ISSUES IN AGRICULTURAL LAND MARKETS: AN EMPIRICAL PERSPECTIVE

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The basic philosophy which provides for agricultural land markets is simple and policies which directly influence these markets are few. However, agricultural land markets are often viewed as being complex with many pertinent related issues. Over time, agricultural land values have increased and a number of policies including farm support programs, taxation, research and technological development, agricultural credit, and international trade have been observed as influencing agricultural land market activity. While land market analysts have linked many of these policies to increasing land values, much of the variation in land values remains unexplained.

Implications of increasing land values have also attracted much attention. Consequences of increasing land values have been associated with changes in agricultural structure and a redistribution of income and wealth (Plaxico). More recently, the concern has switched to declining land values. With these shortrun adjustments, the longrun implications include further structural change and a further redistribution of income and wealth. The future magnitude and direction of these changes will depend on current policy options chosen. Other issues in the future will include policies concerning soil erosion, environmental quality, wetlands protection, and preservation of farmland. With these issues, questions, of which many will be of an empirical nature, will be raised concerning policy options and the potential impacts of these options.

In discussing the issues, it is important to identify to whom the issues are addressed. My view is that the issues are before us, and the most important issue relates to our ability to explain agricultural land market behavior. Although we have improved our understanding of agricultural land market activity in recent years, it is not clear that our empirical models are sufficient to address the policy issues that lie ahead. The following discussion addresses three issues that are important in developing empirical land valuation models. Basic questions concern the motives of agricultural land market participants, measurement of expected benefits from land ownership, and measurement of expected returns to land.[1] Empirical estimates indicate that the traditional capitalization rate which has been viewed as a single variable in agricultural land markets is actually composed of two variables and is represented by the difference between the expected rate of return to land and the expected rate of growth in earnings. In addition, the results suggest that cash flow returns to land provide a better measure of the expected benefits from land ownership as opposed to traditional imputed return measures. Before turning to a discussion of the underlying motives in agricultural land markets, previous explanations of value are briefly reviewed.

EXPLANATIONS OF VALUE

Asset valuation theory is based on value defined as the present worth of future rights to benefits from asset ownership. The process of discounting expected future monetary benefits to a current time has come to be known as capitalization where the capitalization process essentially establishes the relationship between future asset earnings and

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Invited paper presented at the annual meeting of the Southern Agricultural Economics Association, Biloxi, Mississippi, February 3-6, 1985. Invited papers are routinely published in the July *SJAE* without editorial council review but with review of the copy editor (as per Executive Committee action June 25, 1982).

The author wishes to extend appreciation to Leo Guedry, Arthur Heagler, Donald Huffman, and Alvin Schupp for their helpful comments and suggestions. However, the author is responsible for any errors reported herein.

[1]Land and real estate are used interchangeably throughout this discussion and are defined to include farm buildings.

value. Although relatively simple in concept, the capitalization process has provided the basis for much discussion, particularly in the post World War II period. During this period, agricultural economists have recognized an apparent divergence between net farm incomes and real estate values. In 1957, Scofield (p. 1,500) referred to the "seeming paradox" of rising land values in light of stagnant or declining net farm incomes. In the years that followed, agricultural economists accepted the basic tenets of asset valuation theory; however, many looked for other explanations as well (Chryst; Herdt and Cochrane; Tweeten and Martin).

In 1979, the relationship of land earnings and land values was revisited by several researchers. Reinsel and Reinsel reviewed the basic theory of value which is stated as:

$$(1)\ V_o = \Sigma \frac{R_t}{(1+r_t)^t},$$

where V_o is the current value of the asset, R_t is the expected annual net return for period t, and r_t is the expected value of the discount rate in time period t. In any period, expected returns are a function of a number of variables such as commodity output and input prices, commodity yields, taxes, and interest rates while the discount rate is expected to be a function of the pure time preference for money, risk, and inflation. The relationship may be simplified to:

$$(2)\ V_o = \frac{R}{r},$$

if current earnings (R) and the discount rate (r) are assumed to remain constant into perpetuity. However, Reinsel and Reinsel suggested these simplifying assumptions have led to the misuse of the capitalization process. This is because earnings to land did not remain constant but increased over the period 1940-1978. After reviewing trends in cash rent to value ratios for selected states, they further suggested that earnings expectations among land buyers have changed over time.

Melichar challenged the income paradox argument in 1979 by questioning the data series used in past land market research. He noted that using operator's net farm income is not an appropriate measure of returns to land since it also includes a return to operator labor and management. After replacing the real estate price index with the USDA farm production assets series and modifying returns to reflect the returns to assets alone, he developed a series which measured the rate of return to production assets (real estate and other capital assets). After observing the upward movement in the series from 1950 to 1978, he proposed an asset pricing model with provisions for growth in earnings. Based on earnings growth rates computed for alternative subperiods, he concluded that: *"It appears that recent capital gains and those of 1954-67 are in a sense fully explained by the growth exhibited by current returns to assets"* (p. 1,090).

The growth model presented by Melichar (1979) was further discussed by Harris. The land valuation process was viewed as being analogous to the valuation of a growth stock outlined in finance literature. Specifically, Harris noted that the valuation of land is similar to the valuation of a growth stock in which the total yield is composed of a dividend yield plus a capital gains yield. The standard multiperiod stock valuation model (Brigham, p. 79) is given by:

$$(3)\ V_o = \frac{R_1}{(1+r)^1} + \frac{R_2}{(1+r)^2} + \cdots + \frac{R_n}{(1+r)^n},$$

where V_o represents current value, R_n represents cash flow in respective time periods (n) and r represents a required rate of return. The model suggests, if an asset is purchased and held into perpetuity ($n = \infty$), the value of the asset is estimated as the present value of an infinite stream of cash flows. The foregoing formula is still applicable when an asset is purchased, held for a finite time period and then sold. It follows that for any individual investor, cash flows consist of dividends plus the sale price of the asset. However, when the asset is sold, other investors are again estimating value based on future cash flows. Thus, the value of an asset may be established by the present value of its cash flow stream and hence by the generalized asset valuation model.

The generalized asset valuation may be simplified to:

$$(4)\ V_o = \frac{R_1}{r-g},$$

if earnings are assumed to follow a particular pattern and assumed to grow at a constant rate g into perpetuity. The model is known as a normal or constant growth model and R_1 represents the first annual cash flow that new purchasers of the asset expect to receive.[2] The required rate of return r must also be greater than g for the results to be meaningful. Note that the constant growth model will also encompass a no growth case. If no growth in earnings is expected ($g=0$) and expected earnings in the next time period (R_1) equal the most recent earnings that have been paid (R_o), the formulation simplifies to the traditional capitalization relationship (equation (2)).

In 1981, Doll and Widdows reviewed the growth model presented by Melichar. In estimating growth rates for agricultural asset earnings and asset values from a modified growth model, they observed differing asset earning and asset value growth rates implying that asset earnings and values were not growing perpetually at the same rate. From this observation, they suggested that investors were reformulating expectations concerning initial earnings and growth in earnings in such a way as to cause a more rapid growth in land values during the seventies. They also suggested that Melichar was correct in concluding that growth in earnings was having an effect on asset values.

These results seem to suggest that past problems in explaining real estate valuation stemmed not from the validity of available valuation models but from the selection and use of models and the data series used in empirical investigation. It is argued here that further discussion is needed concerning the benefits from wealth increases that have resulted from increasing land values and the measurement of benefits accruing from land ownership.

WEALTH BENEFITS

It is not entirely clear from land valuation literature as to whether the underlying motives of land market participants are guided by profit or wealth motives. However, if we are to explain agricultural land market activity, a clear understanding of the motives prevalent among participants in the market must be present. In the financial literature (Brigham, p. 5) and in the agricultural finance literature (Barry et al., p. 16), the goal of management is to maximize the wealth of asset holders. However, in 1979 Plaxico observed: *"Yet economists often argue that farmland capital gains occur solely because incomes are expected to increase. Unfortunately, economists frequently ignore the current value of unrealized gains because they think of returns as annual income flows and view managers as maximizing a utility function closely related to annual income flows. Yet capital gains constitute an important source of returns, impact an aggregate consumption function, and affect investment and production decisions. Wealth accumulation may be superior to income as a simple proxy of the income surface"* (p. 1,099).

While it is recognized that the wealth motive is important, a question concerns how wealth increases through land price increases affect the benefit flow to land. Plaxico and Kletke (p. 327) argued that equity increases through land price increases have current value because they reduce risk by reducing the degree to which equity is leveraged and by providing an equity base in support of additional borrowing capacity as a basis for business expansion. Yet another reason why equity may have current value, which has not been fully recognized in land valuation literature, relates to the liquidity management of the firm. Baker identified firm liquidity as an important criterion for guiding firm decisions and analyzing firm behavior. Specifically he argued that: *"Unused credit, like balance sheet assets that are liquid, constitute a reserve of liquidity that can be called upon to counter the effects of failure in expectations . . . though not included in the balance sheet, liquidity has value"*, (p. 507).

The data presented in Table 1 can be used to support the argument that wealth increases affect current benefits. Estimates presented in Table 1 generally show increasing trends in real estate values for the Louisiana farming sector as well as increasing trends in claims against asset values (debt and equity). In examining real estate value trends, an important question concerns how changes in real estate values have been distributed within the balance sheet over time. To address this

[2]The first annual cash flow R_1 is also equal to R_o $(1+g)$ where R_o is the most recent cash flow that has already been paid.

TABLE 1. REAL ESTATE BALANCE SHEET AND ANNUAL CHANGES, LOUISIANA FARMING SECTOR, JANUARY 1, 1960-1983[a]

Year	Real estate value	Real estate debt	Real estate equity	Annual change[b]		
				Real estate value	Real estate debt	Real estate equity
	Million dollars					
1960	1,710	142	1,568	76	12	64
1961	1,786	154	1,632	108	14	94
1962	1,894	168	1,726	100	17	83
1963	1,994	185	1,809	254	30	224
1964	2,248	215	2,033	220	37	183
1965	2,468	252	2,216	225	44	181
1966	2,693	296	2,397	183	64	119
1967	2,876	360	2,516	79	54	25
1968	2,955	414	2,541	55	59	−4
1969	3,010	473	2,537	135	−21	156
1970	3,145	452	2,693	734	27	207
1971	3,379	479	2,900	307	28	279
1972	3,686	507	3,179	123	71	52
1973	3,809	578	3,231	574	78	496
1974	4,383	656	3,727	942	58	884
1975	5,325	714	4,611	595	61	534
1976	5,920	775	5,145	734	108	626
1977	6,654	883	5,771	1,693	96	1,597
1978	8,347	979	7,368	1,763	125	1,638
1979	10,110	1,104	9,006	2,897	273	2,624
1980	13,007	1,377	11,630	2,335	171	2,164
1981	15,342	1,548	13,794	70	228	−158
1982	15,412	1,776	13,636	−306	99	−405
1983	15,106	1,875	13,231	—	—	—

[a]Source: United States Department of Agriculture. *Farm Real Estate Market Developments.* Economic Research Service, various issues; United States Department of Agriculture. *Balance Sheet of the Farming Sector.* Economics, Statistics and Cooperatives Service, various issues; and United States Department of Agriculture. *Economic Indicators of the Farm Sector, State Income and Balance Sheet Statistics.* Economic Research Service, selected issues.

[b]It is noted that for any year the sum of changes in claims against assets balance with the total change in real estate values.

question, annual changes in balance sheet components were estimated and presented, Table 1. For example, between January 1, 1960 and January 1, 1961, the total value of real estate in the Louisiana farm production sector increased by $76 million while during the same year real estate debt and real estate equity increased by $12 million and $64 million, respectively. The data show that not all of the real estate value increase has been realized in terms of equity increases. Consistent with the Plaxico and Kletke argument, the data suggest that land value increases have provided an increased equity base for further borrowing for meeting business expansion needs. The data also seem to support the liquidity management argument. For instance, in 1968 and 1981, land value increases were more than offset by increases in debt implying that land owners in the aggregate substituted credit reserves held in the form of equity for debt in meeting liquidity needs and hence cash flow obligations. While it is recognized that a number of factors affect net debt changes within a given year, these data indicate that when viewed in the aggregate current benefits have been realized through the substitution of increased credit reserves for debt. It does not matter whether the debt flow is to a direct flow in the case of new investment or a supplemental flow to meet liquidity needs. However, some benefit was realized from land price increases through 1981.

MEASUREMENT OF BENEFITS

Another question relates to the measurement of net benefits flowing to the real estate resource. Specifically, should we be measuring the benefits in terms of imputed returns or should we be measuring the benefits in terms of cash flows to the resource? Traditionally, most land market research has attempted to measure benefits of land ownership from a net return including imputed charges for management and operators' labor and with the resulting net return representing a residual return to the land.

It is argued here that the cash flow concept would be expected to provide a better measure of benefits of land ownership. This view is consistent with financial literature; that is, with the general multiperiod stock valuation model (equation (3)), benefits of ownership are conceptually defined in terms of cash flow. If we are to be successful in applying

such a model to land valuation, we must be consistent with the conceptual framework on which the model is based. The cash flow argument also seems justified for other reasons. The argument appears to be consistent with what some researchers were observing with regard to cash rents. As early as 1965, Scofield observed that: *"Cash rents for farms provide a more direct measure of returns realized by landowners than do imputed returns"* (p. 43). In addition, cash flow measures are more consistent with the general assumption of wealth maximization. As shown in the previous section, landowners substituted credit reserves for additional debt which is normally included in cash flow accounts.

Trends in production cash flows to real estate and total residual cash flows to real estate for the Louisiana farm production sector are shown in Figure 1. Production cash flows in Figure 1 represent the net cash flows to land and were estimated from USDA farm production expense and gross farm income data series.[3] Moreover, estimates reflect the difference between total cash receipts and nonland cash expenditures for the Louisiana farm production sector. Total residual cash flows were estimated as the sum of production cash flows and the annual change in farm mortgage debt. Consistent with appraisal procedures (Suter, p. 259) and following empirical analysis, both data series were estimated by 3-year moving averages to better identify trends over time. Production cash flows in Figure 1 generally show an upward trend from 1960-1972 and then a sharp increase in trend between 1972 and 1975. However, the trend generally declined for the latter years. Although not directly comparable, the production cash flow trends shown appear to be similar to what Melichar (1984, p. 19) observed in his total returns to farm asset series estimated for the U.S. farm sector.

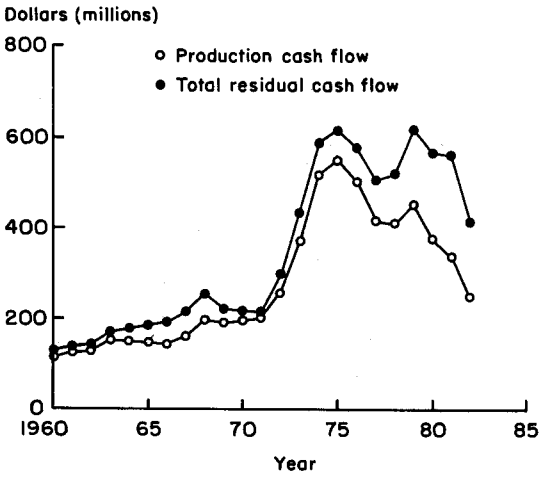

Figure 1. Estimated Residual Cash Flow to Real Estate, Louisiana Farm Production Sector, 1960-1982.

An interesting question arises at this point. If, as Melichar has argued that land values are explained by increasing returns to assets, why did land values continue to increase in the late 1970's? These increases can be explained by examining total residual cash flows shown in Figure 1. Between 1975 and 1981, the general trend in total residual cash flows did not decline but remained high relative to production cash flows. As argued earlier, it appears that landowners in the aggregate used credit reserves from land value increases to increase debt which ultimately supplemented their cash flow positions. In experiencing and analyzing these positions, expectations among participants within the agricultural land market remained relatively high.

MEASUREMENT OF EXPECTED RETURNS

When viewed from the traditional capitalization formula, value is formed by the ratio of expected annual earnings to a required rate of return or capitalization rate (equation (2)). Both expected annual earnings from land and the discount rate must be determined to estimate value. In estimating the required rate of return, appraisers (Suter, p. 270) have utilized previous market information. This simply calls for solving the capitalization equation in terms of the required rate of return. Thus, the required rate of return is estimated by the ratio of expected annual earnings to value or price realized in

[3]Production cash flows to land were estimated as the difference between total cash inflows to land and total nonland cash outflows. Total nonland cash outflows were estimated by removing interest paid on farm mortgage debt and net rent paid to non-operator landlords from USDA total production expenditure data series. These estimates are expected to represent the cash outflow of the farm production sector if it is assumed that cash flows associated with nonland capital assets equal depreciation on nonland farm capital. Similarly, nonmoney income was excluded from gross farm income estimates to reflect total cash inflows to the Louisiana farm production sector.

the market. If it is assumed that both buyers and sellers in the market are fully informed, the estimate may be viewed as both an expected rate of return and a required rate of return. This is because the ratio estimate reflects the minimum amount of funds necessary to bring about the property transfer as well as the relationship between expected annual earnings and value. Although relatively simple in concept, some land market researchers have noted difficulties in estimating the expected returns to land (Boxley and Walker; Doll and Widdows) while other researchers have experienced some success (Castle and Hock; Phipps). The view held here is that expected returns to land can be estimated; however, the approach will begin with the growth model suggested by Melichar (1979) and discussed by Doll and Widdows.

The constant growth model (equation (4)) may be expressed as:

$$(5)\ r = \frac{R_1}{V_o} + g,$$

where r again represents a required rate of return. While r may be viewed as the required rate of return, Brigham (p. 78) has noted that if the market is in equilibrium, the required rate of return may also be interpreted as an expected rate of return. Furthermore, the expected rate of return (r) is shown to consist of two components, a dividend yield which is represented by the ratio of the expected cash flow for the next period (R_1) to current asset value (V_o) and a growth in earnings rate (g). The last component is also interpreted as a capital gains yield.

Doll and Widdows experienced difficulty in developing unique empirical estimates for r and g in the expected return to land relationship. However, it is argued here that unique empirical estimates of expected returns (r) and expected growth in earnings (g) may be developed if we follow procedures used by appraisers in going to the market and estimating the capitalization rate. If these procedures are followed, the constant growth model (equation (4)) can be expressed as:

$$(6)\ \frac{R_1}{V_o} = r - g,$$

which indicates that the dividend yield (R_1/V_o) is equal to the expected rate of return (r) minus the expected growth in earnings rate (g). From an empirical standpoint, the left-hand-side of the equation is directly observable in the land market and can be estimated. More specifically, R_1 would be represented by the total residual cash flow to land (defined earlier) while V_o would be represented by the total value of the land. The right-hand-side of the relationship is actually the denominator of the original growth model evaluation equation. In addition, the dividend yield, hereafter simply referred to as the capitalization rate, is observed as a single variable, yet it represents the difference between two variables.

The growth model solved in terms of the capitalization rate provides the conceptual basis for developing an empirical model for expected returns in the land market. As noted earlier, Doll and Widdows suggested that investors might be revising their expectations on an annual basis and hence land value increases may result from expected increased earnings, expected increased growth in earnings, or from both of these expected increases. It is argued here that these expectations would be reflected in the capitalization rate. The capitalization rate is observable in the land market and results from the assessment of all benefits from land market participants. If participants recognize benefits and hence earnings in the form of production cash flows and in the form of equity increases which enhance firm liquidity management decisions as previously argued, the following model can be hypothesized:

$$(7)\ y = f(P, E|a),$$

where:

- y = capitalization rate measured as the ratio of total residual cash flows to total land value (R_1/V_o),
- a = most recent period earnings (a constant),
- P = expected changes in earnings measured by land production cash flows, and
- E = expected change in growth of earnings measured by equity in land.

Consistent with the conceptual framework (equation (6)), the hypothesized model indicates that the capitalization rate is dependent on expected changes in earnings (P) and the expected change in growth of earnings. The most recent period earnings is included in the relationship as a constant. Moreover, production cash flows (defined earlier) are used as a measure of changes in

expected earnings while land equity is used to reflect changes in expected growth in earnings.

In the hypothesized model, assume the effects of production cash flows (P) and equity (E) are zero implying no change in expected earnings and no change in expected growth in earnings. In this case, the capitalization rate (y) would equal the most recent period earnings (a). Moreover, in this case, production cash flows in the most recent period (P_o) would equal expected production cash flows in the next period (P_1), thus having no influence on the capitalization rate. However, if production cash flows are expected to increase in the next period from P_o to P_1, the capitalization rate would be influenced by most recent earnings, a, and the expected change in earnings, P_1. Now, if the assumption of zero growth in earnings is relaxed and growth in earnings is assumed positive, this would be expected to have a negative influence on the capitalization rate. This is because the conceptual model (equation (6)) suggests that a positive expected growth in earnings rate has a negative impact on the capitalization rate.

EMPIRICAL RESULTS

The hypothesized model provides the basis for estimating capitalization rates in the agricultural land market. Multiple linear regression was used to develop an empirical capitalization rate equation. Within the regression model, the intercept term is expected to provide a measure of most recent period earnings, a, while model coefficients for production cash flows, P, and land equity, E, are expected to measure the influences of expected changes in earnings and expected growth in earnings, respectively. In addition, the empirical capitalization rate equation provides the basis for solving for the expected rate of return and expected growth in earnings rate in the agricultural land market.

Data from 1960 through 1982 for the Louisiana agricultural land market were used to empirically test the hypothesized model. The model was estimated as:

$$(8)\quad Y = \underset{}{-1.08187478} + \underset{(12.056)}{.00100978P} - \underset{(-6.702)}{.00009832E} + \underset{(3.755)}{.000000003407851389E^2},$$

$$R^2 = .97 \qquad D.W. = 1.32,$$

where:

- Y = the ratio of total residual cash flow to total real estate value expressed as a logarithm to the base 10,
- P = the production cash flow to real estate, and
- E = equity in real estate.

In general, the empirical equation indicates that the two hypothesized variables explain a large proportion of variation in the capitalization rate over time. Coefficient t-values (in parentheses) indicate that the variables are highly significant in explaining the relationship. The model is specified so that the influence of production cash flows and hence the change in earnings is linear while the influence of equity and hence the expected change in growth in earnings is quadratic. These results appear to be consistent with observed moderate earnings growth in the 1960's, large earnings growth in the 1970's and declining earnings growth in the early 1980's. Furthermore, if expected increases in earnings, P, and expected growth in earnings, E, are assumed to equal zero, the antilogarithm of the intercept term indicates most recent period earnings (beginning of 1960) of 8.28 percent.

Capitalization rates observed within the Louisiana agricultural land market (R_1/V_o in equation (6)) and estimated capitalization rates from the empirical equation are presented in Table 2. The results indicate the capitalization rate and hence the cash flow return were fairly stable between 1960 and 1972, increased from 1972 through 1974, and then sharply declined for most of the remaining period.

The empirical equation was also used to solve for expected rates of return and expected growth in earnings rates. Estimated rates of return and expected growth in earnings rates shown in Table 2 correspond to estimates of r and g in the conceptual model (equation (6)), respectively. The estimated capitalization rate which represents a cash flow return to land reflects what has been observed in the land market and furthermore reflects the difference between the expected rate of return and the expected growth in earnings rate. Alternatively, the expected rate

of return represents the sum of the capitalization rate (or the cash flow return) and expected growth in earnings rate. In examining the components of returns to land, the results suggest that expected returns from growth in earnings were less than one-half of expected returns prior to 1974, while in the late 1970's and the early 1980's more than one-half of expected returns were composed of expected growth in earnings. These expectations ultimately led to an estimated capitalization rate of 2.9 percent in 1982.

These results are also consistent with recent cash flow problems experienced within agriculture. This is shown by comparing the cash flow return to land with the interest cost on farm mortgage debt. For convenience, Louisiana land values are computed on a per acre basis. As recent as 1976, land valued at $575 per acre with a return of 10.2 percent, Table 2, yielded a per acre cash flow return of $58.65. With 50 percent debt against the land and an 8 percent simple interest rate, interest costs are estimated at $23 per acre which suggests a positive cash flow for meeting principal payments and other needs. However, in 1982, land valued at $1,511 per acre with a return of 2.9 percent, Table 2, yielded a per acre cash flow return of $43.82. The interest cost with a debt load of 50 percent and an 11 percent simple interest rate is estimated at $83.11 per acre which suggests a sizeable cash flow deficit. As expected, land values themselves have impacted both sides of the cash flow equation.

CONCLUSIONS

The results demonstrate that the constant growth model along with the underlying wealth maximizing assumption provides a basis for analyzing and explaining agricultural land market behavior. Essentially, it was argued that equity gains through land value increases have current value because of benefits realized through business expansion and liquidity management considerations. Consistent with these arguments, cash flow estimates were used to measure the benefits of land ownership. Empirical estimates suggest that the traditional land capitalization rate actually is composed of two rates. The capitalization rate represents the difference between the expected rate of return to land and the expected growth in earnings rate. Furthermore, empirical estimates suggest that the expected growth in earnings component has become increasingly important over time and will likely continue to be operative in agricultural land markets in the long run. The results seem to be consistent with previous research. In 1979, Plaxico hypothesized that farm capital gains have a value at

TABLE 2. OBSERVED AND ESTIMATED CAPITALIZATION RATES, EXPECTED RATES OF RETURN AND EXPECTED GROWTH IN EARNINGS RATES FOR REAL ESTATE, LOUISIANA FARM PRODUCTION SECTOR, 1960-1982

Year	Observed capitalization rate	Estimated capitalization rate	Expected rate of returns	Expected growth in earnings rate
1960	.074	.078	.109	.031
1961	.077	.078	.111	.033
1962	.076	.077	.112	.035
1963	.086	.080	.118	.038
1964	.080	.077	.118	.041
1965	.074	.073	.116	.043
1966	.071	.070	.116	.046
1967	.075	.072	.121	.049
1968	.086	.078	.131	.053
1969	.074	.077	.129	.052
1970	.067	.075	.131	.056
1971	.064	.074	.133	.059
1972	.081	.079	.151	.072
1973	.114	.104	.199	.095
1974	.134	.133	.277	.144
1975	.116	.124	.298	.174
1976	.098	.102	.266	.164
1977	.076	.077	.219	.142
1978	.062	.062	.216	.154
1979	.061	.058	.237	.179
1980	.044	.041	.199	.158
1981	.037	.036	.181	.145
1982	.027	.029	.147	.118

least equal to an equal additional disposable income for current farmland purchases. The empirical results were also consistent with Doll and Widdows in suggesting that land buyers were reformulating their expectations of earnings and growth in earnings on an annual basis.

These results do not suggest any inefficiencies in agricultural land markets. During the seventies, we saw an improvement in commodity markets and changes in policies concerning farm income support programs, estate transfers, capital gains taxes, and agricultural credit programs which either directly or indirectly affected the rights to benefits from land ownership. Empirical results suggest that land market participants recognized the benefits from these changes while landowners in general readily accepted newly found wealth. During the eighties, we have seen new policies which have affected the cost of credit to agriculture, and have influenced international trade. Also, relatively weak demand for agricultural products has been experienced. These events have influenced expectations and bidding potentials within agricultural land markets. The land market, in adjusting to these conditions, will have substantial impacts on the structure of agriculture and the distribution of wealth in agriculture in the long run. Given the potential for further land value declines, it could be argued that public funds should not be used to support wealth that has been created in agriculture. However, it can also be argued that income support programs are necessary to preserve some semblance of stability within the agricultural production sector, including rural communities. If wealth distribution in agricultural land markets is viewed as a problem, then other policies can be examined and possibly modified to ensure consistency with economic and social objectives.

The empirical results raise further questions concerning pricing efficiency within localized agricultural land markets. Results suggest that buyer expectations have increasingly been influenced by the growth in earnings component which has resulted in a declining cash flow return to land. With this emphasis, land values may not fully reflect quality and hence marginal value productivity differences. Appraisers have long recognized that within local markets, lower quality land is overpriced relative to better quality land. Given the current cash flow problems and a greater emphasis on the cash flow return to land, potential declines in land values may be greatest on lower quality land. This would further increase financial problems of some owner operators producing on marginal lands.

In general, this discussion has narrowed the many issues relating to agricultural land markets to an empirical issue, an issue that has long been before us and will likely continue in the future. The issue is important as it impacts our effectiveness in the policy arena. Further empirical land market research including further tests of the model discussed here, would be expected to improve our understanding of agricultural land markets and would enable us to better address current issues as well as those that lie ahead.

REFERENCES

Baker, C. B. "Credit in the Production Organization of the Firm." *Amer. J. Agr. Econ.,* 50(1968):507-20.

Barry, Peter J., John A. Hopkin, and C. B. Baker. *Financial Management in Agriculture,* Third Edition, Danville, Illinois: The Interstate Printers and Publishers, Inc., 1983.

Boxley, Robert F. and Larry Walker. "Impact of Rising Land Values on Agricultural Structure." *Structure Issues of American Agriculture,* USDA, ESCS, Agr. Econ. Rept. 438; November, 1979.

Brigham, Eugene F. *Financial Management Theory and Practice,* Second Edition, Hinsdale, Illinois: The Dryden Press, 1979.

Castle, Emery N. and Irwing Hoch. "Farm Real Estate Price Components, 1920-78." *Amer. J. Agr. Econ.,* 64(1982):9-18.

Chryst, Walter E. "Land Values and Agricultural Income: A Paradox?" *J. Farm Econ.,* 47(1965):1265-73.

Doll, John P. and Richard Widdows. "Capital Gains Versus Current Income in the Farming Sector: Comment." *Amer. J. Agr. Econ.,* 63(1981):730-3.

Harris, Duane G. "Land Prices, Inflation, and Farm Income: Discussion." *Amer. J. Agr. Econ.,* 61(1979):1105-6.

Herdt, Robert W. and Willard W. Cochrane. "Farm Land Prices and Farm Technological Advance." *J. Farm Econ.,* 48(1966):243-63.
Melichar, Emanuel. "Capital Gains Versus Current Income in the Farming Sector." *Amer. J. Agr. Econ.,* 61(1979):1,085-92.
Melichar, Emanuel. *Farm Wealth Origins, Impact, and Implications for Public Policy,* W. I. Myers Memorial Lecture, A. E. Res. 83-40, Dept. of Agr. Econ., Cornell University, Ithaca, New York; June, 1984.
Phipps, Tim T. "Land Prices and Farm Based Returns." *Amer. J. Agr. Econ.,* 66(1984):422-9.
Plaxico, James S. "Implications of Divergence in Sources of Returns in Agriculture." *Amer. J. Agr. Econ.,* 61(1979):1,098-1,102.
Plaxico, James S. and Darrel D. Kletke. "The Value of Unrealized Farm Land Capital Gains." *Amer. J. Agr. Econ.,* 61(1979):327-30.
Reinsel, Robert D. and Edward I. Reinsel. "The Economics of Asset Values and Current Income in Farming." *Amer. J. Agr. Econ.,* 61(1979):1,093-7.
Scofield, William H. "The Land Market and Economic Development." *J. Farm Econ.,* 39(1957):1,500-10.
Suter, Robert C. *The Appraisal of Farm Real Estate,* Second Edition, Danville, Illinois: The Interstate Printers and Publishers, Inc., 1980.
Tweeten, Luther G. and James E. Martin. "A Methodology for Predicting U.S. Farm Real Estate Price Variation." *J. Farm Econ.,* 48(1966):378-93.
U.S. Department of Agriculture. *Farm Real Estate Market Developments,* Economic Research Service, various issues.
U.S. Department of Agriculture. *Balance Sheet of the Farming Sector,* Economics, Statistics and Cooperatives Service, various issues.
U.S. Department of Agriculture. *Economic Indicators of Farm Sector, State Income and Balance Sheet Statistics,* Economic Research Service, various issues.