EFFECTS OF FARM POLICY ON THE FIRM LEVEL RISK ENVIRONMENT AND IMPLICATIONS FOR POLICY

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Conventional wisdom holds that policy changes alter the risk environment for agricultural producers. Price and income supports and monetary/fiscal policy affect the price distributions for grains, fiber, and livestock. Supply control provisions and federal income tax regulations affect the aggregate supply of agriculture. Trade policies and farm programs in foreign countries affect the demand for U.S. agricultural products.

Although conventional wisdom holds that policy changes alter the risk environment, aggregate policy models have not been developed to quantify the impacts of policy alternatives on the risk faced by farmers. As a result, policy makers have not been informed as to the probable effects of policy changes on the overall level of risk faced by agriculture, consumers, and the U.S. Treasury.

The primary objective of this paper is to show how farm policy changes affect the risk environment of crop producers. A secondary objective is to discuss the implications of these results for the policy process.

Impacts of Farm Policies on Crop Farms

To address the first objective, the simulation results for different types and sizes of representative rice and cotton farms are presented. The model used for the analyses (FLIPSIM) incorporates the price and yield variability faced by individual producers, as well as the farm programs, income tax provisions, and macroeconomic policies under consideration. The model is described in detail elsewhere by Richardson and Nixon, so further discussion of the model is not provided in this paper.

The results of two firm level, policy studies are summarized to illustrate the effects of farm policy on representative crop farms. The first study predicts the effects of a major policy change on Texas rice producers (Grant et al.), while the second outlines the consequences of proposed farm programs on Texas cotton producers (Knutson et al.).

Rice producers

When Congress passed the Rice Production Act of 1975 a 20 year era of high price supports, acreage allotments, and marketing quotas came to an end. The 1975 Act replaced strict supply controls and high price supports (65% of parity) with a target price, acreage set aside and loan rate program. As indicated in Figure 1, the Texas farm price for rice was much more variable after 1975 than during the 1960s. The coefficient of variation for Texas rice prices increased from 2.8% in 1960-71 to 18.11% over the 1974-81 period. Under the old loan rate formula, the Texas rice price would have exceeded the loan rate in only one year (1977) between 1975 and 1981.

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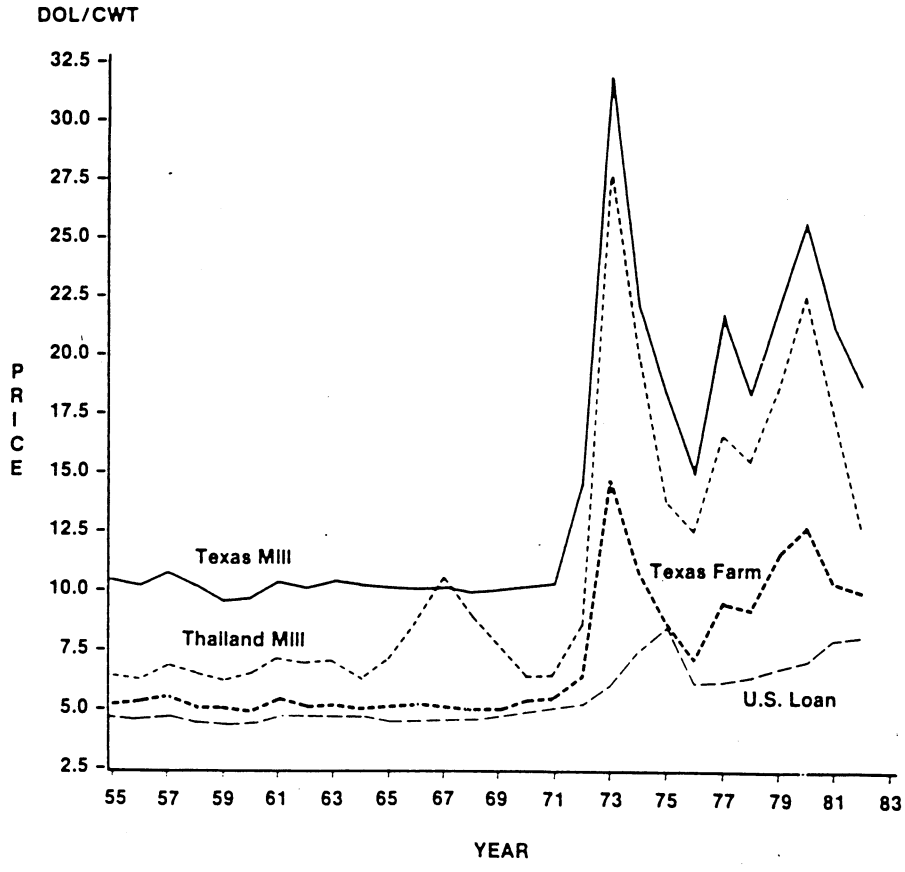
Figure 1. Season Average Rice Prices, 1955-82.
Data Source: USDA-ERS, Rice Outlook and Situation



Grant et al. compared the 1960s policy for rice (and associated macroeconomic and foreign policies) to the more market oriented policy environment of the late 1970s for Texas rice producers. They found that the increased price variability changed the marketing margin for Texas producers. The retail-to-mill margin was increased $0.45/cwt. and the farm-to-mill margin $0.52/cwt. due to the increased price variability.

Three representative rice farms (full owner, part owner, and tenant) in the Texas Upper Gulf Coast were simulated using FLIPSIM for 10 years under the 1960s and 1970s policy scenarios. The policy variables relevant for the two farm programs and the multivariate empirical probability distributions for rice price (first and second crop) were the only changes between the two scenarios. The mean price of first crop rice was increased from $5.09/cwt. under the 1960s policy to $9.73/cwt. for the 1970s policy. All other variables (eg., tax provisions, interest rates, inflation rates, yield distributions, initial equity, machinery replacement rules, crop budgets, and family consumption) were held constant to isolate the effects of the policy changes on rice producers. (Grant et al. provide a complete description of the assumptions and the representative farms.)

Shifting to the 1970s farm policy for rice significantly altered the risk environment faced by the three representative rice farms. Probability of survival (remaining solvent for 10 years) fell for all three farms but the greatest decline was for tenant farmers. The net present value probability distribution for all three farms was altered by the policy change, as indicated by the change in the mean, minimum, and maximum. Average net present value increased more than $60,000 for the part and full owner farms and decreased more than $50,000 by the tenant farm. All three farms experienced a decrease in the minimum net present value and an increase in the maximum net present value.

Thus the policy change resulted in spreading out the net present value distribution, i.e., making the good times better and the bad times worse. This result is shown more dramatically in Figures 2 and 3 where the full and part owner's net present value probability distributions for the two policy scenarios are compared. The coefficient of variation for net present value indicates that on balance the policy change drastically increased the relative variability of net present value for Texas rice producers. Shifting from a high price support with stable prices to a program with increased price variability and an income supporting target price, resulted in greater variability in net income and net present value. The reason being that the payment limitation precluded producers from gaining the full benefit of the income supports offered by the target price, whereas there was no limitation on CCC loans under the 1960's farm program.

The magnitudes of the results in Table 1 change as the producer's initial equity, costs of production, and marketing margin change, however, the direction of the results remain the same. The policy change for rice resulted in greater relative risk for all types (tenure) of farms, decreased the chance of survival for tenant farmers, and increased the profitability for full and part owners. (A similar study by Brorsen et al. on wheat had about the same overall conclusions.)

Cotton producers

Knutson et al. quantified the impacts of alternative farm programs at both the aggregate (supply and utilizations) and the firm (representative crop farms) level. The firm level results for four separate farm policies are presented here. The results for the moderate-size (1360 acre) and large (3300 acre) cotton farms in the Texas Southern High Plains. Each farm was analyzed under the same set of assumptions for the macroeconomic situation, initial equity, consumption function, machinery replacement rules, and income tax provisions, across all four farm policies. Thus all differences in net present value and survival can be attributed to the proposed farm policy change.

Figure 2. Probability Distribution of After-Tax Net Present Value, Owner-Operator

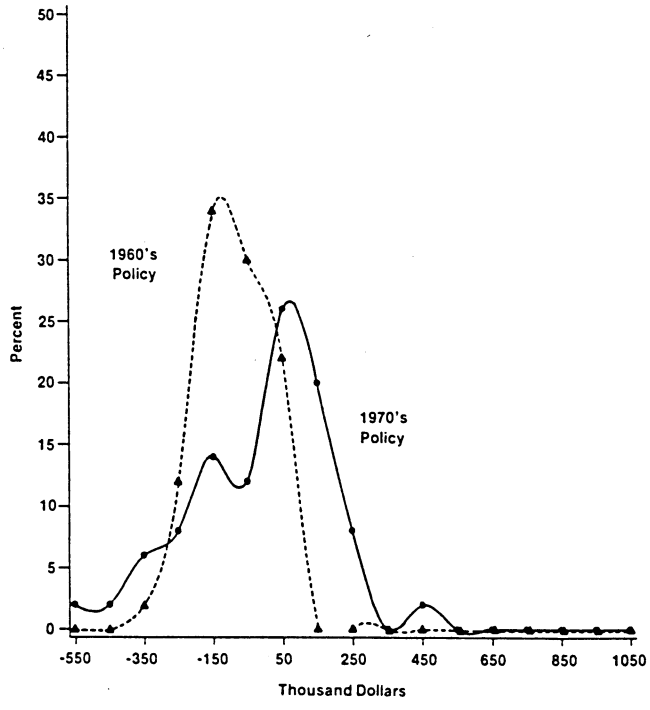


Figure 3. Probability Distribution of After-Tax Net Present Value, Part Owner-Operator

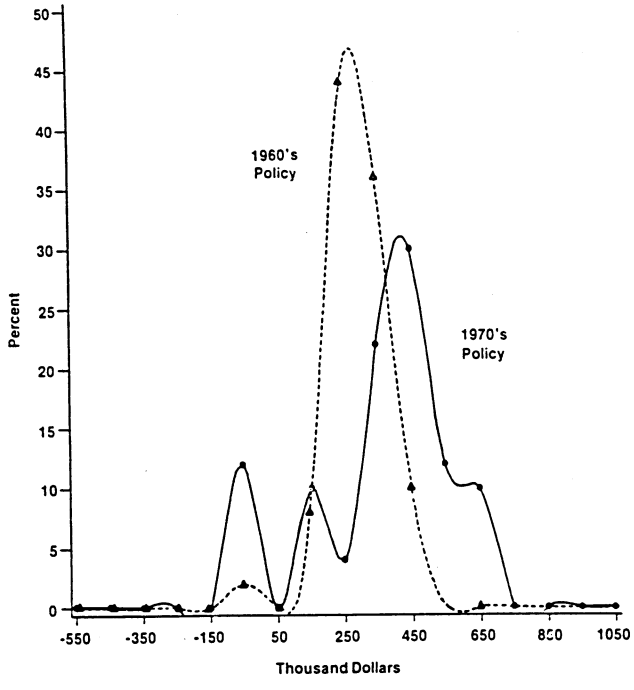


Table 1. Comparison of the 1960's Rice Policy to the 1970's Rice Policy for Rice Producers in the Texas Upper Gulf Coast.

Item[a]	Full Owner		Part Owner		Tenant	
	1960's Policy	1970's Policy	1960's Policy	1970's Policy	1960's Policy	1970's Policy
Probability of survival (%)	100	98	98	88	86	70
Probability of success (%)	22	56	98	88	100	70
Net Present Value						
Mean ($1000)	-92	-11	304	367	606	552
Coef.Var. (%)	108	1865	28	56	38	66
Minimum ($1000)	-312	-538	-8	-87	19	-36
Maximum $1000)	89	493	455	692	822	1030

[a] Probability of survival is the probability that the farm will maintain its leverage ratios at less than maximum levels established for local financial institutions.

- Probability of success is the probability that net present value will be greater than or equal to zero, assuming a discount rate of 4%.

- Net present value is the present value of net annual family withdrawals plus the present value of change in net worth over the 10-year planning horizon. After-tax net present value is largest for the tenant and smallest for the full owner due to the dollar value of initial equity each has invested, the amount of net gains each has from leasing idle land for pasture (none for the tenant), and the amount of retained earnings for each farm. Annual interest and principal payments on cropland for the full owner exceed the annual crop share rental cost of tenants who have greater annual retained earnings.

The four farm policies analyzed over the 1987-90 planning horizon are the following:

- BASE - a continuation of the 1985 farm bill through 1990 with continued high federal budget deficits and fast growth in the money supply (HD-FM).

- LOWTP - a continuation of the 1985 farm bill and HD-FM macroeconomic policy but with target prices reduced 25% from their announced levels after 1987.

- HARKIN - the HD-FM macroeconomic policy but the provisions of the Harkin Bill are implemented after 1987. The Harkin Bill called for a mandatory supply control (28 to 32% set aside for cotton), high price supports (10 to 15% greater than BASE target prices) for a portion of output and a lower price for the remainder, and export subsidies to prevent accumulation of stocks.

- LIMIT - the provisions of the BASE are used, but the $50,000 and $200,000 per producer payment limit was strictly enforced and the farm was eligible only as one individual under the payment limit rules.

A more detailed description of each of these farm policies and their aggregate impacts on corn, wheat, sorghum, cotton, and soybeans is provided in Knutson et al. Annual prices for the aggregate analyses were regionalized for the firm level analyses reported here. Relative price variability was held constant at historical levels for the BASE, LOWTP, and LIMIT scenarios and was assumed to decrease 50% for the HARKIN scenario.

The simulation results for the eight scenarios (two farms and four policies) are summarized in Table 2. Relative to the BASE (continuation of the 1985 farm bill) any policy change would have dramatic effects on the risk faced by the two farms. The probability of survival for the moderate-size farm was dramatically reduced by either the reduction in target prices or the imposition of an effective payment limit. The probability of success (probability of receiving a 5% or greater return on equity) for the large farm was reduced to near zero for the LOWTP and LIMIT scenarios.

Relative variability of net present value was similarly affected by changes in the farm program. The use of high price supports under the HARKIN proposal would reduce the coefficient of variation from 93% to 83% for the moderate-size farm and from 82% to 33% for the large farm. The LOWTP policy would increase the coefficient of variation on net present value for the large farm about 20 percentage points. For the moderate-size farm, this policy change would mean less variability because the farm would be forced out of business during the first three years. The coefficient of variation for net present value declines about 45% under the lower payment limit (LIMIT) scenario because deficiency payments become constant at $50,000, thus reducing the variability in net returns about a much lower mean.

The overall shape of the net present value distribution for the two farms would be altered as a result of the proposed policy changes. The minimum and maximum net present values are reduced under the LOWTP and LIMIT scenarios for both farms. Conversely, the minimums and maximums are increased for the HARKIN proposal.

The conclusion from the Knutson et al. analysis is that farm policy changes dramatically affect producers' risk environment, as measured by the net present value probability distribution. Moderate-size farms are more adversely affected then large farms when farm program benefits are removed because they are in a poorer position to manage risk. When farm program benefits are increased (eg., HARKIN), large farms garner larger absolute increases in net income and are thus better able to purchase assets for growth.

Table 2. Effects of Alternative Farm Policies on Moderate and Large Texas Southern High Plains Cotton Farms.

Item[a]	BASE[b]	LOWTP	HARKIN	LIMIT
	- - Moderate-Size Farm (1,360 acres) - -			
Probability of Survival (%)	94	2	98	76
Probability of Success (%)	4	0	94	0
Net Present Value				
Mean ($1000)	-67	-274	82	-127
Coef.Var.(%)	93	19	83	52
Minimum ($1000)	-302	-367	-182	-263
Maximum ($1000)	42	-100	206	-10
	- - Large Farm (3,300 acres) - -			
Probability of Survival (%)	100	94	100	100
Probability of Success (%)	90	8	98	4
Net Present Value				
Mean ($1000)	145	-154	492	-97
Coef.Var.(%)	82	101	33	47
Minimum ($1000)	-231	-716	-49	-173
Maximum ($1000)	411	133	813	49

[a] Probability of survival is the probability that the farm will maintain its leverage ratios at less than maximum levels established for local financial institutions.
- Probability of success is the probability that net present value will be greater than or equal to zero, assuming a discount rate of 4%.
- Net present value is the present value of net annual family withdrawals plus the present value of change in net worth over the 10-year planning horizon.

[b] BASE is continuation of 1985 farm bill through 1990, high federal budget deficits.
LOWTP is 25% reduction in 1985 farm bill's target prices after 1987.
HARKIN is the Harkin proposal after 1987.
LIMIT is continuation of the 1985 farm bill but with an effective $50,000/$200,000 payment limit.

Other policy studies using FLIPSIM to study Texas cotton farms (eg. Duffy, Richardson, and Smith) show that increased (decreased) price risk leads to a faster (slower) rate of growth if price and income support programs are available. In the absence of these programs, increased price risk would lead to faster growth for larger farms, but a much greater chance of insolvency for all sizes of farms.

Implications for Farm Policy

The impact of farm programs on the distribution of farm sizes has received insufficient attention. Small farms (less than $100,000 sales) generally do not depend on farm programs for their survival because they earn the larger share of their net income from off-farm. Moderate size farms ($100,000 to $250,000 sales) are more dependent on farm programs for their survival than large farms ($250,000 to $500,000 sales) or very large (over $500,000 sales). Moderate size farms are less able to manage risks associated with freer market policies. Large farms achieve greater economies of size. Very large farms not only achieve economies of size, but as a general rule have a substantial advantage in risk management.

While moderate size farms are more dependent on farm programs for their survival, large and very large farms ironically are in a better position to grow and survive with or without farm programs. For example, with the target price program, large farms receive the same deficiency payments per unit (in the absence of effective payment limits) in addition to higher than average market prices (on which the deficiency payment is based). Likewise, large farms are undoubtedly better at utilizing PIK certificates to their advantage. Large farms are better at farming farm programs.

Without farm programs, large farms are in a better position to manage the risks of freer markets than moderate size farms. Thus decoupling proposals of the Reagan-Boschwitz type would provide the greatest advantage to the largest farms. Not surprisingly, these are the farms that are most likely to advocate a movement to freer market policies.

In reality, large farms win no matter what policies are implemented -- unless a means is devised to implement timely effective payment limits. However, such a farm structure policy would lead to distortions and inefficiencies raising questions regarding their desirability.

Proposed farm bills should be evaluated for their impacts on structure. This includes an analysis of both their income and risk effects on each agricultural size segment. Equally important is the need for evaluation of the effects of farm bill implementation strategies on structure. The 1985 farm bill contains more than two dozen implementation (tools) options. Within each tool many different methods and levels for implementation exist. Not enough thought and analyses are being given to the realities and details of policy impacts in setting and implementing these options.

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