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and David J. Leatham**

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Equity Capital in Financing Agriculture

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Financing farm firms with outside equity instead of with debt has the potential for reducing risk and increasing capital availability, but it may also increase transactions cost and distort management incentives. Equity capital is distinguished from debt primarily in the way it is compensated. Equity investors receive a share of the returns. Lenders receive a fixed payment. Servicing a fixed financial commitment from a variable cashflow creates financial risk. Financial risk is reduced with equity investment. If returns to the farm business are low, the compensation for the equity investors are correspondingly reduced. If returns are high, the equity investor shares in the extra profits. Because of the opportunity to share profits when returns are higher, the equity investor may be willing to provide more capital in riskier situations than a lender. Because of the risk and return sharing, equity investment requires more monitoring than lending. Monitoring is costly. In addition because the farm operator shares ownership in the farm business with the equity investor, the operator may not have incentive to maximize returns to the firm.

This article outlines the current state of knowledge about nonfarm equity use in the U.S. and suggests research directions. The current state of knowledge is explored in three areas: 1) the demand for nonfarm investment, 2) the potential supply of nonfarm equity investment and 3) alternative institutional forms for such equity investments. Because equity investment depends crucially on the institutions created to facilitate it, this is explicitly an article about institutional innovation. The focus of this article is on economically sound nonfarm equity investment. An ample literature already exists on tax related equity investment in agriculture (see for instance Davenport, Boehlje and Martin). The article concentrates on institutions for nonfarm equity. The general discussion dealing with farm business organization choice is omitted (see Harl, or Barry et al). This analysis will be of interest to researchers in agricultural finance, to administrators who are responsible for allocating funds to these researchers and to policymakers seeking to avert future farm financial problems.

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At least three reasons exist for expecting farmers to seek alternatives to debt finance in the late 1980s and beyond: 1) the farm financial problems of the early 1980s revealed the weaknesses of debt finance, 2) the real cost of debt can be expected to remain high and 3) changes in federal farm programs may reduce the risk bearing ability of farmers. The 1980s farm problems affected primarily those farmers with high debt loads; when government payments are included in the cashflow, income levels for farmers with low debt were relatively good (Melichar). The real cost of debt may remain high for farmers because: 1) federal credit subsidies for farmers are being reduced, 2) lenders are aware of the federal deficit and are wary of a new burst of inflation, 3) lenders are freshly aware of the risk in lending to agriculture and 4) new legislation, such as Chapter 12 Bankruptcy and mandatory mediation in some states raises lender costs. Federal credit subsidies have come in many forms. Some credit subsidies for farmers were explicit, such as the below market interest rates on some Farmers Home Administration (FmHA) loans. Other credit subsidies were less obvious, such as the implied agency status of the Farm Credit System (FCS) which allowed FCS bonds to sell at an interest rate a just slightly above that of U.S. Treasury Bonds. The FmHA is switching to guarantee loans at market interest rates; not as many below market loans are being made. The implied guarantee for the FCS is not perceived to be as solid as it once was. Changes in FCS operating procedure, such as higher downpayment levels, also increase the real cost of using debt. The Gabriel and Baker risk balancing hypothesis suggests that farmers are willing to bear a certain level of risk, regardless of the source of risk. In this view if a government program is cut, increasing production and price risk, many farmers will respond by reducing debt and thereby decreasing financial risk (Collins 1985a).

The primary sources of capital in U.S. agriculture have traditionally been operator equity and debt, but the use of nonfarm equity is not new. Joint stock companies were used to finance agricultural development from tobacco production in the Jamestown colony to ranching on the Great Plains (See for instance Atherton or Gressley for the cattle industry story). Initially much of the external equity capital was European, but as agriculture developed in an area local nonfarm investors, professional people and merchants, became more involved in supplying capital (Tostlebe, Hibbard and Robotka). Contrary to the popular belief that farm owner operators settled the frontier, many settlers rented farmland (Winters, Swierenga, Cogswell, Gates). Leasing of farmland has traditionally been the most common form of nonfarm equity investment in U.S. agriculture. Currently, about 40 percent of U.S. farm land is rented (U.S. Dept. of Commerce, 1982). Limited partnerships with nonfarm investors have been used in financing specialized farming, for example cattle feeding, citrus orchards and nut groves (Moore, Scofield, Barry et al.). A few farming operations have used sales of common stock to raise equity capital, but high flotation costs have made this route impractical for most farmers

(Barry et al, Penson and Duncan). Lower farm asset prices in the mid 1980s have sparked some renewed investor interest on farm property (Pelzer).

The organization of the paper will be to first review current knowledge and then suggest research possibilities. The first section will outline the demand for nonfarm equity. The second section will discuss the supply of nonfarm investment capital. The third section will review analysis of the institutional alternatives for nonfarm equity investment. The fourth section develops research needs.

Demand for Nonfarm Equity Capital

The demand for nonfarm equity capital is not evident at the sector level, but appears to be concentrated among certain farm groups. In comparison to other sectors of the economy, the farm sector is not highly leveraged. Differing accounting practices complicate leverage comparisons across sectors. The U.S.D.A. farm sector debt to asset ratio estimates are relatively low, 24 percent in 1986, but are not directly comparable to those made for other sectors, because the farm estimates use the market value of assets, while cost based valuation is used in most other sectors. Dunn and Bradstreet report debt to asset ratio averages for small groups of relatively large farms in certain commodity categories. Their numbers show debt to asset ratio substantially higher than the U.S.D.A. estimates, but within the range of other sectors (Table 1). The Dunn and Bradstreet numbers show the troubled grain industries with leverage in the lower end of the range for all industries.

Some evidence exists which suggests that the farm sector has been a net supplier of equity to other parts of the economy. The evidence is primarily in the form of a relatively large discrepancy between the sources of funds in the farm sector and the uses of funds within the sector. In part this discrepancy may be due to estimation error, but the size and persistence of the residual suggests that it may be more than a statistical problem. Table 2 provides an example of this type of calculation for the years 1960-1979. The after tax cashflow estimate is the sum of operator net cash farm income and nonfarm income, minus farm income of nonresident operators, income taxes and cost of social insurance. The consumption estimate is the personal consumption expenditures from the National Income and Product Accounts multiplied by the percent of U.S. population on farms and farm income as a percent of the income of the nonfarm population. The value of farm products consumed directly on farms is subtracted from the consumption estimate to provide an estimate of cash consumption expenditures. The sources of funds are after tax cashflow and new debt. Farm capital expenditures are subtracted in deriving the U.S.D.A. operator cash farm income estimates, hence the residual cashflow is available for consumption or off farm investment. Subtracting consumption from the after tax cashflow and new debt yields a residual that is always positive

in the 1960-1979 period and varies from 2.4 billion to 20.5 billion. The lack of income tax and social insurance estimates prevent similar calculations for the 1980s. Penson derives similar estimates of off farm equity investment for 1970-1975. McKinzie, et al., also found a net equity outflow from the farm sector.

Firm level data shows many profitable U.S. farms with relatively high debt loads that might benefit from equity investment (Table 3). About 12 percent of farms had positive cashflows and debt to asset ratios over 40 percent in early 1987. This groups accounts for 42 percent of farm debt. A total of 41.4 billion of debt is held by this group. The immediate benefit of nonfarm equity for this group would be risk reduction. Unprofitable farms are unlikely to be attractive to profit oriented nonfarm equity investors. The management problems on the unprofitable farms are likely to be beyond the experience and patience of the profit oriented nonfarm investor. Profitable, lower debt farms might benefit from nonfarm equity investment, but that benefit would be more long term. Nonfarm equity capital could help finance new or expanding firms, without the major financial risk that occurs with debt finance. The additional equity capital could help firms take advantage of economies of scale or adopt new technology. Farmers could diversify their investment portfolio by acquiring nonfarm equity to finance the farm business thereby allowing use of some of their own equity to purchase assets in other sectors.

The research framework for analyzing equity use in farm businesses is not well developed. Some agricultural finance textbooks assume that the costs of acquiring both debt and equity rises as leverage increases, and that there is some combination of debt and equity which minimizes the cost of capital (Barry et al, Penson and Lins). Others discuss the relative risks of various capital sources and state that capital structure is a subjective decision based primarily on risk attitude (Lee et al.). Empirical estimates of the optimal farm capital structure within this framework are almost entirely lacking. Instead the textbook treatment relies on rules of thumb that identify the 40-50 percent debt to asset ratio as a critical point. Higher debt to asset ratios are said to be feasible with good management, but very risky.

More complete models of equity choice have been developed, but not thoroughly tested empirically. Collins and Bourn use a simple mean variance model to derive reservation prices for nonfarm equity. Their examples show that in some cases farmers are willing to pay more than a proportionate share of income to nonfarm equity investors. Collins (1985b) has developed a model which chooses the financial structure which maximizes expected present value of consumption. His primary conclusion is that the optimal capital structure is constant over time given a constant rate of return on equity, discount rate and subjective bankruptcy probability. Lowenberg-DeBoer modified a Vickers model to

optimize equity, debt, land and nonland input use in a dynamic environment with uncertain real estate prices. His theoretical model shows that land price risk can cause farmers to increase the proportion of equity in the firm's financial structure. Neither Collins nor Lowenberg-DeBoer differentiate explicitly between farm and nonfarm equity. Neither model has been thoroughly tested empirically. The preliminary empirical work with the Lowenberg-DeBoer model has been in a deterministic setting, rendering the financial structure decision almost trivial.

Empirical work in agricultural economics has usually assumed that equity was fixed or grew through retained earnings. Several studies have looked at the minimum equity necessary to start a farming operation (see for instance, Lowenberg-DeBoer, Grisley and Grady). Firm growth studies have allowed farm equity to be augmented out of retained farm and nonfarm earnings (see for instance Boehlje and White, Lowenberg-DeBoer and Boehlje). Other studies, especially firm survival work using simulation models, have fixed farm physical size and looked at varying debt and leasing combinations, thereby explicitly or implicitly varying equity (see for instance Richardson, Lemieux and Nixon, Richardson and Condra, Hinman and Hutton, or Held and Helmers). Generalization about equity from either the growth or survival studies is difficult because of the location specific nature of the models and the informal nature of their theoretical foundations.

Credit scoring and bankruptcy prediction models generally show that higher leverage is positively related to a higher probability of financial problems (see for instance Collins (1980), Collins and Green or Lufborrow, Barry and Dixon). Indirectly, the models indicate the importance of equity in the financial structure. The models have been used by lenders to help guide loan decisions, but they have not been used to examine farm financial structure questions.

Farm tenure questions are closely related to the issue of nonfarm equity investment because direct ownership of farmland with rental to farmers is one route for nonfarm investment in agriculture. The tenure problem has been approached largely from a production economics point of view, usually assuming that farm equity is fixed and borrowing opportunities nonexistent or very limited (see for instance Currie, Reid). Many important problems in equity investment, such as the principal agent problem and monitoring cost, are treated in the tenure literature, but without credit opportunities.

The capital structure debate in the general finance literature is of little help in solving the farm equity problem. There is no consensus on capital structure in the general finance literature and even if there were it would be difficult to apply their conclusions to agriculture because of differences in business organization. The financial structure debate in the

general finance literature has focused on corporate firms with publicly traded stock. Most farm firms are sole proprietorships or partnerships, and those organized as corporations are mostly closely held by family groups.

At best the available evidence leads to rough estimates of the upper bound for nonfarm equity demand. The work of Collins and Bourn suggests that farmers would be willing to replace some debt with equity, especially in highly leveraged farm operations. According to USDA estimates, total agricultural debt in the U.S. in 1986 was \$157 billion (USDA, 1987). Of that only a portion would be converted to equity. At least initially, the highly leveraged farmers would be the mostly likely to participate in nonfarm equity arrangement. Investor interest is likely to be limited to profitable farms. The textbook rules of thumb suggest farmers would not reduce debt below the 50 percent of assets level. Based on the \$41 billion of debt held by profitable, highly leveraged farmers and the textbook rules, the initial demand for nonfarm equity would be at most \$20.5 billion. The demand could be higher in the long-run if total demand for capital expands or lower leverage appears to be beneficial. Once a nonfarm equity market is functioning, the amount demanded does not appear to be a burden for U.S. financial markets. The amount is small in comparison to the total size of all financial markets, for example the value of all shares on the New York Stock Exchange in 1985 was \$1950 billion (U.S. Department of Commerce, 1986). Start up problems may occur, however, with this size demand. The total value of all new shares issued by U.S. manufacturers in 1985 was \$35 billion (U.S. Department of Commerce, 1986). Introducing a new equity market, over half as large as all new manufacturing shares, within a year or two may strain the available new equity pool.

Supply of Nonfarm Equity

If institutional arrangements can be developed to facilitate nonfarm equity investment, the supply of investor funds will depend on the risk and return characteristics of the farm investment. The attractiveness of farm investments for nonfarmers has been approach largely in the context of the Capital Asset Pricing Model (CAPM) or similar models. No one model completely describes investor behavior, but mean variance models such as the CAPM are widely used and appear to provide workable estimates. CAPM estimates are widely used by investment bankers and investors to analyze risk and return relationships. Using budgeted returns for farmland in various regions and the CAPM, Barry found that farm land investment has little systematic risk for the nonfarm investor. Systematic risk is the variability that can not be diversified away. The CAPM assumes that in equilibrium investors would require compensation only for systematic risk, because nonsystematic risk could be diversified away. Barry's results indicate direct investment in farm land "is a promising candidate for risk reduction in well-diversified portfolios." Similarly, Ibbotson and Fall, and Kaplan reference found that

farm real estate was a low level of systematic risk on a well diversified portfolio. Using returns to publicly traded firms with large agricultural interests, Collins and Bourn found that this type of farm investments have a systematic risk level approximately equal to that of the general economy. Because of this relatively high level of systematic risk, Collins and Bourn show that if farm returns are near historical averages nonfarm investors would require about 1.75 percent of returns for each percent of assets contributed. They also showed that some highly leveraged or risk averse farmers may be willing to agree to this more than proportional share of profits, in exchanged for risk reduction. It is not clear if the difference in CAPM results between Barry, and Collins and Bourn is due to the different types of farming represented. The firms used by Collins and Bourn are primarily involved in specialized production such as fruits and vegetables. The aggregate data used by Barry, Kaplan, and Ibbotson and Fall includes many general farming operations producing bulk commodities. Another possibility is that public trading introduces systematic risk. All four studies show that some plausible conditions exist under which nonfarm investors might make equity investments in agriculture.

Institutional conditions may be major constraints to nonfarm equity investment in agriculture. Many states have legal restrictions on farm investment by nonfarmers (Pelzer). Land ownership by corporations is restricted in 10 states. Investment by nonresident aliens is limited or prohibited in 30 states. In addition to legal constraints, the lack of appropriate market institutions may limit nonfarm equity investment in agriculture. Existing market mechanisms, such as selling shares of common stock or limited partnerships, involve relatively high transactions cost, even at the scale of large commercial farms. It can be hypothesized that equity institutions in agriculture have not developed because they were not needed in an environment of subsidized and government guaranteed credit.

The investor interested in farm equity is probably the same investor who is interested in common stock, the basic equity investment in the nonfarm sector. The farm equity investor is probably not the same investor who currently buys Farm Credit System bonds because the risk and return relationship for the equity investment is much different than for bonds and because FCS bonds enjoy a privileged legal status that would not be shared by the equity investment. The equity investments would be much higher risk than the FCS bonds, with their implied government guarantee. The FCS bonds are in many ways equivalent to Treasury securities. For example, in many states banks can meet reserve requirements with FCS bonds.

Alternative Institutional Forms

Institutional forms currently used or suggested for nonfarm equity investment in agriculture fall into three categories: 1) direct, personal ownership of farm assets, 2) partnerships, and

3) direct ownership of farm assets by a corporation. Direct, personal ownership of farm assets by nonfarmers is at present the most common method for nonfarm equity investment in agriculture. Usually, the asset owned is real estate, but nonland assets may be owned as well. Management of these assets differs widely. Some nonfarm investors lease the farm assets for farm operators for a fixed cash payment and take a minimal part in managing the assets. Share arrangements are common, with the nonfarm investor paying part of the production expenses and taking part of the output. A few nonfarm investors hire farm operators to perform production activities, but retaining all management functions. The demand by farmers for rental land is strong. A large and well organized professional farm management industry exists to oversee nonfarm investor property. Management fees vary by region and type of farm, but 10 percent of gross income is common (Anonymous). For the equity investor the primary transaction cost in buying farm property is search and information cost. It is customary for the seller of farm real estate to pay broker's fees and most documentation costs. For an urban investor with no farm background, the problem of finding and buying appropriate farm property may involve substantial search and information costs. Many nonfarmers who own farm property are nonfarm heirs of farm families, have farm backgrounds, or live in farming areas (Reiss). For these individuals the search and information costs are probably modest. Some farm management firms offer professional help in locating and buying farm investment property. The cost of selling farm real estate involves broker's fees of 3 to 7 percent, as well as fees for surveying and documentation. Selling farm real estate is usually a slow process. Because each tract is unique, matching the land with the right buyer may take several years. Quick sales are possible, but usually require cutting the price substantially below market levels. Farm real estate is illiquid. Farm real estate offers the possibility of substantial capital gains and losses, thus as in the stock market, profitability depends a great deal on timing of sales and purchases. Studies suggest that in the long term farm real estate returns have been comparable to those of common stock (Gertel and Lewis, Kost, Hottel and Gardner, Kaplan, Ibbotson and Fall). In the U.S. there are few legal restrictions on the ownerships of farm property by individual citizens or resident aliens. Because farm assets come in rather large, discrete units, diversification with direct ownership of farm assets may be difficult for the small investor.

Numerous partnership arrangements are possible. The three major alternatives for the nonfarm investor are: unlimited partnership; direct, personal ownership of a limited partnership; and indirect limited partnerships held by a corporation or another partnership. The partnership differs from direct asset ownership, in that the partner owns part of the farm business, not just the farm assets. Partnerships have been most commonly used in the U.S. for farm operations that involve a substantial nonland component, such as livestock, equipment or specialized management. In an unlimited partnership, the partner participates

in management of the farm and is fully liable for all partnership losses, even those beyond the original investment. The unlimited partnership is probably appropriate only for the individual who has substantial management expertise to contribute to the enterprise, for instance someone who is involved in some other aspect of the food and fiber sector and can contribute financial, marketing or other skills. Most nonfarm equity investors would probably prefer the limited partnership, in which the limited partner's liability is restricted to the original investment. Limited partners may not participate in management. Limited partnerships have been used to facilitate investment in cattle feeding, citrus groves, nut orchards and other specialized farm ventures (Matthews and Rhodes). Much of this investment has been tax motivated. Direct, personal investment in either limited or unlimited farm partnerships share many of the problems of direct ownership of farm real estate. For the urban investor, establishing a farm partnership would generally require major search and information expenditures. Finding a farmer operator who is profitable and who wants and outside partner is no trivial task. In addition, negotiating the partnership agreement is likely to be complex because every farm operation is in some ways unique. Because standardization is difficult the directly owned partnership is likely to be an illiquid asset. In some cases large farming operations have marketed standardized limited partnerships through brokers. This improves the liquidity of the limited partnership, but transfers of partnership shares must generally be approved by the general partner. In some cases this rule has to be satisfied by having an escrow agent hold the shares and issue "warehouse receipts" for them to investors. The "warehouse receipts" may be publicly traded. In general, partnership shares will be available in smaller units, than farm assets, so diversification will be easier with a partnership than with direct ownership.

The attraction of having the partnership owned by a corporation is that shares of the corporation could be publicly traded. A major disadvantage of the corporation holding the partnerships is that the corporation is subject to income tax. Thus, the income is taxed twice, first at the corporation level and then at the individual level. Partnerships do not pay tax; the income is passed through to the individual partners. To deal with this problem Collins and Bourn have suggested that the partnerships be held by a Real Estate Investment Trust (REIT). This is a corporation that is restricted to real estate investments and is taxed as a partnership. To qualify as a REIT the corporation must: 1) keep 75 percent or more of its assets in real estate, mortgages or cash, 2) generate 75 percent or more of its income from real estate holdings, 3) have at least 90 percent of its income from rent, interest, or capital gains, and 4) must distribute at least 90 percent of its income each year (Rabinowitz). Collins and Bourn envision the REIT holding standardized limited partnerships agreements with numerous farmers, probably scattered over a wide geographical area as a diversification measure. An alternative would be for the REIT to

hold mortgages in which there is some equity participation, for instance, shared appreciation mortgages. In the limited partnership the farmer would be the general partner and exercise all management control. The legal status of this arrangement is not clear. Can a REIT hold limited partnerships? Similarly, the status of such an organization in states which limit corporate ownership of farm property is in question. Collins and Bourn suggest that the costs of placing the limited partnership would be from 5 to 15 percent. The administration costs, including advisor's compensation, trustee fees, legal fees, accounting costs and shareholder costs, range from 1.1 to 5.2 percent of net assets, with an average of 2.2 percent in 1985. As the farm REIT gain experience in identifying potential farm partners and negotiating partnership agreements with them, the search and information cost may be reduced. Farmers may come to the REIT seeking a partnership. Methods for identifying good managers with sound operations may be developed. It may also be possible to avoid the double taxation by having the farm limited partnerships held by another limited partnership, a so-called "Master Limited Partnership" (Collins and Bey).

Direct corporate ownership of farm assets may take many forms. The corporation may lease the assets to operating farmers. This was the core of the Ag Land Trust proposal in the mid 1970s (U.S. House). Corporations may also take an active role in management. Numerous corporations now own and operate farms. In this context the main advantages of the corporate structure are: the limited liability and the liquidity. Transactions cost for direct corporate ownership would depend on the degree of management involvement, but would probably be lower than with a similar degree of management involvement in either personal ownership or partnerships. The broker's fees in buying shares of a publicly traded corporation vary substantially but are commonly in the 0.5 to 2 percent range. Thus the transaction cost for the investor are lower for the publicly traded corporation than the cost of placing a limited partnership or buying farm property. Buying the shares would involve contacting a broker, a much simpler procedure than searching for a tract of farmland to buy or a farm partner. If the corporation rented its property to operating farmers, the management costs should not be more than if a person rented land through a professional farm management firm and may be lower if the corporation can achieve economies of scale or scope that are not available to the farm management firm. For example, it may be difficult for the farm management firm to convince all clients to jointly purchase inputs, such as seed, fertilizer and chemicals. With direct corporate ownership, the management could make this decision and perhaps cut costs through volume buying. Direct corporate ownership would allow more management flexibility than a REIT. Retained earnings would be used to build equity; a REIT must pay out 90 percent of earnings. The corporation would diversify outside of real estate. Investor diversification with corporate ownership would be easy; shares of the farm corporation can be included along with shares of other corporations in a balanced portfolio. Direct corporate

ownership would subject earnings to double taxation. Probably the most important problem with direct corporate ownership is political. The Ag Land Trust proposal in the 1970s created a political storm. Many states prohibit such corporate ownership. In some states, the farm financial problems of the early 1980s reduced opposition to corporate involvement in agriculture; some farmers were ready to sell their assets to anyone who would buy and work for the highest paying employer, even if that purchaser or employer were a corporation. But in other states, the reaction to farm financial problems has been to blame the corporations. For example, this is part of the debate on Nebraska's constitutional amendment restricting corporate farming (Center for Rural Affairs).

A qualitative assessment of alternative institutions for nonfarm equity investment in agriculture is summarized in table 4. Personal ownership has the advantage of tradition and operating markets. It fails in terms of liquidity and perhaps in diversification potential. Direct partnerships have many of the same characteristics as direct asset ownership, but may have higher transaction costs. The Collins and Bourn proposal does much better than direct ownership in liquidity and diversification potential, but it involves legal and political questions, as well as relatively high transactions cost. The direct corporate ownership alternative appears to be economically the strongest, but politically the weakest.

Research Directions

Research could proceed in three separate, but mutually reinforcing directions. One direction is to refine the tools previously used to evaluate the potential supply and demand for generic external equity instruments, i.e., nonspecific instruments whose supply and demand depend only on price. The second direction is to attempt to validate the conclusions derived from these blunt tools by proposing a specific institutional structure and set of financial instruments for investors and farmers to evaluate. A logically possible third direction would be to develop sophisticated behavioral models for the supply and demand for a specific set of financial instruments from a particular institutional structure. This would most likely lead a researcher into applications of multi-attribute utility and perhaps completely unexplored areas of choice theory. Although such a path could advance the state of economic theory, it is unlikely that any prompt conclusions would be obtained to deal with the problem at hand.

It would certainly be feasible to improve the previous analysis of the potential supply and demand for external equity financing. Previous demand analysis has employed unconstrained mean-variance analysis as a methodological tool. A primary weakness of such an approach is that the distributions of the underlying random variables must be symmetric. The effects of asymmetric distributions on capital structure choices and the

existence of such skewness are not well-understood. Also, the effects of resource constraints and other factors which add realism to micro behavioral models could be considered. Stochastic programming or perhaps simulation could be used to explore these issues. In general, most of the methods previously used to explore debt choice by proprietors could be adapted to the equity choice problem.

Modeling the demand for equity financing poses challenges in terms of multiple objectives, nonprice characteristics of the equity investment arrangement, the life cycle dynamics of the farm firm. In the equity financing problem, the typical single objective framework may be inadequate. For example, the farmer may believe that financial control, pride in ownership and family tradition are important considerations in addition to wealth. Some have also questioned the usefulness of the maximization paradigm in such a setting. Goal programming or simulation might be used to deal with the multiple objectives, but in general economists have not been very successful in quantifying the effect of nonmonetary objectives.

Traditional models assume that the supply and demand depend only on price when, in fact, institutional factors may have a substantial influence on investor and farmer acceptance. Each institutional structure has different implications for control, monitoring, nuisance factors and other important elements of the decision. State legal restrictions on farmland ownership laws in interaction with the securities laws create a very complex legal tangle that directly affects the nature of possible financial intermediaries for providing external equity for agriculture, and the characteristics of a future institution could affect acceptance by both farmers and investors.

Equity use decisions may depend on the operator's age, the growth stage of the farm business and other time related characteristics of the problem. A new farming operation with a young operator may have a very different demand for equity than a mature operation run by someone close to retirement. Little work has been done in the area of dynamic proprietary capital structure choice except for the work of Lowenberg-DeBoer and Collins.

Thorny issues are also involved in evaluation of the supply of equity. Some previous investigations have employed the capital asset pricing model to measure the systematic risk of farm income. Since well-diversified investors appear to require compensation primarily for systematic risk, the method is appropriate. The approach is flawed, however, if returns from proprietary firms are used as estimates of returns to publicly traded equities. If equities are publicly traded, their value is affected by more than actual changes in their income. For example, systematic effects would be introduced by changes in the real risk-free rate as well as changes in anticipated future earnings. Farm income data from proprietary firms may understate

such systematic capital gains and losses. An alternative approach is to evaluate the systematic risk of agricultural equities that are currently publicly traded. This approach yields much higher estimates of systematic risk since systematic effects of ordinary income and capital gains are considered, but it is also flawed because of the very small number of publicly traded agricultural equities that are available to evaluate. The sample could not be considered representative of U.S. agriculture. No clear resolution to this problem is apparent, though modeling the effects of public trading on systematic risk may offer some insights.

Another problem in the evaluation of supply relates to size of the equity market. In financial theory, it is generally assumed that investor's expectations are homogeneous. Therefore, if the expected rate of return on a security exceeds the required rate of return, capital will flow until the price of the equity is bid up to the point where the expected return has fallen to equal the required rate. This produces a perfectly elastic supply of capital at the required rate of return. If the movements in the expected rate of return are small and if the proportion of total wealth involved is small, these are reasonable assumptions. It is not clear, however, that a perfectly elastic supply would prevail for a large new issue of agricultural equity. One might find investor interest, but an insufficient amount to absorb an entire equity issue.

An alternative direction for research would be to focus on a specific institutional structure and a clearly defined financial instrument. This direction requires a complete legal analysis to determine what is in the feasible set of institutions, and the development of prototype financial institutions and instruments. Once the myriad of details is determined, the potential supply and demand could be determined directly by polling investors and farmers. Economists resort to complex behavioral models because of their inability to perform controlled experiments. For this particular problem, a controlled experiment is possible and should be considered as a compliment to further modeling.

Specific Research Areas

The previous discussion suggests several specific research topics that could be addressed with more-or-less standard research methods. The list provided here is by no means exhaustive in terms of possible researchable issues or possible methods that could be used to address these issues, but it should provide a starting point for examining the desirability of nonfarm equity financing in agriculture.

Attainable Institutions: A set of attainable institutions should be defined before detailed analysis of demand and supply conditions are done. Current legal restrictions are important in identifying this set, but should not be taken as absolutes. The rules governing farmland ownership and the operations of

financial institutions change over time as the needs of society change and as the public understanding of the costs and benefits of particular institutions change.

Transactions Cost: The costs of negotiating, documenting and monitoring equity investment appear to differ substantially between alternative institutions. The costs for farmland rental and direct partnerships are fairly well documented, but it is not clear how the transactions costs of the alternative institutions compare to the more traditional equity investments. Research approaches might include a survey of transactions costs in similar nonfarm investments or an experiment with a pilot equity instrument.

Liquidity: The liquidity premium will be an important variable in determining the feasibility of expanded equity investment in agriculture. If the suggested partnership and corporate are to be adopted, they must substantially reduce the liquidity cost of holding farm assets. Research approaches might include: surveys to determine farmer and investor perception of liquidity costs, mathematical programming models with real penalties for "wrong choices" or econometric modeling.

Farm Equity Diversification: Potentially, a flow of nonfarm equity into agriculture could permit farmers to diversify their equity investments into the nonfarm economy. The extent to which this already occurs and the benefits from increased off farm investments by farmers are not well understood. Surveys could determine current investment patterns. Models applying portfolio or asset pricing theory could suggest gains with equity investment changes.

Systematic Capital Gains and Losses: Systematic risk estimates for closely held and publicly traded agricultural investments appear to differ. The source of this difference is not clear. A better understanding of what happens to risk and return relationships when agricultural investments become publicly traded is important to evaluating nonfarm equity investments. Research approaches include case studies of closely held firms that went public and improved modeling of agricultural investment returns, so as to include discount rate changes and other potential sources of public market related systematic risk.

Principal Agent Problem: Management incentives may differ between the owner operated firm and the business with outside equity. Can the equity investment arrangement be tailored to reduce this problem? Methods for analyzing this problem include econometric analysis of farm record data to determine whether tenure affects farmer behavior or improved modeling of management incentives in differing tenure categories.

Sharing Capital Gain: It is hypothesized that investors and farmers have preferences as to whether they would like current income or capital gain. Farmers may need current income to

alleviate cash flow problems. Long term investors may be indifferent between cash and capital gain, and when capital gains are given a tax preference, they may prefer capital gains. There may be benefits to unequal sharing of returns, with the investor receiving a greater share of the capital gain and the farmer receiving a greater share of current income. These benefits could be estimated by modeling the farmer and investor decisions using portfolio theory or other framework for risk analysis.

Monitoring and Metering Cost: In certain equity investment arrangements, the farm operator would have incentives to deceive the investor. Monitoring would be needed to avoid excessive losses. Research in farmland tenure indicates that monitoring cost can differ substantially between rental arrangements (Alston, Datta and Nugent). As in the tenure literature, the monitoring costs and their effects can be estimated from historical data or in case studies. Surveys of professional farm managers may also be useful.

Nonprice Considerations: Nonprice terms of the equity investment arrangement may be important. For example: how real estate titles are held may affect pride of ownerships and social status of farmers. Or would nonfarm investors be willing to accept a lower than market return for farm investments because of the mystique of "owning a piece of the rock" or participating in the perceived wholesome farm life. Research methods might include surveys or an experiment with a pilot equity instrument.

Rights of Farm Tenants: In the U.S. farmers who rent land have relatively few rights to the property compared to operators in many other countries (Seabrooke, Maunder, Peters). Rental agreements are usually for one year at a time. The notice period required for termination of the arrangement is relatively short. The tenant seldom has a legal right to unexhausted improvements. Increased tenant rights in rented farm property may facilitate nonfarm equity investment. Surveys and modeling might be used to identify crucial elements in the legal structure of tenancy and how they might be changed.

Concluding Comments:

The farm financial experience of the early 1980s has increased awareness of the problems with debt finance. The continued high real cost of debt and the uncertain future of government farm programs make the risk and return sharing equity arrangements more attractive. The relatively high transaction cost of equity investment and the possible distortion of management incentives in equity sharing arrangements create doubts about the economic viability of such investments. Comparatively little research is available to help assess the potential and the limitations of nonfarm equity investment. The theoretical foundations for analyzing outside equity investment in proprietary firms is not well developed. In the agricultural finance literature, the empirical work tends to be location

specific and hard to generalize. Researchable topics appear to exist in several areas, including: attainable institutions for equity investment, transactions costs of such investment, liquidity issues, farm equity diversification, systematic capital gains and losses in publicly traded agricultural investments, the principal agent problem, sharing of capital gain, monitoring costs, nonprice considerations and the rights of farm tenants.

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Table 1. Debt to Asset Ratios and Other Financial Measures for Agricultural and Nonagricultural Industries

	Number Observa- tions	Median Net Worth	Median Sales	Median Debt To Assets
Agriculture:				
		-----dollars-----		
Wheat	98	859,000	344,000	0.37
Corn	119	970,000	457,000	0.41
Cotton	72	1,477,000	851,000	0.36
Citrus	77	1,259,000	1,253,000	0.25
Beef Feedlots	136	2,215,000	5,419,000	0.57
Hogs	79	729,000	650,000	0.51
Dairy	178	943,000	600,000	0.39
Eggs	93	1,203,000	2,889,000	0.51
Other Sectors:				
Coal Mining	249	2,326,000	4,250,000	0.45
Residential Construction	886	540,000	1,215,000	0.51
Passenger Car Rental	612	863,000	715,000	0.69
TV Broadcasting	112	4,898,000	3,483,000	0.37
Cotton Textiles	124	511,000	1,118,000	0.45
Steel Foundries	45	1,259,000	2,397,000	0.53
Aircraft	35	2,551,000	4,973,000	0.53
Grocery Stores	2,295	313,000	1,400,000	0.46
Metal Cans	29	3,977,000	5,000,000	0.61

Source: Dunn and Bradstreet Credit Services, "Industry Norms and Key Business Ratios, One Year, 1986-87 Edition", 1986.

Table 2. Estimated Sources and Uses of Funds by Farm Operator Families, 1960-1979.

Year	Before Tax Cashflow ¹	New Debt ²	Cash Consumption ³	Income Tax ⁴	Social Insurance ⁴	Residual Cashflow ⁵
-----millions of dollars-----						
1960	15,108	1,093	12,176	1,434	192	2,399
1961	15,798	1,675	12,659	1,553	200	3,061
1962	16,018	2,528	13,302	1,689	207	3,348
1963	16,014	2,845	13,630	1,740	226	3,263
1964	17,153	2,690	13,282	1,692	227	4,642
1965	17,884	3,674	15,944	1,679	231	3,704
1966	19,880	3,353	16,768	1,858	310	4,297
1967	17,765	2,962	15,629	1,922	309	2,867
1968	20,611	1,665	16,698	2,155	341	3,082
1969	23,453	2,455	18,788	2,817	412	3,891
1970	23,921	2,356	18,519	3,002	389	4,367
1971	24,193	4,438	19,902	3,173	373	5,183
1972	30,007	5,394	24,934	3,433	435	6,599
1973	39,747	8,931	36,500	4,399	654	7,125
1974	39,997	8,266	31,723	4,810	686	11,044
1975	34,950	9,207	30,914	4,481	676	8,086
1976	35,470	11,079	26,037	4,666	706	15,140
1977	28,879	14,441	23,381	4,870	772	14,297
1978	37,814	15,890	31,282	6,796	866	14,760
1979	40,301	23,837	34,372	8,299	975	20,492

¹ The before tax cash flow is operator net cash income from farming, minus income of nonresident operators, plus income of nonresident workers and nonfarm income. Source of data: USDA, 1980, pp. 87-88. The operator net cash income from farming is net of capital expenditures.

² Source: USDA, 1985, p. 15.

³ Cash consumption is calculated as national personal consumption expenditures (Reagan) multiplied by the percent of U.S. population on farms (USDA, 1980, p. 88) and by farm income as a percent of nonfarm income (USDA, 1980, p. 89), minus the value of farm products consumed directly by farm families (USDA, 1980, p. 92).

⁴ Source: USDA, 1980, p. 87.

⁵ Residual cashflow calculated as cashflow before taxes, plus new debt, minus cash consumption, income tax payments and social insurance.

Table 3. U.S. Farms and Farm Debt by Debt to Asset Ratio for Farms With Positive Cash Income

D/A	Number Farms (1,000)	Percent Farms %	Percent Debt %	Total Debt billion \$
0	300	19.9	0	0
0.01 -0.1	129	8.6	2.8	2.8
0.11 -0.4	194	12.9	18.8	18.5
0.41 -0.7	106	7.0	20.9	20.6
0.71 -1.0	42	2.8	13.0	12.8
>1.0	29	1.9	8.1	8.0

Source: Financial Characteristics of U.S. Farms, Jan. 1, 1987, USDA, ERS.

Table 4. Relative Strengths of Nonfarm Equity Institutions

Item	Personal Owner	Direct Partnerships	Collins and Bourn Partner- ships	Corporate Ownership
Transaction				
Costs	high ¹	medium-high	medium	lowest
Risk:				
Liquidity	low	low	good	good
Diversify	low	low	good	good
Politically Acceptable	yes	yes	maybe	major problem
Legal	yes	yes	maybe	some states
Information and Search				
Costs	high ¹	high	medium	lowest
Attractive to Investors	maybe	maybe	maybe	maybe
Attractive to Farmers	yes	maybe	maybe	maybe

¹ Maybe lower for persons familiar with agriculture.