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Hedging, Forward Contracting and Agricultural Credit

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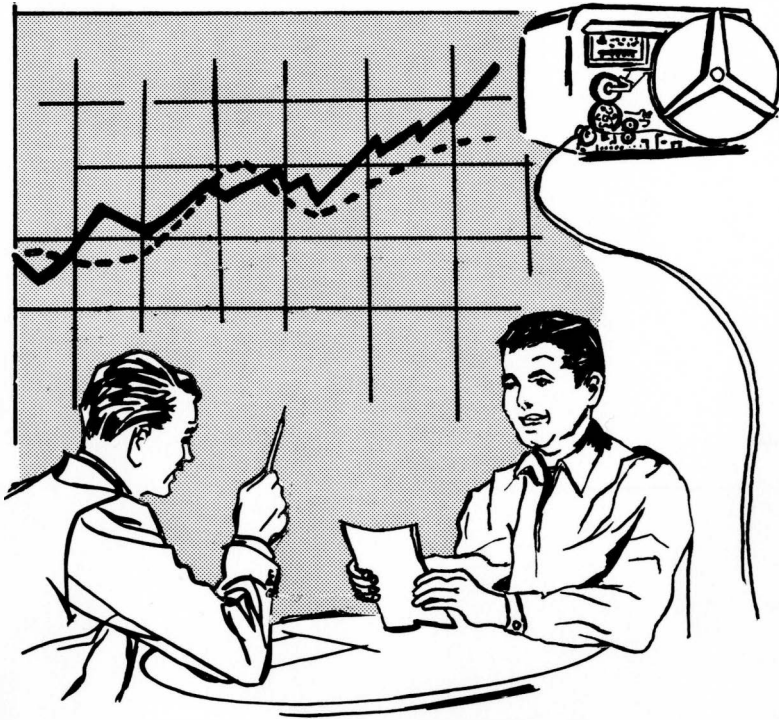
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Hedging, Forward Contracting and Agricultural Credit



A STUDY OF FACTORS IN MAKING LOANS
to Farmers
and Firms

Economics Department Agricultural Experiment Station
South Dakota State University, Brookings

Reprint 1.5M—12-70—859

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SUMMARY OF FINDINGS

Seventy-nine of the 376 credit institutions surveyed had made loans to farmers who offered hedged or contracted collateral as security for the loan.

The proportion of the production credit associations, small banks and large banks that had made loans to farmers offering hedged collateral was not significantly different from the proportions that had made loans to farmers offering contracted collateral.

Significantly greater proportions of the PCAs than banks have made loans to farmers on hedged collateral.

Significantly smaller proportions of small banks than either PCAs or large banks have made loans to farmers on hedged and contracted collateral.

Fifty of the respondent agencies had made loans to agribusiness firms on hedged collateral, while 25 of the agencies made such loans on contracted collateral, a significant difference.

It seemed that most credit agencies had not made such loans because they had received no requests from farmers or because they did not understand hedging and forward contracting well enough to know how such mechanisms should be used.

In general, those credit agencies that had made such loans indicated that whether the collateral was hedged or contracted or neither made no difference in deciding whether to grant a loan to a farmer. A significant percentage however, indicated that it did have an effect on the size of loan granted.

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Hedging, Forward Contracting and Agricultural Credit

By Mark Powers

Assistant Professor of Economics

This study was made to determine if hedging and forward contracting by farmers and agribusiness firms enhanced their position to borrow money—more specifically, whether lending agencies considered the two practices enough of a risk reduction to permit an increase in the size of loans made on given assets or to encourage favorable interest rate reductions charged such loans.

In general, it was found that hedging and forward contracting did have an effect on the size of loans, but not on the interest rates charged.

The advent of futures trading in livestock commodities and the increased tendency for producers to contract their production has generated considerable discussion among economists, businessmen and producers concerning the implications of these developments on an individual's capacity to borrow money. Officials of futures exchanges and of processing firms which offer contractual arrangements have long championed futures trading and forward contracting on the basis that these pricing mechanisms increase an individual's capacity to borrow money.

Their argument goes as follows: Any farmer or businessman who hedges or forward contracts reduces his risk because he assures himself a given price for his production.¹ He is assured a given price through hedging because the equal but opposite transactions in the cash and futures market should result in losses in one market being offset by gains in the other market. The forward contract stipulates a price to be paid at the time of delivery; thus, he is assured a given price. Any farmer or businessman who reduces his risk in such a way is sure to be considered a better risk by lenders. Thus, lenders will be prone to lend greater amounts on given collateral.

Considering the intensified need for capital by farmers and businessmen, research is needed to determine what effect hedging and forward contracting might have on one's ability to borrow money. This study is a first attempt in that direction and as such it is necessarily exploratory.

¹Hedging is defined as the purchase or sale of a futures contract to offset an equal and opposite transaction in the cash market. Forward contracts are non-standardized, private contracts for the future delivery of a commodity. In contrast to futures contracts, such contracts are not subject to the rules and regulations of an exchange and their price is determined by private bargaining.

STUDY OBJECTIVES

The objectives of this study are:

1. To determine the lending policies of banks and production credit associations in South Dakota, Nebraska, Minnesota and Iowa, with regard to farmers and agribusiness firms who hedge or contract their production.
2. To determine if hedging and contracting aid the hedger or contractor in borrowing money.

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REVIEW OF LITERATURE

The literature relating to the use of futures trading and contracting in borrowing money is sparse indeed. Only one rather limited study has been completed which relates to the subject. That study, a part of a larger study on potato growers and credit agencies in Aroostook County, Maine, was concerned primarily with determining the number of credit agencies in Aroostook County who had made loans to potato growers on the basis of hedged potatoes and the total amount of such loans.²

It was found in that study that 9 of the 21 credit agencies contacted made loans to growers on the basis of sales of potato futures contracts. Such loans for 7 of the 9 agencies totaled 8 per cent of the maximum amount of grower loans made by the 21 credit agencies during the season.

In this same study it was also found that fertilizer companies were major sources of credit for Maine potato growers. Five fertilizer companies reported credit sales of fertilizer to growers on the basis of forward contractual arrangements. The value of the fertilizer sold in this way exceeded \$¼ million. No attempt was made to quantify the effects of hedging on the loan nor the interest rate charged. Studies are needed to quantify these effects.

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THEORETICAL FRAMEWORK

Futures trading and forward contracting have long been defended and championed on the basis that they aid producers in borrowing money. This argument stems from Hicks' classical theory of risk, forward planning and interest rates.³

Hicks, in his discussion of equilibrium and economic systems, suggests that decision makers act differently under risk situations than they do in no-risk situations.⁴ He states, "... when risk is present, people will generally act, not upon the price which they expect as most probable, but as if that price had been shifted a little in a direction unfavorable to them."⁵

Accepting Hicks' logic, it follows then that to protect themselves from risk of loss due to fluctuations in price, creditors have a tendency to lend less than the full, expected value of assets offered as security on loans. For example, if a farmer pledges corn with an expected mar-

²United States Department of Agriculture, "The Economic Importance of Futures Trading in Potatoes," Marketing Research Report No. 241, AMS.

³Hicks, J. R., *Value and Capital*, 2nd edition. London: Oxford University Press, 1946.

⁴Hicks, J. R., op. cit., p. 135.

⁵*Ibid.*, p. 134.

ket value of \$1.20 per bushel as security on a loan, the creditor may loan only \$1 per bushel. The 20 cent difference in expected value and loan value may be termed the risk premium. This risk premium tends to increase as risk increases. For example, if the above creditor thought risks were greater, he might lend only 90 cents per bushel of corn, thereby increasing the risk premium to 30 cents.

The problem facing lenders, then, is one of uncertainty.⁶ If a mechanism could be devised to reduce uncertainty, it follows that lenders should be willing to lend a greater percentage of the value of given assets pledged for collateral on loans. Hicks suggests such a mechanism. In the same discussion on equilibrium, he states:

"A way does exist, within the orbit of private enterprise, whereby, expectations and plans can be at least partially coordinated. This is the device of forward trading (including not only dealings in forward markets, commonly so called, but also all orders given in advance, and all long-term contracts)."⁷

He is suggesting futures trading and forward contracting as methods of reducing uncertainty by establishing prices in advance. He points out very distinctly that hedging reduces risk.

"Now there are quite sufficient technical rigidities in the process of production to make it certain that a number of entrepreneurs will want to hedge their sales for this reason; supplies in the near future are largely governed by decisions

taken in the past, so that if these planned supplies can be covered by forward sales, risk is reduced."⁸

If risk is actually reduced by hedging and forward contracting, as has been suggested, it seems logical that farmers pledging a given amount of hedged or forward contracted assets would be able to obtain more credit on these assets than if they had not been hedged or contracted. The farmers, thereby, fix a price, and given expected costs, assure themselves a profit margin. Further, this would assure a price for anyone accepting these assets as collateral for a loan, thus reducing any risk he would need to assume for the possibility of a price reduction or a decrease in the value of these assets.

Lenders protect themselves in several ways because they are taking several kinds of risks. One of the methods lenders use to protect themselves against risk has just been mentioned—namely, lending less money than the actual value of the assets pledged as collateral for the loan. A second method involves the rate of interest that is charged on the loan. Rates of interest depend on several things. Hicks points this out in his chapter on interest rates.

"The money rates of interest paid for different loans at the same date differ from one another for two main reasons:

(1) because of differences in the

⁶Knight, F. H., in *Risk, Uncertainty and Profit*. Cambridge: Houghton Mifflin and Company, 1921, makes a distinction between risk and uncertainty; however, the terms are used interchangeably in this discussion.

⁷Hicks, J. R., op. cit., p. 35.

⁸*Ibid.*, p. 137.

length of time which the loans are to run, and in the way repayment is to be distributed over time: (2) because of differences in the risk of default by the borrower."⁹

Stonier and Hague emphasize the important effect risk has on interest rates charged. They state:

"No firm, however reputable, can guarantee that changes, for example in consumers' tastes, will never affect its profits, and the greater risk incurred by those who invest in commercial bonds means that they will demand a greater return. The more risky the investment, the higher the return demanded."¹⁰

In short, it is the risk of default by the borrower that is responsible for the element of risk premium in interest rates.

METHODOLOGY AND PROCEDURE

For purposes of this analysis, the credit agencies were divided into three categories: large banks, small banks and production credit associations. Large banks were defined as those banks having more than \$10 million in total assets. The data used in the analysis were collected by a series of two mail questionnaires.

The first questionnaire was sent to a random sample of 440 banks drawn from a population of 2,005 banks listed in Polk's Bank Directory for the states of South Dakota, Minnesota, Nebraska and Iowa, as well as to 65 production credit associations within these states. Ninety large banks, 252 small banks and 53 production credit associations returned the first questionnaire.

The purpose of this questionnaire was primarily to determine if banks

In summary, the borrowing capacity of any individual is limited primarily by the risk that he presents to a lender. This risk takes the form of risk of default on the loan, and risk of a decrease in the price of the assets which are pledged as collateral for the loan. We have seen that lenders protect themselves from these risks in one of two ways; either by lending less than the full market value of the assets which are pledged or by charging a higher interest rate. Hicks has suggested methods of reducing these types of risks, namely, the use of forward contracts or futures trading which enables a producer to hedge the assets he pledged, to guarantee a price, to reduce his risk, and thereby reduce the risk to the lender.

and production credit associations (PCAs) have extended credit to farmers and agribusiness firms on the basis of hedged or forward contracted collateral. If those credit agencies had not extended credit to borrowers on that basis, the reasons why such credit had not been extended were to be determined.

The second questionnaire was sent to the 102 banks, and 30 production credit associations that indicated on the first questionnaire that they had extended credit to hedgers and forward contractors. Twenty-one of the PCAs, 38 of the small banks, and 30 large banks returned the questionnaire.

⁹*Ibid.*, pp. 142-143.

¹⁰Stonier, A. W., and Hague, D. C. *A Textbook of Economic Theory*, New York: Wiley and Sons, Inc., 1953, p. 446.

The purpose of this questionnaire was to obtain general information about the borrowers who had hedged and contracted, the types of loans made to these borrowers and whether hedgers and forward contractors received larger loans on given assets and/or lower interest rates on loans secured by hedged or forward contracted collateral.

To determine the latter factor, respondents were given three case situations in which they were asked to make decisions on the interest rates and the percent of asset value they would loan. The case situations were identical except that in one case the individual had not hedged or contracted his collateral, the second case he had hedged and in the

third case he had forward contracted the collateral. Thus, the responses should not be considered the results of actual loans, but rather the results of what the respondents said they would do if faced with this situation. This approach was used to isolate the effects of hedging and contracting.

This study is concerned with both farmers and agribusiness firm borrowers. For purpose of this research, farmers were defined as those involved in producing primary agricultural products. Agribusiness firms were defined as those involved primarily in purchasing agriculture commodities for the purpose of processing, storing, or transporting the commodities.



Extent to Which Credit Agencies Have Made Loans on Hedges and Contracts

The objectives of this section are:

1. To determine the extent to which credit agencies have made loans to farmers and agribusiness firms on the basis of their hedging or contracting operations.
2. To determine why those agencies which have not made such loans did not.

The discussions on the extension of credit to farmers and to firms have been separated for two main reasons: First, to simplify the presentation and, second, because it is possible that credit agencies may follow one lending policy for farmers and another for firms.

EXTENSION OF CREDIT TO FARMERS

The data in Table 1 indicate that in all cases the number of credit agencies which had made loans on hedged collateral was greater than the number that had made loans on forward contracted collateral. About one-third of all agencies responding have made loans on hedged collateral or forward contracted collateral.

Although the numbers varied, proportions of the various credit agencies which had made loans on hedged collateral were approximately equal to proportions that had made loans on contracted collateral. The chi-square value of 1.2689 in Table 2 indicates that there was no significant difference in these proportions between hedged and forward contracted collateral.

Greater proportions of the PCAs, however, have had experience with hedgers borrowing money than have the large banks. The chi-square value of 5.606 is significant. This can be partly explained by the fact that PCAs are likely to have a larger proportion of agriculturally related customers than do large banks and the agricultural customers are the ones who would be using the futures market because most commodities

Table 2. Chi-Square Values Computed from Data Presented in Table 1

Comparisons	Chi-Square Values
Total Chi-Square	39.949*
Hedge vs. Forward Contract	1.2689
Large	
Banks vs. PCAs/Hedge.....	5.606*
Large	
Banks vs. PCAs/Contract ..	.376
Large Banks and PCAs	
vs. Small Banks/Hedge....	21.031*
Large Banks and PCAs vs.	
Small Banks/Contracts	11.667*

*Significant at .05 level.

traded on futures contracts are agricultural products. There was no difference between the proportion of large banks and PCAs that had made loans on contracted collateral.

A significantly smaller proportion of the small banks than of the large banks or PCAs have had experience in making loans to farmers on hedged collateral as well as contracted collateral. Both the chi-square values of 21.031 and 11.667 are significant.

There are several plausible explanations for these differences. First, it is very possible that the clientele of the agencies are different. Small country banks are more likely

Table 1. The Number of PCAs, Large Banks and Small Banks that Have Extended Credit to Farmers on the Basis of Hedged or Forward Contracted Collateral

	PCAs	Hedge		PCAs	Forward Contracts	
		Small Banks	Large Banks		Small Banks	Large Banks
Have						
Extended Credit	24	34	21	14	29	19
Have Not						
Extended Credit	28	210	59	32	200	56
Totals	52	244	80	46	229	75

Table 3. The Number of Large and Small Banks that Have Extended Credit to Firms on the Basis of Hedged or Forward Contracted Collateral

	Hedge		Forward Contract	
	Small Banks	Large Banks	Small Banks	Large Banks
Have Extended Credit	23	27	8	17
Have Not Extended Credit	273	52	218	58
Totals	296	79	226	75

to have smaller farmers as their customers while large banks are more likely to have larger, more progressive farmers as their customers. Often the larger farmers are the ones who use the futures market and who contract their production. Second, large banks are more likely to have agricultural credit specialists who understand the use of the futures market and contracting in reducing risk and therefore would urge their customers to use such tools. Third, PCAs are more likely to get requests for such loans because they have a larger proportion of farmers as customers than do the large banks.

EXTENSION OF CREDIT TO FIRMS

Many of the same banks that made loans to farmers on the basis of the farmers' hedging or contracting arrangements also made such loans to agribusiness firms. Since PCAs make loans only to farmers they are not included in this section.

The proportions of the credit agencies that have extended credit on hedged collateral are significantly different from the proportions that have extended credit on contracted collateral. A much smaller proportion of the agencies have had experience with forward contracting than with hedging (see Tables 3 and 4). Part of the reason for this difference stems from the fact that most of the credit agencies sur-

veyed are located in an area which produces commodities for which a widespread system of forward contracting has not been developed. Futures trading, on the other hand, is a highly developed system and is easily available for everyone.

There is also a significant difference between the proportions of small banks and large banks that have extended credit on both hedged and contracted collateral. Fewer small banks have made such loans than large banks (see Tables 3 and 4). This difference may be attributed to two major factors. First there are, undoubtedly, differences in the clientele of the different size banks. Second, capital requirements of agribusiness firms are usually quite large compared to capital requirements of farmers. Many small banks might not be able to make the necessary amounts of capital available, thus, the firms would tend to patronize large banks that could supply a complete line of credit.

Table 4. Chi-Square Values Computed from Data Presented in Table 3

Comparisons	Chi-Square Values
Total Chi-Square	69.373*
Hedge vs. Forward Contract	4.284*
Large Banks vs.	
Small Banks/Hedge	37.814*
Large Banks vs.	
Small Banks/Contract	27.275*

*Significant at .05 level.

REASONS FOR NOT EXTENDING CREDIT TO HEDGERS AND FORWARD CONTRACTORS

In all the instances considered above, more than 50 per cent of all the credit agencies had not extended credit on hedged or forward contracted collateral. Since results such as this were anticipated, those credit agencies which had not extended such credit were asked to indicate why.

The overwhelming majority of the respondents indicated that they did not extend such credit, primarily because there were no requests for such loans. The data in table 5 show that 57 per cent of PCAs, 70 per cent of the small banks, and 67 per cent of the large banks who responded to the question had received no such requests. A significant proportion of the three groups also indicated that neither the bank-

ers nor the borrowers understood the futures market and forward contracting arrangements well enough to use them effectively in actually reducing risk. This undoubtedly was an important factor in their not receiving requests for such loans.

Responses which were included in the category OTHER included:

"Borrower had hedged but was a poor risk anyway and we didn't want to make the loan."

"Had suggested the borrowers hedge but they refused to do so."

"Farmers have not requested such loans because they prefer to gamble."

"The hedging was not tied to a total marketing program."

Table 5. Reasons why PCAs, Small Banks and Large Banks Have Not Extended Credit to Hedgers or Forward Contractors

	PCAs		Small Banks		Large Banks	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
A. No requests for such loans	26	56.5	204	69.6	55	67.0
B. The borrower did not understand the futures market	6	13.0	33	11.2	10	12.1
C. Our institution has no one who understands the futures market	5	10.8	41	13.9	7	8.5
D. Did not think the borrower had reduced his risk	2	4.3	3	1.0	1	1.2
E. Other	7	15.2	12	4.0	9	10.9
Totals*	46		293		82	

*Figures are rounded.

The Effect of Hedging and Contracting Operations on Loans Made to Farmers and Firms

This section analyzes the responses from those credit agencies which had made loans on hedged or contracted collateral.

The objectives of this section are to determine:

(a) The importance of hedging and forward contracting relative to other credit factors.

(b) Whether these credit agencies required or advised their clients to hedge or forward contract.

(c) What percent of their customers do hedge or contract their production.

(d) What effect hedging and contracting have on interest rates charged and size of loans made on given assets.

The data used in this analysis were obtained from mail questionnaires sent to 132 banks and PCAs in 4 states. Eighty-nine, or 67.4 per cent, of the questionnaires were completed and returned.

For purposes of this analysis the respondents have been divided into the five following categories: (1) PCAs that extend credit to farmers, (2) small banks that extend credit to farmers, (3) small banks that extend credit to firms, (4) large banks that extend credit to farmers and (5) large banks that extend credit to firms.

Since some of the banks extend credit to both farmers and firms that hedge or forward contract commodities, some of the respondents have been placed in two categories.

○ ○ ○ ○ ○ ○ **HEDGING AND FORWARD CONTRACTING AS FACTORS IN MAKING LOANS**

In making the decision on whether or not to grant a loan to an individual, most lending agencies do not place much importance on whether the collateral for the loan is hedged or forward contracted. Only 3.8 per cent of the respondents considered hedging and contracting as very important considerations when making such a decision (see Table 6). They

place more emphasis on their interpretation of the integrity, the managerial ability, and the general repayment ability (exclusive of hedges or contracts signed) of the borrower. In general, the type of collateral pledged as security, the amount of the loan, the current indebtedness of the borrower, the availability of farm records, the size

Table 6. Relative Importance of Factors Considered When Agencies Make Loans

	Very Important		Important		Minor Importance		Unimportant		Total
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.
1. Integrity of borrower	86	96.6	3	3.4					89
2. Managerial ability	74	83.1	14	15.7	1	1.1			89
3. General repayment ability (exclusive of hedges or contracts signed)	68	76.4	21	23.6					89
4. Type of collateral offered (i.e., grain, livestock)	15	17.0	69	78.4	4	4.5			88
5. Amount of loan	13	16.4	45	57.0	17	21.5	4	5.1	79
6. Current indebtedness	24	27.9	58	67.4	3	3.5	1	1.2	86
7. Availability of farm records	8	13.1	42	68.8	10	16.4	1	1.6	61
8. Age of borrower	1	1.8	22	38.6	30	52.6	4	7.0	57
9. Size of farm or firm	7	8.0	44	50.6	26	29.9	10	11.5	87
10. Forward contracts signed by the borrower	3	3.8	24	30.4	28	35.4	24	30.4	79
11. Hedging operations of the borrower	3	3.8	24	30.0	31	38.8	22	27.5	80
12. Per cent of income spent on living expenses	3	5.1	38	64.4	11	18.6	7	11.9	59

of farm or firm and the percentage of income spent on living expenses are all considered as important credit factors.

Most of the agencies, 65.8 per cent, considered forward contracts signed by the borrower and 66.3 per cent considered hedging operation of the borrower to be of minor importance or relatively unimportant factors in deciding whether or not to grant an individual a loan. This suggests that most lenders did not regard these methods of reducing price risks as being of primary importance in establishing a line of credit.

ADVICE GIVEN ON HEDGING AND FORWARD CONTRACTING OPERATIONS

The decision to hedge or forward contract collateral rests on the individual farmer or firm. None of the banks or PCAs required their customers to hedge or forward contract agricultural commodities pledged as collateral for loans, but 24.1 per cent of them advised customers to hedge and 18.0 per cent advised customers to contract, whenever possible (see Table 7).

This hesitancy on the part of credit agencies to make such a stipulation or to give such advice could reflect several things. First, it could

Table 7. Number and Proportion of Credit Agencies That Advise or Require Customers to Hedge or Forward Contract

	Require		Advise		Neither Require Nor Advise		Total No.
	No.	Per Cent	No.	Per Cent	No.	Per Cent	
Hedge			20	24.1	63	75.9	83
Forward Contract			16	18.0	73	82.0	89
Totals			36		136		172

be that many credit agencies lack confidence in their ability to offer such advice. Second, it is possible that the credit agencies believe that farmers and agribusiness firm managers are so unfamiliar with hedging and forward contracting as methods of reducing risk that to require or advise them to use these tools without first gaining complete knowledge of their use could result in some bad experiences for both the borrowers and the credit agency.

TYPES OF COMMODITIES AND PERCENTAGES OF PRODUCTION HEDGED OR CONTRACTED

The types of agricultural commodities hedged and contracted by respondents' borrowers varied con-

siderably, ranging from beef and hogs to eggs and wheat, to castor beans and sunflower seeds. These latter two commodities were mentioned as forward contracted commodities by only one or two PCAs.

Data presented in Table 8 indicate that hedged and forward contracted beef, hogs, corn and soybeans, were pledged as collateral more often than were eggs, wheat and potatoes. It also appears that contracted eggs are used as collateral in more instances than are hedged eggs. Further, it seems that only a very small per cent of the lending agencies' borrowers were involved in hedging on contracting operations.

Table 8. Proportion of Borrowers from Lending Agencies Who Hedge or Forward Contract Commodities, By Commodity

Commodities	Per Cent of Total Borrowers												
	H' FC' 1-10	H FC 11-20	H FC 21-30	H FC 31-40	H FC 41-50	H FC 51-60	H FC 61-70	H FC 71-80	H FC 81-90	H FC 91-100			
(Number of Agencies)													
Beef	44	20	2			1							
Hogs	16	14											
Eggs	1	6		2		2		2	1			3	
Corn	33	29	6	1	4								
Soybeans ..	25	27	9	1	8								
Wheat	7	3		1	2			1					
Potatoes ...			1							1			
Other												3	

¹H—Hedge

²FC—Forward Contract

**Table 9. Proportion of Borrower's Total Production
Which Is Hedged or Forward Contracted**

Percent	Hedged Livestock	Hedged Grain	Forward Contracted Livestock	Forward Con- tracted Grain
	No. of Agencies	No. of Agencies	No. of Agencies	No. of Agencies
1-10	---	8	11	10
11-20	7	4	6	4
21-30	8	7	5	6
31-40	2	4	---	1
41-50	19	13	2	11
51-60	3	---	---	---
61-70	---	3	---	1
71-80	21	1	3	---
81-90	---	---	2	2
91-100	5	---	2	3

For the bulk of the agencies, less than 10 per cent of their borrowers were hedging or contracting their collateral. Very few agencies had more than 30 per cent of their customers involved in such operations. Only in the cases of eggs and the specialty crops of sunflower seeds and castor beans, did agencies with customers producing such crops have 100 per cent of such customers forward contracting. It was also indicated by the respondents that all of the borrowers who received such loans had previously established a line of credit with the institution.

The farmers and firms who had obtained loans on hedged or contracted collateral had hedged or contracted only a portion of their production. Most of them did not hedge more than 50 per cent of their livestock production and none of them hedged more than 80 per cent of their grain production. Similarly, with the forward contracted collateral, most of the borrowers had contracted less than half of

their total production. In only 10 cases had borrowers hedged or contracted 90-100 per cent of their production (see Table 9).

TYPES OF LOANS MADE TO HEDGERS

Whenever a hedger buys or sells a futures contract, he must deposit some money with his broker as a sign of his good faith in fulfilling the obligations for which he has contracted. This money is called "margin money." If the price of the contract should move adversely to the hedger in the sense that he would incur a trading loss if he were to close out his futures contract, he may be asked to deposit more margin money as a further sign of his good faith. If the price moves in a direction favorable to the hedger, his margin money will be returned to him along with any profits he has made at the time he closes out his hedge. All of this means that a hedger must have ready cash available for margin money at the time he

Table 10. Types of Loans Made to Hedgers

	Number
Loans for Margin Money Only.....	13
Loans for Operation and Production Capital Only	17
Loans for Margin Money and Production Capital	41
Total	71

initiates the hedge and during the time the hedge is in effect.

Thus, credit agencies were asked whether the loans they had made to hedgers were for margin money only, operating capital only, or a combination of the two. Data in Table 10 indicate that most of the loans made were for a combination of the two. However, in 13 of the cases, hedgers evidently had enough operating and production capital but did not have ready cash available for meeting margin requirements. Thus, they received loans which were to provide margin money only. Seventeen hedgers received loans which were to be

used for operating and production capital only.

Loans made for purposes of providing margin money present some added problems to lending agencies. One of these problems is concerned with who maintains legal authority to terminate the hedge when repayment of the loan is based on the hedged collateral. If the borrower maintains the right to terminate the hedge at his discretion, the lender could find his collateral unprotected from price change.

Most of the credit agencies who made loans on hedged collateral, however, evidently were not too concerned about this problem. Only two of the respondents indicated that they alone retained the right to terminate the hedge. Several indicated it could only be terminated by joint agreement and the rest indicated that hedgers were allowed to conduct their hedging operations as they wished.

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Hedging and Contracting As Aids in Obtaining Loans

We now turn our attention to the second major objective of this study, to determine whether hedging and forward contracting aid the borrower in obtaining loans. This analysis is divided into two major parts:

The first part is concerned with the effect hedging and contracting have on the size of loans relative to the market value of the collateral.

The second part of the analysis deals with the effects of hedging and contracting on interest rates. The analysis deals with both farmers and agribusiness firms and with both livestock and grain assets.

NUMBER OF CREDIT AGENCIES MAKING LOANS TO FARMERS ON THE BASIS OF HEDGING OR CONTRACTING OPERATIONS

With about half of the respondent credit agencies, a farmer could receive increased amounts of credit if he secured his loan with hedged or contracted livestock assets rather than with non-hedged or non-contracted livestock assets. Twenty-four out of the 45 agencies that had made loans on hedged livestock and 21 out of the 42 agencies that made loans on contracted livestock indicated they would increase the size of loan (see Tables 11 and 12).

The chi-square test indicates there is no significant difference in the responses of the various credit agencies, thus indicating that the same proportion of small banks, large banks and PCAs will extend greater amounts of credit on hedged and forward contracted livestock than on non-hedged and non-contracted livestock. This suggests that any farmer who hedges or contracts his livestock has about an equal chance of obtaining increased credit on those assets at any of the three classes of credit agencies.

Hedged and forward contracted grain can also be used by farmers to gain increased amounts of credit on given assets. About three-fifths of the respondents indicated they would increase the amount loaned on hedged grain over non-hedged grain and about two-thirds said they would do so on contracted grain (see Tables 13 and 14). The chi-square test on the data in Table 13 indicates that there is no significant difference in the proportions

of PCAs, small banks and large banks that would extend increased credit to farmers who offered hedged grain rather than non-hedged grain as collateral. Similarly, the chi-square value in Table 14 indicates that there is no significant difference in the proportions of the various credit agencies that will increase the amount loaned on forward contracted grain. Therefore, if a farmer offers hedged or contracted grain as collateral, there is about an equal chance that any of the three types of agencies will offer him increased credit.

AMOUNTS OF INCREASE ON LIVESTOCK¹¹

The data in Table 15 indicate that the average increases in loans on hedged livestock ranged from 12.2 per cent to 17.5 per cent of the value of assets. On contracted livestock the average increases ranged from 11.9 per cent to 18.3 per cent. All of these increases are significantly greater than zero, thus indicating that hedging and forward contracting of livestock assets do aid the farmer in obtaining capital by increasing the amount loaned on given livestock assets.

¹¹Analysis of variance was used to determine if there was a significant difference between the average amounts the various credit agencies indicated they would loan to farmers who hedge or forward contract collateral. Preliminary analysis of the data indicated that the samples had a common variance and it was assumed that errors were independent and random, thus making analysis of variance applicable.

Table 11. Number of Credit Agencies That Increase Amounts Loaned to Farmers Who Hedge Livestock

Response	PCAs	Small Banks	Large Banks	Totals
Increase Loans ..	8	9	7	24
Do Not Increase Loans	7	6	8	21
Totals	15	15	15	45

Computed chi-square=.536
Level of Significance=.05

Tabular chi-square=5.991
Degrees of Freedom=2

Table 12. Number of Credit Agencies That Increase Amounts Loaned to Farmers Who Forward Contract Livestock

Response	PCAs	Small Banks	Large Banks	Totals
Increase Loans	7	8	6	21
Do Not Increase Loans	6	7	8	21
Totals	13	15	14	42

Computed chi-square=.429
Level of Significance=.05

Tabular chi-square=5.991
Degrees of Freedom=2

Analysis of variance tests on the data in Table 14 indicate that there was little difference in the responses of the various agencies. The "F" values shown in Table 16 indicate that there was no significant difference in the average increases the agencies would grant on hedged livestock as opposed to the average increase they would grant on contracted livestock. Thus, suggesting that all of the agencies would allow about the same increases on hedged livestock as they do on contracted livestock assets. Further, the data indicate that between the agencies,

no difference exists in their responses on hedged livestock or in their responses on contracted livestock. Thus, suggesting that a farmer would get approximately the same increases at each of the agencies, regardless of whether he offered hedged or contracted livestock as collateral.

AMOUNTS OF INCREASE ON GRAIN

There was little variation in the average amounts each of the different classes of agencies would increase loans on hedged and con-

Table 13. Number of Credit Agencies That Increase Amounts Loaned to Farmers Who Hedge Grain

Response	PCAs	Small Banks	Large Banks	Totals
Increase Loans	10	7	10	27
Do Not Increase Loans	7	7	5	19
Totals	17	14	15	46

Computed chi-square=.819
Level of Significance=.05

Tabular chi-square=5.991
Degrees of freedom=2

Table 14. Number of Credit Agencies That Increase Amounts Loaned to Farmers Who Forward Contract Grain

Response	PCAs	Small Banks	Large Banks	Totals
Increase Loans	11	8	9	28
Do Not Increase Loans	3	7	5	15
Totals	14	15	14	43

Computed chi-square=.363
Level of Significance=.05

Tabular chi-square=3.841
Degrees of Freedom=1

Table 15. Average Increases in Amounts Loaned to Farmers on Hedged and Contracted Livestock Assets Over Non-Hedged and Non-Contracted Livestock Assets, All Credit Agencies

Methods of Risk Reduction Compared	PCAs	Small Banks	Large Banks
	Per Cent	Per Cent	Per Cent
Hedged vs. Non-Hedged	17.5*	12.2*	12.6*
Contracted vs. Non-Contracted	17.9*	11.9*	18.3*

*Significant at .05 level.

Table 16. Comparisons and Computed Values of Analysis of Variance on Data in Table 15

Comparisons	Computed F Values
Hedge vs. Forward Contract051
PCAs and Large Banks vs. Small Banks/Hedge395
PCAs and Large Banks vs. Small Banks/Contract	1.110
PCAs vs. Large Banks/Hedge ..	0.0
PCAs vs. Large Banks/Contract680

Error mean square=5.160
Level of Significance=.05

Table 18. Comparisons and Computed Values of Analysis of Variance on Data in Table 17

Comparisons	Computed F Values
Hedge vs. Forward Contract026
Large Banks and Small Banks vs. PCAs/Hedge104
Large Banks and Small Banks vs. PCAs/Contract698
Large Banks vs. Small Banks/Hedge026
Large Banks vs. Small Banks/Contracts281

Error mean square=4.570
Level of Significance=.05

Table 17. Average Increases in Amounts Loaned to Farmers on Hedged and Contracted Grain Assets Over Non-Hedged and Non-Contracted Grain Assets, All Credit Agencies

Methods of Risk Reduction Compared	PCAs	Small Banks	Large Banks
	Per Cent	Per Cent	Per Cent
Hedged vs. Non-Hedged	10.9*	14.3*	15.9*
Contracted vs. Non-Contracted	11.4*	14.5*	19.5*

*Significant at .05 level.

tracted grain. The data in Table 17 indicate that on hedged grain the average increases were 10.9 per cent by PCAs, 14.3 per cent by small banks and 15.9 per cent by large banks. On forward contracted grain the average increases were: PCAs—11.4 per cent, small banks 14.5 per cent, and large banks 19.5 per cent. All of these increases are significantly greater than zero. Thus it seems that hedging and forward contracting also increase the amounts loaned on grain assets.

Analysis of variance was also used to determine if there was a difference in the credit policies of PCAs and large and small banks with respect to average increases in amounts loaned to farmers on the basis of hedged or contracted grain. The comparisons are similar to those made on livestock. The computed "F" values presented in Table 18 again indicate that PCAs, large banks and small banks all extend similar increases in amounts loaned to farmers who hedge or forward contract grain pledged as collateral. There not only is no significant difference when comparisons are made between credit agencies considering the same method of reducing risk, there also is no significant difference between the increases

due to the risk reducing methods themselves. This suggests that the credit agencies consider hedging and forward contracting as being equally useful in reducing price risk.

It can be concluded from this analysis, therefore, that farmers can expect to get approximately the same amount of increase on loans secured by hedged or contracted grain from PCAs, large banks, and small banks.

LOANS TO FIRMS

Of the 50 credit agencies who indicated on the first questionnaire that they had made loans to agribusiness firms, only 21 responded to the second questionnaire. When these responses were classified according to large and small banks, hedged and forward contracted grain and livestock, there were not enough responses in any one class to conduct statistical tests. Nevertheless, the responses are presented in Tables 19 and 20. The data suggest that hedging and forward contracting do have a positive influence on the size of loans granted. However, since statistical tests cannot be conducted, an absolute judgment is withheld.

Table 19. Average Increases in Amounts Loaned to Firms on Hedged and Contracted Livestock Assets Over Non-Hedged and Non-Contracted Livestock Assets, All Credit Agencies

Methods of Risk Reduction Compared	PCAs		Small Banks		Large Banks	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Hedged vs. Non-Hedged	0	—	1	15.0	3	15.0
Contracted vs. Non-Contracted	0	—	2	10.0	2	27.5

INTEREST RATES AS RELATED TO HEDGING AND CONTRACTING

Economic theory as explained suggested that the rate of interest was dependent upon several factors. Included among the factors was risk. It was theorized that if a borrower hedged or contracted the assets he used as collateral for a loan,

he reduced his risk of loss from price change, and that this in turn reduced risk of the lender. Therefore, if interest rates were dependent in part on risk and if risk were reduced, then interest rates on loans should also be reduced.

Table 19. Average Increases in Amounts Loaned to Firms on Hedged and Contracted Livestock Assets Over Non-Hedged and Non-Contracted Livestock Assets, All Credit Agencies

Methods of Risk Reduction Compared	PCAs		Small Banks		Large Banks	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Hedged vs. Non-Hedged	0	—	1	15.0	3	15.0
Contracted vs. Non-Contracted	0	—	2	10.0	2	27.5

Table 20. Average Increases in Amounts Loaned to Firms on Hedged and Contracted Grain Assets Over Non-Hedged and Non-Contracted Grain Assets, All Credit Agencies

Methods of Risk Reduction Compared	PCAs		Small Banks		Large Banks	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Hedged vs. Non-Hedged	0	—	2	17.5	6	15.0
Contracted vs. Non-Contracted	0	—	3	15.0	2	10.0

Table 21. Number of Credit Agencies Which Increase Interest Rates to Farmers on Loans Secured by Hedged and Contracted Collateral, All Credit Agencies

	PCAs		Small Banks		Large Banks	
	Grain	Livestock	Grain	Livestock	Grain	Livestock
Decrease Interest Rates	0	0	0	0	0	0
Do Not Decrease Interest Rates	19	19	16	16	17	17

Table 22. Number of Credit Agencies Which Decrease Interest Rates to Firms on Loans Secured by Hedged and Contracted Collateral, All Credit Agencies

	Grain	Livestock	Grain	Livestock	Grain	Livestock
Decrease Interest Rates	0	0	0	0	0	0
Do Not Decrease Interest Rates	0	0	6	6	14	14

The results of this study do not appear to substantiate this hypothesis. Analysis of the data in Tables 21 and 22 indicates that not a single agency which had made loans on hedged and contracted collateral reduced the interest rates on such loans. Further, it made no difference whether the loans were made

to farmers or to agribusiness firms or whether the collateral was hedged or contracted livestock or grain. Therefore, it appears that hedging and contracting have no effect on interest rates.

There are probably three major reasons for these results. First, some of the lenders prob-

ably believe that hedging and forward contracting do not reduce their risk. This is probably true of those agencies which indicated that they would not increase the amount loaned on hedged or contracted assets. Those agencies which would increase the amounts obviously did not feel that way. Second, a num-

ber of the respondents indicated that they based the interest rate on their cost of money, not on the different amounts of risk presented by farmers or firms. Third, it is quite likely that the risk reduction has been fully accounted for by the increase in the size of the loan.

Summary, Conclusions and Recommendations

Following J. R. Hicks' theory, many writers, economists and businessmen have advocated futures trading and contracting arrangements on the basis that hedging and forward contracting aid producers in borrowing money. No previous research has been completed which supports these statements. This study is a step in that direction.

The analysis of the extent to which credit agencies have made loans on hedges and contracts indicate that about one-third of all responding agencies have made such loans. The proportions of the various credit agencies which have made loans on hedged collateral were approximately equal to the proportions that had made loans on contracted collateral. Significantly greater proportions of the PCAs than the large banks have had experience with hedgers borrowing money. And significantly smaller proportions of the small banks than either PCAs or large banks have had such experience with both hedgers and contractors. Much of the differences are undoubtedly due to differences in clientele.

The primary reason why many of the various credit agencies have not

extended credit on the basis of hedged or contracted collateral is that they have had no requests for such loans. A significant proportion of the respondents also said they had not made such loans because either they or the borrower did not understand the use of hedging and forward contracting as a means of reducing risk. This suggests the need for educating both borrowers and lenders of the value of reducing price risk through proper hedging and forward contracting procedures.

None of the credit agencies required their farm and firm customers to hedge or contract collateral, although a few advised such an action. Hedging and contracting were considered to be of minor importance to most of the credit agen-

cies when considering whether or not to make a loan to a farmer or agribusiness firm.

CONCLUSIONS

It appears, therefore, that in most cases hedging and forward contracting can improve a borrower's line of credit, but cannot be considered vital to gaining credit. In most cases only a small percentage of an agency's borrowers attempted to borrow money on hedged or contracted assets and usually only a small proportion of the borrowers production was hedged or contracted.

Although most credit agencies indicated that hedging and contracting did not seem to rank as factors of major importance to a borrower attempting to obtain a loan, it was found that a significant number of the credit agencies would offer significantly larger loans to farmers on hedged or contracted collateral than on non-contracted or non-hedged collateral. Further, it made no difference whether the collateral was livestock or grain. Thus, it is concluded that hedging and forward contracting do aid the farmer in obtaining larger loans on given assets. It was also found that there was no difference among the various credit agencies in the amount they would increase the size of the loan.

The number of respondent agencies that made loans to agribusiness firms on the basis of the firm's hedged and contracted collateral was so small that it was impossible to conduct statistical tests on the data. The data from those that did

respond, however, indicated that greater credit would be granted on hedged and contracted assets than on non-hedged and non-contracted assets.

None of the respondent credit agencies indicated that they would reduce the interest rates charged on loans if the loans were secured by hedged or contracted collateral rather than by non-hedged or non-contracted collateral. This was true regardless of whether the collateral was livestock or grain assets and whether the loan was to a farmer or an agribusiness firm.

It is obvious from the above analysis that many bank managers, PCA managers and farmers have had limited experience with hedging and contracting operations and that many of them do not understand the use of these tools in reducing price risk. This suggests that the futures exchanges and extension personnel from the land-grant universities may have an important responsibility in educating farmers and managers of credit agencies on the potential use of these techniques in reducing price risk.

NEED FOR FURTHER RESEARCH

The current study is limited to production credit agencies and banks. Yet marketing firms and farm supply firms are also important sources of capital to farmers and some of them advance credit to growers in return for the promise of delivery of part of the crop. For example, fertilizer companies often enter agreements with farmers for the future delivery of a quantity of a commodity equal in price to the cost of the fertilizer. The fertilizer

company then hedges the commodity, thus protecting its position. More research needs to be conducted to determine the extent to which such arrangements are used by farmers as a means of obtaining capital.

Further research is also needed on the use of futures trading and contracting not only as an aid in ob-

taining capital but also as an integrated part of the management of a farm or agribusiness firm. Research is also needed to determine how lending agencies calculate the risk in a loan, how they calculate the amount of risk that is reduced when a borrower hedges or contracts, and what price to put on this risk.



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