THE EVOLUTION OF FARM PROGRAMS AND THEIR CONTRIBUTION TO AGRICULTURAL LAND VALUES

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The economic environment of agricultural producers has been influenced by formal U.S. agricultural policy for more than seventy years. Among the first pieces of New Deal legislation proposed by incoming President Franklin D. Roosevelt, was a farm program designed to address declines in crop prices and net farm income. Key features of the Agriculture Act of 1933 included mandatory price support for specified commodities, direct subsidy payments to farmers, and supply controls. Farm programs, once viewed as temporary and supplementary to agricultural earnings, are increasingly viewed as permanent and of major proportion. Gardner examined the relationships between U.S. farm commodity programs and U.S. farm structure, while others (see Sumner for concept, evidence, and implications) have examined farm programs and specific crops. Gardner (2002), and Weersink et al. analyzed the effects of farm program programs upon land values. These studies examined various aspects of agricultural policy including whether farm program payments have enhanced land prices and landowner wealth rather than the welfare of producers.

While it would seem logical that revenue-enhancing farm programs would increase land values, reliably estimating the magnitudes of farm program effects upon land values is an empirically challenging task. Both statistical and budgeting-based methodologies have been used to estimate the share of land prices generated by farm program payments. Statistically based studies are complicated by the fact that both real per acre crop receipts and per acre farm program payments have trended upward over time but tend to be negatively correlated within any given year. We believe that this complication has resulted in the ambiguity of findings in several published econometric studies. Below we present an example in which farm program payments are estimated to be negatively related to land values when the crop receipt-farm program payment collinearity and identification problems are not addressed.

An additional complication affecting both the statistical and budget-based approaches is the fact that the net land rental shares of crop returns and farm program payments are unknown and may differ over time. If an income capitalization approach is to be utilized to directly estimate land values, the net land rental shares of both gross crop receipts and farm program payments must be assumed or estimated. Erroneous assumptions with respect to the net rental shares may lead to serious errors in the estimated shares of land values generated by farm program payments.

Our contribution in this article is three-fold. We propose the use of a triangular-structure simultaneous equation income capitalization model that addresses the identification difficulties introduced by the counter-cyclical nature of farm program payments. Second, we utilize procedures that enable the indirect estimation of the proportion of agricultural land values generated by crop returns and farm program payments. These are obtained from the estimated elasticities of the crop returns and farm program payment variables from the triangular-structure simultaneous equation econometric model. The methods used do not require a priori knowledge of the crop returns-farm program payment land rental shares. Finally, changes in the estimated crop returns-farm program payment land values shares are estimated for the time periods corresponding to the various farm bills in effect since 1938.

In the next section, a brief discussion of the evolution of farm bills and farm programs since

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1938 is presented. The triangular-structure simultaneous equation income capitalization model is presented in the theoretical section followed by the econometric model. Results of the empirical application to U.S. state-level data with the forty-eight contiguous states forming the cross-sectional units and the period 1940–2002 forming the time series are also presented.

Evolution of Farm Bills and Programs

A farm bill refers to a multi-year, multicommodity federal support law for farm programs. Some standing authority for these programs is provided by the permanent laws of the Agricultural Adjustment Act of 1938 and Agricultural Act of 1949. However, Congress usually amends provisions of permanent law, reauthorizes or amends provisions of preceding temporary agricultural acts, and puts forth new provisions for a limited time into the future. Table 1 provides the chronology of major farm bills since 1938. For detailed discussion on the evolution of farm bills and the programs see Shaik, Helmers, and Atwood.

The Agricultural Adjustment Act of 1938 is considered part of the permanent legislation for farm programs. The 1938 Act was the first to make price support mandatory and established marketing quotas. Title V of the Act established the Federal Crop Insurance Corporation. Agricultural Act of 1949 along with the Agricultural Adjustment Act of 1938 makes up the major part of the permanent law. The 1949 Act designated mandatory support for basic commodities and the nonbasic commodities. The Agriculture Act of 1954 established a flexible price support for basic commodities at 82.5–90% of parity and authorized a Commodity Credit Corporation reserve for foreign and domestic relief. The Agricultural Act of 1956 established Soil Bank Program that authorized short-term (1956–1959) and long-term (3, 5, or 10 years) removal of land from production with annual rental payments. The Food and Agricultural Act of 1965 was the first multi-year farm legislation or omnibus bill that continued payment and acreage diversion programs. The Agricultural Act of 1970 introduced voluntary annual cropland set-asides and marketing certificate payments to achieve parity prices. The Agriculture and Consumer Protection Act of 1973 created target prices and deficiency payments, established annual payment limits at $20,000 for all program crops, and authorized disaster payments. The Food and Agriculture Act of 1977 increased price and income supports. The Agriculture and Food Act of 1981 was the four-year omnibus farm bill that continued and modified commodity programs through 1985.

The Food Security Act of 1985, a five-year omnibus farm bill provided for lower commodity price and income supports, established a dairy herd buyout program, and created conservation programs including the Sodbuster, Swampbuster, and the Conservation Reserve Program. The Food, Agriculture, Conservation, and Trade Act of 1990 was a five-year omnibus farm bill. It continued to move agriculture in a market-oriented direction by freezing target prices and allowing more planting flexibility. The Federal Agriculture Improvement and Reform Act of 1996 was the omnibus farm bill that decoupled the link between income support payments and farm prices. The law increased planting flexibility by allowing participants to plant 100% of their total contract acreage to any crop.

Theoretical Foundations

Most structural models examining agricultural land values have been based upon the income capitalization model (Burt). The basic representation of the income capitalization model is derived from discounting expected returns over an infinite life giving

$$V = A/r \tag{1}$$

where V is land value, A represents annualized expected real returns, and r is a real discount rate.

An extension that explicitly differentiates between the crop returns and farm program payments components of A provides a mechanism for policy analysis. The individual components include expected crop returns (c), expected farm program payments (g), real interest rates r, and expected variability associated with returns (*risk*). To account for the growing nonfarm demand for land due to urban expansion, nonfarm employment representing the nonfarm influences (*nf*) are included in the real land value equation. Following Weersink et al., the extended income capitalization model can be represented as

Table 1. Means of the Variables by Farm Bill Periods Used in the Analysis, 1940–2002

Farm Bills	Farm Bills Period	Agriculture Land Values	Farm Program Payments	Real Interest Rates	Crop Returns	Risk	Nonfarm Employment	Farm Size	Herfindahl
Agricultural Adjustment Act of 1938	FB_1 (1940–1947)	301	5.72	3.36	62.67	13.98	12.12	181	0.3436
Agricultural Act of 1949	FB_2 (1948–1953)	359	3.73	3.43	89.30	21.47	13.38	217	0.3539
Agricultural Act of 1954	*FB3* (1954–1955)	380	1.46	1.81	82.69	17.90	14.90	255	0.3386
Agricultural Act of 1956	FB_4 (1956–1964)	468	3.22	3.79	82.37	12.39	18.81	295	0.3475
Food and Agricultural Act of 1965	FB_5 (1965–1969)	612	8.04	4.58	101.43	14.40	29.59	354	0.3612
Agricultural Act of 1970	FB_6 (1970–1972)	759	10.77	2.73	108.50	16.13	36.46	377	0.3558
Agriculture and Consumer Protection Act of 1973	FB_7 (1973–1976)	976	8.27	2.48	129.81	24.48	40.33	402	0.3570
Food and Agriculture Act of 1977	FB_8 (1977–1980)	1,311	3.27	1.27	164.34	32.49	44.51	427	0.3662
Agriculture and Food Act of 1981	FB_9 (1981–1984)	1,366	3.41	2.16	164.56	33.03	47.02	429	0.3555
Food Security Act of 1985	FB_{10} (1985–1989)	1,058	10.29	6.31	164.13	29.94	56.24	449	0.3515
Food, Agriculture, Conservation, and Trade Act of 1990	FB_{11} (1990–1995)	1,185	12.92	5.00	170.40	27.54	61.24	452	0.3641
Federal Agriculture Improvement and Reform Act of 1996	FB_{12} (1996–2002)	1,354	11.60	5.20	181.94	23.15	71.55	437	0.3621
Average	1940–2002	844	7.35	3.51	125.18	22.24	37.18	356	0.3548

Note: The units of real land values, farm program payments, crop returns, and risk are in real 1996 dollars per acre. Real interest rates are in percentages, nonfarm employment is in number of employed per acre, farm size are in acres and Herfindahl is an index of crop acreage. The mean of the variables by farm bill periods are simple averages of the yearly state-level data.

$$(2) \qquad V = f\,(c,\ g,\ r, risk, nf)\,.$$

Both expected crop returns and expected farm program payments are hypothesized to be positively related to land values. However, this extension with a single equation model has potential problems including identification issues introduced by the counter-cyclical or inverse relationship between c and g leading to insignificant or even negative estimated relationships of farm program payments with land values (Gardner; Shaik and Helmers). We believe these results are a consequence of the expected short-run negative relationship between crop receipts and farm program payments. To address this issue, we use a second equation to estimate expected farm program payments. In the second equation we include a Herfindahl index of crop acreage diversification (*herfindahl*) and a farm size variable (*fsize*) to account for the wide range of agricultural crop intensity in the United States. We also include farm bill dummy variables (FB_j, where $j = 1, \ldots, 12$ major farm bills introduced since 1940). The second equation attempts to model expected per acre farm program payments as

$$(3) \qquad g = f(c,\ risk,\ fsize,\ herfindahl, FB_j).$$

Due to the endogeneity of the explanatory variable (farm program payments), i.e., one or more of the explanatory variables are recursively determined with the dependent variable (land value), we use a triangular-structure simultaneous equation statistical modeling. The joint estimation of equations (2) and (3) overcomes the identification issue and provides a more accurate estimation of the income capitalization model. The triangular-structure simultaneous income capitalization model can be represented as

$$(4) \qquad \begin{aligned} V &= f((c,\ g,\ r, risk),\ nf) \\ g &= f(c,\ risk,\ fsize,\ herfindahl, FB_j). \end{aligned}$$

If the system in (4) can be identified, results in Shaik, Helmers, and Atwood demonstrate that (1) the estimated partial elasticities of the agricultural land values with respect to c and g can be used to obtain estimates of the agricultural land value shares contributed by expected crop returns and expected farm program payments, (2) the sums of these elasticities should be less than or equal to unity, and (3) the elasticity (and hence value share) estimates are independent of the land rental shares of gross crop receipts and farm program payments. As such we do not need to identify or assume land rental shares for crop receipts or farm program payments.

Empirical Analysis

The triangular-structure simultaneous equation capitalization model is estimated to examine the factors affecting farmland values using data from the contiguous 48 states in the United States for the period 1940–2002. To demonstrate the importance of using the two-equation model, we first present the results of estimating the single equation (2) with a two-way random effects specification. The single equation model can be represented as

(5)
$$\begin{aligned} V_{i,t} &= \alpha + \beta_c c_{i,t} + \alpha_g g_{i,t} + \beta_r r_{i,t} \\ &\quad + \beta_{risk} risk_{i,t} + \beta_{nf} nf_{i,t} + u_i + v_t + w_{i,t} \end{aligned}$$

where i and t represent the cross section and time series dimension; V is agricultural land value per acre, c the expected crop receipts per acre, g the expected farm program payments per acre, r is the expected real interest rate, *risk* the expected variability associated with crop receipts per acre and *nf* is nonfarm employment per acre.

To examine the triangular-structure simultaneous equation income capitalization model as defined in equation (4), the following pooled triangular-structure simultaneous equation model (the triangular-structure simultaneous model is also referred to as a recursive model, for details refer to Kmenta, pp. 659–60) is proposed:

(6)
$$\begin{aligned} V_{i,t} &= \alpha_1 + \beta_{1,c} c_{i,t} + \alpha_g g_{i,t} + \beta_{1,r} r_{i,t} \\ &\quad + \beta_{1,risk}\, risk_{i,t} + \beta_{1,nf}\, nf_{i,t} + \varepsilon_{1,i,t} \\ g_{i,t} &= \alpha_2 + \beta_{2,c} c_{i,t} + \beta_{2,risk}\, risk_{i,t} \\ &\quad + \beta_{2,fsize}\, fsize_{i,t} + \beta_{2,herfindahl}\, herfindahl_{i,t} \\ &\quad + \sum_{j=2}^{12} \beta_{2,j} FB_j + \varepsilon_{2,i,t} \end{aligned}$$

where V, c, g, r, *risk*, and *nf* are defined below equation (5) and above equation (3). As demonstrated in Shaik, Helmers, and Atwood, the estimated partial elasticities of agricultural land values with respect to c and g can be used to estimate the agricultural land value shares contributed by expected crop returns and expected farm program payments and the sum of these elasticities should be less than or equal to unity.

Next, we estimate the contribution of expected crop returns and farm program payments to agricultural land values by farm bill periods. To accomplish this, we allow the crop returns and farm program payments slopes to vary by farm bill period by including farm bill dummy-crop return and farm program interaction variables respectively. This can be represented by re-writing equation (6) as

$$(7)\quad V_{i,t} = \alpha_1 + \sum_{j=1}^{12} \beta_{1,j,c}\,(c_{i,t} * FB_j) + \sum_{j=1}^{12} \alpha_{j,g}\,(g_{i,t} * FB_j) + \beta_{1,r}\, r_{i,t} + \beta_{1,risk}\, risk_{i,t} + \beta_{1,nf}\, nf_{i,t} + \varepsilon_{1,i,t}$$

$$g_{i,t} = \alpha_2 + \beta_{2,c} c_{i,t} + \beta_{2,risk} risk_{i,t} + \beta_{2,fsize} fsize_{i,t} + \beta_{2,herfindahl} \times herfindahl_{i,t} + \sum_{j=2}^{12} \beta_{2,j}\, FB_j + \varepsilon_{2,i,t}.$$

To demonstrate the validity that the sum of expected crop returns and expected farm program payments elasticities should equal unity by farm bill periods, we test the null hypothesis $\beta_{1,j,c}\bar{c}_j + \alpha_{j,g}\bar{g}_j = \bar{V}_j$ for $j = 1, \ldots, 12$ major farm bills in system (7). The $\bar{c}$, $\bar{g}$, and $\bar{V}$ are the mean values of crop returns, expected farm program payments, and real land values during the during the twelve farm bill periods.

For details on the sources of the data used in the analysis see Shaik, Helmers, and Atwood (2005). To be consistent with the agricultural land value per acre dependent variable, all the variables are standardized to a per acre basis using acres in farms.

Table 1 provides the summary statistics of the variables used in the analysis by farm bill periods. Average U.S. agricultural land value per acre increased from $301 in the first farm bill period to $1,354 in the last farm bill study period. During the same farm bill periods, expected crop receipts per acre increased from $66.67 to $181.94 and the number of people employed in nonfarm employment increased from 12.12 to 71.55 per acre. Farm program payments per acre were smallest in the third farm bill period and highest in the last farm bill period, $1.46 and $11.60, respectively. In contrast, variability in expected crop returns per acre increased from the first ($13.98) to the ninth ($33.03) farm bill period declining to $23.15 in the last farm bill period. Producers faced the lowest (1.27%) and highest (6.31%) real interest rate in the eighth and tenth farm bill period respectively. Farm size increases from the first (181 acres) to the eleventh (451 acres) farm bill period with a slight drop to 437 acres in the last farm bill period.

Empirical Results

Parameter coefficients, *p*-values, and partial elasticities from the three models are presented in tables 2 and 3, respectively (for details on the panel modeling, estimation, and results see Shaik, Helmers, and Atwood). The three models are the pooled traditional income capitalization model (equation 5), pooled triangular structure simultaneous equation for the extended income capitalization model (equation 6), and pooled triangular structure simultaneous equation for the extended income capitalization model by farm bill periods (equation 7).

In the single-equation results presented in table 2, real interest rates are negatively related (as expected) to land values but are not statistically significant. Crop return risk was negative and significant implying higher expected risk lowers the land values. As expected, nonfarm employment per acre was positive and significant. Expected crop returns are positive and significant indicating higher returns are expected to increase land values. Expected farm program payments were also anticipated to be positively related to land values, but were negative and significant. Similar negative signs for farm program payments were indicated by Shaik and Helmers for all U.S. production regions.

Although space prevents their presentation, state-level plots of real per acre crop receipts and farm program payments show clear evidence of negative short-term correlation. We believe this results in the negative estimated relationship between farm program payments with agriculture land values when crop receipts are also included in the model. To address this problem, the triangular-structure simultaneous equation income capitalization model of agriculture land values and farm program payments as defined in equation (6) is estimated. Estimated coefficients of the variables

Table 2. Pooled Results of Traditional and Extended Income Capitalization

	Traditional Model Equation (5)		Extended Model Equation (6)			
Variables	Coefficient	Pr > |t|	Coefficient	Pr > |t|	Elasticities	Restricted Elasticities
Real land value equation						
Intercept	316.234	<.0001	193.905	<.0001		
Real interest rates	−12.036	0.3612	−69.063	<.0001	−0.2872	−0.2532
Crop returns	4.429	<.0001	5.186	<.0001	0.7690	0.6925
Farm program payments	−4.560	<.0001	43.444	<.0001	0.3547	0.3017
Risk	−4.962	<.0001	−6.605	<.0001	−0.1740	−0.1215
Nonfarm employment	3.799	<.0001	1.961	<.0001	0.0864	0.0960
Farm program payment equation						
Intercept			7.962	<.0001		
Crop returns			−0.007	<.0001	−0.1217	−0.0790
Risk			0.018	0.002	0.0584	0.0212
Farm size			−0.002	<.0001	−0.0889	−0.0945
Herfindahl			−7.571	<.0001	−0.3897	−0.4270
FB_2 (1948–1953) = 1			−1.962	0.000	−0.0276	−0.0300
FB_3 (1954–1955) = 1			−3.547	<.0001	−0.0166	−0.0173
FB_4 (1956–1964) = 1			−0.294	0.085	−0.0062	−0.0099
FB_5 (1965–1969) = 1			4.259	<.0001	0.0498	0.0513
FB_6 (1970–1972) = 1			5.285	<.0001	0.0371	0.0397
FB_7 (1973–1976) = 1			3.751	<.0001	0.0351	0.0353
FB_8 (1977–1980) = 1			2.232	<.0001	0.0209	0.0187
FB_9 (1981–1984) = 1			3.810	<.0001	0.0357	0.0331
FB_{10} (1985–1989) = 1			8.595	<.0001	0.1005	0.1013
FB_{11} (1990–1995) = 1			8.580	<.0001	0.1205	0.1230
FB_{12}(1996–2002) = 1			9.704	<.0001	0.1363	0.1389

involved in the agricultural land value equation and farm program payment equation are presented in the right side of table 2.

In table 2 both crop returns and farm program payments are positive and significantly related to agriculture land values. To examine the relative effect of crop returns and farm program payments we present two sets of elasticities. The first is from the unrestricted model (where the sum of the crop return and farm program payment elasticities may exceed unity). The second set of results is from the model when the crop return and farm program payments elasticities are restricted to sum to unity. Using the estimated elasticities, a 10% decrease in expected crop returns would be expected to reduce agricultural land values by 6.9%. A 10% decrease in expected farm program payments implies a 3% reduction in agriculture land values. Similar results with respect to other variables in the regression can be obtained by examining the corresponding elasticities.

Due to the counter-cyclical nature of expected farm program payments and crop returns an elasticity of –0.079 is estimated for expected crop returns in the farm program payment equation. Increased risk is expected to increase farm program payments with elasticity of 0.021. Farm size with an elasticity of –0.09 in the farm program payment equation indicates that a 10% increase in farm size is associated with almost one percent lower per acre farm program payment. The negative and significant coefficient for Herfindahl index of crop acreage indicates farm program payments are lower under greater crop enterprise specialization. Relative to the first farm bill period, the rest of the farm bill periods saw an increase in farm program payments. The partial elasticities with respect to crop receipts and farm program payments can be used to obtain estimates of the share of agricultural land values generated by crop returns and farm program payments. Pooled over the entire United States, the average share of land values generated by farm program payments over the period 1940–2002 was 0.3017, or about 30%.

We also wanted to estimate whether the farm program payment share of land values

Table 3. Pooled Results of Extended Income Capitalization with Crop Return and Program Payments Slopes

	Real Land Value Equation					Farm Program Payment Equation			
	Coefficient	Pr > |t|	Elasticities	Restricted Elasticities		Coefficient	Pr > |t|	Elasticities	Restricted Elasticities
Intercept	171.957	<.0001			*Intercept*	9.451	<.0001		
Real interest rates	−22.063	0.001	−0.0917	−0.0741	*Crop Returns*	−0.007	<.0001	−0.1262	−0.1422
Risk	−7.199	<.0001	−0.1897	−0.2006	*Risk*	0.027	<.0001	0.0870	0.0995
Nonfarm employment	1.935	<.0001	0.0852	0.0772	*Farm size*	−0.002	<.0001	−0.1018	−0.1018
Crop returns $* FB_1$	3.129	<.0001	0.6503	0.6627	*Herfindahl*	−8.573	<.0001	−0.4413	−0.4382
Crop returns $* FB_2$	3.661	<.0001	0.9099	0.9104	FB_{dum2}	−2.593	0.000	−0.0364	−0.0343
Crop returns $* FB_3$	4.088	<.0001	0.8889	0.9205	FB_{dum3}	−3.999	<.0001	−0.0187	−0.0197
Crop returns $* FB_4$	3.841	<.0001	0.6758	0.7478	FB_{dum4}	−1.367	<.0001	−0.0288	−0.0350
Crop returns $* FB_5$	3.492	<.0001	0.5787	0.6165	FB_{dum5}	4.105	<.0001	0.0480	0.0467
Crop returns $* FB_6$	3.972	<.0001	0.5680	0.6077	FB_{dum6}	5.881	<.0001	0.0413	0.0402
Crop returns $* FB_7$	4.950	<.0001	0.6582	0.6804	FB_{dum7}	2.212	<.0001	0.0207	0.0215
Crop returns $* FB_8$	5.251	<.0001	0.6580	0.6774	FB_{dum8}	−1.495	0.060	−0.0140	−0.0129
Crop returns $* FB_9$	5.689	<.0001	0.6853	0.7622	FB_{dum9}	−0.096	0.106	−0.0009	−0.0080
Crop returns $* FB_{10}$	4.734	<.0001	0.7343	0.7653	FB_{dum10}	7.549	<.0001	0.0883	0.0870
Crop returns $* FB_{11}$	5.730	<.0001	0.8239	0.8406	FB_{dum11}	7.443	<.0001	0.1045	0.1077
Crop returns $* FB_{12}$	5.750	<.0001	0.7730	0.8084	FB_{dum12}	8.262	<.0001	0.1160	0.1132
Farm program payments $* FB_1$	20.046	<.0001	0.3801	0.3355					
Farm program payments $* FB_2$	21.929	0.000	0.2275	0.0889					
Farm program payments $* FB_3$	6.544	0.827	0.0252	0.0789					
Farm program payments $* FB_4$	33.624	<.0001	0.2311	0.2517					
Farm program payments $* FB_5$	30.222	<.0001	0.3971	0.3836					
Farm program payments $* FB_6$	27.592	<.0001	0.3915	0.3925					
Farm program payments $* FB_7$	43.142	<.0001	0.3654	0.3192					
Farm program payments $* FB_8$	141.816	<.0001	0.3541	0.3228					
Farm program payments $* FB_9$	86.759	<.0001	0.2169	0.2381					
Farm program payments $* FB_{10}$	25.992	<.0001	0.2528	0.2345					
Farm program payments $* FB_{11}$	19.520	<.0001	0.2129	0.1593					
Farm program payments $* FB_{12}$	22.717	<.0001	0.1947	0.1919					

had changed during farm bill periods. To examine if the sum of the partial elasticities of agricultural land values with respect to c and g are less than or equal to unity for each of the farm bill periods, we estimate equation (7) and test the null hypothesis $\beta_{1,j,c}\bar{c}_j + \alpha_{j,g}\bar{g}_j = \bar{V}_j$ for the $j = 1, \ldots, 12$ major farm bill periods. Again we fail to reject the joint null hypothesis for each individual farm bill period. The estimated coefficients of the variables involved in equation (7) for the agricultural land value and farm program payment equations are presented in table 3.

The relative elasticity values from the farm bill dummy-crop return and farm program interaction variables provide estimates of the share of agricultural use land value generated by crop returns and farm program payments from 1938 through the most recent farm bill. The proportions of agricultural land values attributable to farm program payments and crop returns are estimated at 30% and 70% of agricultural land values respectively over the time period and states included in the study. In more recent years the share of land values generated by farm program payments appears to have declined from their peak of about 40% in the 1960s and 1970s to more recent levels between 15% and 20%. While the exact causes of these declines may be due to a combination of farm programs and other events that occurred within the same time periods, the evidence appears to indicate that farm program distortions in land markets have declined in recent history.

Summary and Conclusions

This article has presented an extension of the capitalization model enabling the estimation of the proportion of agricultural land values generated by farm program payments and crop returns. The triangular-structure simultaneous equation model enables the identification of each equation in the model while accounting for the counter-cyclical nature of farm program payments and crop returns. The study's focus on elasticities that permits the estimation of the proportion of agricultural land values generated by crop receipts and farm program payments without explicitly identifying or assuming the land rental share of crop receipts or farm program payments.

As expected, the results of the empirical application to forty-eight states in the United States for 1940–2002 indicate a positive and significant relationship for expected real crop receipts and farm program payments, while risk and real interest rates are negatively related to real agricultural land values. The estimates indicate that the share of agricultural land values generated by farm program payments increased up to as much as 30% to 40% of land values during the 1938–1980 period. Since 1980, the share of agricultural land values generated by farm program payments has declined to levels between 15% and 20%.

If this article's estimated proportion of agricultural land values is accurate, there are several policy implications. One is that, although real per acre government payments have been increasing over time, it appears that their distorting effects upon land markets have diminished with time. If true, then future efforts to reduce net subsidization of agriculture would not be expected to have the catastrophic effect upon land prices, as would have been the case in the 1960s or 1970s.

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