FORWARD AND FUTURES MARKETS AND THE COMPETITIVE FIRM UNDER PRICE UNCERTAINTY: DISCUSSION

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Most prior research dealing with hedging in forward or futures markets admit the possibility of only one of these markets. Professors Antonovitz and Nelson include both in considering the theory of the firm under deterministic production. The theoretical results show conditions for optimal levels of production and forward, futures, and spot market positions. Results are produced for both unrestricted levels and levels restricted to nonnegative amounts. The approach taken in presenting the results is innovative in that production and market position decisions are decomposed into stages which allow decision tree analysis.

This discussion has two major objectives. First, the results of Antonovitz and Nelson will be paralleled with results existing in the finance literature on securities. Second, some comments will be made regarding empirical relevancy and the need for a broader perspective on modeling agricultural production firms.

Parallel with the Finance Literature

Antonovitz and Nelson derive and discuss the conditions for production and marketing decision separation. As they state, this separation has been derived by others when forward markets are present. Although they present and discuss their other results in terms of stages or decision modules, these results, especially those of the unrestricted model, also are familiar in terms of a separation framework. The results used to show portfolio separation in the financial economics literature for securities is very much analogous to the results Antonovitz and Nelson derive for market positions in forward, futures, and spot commodity markets. Portfolio separation is a condition which occurs when risky choices are independent of the individual's wealth position. This occurs because the risk-averse, expected utility maximizer forms a portfolio of risky assets and combines it linearly with a risk-free asset. Risk level is adjusted based upon the proportion invested in the risky portfolio and risk-free asset.[1] The hedging situation with the risky spot and futures positions and the risk-free forward position conforms to this framework.

Consider results of stage II in light of portfolio separation. This stage sets the conditions for whether (i) investment in the risk-free asset with leveraging occurs--a position of over 100 percent of production in the risk-free position occurs, (ii) exactly 100 percent of production in the risk-free position occurs, and (iii) a proportion in the risk-free position and risky position occurs. Stage III uses the variance-covariance

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relationships to determine the relationship of spot and futures (the risky portfolio), and the risk-aversion coefficient and price spreads to determine the position in the risky portfolio and the risk-free forward contract.

Antonovitz and Nelson should be applauded for developing the separation results as it applies to hedging and for their recognition that these decisions can occur in separate stages. Because these results parallel results from the securities market research, however, the current finance literature may provide new avenues and insight for addressing other problems of optimal hedging.

Empirical Relevancy

Certainly the theoretical work of Antonovitz and Nelson was not intended to fully describe relationships critical to farm producer behavior. Theoretical work of this nature is important, however, because of its contribution to understanding rational relationships for various situations. Nevertheless, to reach the ultimate goal of understanding and predicting actual farm producer behavior, a broader perspective may be required. Two main considerations are addressed here.

First, the assumption of risk-free or near risk-free production in agriculture seems very limiting. This assumption may be quite strategic to theoretical outcomes intended to explain farmer behavior under conditions of risky production. Because risky production is the more general case empirically, these conditions need developing. Considering only forward markets, Grant concludes that optimal forward positions and optimal expected production must be determined simultaneously. Reid and Musser also advocate this position based upon results using state-preference theory in a paper to this group a few years ago. Unfortunately, this result also implies that portfolio separation probably will not occur,[2] and the decision tree framework of hedging breaks down.

The second consideration can be thought of as an extension of the first one. If production is risky, a model of the theory of firm behavior must consider risk management by diversifying in risky production activities and investments simultaneously with market position taken in the futures, spot, and forward markets available. That is, a more complete opportunity set for risk management must be represented to fully capture the behavior of farmers with respect to their hedging behavior. With this situation, the covariance of the market position with the portfolio becomes relatively more important than the variance of market position. Berck also advocates this perspective and, when considering only futures and spot markets, shows that cotton hedging percentage decreases with the inclusion of other crops.

Although other considerations such as liquity contraints may prove to be important in explaining farmer behavior with regard to forward, futures and spot market positions taken, the foregoing concerns seem the most important overall. Theoretical representations including these additional

two concerns may be quite complex, but some insights may be gained from literature dealing with securities research.

In conclusion, the Antonovitz and Nelson results are interesting and certainly worthwhile. But considering most current agricultural production, the importance of the results are mostly academic in nature. Depending on future development in crop insurance and other risk markets, however, the conditions for forming risk-free assets may come about. If so, the results and framework presented here may prove to be an invaluable basis for development of practical management aids and insights into rational farmer behavior under these conditions.

Footnotes

1. Cass and Stiglitz proved that for arbitrary security return distributions, linear risk tolerant utility functions yield portfolio separation (Copeland and Weston, p. 122).

2. Portfolio separation can occur without a true risk-free asset. See Black for development of these conditions.

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