

Farm Real Estate Price Components, 1920-1978: Comment

Castle and Hock attempted to show that returns to real estate were inadequate as an explanation of farm land prices from 1920 through 1978.(1) However, it appears that their analysis is in part a tautology and their conclusions are perhaps unwarranted. The basic expectations thesis proposed by the authors seems to be somewhat unrealistic and the hypothesized relationship between land values and debt appears to be inverted. The authors' disregard for the problems encountered in applying their model is disconcerting and their choice of analytical measures, that is, the mean values of the time series, seems contrived. To make clear my reasons for the above comments, I will now provide a detailed critique of their article.

Objective (a) of their analysis is stated as follows: "To demonstrate that farm real price involves important components additional to the capitalized value of rent services of land and buildings in farm production." A more scientific inquiry would test the hypothesis that agricultural rent is not a primary determinant of land values. If the null hypothesis could be rejected, then perhaps we would tend to believe that rents were important in determining values.

The one-year expectations model stated as their basic thesis seems to miss the realities of investment behavior. Capital assets including land are purchased for their expected future income streams, which for capital investments extends for more than one period into the future. If earnings are expected to remain constant in perpetuity, the current level of earnings compared with the current market value should provide an adequate measure of the return on the investment. However, if earnings are expected to rise or fall, then the current rent-to-value ratio is an inappropriate estimate of the real return and the constant rent capitalization model is an inappropriate

formulation of expectations. Use of the constant rent formulation in each year of the time series is not equivalent to using a more appropriate formulation. In addition, Castle and Hock seem not to account for the costs involved in exchanges of real estate; thus, their one-year model would be an overestimate of the return at the end of the first year.

The basic thesis proposed by Castle and Hock disassociates an increase in price from an increase in earnings and provides no theoretical basis for the expectations of the price increase. It is possible for expectations to be unrealistic, but it appears inconsistent with theory for unrealized expectations to be maintained indefinitely.

Observation of historical data shows that land rents and land values have moved in a parallel manner over time in the aggregate and in most agricultural areas of the country. This has been documented in several recent articles, including those by Melichar, Reinsel, and Reinsel and Reinsel.(2, 3, 4) These studies suggest that a constant rent model is inappropriate as a basis for expectations. A review of the complete data for Table 2 in the Castle and Hock article shows that land values as reported by the Department of Agriculture declined from 1921 to 1933, remained basically flat from 1933 to 41, and increased from 1941 to 1978. Data on cash rents by states shows that rents per acre declined from 1921 to 33 and then began increasing. The fact that land values fell suggests that there was an expectation that returns would decline. The fact that land values did not rise as quickly as rents from 1933 to the early 40's suggests that the expectations of another decline in rent persisted after returns began to rise.

Castle and Hock define V_t as $\frac{R_t}{.05}$. They suggest that their V is the textbook determinant of real estate value. They have, however, assumed a very special case of the capitalization formula. In fact, the textbook general case $V = \left\{ \frac{R_t}{(1+i_t)} \right\}^t$ is the more appropriate model. If rents are expected to decline or rise over a sustained period, it would be appropriate to assume a model similar

to the form $V = \frac{1+g}{d-g} R_t$ where g could take on either positive or negative signs.

(See Melichar 2.)

Because Castle and Hock do not allow for increasing or decreasing rents, they must hypothesize that other factors explain price and it becomes convenient to explain changes in price by changes in price. This is a tautology and provides no insight into the cause of the price change. They conclude their circular reasoning involving capitalization of appreciation by stating "The notion that capital gains are capitalized may appear novel, but we will document its occurrence by applying discounting formulas in the hypothetical solution of the constant annual rent increases." Apparently the authors wish us to believe that a model that allows for growth in return which thus causes the value of property to increase over time is documentation of their model that allows for no growth in expected returns and, in addition, capitalizes an unsupported increase in value. The growth model, as proposed by Melichar, is a mathematical representative of how increasing returns impact on prices. But capitalization of price changes explains nothing because it is a tautology and although the mathematical operations are possible they do not explain the process.

Castle and Hock continue their argument by talking about increasing rents, but then use a model which assumes expected rents are constant and arbitrarily establish a discount rate of 5 percent. They interpret this rate as an "internal rate of return or time preference for money." Such an interpretation is confusing because the internal rate of return and the time preference for money are not necessarily the same. In the justification of the choice of a 5 percent discount rate, they state that the market rate of interest on farm real estate loans varied from 4 to 6 percent from 1920 to 1966 and thus 5 percent seems reasonable. Why this should be reasonable or why they truncated their data on market rates of interest in 1966 is not explained.

Castle and Hock use a constant scalar of 4/3's to adjust for differences in building values. However, because this is a constant over time, it does not add to precision and offers nothing in the way of additional information. Also, their assumption that buildings represent 25 percent of real estate value over time can not be justified from USDA data, as they state. In fact, USDA data show that buildings represent a declining proportion of the value of farm real estate over time.

In their section on empirical estimates and predictions, the authors attempt to explain how they constructed their real dollar series. From their discussion, it appears that they have deflated the same series twice, but one can not be certain of the process. The example used suggests that they deflated 1980 income by the 1977 inflation rate. Why they would do this is unclear. Presumably, the inflation rate was different in 78, 79, and 80 than in 77. If one were interested in the change in purchasing power of dollars received at the beginning of the year versus those received at the end of the year, the inflation rate for that year would seem to be more appropriate. Having deflated for change from one year to the next, deflation by a 1967 index produces a statistic which is impossible to interpret.

The Castle/Hock explanation of the impact of inflation on the real value of debt appears circular and seems to assume that land investors are better at judging the expected rate of inflation than are financial markets. They also seem to infer that farmers buy real estate to acquire debt. In an inflationary period, it can be argued that the real stream of earnings from real estate can be affected by the rate of inflation and that if inflation is more rapid than the rise in earnings, the real purchasing power of the income stream will be reduced and the real value of the asset will decline. Thus, if we were to assume constant earnings and an increasing rate of inflation, we would discount the value of future earnings rather heavily.

Although Castle and Hock state that their predicted values were very different from actual values, the seriousness of the problem is not clearly shown by the abbreviated data set shown in the mislabeled Table 2 of their article. Because of my concern over the article, I obtained the original data from Hock and, from the table provided, determined that the technique used by the authors underestimated the value in each year from 1922 through 1943. In 15 of those years, the error was greater than 100 percent. In only two years was the error less than 50 percent. From 1944 to 1978 the errors were distributed on either side of the actual, but there was such a wide dispersion about the actual that one has no confidence in the result. Because they found minus values for real estate unacceptable, the authors arbitrarily set minus values to zero and conclude that they have improved their model.

They conclude their analysis by using the mean values of their constructed time series as a measure of the contributions of the components, to their constructed estimate. Such a measure is inappropriate because the mean value of a time series has no real meaning. Also, to accept any of the arguments made, and this is difficult to do, one would expect that the components would have substantially different impacts in different periods of the time series.

If the mean value of the time series was appropriate as a measure of the combination of the components, Castle and Hock could have reduced their effort considerably in calculating this statistic by determining the mean rent in the series and capitalizing it by 5 percent which provides the same answers as capitalizing each year's rent by 5 percent and finding the mean value. However, I doubt that anyone would accept this as the contribution of agricultural rents to the value of farm real estate from 1921 to 1978.

References

- (1) Castle, Emery N. and Hock, Irving, "Farm Real Estate Price Components," AJAE 64:8-18, Feb 1982.
- (2) Melichar, Emanual "Capital Gains versus Current Income in the Farming Sector," AJAE, Vol. 61, Number 5, pp. 1085-1092, Dec. 1979.
- (3) Reinsel, Robert D. "Land Rents, Values, and Earnings," contributed paper, AAEA annual meeting, Edmonton, Alberta, August 1973.
- (4) Reinsel, Robert D. and Reinsel, Edward I. "Economics of Asset Values and Current Income in Farming," AJAE, Volume 61, Number 5, pp. 1093-1097, Dec. 1979.