

## **Farm Land Ownership as a Source of Retirement Income**

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## **Farm Land Ownership as a Source of Retirement Income**

“Baby boomers” are approaching retirement age. Therefore, during the next decade, the number of people retiring is expected to drastically increase. Population estimates for 2010 predict that there will be more than 50 million Americans over 60 years old. Between 2000 and 2010 the number of Americans between the ages of 56-60 and 61-65 will increase by 44.78% and 48.49%, respectively (U.S. Dept. of Commerce). These percentages are significant because people ages 56-65 will be facing retirement decisions within the next few years. How will they support themselves?

Shroder attributes the popularity of real estate ownership to the receipt of property transfers from previous generations. Because real estate ownership has become popular, farm land ownership may be a desirable investment. It may provide a source of retirement income for individuals who own, purchase or inherit it.

The age distribution of U.S. farmers (Allen and Harris) suggests that a large proportion of farm operators will retire in the near future. Census data indicate that the average age of farmers in 2002 was 55.3 years (USDA-NASS). The average age of farm operators who do not have other occupations was 57.0 and almost 1 out of 3 of these farmers was 65 and over. The Center for Rural Affairs predicts that “half of all current farmers are likely to retire in the next decade.”

Based on the 2001 Agricultural Resource Management Survey, Mishra, Johnson, and Morehart found that for farm households planning to retire “in the next 5 years,” 20% plan to sell the farm and 22% plan to rent it out. Rented land is very important to U.S. agriculture. U.S. census data for 2002 indicate that 37.6% of land in farms was rented. As farmers retire, they may rent out their owned farm land as a source of retirement

income. Moreover, when older farmers and their surviving spouses pass away, owned farm land in their estates may provide retirement income for their heirs.

The purpose of this paper is to evaluate the desirability of farm land ownership as a source of retirement income. The focus is on debt-free farm land. Whether an individual is a farmer or not, he or she may inherit debt-free farm land. Inherited land may be owner-farmed, sold, or rented to generate income. A farmer may choose to retire and rent his or her debt-free farm land instead of selling it. A person who is able to pay cash may invest in debt-free farm land.

Debt-free farm land may be sold and the proceeds invested in alternative investments. To provide perspective on farm land ownership as a retirement strategy, farm land ownership is compared to ownership of stocks and U.S. Treasury securities as a source of retirement income. Also, various portfolios of farm land, stocks, and Treasury securities are considered.

## **Procedures and Data**

The net present value model for an investment with no external financing is:

$$(1) \quad NPV = \sum_{n=1}^N \frac{P_n}{(1+i)^n} + \frac{V_N - T_N}{(1+i)^N}$$

where  $NPV$  is the net present value of the investment,  $P_n$  are the annual after-income-tax net cash flows projected for the investment,  $i$  is the after-tax opportunity cost of the investor's financial capital,  $N$  is the length of planning horizon,  $V_N$  is the terminal value of the investment, and  $T_N$  is the capital gains tax when the investment is disposed of (e.g., Barry, Ellinger, Hopkin, & Baker).

Criteria that may be used to evaluate an investment in farm land include NPV,

retirement income (annual net cash flows), and the terminal value of the investment.

When a long-term investment is held with annual income reinvested to maximize long-term return, the NPV is the most important criterion. In contrast, when an investment is held to generate retirement income, annual net cash flows and the maintenance of annual net cash flows at an acceptable level are the more important criteria.

In order to capture the variability in farm land values as well as variability in stocks and Treasury securities, a 30-year time period (1975-2004) was chosen. Life expectancy at age 65 is 16.6 years for a man and 19.5 years for a woman (U.S. Dept. of Health and Human Services). To provide perspective on shorter time periods, 15-year, 10-year and 5-year time periods between 1975 and 2004 are also analyzed. The analysis is completed in both nominal and real dollars. The Consumer Price Index is used to convert nominal to real (April 2005) dollars (U.S. Dept. of Labor).

Land data are for the state of Kansas. The focus is on nonirrigated cropland because nonirrigated accounts for approximately 87% of all cropland in the U.S. and 91% of all cropland in Kansas (USDA-NASS).

Initial investment in stocks and bonds is based on the assumption that a 7% sales cost was incurred when land was sold.  $P_N$  for stocks are after-income-tax annual dividends. Stock values and annual incomes (dividends) are based on the historical average value of the S&P 500 index (Council of Economic Advisors). S&P 500 data includes an aggregate of leading companies, generally large in size, selected by Standard and Poors.  $P_N$  after-income-tax for the 30-year bond is based on the coupon rate for a 30-year Treasury bond purchased in 1975 and held to maturity in 2004 (The Federal Reserve Board).

Income taxes differ for the three alternatives. Income tax and capital gains tax rates vary across individuals. For this study, the combined federal and state tax rate for farm land is assumed to be 40%. Because dividends from stocks receive a preferential income tax rate, an income tax rate of 20% is used for stock dividends. Because annual income from bonds is exempt for state and local taxes, a 35% income tax rate was used for bonds.

A nominal before-tax discount rate (7.0%) was based on the average fixed annual interest rate on long-term farm real estate loans for the third quarter of 2004 from the Tenth (Kansas City) Federal Reserve District (Federal Reserve Bank). This rate was adjusted for inflation by using the 4.28% average inflation rate over the 30-year period. The discount rate was also adjusted for the different income tax rates for the three investments by using the formula  $r = i(1-t)$  where  $r$  is the rate that accounts for income taxes,  $i$  is the before-income-tax real discount rate and  $t$  is the income tax rate (Kay, Edwards, Duffy).  $V_N$  is the 2004 asset price.  $T_N$  is the terminal asset value minus the initial asset value multiplied by the capital gains tax rate. In 2004, a capital gains tax rate of 20% was charged on the 1974-2004 change in nominal value for land and stocks.

Because estate taxes are undergoing changes (Herman and Silverman) and will vary across individuals, estate tax is not considered. Because Kansas local intangibles tax (Kansas Department of Revenue) varies by county and may not exist in other states, intangibles tax is not considered. Additional details associated with data sources, assumptions, and calculations are shown in table 1.

The initial analysis involves comparisons of the three alternatives – holding debt-free farm land or selling the land and investing the proceeds in either stocks or bonds.

However, rather than selecting the best alternative based on investment and retirement income criteria, the retiree may want to consider a portfolio of the three alternatives. In order to evaluate portfolios in a risk-return framework a Target MOTAD model was used. The model maximizes average annual income per acre over the time period modeled while minimizing the average of the annual negative deviations from the target annual income.

The target income is based on the 2003 state family living expenses for couples from the 2003 Kansas Farm Management Associations (Funk). First, the total family living expenses for 2003 were converted to an April 2005 price level using the consumer price index. Then 2002 Agricultural Census data were used to calculate the average number of non-irrigated cropland acres on non-irrigated farms in Kansas. Then the annual family living expenses was divided by the average number of non-irrigated cropland acres and multiplied by .5 based on the assumption that the retired couple might need to obtain half of their retirement income from their owned non-irrigated cropland. The resulting target income, \$56.47 per acre, was used for all time periods.

For each time period an optimal combination of farm land, stocks and government bonds or notes was sought. However, because there were only three alternatives modeled and one of the three was usually better than the other two, in most cases the optimal solution contained only one alternative. Therefore, in order to consider a range of portfolios, the following portfolios were modeled: (1) an equal amount invested in each of the three alternatives, (2) half invested in one of the alternatives and 25% invested in each of the other two, and (3) investment in only one of the three alternatives. These seven portfolios are compared in terms of average annual income and risk, measured as

the sum of the annual negative deviations from the target income.

## **Results**

Results for each of the time periods and the portfolios are presented below.

### *30-Year Period*

State average nominal cash rents and land prices have increased over the chosen 30-year period, while real prices have declined (table 1 and figure 1). In 1975 nominal after-income-tax cash rent per acre (cash rent minus property tax) was \$12.03 and increased to \$20.11 in 2004. On the other hand, after-income-tax real cash income per acre in 1975 was \$43.50 and in 2004 it was \$20.71, less than half of the 1975 real cash rent. The 30-year average (nominal and real, respectively) annual income was \$17.15 and \$29.06 while standard deviation was \$2.04 and \$7.09. The coefficient of variation was 11.91% and 27.17%. Nominal and real NPVs are \$129.41 and -\$106.96, respectively. Nominal and real income was below average income for farm land for 11 and 18 out of 30 years, respectively.

During the 30-year period 1975-2004, nominal land values and cash rents almost doubled. However, land values and cash rents did not keep up with inflation, and therefore, real values and rents decreased. The purchasing power of dollars used to measure retirement income is an important issue for retirees and it increases in importance as the length of the retirement period increases.

If the farm land was sold and the money invested in stocks, the 30-year average annual income (nominal and real, respectively) on a per acre basis was \$31.32 and

\$47.05, respectively (table 1). Nominal and real standard deviation was \$13.24 and \$5.78 while coefficient of variation was 42.29% and 12.28%, respectively. Nominal and real NPV was \$730.87 and \$1,705.18, respectively. Nominal and real income fell below average income for land for 5 and 0 out of 30 years, respectively.

Stocks had the highest average nominal and real annual income per acre: \$14.17 and \$17.99, respectively, higher than income for farm land. NPV for stocks was significantly higher than NPV for farm land. Standard deviation and coefficient of variation for stocks were larger than risk measures for land when nominal dollars were used, but smaller when real dollars were used.

Selling the farm land and investing in a 30-year U.S. Treasury bond resulted in a 30-year average annual nominal and real income per acre, of \$21.08 and \$37.03 with a standard deviation of \$0 and \$15.23, respectively (table 1). Coefficient of variation was 0% and 41.12%, respectively. Nominal and real NPV was \$108.04 and -\$156.57, respectively. Nominal and real bond income was below average income for farm land for 0 and 12 out of 30 years, respectively.

Nominal and real after-income-tax average annual income per acre for bonds was \$3.93 and \$7.97, respectively, more than the average annual income per acre for farm land. NPV for the bond was lower than NPV for farm land. Standard deviation for the 30-year bond was smaller than that of land with nominal dollars, but larger than that of land with real dollars. The bond and farm land were comparable, with farm land providing less annual income, but a larger terminal value. However, during the 1975-2004 time period, stocks were a better investment than farm land or a 30-year Treasury bond.



Table 2 shows how annual real rates of return for farm land compare with rates for stocks and bonds. Real rates of return were calculated by adding after-income-tax annual income to the annual change in value (calculated as current year value minus previous year value) and then dividing by current year value. Stocks yielded the highest annual nominal and real rate of return for 18 and 17, respectively, of 29 years. However, stocks had the lowest nominal and real annual rate of return for 9 out of 29 years. Farm land yielded the highest nominal and real annual rate of return for 6 and 7 out of 29 years and the lowest for 15 out of 29 years. The government bond yielded the highest and lowest nominal and real annual rate of return for 5 out of 29 years.

#### *15-year Time Periods*

Between 1975 and 2004 there are sixteen 15-year time periods (table 3). During 1975-2004, the 15-year average annual nominal nonirrigated cropland incomes increased and the 15-year average real incomes decreased (table 3 and figure 2, panels A and B). For stocks, the 15-year average nominal and real income increased through the 1982-1996 time period and then decreased in most of the remaining 15-year time periods. Because a 15-year U.S. Treasury security was not available during all time periods, investments in three 5-year U.S. Treasury notes purchased every five years and held to maturity were used to measure investments in U.S. treasury securities during the 15-year time periods. For 5-year notes, the 15-year average nominal income increased through the 1981-1995 time period and then declined until there was an increase in 1984-1998 and small increases during the last three time periods. Average real incomes for the notes had a pattern similar to the pattern for nominal income, except that real income peaked in the

1980-1994 time period and then decreased, except for increases in 1984-1998 and 1988-2002.

Based on the average of the 15-year average incomes, the three 5-year U.S. Treasury notes offered the highest average 15-year income, \$35.10 in nominal dollars and \$58.22 in real dollars. Stocks were second with \$27.88 in nominal dollars and \$44.27 in real dollars. Land had the lowest average 15-year income with \$17.32 in nominal dollars and \$27.88 in real dollars. Treasury notes had the largest nominal and real income in all of the 15-year time periods. Average 15-year incomes from stocks were larger than those of farm land until the last four 15-year time periods.

Using years when income was below the 15-year average for land as a “safety first” criterion, U.S. government notes were the safest investment (table 3). When nominal dollars were used, the annual income from notes did not fall below the average income for land (table 3). When real dollars were used, the average income from notes did not fall below the average income for land in 11 of the 15-year time periods. However, during the 1988-2002 time period, annual income from notes fell below the 15-year average income for land 8 times. Based on this safety first criterion, stocks, except for the 1977-1991 time period, were successful in keeping annual real income above the average for land for the first eleven 15-year time periods. However, during the last four 15-year time periods, the annual income from stocks was below the 15-year average income for land in most years.

Based on the NPV investment criterion, stocks were the best 15-year investment and land was the worst (figure 2, panels C and D). For stocks over the sixteen 15-year time periods, the average of the nominal and real NPVs were \$662 and \$1136,

respectively. The average nominal and real NPVs for land were both negative. For both real and nominal dollars, stocks had the largest NPV and farm land had the smallest NPV in all of the 15-year time periods.

Overall, for the 15-year time period stocks were the best investment and notes provided the best annual income. Stocks were the best investment because the dividends and increases in value over time resulted in stocks having considerably larger nominal and real NPVs than either notes or land. Notes were not as profitable an investment as stocks because the nominal value of the 5-year notes was constant and therefore the real value of the notes decreased over time because of inflation. However, notes might be the preferred retirement strategy because they provided the largest annual income over each 15-year time period and they had the fewest years with income below the 15-year average income for land.

#### *10-year Time Periods*

Between 1975 and 2004 there are twenty-one 10-year time periods (table 4). Results for the 10-year time periods were similar to those of the 15-year time periods. Ten-year Treasury notes had the largest average annual income in all of the 10-year time periods (table 4 and figure 3, panels A and B). Land had the lowest average of the 10-year average incomes. However, in the ten most recent 10-year time periods, land had a larger 10-year average income than stocks.

In the whole 10-year analysis, nominal income for Treasury notes did not fall below the average income for land (table 4). The annual real income for 10-year notes was below the average annual income for land only 1 year. Annual income for land was

below the average annual income for land 3 to 7 years of the 10-year time periods.

During the first eleven 10-year time periods, annual income for stocks was below the 10-year average for land only in the first three 10-year time-periods. However, in most of the most recent 10-year time periods the annual income for stocks was below the 10-year average annual income for land in all ten years.

NPV results indicate that for 10-year time periods during the time interval of 1976 to 2004, stocks were the best of the three investments and land the worst (figure 3, panels B and C). However, land was the best investment during the 1975-1984 time period.

#### *5-year Time Periods*

Between 1975 and 2004 there are twenty-six 5-year time periods (table 5). Results for the 5-year time periods were similar to results for the 10- and 15-year time periods in that Treasury notes provided the best 5-year average incomes (table 5 and figure 4, panels A and B). Stock provided better income than land in early time periods and land provided better income than stocks in later time periods. In several 5-year time periods, NPV favored farm land over stocks (figure 4, panels C and D). According to the NPV criterion, stocks were the best investment most of the time. According to the annual income and “safety first” criteria (table 5), 5-year notes were the best retirement strategy. The average of the 5-year average incomes for land was greater than the average for stocks.

#### **Portfolio Analysis**

The Target MOTAD analysis with the 30-year time period indicated that the best retirement strategy is to sell the farm land and invest the proceeds in stocks (table 6).

Stocks had the highest average annual income (\$47.10) and the lowest risk (\$9.46).

Keeping the farm land had the lowest average annual income (\$29.06) and the largest risk (\$27.41). The second best strategy (income \$40.05 and risk \$16.42) was to keep 25% of the land and invest 50% in stocks and 25% in bonds. Keeping all of the land resulted in less income and more risk than selling some or all of the land. So the opportunity cost of holding land during the 30-year time period was large.

Because of the large number of 15-, 10-, and 5-year time periods, the portfolio analysis was limited to the best and worst time periods in each group for each of the three alternatives. Average income was the criterion used to determine best and worst.

The best 15-year time periods for land, stocks, and notes were 1975-1989, 1982-1996, and 1980-1994, respectively. The worst 15-year time period for land was the most recent, 1990-2004. For both stocks and notes, the worst 15-year time period was 1987-2001. For all of these time periods, the 100% notes portfolio had the largest annual average income, ranging from \$29.35 in 1987-2001 to \$89.12 in 1980-1994. For three out of five of these periods the 100% bonds portfolio also had the lowest risk and for a fourth one the 100% bonds portfolio was within \$0.02 of having the lowest risk. For three of the time periods 100% farm land had the lowest average annual income and highest risk. But for the 1987-2001 and 1990-2004 time periods 100% stocks had the lowest average annual income and highest risk. In the 1980-1994 and 1982-1996 time periods 100% stocks had relative high average annual incomes (\$65.62 and 72.74, respectively) and zero risk, indicating that annual income did not fall below the \$56.47 per acre target income during the 15-year periods. As was the case with the 30-year time period, opportunity costs in terms of lower average annual income and higher risk were

associated with holding farm land rather than selling it and investing in stocks or bonds. However, during two recent 15-year time periods modeled (1987-2001 and 1990-2004), although bonds were the most attractive investment, land had higher average annual income and lower risk than stocks.

The two time periods 1980-1994 and 1987-2001 were the only portfolio analyses for which more than one Target MOTAD solution resulted when the model was allowed to select the optimal combination of land, stocks, and notes. The results for the 1980-1994 time period were not very interesting because the solution that was most different from the 100% notes solution reported in table 7 had 98% notes and 2% stocks. The return-risk frontier associated with the 1982-1996 was more interesting. Solutions ranged from \$83.22 average annual income and \$3.80 risk with 100% notes to \$79.74 average annual income and \$0.00 risk with 35.8% stocks and 64.2% notes. Thus, in this case risk of annual income falling below the target income could be eliminated by diversification that also reduced average annual income by \$3.48.

The best 10-year time periods for land, stocks, and notes were 1975-1984, 1982-1991, and 1981-1990, respectively. The worst 10-year time period for notes was 1993-2002. For both stocks and land, the worst 10-year time period was the most recent, 1994-2004. For all of these time periods, the 100% notes portfolio had the largest annual average income, ranging from \$37.03 in 1993-2002 to \$157.61 in 1981-1990 and the lowest risk ranging from \$0.00 in both 1981-1990 and 1982-1991 to \$19.45 in 1993-2002. For three of the time periods 100% farm land had the lowest average annual income and highest risk. But for the 1993-2002 and 1995-2004 time periods 100% stocks had the lowest average annual income and highest risk. In the 1981-1990 and

1982-1991 time periods all of the portfolios had essentially zero risk except for 100% farm land that had risk of \$25.69 and 26.69, respectively. As was the case with the 30-year and 15-year time periods, opportunity costs in terms of lower average annual income and higher risk were associated with holding farm land rather than selling it and investing in stocks or notes. However, during the two most recent 10-year time periods modeled (1993-2002 and 1995-2004), although notes were the most attractive investment, land had higher average annual income and lower risk than stocks.

The best 5-year time periods for land, stock, and notes were 1975-1979, 1982-1986, and 1981-1985, respectively. The worst 10-year time period for notes was 1993-1997. For both stocks and land, the worst 10-year time period was the most recent, 2000-2004. For all of these time periods, the 100% notes portfolio had the largest annual average income, ranging from \$35.65 in 1993-1997 to \$183.54 in 1981-1985 and the lowest risk ranging from \$0.00 in both 1981-1985 and 1982-1986 to \$20.83 in 1993-1997. For two of the time periods 100% farm land had the lowest average annual income and highest risk. But for the 1993-1997 and 2000-2004 time periods 100% stocks had the lowest average annual income and highest risk. In the 1981-1990 and 1982-1991 time periods all of the portfolios had essentially zero risk except for 100% farm land that had risk of \$22.16 and 23.35, respectively. As was the case with the 30-year and 15-year time periods, opportunity costs in terms of lower average annual income and higher risk were associated with holding farm land rather than selling it and investing in stocks or notes. However, during the two most recent 10-year time periods modeled (1993-1997 and 2000-2004), although bonds were the most attractive investment, land had higher average annual income and lower risk than stocks.

## **Suggestions for Future Research**

This analysis assumed that the farm land was debt-free and could be rented for cash or sold. Options other than cash-renting or selling debt-free farm land are possible: One might examine the potential income if farm land were placed in a charitable trust fund. Additionally, farm land income potential could be compared with other real estate rental investments. Another alternative to this analysis would be to determine retirement income potential if purchased farm land were financed by debt.

To achieve a more accurate case-by-case analysis, less aggregated stocks and alternative bonds data could be used. Farm land may be much more competitive if it is compared to individual stocks or alternative bonds. Another option could be to consider various portfolios with different asset allocation mixes in order to obtain more of a variety in the analysis. Finally this study is based on data from the 30-year time period, 1975-2004. Analyses of other time periods and causes of variability in returns and values of investment over time is warranted.

## **Summary and Conclusion**

Above results based on the 1975-2004 time period indicate that the owner should have sold the farm land in 1975 and invested in stocks. Although land provided a larger annual income in the first 3 years and stocks provided a larger annual income in the first 9 years, a U.S. Treasury bond provided larger annual income in later years. Of the three investments, stocks was the only one that increased in real value over the 30-year period. Increases in the value of stocks contributed to stocks having a much larger net present



value than farm land or Treasury securities.

Short time periods tended to favor Treasury securities as a retirement strategy and stocks as an investment. All 16 of the 15-year time periods between 1975 and 2004 showed the largest average annual returns for Treasury notes and the largest net present values for stocks. All 21 of the 10-year time periods showed the largest average annual returns for the 10-year Treasury note and all but one of the 10-year periods showed the largest net present values for stocks. All 26 of the 5-year time periods showed the largest average annual returns for Treasury notes. However, the investment that showed the largest net present value varied over the 5-year time periods.

A portfolio analysis of the 3 investments over a 30-year time period favored stocks. Portfolio analyses over 15-year time periods favored Treasury securities. Portfolio analyses over 10- and 5-year time periods were more variable; but in all situations modeled either stocks or Treasury securities (or both) were favored over farm land.

In conclusion, farmers or other owners of debt-free farm land who are planning for retirement should consider sale of the land and purchase of off-farm investments such as stocks or U.S. Treasury securities. Their goals such as stable annual income, wealth maximization and other preferences will influence their investment decisions.

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**Table 1. Asset Values and Annual Income per Acre if Land Was Retained or Sold to Purchase Stocks or a Bond, 1975-2004<sup>a</sup>**

Year	Nonirrigated Kansas Crop Land <sup>b</sup>				Stocks <sup>g</sup>				30-Year U.S. Treasury-Bond					
	Value of Land		Income per Acre <sup>cd</sup>		Value of Stock		Income per Acre <sup>h</sup>		Value of Bond		Income per Acre <sup>ijk</sup>			
	Nominal	Real <sup>e</sup>	Nominal	Real <sup>e</sup>	Nominal <sup>f</sup>	Real <sup>e</sup>	Nominal <sup>f</sup>	Real <sup>e</sup>	Nominal <sup>f</sup>	Real <sup>e</sup>	Nominal <sup>f</sup>	Real <sup>e</sup>		
1975	\$333.00	\$1,204.49	\$12.03	\$43.50	\$309.69	\$1,120.18	\$10.68	\$38.62	\$309.69	\$1,120.18	\$21.08	\$75.22		
1976	385.00	1,316.71	13.49	46.15	366.66	1,253.99	11.06	37.82	309.69	1,059.15	21.08	71.35		
1977	451.00	1,448.26	13.26	42.57	352.97	1,133.45	13.05	41.89	309.69	994.48	21.08	66.81		
1978	473.00	1,411.75	13.54	40.40	345.13	1,030.10	14.58	43.51	309.69	924.32	21.08	61.75		
1979	568.00	1,522.49	14.70	39.39	370.25	992.45	16.20	43.43	309.69	830.11	21.08	55.11		
1980	669.00	1,579.94	15.95	37.67	426.94	1,008.28	17.97	42.43	309.69	731.38	21.08	48.56		
1981	702.00	1,502.85	16.49	35.31	460.26	985.33	19.15	40.99	309.69	662.99	21.08	44.46		
1982	726.00	1,464.04	17.79	35.87	430.28	867.70	20.00	40.33	309.69	624.51	21.08	42.16		
1983	688.00	1,344.22	17.92	35.02	576.57	1,126.51	20.30	39.65	309.69	605.08	21.08	40.86		
1984	673.00	1,260.50	18.04	33.78	576.75	1,080.23	21.41	40.10	309.69	580.04	21.08	39.25		
1985	544.00	983.85	17.48	31.62	671.57	1,214.57	22.83	41.30	309.69	560.09	21.08	37.82		
1986	460.00	816.75	16.52	29.34	849.49	1,508.31	23.72	42.11	309.69	549.87	21.08	37.29		
1987	415.00	710.91	15.67	26.84	1,030.97	1,766.08	25.40	43.52	309.69	530.51	21.08	35.84		
1988	462.00	759.98	16.70	27.47	955.34	1,571.51	27.82	45.76	309.69	509.43	21.08	34.40		
1989	473.00	742.30	16.42	25.76	1,160.40	1,821.08	32.03	50.26	309.69	486.01	21.08	32.79		
1990	501.00	745.94	18.06	26.88	1,202.64	1,790.61	34.73	51.71	309.69	461.10	21.08	31.12		
1991	500.00	714.39	17.70	25.29	1,352.13	1,931.89	35.05	50.07	309.69	442.48	21.08	29.95		
1992	513.00	711.55	17.29	23.99	1,494.32	2,072.66	35.74	49.58	309.69	429.55	21.08	29.08		
1993	516.00	694.90	17.82	24.00	1,622.53	2,185.08	36.09	48.60	309.69	417.06	21.08	28.27		
1994	549.00	720.89	17.58	23.09	1,654.91	2,173.05	37.33	49.02	309.69	406.65	21.08	27.56		
1995	595.00	759.76	19.16	24.46	1,947.14	2,486.30	39.88	50.92	309.69	395.44	21.08	26.81		
1996	607.00	752.85	17.43	21.62	2,410.02	2,989.10	42.22	52.37	309.69	384.10	21.08	26.02		
1997	615.00	745.66	18.49	22.41	3,139.42	3,806.43	44.45	53.90	309.69	375.49	21.08	25.51		
1998	620.00	740.20	19.07	22.76	3,901.68	4,658.08	46.51	55.52	309.69	369.73	21.08	25.10		
1999	625.00	730.04	18.75	21.90	4,770.90	5,572.73	47.71	55.73	309.69	361.74	21.08	24.53		
2000	630.00	711.95	19.03	21.51	5,129.94	5,797.25	47.20	53.33	309.69	349.97	21.08	23.68		
2001	635.00	697.75	19.31	21.22	4,292.31	4,716.45	45.33	49.81	309.69	340.29	21.08	23.13		
2002	640.00	692.30	19.30	20.87	3,572.58	3,864.50	46.01	49.77	309.69	335.00	21.08	22.74		
2003	645.00	682.16	19.28	20.39	3,469.38	3,669.25	49.13	51.96	309.69	327.53	21.08	22.29		
2004	665.00	685.07	20.11	20.71	4,063.96	4,186.59	55.92	57.61	309.69	319.03	21.08	21.59		
Average Income per Acre			\$17.15	\$29.06				\$31.32	\$47.05				\$21.08	\$37.03
Standard Deviation			\$2.04	\$7.90				\$13.24	\$5.78				\$0.00	\$15.23
Coefficient of Variation			11.91%	27.17%				42.29%	12.28%				0%	41.12%
Years Income was Below 30-Year Average for Land			11	18				5	0				0	12
NPV <sup>lm</sup>			\$129.41	-\$106.96				\$730.87	\$1,705.18				\$108.04	-\$156.57

Source of land data: Dhuyvetter, K.C. and T.L. Kastens. "Kansas Land Prices and Cash Rental Rates." Kansas State University Department of Agricultural Economics. MF-1100, October, 2004 and Kansas Agricultural Statistics Service. Internet site: <http://www.nass.usda.gov/ks/landval/landhist.htm> (Accessed February 2005). State nonirrigated price for 1975 was not available. The value for 1975 was estimated by dividing the price of all agricultural land in 1975 by the price of all agricultural land in 1976 (KAS) and multiplying this ratio by the 1976 nonirrigated price.

Source of stock data: Council of Economic Advisors, Joint Committee on the Economic Report. "Common Stock Prices and Yields." Federal Reserve Archival System for Economic Research (FRASER). St. Louis, MO. Internet site: <http://fraser.stlouisfed.org/publications/ei/page/43> (Accessed June 2005).

Source of bond data: The Federal Reserve Board. "H.15 - Selected Interest Rates: Historical Data." Federal Reserve Statistical Release. Washington, DC. Internet site: <http://www.federalreserve.gov/releases/h15/data.htm> (Accessed June 2005).

<sup>a</sup> Income is after income taxes. Estate taxes and local intangibles taxes are not considered.

<sup>b</sup> The historical nominal value of land and cash rent is the average for Kansas.

<sup>c</sup> Property tax rate of .6% of land value (Kastens) was subtracted from annual cash rent.

<sup>d</sup> Federal income tax of 35% and state income tax of 5% was deducted from annual cash rent minus property taxes.

<sup>e</sup> Nominal values were adjusted to real April 2005 dollars using the "CPI-All Urban Consumers" from the Bureau of Labor Statistics.

<sup>f</sup> Initial stock and bond investment is based on the assumption that a 7% sale cost was incurred when land was sold.

<sup>g</sup> Stock values and annual incomes (dividends) are based on the historical average annual value of the S&P 500 Index.

<sup>h</sup> For stocks the preferential federal income tax rate of 15% combined with a 5% state income tax rate was used.

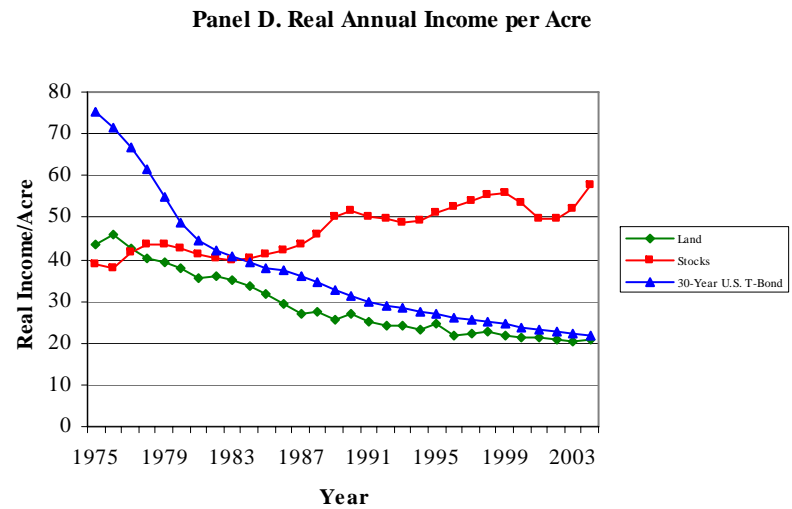
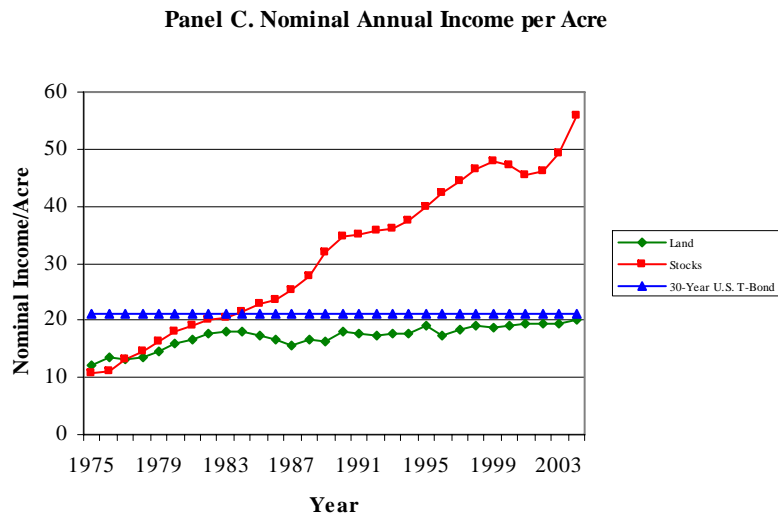
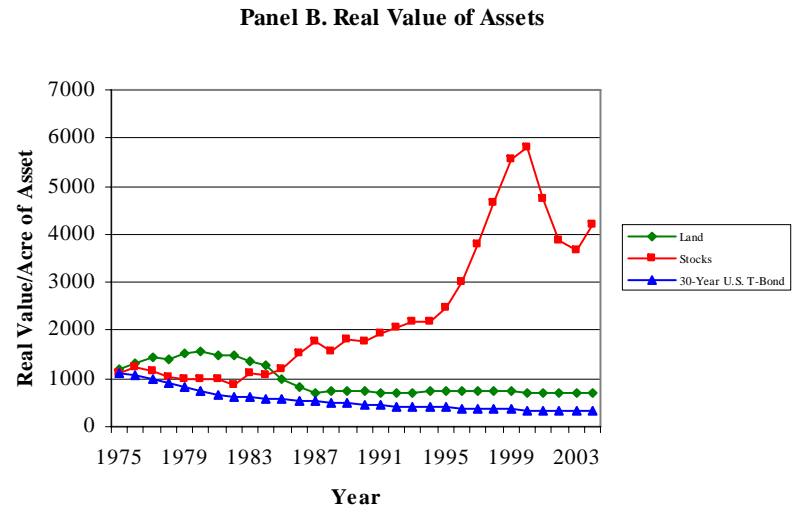
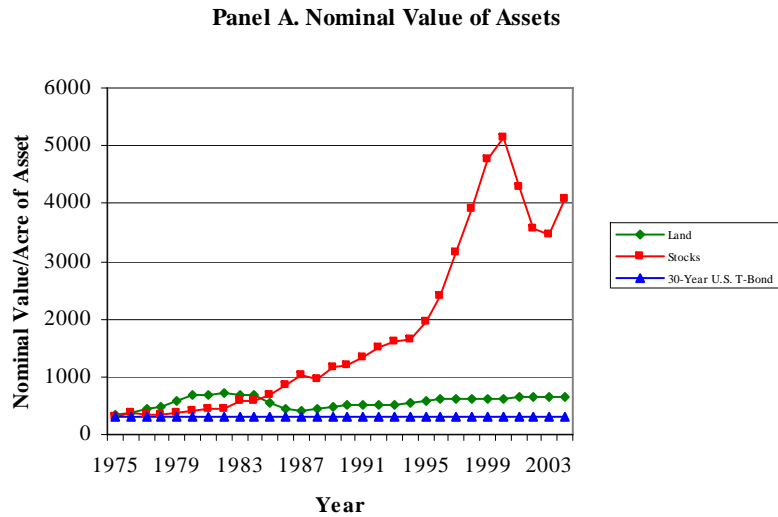
<sup>i</sup> Annual income per acre is based on the coupon rate for a 30-year Treasury bond purchased in 1975 and held to maturity in 2004.

<sup>j</sup> Annual income from U.S. Treasury Securities is exempt from state and local income taxes, so a 35% federal income tax rate was used.

<sup>k</sup> Annual income for bonds is the sum of the two semi-annual payments per year.

<sup>l</sup> A nominal before tax discount rate was based on the third quarter 2004 average fixed annual interest rate on long-term real estate farm loans from the Tenth Federal Reserve District (7.0%). This rate was adjusted for inflation using the 4.28% average inflation rate over the 30 year period. The discount rate was also adjusted for the different tax rates for the three investments.

<sup>m</sup> When calculating NPV for land and stocks, income was assumed to be received in the middle of the year. In 2004, a capital gains tax rate of 20% was charged on the change in nominal value from 1975-2004 for land and stocks. Because bond payments are received twice a year, the NPV was computed using semi-annual compounding June 31 and December 31. When calculating NPV, the value of the asset in 1975 is used as the initial cost of the asset.



**Figure 1. Value and annual income per acre of Kansas nonirrigated crop land, stocks, and a 30-year U.S. T-Bond, 1975-2004**

**Table 2. Annual Rates of Return for Kansas Nonirrigated Cropland, Stocks, and a 30-year T-Bond, After Taxes<sup>a</sup>**

Year	Nonirrigated Cropland		Stocks		30-Year U.S. T-Bond	
	Nominal	Real	Nominal	Real	Nominal	Real
1975	N/A	N/A	N/A	N/A	N/A	N/A
1976	17.01%	12.03%	18.55%	13.69%	6.81%	1.04%
1977	17.57%	12.02%	-0.18%	-6.94%	6.81%	0.30%
1978	7.51%	0.28%	1.95%	-5.81%	6.81%	-0.78%
1979	19.31%	9.86%	11.16%	0.58%	6.81%	-4.54%
1980	17.48%	6.02%	17.48%	5.78%	6.81%	-6.69%
1981	7.05%	-2.78%	11.40%	1.83%	6.81%	-3.51%
1982	5.76%	-0.20%	-2.32%	-8.91%	6.81%	0.65%
1983	-2.92%	-6.31%	28.89%	26.50%	6.81%	3.59%
1984	0.45%	-3.96%	3.74%	-0.57%	6.81%	2.49%
1985	-20.50%	-24.91%	17.52%	14.46%	6.81%	3.25%
1986	-14.67%	-16.87%	23.74%	22.27%	6.81%	4.95%
1987	-7.07%	-11.11%	20.07%	17.06%	6.81%	3.16%
1988	13.79%	10.07%	-5.00%	-9.47%	6.81%	2.67%
1989	5.80%	1.09%	20.43%	16.46%	6.81%	1.99%
1990	9.19%	4.09%	6.40%	1.19%	6.81%	1.40%
1991	3.34%	-0.88%	13.65%	9.91%	6.81%	2.60%
1992	5.91%	2.97%	11.91%	9.18%	6.81%	3.80%
1993	4.04%	1.06%	10.13%	7.37%	6.81%	3.81%
1994	9.21%	6.81%	4.21%	1.70%	6.81%	4.25%
1995	10.95%	8.34%	17.06%	14.65%	6.81%	3.97%
1996	4.85%	1.95%	20.96%	18.57%	6.81%	3.85%
1997	4.31%	2.04%	24.65%	22.89%	6.81%	4.51%
1998	3.88%	2.34%	20.73%	19.48%	6.81%	5.25%
1999	3.80%	1.61%	19.22%	17.41%	6.81%	4.60%
2000	3.81%	0.48%	7.92%	4.79%	6.81%	3.44%
2001	3.83%	1.01%	-18.46%	-21.86%	6.81%	3.96%
2002	3.80%	2.23%	-18.86%	-20.76%	6.81%	5.23%
2003	3.76%	1.50%	-1.56%	-3.91%	6.81%	4.53%
2004	6.03%	3.45%	16.01%	13.73%	6.81%	4.14%
Number of Years Investment had Highest Return						
	6	7	18	17	5	5
Number of Years Investment had Lowest Return						
	15	15	9	9	5	5

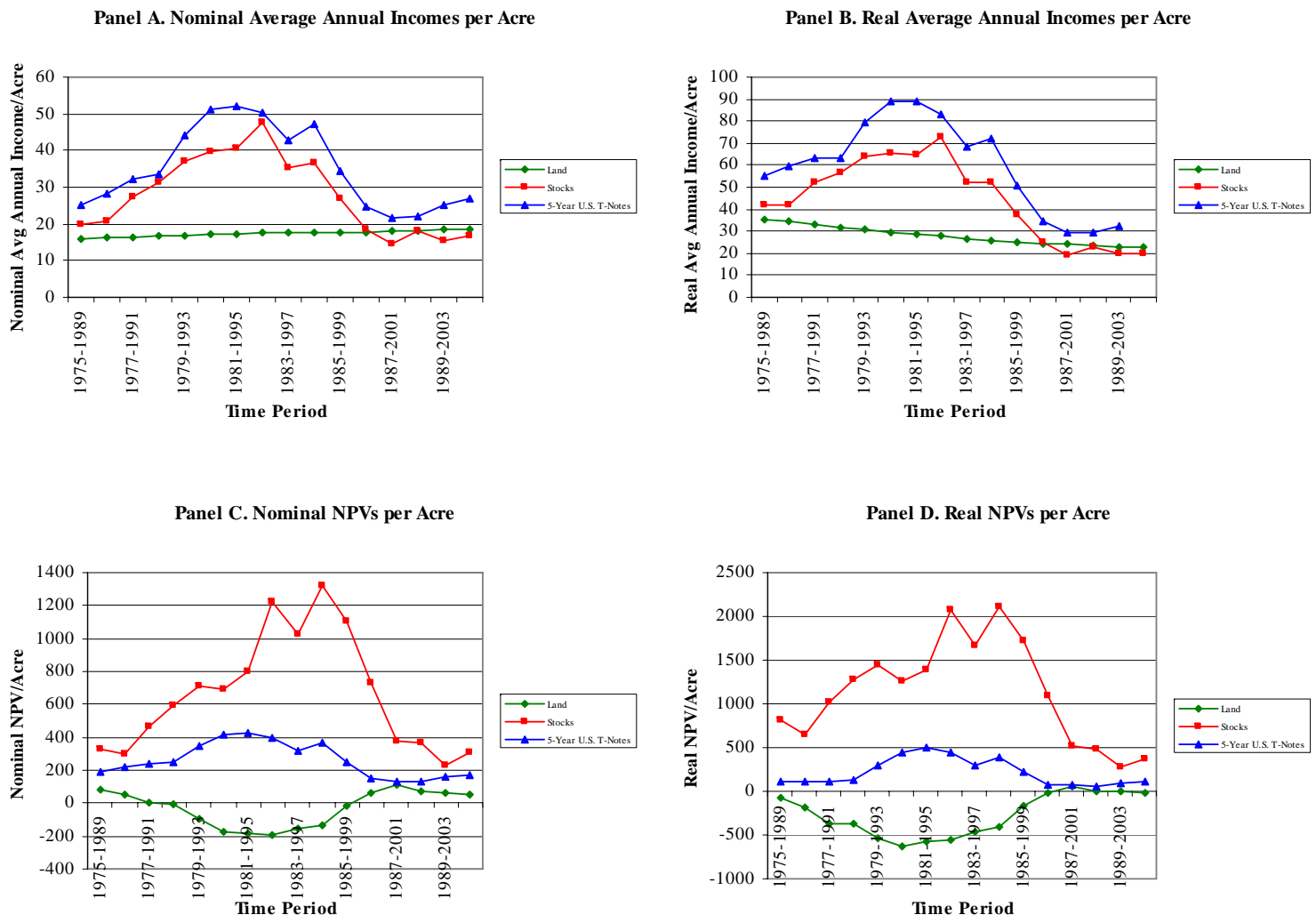
<sup>a</sup> Annual rate of return is calculated as after income tax annual income plus change in value of the investment (calculated as current year value minus previous year value) divided by current year value. See footnotes for Table 1 for details about data sources and calculations.



**Table 3. Income Statistics for 15-Year Time Periods for Kansas Farm Land, Stocks, and T-Notes**

Years	15-Year Average Incomes per Acre						Years Income was Below 15-Year Average for Land					
	Nonirrigated Crop Land		Stocks		5-Year U.S. T-Notes <sup>a</sup>		Nonirrigated Crop Land		Stocks		5-Year U.S. T-Notes <sup>a</sup>	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1975-1989	\$15.73	\$35.38	\$19.75	\$42.12	\$25.00	\$55.25	6	8	4	0	0	0
1976-1990	16.13	34.27	20.85	41.98	28.29	59.29	6	7	4	0	0	2
1977-1991	16.41	32.88	27.27	52.05	32.23	63.53	5	7	9	11	0	0
1978-1992	16.68	31.64	31.18	56.48	33.38	63.05	7	8	0	0	0	0
1979-1993	16.97	30.55	36.94	63.71	43.97	79.21	7	8	0	0	0	0
1980-1994	17.16	29.46	39.79	65.62	51.23	89.12	6	9	0	0	0	0
1981-1995	17.38	28.58	40.80	64.67	51.92	88.76	6	9	0	0	0	0
1982-1996	17.44	27.67	47.55	72.74	50.39	83.22	6	10	0	0	0	0
1983-1997	17.49	26.77	35.44	52.44	42.95	68.21	7	8	0	0	0	0
1984-1998	17.56	25.95	36.55	52.43	47.25	72.27	7	9	0	0	0	0
1985-1999	17.61	25.16	26.69	37.18	34.60	50.71	8	8	1	0	0	0
1986-2000	17.71	24.49	18.66	25.26	24.53	34.24	8	9	6	4	0	1
1987-2001	17.90	23.95	14.41	18.97	21.60	29.35	8	7	15	15	0	5
1988-2002	18.14	23.55	17.93	22.98	22.18	29.57	8	8	8	10	0	8
1989-2003	18.31	23.08	15.65	19.52	25.09	32.22	7	8	14	15	0	4
1990-2004	18.56	22.74	16.62	20.14	27.07	33.58	7	8	13	15	0	0
Average of 15-Year Periods	17.32	27.88	27.88	44.27	35.10	58.22	7	8	5	4	0	1

<sup>a</sup> Annual income per acre is based on the coupon rate for 5-year U.S. Treasury notes purchased every five years and held to maturity.

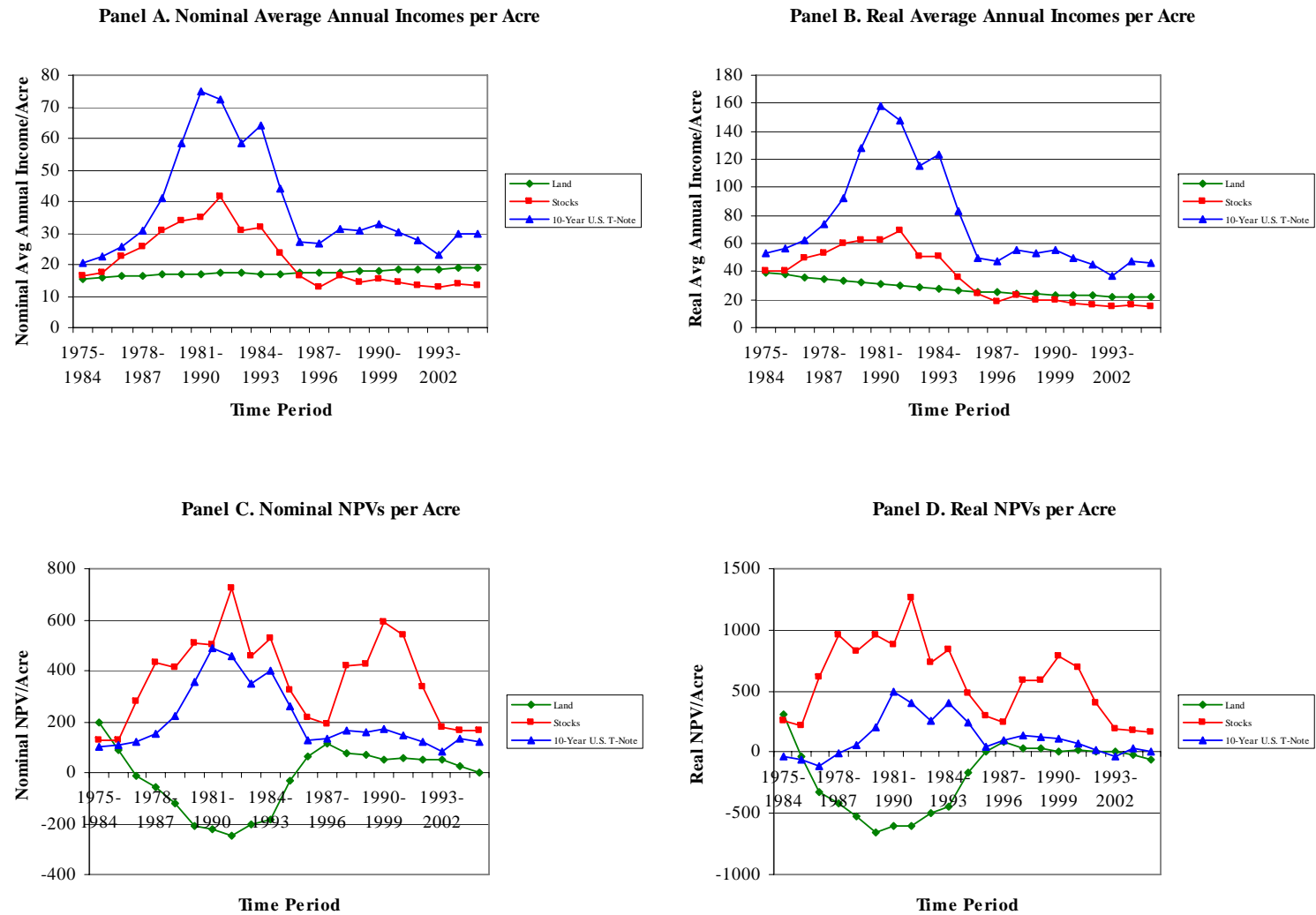


**Figure 2. Annual incomes per acre and net present values (NPVs) for Kansas nonirrigated crop land, stocks, and 5-year U.S. T-Notes over 15-year time periods**

**Table 4. Income Statistics for 10-Year Time Periods for Kansas Farm Land, Stocks, and T-Notes**

Years	10-Year Average Incomes per Acre						Years Income was Below 10-Year Average for Land					
	Nonirrigated Crop Land		Stocks		10-Year U.S. T-Note <sup>a</sup>		Nonirrigated Crop Land		Stocks		10-Year U.S. T-Note <sup>a</sup>	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1975-1984	\$15.32	\$38.97	\$16.44	\$40.88	\$20.41	\$52.83	5	5	4	2	0	1
1976-1985	15.87	37.78	17.24	40.18	22.48	56.13	4	6	4	1	0	0
1977-1986	16.17	36.10	22.48	49.40	25.68	61.90	4	6	1	0	0	0
1978-1987	16.41	34.52	25.69	53.20	30.52	73.45	4	4	0	0	0	0
1979-1988	16.73	33.23	30.64	59.87	41.10	92.43	6	4	0	0	0	0
1980-1989	16.90	31.87	33.61	62.15	58.67	127.58	6	5	0	0	0	0
1981-1990	17.11	30.79	35.09	61.81	74.97	157.61	5	5	0	0	0	0
1982-1991	17.23	29.79	41.31	69.80	72.47	147.50	4	6	0	0	0	0
1983-1992	17.18	28.60	30.96	50.39	58.59	115.57	4	6	0	0	0	0
1984-1993	17.17	27.50	31.99	50.25	64.34	123.29	4	7	0	0	0	0
1985-1994	17.12	26.43	23.41	35.55	44.33	82.74	4	5	0	0	0	0
1986-1995	17.29	25.71	16.51	24.25	27.07	49.37	4	5	4	9	0	0
1987-1996	17.38	24.94	12.96	18.41	26.71	47.65	4	5	10	10	0	0
1988-1997	17.66	24.50	16.43	22.59	31.37	54.83	5	6	7	10	0	0
1989-1998	17.90	24.03	14.56	19.41	30.81	52.84	6	6	10	10	0	0
1990-1999	18.14	23.64	15.49	20.05	32.87	55.35	6	5	9	10	0	0
1991-2000	18.23	23.10	14.17	17.85	30.15	49.84	5	6	10	10	0	0
1992-2001	18.39	22.70	13.49	16.56	27.59	44.77	4	5	10	10	0	0
1993-2002	18.59	22.39	12.80	15.35	23.24	37.03	4	5	10	10	0	0
1994-2003	18.74	22.02	13.75	16.11	29.86	46.74	3	6	10	10	0	0
1995-2004	18.99	21.79	13.20	15.09	29.99	46.12	3	6	10	10	0	0
Average of 10-Year Periods	17.75	25.61	21.23	32.23	41.44	77.43	4.44	5.56	5.63	6.19	0.00	0.00

<sup>a</sup> Annual income per acre is based on the coupon rate for a 10-year U.S. Treasury note purchased at the beginning of the period and held to maturity.

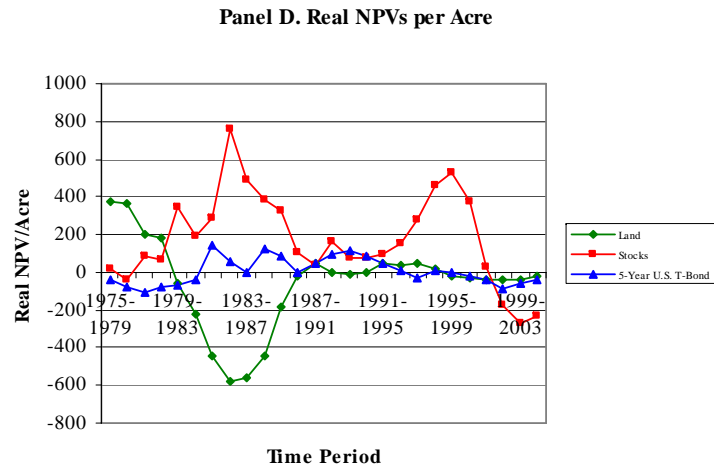
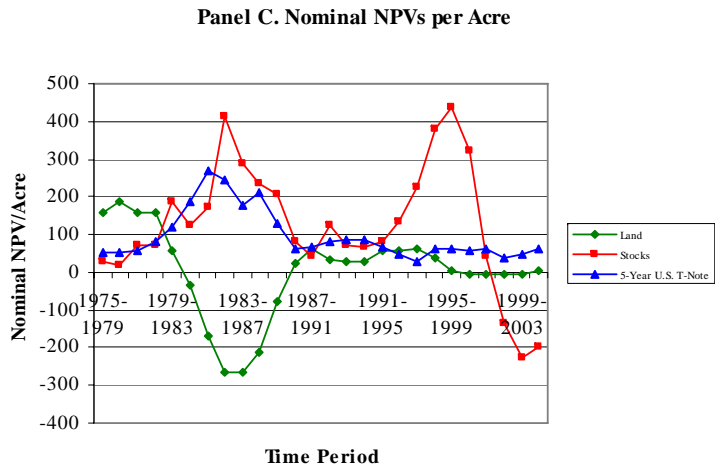
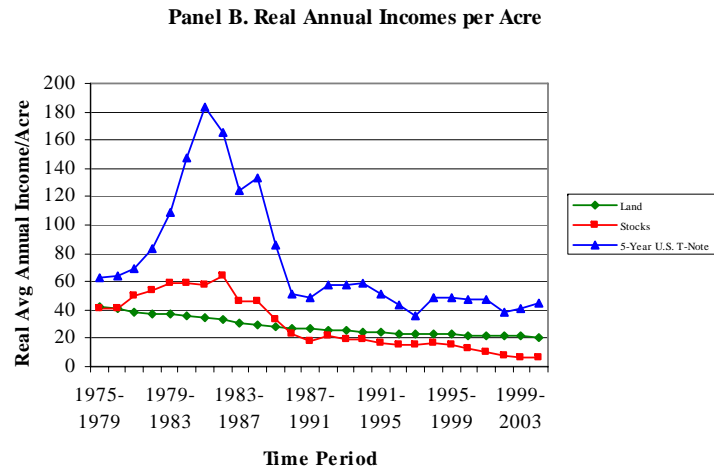
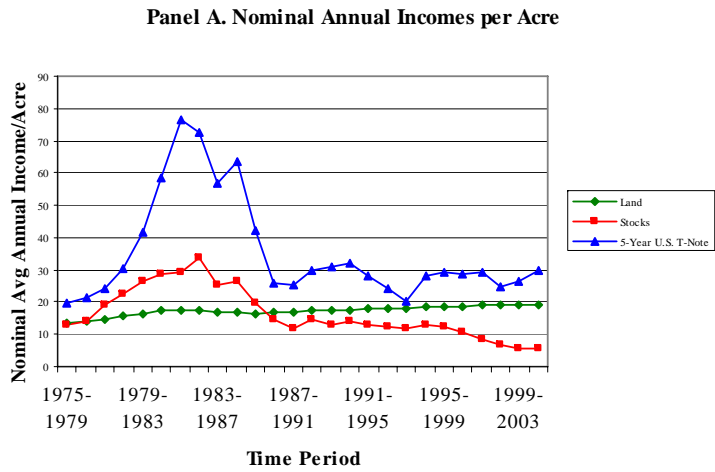


**Figure 3. Annual incomes per acre and net present values (NPVs) for Kansas nonirrigated crop land, stocks, and 10-year U.S. T-Notes over 10-year time periods**

**Table 5. Income Statistics for 5-Year Time Periods for Kansas Farm Land, Stocks, and T-Notes**

Years	5-Year Average Incomes per Acre						Years Income was Below 5-Year Average for Land					
	Nonirrigated Crop Land		Stocks		5-Year U.S. T-Note <sup>a</sup>		Nonirrigated Crop Land		Stocks		5-Year U.S. T-Note <sup>a</sup>	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1975-1979	\$13.40	\$42.40	\$13.11	\$41.06	\$19.88	\$62.28	2	2	3	3	0	0
1976-1980	14.19	41.24	14.23	40.83	21.21	63.75	3	3	2	2	0	0
1977-1981	14.79	39.07	19.24	50.44	24.19	69.67	3	2	0	0	0	0
1978-1982	15.69	37.73	22.40	53.71	30.19	83.12	2	3	0	0	0	0
1979-1983	16.57	36.65	26.71	59.02	41.44	108.81	3	3	0	0	0	0
1980-1984	17.24	35.53	28.80	59.31	58.77	147.25	2	3	0	0	0	0
1981-1985	17.54	34.32	29.41	57.41	76.75	183.54	2	2	0	0	0	0
1982-1986	17.55	33.12	33.97	63.86	72.47	165.85	2	2	0	0	0	0
1983-1987	17.13	31.32	25.23	45.87	56.96	124.92	2	2	0	0	0	0
1984-1988	16.88	29.81	26.30	46.18	63.31	133.68	3	3	0	0	0	0
1985-1989	16.56	28.20	19.86	33.59	42.24	86.28	3	3	0	0	0	0
1986-1990	16.67	27.26	14.47	23.50	25.76	51.23	3	3	4	5	0	0
1987-1991	16.91	26.45	11.61	18.07	25.28	49.07	3	2	5	5	0	0
1988-1992	17.23	25.88	14.87	22.25	30.06	57.23	2	3	5	5	0	0
1989-1993	17.46	25.19	13.16	18.97	30.85	57.77	2	2	5	5	0	0
1990-1994	17.69	24.65	13.87	19.29	32.17	59.32	2	3	5	5	0	0
1991-1995	17.91	24.17	12.66	17.07	28.27	51.26	4	3	5	5	0	0
1992-1996	17.86	23.43	12.21	15.99	24.36	43.42	4	2	5	5	0	0
1993-1997	18.10	23.12	11.83	15.07	20.35	35.65	3	3	5	5	0	0
1994-1998	18.35	22.87	12.98	16.15	28.18	48.49	2	3	5	5	0	0
1995-1999	18.58	22.63	12.55	15.26	29.13	49.23	2	3	5	5	0	0
1996-2000	18.55	22.04	10.69	12.69	28.78	47.76	2	3	5	5	0	0
1997-2001	18.93	21.96	8.42	9.78	29.35	47.74	2	3	5	5	0	0
1998-2002	19.09	21.65	6.88	7.81	24.50	39.00	3	3	5	5	0	0
1999-2003	19.13	21.18	5.74	6.35	26.61	41.44	2	2	5	5	0	0
2000-2004	19.41	20.94	5.56	6.00	29.78	45.39	4	3	5	5	0	0
Average of 5-Year Periods	18.03	23.85	11.71	16.12	28.48	50.64	2.69	2.75	4.63	4.69	0.00	0.00

<sup>a</sup> Annual income per acre is based on the coupon rate for a 5-year U.S. Treasury note purchased at the beginning of the period and held to maturity.



**Figure 4. Annual incomes per acre and net present values (NPVs) for Kansas nonirrigated crop land, stocks, and 5-year U.S. T-Notes over 5-year time periods**

**Table 6. Average Annual Income and Risk per Acre for Different Portfolios of Kansas Nonirrigated Crop Land, Stocks, and a 30-Year U.S. T-Bond for a 30-Year Time Period<sup>a</sup>**

Portfolio			1975-2004	
Land	Stocks	Treasury	Income	Risk
1/3	1/3	1/3	\$37.72	\$18.76
1/2	1/4	1/4	35.55	20.92
1/4	1/2	1/4	40.05	16.42
1/4	1/4	1/2	37.55	18.99
1	0	0	29.06	27.41
0	1	0	47.05	9.46
0	0	1	37.03	21.08

<sup>a</sup> Risk is the average amount that income for the portfolio was below the annual per acre target value (\$56.47). The target value is half the income needed per acre from owned nonirrigated crop land from an averaged sized nonirrigated farm in Kansas (NASS 2002 Census of Agriculture) to cover the average expenditures of a couple (Funk).

**Table 7. Average Annual Real Income and Risk per Acre for Different Portfolios of Kansas Nonirrigated Crop Land, Stocks, and U.S. Treasuries for 15-, 10-, and 5-Year Time Periods**

Portfolio			15-Year Periods <sup>a</sup>									
			1975-1989 BL		1980-1994 BN		1982-1996 BS		1987-2001 WS WN		1990-2004 WL	
Land	Stocks	Treasury	Income	Risk	Income	Risk	Income	Risk	Income	Risk	Income	Risk
1/3	1/3	1/3	\$44.25	\$12.23	\$61.40	\$1.41	\$61.21	\$2.54	\$24.09	\$32.39	\$25.49	\$30.99
1/2	1/4	1/4	42.03	14.44	53.42	5.10	52.82	6.98	24.05	32.42	24.80	31.67
1/4	1/2	1/4	43.71	12.76	62.46	0.11	64.09	0.12	22.81	33.67	24.15	32.32
1/4	1/4	1/2	47.00	9.48	68.33	0.86	66.71	2.81	25.40	31.07	27.51	28.96
1	0	0	35.38	21.10	29.46	27.01	27.67	28.81	23.95	32.53	22.74	33.73
0	1	0	42.12	14.36	65.62	0.00	72.74	0.00	18.97	37.50	20.14	36.33
0	0	1	55.25	4.69	89.12	0.02	83.22	3.80	29.35	27.13	33.58	22.90

Portfolio			10-Year Periods <sup>a</sup>									
			1975-1984 BL		1981-1990 BN		1982-1991 BS		1993-2002 WN		1995-2004 WL WS	
Land	Stocks	Treasury	Income	Risk	Income	Risk	Income	Risk	Income	Risk	Income	Risk
1/3	1/3	1/3	\$44.23	\$12.25	\$83.40	\$0.00	\$82.36	\$0.00	\$24.92	\$31.55	\$27.67	\$28.81
1/2	1/4	1/4	42.91	13.56	70.25	0.00	69.22	0.00	24.29	32.19	26.20	30.28
1/4	1/2	1/4	43.39	13.09	78.00	0.00	79.22	0.00	22.53	33.95	24.52	31.95
1/4	1/4	1/2	46.38	10.14	101.95	0.00	98.65	0.00	27.95	28.53	32.28	24.20
1	0	0	38.97	17.51	30.79	25.69	29.79	26.69	22.39	34.09	21.79	34.69
0	1	0	40.88	15.60	61.81	0.02	69.80	0.00	15.35	41.13	15.09	41.39
0	0	1	52.83	7.70	157.61	0.00	147.50	0.00	37.03	19.45	46.12	10.35

Portfolio			5-Year Periods <sup>a</sup>									
			1975-1979 BL		1981-1985 BN		1982-1986 BS		1993-1997 WN		2000-2004 WL WS	
Land	Stocks	Treasury	Income	Risk	Income	Risk	Income	Risk	Income	Risk	Income	Risk
1/3	1/3	1/3	\$48.58	\$7.89	\$91.76	\$0.00	\$87.61	\$0.00	\$24.61	\$31.86	\$24.11	\$32.37
1/2	1/4	1/4	47.04	9.44	77.40	0.00	73.99	0.00	24.24	32.24	23.32	33.16
1/4	1/2	1/4	46.70	9.78	83.17	0.00	81.67	0.00	22.23	34.25	19.58	36.89
1/4	1/4	1/2	52.01	4.47	114.70	0.00	107.17	0.00	27.37	29.10	29.43	27.04
1	0	0	42.40	14.07	34.32	22.16	33.12	23.35	23.12	33.36	20.94	35.53
0	1	0	41.06	15.42	57.41	0.05	63.86	0.00	15.07	41.40	6.00	50.48
0	0	1	62.28	0.90	183.54	0.00	165.85	0.00	35.65	20.83	45.39	11.08

<sup>a</sup> BL means Best Land of the time periods. Average real income per acre of each time period was used to identify "Best" and "Worst." BS means Best Stocks. BN means Best Notes. WL means Worst Land. WS means Worst Stocks. WN means Worst Notes.