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BUSINESS AND FINANCIAL RISK OF COTTON PRODUCERS IN THE TEXAS HIGH PLAINS

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Abstract

Production agriculturalists must manage both biological and financial resources to maintain profitable operations. Since producers are price takers and are subject to yield variations due to uncertain weather conditions, the added business risk needs to be offset with lower financial risks to maintain an acceptable level of total risk. However, this is not always possible given that additional term debt must often be incurred to keep up with technology that increases productivity. There exists an optimal level of total risk that allows producers to maintain a viable operation with an acceptable probability of failure. The objective of this study was to estimate the levels of business and financial risk for producers in the Texas High Plains. The distribution of net cash flows and term debt payments of producers were analyzed to estimate the relationship between business and financial risk. Results indicate a wide range of total risk for producers on the Texas High Plains. Also, business and financial risk varied considerably across producers.

Introduction

In order for production agriculturist to be profitable, they must manage in an environment of changing input costs and market prices with uncertain weather conditions. The production or business risk involved in production agriculture is significant because farmers are price takers (Johnson and Durham) and are subject to variations in yields due to weather conditions. Due to this high degree of business risk, producers need to limit the amount of financial risk they assume in the form of operating and long-term loans. Unfortunately, this is not always an option, as debt must often be taken on in order to keep up with technological advances that increase productivity (Peoples, et.al, 1992). Under adverse production and economic conditions, producers may be forced out of business because of their inability to pay the debt back.

This situation can be illustrated with the agricultural credit crisis of the 1980s. Commodity prices in the 1970s encouraged producers to expand production by taking on increased debt to pay for land and equipment. When commodity prices fell, many producers where forced out of business and many agricultural banks failed.

Gabriel and Baker (1980) developed a conceptual framework for linking production and investment decisions to the financing decision via a risk constraint. This risk constraint can be divided into business and financial risk. Business risk is defined as the variability of income based on the market and biophysical environment. Financial risk is defined as the added variability of net cash flows of the owners' equity that results from the fixed financial obligations associated with debt financing and cash leasing. The producer must balance these risks so that total risk does not exceed a specified level. Their results show that on the aggregate, farmers make financial adjustments leading to decreased (increased) financial risk in response to a rise (fall) in business risk.

Johnson and Durham (1999) studied the effects of the Federal Agricultural Improvement and Reform (FAIR) Act on producers' risk. The FAIR act reduced support payments to farms through 2002, therefore, increasing business risk. They studied two farms in the Texas High Plains region and assessed their ability to accommodate increasing levels of risk associated with declining support payments and potential increases in price variability associated with the enactment of the FAIR act. They concluded that a farm that is profitable primarily due to a high operating efficiency could continue to perform profitably while assuming higher levels of debt; however, a farm that is unprofitable due to a weaker operating efficiency significantly decreases its probability of survival as the debt level increases. This implies that the level of profitability and debt contribute significantly in determining the farm's probability of survival, with a positive relationship between farm profitability and its probability of survival and an inverse relationship between the debt level and the probability of survival. Therefore, the risk constraint of a highly profitable farm is expanded while it requires a marginally profitable farm to minimize financial risk. The total risk allocated to a farm is determined by the profitability of the farm.

There is an optimal amount of risk that producers can assume in their operations. However, if they move beyond this risk, the probability of business failure increases. This optimal amount of risk needs to be determined so that producers can better balance business and financial risk to increase the probability of success.

Objectives

The general objective of this research was to estimate the risk profile of Texas High Plains producers. The specific objectives of this research were to: (1) Estimate the distribution of term debt and net cash flows of producers in the Texas High Plains and (2) Estimate the relationship between business and financial risk for producers in the Texas High Plains.

Methods and Procedures

The methods utilized in this study included a combination of the Standardized Performance Analysis – Multiple Enterprises (SPA-ME) computer program, the Standardized Performance Analysis (SPA) database and the concepts developed by Gabriel and Baker (1980). The SPA-ME computer program was utilized to complete all individual analyses used in this study. SPA-ME is an analytical program that allows for individual enterprises and whole farm financial analysis (McGrann, Michalke, and Stone, 1996). The program starts by identifying all enterprises and farming units within a specific farming operation. Whole farm financial statements including balance sheets, accrual adjusted income statement, statement of cash flows, and a statement of owners' equity are developed for the operation according to the recommendations of the Farm Financial Standards Council. After this step, revenue, expenses, assets, and liabilities are allocated to each enterprise and specific farm. The result is a true picture of enterprise production costs and profitability of the operation.

After completion of the individual analyses, each analysis was entered into the SPA database which compiles the information generated by the analysis. The whole farm financial statements for seven producers from 1996 to 2002 were used in this study to apply the concepts of Gabriel and Baker (1980). In order for the concepts to be applied, a producer must have participated in the project for at least four years out of the seven years examined, thus only information from seven producers were included in the study.

Business risk is defined as the inherent uncertainty in the firm; independent of the way it is financed. Business risk may be expressed as the coefficient of variation of returns $\sigma_1 / \bar{c}$, where σ_1 is the standard deviation of net operating income (or net cash flows) without debt financing and $\bar{c}$ is the expected net operating income of the firm or producer. Thus, a high (low) coefficient of variation of net operating income would indicate a high (low) business risk. Business risk at this point may be based on the probability distribution of net cash flow (Gabriel and Baker 1980). To apply this concept, net operating income was found by taking the net income and adding back the interest of term debt. Then the standard deviation of the four to seven years was calculated and divided by the average of the net cash flows which is the expected net cash flows.

Financial risk is defined as the added variability of net cash flows to owners' equity that result from the fixed financial obligations associated with debt financing. To better define financial risk, a measure of total risk must first be defined. Total risk may be defined as: $TR = \frac{\sigma_2}{\bar{c} - \mathrm{I}}$ where σ_2 is the standard deviation of net cash flows with debt financing and I as the fixed debt servicing requirement. By deducting business risk from total risk we can measure financial risk as: $FR = \frac{\sigma_2}{\bar{c} - I} - \frac{\sigma_1}{\bar{c}}$. The previous equation can be rewritten, allowing us to divide financial risk into its components (Gabriel and Baker) to obtain: $FR = \frac{\sigma_2 - \sigma_1}{\bar{c} - 1} + \frac{\sigma_1}{\bar{c}} \frac{I}{\bar{c} - I}$. When debt financing is used ($\mathrm{I} > 0$), and financial risk will be positive.

If it is assumed that use of financial leverage does not include a change in the variability of net cash flows (i.e., $\sigma_2 = \sigma_1$), then the first term on the right side of the previous equation becomes zero leaving the following equation: $FR = \frac{\sigma_1}{\bar{c}} \frac{I}{\bar{c} - I}$ (Gabriel and Baker 1980). Financial risk is determined by the degree of business risk inherent in the firm $\sigma_1 / \bar{c}$, and the relation $\mathrm{I} / (\bar{c} - \mathrm{I})$ which is determined by the financing decision. Again to apply this to the cotton producers of the Texas High Plains, the previously found business risk was multiplied by the total principal and interest paid for term debt divided by expected net cash flows minus term debt obligations.

Results

Business, financial, and total risk were derived for seven individual producers in the Texas High Plains. The standard deviation of net cash flows was divided by the expected net cash flows to estimate business risk. Expected net cash flows was the average of cash flows for the seven years. Financial risk was determined by multiplying the business risk by the annual term-debt service divided by the expected net cash flows minus the annual term-debt service. Total risk was found by dividing the standard deviation of net cash flows by the expected net cash flows minus the annual term-debt service. The estimated business, financial and total risk for each operation in the study is presented in Table 1 and Figure 1.

As shown in Table 1, there was a wide range in total risk across producers in the Texas High Plains, ranging from a low of 0.30 to a high of 2.34. There was considerable variation between both business and financial risk among producers. Producer 1 had the greatest variation between business and financial risk along with the highest level of business risk. The high level of business risk can be explained by producer 1's expected net cash flows, as shown in Table 2, which varied consid-

erably, giving a higher standard deviation of net cash flows over the time period. Producer 2 had the least amount of business, financial, and total risk, which may be attributed to the smaller variation between expected net cash flows over the time period.

Producer 3 had the highest level of financial risk, which can be attributed to a high level of term debt as shown in Table 3. Producer 3 increased his term debt to expand his operation. His relatively high business risk compared to the other producers in combination with a high level of financial risk, gave Producer 3 the highest level of total risk among all of the producers examined.

Producers 4 and 5 had similar levels of business and financial risk, and fall into the lower half of the total risk profile for all producers. There is less variation for expected net cash flows and long-term debt service for these producers. Producer 6 had the smallest variation between business and financial risk, with a total risk in the middle of the range for all producers. Producer 7 fell towards the upper half of the total risk for all producers. His term debt payments had little variation expect for 2002, when his term debt payments increased.

Conclusions

This analysis indicates that there is a wide range in the total risk profile for cotton producers in the Texas High Plains. Several conclusions can be drawn from this study. First, individual producers can significantly control their amount of total risk. While business risk is hard to control because it reflects income as subject to price and yield fluctuations, some of this risk can be reduced with the use of forward contracting, crop insurance, and hedging. Financial risk is more specific to individual producers, because they can determine how much debt they are willing to acquire. As the results show, some producers are more successful at controlling financial risk than others.

References

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Table 1. Summary of business, financial, and total Risk for seven producers in the Texas High Plains.

Producer	Business Risk	Financial Risk	Total Risk
1	1.08	0.30	1.38
2	0.22	0.08	0.30
3	0.80	1.54	2.34
4	0.41	0.22	0.63
5	0.35	0.14	0.48
6	0.48	0.34	0.82
7	0.78	0.45	1.23

Table 2. Summary of Net Cash Flows for seven producers in the Texas High Plains.

Producer	1996	1997	1998	1999	2000	2001	2002
1	359,133	183,373	68,678	115,200	(30,290)	12,619	125,805
2	265,716	213,913	223,095	245,058	141,241	153,519	217,985
3	334,955	99,329	96,648	78,660	81,198		
4	194,501	124,434	85,472	71,116		113,292	
5	86,403	52,230	107,870		56,125		
6	136,474	96,049	77,596	70,767	26,036	53,997	43,365
7	130,915	32,125	71,980	178,325	(1,703)	207,880	30,618

Table 3. Summary of term debt payments for seven producers in the Texas High Plains.

Producer	1996	1997	1998	1999	2000	2001	2002
1	17046	10,966	33,186	39,487	42,500	14,110	20,161
2	43084	53,107	19,281	72,406	80,353	70,307	61,196
3	81600	76,195	73,011	176,322	47,442		
4	41565	36,042	40,106	32,468		55,964	
5	8371	21,967	17,847		36,501		
6	7776	65,156	18,088	31,810	29,993	32,630	38,629
7	38918	27,012	24,650	38,789	19,494	41,140	75,735

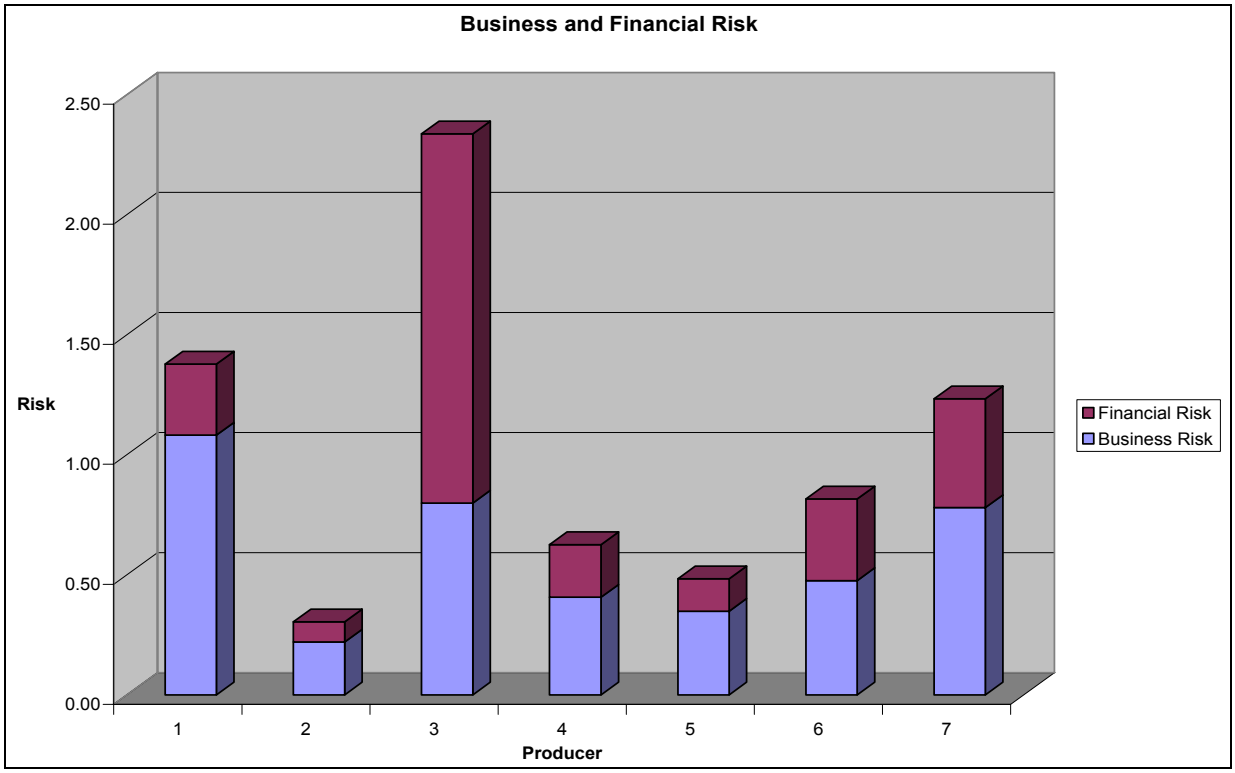

Figure 1. Summary of business, financial, and total risk for seven producers in the Texas High Plains.