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Opportunities for Farm Firm Growth

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Plan of analysis



Opportunities for
Farm Firm Growth
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The financial vitality of the nation's agricultural sector--especially that in the North Central Region--has weakened considerably in the past four years. Underlying causes for this are (1) a deterioration in farmland values which has resulted in farm debt-asset ratios that are higher now in the U.S. than any time since the Great Depression, (2) "real" (inflation-adjusted) interest rates which are higher now in the U.S. than in any other major industrial country, and (3) a declining ratio of prices received to prices paid by farmers (from 100 in 1973 to 62 in 1983).

As a result of these and other related forces, the financial future of many farms is in serious jeopardy. For many other farms, the most immediate need is just to survive.

As we look to the future, certain structural elements in the overall agricultural economic environment could change. If they do, paths of farm firm growth similar to those experienced in the 1970's might again emerge.

It is within this context that the research reported in this Newsletter issue was undertaken. The objectives of the research were to determine the impacts of reduced leverage, reduced interest rates, and increased crop price levels on the prospective growth and economic vitality over the next 10 years of a representative irrigated farm in Brookings County.

A polyperiod linear programming model was used to determine the organization and scale of the representative farm that would generate the greatest amount possible of discounted net farm income over a 10 year planning period. The farm manager was presumed to want to (1) maximize his net farm income, defined as gross receipts less all variable and fixed costs (including \$10,000 per year for family living expenses); (2) give primary consideration to investing capital surpluses in farm operations and assets (land, machinery, irrigation equipment), but to be open to making off-farm investments as well; (3) retain a substantial cash grain component in his farm, rather than let the farm become dominated by livestock and/or alfalfa production; (4) avoid undue credit risk; and (5) limit the amounts of labor he hires and land that he rents so as to avoid exceeding his supervisory capacities.

The most profitable organizational plan was first determined for the farm over a 10 year period with the following assumed economic conditions: \$27,500 of initial net operating capital (with an overall initial debt-asset ratio of 0.28), a 16% interest rate, and projected commodity prices reflecting averages for the past 10 years. This plan is termed the baseline solution.

Values for the three key variables in the study were then changed one-at-a-time to reflect contrasting circumstances for degree of leverage, interest rates, and level of crop prices. The comparisons involved a 30% increase in initial net operating capital from \$27,500 to \$35,700, a reduction from 16 to 10% in the operating capital interest rate, and crop prices 30% higher than the 10 year average.

FIGURE 1. CURRENT CAPITAL BORROWING

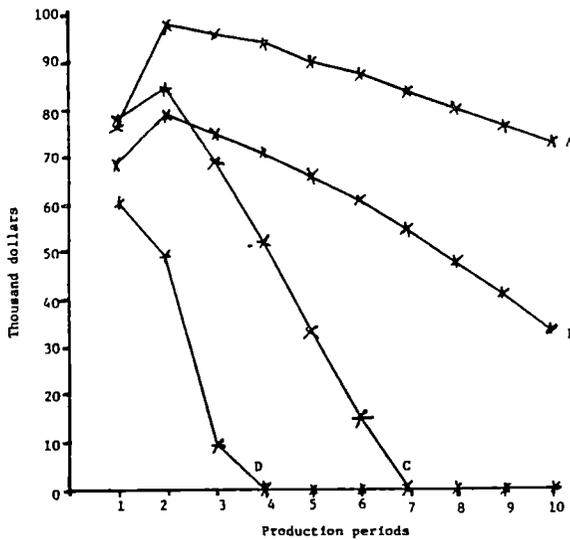


FIGURE 2. ANNUAL CASHFLOW BALANCES

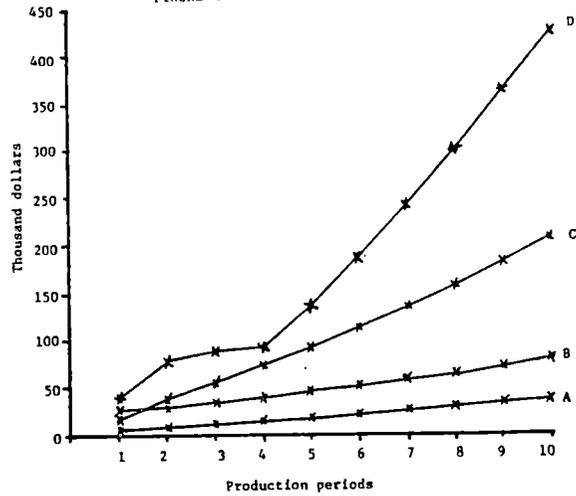
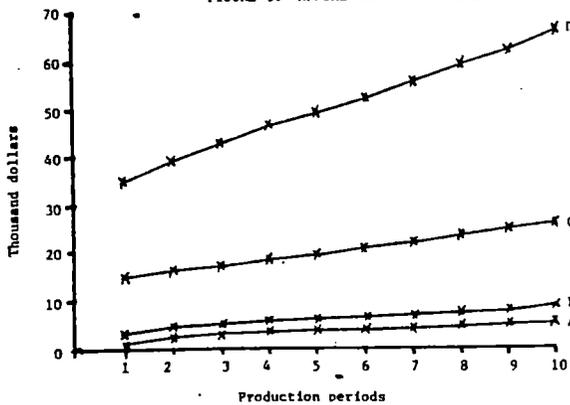


FIGURE 3. ANNUAL NET FARM INCOMES



FARM PLAN MODEL LEGEND

- A = Baseline solutions: \$27,500 initial net operating capital; 16% interest rate; 10 year average projected prices
- B = Reduced leverage solutions: \$35,700 initial net operating capital; 16% interest rate; 10 year average projected prices
- C = Reduced interest rate solutions: \$27,500 initial net operating capital; 10% interest rate; 10 year average projected prices
- D = Increased crop price solutions: \$27,500 initial net operating capital; 16% interest rate; 30% increased price level

Most profitable farm organizational plans were determined for each of the contrasting situations. The amounts of current capital borrowed (Fig. 1), cashflow balances (Fig. 2), and net farm income (Fig. 3) for the various solutions were compared with those for the baseline solution (the A functions in the figures) and with each other to reflect the impacts of the reduced leverage (B functions), reduced interest rate (C functions), and increased crop price level (D functions).

Nature of the baseline solution

The baseline solution involves a hog-soybean cash grain farm with enough irrigated corn to raise and feed out the pigs produced. In terms of resource expansion, between \$75,000 and \$100,000 of operating capital is borrowed during different years of the 10 year production period. Since no land or irrigation systems are purchased, no

intermediate or long-term credit is borrowed. Further, no capital surpluses are invested off-farm. The expansion of resources is limited, then, to the renting of 273 acres of cropland (48 of which are irrigated), 65 acres of pasture, and the hiring of the maximum permitted amount of labor during September-October.

The end-of-year cashflow balances in the baseline solutions for the representative farm are all positive. They are modest in size, however, amounting to less than \$6,000 in the 1st year and growing to about \$35,000 in the 10th year.

The annual net farm incomes in the baseline solutions are also all positive. They, too, are modest -- amounting to less than \$1,000 in the 1st year and approaching but not reaching \$5,000 in the 10th year.

Impact of reduced leverage

The most profitable resource organization of the representative farm with the reduced leverage model is identical to that for the baseline model. The amount of current operating capital borrowed in the 1st year is \$8,200 less (\$35,700 - \$27,500). The reduction in operating credit needs widens throughout the remaining 9 production periods. In the 10th year, the operating credit need with the reduced leverage solution (\$33,830) is less than one-half that for the baseline solution.

The end-of-year annual cashflow balances with the reduced leverage solution are at least twice as much as with the baseline solution. In the earlier periods, the relative differences in cashflow balances are greater, but the absolute differences are less. The same general patterns of relationship apply to the annual net farm incomes as to cashflow balances.

The impact of a reduced interest rate

The most profitable resource organization of the representative farm with the reduced interest rate is almost identical to that for the baseline model. The current operating credit needs with the reduced interest rate model are much less, however, than with the two prior models. The credit need with the reduced interest rate does peak at \$85,000 in the 2nd year, but rapidly drops thereafter and becomes zero beginning in the 7th production period.

The end-of-year cashflow balance with the reduced interest model begins with a level intermediate between those for the baseline and reduced leverage models. Beginning with the 2nd year, however, cashflow balances with the reduced interest rate build up rapidly. By the 10th production period, they exceed \$200,000.

The net farm incomes show steady growth throughout the period of analysis beginning in the 1st year at about

\$15,000 and rising to over \$26,000 in the 10th year. These levels are several-fold those for the baseline and reduced leverage models. In the reduced interest rate solution, some off-farm investment is made. In the 10th year, the return on the off-farm investment represents 17% of the total net income earned.

The impact of an increased crop price level

The most profitable resource organization of the representative farm with the increased crop price level differs from that for the three prior models. The primary changes are a 26% expansion in the cropped area (including the cultivation of the maximum permitted acres of rented land, but the purchase of no land), the dropping out of hog production, the further expansion of soybean production, and the purchase and use of two low pressure center pivot systems.

The irrigation systems are purchased outright with cash, rather than via a lease-purchase arrangement. As in the earlier models, no intermediate or long-term borrowing takes place in the increased crop price model. The borrowing of current operating capital is limited to the first 3 production periods.

The end-of-year cashflow balances during the first 4 production periods with the higher crop prices -- while greater than with any of the three prior models -- grow at a relatively modest rate (from \$40,000 to \$90,000). During this period, two center pivot systems are purchased. Thereafter, however, the balances rapidly accumulate, and by the 10th production period they amount to more than \$428,000.

Over 60% of the 10th year cashflow balance (\$271,895) is invested off-farm, with the return from the off-farm investment amounting to about 25% of the total net income earned on the farm. A main factor limiting the further growth of the farm is the limited labor supply during September-October, a time when

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all available labor is fully employed in the various farm activities.

maximum net farm income of less than \$5,000 in the 10th year).

The annual net incomes with the higher crop prices increase from \$35,000 in the 1st year to \$66,000 in the 10th year. They are more than twice as large as those with the reduced interest rates.

Judged by each of the three criteria, the prospects for growth with reduced leverage (a 30% increase in net operating capital) are greater than with the baseline model. In turn, the prospects for growth are greater with a reduced interest rate (from 16 to 10%) then with reduced leverage. And finally, the prospects for growth are considerably greater with a 30% increased crop price level than with the reduced interest rate. But even in the most favorable situation, the before interest and taxes return on total assets is less than 7%.

Summary and conclusions

The results of the study, therefore, suggest prospects for a certain economic viability of moderately-leveraged farms. But with economic conditions of the early 1980's, agriculture falls far short of being a high profit industry.

The results of analysis to determine the impacts of reduced leverage, reduced interest rates, and an increased crop price level on the growth and economic vitality of a representative irrigated farm firm are quite clear.

New publication

In the baseline model, the following conditions were assumed: \$27,500 of initial net operating capital (with an initial debt-asset ratio of 0.28), a 16% interest rate, and projected commodity prices reflecting averages for the past 10 years. Over the 10 year planning period, the expansion of the farm is minimal (some land rented and labor hired, but no land or irrigation systems purchased). Current operating capital needs decrease only slightly over the 10 year period. Annual cash flow balances and net farm income are positive, but they increase only slightly over the 10 year period (a

Readers interested in learning more detailed results from this study should request from the authors a copy of "Impacts of Credit and Commodity Price Levels on the Organization and Growth of an Irrigated Farm Firm", Bulletin, South Dakota Agricultural Experiment Station.