. Means and Standard Deviations of Observations.

	Illinois	Indiana	Iowa	Minnesota	Missouri	Ohio
Price Support Programs (1948-49, 1951-53, 1959-60, 1974-77)						
Corn Acreage[a/]	10,102	5,334	12,121	6,298	3,860	3,746
	(1,012)	(705)	(1,349)	(791)	(652)	(193)
Exp. Price Corn	1.88	1.88	1.88	1.88	1.88	1.88
	(.64)	(.64)	(.64)	(.64)	(.64)	(.64)
Exp. Price Soybeans	3.97	3.97	3.97	3.97	3.97	3.97
	(1.96)	(1.96)	(1.96)	(1.96)	(1.96)	(1.96)
Productivity Index	86	86	86	90	86	86
	(16)	(16)	(16)	(19)	(16)	(16)
1st Prin. Component	.58	.59	.66	.75	.81	.65
Fertilizer Prices	(1.28)	(1.32)	(1.25)	(1.38)	(.95)	(1.37)
Set-Aside Programs (1965-74, 1978)						
Corn Acreage	10,336	5,302	11,351	5,808	3,022	3,384
(1,000's)	(488)	(391)	(1,006)	(638)	(303)	(266)
Exp. Price Corn/bu.	1.43	1.43	1.43	1.43	1.43	1.43
	(.42)	(.42)	(.42)	(.42)	(.42)	(.42)
Exp. Price Soybeans/	3.40	3.40	3.40	3.40	3.40	3.40
bu.	(1.38)	(1.38)	(1.38)	(1.38)	(1.38)	(1.38)
Productivity Index	101	101	101	107	101	101
	(6.26)	(6.26)	(6.26)	(9.26)	(6.26)	(6.26)
1st Prin. Component	-.51	-.49	-.44	-.36	-.44	-.45
Fertilizer Prices	(.86)	(.85)	(.81)	(.81)	(.82)	(.84)
Minimum Set-Aside	1,976	1,029	2,480	1,374	872	699
(1,000's acres)	(455)	(227)	(604)	(350)	(277)	(168)
Set-Aside Payment	.18	.18	.17	.18	.18	.18
Rate/bu	(.02)	(.02)	(.02)	(.02)	(.02)	(.02)
Maximum Set-Aside	5,075	2,638	6,357	3,553	2,320	1,809
	(932)	(494)	(927)	(545)	(410)	(368)
Allotment-Diversion Programs (1950, 1954-58, 1961-64)						
Corn Acreage	8,837	4,658	10,432	5,736	3,725	3,329
	(443)	(214)	(404)	(238)	(439)	(355)
Exp. Price Corn	1.26	1.26	1.26	1.26	1.26	1.26
	(.11)	(.11)	(.11)	(.11)	(.11)	(.11)
Exp. Price Soybeans	2.50	2.50	2.50	2.50	2.50	2.50
	(.20)	(.20)	(.20)	(.20)	(.20)	(.20)
Productivity Index	85	85	85	85	85	85
	(8)	(8)	(8)	(9)	(8)	(8)
1st Prin. Component	-.35	-.40	-.26	-.20	-.29	-.27
Fertilizer Prices	(.16)	(.21)	(.19)	(.16)	(.30)	(.14)
Effective Allotment	7,483	3,841	9,013	4,729	3,189	2,722
	(1,372)	(706)	(1,799)	(1,221)	(717)	(493)
Diversion Payment Rate	.60	.60	.58	.61	.61	.62
	(.37)	(.37)	(.36)	(.38)	(.38)	(.38)
Maximum Diversion	4,236	2,187	5,109	2,731	1,838	1,545
	(1,362)	(714)	(1,660)	(930)	(613)	(499)

[a/] The mean values appear on the first line. The standard deviations are directly below the mean in parentheses.