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AN EMPIRICAL ANALYSIS OF DAIRY FARM
REINVESTMENT VERSUS TAX-DEFERRED PLANS
FOR RETIREMENT INCOME

by

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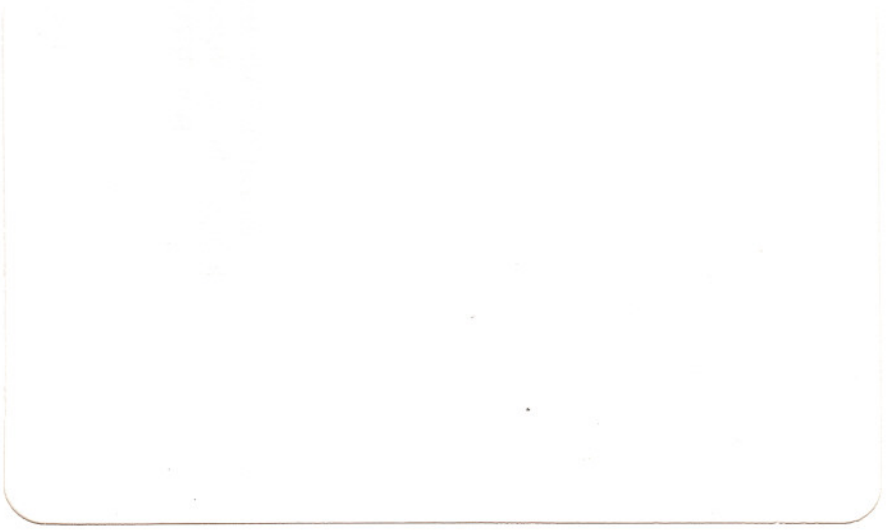

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An Empirical Analysis of Dairy Farm Reinvestment Versus Tax-Deferred Plans for Retirement Income*

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Abstract

This study empirically compares the retirement values of dairy farm investments to tax-deferred retirement investments that were funded with bank certificates of deposit or common stock. For a successful dairy farm, the results indicate the tax-deferred retirement plans were not as good an investment as reinvesting farm earnings back into the farm business.

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An Empirical Analysis of Dairy Farm Reinvestment Versus Tax-Deferred Plans for Retirement Income

Farmers looking towards retirement may establish and invest in tax-deferred retirement plans. This entails foregoing either alternative investments or current consumption. For many farmers, the alternative investment foregone is additional investment in the farm business. To decide whether to invest in a tax-deferred retirement plan or to make additional investment in the farm business, a farmer must consider the likely outcomes of the investments under relevant rates of return, taxes, and investment duration. Because the past performance of these investments would be useful to farmers contemplating future investments, this study uses empirical data to assess the historical performance of a dairy farm investment compared to tax-deferred retirement plans.

Although various researchers have analyzed the entry, growth, and exit processes of farmers, very few have empirically measured investment returns for retirement. Lee and Brake studied the process of converting farm assets to alternative investments and income during the retirement years. Because their study covered a period of relatively low farmland prices and returns, they recommended higher return, more liquid investments than farmland for retired farmers. Spence and Mapp developed a stochastic simulation model which can be used to evaluate investment opportunities available to retiring farm operators who have not participated in preretirement planning. Both of these studies focused on disinvestment from farming during retirement rather than investing for retirement. Acker, Wright, and Harrison numerically analyzed the value of farmland investment, nontax-deferred investments, and tax-deferred retirement plans for retirement income under various assumed return and tax rates.

Their analysis did not empirically assess these investments under historical return rates. Tauer demonstrated how to calculate the retirement value of alternative investments given stated return and tax rates, but did not empirically assess alternative investments.

Investments for Retirement Income

There are two tax-deferred retirement plans available to a noncorporate farmer. These are the Keogh or HR-10 plan and the Individual Retirement Account plan (IRA). Either plan permits a farmer to place a portion of his current farm earnings into a restricted fund for retirement. The annual amount deposited in a Keogh plan is limited to the lesser of 15 percent of earned income or $15,000 (defined contribution plan). The annual maximum for an IRA is the lesser of 100 percent of earned income or $2,000. The amount deposited is excluded from taxable income the year for which the deposit is made. In addition, the earnings from the retirement plan are not taxed as they accrue. However, when the retirement fund is liquidated, the entire amount of the fund is subject to taxation.

Additional investment in a farm business will generate current income and price appreciation. Current income will be taxed each year it is earned, but in farming, some current income often receives capital-gain taxation treatment. An example is the income from the sale of qualified breeding livestock. Price appreciation accumulates each year and increases the value of the farm investment, but it is not taxed until the investment is sold and then it is often capital gain. Farm investment is not deducted from taxable income the year of investment except for some inventories (cash basis farmer). Depreciable property

is deducted as a depreciation allowance over a period of years. Some types of farm investments receive investment tax credit which reduces taxes the year of investment.

Empirical Analysis

To analyze a farm investment versus tax-deferred retirement plans, the following hypothetical situation is used. Assume a dairy farmer, age 55, has developed his farm business to where it will comfortably support his family by reinvesting all savings into the business by the purchase of land, buildings, equipment, dairy cows, and other farm property. At this point in his life he must decide whether to continue this farm reinvestment or to place $2,000 annual income into a tax-deferred retirement account. At age 65, the farmer will liquidate either investment as a lump sum. In reality the investments may be liquidated gradually through sales or an annuity, and generate additional income. However, the purpose of this analysis is not to determine the optimal disinvestment strategy which would be unique for each farmer. If the after-tax lump sum of an investment is more valuable than the after-tax lump sum of an alternative investment, it is likely that its annuity, gradual sale, or installment sale will also be more valuable. The formulas used to calculate the future after-tax value of these series of investments are similar to those formulated by Tauer, except that the annual investment parameters were allowed to change for each of the 10 years.

To obtain data to evaluate the farm investment, a sample was drawn from participants in the New York Dairy Farm Business Summary. This

annual Summary contains data from approximately 600 commercial dairy farms whose owners have voluntarily participated in the program. Selected counties were drawn from various regions of the state, and 27 participants who had participated in the Summary for any 10 consecutive years during the period 1964 to 1978 were selected from these counties. Data from each farm for 10 years were used to assess the outcome of a $2,000 per year before-tax farm investment for that farmer (income tax is paid on the $2,000 before it is invested).

The Farm Summary data include information on receipts, expenses, and assets. In the earlier years, no data on liabilities were available. Thus, percent return was calculated as return to assets rather than return to equity. This was probably not a serious limitation, because many farmers at age 55 probably do not highly leverage additional farm investment. Percent return was calculated as it was calculated in the early years' New York Farm Business Summaries (Bratton and LaDue), but for this study was separated into three components--current income return, current capital gain return, and appreciation return. These were average returns from the entire farm investment and not marginal returns from the last $2,000 invested, which could not be calculated. With an optimal unconstrained investment, marginal return should be equal to or less than average return. However, a study completed during the data period, using synthesized farms, indicated economies of size in dairy farming (Buxton and Jensen). This would suggest that marginal returns from dairy farms operating under a capital constraint could be higher than average returns.

Cash expenses before 1971 included capital expenditures rather than depreciation, but depreciation was implicit in net accrual farm income

because inventory values included the ending market value of any capital expenditures made during the year. Explicit machinery and real estate depreciation were available after 1971. Interest was not included as a cash expense. The value of the operator's and the family's unpaid labor, which was standardized for all participants before 1973 but was estimated by each participant after 1972, was subtracted from net farm income so that only returns to investment remained.

Cash livestock sales were separated from farm income and were treated as capital gain income. Because no tax basis data on livestock were available, it was initially assumed that all livestock were raised and thus had a zero tax basis. In a revised analysis, all livestock sales were treated as ordinary income. Both capital gain and ordinary income were divided by beginning total farm assets to obtain percent returns. Real estate value increases from the ending to the beginning balance sheet were divided by total beginning farm assets to obtain an appreciation rate for pre-1973 data. Real estate appreciation had been explicitly estimated by participants since 1973.

Yearly new investments in machinery and purchased livestock were divided by total new investment in farm assets to arrive at the fraction of new investment that qualified for federal investment credit. This procedure assumes that all machinery and purchased livestock qualify for full investment credit. This assumption is later relaxed to examine its sensitivity. Investment tax credit was not claimed on farm investments made the last two years of the 10-year period, and only one-third and two-thirds of the investment qualified during the eighth, seventh, and then fifth, sixth years, respectively.

Yearly income tax rates were obtained by determining the tax bracket for the net farm income of each year minus the standard deduction and two personal exemptions. There was no information to calculated itemized deductions. The tax rate used to calculate the after-tax retirement value was the average tax rate of the five years before retirement.

The state average total return to assets for the Summary participants for the years 1964 to 1978 was 7.6 percent. The average for the sample during this period was 12.6 percent. (The average ordinary income rate of return for the group was 4 percent, the average annual capital gain return was 4.5 percent, and the average appreciation rate was 4.1 percent. The average tax rate for the group was 21 percent, and 68 percent of their new farm investment on average qualified for investment tax credit.) Thus, it appears that the 27 sample farms as a group had greater returns than the average of the Summary participants. The only readily available measure of dispersion for the Summary participants is the information that the top ten percent farms had a total average return of 16.5 percent for the years 1964 to 1972, compared to 8.8 percent for the state average, and 11.6 percent for the sample average. Assuming a normal distribution, this would place the sample farms in the quartile above the mean, and thus better than average. It may be that the farmers with higher returns are the only farmers who have excess funds to consider alternative investments. Farmers with low return rates may find that they have no alternative but to reinvest all available earnings back into the farm to maintain it as a viable business.

In rural areas, tax-deferred retirement plans are available through local financial institutions, life insurance companies, and brokerage

firms. The most prevalent and possibly the widest used are tax-deferred plans sponsored by local commercial banks. The banks generally establish these plans to invest in small denomination certificates of deposit. In the 1960s and 1970s, these certificates were subject to interest rate ceilings. These ceilings are being phased out during the early 1980s. Thus, rather than use rates that may have been subjected to a ceiling rate of interest which will not apply in the future, it was decided to use the competitive $100,000 certificate of deposit, whose rate was determined by unrestricted market demand and supply.

An alternative investment for a Keogh or IRA is a common stock mutual fund. Twenty-seven mutual funds, whose objective is growth and current income, were randomly selected from a listing of common stock funds that have IRA and Keogh plans. The listing and annual returns for each of the funds were obtained from the Wiesenberger Investment Companies Service, which computes and publishes annual returns for most mutual funds. The annual return is the percent change in net assets per share with any capital gains and income dividends added back in.

To compute the retirement investment outcome, $2,000 minus any sales charge was added each year to previous deposits and accumulated interest or earnings. The tax-deferred plan began the same year as the farm investment for each of the 27 farmers. At the end of the ten-year investment period, income taxes were paid on the lump-sum amount in the fund. The tax rate used was again the farmer's average tax rate during the previous five years.

Empirical Results

The empirical results are shown in Table 1. The average value of the farm investment for the 27 farmers was $31,288. The average for the

Table 1. The After-Tax Values of a Farm Investment and Tax-Deferred Investments After 10 Years of $2,000 Annual Contributions for 27 Dairy Farms

Farm Number	Farm Investment	Bank CD Tax-Deferred Investment	Common Stock Mutual Fund Tax-Deferred Investment
1	$20,086	$25,126	$15,352
2	20,234	13,904	10,170
3	23,742	21,564	15,534
4	24,226	21,068	21,004
5	24,618	20,146	17,130
6	24,904	15,732	11,982
7	25,150	14,428	17,994
8	25,854	25,904	20,562
9	27,116	21,846	19,962
10	27,294	18,106	16,658
11	28,396	20,788	14,606
12	28,690	20,146	14,690
13	31,368	23,036	27,412
14	31,484	24,614	25,096
15	31,886	19,238	19,663
16	32,256	21,350	20,498
17	33,568	23,626	15,414
18	34,066	20,146	19,098
19	34,744	19,294	16,654
20	36,026	24,280	14,614
21	37,064	21,248	23,532
22	38,846	23,342	18,336
23	38,892	16,092	10,234
24	39,326	24,008	16,508
25	39,852	23,432	11,870
26	40,188	23,766	19,892
27	44,894	23,998	13,368
Average	31,288	21,120	17,327

bank CD tax-deferred investment was $21,120, or $10,168 less. The average for the stock mutual fund tax-deferred investment was $17,327, or $13,961 less than the farm investment and $3,793 less than the bank CD tax-deferred investment. For each farmer, the farm investment was a better alternative than the mutual fund tax-deferred investment, and the farm investment was a better alternative than the bank CD tax-deferred investment for 25 of the 27 farmers.

A stochastic dominance comparison of the empirical distributions of the farm investment and retirement plans indicates that the farm investment dominates both tax-deferred investments by first-degree stochastic dominance, and thus by second- and third-degree stochastic dominances (Anderson, Dillon, and Hardaker). The bank CD tax-deferred investment also dominates the stock mutual fund tax-deferred investment by first-, second-, and third-degree stochastic dominances. These results indicate that successful dairy farmers who prefer more wealth should invest farm earnings back into the farm business rather than into a tax-deferred retirement plan. The reasons are that dairy farming has generally been profitable for this group of farmers, it benefits from tax-deferment because of capital appreciation, and it shelters some income from income taxes because of investment tax credit and capital gain taxation.

The preceding analysis assumed that all livestock and machinery purchases qualified for investment tax credit, and all livestock sales and farm appreciation qualified for capital gain taxation. To examine sensitivity to these assumptions, they were completely relaxed by eliminating both investment tax credit and capital gains taxation preference treatment. The value of the tax-deferred investments did not

change. The value of the farm investment dropped as expected, but the drop was relatively small. The average value of the farm investment dropped from $31,288 to $27,336. Yet, stochastic dominance tests indicate that the farm investment still dominates both tax-deferred investments by first-, second-, and third-degree stochastic dominance.

One selling point for tax-deferred investments is that a taxpayer may be in a lower tax bracket when he retires, thus reducing the taxes paid on the tax-deferred investment. To measure the maximum impact of a lower tax bracket at retirement, the retirement income tax rate for each farmer in the analysis was set equal to zero. The effect is to substantially increase the after-tax values of the tax-deferred investments, but to only marginally increase the after-tax value of the farm investment. Much of the farm investment return had been taxed before retirement, and the farm appreciation had received capital gain preference treatment, resulting in lower taxes. The average value of the farm investment for the 27 farmers was $31,916. The average for the bank CD tax-deferred investment was $28,232, or $3,684 less. The average for the stock tax-deferred investment was $23,202, or $8,714 less than the farm investment. Although the average was greater for the farm investment, its probability distribution does not dominate the distribution of the CD tax-deferred investment by either first-, second-, or third-degree stochastic dominance. The farm investment, however, does dominate the stock tax-deferred investment. Thus, with a zero tax rate at retirement, the farm investment cannot be preferred over the CD tax-deferred retirement plan or vice versa based on this decision criterion, but the farm investment and the CD tax-deferred investment can both be preferred over the stock tax-deferred investment.

Summary and Conclusions

This study empirically compared the retirement values of dairy farm investments for relatively successful dairy farmers to tax-deferred retirement investments that were funded with bank certificates of deposit or common stock. Under most situations, the dairy farm investment vastly outperformed the tax-deferred investments. This was the case even without the benefits of investment tax credit or capital gain taxation treatment for farm investments. However, if the income tax rate of a farmer approached zero at retirement, there was no clear choice between the farm investment and the bank CD tax-deferred retirement plan, although both were preferred over the common stock mutual fund tax-deferred investment. For a successful commercial dairy farm, the results indicate that tax-deferred retirment plans that generate rates of return similar to certificates of deposit or common stock mutual funds are probably not as good an investment alternative as reinvesting farm earning back into the dairy farm business.

Although this study only analyzed dairy farm investment, many other farm types were at least as profitable as dairy farms during the analysis period. Thus, it is probable that other types of farmers would have fared better by reinvesting in their farm rather than in retirement plans.

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