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Rates of Return in the Farm and Nonfarm Sectors: How Do They Compare?

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This study examines the return on agricultural assets relative to nonfinancial corporate assets in the general economy using aggregate Bureau of Economic Analysis data. Our results indicate that the rate of return on nonfarm assets dominates the rate of return on agricultural assets. The average rate of return on nonfarm assets is higher than the average rate of return on farm assets, and the variance of the rate of return on nonfarm assets is lower than the variance of the rate of return on farm assets. Furthermore, the rate of return on agricultural assets only exceeds the rate of return in the nonfarm sector in 1992.

Key Words: Farm sector accounting, nonfarm income, nonfarm sector, rate of return, returns to farm assets

JEL Classifications: Q14, Q18

This study examines whether the rate of return on agricultural assets is comparable to the rate of return on assets in the nonfarm sector using newly released Bureau of Economic Analysis (BEA) aggregate sector rate of return measures. The empirical results show that nonfarm rates of return dominate rates of return on agricultural assets from 1960 through 2001 producing both a higher expected rate of return and lower risk (where risk is measured by the variance). The analysis departs from previous work (i.e., Moss, Featherstone, and Baker) that compared the rate of return on agricultural assets with the rate of return on aggregate or individual stocks. Our comparison is possible because newly released BEA data provide a more consistent accounting for tangible assets and depreciation than was previously available. These revisions of the BEA data (as described in detail by Fraumeni and by Katz and Herman) generate new estimates for current and constant dollar stocks of reproducible physical capital in the nonfarm, nonfinancial corporate sector, which are more comparable with asset valuation in the farm sector. The nonfinancial corporate sector was chosen for comparison because it is the largest nonfarm sector in the BEA data series, accounting for some 70% of total nonfarm business product.

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Literature Review

Economists have suggested that agriculture in the United States suffers from persistently low and variable factor returns (Tweeten 1969; Tweeten and Brinkman). This speculation usually defines low factor returns as returns to agricultural assets below their opportunity cost in other sectors. Persistent disequilibrium has been explained by a variety of factors includ-

ing asset fixity and the technology treadmill (Herdt and Cochrane; Tweeten 1969, 1989; Barry and Robison). Such explanations have long been used as justifications for agricultural programs (Gardner 1992, 2001; Moss, Shonkwiler, and Reynolds).

There are a variety of reasons why rate of return estimates in the farm and nonfarm sectors may not be directly comparable in previous studies. These include: 1) use of book value versus current cost accounting; 2) differences in depreciation methods; 3) use of accounting versus nominal economic rates of return; 4) whether capital gains are included in total returns; 5) the specific structural characteristics of the farms; 6) risk characteristics of farm and nonfarm investments; 7) the time period chosen for comparison (short versus long-term returns); 8) the need to properly differentiate between income returns to farm operators, landlords, contractors, and others; and 9) problems associated with estimating the residual return to farm business assets in the presence of one or more quasi fixed factors of production (Mishra, Moss, and Erickson). These issues given, the literature has extensively addressed the relative profitability of farm versus nonfarm investments.

Agricultural finance literature has typically focused on the effect of relative risk. Barry, Bjornson, Bjornson and Innes, and Irwin, Forster, and Sherrick examined the risk-rate of return performance of agriculture relative to other assets using the capital asset pricing model (CAPM). Barry estimated beta values for CAPM. 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. Also, the positive alpha values he found implied that farm real estate 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. Irwin, Forster, and Sherrick 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 1947–1984.

Bjornson and Innes developed econometric tests of whether mean returns on agricultural assets have been higher or lower than those of comparable risk (same beta) assets in nonagricultural capital markets. They 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 from those on nonagricultural assets with the same systematic risk?

Bjornson and Innes also used two different aggregated sector-level agricultural return series. First, they used annual U.S.-level rates of return to farm assets obtained from the Board of Governors of the Federal Reserve System's *Agricultural Finance Databook.* These included returns from current income and from capital gains on farmer-owned agricultural assets and are comparable to the U.S. Department of Agriculture (USDA)–Economic Research Service (ERS)'s sector-level rate of return estimates. Second, they used annual rates of return to ownership of prime Illinois farmland to estimate the returns to landlords. Bjornson and Innes distinguished between rates of return to farmers and rates of return to landlords. They concluded that, over the 1963–1984 and 1963–1986 periods, mean returns on farmer-held assets (i.e., to a farm operator's investment in his or her own business) were significantly lower than those on investments in comparable risk nonagricultural assets. Also, the APT model indicated that risk-adjusted returns received by farm owner/operators were significantly lower than those received by landlord/owners of farmland. Investments in farm real estate earned significantly higher returns, on average, than investments in APT-comparable-risk nonagricultural assets. Farmland also yielded insignificantly higher average returns than CAPM-comparable-risk nonagricultural assets. Bjornson and Innes's results further supported the view that farm

real estate investments require a higher return than investments in comparable-risk nonagricultural assets, but they also supported the view that farmer-held assets tend to earn lower returns than comparable-risk nonagricultural.

Our analysis places less emphasis on the comparison of relative risk and instead emphasizes the role of data construction in comparing the rate of return on farm and nonfarm assets. We consider the effect of risk by emphasizing risk efficiency criteria (Levy and Sarnat). Specifically, we compare the expected returns and standard deviations of two rates of return series which implies the use of mean variance as a risk efficiency criterion. In addition, we consider the existence of crossings (periods where the rate of returns to nonfarm assets fall below the rate of return to farm assets) that is akin to first-degree stochastic dominance.

Data

Farm sector returns and nonfinancial corporate sector returns, including capital gains/losses are estimated from data published by the USDA-ERS, the BEA, and the Federal Reserve's *Flow of Funds* report. Newly available BEA data values both nonfinancial corporate assets and farm assets at current market value rather than historic cost, a primary motivator for this study. The historical data used covered the period of time from 1960 to 2001. BEA's concept of net farm income and nonfinancial corporate net income is used because it offers consistency between the farm and the nonfinancial corporate sectors. However, from BEA estimates of net farm income, we calculate returns to farm assets using USDA-ERS's accounting method of estimating residual returns to farm assets. We also use BEA data and the Federal Reserve's *Flow of Funds* data to estimate residual returns to nonfarm assets comparable to the residual returns to farm assets. All estimates are "pretax," because comparisons between sectors with very different tax structures may not be useful from an investor's standpoint (i.e., comparing pretax rates of return reduces possible distortions caused by differences in ownership forms, corporate in the nonfarm sector vs. sole proprietorships in the farm sector). However, we recognize that differences in tax rules such as depreciation allowances and the relative importance of capital gains on farmland in the agricultural sector may improve the rate of return on agricultural assets relative to nonfarm assets. The following discussion describes the data used and addresses the reconciliation of data between sectors as conducted for this study.

Farm Sector Data

Both the USDA-ERS and the BEA publish annual estimates of the relative profitability of agriculture, but their estimation methods are not consistent. The BEA's rate of return on farm assets is calculated as the ratio of property income to produced assets, whereas the USDA's rate of return on assets is composed of two components: residual income and capital gains. In other words, the BEA only estimates returns from current income and excludes capital gains, while the ERS estimates both. In addition, there are some discrepancies in the measurement of current income. For example, the rental payments to nonoperator landlords are included in farm income by the USDA-ERS but are placed in the real estate sector by the BEA. Figure 1 depicts net farm income as published by the BEA and USDA-ERS for 1960 through 2001. Procedural discrepancies in calculating net farm income result in BEA estimates being consistently higher than those of the USDA-ERS.

In this study, we compute the rate of return to farm assets by adjusting the BEA's measure of return to farm assets for factors such as nonoperator landlords, commodity credit corporation loans, grazing fees on public land, government payments to farmers, and business taxes paid by farmers as detailed in Table 1. Specifically, starting with BEA's net farm income, we subtract the cost of operator dwelling, add back the net rent paid to nonoperator landlords and interest on farm business debt, and subtract the imputed return to labor and management. Starting with the BEA's measure of income guarantees consistency in depreciation estimates and in accounting methods be-

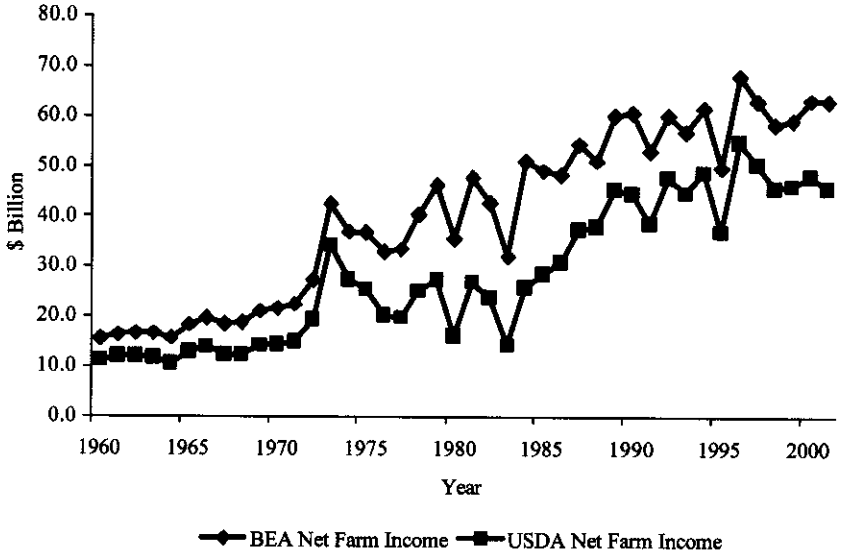

Figure 1. Net Farm Income as Published by BEA and USDA/ERS

Table 1. Reconciliation between U.S. Department of Commerce Farm National Income and the U.S. Department of Agriculture Farm Sector Accounts, Selected Years, 1998–2001

	Line	1998	1999	2000	2001
Net Farm Income, USDA	1	42.9	44.3	46.5	45.6
Plus					
Depreciation and Other Consumption of Farm Capital, USDA	2	18.2	18.4	18.7	19.0
Farm Housing, NIPA	3	6.7	7.2	7.6	8.0
Monetary Interest Received by Farm Corporations	4	0.8	−0.8	0.9	0.9
Valuation Adjustment, Commodity Credit Corporation Loans	5	0.0	−0.4	0.4	−0.3
Less					
Consumption of Fixed Capital, NIPA	6	27.3	28.9	28.7	29.4
Gross Rental Value of Farm Housing, USDA	7	9.8	10.4	10.4	10.5
Patronage Dividends Received from Cooperatives	8	0.6	0.6	0.6	0.6
Other	9	1.0	1.1	1.3	1.9
Equals					
Farm Proprietors' Income Corporate Profits, with Inventory Valuation and Capital Consumption Adjustments	10	29.9	29.6	33.2	30.9
Proprietors' Income	11	25.6	27.7	22.6	19.0
Corporate Profits	12	4.3	1.9	10.6	11.8

Source: *Survey of Current Business,* August 2000, Volume 80, Number 8, p. 118, Table 8.24.

Notes: 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 capital consumption. Net rental payments to nonoperator landlords are excluded from net farm income by USDA because net farm income includes only the earnings of farm operators (those who share in the risks of production). This maintains consistency with the method of estimating returns in the nonfinancial corporate sector. However, because net rental payments to nonoperator landlords contribute to the earnings of farm sector, they are included in net value added.

Table 2. Rates of Return, Farm and Nonfarm Sectors, Selected Years, 1960–2001

	Farm Sector				Nonfarm Sector			
	Average	Std. Dev.	Minimum	Maximum	Average	Std. Dev.	Minimum	Maximum
1960–70	6.599	1.917	3.659	9.889	15.374	3.066	10.228	19.956
1970–80	10.185	4.941	3.774	20.689	20.900	4.242	13.637	25.708
1980–90	−0.761	5.131	−7.216	6.790	13.083	4.005	8.654	21.612
1990–01	4.988	1.278	1.492	6.350	10.772	5.524	2.335	17.092
1960–01	5.240	5.254	−7.216	20.689	14.829	5.687	2.335	25.708

Source: Authors' computations.

tween the farm and nonfinancial corporate sectors. We then divide the adjusted return to agricultural assets by the average value of farm assets (average of the beginning and ending farm asset values). The capital gains rate is then computed separately and added to the rate of return to assets computed based on the BEA data.[1]

In summary, the numerator that we estimate for the rate of return to farm assets is calculated from the BEA's estimates of net farm income, which are consistent with BEA nonfinancial corporate estimates, and then adjusted to reflect the USDA's concept of residual returns to agriculture. The denominator is simply BEA's estimate of the current cost of farm assets and is consistent with BEA estimates of nonfinancial corporate assets.

Nonfinancial Corporate Sector Data

The BEA publishes a series in which asset values are estimated at current cost values (Larkins 2000, 2002). The estimates are constructed by applying price indexes to the constant cost stock estimates to convert them to current cost measures. In effect, the current cost stock measure is a measure of the replacement value of capital. We make no adjustments to these data because they are consistent with the asset valuation concept used in developing BEA estimates of farm national income. As such, we use these asset values as the denominator in our rate of return calculations.

The rate of return on nonfarm, nonfinancial corporate assets is calculated by the BEA as the ratio of "property income" to "produced assets."[1] This ratio is used for the return on assets excluding capital gains and losses for the nonfarm sector. To estimate the return on nonfinancial corporate assets including capital gains/losses, we use the Federal Reserve's *Flow of Funds of the United States* data series that includes both estimates of nonfarm, nonfinancial assets, debt, equity, after-tax profits, and net interest. As in the BEA series, we use the ratio of after-tax profits to total nonfarm, nonfinancial corporate assets. This includes real estate equipment and inventories.

Results

The average rates of return for farm and nonfarm corporate assets for selected time periods are presented in Table 2, along with the associated standard deviations and ranges. In general, these results indicate that the rate of return on nonfarm, nonfinancial corporate assets dominates rate of return on farm assets, producing both higher average returns and lower risk (measured by the standard deviation of returns) for each subsample. These differences in average returns vary between 13.8% in 1980–1989 to 5.8% in 1990–2001. Over the entire sample, the rate of return on nonfarm assets exceeded the rate of return on farm assets by 9.6%. Looking past the population statistics, the annual rates of return for farm and

[1] By definition the BEA's value of produced assets includes stock of fixed assets and changes in private inventories. This definition does not include land. However, given that land is a small fraction of production processes outside of agriculture, this distortion should be small.

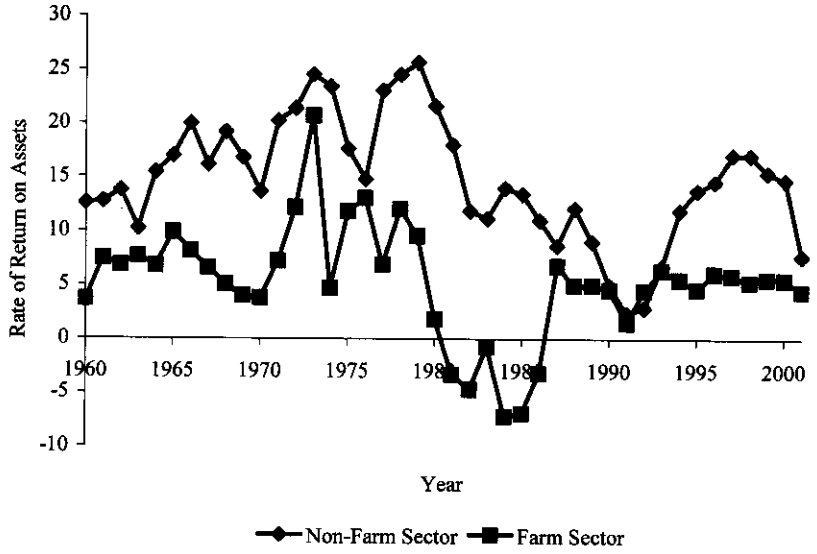

Figure 2. Comparison of Farm and Non-Farm Rates of Return to Assets

nonfarm assets are presented in Figure 2. Figure 2 demonstrates that the rate of return to farm assets exceeds the rate of return to nonfarm assets in only one year, 1992.

Conclusion

This study has used newly published income and balance sheet data from the BEA, the Federal Reserve, and the ERS to develop conceptually consistent and updated estimates of rates of return experienced by those who have invested in agricultural and nonfinancial corporate sector assets. Rates of return on farm assets and on nonfinancial corporate assets were compared for the years 1960–2001. In general, the results indicate that the rate of return on nonfarm assets dominates the rate of return on farm assets producing both a higher rate of return and a lower risk. Apart from the population statistics, the rate of return on farm assets exceeds the rate of return on nonfarm assets in only one of the 32 years analyzed. The dominance of the rate of return on nonfarm assets, as measured by the nonfinancial corporate sector of the U.S. economy, over the return to farm assets supports the contention of Tweeten (1969) and Tweeten and Brinkman that agriculture in the United States suffers persistently low factor returns.

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