RATES OF RETURN IN THE FARM AND NON-FARM SECTORS: A TIME SERIES COMPARISON

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August 21, 2001

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RATES OF RETURN IN THE FARM AND NON-FARM SECTORS: A TIME SERIES COMPARISON

Agricultural economists and policy makers debate whether U.S. farmers are at a continuous economic disadvantage relative to the non-farm sector (Tweeten, 1969; Hottel and Gardner, 1983). Perceived low rates of return on farm assets have long been considered a major farm problem and one justification for government commodity programs. Also, there is increasing interest in and policy concerns about agricultural investments by non-farm investors, especially in farm real estate. For example, trust firms and other investment companies are considering mechanisms for channeling outside equity capital into agriculture.

A number of agricultural finance papers have examined the relationship between rates of return on farm assets and rates of return on comparable-risk nonagricultural assts. One common hypothesis is that farmers accept lower returns on their farm investments than would be required by competitive investors in comparable-risk nonfarm assets because of nonfinancial (lifestyle) benefits of farming (Brewster, 1961). Another is the investors require higher expected returns on agricultural assets than they do on comparable-risk nonagricultural assets for two reasons. First, because owners of agricultural assets have poorly diversified portfolios, they require a return premium for the unsystematic risk which could in theory be eliminated by diversification. Second, agricultural assets are less easily traded than stock market assets (Barry, 1980) implying that investors will require a return premium for illiquidity. Therefore, it is important to evaluate agriculture's risk-return characteristics relative to those of other investments.

Ibbotson and Sinquefield examined historical nominal and real rates of return for seven major classes of assets in the United States: (1) large-company common stocks, (2) small-

capitalization common stocks, (3) long-term U.S. government bond, (4) long-term corporate bonds, (5) intermediate-term U.S. government bonds, (6) U.S. Treasury bills, and (7) consumer goods (a measure of inflation). For each asset, they calculated total rates of return before taxes or transaction costs. Table 1 gives a summary of the rates of return, risk premiums, and standard deviations for the basic and derived series. These historic returns on assets reflect the differences in risk characteristics of the sectors.

The U.S. Department of Agriculture's Economic Research Service develops, interprets, and disseminates farm sector accounts information. This includes estimating sector output, value-added, and income using concepts consistent with National Income and Product Account principles. For each of the income, asset and liability data series, the farm sector is considered as a single entity with no adjustment made for differences in ownership or business arrangements among farms and other entities that comprise the sector.

To compare rates of return in the farm and nonfarm sectors, both the numerators (income after taxes, plus capital gains) and the denominator (dollar value of assets or equity) of the rates of return ratios must be comparable. The purpose of this study is to develop consistent data series to compare the rates of return from current income and the total economic rates of return, including real capital gains, in the farm and non-farm sectors.

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Review of the Rate of Return Literature

Tweeten studied farm sector returns imputed from sector data and examined three theories advanced to explain low returns to agriculture: 1) the fixed resource theory, 2) increasing returns to farm size, and 3) imperfect competition. He concluded:

> Because the various theories explaining the persistence of low returns are highly interrelated, and for lack of empirical data, it is difficult to pinpoint the portion of

> the problem of low returns that can be imputed to each causal factor.…If there appear to be measured low resource returns, it is only because those who are measuring assign too high an opportunity cost to farm labor. (Tweeten, 1989, pp. 815-16)

Barry (1980) and others have examined the risk-rate of return performance of agriculture relative to other assets measured at current cost. Barry used data for the 1950-77 period and estimated beta values for the capital asset pricing model (CAPM). Beta values measure the tendency of farm real estate returns to respond to swings in the broad market. He found low beta (systematic risk) values for returns to farm real estate at the national and regional levels and thus concluded that investment in farm real estate contributes little systematic (undiversifiable) risk to a well-diversified portfolio. Besides the low-systematic risk, the positive alpha values he found imply that farm real estate has offered substantial premiums above those that would be predicted by an equilibrium model like the CAPM. Barry thus concluded that risk-adjusted returns in agriculture might have been high relative to their risk.

Turvey and Driver (1987) developed a CAPM model to examine systematic agricultural risks. They found that for many agricultural commodities and crop mixes the amount of systematic risk is high. Moreover, for a majority of commodities and crop mixes examined, farmers are being under-compensated for the level of systematic risk they are accepting. They suggest off-farm investment to reduce systematic risk within agriculture.

Irwin, Forster, and Sherrick (1988) extended Barry's results by explicitly accounting for the effects of uncertain inflation on portfolio performance, using a broadened market proxy, and lengthening the sample period to 1947-84. The results are sensitive to the sample period and thus lead to a modification of Barry's conclusions. Farm real estate (a) offers only slight (not substantial) premiums above those for systematic risk; (b) contributes little systematic risk to a

well-diversified portfolio; and (c) exhibits substantial risk from uncertain inflation. Irwin, Forester, and Sherrick's results (1988) for the longer sample period are not dominated by the boom in farm real estate returns during the 1970s, and thus are representative of the longer-run prospects for farm real estate returns.

Bjornson and Innes (1992) estimated both a CAPM and an arbitrage pricing theory (APT) asset pricing model to uncover both the systematic risk properties of returns to agricultural assets and the relationship between agricultural returns and returns on comparable-risk nonagricultural assets. The question they addressed is: Do mean returns on agricultural assets differ significantly form those on nonagricultural assets with the same systematic risk (i.e., the same beta)?

Bjornson and Innes distinguish between rates of return to farmers and rates of return to landlords. They concluded that (a) over the 1963-84 period and 1963-86 period, mean returns on farmer-held assets (i.e. to a farm operator's investment in his or her own business) have been significantly lower than those on investments in comparable risk nonagricultural assets, whether "comparable risk" is defined in the context of CAPM or APT. Also, the APT model indicates that risk-adjusted returns received by farm owner/operators have been significantly lower than those received by landlord-owners of farmland; (b) investments in farm real estate have earned significantly higher returns, on average, than investments in APT-comparable-risk nonagricultural assets. Farmland has not yielded significantly higher average returns than CAPM-comparable-risk (same beta) nonagricultural assets.

Farm asset returns and farmland returns have been subject to systematic risks as both have been sensitive to at least one factor that is priced in capital markets. But they found that farmland and farmer-held assets appear to exhibit quite different systematic risks. Farmland

returns are sensitive to the effects of unanticipated inflation, indicating that investment in farm real estate has provided a good hedge against inflation but has therefore required a lower expected return. However, farm assets have not been sensitive to this factor. Instead, they respond to a complex factor more closely related to changes in expected inflation.

Bjornson and Innes's results further support the view that farm real estate investments require a higher return than investments in comparable-risk nonagricultural assets, but they also support the view that farmer-held assets tend to earn lower returns than comparable-risk nonagricultural assets (Bjornson and Innes, 1992, p. 118).

Hopkins and Morehart (2000) compared rates of return in the farm and non-farm sectors. Their study offered two main policy conclusions: 1) the agricultural sector does not seem to be suffering from the *farm problem* as defined by low returns because most of the value added in agriculture occurs on farms that achieve profit levels similar to profits achieved by nonfarm businesses, and 2) variability in the distribution of returns is much greater for the nonfarm business sector than for the farm business sector.

There are several noteworthy studies of the rates of return in the nonfarm, nonfinancial corporate sector. Fisher (1984) discussed accounting and economic rates of return and notes that while the economic rate of return is the magnitude that properly relates a stream of profits to the investments that produce it, the accounting rate of return does not. By relating *current* profits to *current* capitalization, the accounting rate of return fatally scrambles up the timing. Kay and Mayer (1986) conclude that the principle difficulties in using accounting data are the result, not of fundamental deficiencies in accounting concepts, but in the practical application of these concepts. Fraumeni and Jorgenson (1980) estimated rates of return by industrial sector in the United States, 1948-76. They concluded that there are surprisingly large differences in rates of

return among sectors. Second, substantial differences have persisted over the period 1948-76. Third, "own rates of return" (capital gains) for the most recent subperiod, 1973-76, are about average by postwar standards, while rates of return for the period 1966-68 were exceptionally high, and rates of return for the period 1957-59 were exceptionally low. However, one must be cautious about inferring too much from a 3-year "window" on capital gains compared to longer periods. Poterba (1997) found that the pretax return on capital in the nonfinancial corporate sector has averaged 8.5 percent over the 1959-1996 period. He found the average pretax rate of return for the 1990-1996 period to be 8.6 percent, and the average after-tax return to be 5.0 percent.

This review of the literature suggests that there is considerable disagreement about the relative profitability of farm vs. nonfarm investments. Some (Tweeten; Irwin et al; Turvey and Driver; and Bjornson and Innes) conclude that mean returns on farm-held assets may have been significantly lower than those on comparable risk nonagricultural assets. Others (Barry; Morehart and Hopkins) conclude that the farm sector is not suffering from low returns. We now consider some of the reasons why these studies give differing results.

Why Do Rates of Return Estimates Differ?

Book Value vs. Current Cost and After-tax Returns

Before the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce published estimates of nonfarm nonfinancial assets at current cost (1991), accounting and total economic rates of return in the farm and non-farm sectors were incommensurable. First, farm sector asset and equity values were measured at current market value, whereas non-farm sector assets and equity were valued at original cost. Second, estimates of after-tax returns were not

comparable. This is primarily because of differences between BEA's and USDA's production-related measures of income. Further, the ERS and the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce use different methods to estimate depreciation expenses, and other expenses (see Table 2). Also, BEA's after-tax returns in the non-farm sectors are net of corporate income taxes paid, whereas USDA's after-tax returns in the farm sector are not.

Capital Gains/Losses and Rates of Return

ERS estimates both the rate of return from current income and the total economic rate of return, including real capital gains for the farm business sector, independent of who owns these assets. The rate of return on assets (ROA) from current income is the ratio of residual income to farm assets from current income to the average value of the beginning and end of year's farm assets. The rate of return on farm equity (ROE) is the ratio of residual income to farm assets excluding interest paid, to the average value of the beginning and end of year's farm equity. The total real economic (*ex ante*, expected) rate of return to assets (equity) is divided into two components: current income as a percentage of assets (equity) and unrealized real capital gains/losses as a percentage of assets (equity):

$$\text{Total ROA(ROE)} = \frac{\text{returns from current income + returns from capital gains}}{\text{average value of farm assets (equity)}}$$

Aukes (1987) criticized the practice of including returns from capital gains in total returns. He believed that combining the income share (an accounting concept) and the capital gains share (an economic concept) represents "double-counting" income because he views income both as a realization (the income share) and as an expectation (the capital gains share).

Melichar (1979) argued that since the price of farm assets reflects capital gains due to expected future income growth, those gains should be included in computations of the total returns to farm assets.

One problem with simply adding returns from real capital gains to returns from current income is that each year's capital gains are not necessarily realized since they are dependent upon expectations about future return, and these expectations may not be realized. Therefore, the absolute value of real capital gains is overstated, since ERS procedures consider neither the additional contingent liabilities nor the discounted present value of the capital gains (Ryan, 1987). Dunford has offered a counter argument. Although anticipated capital gains are not fully realized until the property is sold, equity investments due to land appreciation can be used to finance other investments – increasing the present value of anticipated (unrealized) capital gains (Dunford).

Farm Structural Characteristics

Farm structural characteristics provide a context helpful in understanding and explaining differences in the financial performance of the farm sector. Farm structure covers such factors as the number and size of farms; farm specialization and diversification; ownership and control of resources; and business arrangements, including contractual agreements (USDA-ERS, September 2000; Boehlje and Ray, 1999). Therefore, estimates of returns to farm assets vary depending upon the specific structural characteristics of the farms.

The U.S. Department of Agriculture's Economic Research Service (ERS) rates of return estimates vary greatly by the type of farm (specialization), by farm size, by ownership and tenure arrangements, and by the type of business arrangements that are involved in the farm business.

Furthermore, the changing structure of production agriculture affects the estimation of returns to farm assets due to the increased use of production contracts and a variety of other business arrangements. ERS sector-wide estimates of returns to farm assets are to measure the (average) income return to the owners of those farm business assets. If some of the assets and income earned are owned by others outside the sector (contractors for example), and these are included (incorrectly) in returns to farm business assets and/or in the value of farm business assets, then farm sector rates of return will be overstated.

The large number of farms with sales under $40,000 per year (nearly 75% of all farms) distorts the rate of return comparisons. If only farms with sales of $40,000 per year or more were included, the U.S. farm sector's rate of return would be over 60 percent higher (Ryan, 1989-90). Also, if farm assets were valued at original cost, rates of return from current income would be substantially higher and from real capital gains considerably lower (Ryan, 1987). Ryan (1996) used the USDA's 1994 Farm Cost and Returns Survey (FCRS) to estimate rates of return to capital provided farm operations by creditors, landlords, lessors, and operators. He found that rates of return on all managed assets might differ considerably from those calculated for owned assets.

Capital Structure and Rates of Return

Featherstone, Moss, Baker and Preckel (1988) showed that both risk-reducing and income-augmenting agricultural policies increase the optimal leverage ratio, the variance of the rate of return on equity, the expected return on equity, and the expected utility. Further, they showed theoretically that income-augmenting and risk-reducing farm policies might increase the

probability of farmers experiencing partial or total equity losses because of the increased leverage induced by those policies.

The rate of return on equity can be expressed as a weighted average of the return on assets (ROA) and the cost of debt (COD) where the weights are the proportional claims of assets (A) and debt (D) on total equity (E) (Weston and Brigham, 1993)

(1) $$ROE = ROA \times A/E - COD \times D/E.$$

Differences in rates of return between farm and non-farm investments are related to leverage decisions in the sectors. Table 3 shows how the farm sector's higher cost of debt (COD) and relatively smaller use of debt capital (D/E) affect relative rates of return in the farm and non-financial corporate sectors, and the significance of the capital gains component of returns. Decisions regarding capital structure and financing decisions only affect estimates of the rate of return on equity.

Risk Characteristics of Farm and Nonfarm Investments

How does one view and measure risk? What is the appropriate way to compare returns among these classes of assets with different expected returns and riskiness? How does one compare the risk-return tradeoff between farm and non-farm investments? The Capital Asset Pricing Model (CAPM) is built on the insight that the appropriate risk premium on an asset will be determined by its contribution to the risk of investors' overall portfolios. That is, how does the addition of that asset to the investor's portfolio, say farmland, contribute to the investor's overall portfolio risk?

The CAPM model states that an asset's risk consists of two components: market or *systematic* risk and firm-specific or *unsystematic* risk. Unsystematic risk can be reduced by

diversification. Market or systematic risk is caused by general movements in the overall market and is measured by *beta*. Beta is a measure of the asset's volatility relative to the market. Since an asset's beta determines how the asset affects the riskiness of a diversified portfolio, beta is the most relevant measure of risk. Investors must be compensated for bearing risk. The greater the riskiness of a stock, the higher its required return. However, compensation is only required for the undiversifiable systematic risk.

The expected return-beta relationship of the CAPM is a reward-risk relationship. For farm asset FA, the CAPM model implies an equilibrium asset pricing relationship of the form:

$$E(r_{FA}) = r_f + \mathrm{B}_{FA}[E(r_M) - r_f),$$

where E is the expected return on the portfolio with farm asset FA, r is the risk-free interest rate, B is the systematic risk, and $[E(r_M) - r_f]$ is the required risk premium on the asset.

However, there are several important considerations when considering the reward-risk relationships of farm and non-farm investments (Bjornson, 1994). First, is there a single risk standard? For example, Fame and French (1993) propose a three-factor model in which risk is determined by the sensitivity of a stock to 1) the market portfolio, 2) a portfolio that reflects the relative returns of small versus large firms, and 3) a portfolio that reflects the relative returns on firms with high versus low ratios of book value to market value. The results depend on which risk standard is chosen, and there are real measurement problems with all the measures of risk. For example, the beta's change over time, and the risk profiles and preferences of investors change over time. Third, given that farmland markets are "thin", CAPM's assumption of many investors, each with an endowment (wealth) that is small compared to the total endowment of all investors is questionable.

The Time Period: Short vs. Long-term Returns

Risk also depends on your investment horizon. As previously noted, land, as an investment needs a long-term planning horizon for it to be profitable and competitive with other alternatives. Returns on real estate are difficult to derive because of the thinness of the market and the lack of a national source of data for the transactions that allows one to accurately compute rates of return. This suggests that CAPM's assumption of many investors, each with an endowment (wealth) that is small compared to the total endowment of all investors is questionable. Goetzmann and Ibbotson gathered data on commercial and residential real estate and estimated returns on residential real estate (Goetzmann and Ibbotson, 1990). Table 4 summarizes estimated real estate returns compared to various stock, bonds, and inflation series.

The two commercial real estate series give strikingly different results. The CREFs had lower returns and low volatility, while the REIT index had higher returns (arithmetic mean) and risk (standard deviation). The REIT returns were higher than those of common stocks, but the risk measure for real estate was lower. The residential real estate series reflected lower returns and low risk. The longer-term results indicate that all the real estate series experienced lower returns than common stock, but they also had much lower risk.

The comparison of the total real economic rate of return on farm assets with the total rate of return on long-term government bonds is also noteworthy (Figure 1). From 1970 through 1979, total real rates of return were generally strongly positive, while real interest rates were low or negative. Consequently, these low or negative real interest rates provided investors an economic incentive to buy assets that inflated in value – like farmland. However, this situation abruptly changed form 1980 through 1986. Total real rates of return in the farm sector were negative due to large capital losses, while real interest rates averaged 4.1 percent. This is significantly higher than the historical average of less than 2 percent. Lins noted that if real

interest rates remained high, one would expect a continued softness of demand for assets like farmland, where a significant part of the total return is from capital gains. Investors could beat the overall rate of inflation by 4 to 6 percent while taking on very little risk (Lins, 1989, p. 35). In fact, real interest rates fell, ranging from 1.2 to 3.6 percent form 1987-89, while total real rates of return in the farm sector rose, ranging from 5 to 8 percent over the same period. Farmland investments became somewhat more attractive.

Estimating Rates of Return to Factors of Production

ERS estimates the income return to farm assets as a residual return, after the (imputed) returns to management and labor are subtracted from income to farm assets, labor and management. The use of residual returns is consistent with the Ricardian notion of residual returns to the most fixed factor of production. The assumption is then that farmland is the most fixed factor. However, while farmland may be the most fixed factor of production, it is not the only fixed factor of production. For example, most agricultural machinery and equipment has limited value outside the sector. The presence of multiple quasi-fixed factors implies that the rate of return to farmland may be understated by residual measurement. Furthermore, returns estimates vary greatly depending upon whether farm assets, or operators' labor and management, are considered the residual claimant to income (Hottel and Gardner).

Comparing Farm and Non-financial Rates of Return

Why Examine Returns from Current Income and from Capital Gains?

The profitability of investments can be described with various financial measures. For example, rate of return may be measured both excluding capital gains/losses, including capital

gains and losses. The rate of return on assets (ROA) is a widely used indicator of firm or sector profitability. The ROA reflects returns per dollar of owned and borrowed capital and is the ratio of residual income (including interest paid) to total assets. The total rate of return on assets equals the rate of return on real capital gains/losses. In periods of rapidly changing farm income and land values, such as the 1970s, measures which include capital gains may give better estimates of the farm sector's profitability than those that do not.

One reason for examining returns from both current income and from capital appreciation is that farm programs and macroeconomic policy changes affect both the short-term (current) return on farm assets and the wealth of farm asset holders. Changes in expectations about income growth or interest rates can cause large changes in asset values and in real capital gains. Also, capital has substituted for both land and labor. This has substantially raised the level of net returns attributable to capital.

Comparing Accounting Rates of Return

Erickson (1991) used newly published data from the U.S. Department of Commerce, Bureau of Economic Analysis and from the Federal Reserve's (Fed*) Flow of Funds of the U.S.* to estimate and compare rates of return in the farm and non-financial corporate sectors, 1970-1987. Since Erickson's 1991 study, the Bureau of Economics Analysis has published estimates of the rate of return on non-farm, non-financial assets (excluding capital gains/losses), from 1960-1998. Furthermore, the Board of Governors of the Federal Reserve System updated their Flow of Funds of the United States data series to 2000. This series contains data on net profits after taxes, net interest, and non-financial corporate assets, debt, and equity. Therefore, we compare the farm sector returns with the BEA's and the Fed's Flow of Funds estimates of non-farm rates

of return. The non-financial corporate sector was chosen for comparison since it is the largest non-farm sector in the BEA data series, accounting for some 70 percent of total nonfarm business product. These data allow meaningful comparison and evaluation of returns.

In 1991 Erickson estimated the returns to non-farm, non-financial assets from published data. In this paper we use BEA's estimates of the rates of return on non-farm, non-financial assets (BEA, 2000) 'as is' since they are consistent with the returns to assets concept used by BEA in developing its estimates of "farm national income" (see Table 2). BEA's rate of return is calculated as the ratio of "property income" to "produced assets". Property income is *pre-tax* profits of domestic nonfinancial corporations with inventory valuation and capital consumption adjustment plus net interest (BEA, 2000, table 3, p. 16).

We also use the Federal Reserve's (Fed) Flow of Funds of the United States data series (which include both estimates of non-farm, non-financial assets, debt, equity, after-tax profits, and net interest to estimate an alternative time-series estimate of rates of return to non-farm non-financial assets and equity. Rather than using the ratio of "property income" to "produced assets" as in the BEA series, we use the ratio of "*after-tax* profits" to "total Nonfarm Non-financial corporate business assets. This includes real estate, equipment, and inventories. We also include estimates by James M. Poterba of the National Bureau of Economic Research (November, 1997). Poterba used data released in January 1997 by the Bureau of Economic Analysis (BEA), whereas we used more recent data from the BEA published in the Fed's *Flow of Funds of the United States.*

Next, the USDA's after-tax return estimates were adjusted to conform to BEA's method of estimating after-tax returns in the farm and non-farm sectors. First, USDA's net farm income estimates were reconciled to BEA's net farm income definition (Figure 2 and Table 2). Second,

farm sector returns were adjusted to include business taxes (property and corporate income taxes) but exclude non-business taxes such as taxes paid by sole proprietorships, and personal income taxes.

From 1960-99 rates of return from current income in farming (adjusted to BEA's income accounting) were considerably lower than the BEA's *before-tax* estimate of the rates of return to "produced assets" in the non-financial corporate sector (Table 5 and Figure 3). However, when rates of return in the farm sector are compared to after-tax rates of return to all "non-financial corporate assets" using the Fed's *Flow of Funds* (after-tax) data, the nonfinancial corporate returns were similar in the 60s, somewhat higher in the farm sector from 1972-75, lower in the farm crisis years of 1980-86, and roughly comparable since then. Poterba's estimates of nonfinancial corporation (NFC) returns using 1997 BEA data suggest that the nonfarm sector returns generally exceeded those we estimated using more recent data (especially in the 80s and 90s. These differences may also reflect different estimation methods used.

Since the rate of return estimates in the farm sector are derived from BEA's "Farm net income", which is somewhat different from ERS's "net farm income", we also compare this with the USDA-ERS's estimates of net farm income (Figure 4 and Appendix 1 and *Survey of Current Business*, Table 8.24 – Relation of Net Farm Income in the National Income and Product Accounts (NIPA's) to Net Farm Income as Published by the U.S. Department of Agriculture (USDA). There are three principle reasons why BEA and ERS's estimates differ. First, BEA's estimates of the imputed rental value of farm housing are extrapolated from USDA's gross imputed rental value of farm buildings using the percent change in BEA farm residential housing valued at current-period replacement cost. Second, BEA's estimates of depreciation and other consumption of farm capital differ from ERS's. Third, BEA only counts as income the direct

government payments going to farm operators, and not those accruing to nonoperator landlords. But payments to nonoperator landlords (like those to farm operators) are viewed as a flow of funds that are part of the total returns to farm assets. Although some of these payments are made on a cost-share basis (e.g., Agricultural Market Transaction Act, or AMTA payments), others such as loan deficiency payments (LDP's) and Conservation Reserve Payments (CRP's) represent transfers of rent to landowners. Therefore, because they are capitalized into farmland values they can influence production decisions through the "wealth effect".

Comparing Total Farm vs. Non-financial Rates of Return

The total economic rates of return on farm assets include the real capital gains component (unrealized) of total returns. In periods of rapidly changing or increasing farm income and land values, such as the 1970's, measures which include capital gains yield better estimates of profitability than measures that do not.

We first estimated total returns to farm assets (Figure 5) and to non-farm assets (Figure 6). We used USDA-ERS's estimates of total returns to farm business assets, and estimates of returns from current income and from capital gains/losses derived from the data published by the Fed in its *Flow of Funds Accounts of the U.S.*

Including capital gains/losses dramatically affects the comparison of rates of return (Figure 7). For example, from 1960 through 1980, rates of return on assets from real capital gains in the non-financial corporate sector ranged from 6.1 to 14.2 percent. This pushed total real returns to 8.4 and 16.1 percent over that period. In the farm sector, rates of return from real capital gains ranged from –0.6 to 10.5 percent, and total real returns from 2.6 to 18.5 percent. Likewise, including capital gains/losses on equity also greatly affected the farm versus non-

financial corporate sector comparison. Total real rates of return in the farm sector were generally lower than those in the non-financial corporate sector, and showed considerably more variation.

From 1981 through 1986, including capital losses in farm sector rates of return on assets drove total real returns negative – from 1.1 in 1980 to a minimum of –15.6 percent in 1984 (Figure 3). Including the modest capital gains in non-financial corporate sector rates of return kept total real returns positive.

Concluding Comments

This study has used newly published income and balance sheet data to estimate rates of return experienced by those who have invested in agricultural and non-financial corporate sector assets. Rates of return on farm assets and on nonfinancial corporate financial assets were compared both excluding and including capital gains/losses, from 1960-1999. From 1960-1969 rates of return from current income in farming were similar to after-tax returns in the nonfinancial corporate sector. Poterba's estimates of returns in the nonfinancial corporate sector were somewhat higher than our estimates. Including capital gains/losses dramatically affects the comparison of rates of return. Total rates of return in the farm sector were generally lower than those in the non-financial corporate sector, and showed considerably more variability.
These results should not be surprising. The generally lower returns to farm assets is consistent with the hypothesis that investors may require higher expected returns on farm investments than they do on comparable-risk nonagricultural assets. Also, since farmland may be a "quasi-fixed" factor in the short-run, it may require a return premium for illiquidity.

Since we have estimated returns to all farm assets (land and other farm business assets) and have not differentiated between rates of return to farmers and to landlords (as Bjornson and Innes did) our results are not directly comparable to theirs. However, to the extent that the

nonfinancial corporate sector can be taken as a proxy for the overall market, and to the extent that the farm sector and nonfinancial sectors have similar betas (comparable risk-adjusted returns), our results appear to be consistent with their results that farm real estate investments require a higher return than investments in comparable-risk nonagricultural assets.

How do rates of return in the farm and non-farm nonfinancial corporate sectors compare? The full answer depends on (1) how returns are measured, (2) whether returns from capital gains/losses are included, (3) the structural characteristics of the farms, (4) the effect of capital structure and financing decisions on returns (only affects the return on equity) (5) the time period chosen for comparison, (6) how returns to factors of production are estimated, and (7) and how risk is viewed and measured.

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Table 1 – Historical nominal and real rates of return for major classes of assets in the U.S. (1926-1998)

Series	Arithmetic Mean of Annual Returns	Standard Deviation of Annual Returns
Large-company stocks	13.2 %	20.3 %
Small-capitalization stocks	17.4	33.8
Long-term corporate bonds	6.1	8.6
Long-term government bonds	5.7	9.2
U.S. Treasury bills	3.8	3.2
Consumer price index	3.2	4.5
Large-company stocks-inflation adjusted	9.9	20.4
Small-capitalization stocks-inflation adjusted	13.9	33.1
Long-term corporate bonds-inflation adjusted	3.1	9.9
Long-term government bonds-inflation adjusted	2.7	10.5
U.S. Treasury bills-inflation adjusted	0.8	4.1

Source: Copyright --- *Stocks, Bonds, Bills, and Inflation: 1999 Yearbook*, Ibbotson Associates, Chicago.

Table 2 – Reconciliation between U.S. Department of Commerce (BEA) Farm National Income and the U.S. Department of Agriculture (ERS) Farm Sector Accounts

The Bureau of Economic Analysis (BEA) in the Department of Commerce publishes "Farm national income" in the July issue of Survey of Current Business. BEA develops its sector measure by making adjustments to the USDA value-added account components. The largest adjustments relate to non-operator landlords (NOLL) which are included in the farm sector accounts by USDA but placed in the real estate sector by BEA. Other adjustments are made to achieve consistency in the farm sector accounts with inter-sector transactions carried in BEA's Government Sector, such as treatment of Commodity Credit Corporation loans, grazing fees of public land, Government payments to farmers, and business taxes paid by farmers.

Differences in BEA's and USDA's revision schedules are another source of discrepancies in the numbers published by these two agencies.

Farm Output

Crops

BEA cash receipts = USAD crop cash receipts
- \- USDA net CCC loans @ book value
- \+ USDA CCC loans forfeited @ book value
- \+ USDA forest product sales

BEA change in farm inventories = USDA value of change in inventory
- + USDA/BEA net CCC loans @ market value
- \- USDA CCC loans forfeited @ book value

Livestock

BEA cash receipts = USDA livestock cash receipts

BEA change in farm inventories = USDA value of change in inventory

Farm Housing

For 1988, BEA farm housing = USDA gross imputed rental value of farm building
For all other years, BEA = USDA for 1988, extrapolated using the percent change in BEA farm residential housing valued at current-period replacement cost.

Home Consumption

BEA farm products consumed on farms = USDA home consumption

Other farm income

BEA other farm income = USDA other farm related income
- - USDA or BEA patronage dividends received
- - USDA forest products sales (to crop receipts)
- - USDA insurance indemnity payments
- + USDA reserve storage payments

Intermediate Consumption (outlays for production expenses)

BEA intermediate goods and services (expenditures) =

1 USDA intermediate consumption outlays
2 + BEA imputed interest
3 - Department of the Interior Grazing fees on public lands
4 + USDA net rent to non-operator landlords (NOLL), excluding Government payments to NOLL
5 + USDA interest on real estate debt paid by NOLL
6 + USDA property taxes paid by NOLL
7 + USDA depreciation attributable to NOLL assets
8 - Insurance indemnity payments
9 - Motor vehicle licensing and registration fees

Note: Lines 1+2+3-8-9 equals BEA's nonrent component.
Lines 4+5+6+7 comprise BEA's rent component.

Net Government transactions

BEA neither adds Government payments nor subtracts business taxes to derive its measure of gross farm product.

BEA computes Gross Farm Product as:
Farm Output
less: intermediate goods and services purchased

BEA then computes Farm Net Income as:
Gross Farm Product
less: Consumption of fixed capital
Indirect business taxes and non-tax liabilities
Plus: Subsidies to operators (but excluding direct Government payments to nonoperator landlords).

Table 3. Farm Sector vs. Non-Farm Non-financial Corporate Sector: Rates of Return from Current Income, Cost of Debt, and Debt/Equity Ratios, selected years

Item	Rate of return on assets (percent)	Rate of Return on equity (percent)	Cost of debt (percent)	Debt/equity (ratio)
1950-59:				
Farm 1/	3.78	3.10	5.64	0.12
Non-farm (Fed) 2/	3.70	4.91	1.10	0.40
1960-69:				
Farm	3.31	2.58	5.80	0.18
Non-farm (Fed)	3.30	3.65	2.04	0.51
1970-79:				
Farm	4.45	4.60	7.77	0.20
Non-farm (Fed)	2.55	2.45	3.00	0.61
1980-89:				
Farm	1.61	2.27	10.17	0.25
Non-farm (Fed)	2.45	0.65	3.05	0.77
1990-99:				
Farm	2.29	1.99	8.41	0.19
Non-farm (Fed)	1.95	-2.55	2.52	1.00

1/ Uses rates of return to farm assets adjusted to BEA's income definition.
2/ *Flow of Funds Accounts of the United States*, Board of Governors of the Federal Reserve System.

Table 4 – Summary Statistics of Commercial and Residential Real Estate Series Compared to Stocks, Bonds, T-bills, and Inflation

Series	Date	Arithmetic Mean	Standard Deviation
Annual Returns 1969-1987			
CREF (Comm.) 1/	1969-87	10.9 %	2.6 %
REIT (Comm.)	1972-87	15.7	15.4
S&P (Stocks)	1969-87	10.5	18.2
LTG (Bonds)	1969-87	8.4	13.2
Tbill(Bills)	1969-87	7.6	1.4
CPI (Infl.)	1969-87	6.4	1.8
Annual Returns over the Long Term			
CPIHOME (Res.)	1947-86	8.2	5.2
USDA (Farm)	1947-87	9.9	8.2
S&P (Stocks)	1947-87	12.6	16.3
LTG (Bills)	1947-87	4.6	9.8
TBILL (Bills)	1947-87	4.7	3.3
CPI (Infl.)	1947-87	4.6	3.9

Source: William N. Goetzmann and Roger G. Ibbotson, "The Performance of Real Estate as an Asset Class," *Journal of Applied Corporate Finance* 3, no. 1 (Spring 1990): 65-76.
1/ CREF stands for Commercial Real Estate Finance.

Table 5 – Average Rates of Return on Assets from Current Income, Farm and Non-Farm Sectors, 1960-99 (selected time periods)

Time period	Farm Sector			Non-financial Corporate Sector	
	BEA-adjusted 1/ (After-tax)	ERS (After-tax)	BEA 2/ (Before-tax)	Fed 3/ (After-tax)	Poterba, NBER 4/ (After-tax)
			(percent)		
1960-69	4.0	2.9	11.1	3.3	4.4
1970-79	4.1	3.5	8.3	2.6	2.9
1980-89	2.9	2.9	7.4	1.6	3.8
1990-99	3.5	2.1	7.0	3.4	5.0 5/

1/ "BEA-adjusted" means that returns to farm assets have been reconciled to the profits after taxes definition uses to estimate rates of return to non-farm assets.
2/ *Survey of Current Business*, U.S. Department of Commerce (DOC), June 2000. Rates of return are estimated by the DOC's Bureau of Economic Analysis as returns to "produced assets."
3/ Rates of return were estimated using Fed Flow of Funds data and are estimated as the ratio of after-tax profits from dividends and undistributed profits to total nonfinancial corporate assets.
4/ James M. Poterba, National Burerau of Economic Research Working Paper 6263, November 1997.
5/ Estimates through 1996 only.

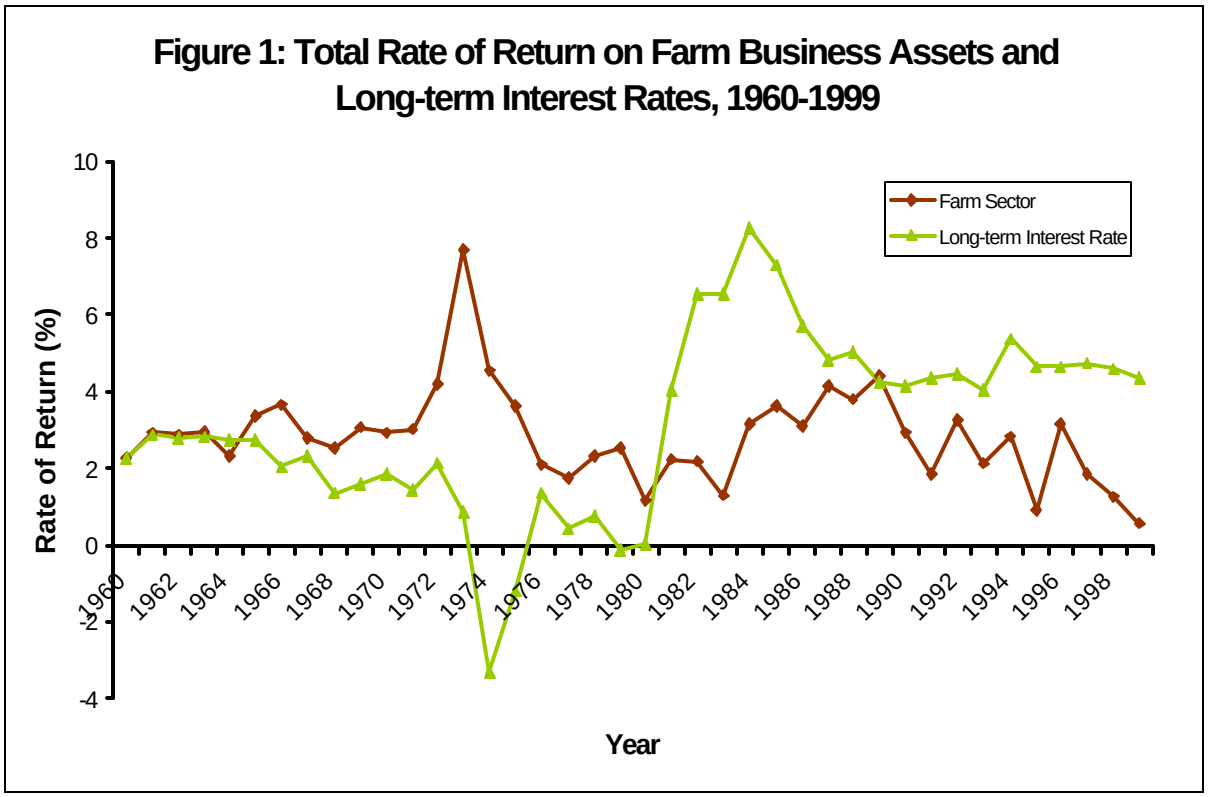
Figure 1: Total Rate of Return on Farm Business Assets and Long-term Interest Rates, 1960-1999
Rate of Return (%)
Year
Farm Sector
Long-term Interest Rate
10
8
6
4
2
0
-2
-4
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998

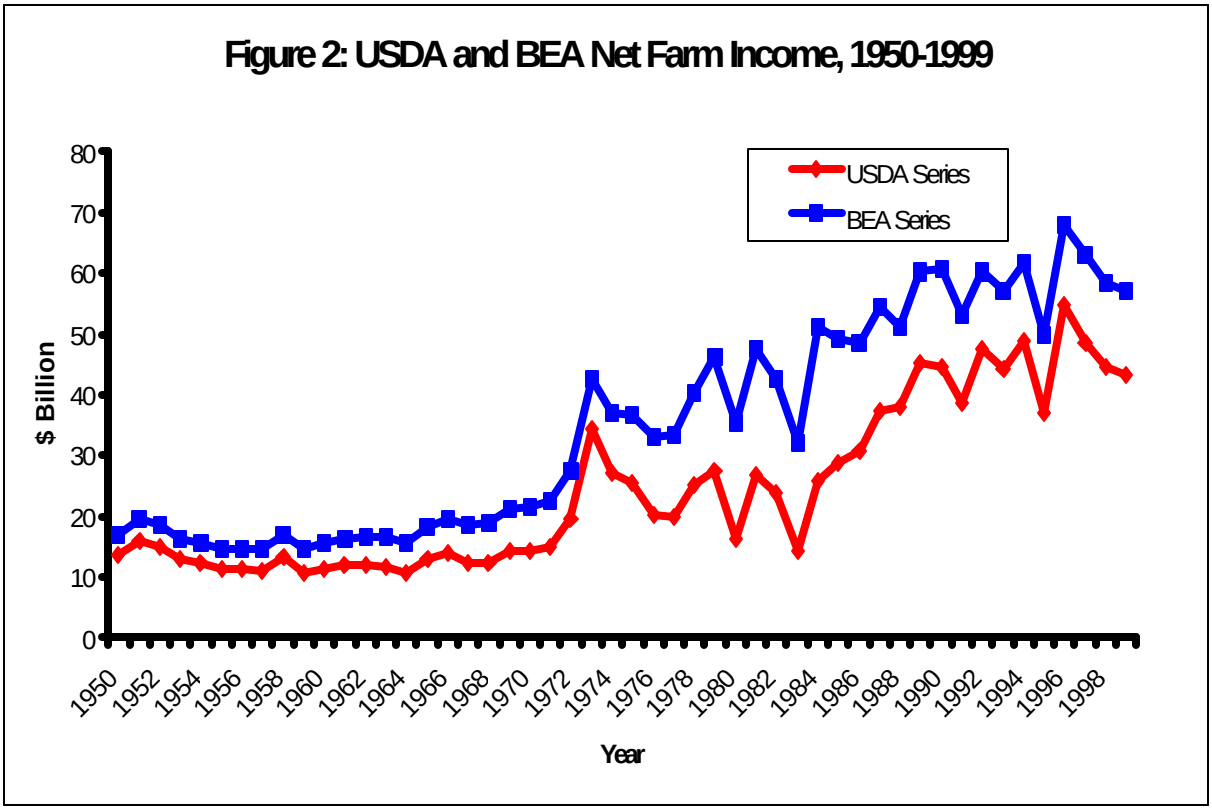
Figure 2: USDA and BEA Net Farm Income, 1950-1999
$ Billion
Year
USDA Series
BEA Series
80
70
60
50
40
30
20
10
0
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998

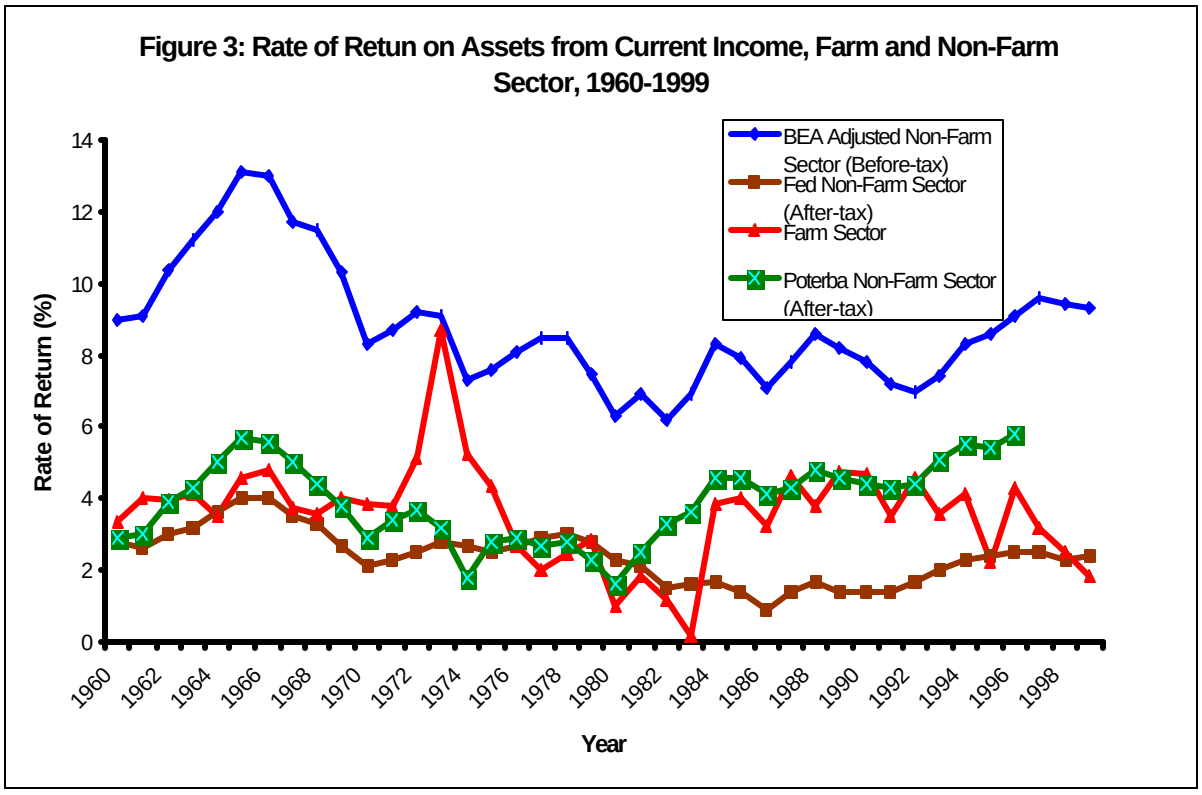
Figure 3: Rate of Retun on Assets from Current Income, Farm and Non-Farm Sector, 1960-1999
BEA Adjusted Non-Farm Sector (Before-tax)
Fed Non-Farm Sector (After-tax)
Farm Sector
Poterba Non-Farm Sector (After-tax)
Rate of Return (%)
Year

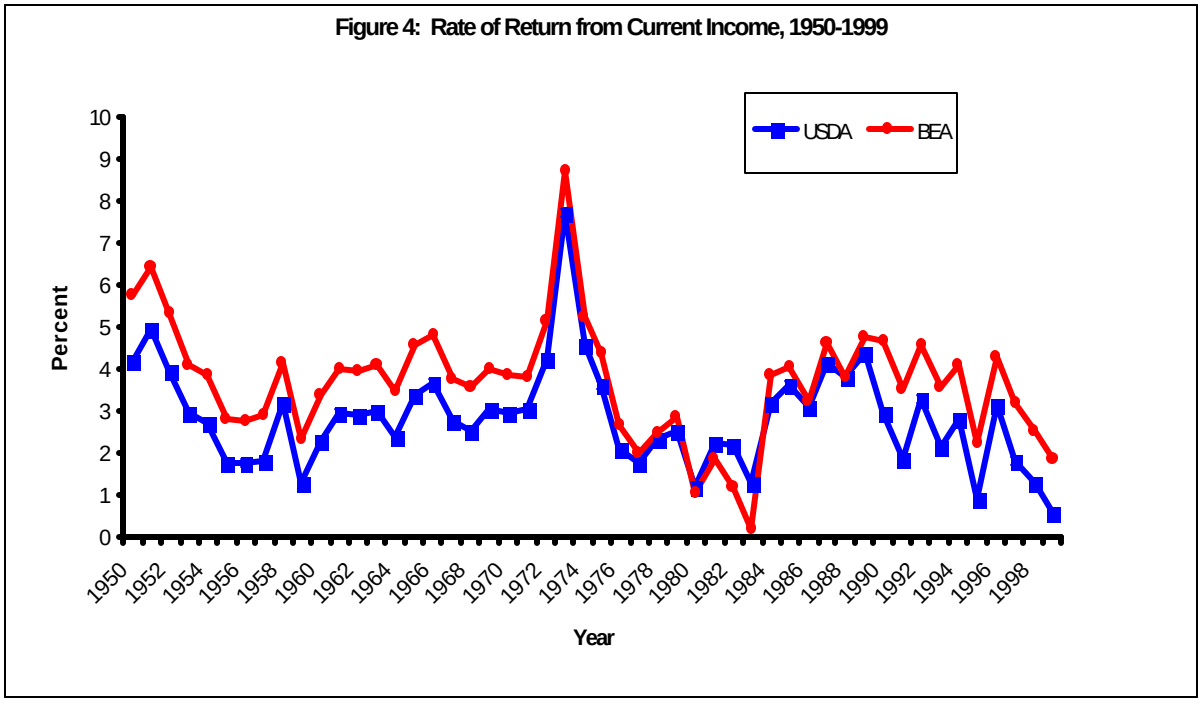
Figure 4: Rate of Return from Current Income, 1950-1999
USDA
BEA
Percent
Year

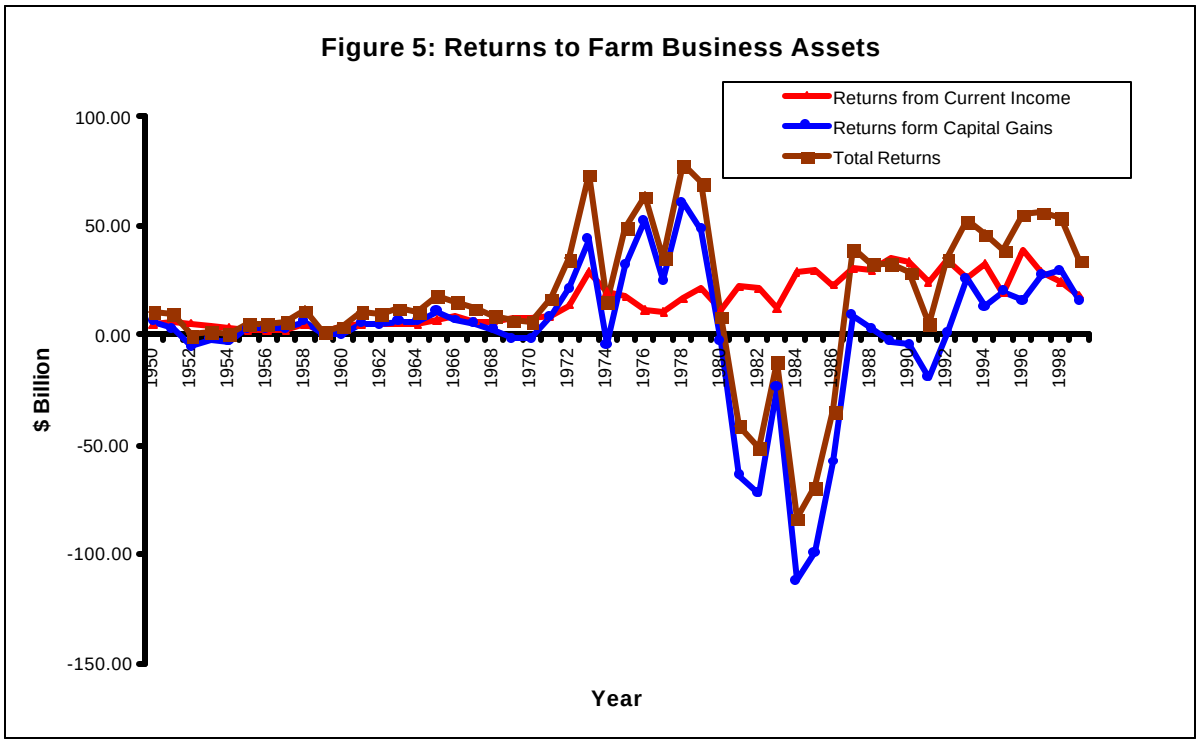
Figure 5: Returns to Farm Business Assets
Returns from Current Income
Returns form Capital Gains
Total Returns
100.00
50.00
0.00
-50.00
-100.00
-150.00
$ Billion
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
Year

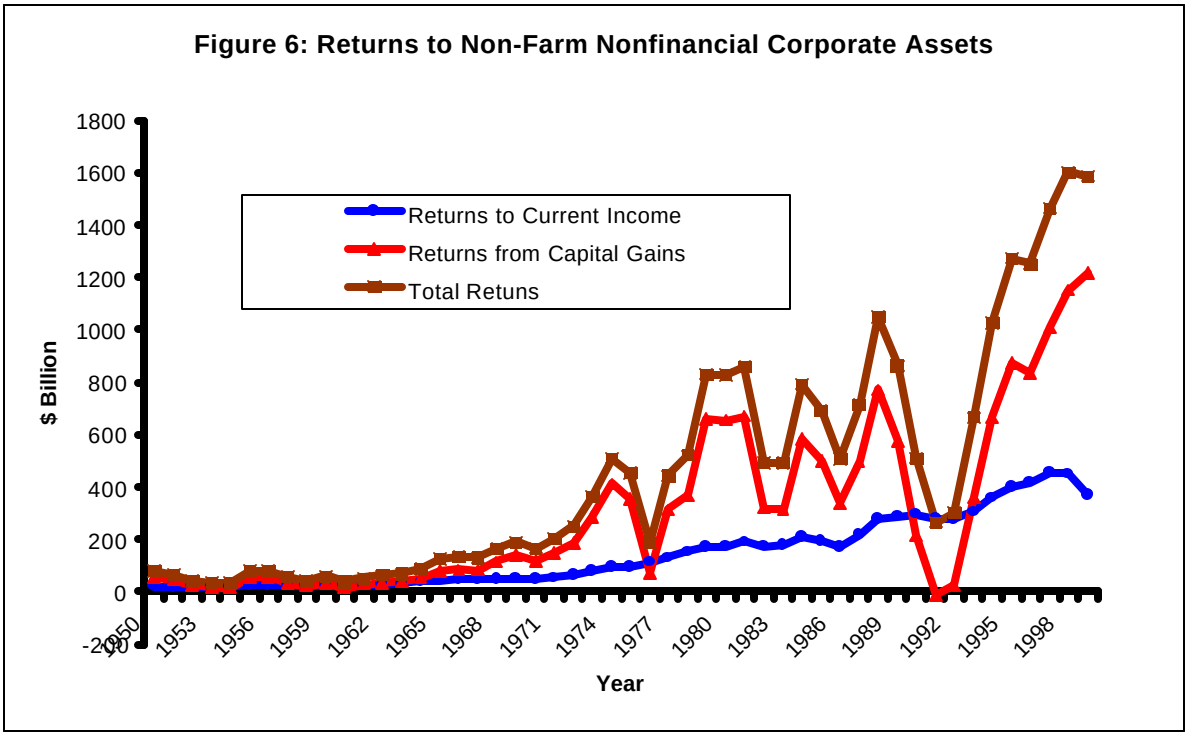
Figure 6: Returns to Non-Farm Nonfinancial Corporate Assets
Returns to Current Income
Returns from Capital Gains
Total Retuns
1800
1600
1400
1200
1000
800
600
400
200
0
-200
$ Billion
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
Year

Figure 7: Rate of Return to Assets Including Capital Gains/Losses: Non-Farm Non-Financial Corporate and Farm Business Sector, 1960-1999