Impacts of Price Variability on Marketing Margins and Producer Viability in the Texas Wheat Industry

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The effects on marketing margins and Texas wheat producers of shifting from a period with stable prices to a period without stable prices were investigated using both econometric and simulation techniques. Empirical evidence reveals wheat export firms are risk averse and that either futures markets were unable to absorb increased price risk or futures markets absorbed increased price risk at a cost of $0.054 per bushel. Increased variability in prices and reduced farm program benefits substantially reduced the probability of Texas wheat producers receiving a reasonable return on equity and a reasonable rate of asset accumulation.

The impact of risk on production decisions has been the subject of much research (e.g., Just; Lin). Winter and Whittaker found increases in price variability resulted in decreased wheat acreage. Gallagher related the impacts of farm price stabilization to corn acreage responses. Additional impacts of risk other than acreage response need to be investigated. This paper seeks to quantify some of the impacts of risk on both producers and marketing firms. Changes in price risk faced by wheat producers are closely related to shifts in U.S. farm policy as well as changes in world economic conditions.

Two of the main purposes of past government farm programs have been to (a) stabilize prices, and (b) increase producers' incomes. The Agricultural Act of 1964 and extensions of the act through 1970 provided stable prices (Rasmussen and Baker; Heid). This program was based on supply control through acreage allotments, domestic marketing certificates, and high loan rates. U.S. farm prices began rising in 1972 due to a worldwide tight wheat supply and increased U.S. export demand. Prices had more than doubled by August of 1973. Concurrent with these events the decision by the United States to adopt a floating exchange rate and to place increased emphasis on agricultural exports for reducing trade deficits also affected the wheat industry. World shortages and high domestic prices allowed passage of the 1973 Agricultural and Consumer Protection Act which brought a dramatic shift in the emphasis of U.S. farm policy (Rasmussen and Baker). Target prices were introduced and used with lower loan rates to promote movement of wheat into international trade.

The shift in farm policy coupled with the change in U.S. and world economic conditions resulted in a change in price risk faced by wheat marketing firms as

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well as producers. Marketing firms' responses to price risk have an indirect impact on prices paid to producers. This research evaluates the impacts of the shift in farm policy and economic environment on marketing firms and Texas wheat producers. The impact on marketing firms of increased price risk is obtained first, and then the indirect impact on producers is estimated. Finally, both the direct and indirect impacts on producers of increased price risk induced by the shift in farm program emphasis and the change in economic environment are evaluated.

Procedures

Both econometric and simulation techniques were used to quantify the impacts of the increased price variability on marketing firms and Texas wheat producers. A theoretical model was developed and estimated to quantify the impacts of changes in price variability on marketing margins. The impacts of the change in wheat farm programs, marketing margins, and price variability on Texas wheat producers were estimated with a Monte Carlo whole farm simulation model. A typical High Plains wheat farm was simulated stochastically by the model for farm programs of both the 1960s and 1970s, to determine effects on producer survival and economic well-being.

Marketing Margin Model

The relationship of margins and risk in the Texas wheat industry can be depicted using a theoretical model developed by Gardner. Over 75 percent of Texas High Plains wheat is exported through the Gulf, therefore, only the marketing margin change for exporters is considered (Fuller *et al.*).

Gardner contends in his model of price determination for alternative levels of a marketing channel, that prices are determined by retail demand (exports, in this case), farm supply, and the supply of marketing services. Sandmo and Batra and Ullah have shown that increases in risk can shift a risk averse firm's input demand function. Similarly, if exporters are risk averse, a change in output price variability would be expected to shift the supply of marketing services. However, the full impact of increased price variability may be tempered by the fact that three viable wheat futures markets are available for firms to transfer a portion of the increased price risk to others at very little cost (Danthine; Feder *et al.*).

The supply of marketing services is written in price dependent form as

$$S = f_1(Q,V,Z) \tag{1}$$

where S is the margin, Q is quantity exported, V is a measure of price variability, and Z is a set of exogenous shifters (e.g., transportation costs). The quantity supplied at the farm (Q_f^s) is

$$Q_f^s = f_2(P_f,X) \tag{2}$$

where P_f is the farm price and X is a set of exogenous shifters (e.g., yield). The quantity demanded at the export level (Q_e^d) is

$$Q_e^d = f_3(P_e,Y) \tag{3}$$

where P_e is export price and Y is a set of exogenous shifters (e.g., population, income, world wheat production). The system is completed by the following identities:

$$P_f = P_e - S, \tag{4}$$

$$Q = Q_f^s = Q_e^d. \tag{5}$$

The inverse supply of marketing services (1) can be estimated directly assuming quantity is determined exogenously. The incidence of a change in margin can be determined by a method similar to that of Fisher. After estimates for (1) are obtained, the impact of increased price variability on the margin can be obtained by totally differentiating (1):

$$dS = \frac{\partial f_1}{\partial Q}dQ + \frac{\partial f_1}{\partial V}dV + \frac{\partial f_1}{\partial Z}dZ. \quad (6)$$

If dQ and dZ are assumed to be zero then (6) can be solved for the change in margin with a change in price variability. By equating the quantities in (2) and (3) and totally differentiating we obtain

$$\frac{\partial f_2}{\partial P_f}dP_f + \frac{\partial f_2}{\partial X}dX - \frac{\partial f_3}{\partial P_e}dP_e - \frac{\partial f_3}{\partial Y}dY = 0. \quad (7)$$

By assuming dX and dY to be zero and writing (7) in elasticity form, we obtain

$$e_s\frac{dP_f}{P_f} - e_d\frac{dP_e}{P_e} = 0 \quad (8)$$

where e_s is the elasticity of farm supply and e_d is the elasticity of export demand. By totally differentiating (4) we obtain

$$dP_f = dP_e - dS. \quad (9)$$

Equations (8) and (9) can be solved for dP_f and dP_e, given e_s, e_d, P_e, P_f, and dS. Thus, the change in farm price (dP_f) resulting from the impact of increased price risk on marketing firms can be obtained.

Unweighted seasonal average prices (USDA, Agricultural Prices and Grain Market News) were used to calculate the margin in (4). The supply of marketing services (1) was estimated by regressing the margin against quantity and the shifters of the supply for marketing services. The standard deviation of monthly Houston export prices within each marketing year was used to represent price variability. Exporters usually maintain short-term inventories (one to two months) and should, therefore, be influenced by short-term price variation. Texas wheat production was used as an indicator of the quantity moving through the marketing channel (USDA, Crop Production). An index of wheat transportation costs was used to represent the other shifters of the supply of marketing services (USDA, Marketing and Transportation Situation).

During 1975 to 1978 the short-run elasticity of export demand for U.S. wheat was −0.6 (Sharples). Acreage response elasticity, a proxy for production elasticity, was estimated at 0.4 (Hoffman; Houck *et al.*; Gallagher *et al.*). These are aggregate export demand and domestic supply elasticities for the United States. They are assumed to be representative of demand at Houston and supply in Texas. Given these elasticities and the estimated supply of marketing services, the portion of the increased margin that would be shifted to the producer can be estimated using (8) and (9).

Farm Simulation Model and Typical Farm

The firm level income tax and farm policy simulator (FLIPSIM V) was used to simulate a typical Texas wheat farm under both the 1960s and the 1970s farm programs for wheat using the respective price distributions observed for these periods. The farm was simulated over a ten year planning horizon for each scenario. Wheat yields and prices were drawn at random from a multivariate empirical probability distribution. To develop a sufficient sample for comparing the alternative scenarios, the planning horizon was replicated 50 times with annual random prices and yields drawn at each iteration.

A detailed description of FLIPSIM is available in Richardson and Nixon. The original model was modified in 1981 and in 1982 for changes in federal income tax laws and farm programs. For the analysis reported here, FLIPSIM was also modified to simulate the domestic allotment program for wheat.

To test the structural impacts of the change in the farm program and economic environment on Texas High Plains wheat producers, three tenure arrangements were simulated: (a) full owner, (b) part owner, and (c) tenant. The economic viability[1] of each farm was estimated for

[1] Viability in this case refers to the probability the farm will be an economic success and the farm will be able to survive for 10 years. Probability of suc-

TABLE 1. Characteristics of Alternative Tenure Arrangements for the Typical Texas High Plains Wheat Farm.

Attribute	Tenure Arrangement		
	Full Owner	Part Owner	Tenant
Cropland:			
Acres Owned	1,280	640	0
Acres Leased	0	640	1,280
Percent of Cropland Irrigated	68	68	68
Value of Owned Cropland ($1,000)	813.1	406.6	0
Value of Equipment ($1,000)	100.1	97.5	97.1
Net Worth ($1,000)	632.9	381.1	109.1
Initial Debt to Asset Ratio:			
Long Term	42	42	N/A
Intermediate Term	12	12	12
Off-farm Income ($1,000)	0	0	0
Minimum Family Living Expenses ($1,000)	13,000	13,000	13,000
Minimum Equity Ratio (%)	25	25	25

Source: Richardson and Bailey.

the 1960s wheat program (1960–71) and the 1970s wheat program (1974–82), assuming everything else was held constant. In other words, the same assumptions regarding machinery depreciation and replacement, income tax and self employment schedules, family size and living expenses, interest rates, land values, inflation rates, production costs, financial constraints, debt levels, growth restrictions, and yield distributions were used for both policy environments.

Information to simulate the wheat farm was developed from data describing the typical Texas High Plains wheat farm (Richardson and Bailey). The typical wheat farm in the region has 1,280 acres of cropland of which 68 percent is irrigated and 100 percent is planted to wheat (Table 1). All three tenure arrangements were assumed to have the same initial debt to asset ratio as the typical farm in the region. Variable costs of production for irrigated and dryland wheat in the region were assumed to be equal across tenure arrangements. Variable production costs

cess is measured as the probability the farm will generate sufficient income and retained earnings to have a positive after-tax net present value of net family withdrawals and change in net worth. Assuming a real after-tax discount rate equal to 4 percent, the probability of success indicates the chance a farm will provide a 4 percent or greater return to initial equity. Survival in this case is defined as the farm operator remaining solvent for 10 years.

TABLE 2. Probability Distributions of Wheat Yields and Prices for Texas Northern High Plains Producers.

Item	Wheat Yields		Wheat Prices	
	Irri-gated	Dry-land	1964–71	1976–82
	(bu./acre)		($/bu.)	
Mean	51.67	17.20	1.45	3.18
Ranked Deviation from the mean				
1	−23.15	−9.12	−0.43	−1.37
2	−17.20	−7.06	−0.32	−0.89
3	−7.98	−4.69	−0.21	−0.43
4	−1.77	−3.65	−0.20	−0.23
5	1.19	−2.91	−0.15	−0.19
6	3.73	−1.03	0.02	0.34
7	6.19	−0.04	0.08	0.42
8	7.74	1.07	0.13	0.46
9	9.73	9.91	0.34	0.59
10	9.73	13.45	0.50	0.68
Correlation coefficients:				
Dryland yield to irrigated yield			−0.091	
Dryland yield to wheat price			0.464	
Irrigated yield to wheat price			−0.126	

TABLE 3. Comparison of the 1960s Wheat Policy to the 1970s Wheat Policy.[a]

Attribute	Wheat Policy 1960s	1970s
Average Loan Rate ($/bu.)	1.25	2.81
Average Target Price ($/bu.)	N/A	3.46
Direct Entry FOR Loan Rate (% of loan)	N/A	120.0
FOR Release Price (% of loan)	N/A	140.0
Domestic Marketing Certificate Payment Rate ($/bu.)	1.46	N/A
Percent of Production Eligible for Certificate	41.0	N/A
Average Diversion as a Percent of Allotment	12.3	N/A
Average Diversion as a Percent of Planted Acres	N/A	9.7
Average Diversion Payment		
Irrigated Land ($/acre)	2.19	0.0
Dryland ($/acre)	0.73	0.0
National Wheat Allotment (mil. acres)	54.67	71.82
Average Allotment for the typical farm (acres)	926.0	1,216.0

[a] All values are presented as averages for 1964–70 or for 1974–82.

were obtained from enterprise budgets developed by the Texas Agricultural Extension Service. All costs, mean prices, and policy parameters were held constant over the 10 year planning horizon. Similarly, all interest rates were held constant at their 1982 values. Land values were allowed to increase 2 percent per year while nominal values of used machinery were held constant.

A multivariate probability distribution for wheat yields (dryland and irrigated) and prices was developed from producer yields and historical prices received by farmers in the study area. Actual farm yields for 10 years (1973–82) were used to develop the empirical probability distributions for wheat summarized in Table 2. Deviations from the mean for irrigated and dryland wheat are correlated in the simulation model using their estimated correlation coefficient, -0.09.[2]

Numerous marketing strategies exist for wheat producers in the Texas High Plains. The typical strategy is to either sell after harvest in August or place the crop under Commodity Credit Corporation loan. To simulate this practice, average August wheat prices received by farmers north of the Canadian River were used to develop price distributions for 1964–71 and 1974–82. Deviations about the means for the two price distributions are summarized in Table 2 along with the correlation coefficients necessary to simulate a multivariate price and yield distribution.

Under the 1960s wheat policy, producers were required to plant within their allotment and comply with the acreage diversion requirements to be eligible for the CCC loan and domestic marketing certificate (Table 3). Under the 1970s wheat policy, the national allotment was increased, acreage diversions were all but eliminated, a direct farmer owned reserve (FOR) was initiated, and domestic marketing certificates were discontinued (Table 3).

To compare the two farm policies and their associated economic environments, all price related variables in Table 3 for the old policy were scaled up by the ratio between the average price received by farmers under the old policy and the new policy (Table 2). The empirical price distribution for the 1964–71 period (Table 2) was scaled up to yield the same mean price

[2] Grazing is not correlated to grain yields if the cattle are removed by March 15th (Harman). The analyses presented here assume the operator did not graze out his wheat.

as observed for the new policy ($3.18 per bushel) plus the marketing margin adjustment ($0.03 per bushel). This adjustment for marketing margins was made since returning to the old wheat policy would reduce both the price variability and the marketing margin and, thus, increase the mean price received by wheat producers in the Texas Northern High Plains by the change in the margin. The average wheat price for 1974–81 (Table 2) and the average loan rate and target price for 1976–81 (Table 3) were used directly for the new policy scenario. All mean prices and policy variables (loan, target prices, diversion payments, certificate payment rates, acreage diversion levels, allotment, and farmer owned reserve release and entry price) were held constant over their respective ten year planning horizons.

The typical farm's wheat allotment under the old program (926 acres) was estimated by reducing the farm's current plantings and allotment (1,216 acres) by the ratio of the average old and new national wheat allotments (54.67 and 71.82 million acres, respectively). The producer was assumed to summer fallow non-allotment and set-aside acreage under the old wheat program. Under both programs, the slippage rate for set-aside and diverted acreage was assumed to be 90 percent based on estimates cited by Tweeten (p. 484) for the 1960s farm program.

Results

Using the marketing margin model, an attempt was made to associate the observed widening of the Texas farm-Houston export marketing margin during the 1970s, with the respective factors of importance, i.e., quantity of wheat produced in Texas, index of wheat transportation costs, and a measure of the increased wheat export price variability. The estimated inverse supply of marketing services was

$$\underset{}{MAR} = \underset{(-.74)}{-0.032} + \underset{(2.11)}{0.00128QT} + \underset{(3.65)}{0.23971DEV} + \underset{(6.19)}{0.00223TRANS} \quad (10)$$

where MAR is the Houston export price minus the Texas farm price (dollars per bushel), QT is annual Texas wheat production (million bushels), DEV is the standard deviation within crop year of monthly export prices in Houston (dollars per bushel), and TRANS is the index of wheat transportation rates (1967 = 100). R-square equals 0.92. The t statistics are in parentheses under their respective regression parameter estimate. The variable representing price variability, DEV, over the estimation period (1964–81) is highly significant and positive. Transportation and Texas production costs had a positive impact on margins.

These results indicate that widening in the farm-export margin is associated with the increase in price variability during the 1970s. The increased variability in Houston export prices (standard deviation shifting from .0624 in 1964–71 to .2857 in 1974–81) implies an increase in farm-export margin of $.054 per bushel. The average farm price during 1974–81 was $3.39/bu., while the average Houston export price for the same period was $4.04/bu. Using these price levels and the earlier discussed elasticities (production at 0.4 and export demand at −0.6) in equations (8) and (9) indicates the increased price variability in Houston export prices decreased Texas farm prices by $.03/bu. An explanation of these results corresponding to the theoretical models of Sandmo and Batra and Ullah is that export firms are risk averse and that either futures markets were not able to absorb all of the increased price risk, or futures markets absorbed the risk, but at a cost of $.054 per bushel.

The increased market price variability and slightly wider farm-export marketing margin suggests Texas wheat producers were confronted with major marketing

TABLE 4. Comparison of the Old Wheat Policy and the New Wheat Policy for Wheat Farmers in the Northern High Plains of Texas.

	Full Owner		Part Owner		Tenant	
Item	New Policy	Old Policy	New Policy	Old Policy	New Policy	Old Policy
Prob. of Survival[a]	100	100	100	100	74	100
Prob. of Success[b]	16	100	60	100	74	100
After-tax Net[c] Pres. Value ($1,000)						
Mean	−69.4	188.0	0.9	222.9	50.3	246.9
Std. Dev.	83.9	38.8	67.8	31.7	56.8	25.7
Min.	−304.6	63.6	−200.1	123.5	−60.9	167.6
Max.	74.0	275.9	119.1	295.6	158.3	305.9
Present Value of Ending Net Worth ($1,000)						
Mean	458.1	715.5	277.4	499.3	63.6	250.5
Std. Dev.	83.9	38.8	67.8	31.8	42.2	25.7
Min.	222.8	591.1	76.3	399.9	−0.7	171.2
Max.	601.5	803.3	395.5	572.4	162.0	309.5
Ending Longterm Debts ($1,000)						
Mean	425.2	169.7	197.6	84.0	0.0	0.0
Std. Dev.	121.9	8.3	83.0	0.0	0.0	0.0
Min.	215.8	168.1	11.8	84.0	0.0	0.0
Max.	743.4	224.9	371.7	84.0	0.0	0.0
Ending Intermed. Debts ($1,000)						
Mean	0.6	0.0	3.7	0.0	33.1	0.0
Std. Dev.	4.1	0.0	14.9	0.0	30.4	0.0
Min.	0.0	0.0	0.0	0.0	0.0	0.0
Max.	29.0	0.0	84.1	0.0	95.1	0.0
Ending Leverage Ratio						
Mean	0.73	0.19	0.62	0.14	1.35	0.03
Std. Dev.	0.42	0.02	0.50	0.02	1.74	0.02
Min.	0.27	0.17	0.16	0.13	0.00	0.00
Max.	2.41	0.29	2.93	0.24	6.00	0.19

[a] Probability of survival is the probability that the farm will remain solvent for 10 years.

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

[c] 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 amount 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.

problems following changes in the wheat farm program and in the general economic environment. The results of simulating the typical Texas High Plains wheat farm under the 1960s and 1970s economic environments (farm policies) are summarized in Table 4. The lower price variability and smaller marketing margins associated with the 1960s wheat policy resulted in significantly greater producer viability (success and survival) than under the 1970s wheat policy. For a Texas wheat producer with full ownership in 1,280 acres of cropland, the new wheat policy provides only a 16 percent chance of being an economic success (producing a 4 percent or greater return to initial equity) while the old policy provided a 100 per-

TABLE 5. Comparison of the Marketing Margin Adjustment for Wheat Farmers in the Northern High Plains of Texas, Given the Old Wheat Policy.

Item	Full Owner		Part Owner		Tenant	
	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted
Prob. of Survival[a]	100	100	100	100	100	100
Prob. of Success[b]	100	100	100	100	100	100
After-tax Net[c] Pres. Value ($1,000)						
Mean	188.0	183.9	222.9	219.5	246.9	244.1
Std. Dev.	38.8	38.4	31.7	31.6	25.7	25.5
Min.	63.6	59.5	123.5	120.6	167.6	165.9
Max.	275.9	271.9	295.6	292.2	305.9	302.6
Present Value of Ending Net Worth ($1,000)						
Mean	715.5	711.3	499.3	495.9	250.5	247.7
Std. Dev.	38.8	38.4	31.8	31.6	25.7	25.5
Min.	591.1	587.0	399.9	397.0	171.2	169.5
Max.	803.3	799.2	572.4	568.7	309.5	306.2
Ending Longterm Debts ($1,000)						
Mean	169.7	169.7	84.0	84.1	0.0	0.0
Std. Dev.	8.3	9.1	0.0	0.0	0.0	0.0
Min.	168.1	168.2	84.0	84.1	0.0	0.0
Max.	224.9	231.3	84.0	84.1	0.0	0.0
Ending Intermed. Debts ($1,000)						
Mean	0.0	0.0	0.0	0.0	0.0	0.0
Std. Dev.	0.0	0.0	0.0	0.0	0.0	0.0
Min.	0.0	0.0	0.0	0.0	0.0	0.0
Max.	0.0	0.0	0.0	0.0	0.0	0.0
Ending Leverage Ratio						
Mean	0.19	0.20	0.14	0.15	0.03	0.04
Std. Dev.	0.02	0.02	0.02	0.02	0.02	0.02
Min.	0.17	0.17	0.13	0.13	0.00	0.00
Max.	0.29	0.30	0.24	0.24	0.19	0.19

[a] Probability of survival is the probability that the farm will remain solvent for 10 years.
[b] Probability of success is the probability that the net present value will be greater than or equal to zero, assuming a discount rate of 4 percent.
[c] 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 amount 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.

cent chance. A part owner has a 60 percent chance of being an economic success under the new policy and the tenant has a 74 percent chance. Both the tenant and part owner had a 100 percent chance of being an economic success under the old wheat program.

The probability that tenant farm operators will remain solvent for 10 years (survive) is reduced from 100 percent under the old policy to 74 percent under the new policy. The probability of survival did not decrease for the part owner and the full owner by changing farm policies since they had greater initial net worths (Table 4). However, their average after-tax net present values and average ending net worths are significantly lower for the current program than under the old policy.

The financial well-being of wheat producers in the Texas High Plains also was worsened by changes in the general economic environment from the 1960s to the 1970s. Average ending long-term debt for the full operator increased 250 percent due to the policy change; for the part owner, the increase was 235 percent (Table 4). The average leverage ratio for part owners increased over fourfold as a result of changes in the economic environment and for tenant operators the increase was substantially greater.

To isolate the impact of the marketing margin on Texas High Plains wheat producers, the three tenure arrangements were simulated under the provisions of the old wheat policy, but without the $0.03 per bushel export marketing margin adjustment. For wheat farmers in the Texas High Plains the change in the export marketing margin alone did not change their probability of survival or their probability of success (Table 5). Average after-tax net present value was reduced about 2 percent due to the change in the marketing margin. The increased marketing margin also was responsible for reducing the average present value of ending net worth about 1 percent for wheat farmers.

The simulation results in Table 4 indicate the new wheat policy and the 1970s economic environment will not be structurally neutral. The new policy environment significantly reduces the chances of a Texas tenant wheat farmer remaining solvent while not reducing the chances of survival for full owners and part owners.[3] Additionally, the new wheat policy significantly increases the average debt load for full owners, part owners, and tenants in the High Plains. The results further indicate that the creation of a farmer owned reserve for wheat and the use of target prices to support incomes did not offset the direct and indirect effects of increased price variability for Texas wheat producers.

Summary and Conclusions

The objective of this paper was to investigate the effects on the Texas wheat industry of shifting from a period with stable prices to a period without stable prices. A model was developed to quantify the impacts of changes in price variability on marketing margins. The impacts of the change in farm programs, marketing margins, and price variability on Texas wheat producers were estimated using a whole farm simulation model (FLIPSIM V). Empirical evidence suggests that export firms are risk averse and that either futures markets were not able to absorb all of the increased price risk or futures markets absorbed the risk, but at a cost of $.054 per bushel. These results suggest that policy makers should consider the impact of price variability on marketing firms as well as the impact on producers.

The increased variability in prices and the increased margin substantially reduced Texas wheat producers' chances of achieving economic success. Additionally, the probability of survival for tenant operators was reduced about 25 percent between the two periods. Increased price variability is not structurally neutral on Texas wheat producers. The results indicate the tenant wheat producer has less chance of surviving than the full or part owner. In addition to reducing the probability of survival for tenant wheat farmers, increased price variability decreases the probability of receiving a rea-

[3] Increasing the rate of capital gains for land would benefit the landowners and would not improve the probability of survival for tenant operators. Since probability of survival for full and part owners is already at 100 percent, increasing the capital gains rate for cropland merely increases the ending net worth for full and part owners, thus further distorting the relative wealth position between tenants and landowners.

sonable return on equity (economic success) for all tenure classes.

Additional factors needing further research are the impacts of price instability on consumers' food costs, taxpayer costs of the farm program, and decreases in technical efficiency due to fixed production patterns and cost of compliance. The research reported here does not consider all factors, but it provides some evidence that most Texas High Plains wheat producers were financially better off under the 1960s farm program and economic environment than under the farm program and economic environment of the 1970s.

References

Batra, R. N. and A. Ullah. "Competitive Firm and the Theory of Input Demand Under Price Uncertainty." *Journal of Political Economy,* 82(1974):3 537–48.

Danthine, J. P. "Information, Futures Prices, and Stabilizing Speculation." *Journal of Economic Theory,* 17(1978):1 79–98.

Feder, G., R. E. Just, and A. Schmitz. "Futures Markets and the Theory of the Firm Under Price Uncertainty." *The Quarterly Journal of Economics,* 94(1980):2 317–28.

Fisher, B. S. "The Impact of Changing Marketing Margins on Farm Prices." *American Journal of Agricultural Economics,* 63(1981):2 261–63.

Fuller, S., M. Paggi, and D. Engler. "Texas Wheat Flows and Transportation Modes, 1975." Texas Agricultural Experiment Station, College Station, B-1179, Aug. 1977.

Gallagher, P., M. Lancaster, M. Bredahl, and T. J. Ryan. "The U.S. Wheat Economy in an International Setting: An Economic Investigation." Economics and Statistics Service, United States Department of Agriculture, Technical Bulletin 1644, March 1981.

Gallagher, P. "The Effectiveness of Price Support Policy—Some Evidence for U.S. Corn Acreage Response." *Agricultural Economics Research,* 30(1978):4 8–14.

Gardner, B. L. "The Farm Retail Price Spread in a Competitive Food Industry." *American Journal of Agricultural Economics,* 57(1975):3 399–409.

Harman, W. Personal communication, 1983.

Heid, W. G., Jr. "U.S. Wheat Industry." Economics, Statistics and Cooperatives Service, United States Department of Agriculture, Agricultural Economics Report 432, April 1980.

Hoffman, R. G. "Wheat—Regional Supply Analysis." Economic Research Service, United States Department of Agriculture, WS-225, August 1973.

Houck, J. P., M. E. Abel, M. E. Ryan, P. W. Gallagher, R. G. Hoffman, and J. B. Penn. "Analyzing the Impact of Government Programs on Crop Acreage." Economic Research Service, United States Department of Agriculture, TB-1548, August 1976.

Just, R. "An Investigation of the Importance of Risk in Farmer's Decisions." *American Journal of Agricultural Economics,* 56(1974):1 14–25.

Lin, W. "Measuring Aggregate Supply Response Under Instability." *American Journal of Agricultural Economics,* 59(1977):5 903–07.

Rasmussen, W. D. and G. L. Baker. "Price-Support and Adjustment Programs from 1933 through 1978: A Short History." Economics, Statistics and Cooperatives Service, United States Department of Agriculture, Agricultural Information Bulletin 424, February 1979.

Richardson, J. W. and C. J. Nixon. "Producer's Preference for a Cotton Farmer Owned Reserve: Application of Simulation and Stochastic Dominance." *Western Journal of Agricultural Economics,* 7(1982):1 123–32.

Richardson, J. W. and D. V. Bailey. "Debt Servicing Capacity of Producers in the Northern High Plains." Department of Agricultural Economics, Texas A&M University (mimeo), Nov. 1982.

Sandmo, A. "On the Theory of the Competitive Firm Under Price Uncertainty." *American Economic Review,* 59(1971):1 65–73.

Sharples, J. A. "The Short-run Elasticity of Demand for U.S. Wheat Exports." Economic Research Service, United States Department of Agriculture, IED staff report, April 1982.

Texas Agricultural Extension Service. *Agricultural Budgets,* 1982.

Tweeten, L. *Foundations of Farm Policy.* University of Nebraska Press, Lincoln, 1979.

United States Department of Agriculture. *Agricultural Prices.* Statistical Reporting Service, Washington, D.C., selected issues.

United States Department of Agriculture. *Grain Market News.* Agricultural Marketing Service, Washington, D.C., selected issues.

United States Department of Agriculture. *Crop Production.* Statistical Reporting Service, Washington, D.C., selected issues.

United States Department of Agriculture. *Marketing and Transportation Situation.* Economic Research Service, Washington, D.C., selected issues.

Winter, J. R. and J. K. Whittaker. "Estimation of Wheat Acreage Response Functions for the Northwest." *Western Journal of Agricultural Economics,* 4(1979):2 83–87.