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Bruce l. Ahrendson, Paul N. Ellinger, Wendy L. Moritz and Sheila Pierson

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ABSTRACT

Many states and the Farmers Home Administration (FmHA) have beginning farmer financial assistance programs. The effectiveness of the FmHA program is examined for Arkansas and Texas by simulating the performance of four representative farms for ten years. The results indicate that FmHA financial assistance improves the financial performance of the farms. However, the assistance may not be necessary for the broiler/cow-calf farm and is not enough for the rice/soybean farm. The assistance may not be necessary or may not be enough for the cotton and corn/cotton/sorghum farms depending on non-farm income levels and economic conditions.

Key Words: public financing, young farmer, simulation, FmHA

Increased capital requirements and reduced profit margins have restricted farmers' borrowing and repayment capabilities (U.S. General Accounting Office). These conditions can be discouraging for individuals starting a farming operation. There is much public concern about the number of beginning farmers entering agriculture as indicated by the many states (Figure 1) and the Federal government having beginning farmer financial assistance programs targeted toward potential farmers having difficulty obtaining debt capital from traditional sources (Moritz). Such programs provide easier access to credit for beginning farmers through lower-cost credit and reduced principal obligations. The primary objective of this study is to evaluate the effects of beginning farmer financing programs on representative (model) farms in Arkansas and Texas.

In many instances, new entrants in production agriculture have a limited amount of equity capital. They often look to various sources of debt capital such as local commercial banks, the Farm Credit System and others to finance new equipment, operating expenses, land purchases, etc. However, these credit institutions may not be willing to make a loan to a beginning farmer with limited equity capital and who can not document historic repayment ability for the proposed operation.

Trying to obtain financing can often be a difficult and frustrating experience for beginning farmers. Without financing, potential farmers or ranchers might be forced to choose other occupations with lower capital requirements. According to the U.S. General Accounting Office's Farm Finance Report, potential farmers entered non-farm occupations

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The authors are assistant professor of agricultural economics at the University of Arkansas, assistant professor of agricultural economics at Texas A&M University, and former graduate students at Texas A&M University and the University of Arkansas. Ahrendsen is a principal of the Center for Farm and Rural Business Finance.

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during the 1980s because of the adverse financial situation in the agricultural sector. In addition, census information indicates new farm entrants declined from about 100,000 per year during the 1978-82 period to approximately 75,000 per year over the 1982-87 period (U.S. Census of Agriculture, 1987). Most of this reduction (58 percent) was among people less than 35 years of age. The downward trend in the number of new farming entrants is expected to continue into the 1990s.

This study evaluates the performance of two Arkansas and two Texas farming operations using the Federal beginning farmer financial assistance programs offered by Farmers Home Administration (FmHA). Information is used in developing representative case farms and in modifying the simulation model used for analysis purposes. Data are also gathered from Arkansas and Texas Agricultural Extension Service enterprise budgets. The case farms are verified with the assistance of agricultural lenders. The representative case farms consist of (1) an Ozark broiler/cow-calf farm in northwest Arkansas, (2) a Delta rice/soybean farm in eastern Arkansas, (3) a cotton farm in eastern Texas and (4) a corn/cotton/sorghum farm in southern Texas.

The model used in this study, Agricultural Risk and Finance Simulator (ARFSIM), was developed to analyze the amount of risk present in the portfolio of the Farm Credit Bank of Texas. Modifications are made to the model for the purposes of this study. Financial statements and ratios are produced by the model to reflect producers' financial position over a ten year period. Once the case farms have been estimated with ARFSIM, financial performance results from beginning farmer program financing are compared to critical values selected by agricultural lenders and to conventional lender financing results. Financial performance measures such as net present value of net income after family withdrawals, probability of achieving a positive net income, ending net worth level, contributed capital and retained earnings level, credit scores, etc. are used to measure the benefits of beginning farmer programs.

Simulation models have been used to evaluate farm financial performance. Schnitkey, Barry and Ellinger developed a model to analyze the responses of financially stressed farms to different managerial strategies and options. Barry, Ellinger and Eidman used simulation to evaluate various strategies and policy options that farmers and lenders might follow under financial stress. In a similar study, Pederson et al. analyzed the effects of altering loan terms using a simulation model. Cochran, Richardson and Nixon designed a simulation model to analyze economic factors, risk and tax components and their interaction in small businesses. Another simulation model is the Firm Level Income Tax and Farm Policy Simulator developed by Richardson and Nixon which shows the probable outcomes of a wide variety of farm strategies and policies on representative farms. Richardson, Lemieux and Nixon used the model to evaluate the effects of beginning equity structures on a representative cotton farm in the Texas High Plains. Barry and Ellinger also used simulation to evaluate responses in farm performance to changes in loan prices over a ten year period. A simulation study by Perry, Nixon and Bunnage analyzed the effects of agricultural and tax policy and production costs on farm profitability of representative wheat farms in the United States and Canada. And King et al. used a simulation model to evaluate different strategies for managing risk incurred by uncertain crop prices and yields.

The next section provides a brief description of the beginning farmer financial assistance program offered by FmHA. Then the methodology and data are presented followed by the specification of the representative farms. The results are then presented. Finally, concluding comments are offered.

FmHA BEGINNING FARMER PROGRAM

In the fall of 1993, FmHA implemented beginning farmer provisions as required by the Agricultural Credit Improvement Act of 1992. The Act calls for a special beginning farmer operating loan assistance program and a farm ownership down payment program. Funds are targeted by FmHA to qualified beginning farmers and ranchers under the new programs. One of the major objectives of the loan program is to start farmers with direct funding, then move them to guaranteed funding, and finally graduate them to private sources of credit. The program offers a reduced loan interest rate of four percent and makes credit readily available to beginning farmers and ranchers. It is selected for evaluation in this study because it encompasses several common characteristics of other state beginning farmer programs such as reduced interest rates and easier access to credit. Another factor is that it is open to farmers and ranchers across the nation and thus, results attained in this study may be compared to others from different geographical regions of the country.

Applicants must meet FmHA's beginning farmer definition when applying for either the special beginning farmer operating loan or the farm ownership down payment program. This definition requires applicants to meet the following conditions: (1) the farmer has not operated a farm or ranch or has not operated either for more than 10 years, (2) the farmer does not directly or indirectly own real estate exceeding 15 percent of the average farm or ranch acreage in the county where the operation is located, (3) the farmer agrees to take part in FmHA training and financial management and loan assessment programs, (4) the farmer will materially and substantially participate in the operation of the farm or ranch, and (5) in the case of an entity, all members are related by blood or marriage and all stockholders in a corporation meet the beginning farmer or rancher definition.

The beginning farmer operating loan assistance program provides qualified farmers and ranchers with a reliable line of operating credit on either a direct or guaranteed basis for a maximum of ten years. The operating funds are subject to availability and applicants must have a feasible plan for their operation. A feature of this program is FmHA's commitment to move the applicant to private credit at the end of the ten year period. To be eligible to receive a special beginning farmer operating loan, applicants must meet several criteria. The first is FmHA's beginning farmer or rancher definition. The second criterion requires that no member of the entity can have operated a farm or ranch for more than five years. Applicants must also have acquired sufficient experience and education during a five year period prior to applying for the loan.

A plan of operation for the first five years must be submitted. It should describe operational procedures, commodity types and quantities, production and conservation methods, livestock and equipment needs, expected income, expenses, and credit needs, and the operation's location. Non-farm income cannot be used to cover farm expenses or debt payments. The plan must show that the operation will be viable at the end of a five year period and the applicant will be able to graduate to private credit by the tenth year.

Applicants must own, lease, or have an obligation to lease a site for the planned operation. They must also possess or have access to the equipment and/or livestock needed for the proposed operation.

The down payment loan program is designed to combine the resources of the beginning farmer, FmHA and a commercial lender in assisting eligible applicants become owner-operators of farms. The FmHA will provide up to 30 percent of the land purchase price or appraised value (whichever is lower) for a period not to exceed 10 years at a rate which is currently 4 percent. The beginning farmer must provide a minimum of 10 percent of the purchase price as a down payment. The remaining loan balance, not to exceed 60 percent, will be financed through a commercial lender or private contract seller and will be secured by a first lien. The commercial lender's or private contract seller's loan must be amortized for 30 or more years, yet it can have a balloon payment due any time after the first ten years. This loan may also be guaranteed up to 90 percent by the FmHA. The purchase price or appraised value, whichever is lower, cannot exceed $250,000. If a beginning farmer or rancher is currently receiving a special beginning farmer operating loan, they are not eligible for participation in the farm ownership program until their farm or ranch has been in operation for at least five years.

METHODOLOGY AND DATA

Simulation Model

The farm and ranch scenarios are simulated using a simulation model known as the Agricultural Risk and Financial Simulator (ARFSIM). This recursive, multi-period model is designed to evaluate a firm's financial performance, credit standing and success or failure rate over a ten year period. With simulation, estimation is performed under a set of complex, yet controlled, operating conditions. Simulation produces a wide range of possible results and their respective probabilities of occurrence. An additional advantage of simulation is the ease of programming financial statements and performance measures along with providing a distribution of potential outcomes based on alternative system designs and assumptions.

Stochastic simulation generates numerous outcomes from selected ranges and distributions of input values and assigned probabilities of occurrence. ARFSIM utilizes the simulation software, @Risk™, an add-in to Lotus 1-2-3™ version 2.4. The @Risk™ software is specifically designed for use in simulation modeling and risk analysis. The ARFSIM program utilizes the joint distribution properties of input variables to measure the impact of alternative policies on farm financial performance. A flow chart of the ARFSIM model is shown in Figure 2.

The input requirements of the program include information to describe the size and scope of the operation, participation in government programs, and land, machinery, and buildings purchases. Deterministic and stochastic variables are summarized in Table 1. To describe the degree of uncertainty in stochastic variables, probability distributions are assigned according to each particular variable's likelihood of occurrence. The normal, truncated normal and triangular distributions are used to describe the likelihood of occurrence

of the stochastic variables in ARFSIM. Covariance matrices describe the relationship among prices, yields and other stochastic variables in the model.

The farm's ending financial position in year one is used recursively as the beginning financial position for the following year. Over the planning horizon, growth rates are applied to production and overhead expenses, prices, and machinery and land values to incorporate the effects of inflation. These rates are projections developed by the Food and Agriculture Policy Research Institute (FAPRI). The model also estimates government commodity program deficiency payments. A set of accounting rules is also incorporated into the model.

ARFSIM is also formatted to calculate an operation's credit score over a ten year period. The credit scoring models incorporated into ARFSIM are experience-based models developed by a group of financial experts (Splett et al.). A credit score reflects the farm's financial performance from year to year. Measures of profitability, solvency, liquidity and debt service are weighted and mathematically combined to calculate an overall credit score.

To summarize the overall operations of ARFSIM, annual production, government program participation, financial management and income taxes are simulated based on stochastic yield, cost and price data. The model uses all costs and revenues, the beginning balance sheet, accounting rules, tax calculations, growth rates, interest rates and correlation matrices to derive pro forma financial statements and ratios.

Data

There are several types of inputs to develop the baseline projections in ARFSIM. The inputs are farm size and type definitions, enterprise budgets, yield projections, economic projections and modeling assumptions (Figure 3). The sources of this input information vary. The information on the size and type of representative farms came from consultations with Farm Credit System personnel. Enterprise budgets used to develop the representative farms are from the Arkansas, Texas and Oklahoma Extension Services and from interviews with agricultural loan officers. Yield projections are based on ordinary least squares regressions of county farm yields for 1981 to 1990 from Arkansas and Texas Agricultural Crop Statistics publications. Historical commodity prices are obtained from Arkansas and Texas Agricultural Price publications. Projected growth rates for crop prices, machinery and land values, production expenses, overhead costs, family withdrawals, and non-farm wages are projections developed by the Food and Agricultural Policy Research Institute (FAPRI). The correlation coefficients among the input variables are then entered in ARFSIM (Moritz; Pierson).

The ARFSIM baseline projections are verified and validated by consultations with agricultural lenders. Then simulation analysis and sensitivity analysis are performed on the representative farms using ARFSIM. In addition, the criteria used to measure the effectiveness of the FmHA financing program to graduate farmers to commercial credit are from interviews with agricultural lenders.

REPRESENTATIVE FARMS

Studies involving farm operations are often able to utilize USDA data or existing databases containing information on representative farms. Unfortunately for this study, compiled data on beginning farmers do not exist. One source of information used to develop the representative farms is Extension Service enterprise budgets. These projected budgets

are compiled annually and are representative of farms in their respective areas. Information is also gathered from interviews with agricultural lending officers who regularly evaluate beginning farm loan requests.

Arkansas Ozark Broiler/Cow-calf Farm

The most common farm operation in the Ozarks of Arkansas is a broiler/cow-calf operation. Having two broiler houses is common and is encouraged by poultry contractors. A herd of approximately 31 beef breeding stock also is common in Washington County. The 31 head herd consists of eighteen mature cows, three-three year old cows, four first calf heifers, five replacement heifers and one breeding bull. The acreage for the farm is set at forty to comply with the Environmental Protection Agency requirement of twenty acres per broiler house to consume the poultry litter. The beef cattle herd was started as an FFA project while the beginning farmer was in high school. Eighty acres of pasture land are rented at $19.90 per acre per year.

The broiler houses are 40' X 400' with a capacity of 19,833 birds per house. Fully equipped broiler houses are valued at $5 per square foot. Since the houses are used, they are worth $60,000 each. The broiler operation will average 5.5 batches per year per house with an average weight of 4.68 pounds per bird and a base pay of $0.04 per pound. The expenses incurred by the broiler enterprise will be litter disposal, clean-out, repairs to the houses and equipment, some supplies, utilities, insurance and property tax. The additional requirements for the broiler operation are a composting shed, two electric generators and a front end loader and spreader used to clean the houses.

The cow-calf enterprise requires many inputs. They include: pasture land, hay, protein supplement, salt and minerals, fertilizer for the pasture land, veterinary expenses, marketing charges, custom hauling and insurance. The machinery required for this operation include: a 70 horsepower used tractor, a sprayer, a light duty bush hog (Flynn, Garner and Goodwin) and a bale fork. The total funds required for the farm are $204,680.

The husband will work as a fieldman for one of the poultry contractors in the area thus providing an income of $20,500 and the skills needed for the broiler enterprise. The spouse will operate the two broiler houses. The couple are in their late twenties and have two children.

The farmer plans to participate in the beginning farmer program offered by the FmHA to expand upon his current beef cow-calf operation by establishing broiler production. The portion of the program which will be most beneficial to this farmer is the down payment loan portion. In order to participate, the farmer must provide 10 percent of the purchase price of the property, $14,980, which the farmer has in the form of savings. The FmHA will provide 30 percent of the purchase price, $44,940, at 4 percent interest amortized over 10 years. The remaining 60 percent of the purchase price, $89,880, must be financed through a commercial institution at a rate given to similar loans. For this loan simulation the loan is assumed to have an interest rate of 7.75 percent, amortized over 30 years. The $54,880 machinery expense is financed through a commercial institution at 7.75 percent interest, amortized for seven years. The farmer does not have any outstanding loans, is in good standing and has previously done business with this institution.

Arkansas Delta Rice/Soybean Farm

The second farmer will lease and manage a rice and soybean farm consisting of 143 acres of rice and 229 acres of soybeans located in the Delta region of Arkansas (Jefferson County). The crop share lease provides the farmer with land and some paid expenses in exchange for a proportion of the crop yield. One of the most common forms of a crop share lease is where the landowner receives 25 percent of the crop as rent. The machinery and equipment needed were found in Salassi.

The equipment leased by the farm includes three-two wheel drive tractors, a heavy duty disk, a tandem disk, a field cultivator, a drill, a land plane and a broadcast seeder. The equipment leases for $19,824 per year. The farmer will custom harvest the crops to avoid purchasing or leasing the harvesting equipment. The miscellaneous equipment needed will be borrowed from family and friends.

The rice acreage will be 63 percent drilled and 37 percent broadcasted. The target price for rice is $4.82 per bushel. The loan rate for rice is $2.93 per bushel. The farmer will receive deficiency payments in the second and fourth quarters. The family has an average of $30,000 in non-farm income.

East Texas Cotton Farm

For each of the Texas representative farms, the operation has $50,000 of non-homestead equity at the beginning of the planning horizon. The husband and wife team for each representative farm are assumed to have two children.

The full-time, irrigated cotton operation in eastern Texas consists of 400 leased acres. Based on Texas Agricultural Extension Service enterprise budgets, the landlord receives one-fourth of the harvested yield and pays for one-fourth of the fertilizer, ginning, picking and hauling expenses. Used machinery and equipment are purchased for use on the farm to help reduce start-up costs. However, repair costs are increased because of the initial condition of the machinery and equipment. Purchases include a $17,000 one-hundred twenty horsepower tractor, $5,000 planter, $2,000 cultivator, two $1,500 plows, two sixty-horsepower $2,900 irrigation motors with trailers and $2,000 for miscellaneous equipment. These figures are based on estimates provided by an agricultural loan officer located in the region.

The farmer receives deficiency payments from government programs. The amount of the deficiency payment is determined based on a ten percent acreage set aside, target price of $0.729 per pound, and a loan price of $0.524 per pound.

Southern Texas Corn/Cotton/Sorghum Farm

The farming operation in southern Texas consists of 334 acres of corn, 333 acres of non-irrigated cotton and 333 acres of sorghum. All 1,000 acres are leased. Based on Texas Agricultural Extension Service enterprise budgets, the landlord receives one-third of the corn and sorghum yields and one-fourth of the cotton crop. In addition, the landlord pays one-third of fertilizer, herbicide, harvest and hauling expenses on the corn crop, one-third of fertilizer expenses on the sorghum crop, and one-fourth of fertilizer, ginning, ties, and bagging expenses

on the cotton crop. Used machinery and equipment are purchased for this operation. Repair costs are increased because of the initial condition of the machinery and equipment. Purchases include two $17,000 tractors, two $5,000 planters, two $2,500 disks, two $2,000 cultivators, two $1,500 plows, two $1,500 shredders, and $11,000 for additional machinery. The machinery and repair estimates are based on information provided by agricultural loan officers.

The farmer receives deficiency payments from government programs on the corn, sorghum and cotton crops. The deficiency payments are calculated using a five percent set aside for both the corn and sorghum crops with a ten percent set aside for cotton. Target prices for the corn, sorghum and cotton crops are respectively $2.75 per bushel, $4.66 per hundredweight and $0.729 per pound while loan prices are $2.01 per bushel, $3.41 per hundredweight and $0.5235 per pound.

SIMULATION STUDY PROCEDURES AND RESULTS

Simulation Study Procedures

ARFSIM is used to project financial statements and other financial information for the representative farms for each year of the ten year plan. However, different evaluation criteria and sensitivity analyses are used for the Arkansas representative farms and Texas representative farms (Figure 4). A down payment farm ownership loan for $150,000 is considered for the Arkansas Ozark broiler/cow-calf farm. An annual operating loan for $50,000 is considered for the Arkansas Delta rice/soybean farm. Term and annual operating loans of $117,000 are considered for the eastern Texas irrigated cotton farm and the southern Texas corn/cotton/sorghum farm.

The criterion used to evaluate the success of the beginning farmer program for the Arkansas farms is if the farmers are able to graduate, by refinancing, to a commercial institution or a private contract seller within ten years and no longer receive FmHA assistance. In order to graduate to a commercial institution, various financial performance measures of the farm must exceed critical values determined from interviews with agricultural lenders. The financial performance measures are contributed capital and retained earnings, current ratio, debt-to-asset ratio, rate of return on farm assets, and term debt and capital lease coverage ratio. The sensitivity of the ARFSIM results for the Arkansas farms is evaluated by varying the initial representative farms by changing loan amounts, interest rates and the level of farm ownership (buying instead of leasing land) (Pierson).

Instead of comparing the financial performance measures obtained with FmHA financing to critical values, the two Texas farms are each simulated under two different financing alternatives: conventional financing and FmHA's special beginning farmer operating loan. The primary differences between the conventional financing scenarios and the FmHA financing scenarios are the reduced interest costs and access to credit. The conventional scenarios incorporate a 7.85 percent rate of interest and prohibit the operation's debt-to-asset ratio from exceeding 0.85. The FmHA financing scenarios use a 4.00 percent rate of interest and a maximum allowable debt-to-asset ratio of 1.5. The financial performance measures for comparison and evaluation include: net present value of net income after withdrawals, probability of positive net income after withdrawals, maximin criterion of net income after withdrawals, coefficient of variation of net income after withdrawals, ending net worth,

probability of net worth greater than zero, contributed capital and retained earnings and credit scores. The sensitivity of the ARFSIM results for the Texas farms is evaluated by varying the initial representative farms to include $20,000 in non-farm income or decrease gross returns ten percent (Moritz).

Results

Arkansas Ozark Broiler/Cow-calf Farm

The results for the Arkansas farms are presented in figures 5 through 12. The figures are distribution summary graphs. During the simulation, probability distributions are generated for financial performance measures for each year so that the potential for graduation from FmHA financing to conventional financing may be evaluated. The center line in each figure is the trend of the expected value for the financial performance measure. The shaded area in each figure represents one standard deviation around the expected value. The upper and lower lines in each figure represent a 90 percent confidence interval about the expected value. Therefore, if the shaded area and confidence interval become larger over time, there is more risk. The distribution summary graph also provides information about the likelihood of a financial performance measure exceeding its critical value so the farm may graduate to conventional financing from FmHA financing.

The expected value of the contributed capital and retained earnings for the farm operation, after a brief decline, increased to $128,000 at the end of the tenth year (Figure 5). This positive trend shows the ability of the farm operation to make and manage money, and the variability of the values are fairly constant.

Other balance sheet financial measures evaluated are the current ratio and debt-to-asset ratio. The trend of the current ratio expected value is erratic because of adjustments made to the cow-calf herd (Figure 6). The critical value for graduation from FmHA financing to conventional financing for a broiler/cow-calf farm current ratio is 0.5 according to an agricultural lender in the region. At first thought this value seems low. However, a broiler farm has few current assets since chicks and feed are provided by the contractor. And the farm does have the current portion of non-current liabilities and accrued interest of non-current liabilities as current liabilities. A portion (less than 50 percent) of the values from the current ratio probability distribution is less than the critical value of 0.5 for years one through four, however, the current ratio exceeds the critical value after year four. The debt-to-asset ratio critical value is 0.75. The average farm debt-to-asset ratio decreases from 0.8 in year one to 0.18 in year nine before increasing to 0.2 in year ten (Figure 7). The increase in year ten occurs because equipment in the broiler houses is replaced. Considering the debt-to-asset ratio confidence interval, the debt-to-asset ratio is significantly less than the 0.75 critical value after year three indicating the farm could graduate to conventional financing by the tenth year.

The profitability of the farm operation is measured by the rate of return on farm assets (Figure 8). Although the rate of return is variable throughout the ten year period as indicated by the confidence intervals and negative for the first three years, the expected rate of return is acceptable (approximately six percent) for year ten.

The repayment capacity of the farm operation is measured by the term debt and capital lease coverage ratio. The expected ratio and 90 percent confidence interval exceeds the critical

value of 1.1 for the entire ten years (Figure 9). In fact, the coverage ratio becomes extremely large in year ten because term debt is nearly paid off. Therefore, the farm operation made prepayments since 60 percent of the term debt is amortized for 30 years.

The term debt credit score summarizes much of the above financial information. The credit score increases through the ninth year before experiencing a slight decrease in year ten (Figure 10). Based on the credit score and the above financial performance measures compared to their critical values, the broiler/cow-calf farm would be able to graduate to conventional credit by the tenth year.

Representative farms with increased leverages were also considered to evaluate the sensitivity of the results to modeling assumptions. The leverages of the representative farms were increased by having a loan ($10,000) for the beef cows and by obtaining a loan ($30,000) to buy the 80 acres of pasture instead of renting the 80 acres. The measures of financial strength decreased only slightly (Pierson). These broiler/cow-calf farms would also be able to graduate to conventional credit by the tenth year since the financial measures exceeded their critical values.

Arkansas Delta Rice/Soybean Farm

The expected value of the contributed capital and retained earnings for the farm operation decreases throughout the ten years from approximately $11,000 to negative $15,000 and becomes increasingly variable as indicated by the widening of the confidence intervals (Figure 11). The negative trend shows the farm business is experiencing losses.

The expected value of the operating debt credit score is fairly constant, although highly variable, for the ten years (Figure 12). The credit score does not decline because non-farm income ($30,000 on average) subsidizes the business so that operating loans are repaid. However, the FmHA beginning farmer program does not allow for non-farm income to subsidize the farm business. Therefore, this farm is not eligible. At lower levels of non-farm income the measures of financial strength decline over time indicating the farm operation would not be able to graduate to conventional credit.

Representative farms with increased leverages were also considered to evaluate the sensitivity of the results to modeling assumptions. The leverages of the representative farms were increased by having a loan ($53,000) for a tractor and by obtaining FmHA down payment program loans ($70,000) after five years to buy 60 acres of crop land instead of leasing 60 acres. The measures of financial strength decreased to unacceptable levels for the farm to graduate to conventional financing by the tenth year (Pierson).

East Texas Cotton Farm

In the first scenario, the representative farm is simulated using conventional financing. The net present value of net income after withdrawals is $18,345 as listed in Table 2. The farm's probability of achieving a positive net income after withdrawals for family living increases from 48 percent in year one to 59 percent in year ten. The minimum amount of income after family withdrawals generated by the farm under the worst conditions is a loss of $107,386. The coefficient of variation generally followed a rising pattern from -4.3 in year one to 26.4 in year ten.

As Table 3 indicates, the farm's ending net worth is approximately $97,669 and the survival measure or probability of net worth being greater than zero declined from 100 percent in year one to 81 percent in year ten. Contributed capital and retained earnings increased from $45,705 in year one to approximately $81,138 at the end of the tenth year. Figure 13 indicates the term loan credit score increased from 2.5 in the first year to 3.1 in the tenth year.

Under the second scenario, the eastern Texas farm is simulated using FmHA's beginning farmer operating loan. The farm achieved a higher net present value of net income after withdrawals for family living of $53,801 when compared to the conventional financing net present value of $18,345 (Table 2). The farm's probability of achieving a positive net income after family withdrawals is greater than that of the conventional financing scenario. Year one has a probability of 58 percent while year ten is 66 percent. The FmHA financing scenario's minimum level of net income after family withdrawals exhibited a smaller loss of $88,356 than the first scenario's loss of $107,386. The coefficient of variation is lower under the FmHA financing scenario than under the conventional financing scenario.

The FmHA financed farm achieved a higher ending net worth of $143,850 and also achieved a higher probability of net worth being greater than zero in all ten years (Table 3). The level of contributed capital and retained earnings is higher every year over the ten year period and exhibited beginning and ending values of $50,868 and $127,319 respectively. Finally, the farm ended with a better term loan credit score as indicated in Figure 13.

Overall, the financial performance of the eastern Texas farm using FmHA financing exhibited stronger financial performance compared to conventional financing. The higher probabilities of achieving positive net income and ending net worth translate into better chances of survival for a new farmer. The higher levels of retained earnings should allow a beginning farmer to expand operations or purchase land sooner than with conventional financing. Moreover, with better credit scores, beginning farmers using FmHA financing could improve their financial relationships with lenders and progress to private sources of credit sooner.

In addition to these results, a sensitivity analysis was conducted to evaluate the operation's performance under alternative conditions (Moritz). The first test added non-farm income of $20,000 in year one. FAPRI growth rates were used to adjust non-farm income in subsequent years. The second test evaluated the financial performance of the operation subject to a ten percent decrease in the gross returns baseline.

With the addition of non-farm income, all financial performance measures improved (Moritz). Although the infusion of non-farm income benefitted the farm, the differences in financial performance measures between the methods of financing were small.

The results of the second sensitivity analysis, a ten percent decrease in gross returns, indicated a substantial negative impact upon the farm. Net income and the operation's chances for survival diminished greatly as did the level of retained earnings. Credit scores either declined or remained relatively flat. Under this commodity price scenario, agricultural profit margins were reduced to the level that FmHA financial assistance may not be enough to permit survival.

South Texas Corn/Cotton/Sorghum Farm

Simulation results for the FmHA beginning farmer operating loan financing are compared to the simulation results for the conventional financing for the southern Texas farm. The FmHA financing results indicate the net present value after withdrawals for family living is $80,778 (Table 4). This value is higher than the conventional financing scenario net present value loss of $776. The probability of the farm achieving a positive net income after family withdrawals is greater over the ten year period ranging from 47 percent to 68 percent while the conventional financing scenario ranged from 32 percent to 60 percent. The minimum level of net income after family withdrawals is a smaller loss of $109,421 compared to the $330,187 loss under conventional financing. The coefficient of variation of net income after family withdrawals is lower in all but the first year with FmHA financing ranging from -6.6 in year one to 2.2 in year ten.

Results in Table 5 indicate a higher ending net worth of $202,072 under FmHA financing compared to $86,582 under conventional financing. The farm's probability of survival (positive net worth) is greater than that of the conventional financing scenario over the ten year period ranging from 100 percent in year one to 94 percent by year ten. Contributed capital and retained earnings are also higher in every year of operation for the FmHA financing scenario increasing from $46,249 in year one to $170,296 in the tenth year. The conventional financing scenario's contributed capital and retained earnings rose from $35,619 to $54,815. The term loan credit score started higher at 2.6 in year one and ended higher as well at 3.6 in year ten.

The use of FmHA financing results in better financial performance measures. Thus, expansion or land purchases could occur sooner with using FmHA financing than with using conventional financing. The farm achieved higher loan credit scores with FmHA financing which would speed up the transition to private sources of credit.

As with the eastern Texas farm, sensitivity analyses were conducted (Moritz). With the addition of $20,000 of non-farm income, the southern Texas farm improved its overall level of performance. This would allow a new farmer to expand or make land purchases sooner. Higher credit scores should improve the farmer's financial status with lenders. As with the eastern Texas farm, the addition of non-farm income did not result in substantial differences between the methods of financing. The farm could have survived using either of the financing strategies.

With a ten percent decline in cotton, corn and sorghum prices, the farm benefitted by utilizing FmHA financing. However, the reduction in commodity prices reduces profit margins to a level that would question the long-run financial survival of the farm.

CONCLUDING COMMENTS

The FmHA beginning farmer financial assistance program's goals are to increase access of funds to young farmers and to restore the FmHA to its original purpose of providing limited credit assistance for a limited time. The key factors associated with FmHA's beginning farmer program are readily available credit and reduced interest expenses. The availability of credit assists beginning farmers meet the relatively high capital requirements of beginning a

farm operation. The effectiveness of the program was examined for Arkansas and Texas by considering the performance of four representative case farms.

As the results demonstrated, beginning farmers benefit from the program when their operations are not supported with non-farm income or when price declines are experienced. With FmHA financing, the operations showed higher levels of net income, ending net worth, and retained earnings as well as better chances for survival. This, in turn, should allow beginning farmers to improve their chances of continuing operations and making land purchases. However, under adverse conditions financial assistance may not increase agricultural profit margins to levels that permit long-run sustainability.

The beginning farmer program is effective in meeting its goals for the Arkansas Ozark broiler/cow-calf farm, yet the program may be unnecessary. Many lenders are willing to undertake the risk in providing funds without the assistance of the FmHA because broiler production cash flows well and is a thriving industry in this region.

There are several limiting factors to FmHA's beginning farmer program. First, a young farmer may have difficulty acquiring the 10 percent down payment required to participate in the down payment portion of the program. Furthermore, the FmHA offers similar loan programs, guaranteed and direct, outside of the new beginning farmer program which allow longer repayment plans and may not require as large of a down payment. However, the increased targeting for the beginning farmer program of limited appropriated funds will assist beginning farmers. Second, the five years of required experience may be unnecessary for certain farm enterprises. Broiler contractors provide fieldmen to supply management assistance for broiler production. And finally, although the loan limits of $250,000 for a down payment loan and $200,000 for operating loans are adequate for the representative farms in this study, the loan limits may be restrictive for larger livestock or crop farms or for farms in other regions.

The results of this study represent only four specific farms. Additional studies should be performed on various farm sizes, types and locations before more explicit conclusions can be drawn. Another limitation to this study is the lack of information pertaining to beginning farmers. Although this study attempted to simulate the uncertainty farmers face, the study is limited to using enterprise budgets for established farms, FAPRI projections, and estimates by loan officers.

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Table 1. Summary of Deterministic and Stochastic Variables in ARFSIM.

Input	Deterministic	Stochastic
Acreage	X	
Operator's share of production expenses	X	
Cash flow payment periods	X	
Secondary crop variables	X	
Deficiency payment acreage	X	
Other deficiency payments and non-farm income	X	
Cash flow of deficiency payments	X	
Loan maturity	X	
Depreciation	X	
Cash flow payment periods for buildings, land and machinery	X	
Cash flow payment periods for fixed costs	X	
Down payment percentage	X	
Fixed principal amount	X	
Sales of machinery	X	
Percent of quarterly sales	X	
Beginning current assets	X	
Beginning intermediate assets	X	
Beginning liabilities	X	
Accounting rules	X	
Tax calculations	X	
Correlation coefficients	X	
Interest rates		X
Yields		X
Variable costs per acre		X
Variable costs per unit of production		X
Target prices/loan rates		X
Unallocated or fixed expenses		X
Cost of machinery, buildings, and land		X
Family withdrawals		X
Non-farm wages		X
Returns on financial assets		X
Prices		X
Growth rates		X

Table 2. East Texas Cotton Farm: Net Income after Family Withdrawals Evaluation

	Conventional Financing	FmHA Financing
Net income after family withdrawals		
(NPV of 10 years)	$18,345	$53,801
Probability of positive net income after family withdrawals (%)		
Year 1	48.0	58.3
Year 2	59.7	69.3
Year 3	69.3	76.3
Year 4	65.3	75.7
Year 5	68.3	75.0
Year 6	64.3	74.0
Year 7	61.7	68.7
Year 8	59.7	68.7
Year 9	54.0	64.0
Year 10	59.0	66.0
Minimum net income after withdrawals		
	($107,386)	($88,356)
Coefficient of variation of net income after withdrawals		
Year 1	-4.342	23.806
Year 2	15.081	3.633
Year 3	2.943	1.695
Year 4	3.205	1.918
Year 5	3.484	1.849
Year 6	3.630	1.946
Year 7	5.654	2.368
Year 8	8.542	2.751
Year 9	12.288	2.852
Year 10	26.435	2.987

Table 3. East Texas Cotton Farm: Net Worth Evaluation

	Conventional Financing	FmHA Financing
Ending net worth	$97,669	$143,850
Probability of net worth greater than 0 (%)		
Year 1	100.0	100.0
Year 2	96.7	98.7
Year 3	96.7	99.7
Year 4	93.7	98.7
Year 5	91.3	97.3
Year 6	90.7	97.7
Year 7	87.7	97.0
Year 8	86.7	96.3
Year 9	82.7	97.0
Year 10	81.3	96.3
Contributed capital & retained earnings		
Year 1	$45,705	$50,868
Year 2	$46,911	$55,612
Year 3	$52,450	$64,776
Year 4	$59,565	$75,708
Year 5	$65,109	$85,189
Year 6	$70,392	$94,163
Year 7	$74,501	$102,502
Year 8	$77,584	$110,471
Year 9	$79,922	$118,783
Year 10	$81,138	$127,319

Table 4. South Texas Corn/Cotton/Sorghum Farm: Net Income after Family Withdrawals Evaluation

	Conventional Financing	FmHA Financing
Net income after family withdrawals		
(NPV of 10 years)	($776)	$80,778
Probability of positive net income after family withdrawals (%)		
Year 1	31.7	46.7
Year 2	50.0	66.3
Year 3	60.0	74.0
Year 4	63.7	75.0
Year 5	59.7	72.0
Year 6	50.3	64.7
Year 7	49.7	65.3
Year 8	53.7	65.7
Year 9	55.7	66.0
Year 10	60.0	68.0
Minimum net income after withdrawals		
	($330,187)	($109,421)
Contributed capital & retained earnings		
Year 1	-1.914	-65.562
Year 2	-45.174	2.932
Year 3	4.865	1.700
Year 4	4.165	1.463
Year 5	7.304	1.893
Year 6	-73.973	2.556
Year 7	-28.870	2.592
Year 8	-1099.878	2.365
Year 9	31.794	2.528
Year 10	16.364	2.205

Table 5. South Texas Corn/Cotton/Sorghum Farm: Net Worth Evaluation

	Conventional Financing	FmHA Financing
Ending net worth	$86,582	$202,072
Probability of net worth greater then 0 (%)		
Year 1	97.3	99.7
Year 2	93.3	98.7
Year 3	89.7	98.0
Year 4	83.7	95.3
Year 5	82.7	96.3
Year 6	80.7	96.0
Year 7	78.3	96.0
Year 8	75.3	96.7
Year 9	74.0	95.3
Year 10	74.0	94.3
Contributed capital & retained earnings		
Year 1	$35,619	$46,249
Year 2	$35,064	$53,954
Year 3	$40,412	$67,244
Year 4	$47,590	$83,132
Year 5	$51,770	$97,436
Year 6	$51,308	$108,447
Year 7	$49,875	$120,418
Year 8	$49,834	$133,910
Year 9	$51,410	$149,185
Year 10	$54,815	$170,296

Figure 1. Results from Beginning Farmer Program Survey.

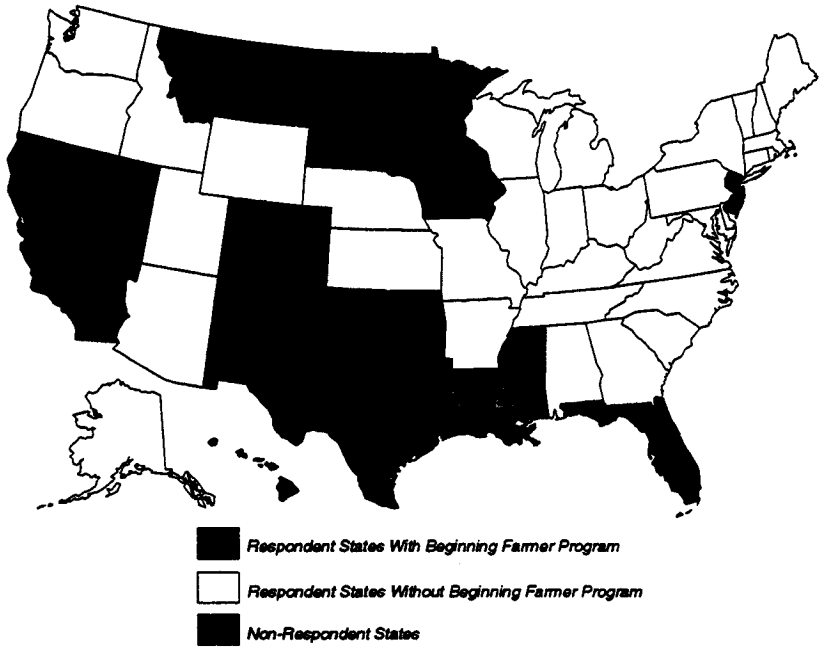


Figure 2. ARFSIM Flowchart

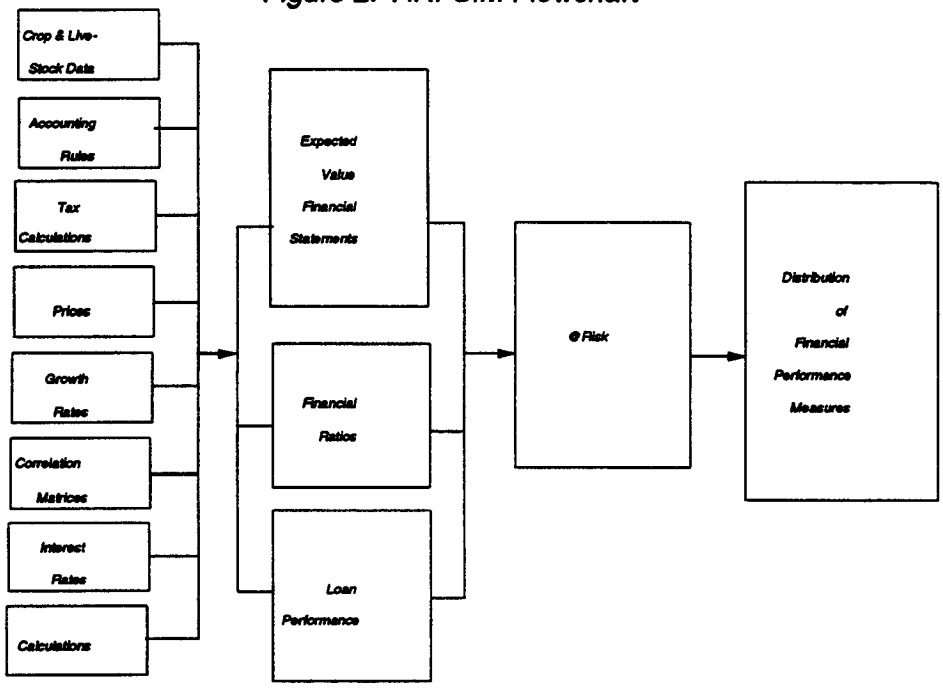


Figure 3. Information Flows

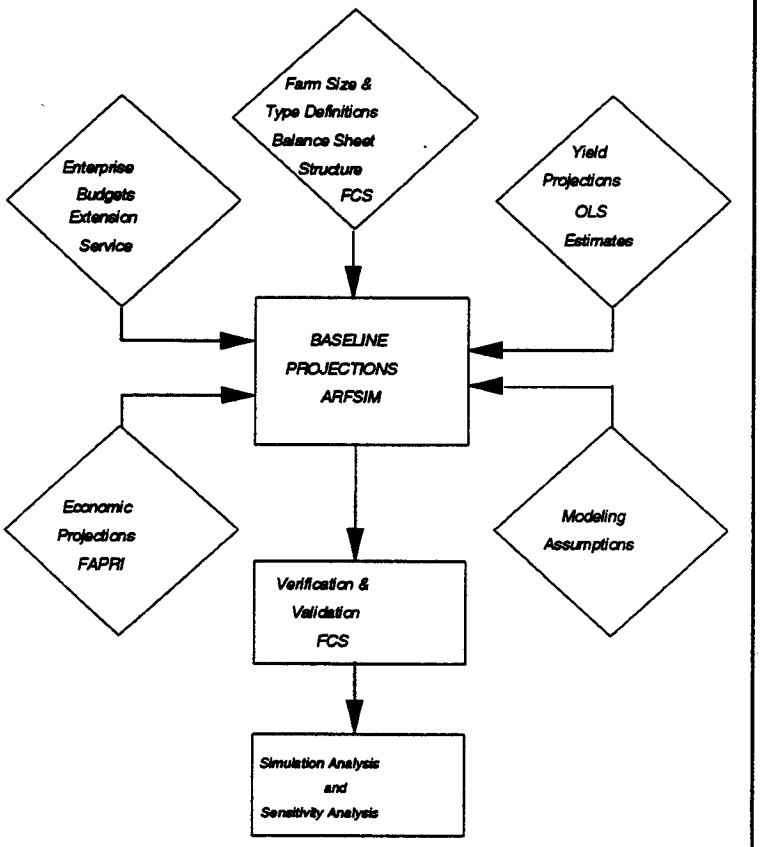
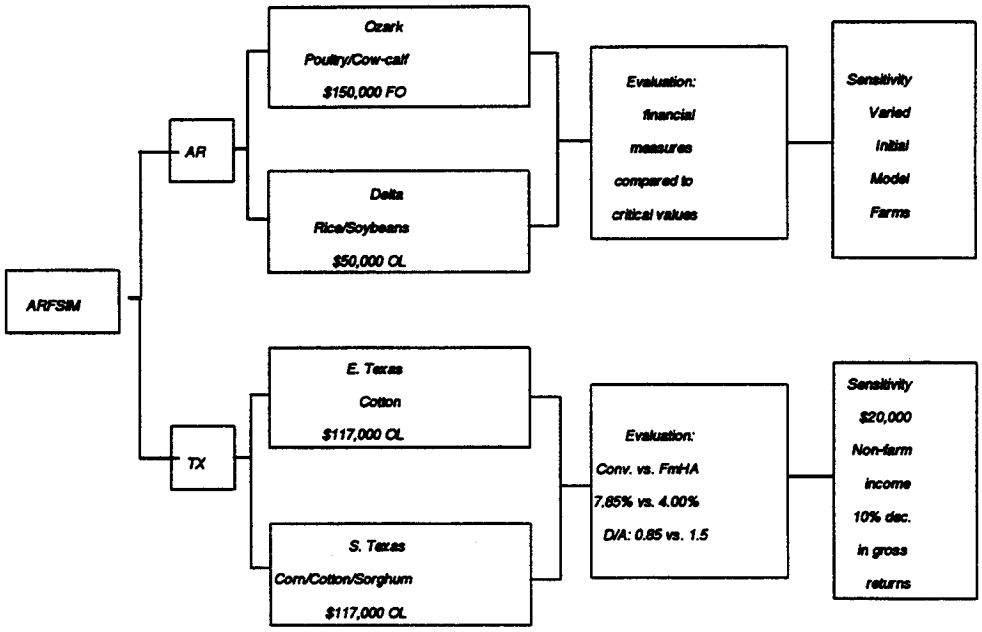


Figure 4. Simulation Study Procedures



Trend in Mean,
1 Standard deviation,
5/95 percent.

Figure 5. Ozark: Broiler/Cow-calf
Contributed Capital and Retained Earnings

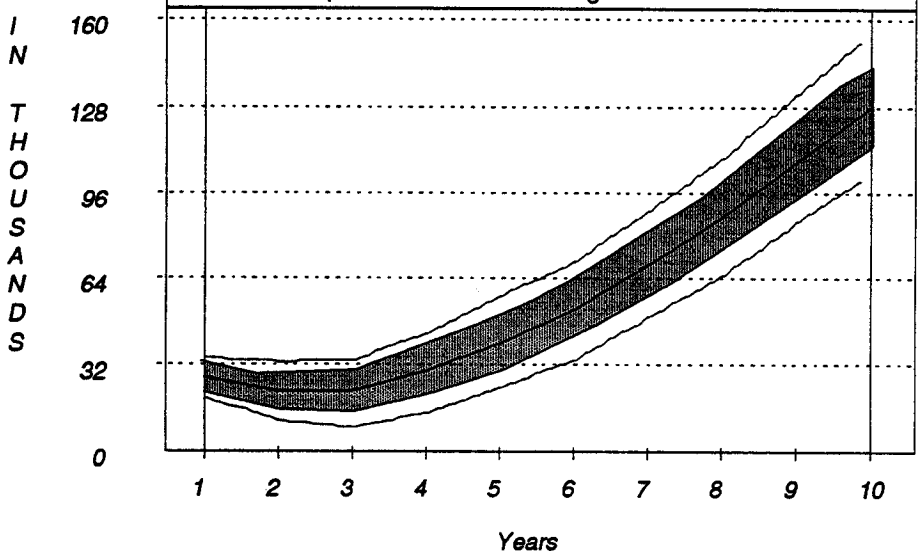


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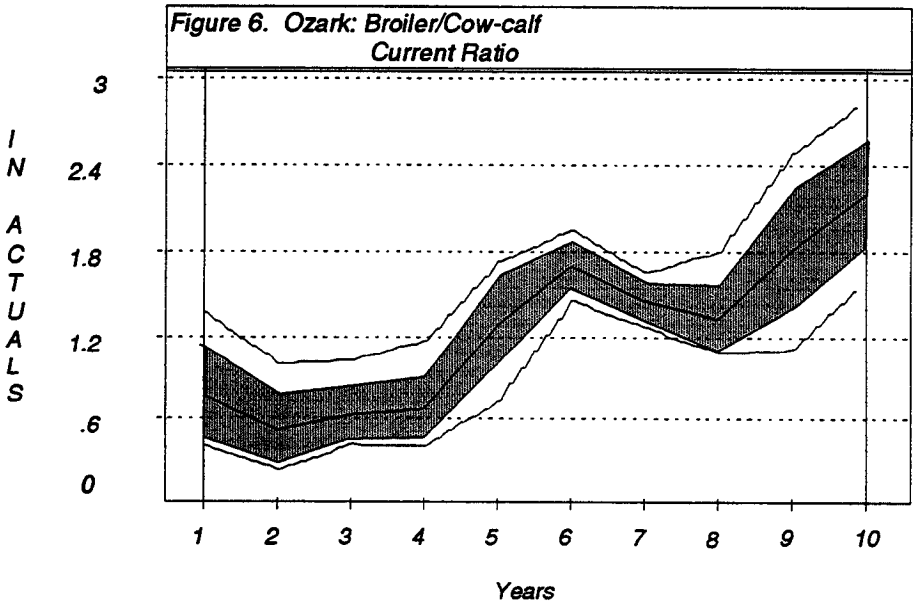
Figure 6. Ozark: Broiler/Cow-calf
Current Ratio



Trend in Mean,
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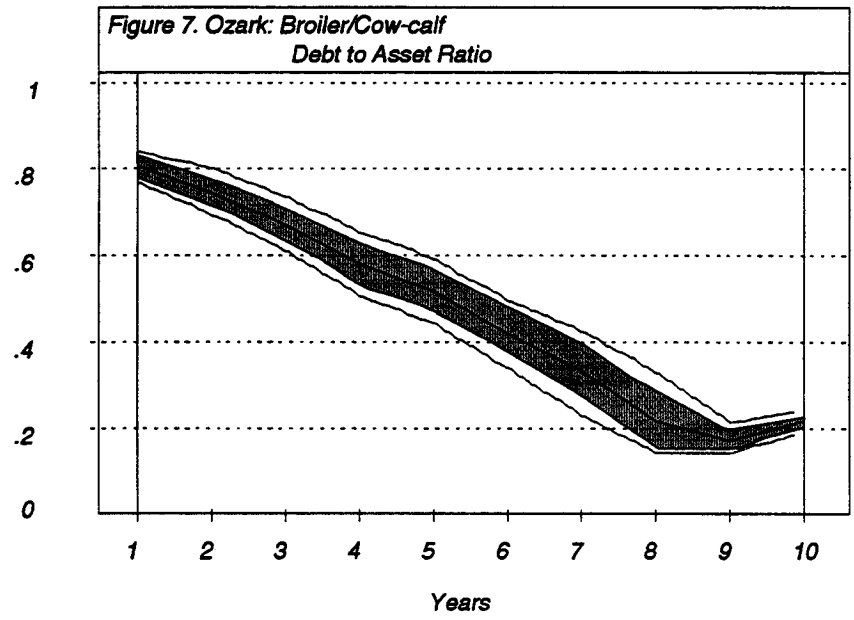

Trend in Mean,
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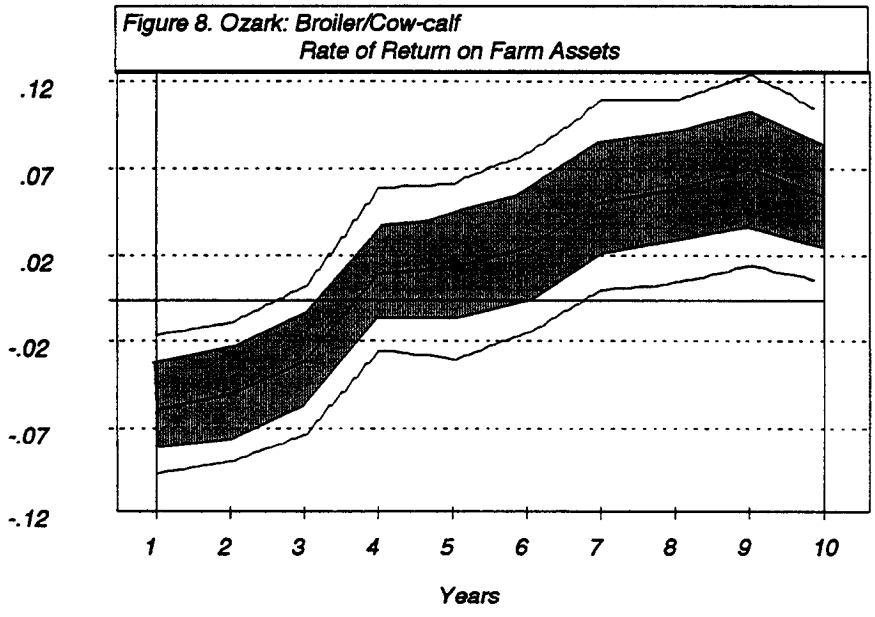

Trend in Mean,
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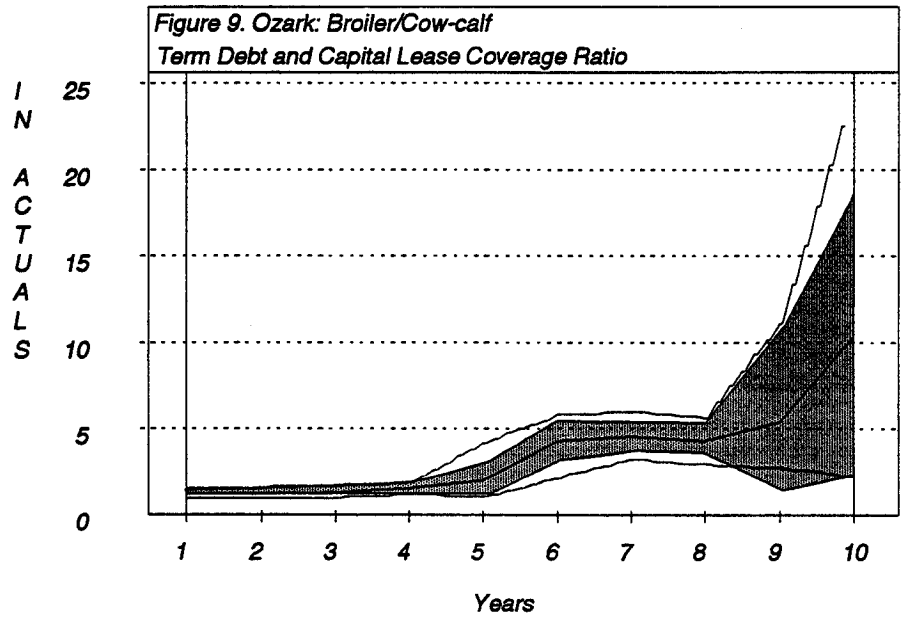
5/95 percent



Trend in Mean,
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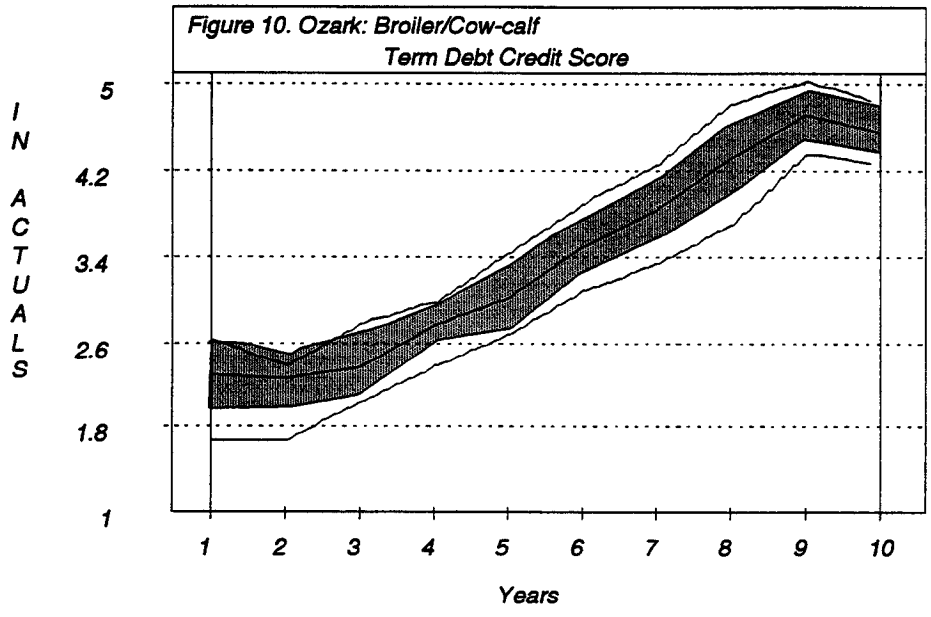
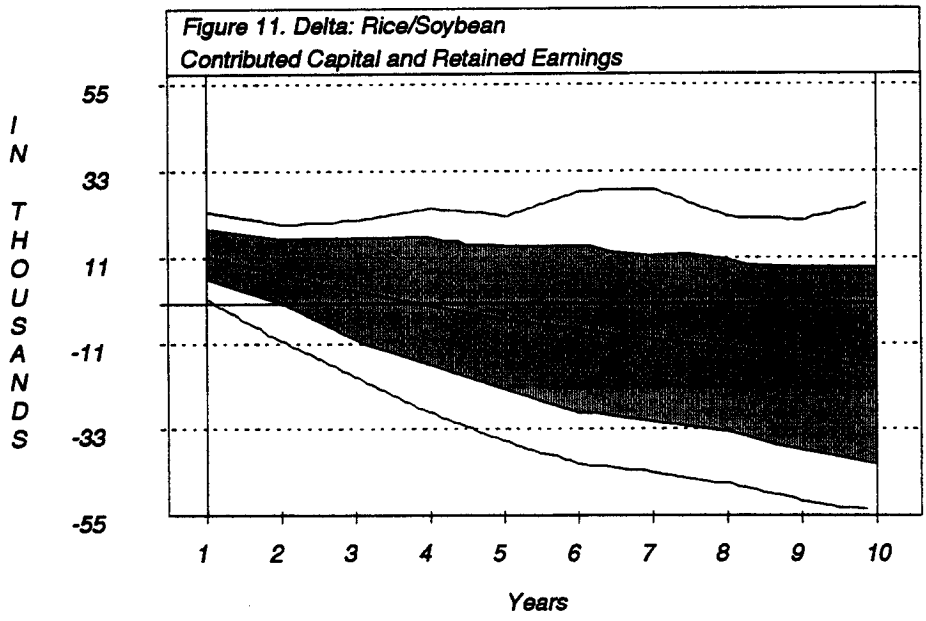
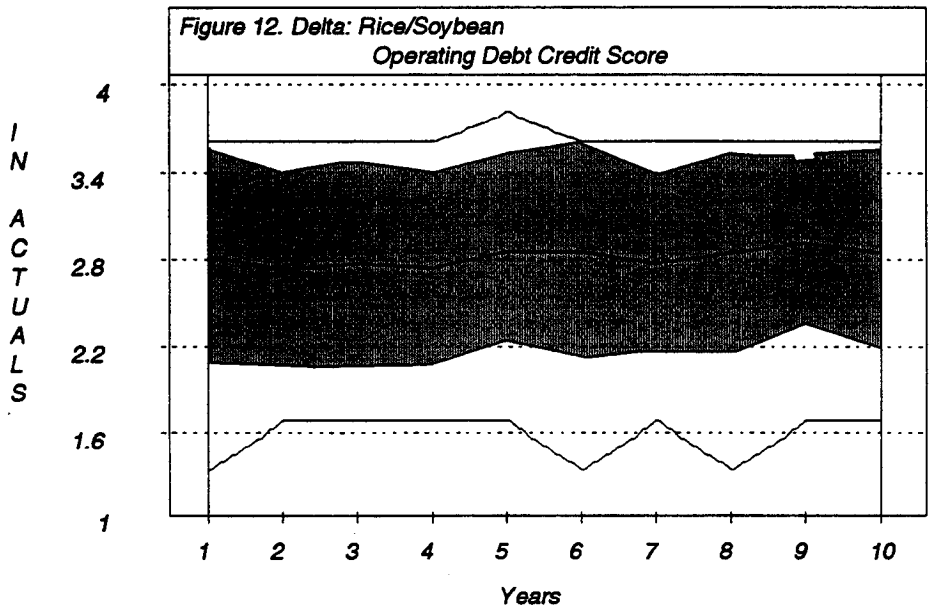
5/95 percent



Trend in Mean,
1 Standard deviation,
5/95 percent



Trend in Mean,
1 Standard deviation,
5/95 percent



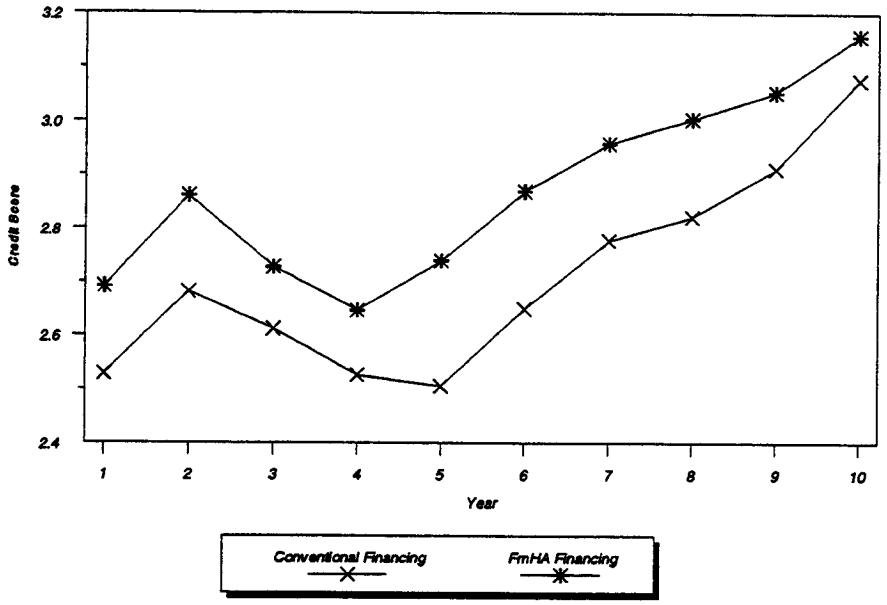


Figure 13. East Texas Cotton Farm: Expected Term Loan Credit Score

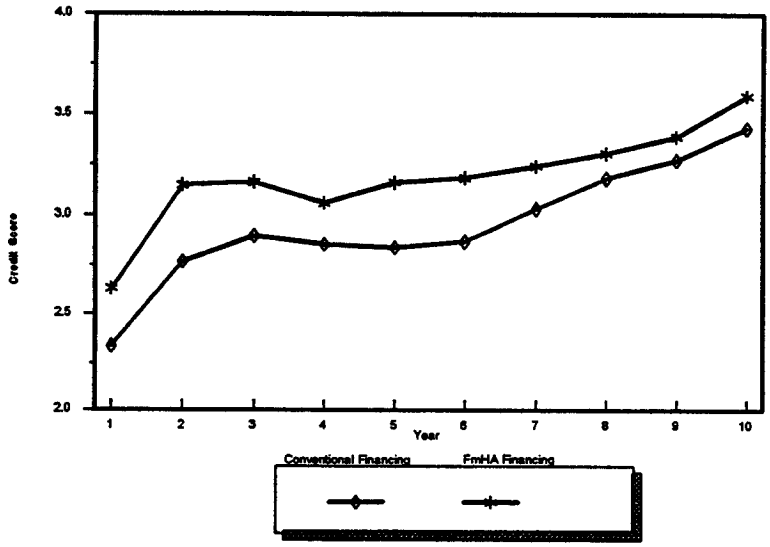


Figure 14. S. Texas Corn/Cotton/Sorghum Farm: Expected Term Loan Credit Score