EXTERNAL FINANCE: A NECESSARY COMPONENT IN GROWTH PROJECTIONS FOR SOUTHERN AGRICULTURE*

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Literature is replete with studies projecting the performance of agriculture to 1980, 1985 and the year 2000. These studies are usually based upon a dynamic certainty econometric model which, in turn, either assumes or projects annual rates of growth in the stock of producer capital over the time period covered by the study. In two recent assessments of the state of the art King [12] and Tweeten [27] cited several needed changes in our approach to sector econometric projections models, which should lead to increases in accuracy and consistency of future projections. Among those listed were incorporation of risk and uncertainty associated with expected outcomes and integration of disparate models into an aggregate sector projections system. Both of these authors failed, however, to identify the lack of financing considerations in present sector projections models. For example, those studies that sought to explain aggregate demand for farm producer capital when projecting the capital stocks associated with future output levels ignored the implicit rental price of capital and other variables suggested by finance and risk theory. Furthermore, the demand for financial assets, if included at all, was expressed merely as a function of time.

In his recent paper on the "new macroeconomics" of agriculture, Schuh [28] correctly argued that greater attention must be given to changes in monetary and fiscal policy, both domestic and foreign, if we are to fully understand changes taking place in agriculture and accurately project future sector economic outcomes. Schuh's recommendations, however, are cast almost entirely in terms of those policies aimed at regulating gold flows or our balance of payments deficit. Equally important to projections of the future growth of agriculture are those monetary and fiscal policies which affect cost and availability of debt and equity capital to farm firms.

The initial purpose of this paper is to present a simplified theoretical growth model designed specifically to illustrate channels through which cost and availability of debt and equity capital and increasing financial risk can restrict future rate of growth of farm firms.[1] Increasing importance of debt capital to finance replacement and expansion of farm producer capital, increasing length of debt payback periods, and changing market shares for those lenders who supply loan funds to southern agriculture will then be compared to similar trends in the rest of the country. In light of recent projections of future external financing requirements in agriculture to 1985, several likely changes in present lending practices and in ownership and control of farm producer capital will be identified as they affect future growth and financial position of farm firms. Finally, implications of the preceding analysis for future research needs will be discussed.

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[1] Because of problems encountered when aggregating physical quantities of outputs or inputs at the sector level, a financial measure of growth must be employed. Perhaps the most widely-used measure of growth when comparing different geographical regions or industries is the rate of increase in net business income or owner equity expressed in constant dollars.

INCORPORATION OF FINANCE INTO SECTOR GROWTH MODELS

Melichar [13] was first to recognize the need to incorporate financing considerations into a sector projections model.[2] His econometric model, which was the basis for his published projections of outcomes in agriculture to 1980, includes a determination of the demand for external capital finance. Absence of the rate of interest on debt capital or cost of equity capital, assumption of a constant rate of saving, and the residual rather than simultaneous solution of demand for external capital finance are among other features which raise serious questions about the ability of his model to reflect effects of future trends in financial markets on agricultural growth. The theoretical growth model presented below offers an illustration of how researchers can begin to incorporate effects of these and other finance relationships into their sector projections models.

Aggregate Growth Model

The theory of the firm, under conditions of perfect competition such as perfect knowledge, suggests that farm firms will continue to add to their fixed capital stock as long as present value of the net revenue generated by an additional unit of fixed capital exceeds its purchase price. If we assume the simplist case where real farm output, Y, is produced according to the Cobb-Douglas production function

$$Y = AL^{\alpha}K^{\beta}V^{\gamma} \tag{1}$$

where

L = labor input
K = fixed capital inputs and
V = variable capital inputs

while α, β and γ are the factor shares associated with L, K and V, then farm firms will continue to expand their fixed capital stock as long as

$$\sum_{t=1}^{\infty} [P\,(\partial Y/\partial K) - PP_K\,(\partial CD_t/\partial K)]\,(1+r)^{-t} > PP_K \tag{2}$$

where

P = actual product price received per unit of output
PP_K = purchase price for fixed capital
CD_t = capacity depreciation of fixed capital in year t and
r = weighted-average cost of debt and equity capital.[3]

Maximization of owner equity under conditions of perfect competition, including perfect knowledge, therefore requires that

$$(\partial Y/\partial K) = C_K/P \tag{3}$$

where

$$C_K = [PP_K\, r(1+\sum_{t=1}^{\infty} (\partial CD_t/\partial K)\,(1+r)^{-t})] \tag{4}$$

and where C_K represents the actual implicit rental price of fixed capital.[4] The first component of C_K, or PP_K r, represents opportunity cost of financing PP_K dollars required to purchase an additional unit of fixed capital. The second component represents present value of cost of all future replacements, including replacements of replacements.[5]

By substituting the marginal product expression for fixed capital from equation (1) into equation (3), optimal stock of fixed capital under conditions of perfect knowledge can be solved for. Then, desired year-end stock of fixed capital measured in efficiency units associated with the different vintages it incorporates is given by

$$K_{t+1}^{*} = \beta[\,(P\,Y)/C_K]_t \tag{5}$$

which suggests that the desired year-end stock of fixed producer capital is positively affected by

[2]The U.S. Department of Agriculture currently publishes a short-run forecast of financial outcomes in agriculture for the upcoming year in *Agricultural Finance Outlook* [32]. This one-year forecast is based in part upon a solution of the AIW simulator originally developed by Penson [18].

[3]Penson, Hughes and Nelson [20] recently estimated the efficiency units associated with the existing stock of farm tractors and their annual capacity depreciation based upon agricultural engineering data.

[4]We can broaden the scope of C_K to include tax considerations. Setting the right-hand-side of equation (4) equal to ξ,

$$C_K = \xi[1-T_c-T_\pi\,(1-\rho T_c)\,B_K]\,/\,(1-T_\pi)$$

where:

T_c = investment tax credit rate
T_π = income tax rate
ρ = portion of investment tax credit deducted from depreciable base of qualifying equipment and
B_K = present value of the stream of tax depreciation stemming from one dollar or current investment in qualifying equipment.

[5]Purchasing power of price sensitive farm assets is assumed to remain constant in the definition of C_K included in the model.

increases in product prices and output and negatively affected by increases in the implicit rental price. The latter relationship further suggests that the fixed capital stock desired by farm firms will decrease if purchase price, weighted-average cost of debt and equity capital, rate of capacity depreciation or income tax rate increases. These effects, however, can be partly offset by a simultaneous increase in the investment tax credit rate.

Schuh [28, p. 803] states, "From a chronic problem of low relative incomes for farm people, a shift has occurred to what many believe will be a chronic problem of instability." Yet, instability alone does not imply existence of business risk if future values of prices and yields are known in advance. The fact that no one could have foreseen with complete certainty recent variability in farm prices, yields and money interest rates, however, underscores the need for researchers to use expected rather than actual values when estimating the parameters of an econometric projections model. One approach to accounting for uncertainty is to use a variant of Muth's [16] rational expectations hypothesis as Birch and Siebert [5] did in a recent study on the manufacturing sector.[6] They suggested that manufacturers form their current sales expectations based not only on past sales but on other previous events as well. Thus, if the earlier assumption of perfect knowledge is relaxed and that farm producers are risk averse is assumed, their desired year-end stock of fixed capital would instead be given by

$$K_{t+1}^{*} = \beta \hat{V}_t - \delta(\Phi/W)_t \qquad (6)$$

where

$$V_t = [(P\,Y)/C\kappa]_t$$

$$\Phi_t = [\sum_{j=1}^{m} 1/m|\,(V_{t-j} - \hat{V}_{t-j})|]$$

which simply assumes a mean-variance behavior on the part of producers toward business risk, where expected business risk is defined as the previous forecast errors incurred over a period of m years with each assigned an equal probability of re-occurring. The variable W_t above represents the purchasing power of beginning producer equity while $\hat{}$ denotes the expected value. The entire second term in equation (6) therefore reflects the degree to which risk aversion by farm operator families would be offset by the level of their beginning real wealth.[7]

To complete the model, desired balances of asset and credit liquidity must be accounted for. Based in part upon the principle of increasing risk and asset preference theory, it is assumed that the year-end cash balances desired by farm firms (F_{t+1}^{*}), as well as their desired net borrowing during the year (ΔD_t^{*}), are given by

$$F_{t+1}^{*} = f(r_t, [(\hat{P}\,Y)/\Phi]_t, [(K_{t+1}^{*})\,(PP\kappa_t)], \hat{PW}_t) \qquad (7)$$

$$\Delta D_t^{*} = f(\hat{mc}_t, [(\Delta K_t^{*})\,(PP\kappa_t)], \Delta F_t^{*}) \qquad (8)$$

where

$$\hat{mc}_t = \hat{i}_t + f(D_{t+1}^{*}/(Lev)\,(W_t)) \qquad (9)$$

subject to

$$D_{t+1}^{*} \leq [(Lev)\,(W_t)] \qquad (10)$$

and where

$\hat{mc}_t$ = expected marginal cost of credit use by farm firms in the current year

$\hat{i}_t$ = current expected rate of interest on debt capital

$\hat{PW}_t$ = expected producer withdrawals for personal consumption and income tax payments and

Lev = maximum financial leverage ratio or degree to which lenders will permit farm producers to leverage themselves.

Equation (7) suggests the asset liquidity desired by farm producers will decrease as expected gross income increases and will increase as their asset fixity and business risk increase [26], [21]. In addition, equations (8) and (9) together suggest that as farm producers use up their credit reserves, marginal cost of borrowing additional debt capital increases faster than the money rate of interest, further reducing their desired use of borrowed funds.[8] Thus, the annual rate of growth in owner equity achieved by farm producers is determined in the above model by those variables in equations (6) through (10) affecting

[6] The estimating equations suggested by the sector growth model presented in this paper are available from the author upon request.

[7] Several studies have reported empirical evidence which shows that risk aversion displayed by investors decreases as their wealth increases [4].

[8] For further discussion of this topic, see [9].

the desired stock of fixed capital, cash balances and debt outstanding.

Linkages to Financial Markets

While several internal and external constraints to growth are illustrated by the theoretical sector growth model, perhaps those most noticeably absent from past sector projections models pertain to interrelationships between financial markets and the farm producers they serve. There are two explicit linkages to financial market outcomes identified in the above model.

The first linkage pertains to the expected weighted-average cost of debt and equity capital ($\hat{r}_t$) included in the expected implicit rental price of capital ($\hat{C\kappa}_t$). According to the model, an increase in the expected opportunity cost of current saving would lead producers to increase their desired holdings of interest-bearing financial assets and other forms of nonfarm capital, at the expense of their desired stock of farm business assets. Importantly, this modification to investment intentions will affect rate of growth in the future productive capacity of agriculture along the lines suggested by Hickman [11].

The second linkage to financial markets suggested by the model pertains to the external and internal rationing of credit use by producers. Barry and Fraser [4] recently pointed out that interest rates on farm loans seldom vary among farm firms. Instead they suggest [4, p. 294], "the brunt of risk pricing for farm debt is expressed in terms of loan limits that differ among borrowers—a more inefficient and less effective mechanism." This feature is accounted for in an aggregate fashion by the maximum debt-to-equity ratio (Lev) in the model. For example, if lenders in general restrict credit capacity of producers, the effect is constraining use of borrowed funds and hence, the rate of growth in owner equity. Farm producers, on the other hand, may desire to limit their use of debt capital, retaining a portion of their existing credit reserves for liquidity. Since the marginal cost of borrowing additional funds includes both the interest rate and liquidity value to the farm firm, the expected marginal cost of debt capital ($\hat{mc}_t$) increases to risk averse producers as their credit reserves approach zero. This, in turn, will decrease their desired use of debt capital and stock to fixed producer capital.

Limitations of the Model

The theoretical sector growth presented in this paper is not without its own limitations, however. The aggregate production function and factor demand equations, for example, are homogeneous of degree one and zero, respectively; thus implying constant factor shares. Ott, Ott and Yoo [17] suggest, however, that one can account for cyclical variations in factor shares for capital and labor by adjusting α and β according to the rate of capacity utilization. In addition, implicit rental price of capital does not account for the offsetting influence of expected real capital gains over time. But then, purchasing power of price sensitive assets was assumed constant. The model also ignores possibility of farm producer capital being owned outside agriculture and leased to farm firms, or the possibility of farm producers seeking external equity capital to finance plant expansion in the event their credit reserves fall below preferred levels. While outside equity capital has historically played a negligible role in financing farm capital flows at the sector level, capital leasing of land in particular from nonoperator landlords has been significant [4]. The model also implicitly assumes the sector is one giant collection of continuing, homogeneous proprietorships which, of course, is an oversimplification. At minimum, the model should be expanded along the lines adopted by Penson [18], that capital purchased by producers from discontinuing sector participants requires financing even though the aggregate capital stock will have remained unchanged. Furthermore, one should attempt to disaggregate sector projections models to reflect differences in liquidity needs and risk faced by selected groups of producers.

Despite these shortcomings, the model clearly defines selected channels of influence through which changing financial market conditions and financial decisions by producers can effect the rate of growth of agriculture. These linkages suggested by finance theory, producer responses to increasing business, and financial risk suggested by risk theory must be included in present sector econometric projections models if they are to adequately explain present events as well as project future outcomes.

FINANCING GROWTH IN SOUTHERN AGRICULTURE DURING THE 1970'S

One can anticipate the argument, at this point, that external finance of farm capital accumulation has historically played a minor role and would have little impact upon projected growth in agriculture to 1980 and beyond. Tostlebe [26], after all, had shown the fraction of annual capital flows financed with debt capital was extremely small over the 1900-1950 period. Furthermore, the sources-and-uses-of-funds statement published annually by the U.S. Department of Agriculture [31] shows that net increases in debt outstanding accounted for only 12 percent of the

total sources of funds used to finance farm capital flows, personal consumption and withdrawals by continuing sector participants as late as 1975. Penson [19] recently showed, however, that farm producers financed 48 percent of their farm capital expenditures with debt capital during the 1973-1975 period, as compared to only 27 percent in 1970. While sources and uses of debt capital and growth in owner equity in agriculture at the national level are well known, little is known as to how these outcomes differ at the regional level. The following analysis utilizes what little regional data are available to compare the increasing importance of debt capital in financing growth in southern agriculture as well as changes in the market shares for those who supply these funds with similar data for the rest of the country.

Climate for Growth at Beginning of 1970s

A sample survey conducted by the U.S. Bureau of the Census [29] provides regional flow-of-funds data for the year 1970. An analysis of these data by Penson and Williams [22] showed, for example, that only those producers in the Delta States region, who financed 51 percent of their farm capital expenditures with increases in debt, exceeded the national average in the South.[9] By combining these survey data with information from the 1969 Census of Agriculture, Hottel and Reinsel [10] revealed rather dramatic regional differences in the financial leverage position of farm producers. For example, large-sized farms (those with sales of $100,000 or more) in the Southeast and Delta States regions reported leverage ratios of 0.26 and 0.31 in 1970 while similar sized farms in the Lake States and Corn Belt regions reported leverage ratios of 0.70 and 0.50, respectively. This is despite the fact that the large-sized farms in the Southeast and Delta States regions reported *higher* returns to owner equity (10.7 and 11.9 percent) than for similar farms in the Lake States and Corn Belt regions (9.1 and 6.3 percent). Furthermore, large-sized farms in the Southern Plains region reported a leverage ratio of 0.30, lowest in the country even though their return to owner equity was equal to that reported by similar farms in the Corn Belt region.

It is impossible to conclude from either of these studies whether the relatively conservative use of debt capital throughout the South in 1970 was the result of internal or external credit rationing, although it is likely that some combination of the two existed. It *is* obvious, however, that several conditions identified above in the sector growth model (i.e., higher returns to owner equity and seemingly larger unused credit reserves) suggest the potential existed for a higher future rate of growth in southern agriculture at the beginning of the 1970s.

Debt Capital Expansion During the 1970s

Neither the fraction of farm uses of funds financed with debt capital, the growth in owner equity nor the financial leverage position of producers can be estimated at the regional level beyond 1970 without making numerous heroic assumptions regarding missing data. However, regional differences in the *amount* of debt capital used by producers and non-operator landlords to finance farm capital accumulation in recent years based upon unpublished data provided by the U.S. Department of Agriculture[10] can be examined.

All four production regions in the South recorded a greater percentage increase in total farm debt outstanding over the January 1, 1970-1976 period than the rest of the country. The Southeast region, where total farm debt outstanding rose from $2.6 billion on January 1, 1970 to $5.5 billion by January 1, 1976, led the way with a 112 percent increase. This region also recorded the largest percentage increase in real estate farm debt (110 percent) and the highest debt-to-purchase price ratio in the country, the latter rising from 61 percent for the year ending March 1, 1970 to 78 percent in 1976 [32]. By comparison, real estate farm debt outside the South rose approximately 70 percent during the same period. The lone exception to the trend in the South towards a greater use of debt capital to finance real estate transfers was the Delta States region where, despite a 65 percent increase in real estate farm debt, the debt-to-purchase price ratio fell from 82 percent in 1970 to 68 percent in 1976, lowest in the country.

The Delta States region, on the other hand, did record the largest percentage increase in non-real estate farm debt (158 percent). By comparison, non-real estate farm debt outside the South rose by 104 percent. Thus, the South has received approximately one-third of the net flow of farm loan funds in the United States so far during the 1970s—an increase of some three percentage points over its share during the 1960s.

As a result of increased use of debt capital by

[9]The production regions identified in this paper are comprised of the following states: *Appalachian:* Kentucky, North Carolina, Tennessee, Virginia and West Virginia; *Delta States:* Arkansas, Louisiana and Mississippi; *Southeast:* Alabama, Florida, Georgia and South Carolina; and *Southern Plains:* Oklahoma and Texas.

[10]A computer listing of annual data on market shares for selected institutional and noninstitutional lenders by state covering the 1960-1976 period was provided by ERS, U.S. Department of Agriculture.

southern farm firms, their debt payback period, as measured by the ratio of debt outstanding-to-total net farm income, increased in all four production regions during the 1970-1975 period. The debt payback period for farm firms outside the South, on the other hand, actually decreased during the same period. While the relatively greater use of debt capital by southern farm firms obviously contributed to the total increased length of their debt payback period, the recent decline in their total net farm income implies an even longer time period if it continues. In 1975, for example, farm firms in the Delta States region increased their debt outstanding by approximately $520 million at the same time their total net farm income fell almost $800 million below the previous year's level. As a result, at the end of 1975 it would have taken 4.5 years to repay farm debt outstanding in this region if all net farm income were used for this purpose, as compared to 2.2 years just one year earlier. A large part of this net income flow is, of course, withdrawn to finance personal consumption, income tax payments and other nonfarm uses of funds, thereby implying an even longer debt payback period. Further examination also reveals that, while each of the four regions in the South exhibited shorter debt payback periods in 1960 than found in general outside the South, much of this gap was closed by the end of 1975. The Southern Plains region, for example, showed a debt payback period of 7.1 years at the end of 1975 as compared to 3.1 years outside the South.

In summary, we have seen a significant increase in the amount of debt capital used to finance farm capital accumulation in southern agriculture so far during the 1970s. Recent declines in net farm income incurred by these producers, however, not only suggest a further lengthening of their debt payback period, but also serve to underscore the increasing financial risk confronting both borrowers and lenders. According to our theoretical growth model, if these events continue they will reduce future use of debt capital otherwise projected and hence, the growth rate in southern agriculture.

Changes in Debt Capital Markets Serving Agriculture

Several changes have taken place in the debt capital markets serving southern agriculture in recent years. With respect to non-real estate farm debt, the market share of commercial banks has fallen rather dramatically since 1960, particularly in the South. In the Appalachian region, for example, non-real estate farm debt owed to commercial banks fell from 59 percent of the institutional share of the market in 1960 to 38 percent in 1976. Similar declines are noted in the Delta States and Southeast regions as well. Only in the Southern Plains region have commercial banks maintained their market share of approximately 65 percent. These declines have been offset, for the most part, by the net increase in non-real estate farm loans made by Production Credit Associations. A similar change has taken place in the real estate farm debt capital market. While commercial banks have maintained a relatively constant market share throughout the South and elsewhere, life insurance companies, long an important source of real estate loan funds, have declined in market performance. In the Southern Plains region, for example, the market share recorded by life insurance companies fell from 30 percent in 1960 to 15 percent in 1976. A similar comparison in the Appalachian region shows a decline from 17 percent in 1960 to just 6 percent in 1976. The market share of Federal Land Banks, on the other hand, has risen in almost exact proportion to the declines noted for the life insurance companies. As a result of these changes, an increasingly larger share of the new loan funds to southern agriculture is being provided by the Farm Credit System which, in turn, depends upon the sale of debt instruments on money markets for new loanable funds.

Several factors are frequently advanced to explain these changes in market shares. A popular notion is that banking organizational structure in general and lack of access to urban savings by rural banks in unit banking states, in particular, have contributed to the changes in the market share of commercial banks. Yet, Melichar [14] has shown that non-real estate farm debt, in particular, owed to commercial banks tended to be less in branch banking states than in unit banking states and that farmers in unit banking states owed a higher level of commercial bank debt in relation to their income and assets. This suggests that the frequently-cited advantages of branch banking in agriculture are somewhat offset in unit banking states through use of correspondent and other forms of participatory relationships. Still other mechanisms such as establishment of secondary markets and pooling arrangements for farm loans appear to offer rural banks in unit banking states a means to attract additional loanable funds without having to place compensating balances at a correspondent bank. Unfortunately, results from past empirical studies on the effects of bank organizational structure on farm lending appear to yield conflicting results to date [15]. A particularly interesting result is reported by Sullivan [24] who found that during the 1962-1970 period, holding company banks in Florida *decreased* their farm lending activity shortly after becoming affiliated, while independent banks were expanding their farm lending.

The recent market share abdicated by life insurance companies to Federal Land Banks is frequently thought to be the result of more favorable returns on nonfarm investments, state usury laws and the tax and other advantages afforded Federal Land Banks. In addition, the variable interest rate plan used by Federal Land Banks, which allows for interest rates on all loans covered to be re-adjusted in accordance with current bond costs, may also have been a major factor since its adoption in 1970. Interest rates on Federal Land Bank loans will generally be lower than those charged by life insurance companies when bond costs are rising, and higher when bond costs are falling since the variable rate more closely approximates the average cost rather than current cost of bonds.

A review of literature suggests, however, that relatively little has been done in the way of identifying and testing determinants of changing market shares for those financial intermediaries providing loan funds to agriculture. Yet, empirical estimates of lender responses to changing market conditions are obviously required to project the future supply of debt capital as well as who will supply these funds.

FUTURE DIRECTIONS IN EXTERNAL FINANCE

It is frequently said that agriculture is an attractive place to lend with $4 of assets backing every $1 of liabilities, since only $2 of assets backs every $1 of liabilities for U.S. business as a whole. Almost 40 percent of present producers, however, have no farm debt outstanding. If we assume for the moment that the majority of these producers are near retirement and that they or their nonfarm heirs will withdraw their equity capital at the time of sale, it is not hard to see how this asset-to-debt ratio could change dramatically in the next ten years. Since no new capital is being formed in this instance, we would also see further dramatic increases in the debt payback period as well. Finally, security required for new loan funds flowing into agriculture is highly dependent upon how lenders form their expectations regarding future income flows and market values for price sensitive farm assets. One need only recall the large losses in equity incurred recently by many highly-leveraged cattle producers who suffered from the substantial price declines during 1973-1974 to illustrate this point. According to Barry and Fraser [4], lenders experienced serious loan repayment and security problems and, as a result, now require higher equity margins and exercise greater control.

Governor Harding [8] recently projected the Farm Credit System's January 1, 1976 loans outstanding would likely increase between 189-281 percent by 1985 depending upon annual rate of inflation and the percent of future annual farm capital flows financed with debt capital. Of particular interest is the fact that this projection assumes that the System's share of the farm debt capital market will remain at 39 percent of the annual flow of farm loan funds. Assuming for the moment that sufficient capital will exist to meet the loanable funds needs of the Farm Credit System and other money market lenders serving agriculture and that rural saving will be sufficient to insure continued deposit expansion at rural banks, one must still question whether non-FCS and non-FHA lenders in particular will actually desire to supply their *present* share of the projected increase in debt outstanding in light of the increasing debt payback periods and financial risk this implies.

To facilitate servicing of this projected debt level, lenders in general and commercial banks in particular will need to more closely match the term of the loan with the useful life of the asset being financed. Lenders will also have to be more flexible in the scheduling of principal repayment in periods of adverse income flows as well as in the restructuring of existing debt. The variable amortization program proposed by Baker [3], for example, deserves serious consideration as it seemingly provides for a more stable financial environment. Due to the sheer size of individual farm loans, lenders will also likely exert greater control over the application and management of farm loans to minimize potential losses.

As producers seek to expand their existing capacity by adopting new technologies or by acquiring existing assets from discontinuing producers in an increasingly uncertain environment, we will also likely see several changes in the ownership and control of farm business assets. Brake [6], for example, sees a trend toward more partnerships and corporations in agriculture because of the difficulty encountered in transferring and recapitalizing increasingly larger-sized farms. Aines [1] also sees the possibility of greater use of permanent financial linkages, including risk sharing, between farm firms and nonfarm corporations producing major manufactured production inputs. Use of outside equity capital provided by joint ventures, such as limited partnership agreements, is likely to increase in importance as a source of external finance and risk sharing to producers in specific sub-sectors of agriculture—so long as the economic incentives for doing so are competitive with the nonfarm investor's required rate of return.

In addition to these possibilities, there will likely be greater leasing of depreciable producer capital by producers where traditional lenders are included

among the lessors. Rose and Fraser [23] recently showed that 95 percent of the Nation's 50 largest banks have become involved with equipment leasing, and that over 120 holding companies have now either started or purchased equipment leasing companies. A recent estimate also suggests that a leasing company can often earn a return on their investment which exceeds interest rates permitted by many state usury laws [2]. Present and beginning producers seeking other avenues to finance expansion without having to draw down their existing credit reserves or committing substantial amounts of their equity capital to purchase producer capital goods may well turn to leasing capital owned by commercial banks, Production Credit Associations or equipment companies themselves. Finally, continually rising land values and the eventual capital gains taxes they imply may also suggest that more producers or their nonfarm heirs will desire to either sell via a land contract or postpone sale and lease the land as a non-operator landlord.

IMPLICATIONS FOR FURTHER RESEARCH

There is a critical need to expand coverage of agricultural data systems if they are to supply necessary information to estimate even the simplified econometric model illustrated in this paper at the regional or industry level. Further development of sub-sector data series along geographic and demographic (i.e., size and type of farm, tenure, etc.) lines is required to adequately assess the changing financial structure and ownership of agriculture and to avoid the problem of aggregation bias when estimating sector econometric projections models.

In addition, further information on the extent of producer capital leasing in agriculture and use of outside equity capital to finance farm capital flows is required as they grow in importance. Also, little is known about the magnitude and liquidity of nonfarm capital accumulated by farm producers or how these investments are financed.

Finally, further study of management goals of both producers and lenders, as well as how they form their expectations regarding future financial outcomes and their responses to increasing business and financial risk, is needed if sector econometric projections models to accurately project the future growth of agriculture in an uncertain environment are to be expected.

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