Floating versus Fixed-Rate Loans in Agriculture: Effects on Borrowers, Lenders, and the Agriculture Sector

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Deregulation, changes in monetary policy, and rapidly fluctuating inflation rates have significantly altered the financial market environment in which agricultural lenders and borrowers must function. Market interest rates have become highly variable. Rural lenders are no longer insulated from these market forces. The unexpected fluctuation in interest rates, particularly the large and rapid rise in rates that occurred during 1980–81, inflicted losses on fixed rate lenders, encouraging them to look for ways to modify their interest rate exposure. The method chosen by many lenders was a shift to floating or variable interest rates.

Use of Variable Rates

Between 1978 and 1983, use of variable rates on non-real estate bank loans to farmers rose sharply, particularly at the smaller banks which provide 70% of the agricultural credit, where variable rate loans increased from one percent to nearly 30% of new loans (Melichar and Balides). Large banks have customarily used variable rates and, thus, have a much higher rate of use throughout the period. Variable rate use at large banks increased from about 60% to 80% of farm loans during the 1979–80 period but has since declined modestly.

The report by Melichar and Balides that variable rate use by commercial banks had only reached 42% by 1983 could easily lead to an underassessment of the pervasiveness of variable rates. The data they report include only non-real estate loans. These loans had an average maturity of six to nine months during the 1978–83 period. Even machinery and equipment loans which cover assets with an expected life of three to ten years currently have an average maturity of less than one year (Melichar and Balides, p. 38). The short maturities of most fixed-rate loans limit the bank interest rate risk. Depending on the frequency with which variable rates are changed, the risk with some short-term fixed-rate loans would not be greater than with variable rates. For many other loans the reduced risk with a variable rate would not offset the increased service costs and borrower resistance. In a recent study of variable rate lending in New York State (Zook and LaDue) fewer banks charged variable rates on their loans with maturities of less than one year than used variable rates on longer-term loans.

The Farm Credit Service (FCS) has used variable rates on most new loans since 1969. However, since FCS rates are based on the average cost of outstanding bonds, rates are more stable than variable rates used by most other lenders. In comparing the effects of variable rates on debt payment levels and repayment ability, LaDue and Zook found that FCS rates were more like fixed rates than prime-based variable rates.

Other lenders vary in the degree to which they use variable rates. The Farmers Home Administration does not use variable rates. While FmHA interest rates may increase over the life of some loans, this normally results from a reduction in the interest subsidy as the farm business repayment capacity improves. Insurance companies generally have not adopted variable rates but have moved to shorter maturities and frequent use of renegotiable loans. They have also been innovative in the development of shared appreciation mortgages and equity investment in agricultural enterprises. Some machinery manufacturers have adopted variable rates, frequently with a final balloon payment when rates in-
crease. Use of variable rates on individual contracts has increased as former owners tie interest rate payments to FCS, or other easily verifiable, interest rates.

Effect on Borrowers

The primary result of the adoption of variable rates is a shift of the interest rate risk from lender to borrower. Interest as a percentage of total production expenses increased to over 15% by 1982, triple the rate of the early 1960s and the highest level since the early 1930s (U.S. Department of Agriculture). The 1977–82 increase is primarily caused by increases in debt and in the level of interest rates, but the expanding use of variable rates also contributes by speeding the application of new higher rates to previously existing loans. Variable rates also contribute to more rapid declines in aggregate interest costs when rates fall, but the increased amplitude of volatility places a significant cash flow burden on the farm sector.

From an individual farm perspective, variable rates increase the year-to-year variation in debt carrying capacity. Given the inability of farmers and lenders to predict interest rates, the increased variability effectively reduces maximum debt levels. A reduction in debt carrying capacity of 12% from fixed rate levels was observed in one recent study (LaDue and Zook). Use of renegotiable rates on long-term loans will reduce the negative impact of variable rates only when rate change dates do not coincide with peaks and valleys in interest rate levels. Further, renegotiable rates provide effective stability only up to the first rate change date.

The wholesale shift to variable rates creates inefficiency in the agricultural credit market by shifting risk bearing from institutions designed to handle such risk to farmers who have limited ability to absorb or transfer the risk involved. Financial institutions have, or should have, more training and experience in ways to make use of financial market instruments in the handling of risk. The surge in both interest rates and interest rate variability during the late 1970s and early 1980s increased the magnitude of the interest rate risk above the levels that financial institutions had expected or planned for. The quickest and easiest way to handle the risk was to transfer it to borrowers by switching to variable rates.

There is little reason to believe that this is an optimal long-run solution. While there are undoubtedly some situations where farmers will find it advantageous to bear the interest rate risk, many situations will need fixed rates to be economically viable and efficient.

Variable rates provide a vehicle for rapid transmission of the effects of monetary policy to farmers. Producers are no longer protected from interest rate swings for the duration of existing loans.

One positive effect of variable rates is the lower net interest rate. This is not necessarily observed on individual loans but will result over time. Over the 1977–83 period New York banks charged approximately .3 percentage points less on short and intermediate variable-rate than fixed-rate loans (Zook and LaDue). Further, variable rates allow farmers to take advantage of declining interest rates without incurring refinancing as prepayment costs.

Variable rates have the potential of improving the availability of long-term funds. Variable rates eliminate the lender risk that rates paid on funds will get significantly out of line with loan rates as a result of general trends in factors influencing interest rates, such as inflation. The primary remaining risk is the remote possibility of being unable to roll over maturing short-term instruments at any reasonable interest rate.

A related side effect, however, is that the efficiency of interest rates as a rationing device is likely changed by variable rates. Efficiency is reduced when past investors who borrowed funds must pay higher rates as a result of the demand effect of use of additional funds for new investment. Firms making new investments do not pay the total added cost of the additional credit used except in the remote case where the firms making new investments and those with outstanding debt are identical and the relative proportions of new investment and outstanding debt are similar for individual firms. On the positive side, efficiency is improved to the degree that variable rates make it unnecessary for lenders to charge new borrowers above-normal rates to cover rollover costs on existing loans.

Effect on Lenders

The primary effect of variable rates on lenders, and the primary reason for their recent widespread adoption, is reduced interest rate
risk. With variable rates, the factors that influence interest rates become of less concern. Projections of future interest rates become less critical to success. Unexpected changes in inflation no longer represents a serious threat. Interest margins can be maintained by adjusting rates as costs change. In some cases it is possible to increase the margin during the course of a loan. The margin is easily modified when variable rates are not rigidly tied to an index and judgment is exercised in determining the timing and amount of any rate adjustment.

With the shift of interest rate risk from lender to farmer, lender incomes should be stabilized at a lower level. Transfer of the interest rate risk eliminates a major factor causing variability in incomes. However, lenders are providing one less service and thus will be earning lower incomes than would otherwise occur. While the return to bearing interest rate risk was likely negative during the late 1970s, a positive return to the risk bearer can be expected in the long run with appropriate pricing strategies.

Variable rates also result in higher administrative costs. Additional costs are incurred for monitoring rate indices, informing borrowers of rate and payment changes, and recalculating payments. The magnitude of the burden will depend on the degree to which the lender is computerized. Administrative costs limit the adoption of variable rates by small banks, particularly for loans of relatively short maturity (Zook and LaDue).

Shifting interest rate risk to farmers results in an increase in lender credit risk (default risk). The debt service requirements of any loan become highly variable. Increased default on payments or need for refinancing can be expected during periods of rising interest rates. A study of dairy farms, which have relatively stable incomes, found that the frequency of payment default was eight percentage points higher with variable compared to fixed rates under the 1978–81 interest rate environment (LaDue and Zook). Defaults would be higher for farm types with less stable incomes.

While there is some correlation between incomes and interest rates for corporations (Morris) and even individuals (Federal Reserve Bank of Minneapolis), the aggregate demand for farm products is primarily determined by factors other than the aggregate level of economic activity. The correlation between farm income and interest rates, thus, is expected to be near zero (Barr 1981). This implies that the increase in default risk from use of variable rates may be greater for agriculture than for other sectors of the economy.

Interest rates and farm incomes may move together when the driving force is inflation. However, much of this increase in value occurs in the form of noncash capital appreciation. Net farm income is increased but cash flow available for debt repayment changes modestly. Periods of rapidly rising inflation can be expected to result in an increased frequency of refinancing and increased default where refinancing is impossible.

The increased credit risk places additional burden on the loan evaluation process. An evaluation of the interest rate sensitivity of repayment becomes a necessary part of loan analysis. Lenders’ expectations about the future course of interest rates is, thus, a factor in the acceptance and rejection of loans. The ability to accurately project cash flows becomes increasingly important. Old rules of thumb for safe lending must be modified.

**Effect on Agriculture**

Variable interest rates reduce the level of farm investment. As indicated by D. Gale Johnson long ago, income uncertainty leads to capital rationing. The rationing may be internal as the farmer attempts to insure either sufficient cash flow to meet all possible payment requirements or enough credit reserve to allow “borrowing” through periods of high interest rates. Or rationing may be external as the lender attempts to insure that required debt service is below the farm’s cash-generating ability (Leventen) or that the liquidation value of collateral always exceeds the loans outstanding. In either case, young farmers and those attempting to expand their business will do so more slowly as the amount of debt capital available relative to the asset base at any point in time will be more limited. Tenants and others attempting to get started in farming or move to farm ownership will find the process more difficult as the sustainable level of debt capital for any given set of resources will be reduced.

Marginal costs of farm production must include a charge for interest rate risk. This implies that the level of production on farms with debt capital will be less as firms produce
where long-run marginal revenue equals marginal cost. Given the general overinvestment in agriculture this may not represent a serious problem in the aggregate. It does raise the credit barrier to entry and increases the likelihood that farmers suffering financial reverses from natural disasters, weather, or depressed product prices will be unable to "borrow through" the period of adversity.

Variable rates may lead to more cyclical investment and, thus, production. When rates rise, the interest cost on existing as well as new investment is increased. Investment is reduced both because the profitability of new investments is reduced and because the increased current cash drain of past investments reduces the current cash available for investment. Short-term investments that will be paid for and used up before rates are expected to decline significantly will have a higher net cost and, thus, will be reduced. The opposite will occur during declining rate periods.

Theoretically, the increased cyclical nature of short-term investment should be at least partially offset by reduced interest sensitivity of long-term investments. Long-term investments should be evaluated relative to expected rates over the life of the loan. In that case, current rates become less important and cyclical changes in investment levels in response to fluctuating interest rates should decline. However, if expected interest rates are primarily based on current rates, investment could become more cyclical. The windfall from lower payments on existing debt and the perceived ability to make payments in the short run could increase investment when rates are low, while the cash squeeze caused by high rates would limit investment.

Managing Interest Rate Risk: The Long Run

Shifting the interest rate risk to the farmer has helped lenders control the gap between ratesensitive assets and ratesensitive liabilities. However, this shift has resulted in placing the burden on that segment of the financial market, i.e., farmers least equipped to handle it. Although it will be optimal for some farmers to continue to bear at least some of the risk, a viable long-run solution will undoubtedly require that agricultural lenders reassume much of the risk they recently shunted aside. Leatham and Baker (1984b) estimate that it would be optimal for Midwest crop-livestock farmers to use some fixed rate debt even at a premium of 150 basis points. Methods must be developed that allow the financial community to manage the risk, rather than just assuming it and hoping it does not seriously dampen profits, or shifting it to the farmer.

Some institutions currently modify the farm-level risk through the use of balloon end-payments or maturity extensions. Maturity extensions are limited to situations within legal maturity limits and normally where current payments are sufficient to cover all interest. Both of these payment adjustment techniques allow maintenance of a stable payment and delay the consequences of rate changes for the original maturity of the loan.

Numerous risk-sharing methods are currently used. With the shift to variable rates, many banks have adopted instruments and techniques to limit borrower interest rate risk. Maximum rate change step size, maximum total rate change, or an interest rate cap with variable rates and renegotiated rate loans are all widely used. These methods generally limit the amount of change that can take place in the borrower's payments and result in the financial institution sharing part of the risk when rates change rapidly or by large amounts. More direct risk sharing is achieved with shared appreciation mortgages (SAMs) with which insurance companies have experimented. SAMs, like purchasing power mortgages which are more widely used in the housing market, assume that the major factor causing high interest rates is inflation. With a SAM the farmer pays for the fixed, and frequently lower, interest rate by giving up some of the appreciation in owned assets. Like the payment adjustment methods discussed above, SAMs delay the real cost of interest rate control to the end of the loan period. But, in this case, the farmer is assured that the income will be generated to make the payment although borrowing may be necessary to spend this income. In spite of its conceptual advantages, intraloan-period investment and asset valuation problems will likely limit use of this technique.

Long-run solutions to the management of interest rate risk will require development of techniques and instruments that allow the lender to shift the interest rate risk to money market or insurance industry participants rather than the farmer. Generally this will involve use of a fixed rate loan to the farmer with concurrent actions limiting lender risk.
New and innovative financing techniques are needed. Some of the possibilities involve use of asset-liability matching, financial futures, options, and callable bonds.

Asset-liability matching requires the institution to match fixed rate loans with fixed rate liabilities of the same term. The risk is borne by the lender’s funding sources. The basic problem with this technique is that farm income variability, reinvestment, and expansion frequently result in early repayment of the loan. Such repayment creates a gap management problem for the lender.

The early repayment problem, however, could be handled through use of a variable prepayment penalty. A prepayment penalty tied to market interest rates or to the lenders’ cost of purchasing a replacement asset (loan or other money market instrument) could protect the lender while giving the farmer the opportunity to repay early, particularly whenever interest rates are favorable. The risk inherent in a variable prepayment penalty is modest compared to the variable interest rates. Such a plan designed to alleviate farmers’ interest rate risk should allow for a negative penalty. However, much of the opportunity provided by a negative penalty could be achieved through availability of a variable rate alternative with a fixed rate conversion option.

Other than early repayment, the primary risk with asset-liability matching on individual loans results from normal amortization where some of the loan is repaid before the liability matures. For long-term loans, the problem is modest in the short run because of the minimal principal payment that occurs. For shorter-term loans participation in more than one issue or use of a bond with pass-through of normal amortization may be necessary. Partial funding of the farm business with unamortized credit on a fixed rate basis may also be an alternative.

An asset-liability matching program could be developed easily by the Farm Credit Service, which has a large volume of agricultural loans of all maturities and excellent access to money markets to obtain funds for a wide variety of maturities. A few Federal Land Banks have recently taken a step in that direction by offering a five-year fixed rate option with a reinvestment fee assessed if bonds sold at the time of prepayment are priced below the rates that existed when the fixed rate was established. Additional alternatives could easily be developed.

Commercial bank development of a similar plan would be more difficult because of the lack of established long-term sources of funds. Obtaining funds with maturities in excess of one year may be difficult or costly. However, the innovation in instruments that has recently occurred as a result of competition and deregulation implies that developing such sources could be accomplished. Development of regional or national loan discounting organizations should be considered.

A brokered or pass-through loan, where the originator sells to another party for a fee, is most common in the mortgage lending area, where depository institutions pass through mortgage loans to other financial institutions such as life insurance companies and pension funds. The buyer of the loan bears the interest rate and default risk. Loan brokering for agricultural loans has not developed to the extent it has in home mortgages. However, some farm loan brokering does exist. Twelve mid-American states can currently sell portions of their farm loans to Rabobank Nederland through the MASI, an agricultural credit corporation. This program allows participating banks more flexibility in asset-liability management but currently provides fixed rates for periods only one year or less (Barry 1983; Carraro and LaDue). Banks have also successfully brokered FmHA guaranteed loans. Large volume use of brokering will likely require standardization of loans in various categories and a recognizable guaranty entity. The federal government works as a guaranty entity. A major bank or bank group could also serve that function.

Financial futures may be used by financial institutions to convert floating-rate liabilities into fixed-rate liabilities that can be used to fund fixed-rate loans. In this application, lenders sell interest rate futures in order to hedge subsequent changes in their cost of funding. If the interest rates rise, the futures position would show a profit that would tend to offset the shrinking spread between the fixed-rate loan yield and the variable funding costs. Alternatively, if rates fall, the futures position would show a loss that would be offset by the increasing spread between the fixed-rate loan yield and the variable funding costs.

There are several factors that complicate or limit use of hedging. These are discussed in another paper by Drabenstott and Heffernan. Further, Jacobs has shown that the average cost of fixed-rate loans would be less if funding
were obtained from matched maturity instruments rather than from shorter-term maturity instruments with the interest rate hedged with futures. However, the lack of depth in the long-term CD market means that banks frequently cannot match maturities with fixed rate assets.

One alternative to lender hedging of a loan is use of a synthetic fixed-rate loan. That is, establish a floating rate loan with the rate tied to an easily hedgeable market rate (e.g., T-bill rate) and let the borrower do the hedging. However, farm loans are rarely in multiples of $100,000 or $1 million.

An alternate strategy is for the lender to hedge interest rate risk using futures contract options (Handorf and McCarthy, and Leatham and Baker 1984a). The lender and borrower are protected against upward movements in interest rates but have no obligation if interest rates decline. In addition, both the lender and borrower can take advantage of lower rates if interest rates decline. However, the cost of options is significantly higher than the purchase of future contracts. If the cost of hedging is passed back to the borrower as would be expected, the advantage of a fixed rate is reduced. Leatham and Baker have concluded that Midwest crop-livestock producers would not use fixed rate debt hedged with options if they are required to pay the full cost of the options.

Callable bonds could also be used by institutions with access to the bond markets. With a bond issue in small units, bonds could be recalled as the loan is repaid. While the premium required for a callable option will likely vary with the likelihood of recall, money market analysts indicate that the premium for intermediate-term bonds would be twenty-five to fifty basis points. Most callable bonds give the investor call protection for the first few years. A prepayment penalty on loans may be required during this period.

Concluding Comments

The recent increase in the volatility of interest rates has amplified the interest rate risk inherent in borrowing money. In response to the low incomes resulting from bearing that risk during the late 1970s and early 1980s, financial institutions sharply increased their use of variable interest rates on loans. The switch from fixed to variable rates shifts the interest rate risk from the lender to the borrower. As a result of this shift, farmer debt-carrying capacity is reduced and agricultural credit market efficiency declines. Lenders experience increased credit risk. Investment in agriculture is reduced and is likely more cyclical. On the positive side, lender incomes are stabilized. Also, interest costs to farmers are reduced slightly, and fund availability may be improved.

Lenders have several alternatives for shifting interest rate risk to someone other than farmers. Asset-liability matching, hedging, brokering, options, and callable bonds are among those that should receive consideration. The research and finance communities need to focus on evaluating the strengths and weaknesses of alternatives and on developing practical methods of implementing those financing methods that show the most promise.

References


