April 10 2015

Letter to the editor:

Farm Real Estate Tax statements have farmers in a "flurry", to say the least. On many parcels taxes doubled from past tax assessment. Farmers should be concerned, I contend. I agree with their point of view, something has gone wrong.

The WNJ story April 2nd reported that the "CAUV formula to be improved". The administrated changes cited in the article do not I contend, adequately address the problem. The "tweeking" errors over time (since 1974 when CAUV was initiated) have accumulated to create the distortion in the calculated land reappraisal values for 2014. Those are now the basis for Clinton Co. land tax assessment.

Historical events provide noteworthy background. In the late 1960's a Cleveland developer sued in the Ohio Supreme Court that all property=residential, business, industrial, and agricultural = should be taxed at the same rate of market valuation. The court concurred. Previously, farmland was taxed at a lower rate of market value than the other uses.

There was legitimate reason for lower valuation. Only about two percent of farmland is brought and sold annually. (Houses change hands much more often). A few transactions thus create the comparable sales data for appraisers.

Furthermore, market value sales data typically reflect transitional land use changes. For a developer who pays $40,000 per acre for a tract, that land cost on a one –fifth acre lot is a small item in the new house price. But the appraiser collecting comparable sales data saw the land growing soybeans last year. Thus to him the dollar figure is the market value of agricultural land. There is no notation on the real estate record that "this sale reflects housing development value", nor a notation "this land will be farm land for the next 100 years". Farm land 20 miles from the country courthouse which will be growing crops or pasture for the next 100 years thus has transitional market value built in to taxes.

The Farm Bureau Federation foresaw the potential effect on farmland from 100% market valuation. The organization promoted a constitution amendment to tax farmland based upon its earnings value in agricultural use (cropland, pasture, woodland, and forest), instead of market price. Ohio voters approved the amendment in 1973, and permitting Ohio to institute agricultural use value assessment.

The basic premise of the procedure is to capitalize net income earnings per acre into an economic valuation. This is an economically sound and justifiable concept for calculating use value.

The Ohio Department of Taxation's explanation of the METHOD of value calculation has gone awry, in my estimation. It is obvious that the bureaucracy does not have agricultural agronomists nor economists on their staff. Their method minimizes or omits soil type (productivity) and land class (arable, pasture, or forest use) from the equation.

In my experience with Clinton Co. farmers and 40 years of teaching farm business analysis, my valuation is that land tax should be in the range of $28 to $35 per acre on the most highly productive land in county. I have heard of taxes being $50 to $150 per acre. I think farm landowners have a legitimate gripe.

CAUV must be preserved. It is a legitimate land use valuation. The calculation procedure must be changed to properly define the correct value, however.

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A Technique for Taxation Assessment of Farm Real Estate Based Upon The Capitalized Income Stream of Agricultural Production

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Differential assessment of land to preserve open space and reduce property taxes on farmland is provided in 31 states. The Ohio Legislature placed a constitutional amendment on the 1973 November general election ballot providing for assessment of farm land for tax purposes on its use value rather than on market value. With passage of the amendment, the Legislature enacted laws in 1974 permitting Ohio to use use-value assessment.

This law marked a significant change in the system of real estate assessment for taxation that had developed in Ohio from its institutional background. Ohio residents, historically, have placed strong emphasis on local governing units and local governmental authority. A result of this posture has been that many governmental decisions and service authorities function at the county level rather than state level for decision making and implementation.

Urbanization has had significant influence on shaping locality needs for tax revenues. In Ohio there is a widely dispersed population of 12 million. Their requirements for highways, utilities, schools, and recreational areas have created pressures on agricultural,

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residential, commercial, and industrial land uses. Heretofore, county auditors and county boards of revision had been able to regulate the assessment levels based upon differing property classes. Residential housing might be taxed at a different rate than farm land or office buildings. During the decade of the 60's the Park Investment Company, a Cleveland real estate holding company, petitioned the Supreme Court that it was subjected to discrimination in real estate taxation. After four trials extending over most of the decade, the decision was handed down that the same (common) level of assessment must be used for all classes and parcels of property in Ohio.

This ruling was immediately recognized by the Ohio Farm Bureau and other farm groups as providing for a substantial increase in farm real estate taxation. The Farm Bureau initiated a vigorous educational program. They set up 1300 study groups on the local level to formulate ideas and generate grass root support. They provided leadership for interaction with Legislators and worked on development of the bill.

The purpose of this paper is to explain the technique developed by The Ohio State University Department of Agricultural Economics and Rural Sociology for calculating value of agricultural land based upon the capitalized income stream.

The basic premise of this technique is that net income attributable to the land resource can be capitalized into economic value ratings.

Work by Reiss has shown a direct correlation between soil productivity ratings and net rent earned by landlords on Illinois

farms.[1] Better soils produced higher earnings; thus, highly productive soils should be valued more than lesser productive soils for agricultural purposes. Our purpose was to define a system for farm land valuation based upon differences in the inherent capacity of the soil to produce income.

Income capitalization is the direct and primary approach to value.[2] Through use of the capitalization formula, periodic future income can be converted into land value. The formula in its simplest form is: $V=\frac{R}{I}$ where V is the calculated value, R is the annual net return to the land resources, and I is a selected capitalization rate. The agricultural value of land, based upon its income earning capacity in agricultural production, can be calculated after R, net income, and I, a capitalization rate, are determined.

Economic rent accruing to land is the surplus return of gross product value over production cost.[3] Net income, R, is thus the difference between production receipts and expenses. Calculation of net income is the first step in the technique. The fact that the agricultural production process involves a mix of land, labor, capital, and management does not allow a simple, straight forward determination of the amount of surplus return to credit to land. In the marginal approach to productivity, economic land rent is the remainder after other costs of production have been costed to the

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1/ Franklin Reiss, "Cash Rent and Custon Farming," Journal of the American Society of Farm Managers and Rural Appraisers, Vol. 33, No. 1, April, 1969.

2/ Earl F. Crouse and Charles H. Everett, Farm Appraisals, Prentice Hall Inc., Englewood Cliffs, New Jersey, P. 19-20.

3/ Thomas R. Malthus, Principles of Political Economy, William Pickering, London, 1836, P. 136.

production process. The weakness of this approach is the fact that it assumes that the return to the other production input factors can be determined with precision. The returns attributed to non-land factors are usually derived through an accounting process. The costs of non-land inputs may represent actual cash payments made, going rates of these payments or estimates of what a fair or normal return should be. We can rely on economic definitions to help legitimize the accounting process. In pure competetive conditions, "a profit maximizing entrepreneur will employ units of a variable productive service until the point is reached at which the value of the marginal product of the input is exactly equal to the input price.[4/] But because of real world conditions, knowledge is imperfect. We can only rely upon accounting budgets which reflect producers' actual input combinations; we can assume that they have evaluated what each respective input contributed to their production process. Thus we can take their actions as indications of the marginal values they attribute to the inputs they employ, given the limitations, risk and uncertainty the operators face.

A detailed on-farm study of costs of producing crops was made in Ohio in 1968.[5/] This study was the basis for calculating crop cost budgets in our effort to calculate net income. It provided the

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4/ C. E. Ferguson, Microeconomic Theory , Richard D. Irwin, Inc., Homewood, Illinois P. 380.

5/ E. T. Shaudys and G. R. Prigge, "The Costs of Producing Major Field Crops in Ohio," Research Bulletin 1051, OARDC, Wooster, Ohio, April, 1972.

input mix that producers chose to employ.[6/] As production systems change over time, the input mix can be kept up to date by reoccurring studies on a periodic cycle. The index of agricultural prices can be used to update costs and prices of products produced as they change over time.[7/]

Cost studies have shown production costs to be fairly constant across soil type within soil classes.[8/] However, yields are significantly variable based upon productive capacity. The agricultural productive capacity of soils is determined by parent material forming the soil, erosion that has occurred, drainage, and slope differences. Agronomists used the first factor in establishing yield projections for the soil types in the state.[9/] Their yield data can be converted into a productivity index for each soil type by expressing the yield of an individual type as a percent of the average yield of all soils. A productivity index of 130 means that that soil has the capacity to produce 30 percent more than the average of all soils in the state.[10/] As state yield averages change over time, the

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6/ The average yields attained by the cooperators equalled the state average yields. Therefore, we assumed their production represented typical production.

7/ _____, Agricultural Prices, United States Departmen of Agriculture Statistical Reporting Service, Crop Reporting Board, Washington, D.C. Average annual Indices are reported in the Annual Summary issue printed in June.

8/ Reiss, loc. cit.

9/ Samuel Bone, et., al., "Productivity Guide for Ohio Soils," Bulletin 476, Cooperative Extension Service, Ohio State University, Columbus.

10/ It is suggested that the highest valued crop or crops be used for calculating the index. Corn was selected for the Ohio work because of its dominance in acreage, value, widespread cultivation, and extensive yield data.

actual physical production potential, and hence, gross value product, can be adjusted to reflect changing productivity.

The next step in defining crop production potential of a soil is to consult soil survey maps developed by the Soil Conservation Service. Their land capability classifications evaluate soils by features influencing the suitability to grow crops. Specifically the factors which determine if a soil falls in a class of I through VIII are slope, drainage, and erosion. These three characteristics determine intensity of rotations in addition to crop yield differences. Rotational limitations affect income earning potential since forage crops seldom return as much net income as row crops. Work by Howell reported typical rotational sequences and yield by capability class, with constant managerial levels, for Ohio conditions.[11/]

Combining the yield and rotation information with prices of crop output, we can calculate a Gross Revenue Index for respective land classes. This Revenue Index reflects the expected average gross receipts from crop production due to yield and rotational limitations dependent upon land capability classes. It further reports gross receipts from pasture and woodland on those soil classes which have severe physical limitations.

The production cost of a rotation subtracted from the Gross Revenue Index equals the net income, or R of the capitalization formula. Dividing this net income figure by a capitalization rate will produce the agricultural value of a soil type according to its land capability class.

11/ James Howell, Unpublished Ph.D. Dissertation, Department of Agricultural Economics, Ohio State University, Columbus.

Selection of A Capitalization Rate

Choice of a capitalization rate is of extreme importance. Wide differences in value estimates occur from small absolute changes in the rate selected. For example, a 5% rate applied to a $30 rent value yields a $600 value; a 10% rate, a $300 value. A shift from 5% to 10% is a 100% change in the capitalization rate. When applied to the rental figure, the capitalized value correspondingly changed 100%.

It should be noted that the capitalization rate is the reciprocal of the number of years of expected income it takes to equal the property's present value. A capitalization rate of 5 percent has a reciprocal of 20 and may be described as a 20 year purchase price. Similarly, a 4 percent rate has a 25 year price, and a 10 percent rate has a 10 year price.

Land is a source of wealth, based upon its income earning potential. The rate of return contemplated from it should be comparable to returns from other forms of wealth, properly adjusted for variations in risk and uncertainty.

If all properties were held without income risk or uncertainty, owners would capitalize their property incomes at low, safe rates of interest comparable to yields on government bonds. But owners take risks when they invest in land; they suffer from illiquidity, and they assume burdens of management. Each of these factors contributes to the use of capitalization rates that are higher than the relatively safe, non-risk rates of government bonds.

One method for selection of a capitalization rate is to compare returns on alternative investments. Lee and Brake[12/] analyzed the historical performance of five equity and fixed income assets. Table 1 shows the average annual rates of return and standard deviations of these returns in each of the alternatives over the 13 year period 1955 to 1968. (The period 1955-1968 was one of general economic prosperity characterized by rising interest rates, rising prices, and favorable business conditions.)

The table shows that the total returns to farm real estate in Michigan were moderately high and relatively stable, averaging around 12%. A look at income returns only shows that farm real estate was again moderately high, but was more variable than any other alternative investment analyzed.

Another method for determination of a capitalization rate is the component rate method. Under this method, the rate selected depends not only on the amount of income, but also on the quality of the investment. The appraiser sets up component parts of the capitalization rate to reflect the various qualities of investment, assigns a rate to each, and sums them to arrive at the capitalization rate.

12/ W. F. Lee and J. R. Brake, "Conversion of Farm Assets for Retirement Purposes," Research Report 129, Michigan State University, East Lansing, January 1971.

The procedure is as follows:

1.	Safe rate (i.e., current rate of return on investments having the greatest liquidity and safety, like U.S. Govt. bonds)	4.5%
2.	Risk rate (allowance for continued ability of property to earn current income)	3.0%
3.	Penalty for non-liquidity	2.0%
4.	Burden of management	1.5%
	Total rate of capitalization	11.0%

A slight variation to this method utilizes the same system of addition of component rates, but its existence stems from an investors view of his situation. It may be called a cash flow basis of rate selection. The difference between projected gross receipts and expenses yields net return. This net return can be used to pay (1) the market price of interest charged by lending institutions, (2) an annual portion for debt amortization, and (3) establish a reserve to cover fixed commitments in case the annual net return falls below requirements.

Following this scheme, a capitalization rate can be selected in the following manner:

1.	Borrowing rate of interest on real estate loans 8% (rate is applicable to 1/2 the initial balance)	4.0%
2.	Annual rate of payback (20 year payout)	5.0%
3	Uncertainty of income (due to fluctuations from average)	3.0%
	Total rate of capitalization	12.0%

In summary, it appears that a capitalization rate of any magnitude in the range of 10% to 12% could be justified, depending

upon the basis of justification. It is important that a method be selected that can be easily understood and that will provide equitable relative values. For the 1972 year we selected a capitalization rate of 10%.[13/] It conjurs thoughts of a 10 year gross recovery of price. Alternatively, it is slightly over a 10.5 year life on a 6% loan.

Though the above process may seem somewhat complicated, a farm management specialist and an agronomist can prepare three basic tables which quote a per acre value for use by the county assessor and auditor. In Ohio we prepared tables of cropland, pasture land and wood land values. (Tables 2 thru 7). Pertinent soil information is reported on Land Use Maps prepared by the Soil Conservation Service.[14/] These maps can be used to determine acreages of land by soil type and capability class on individual farms. The assessor can measure the areas with grid or planimeter. He can then refer to tables of capitalized land values to ascertain agricultural value of each category. By aggregation he determines the entire farm agricultural value. The tax value can be completed by adjusting for home site, building improvements and other pecularities which may affect value of a specific unit.

The system of valuation does not penalize the excellent manager for making improvements like drainage and fertility. It uses an "average" productivity value. However, farm size, field

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13/ In 1973, the rate selected was 11%.

14/ More than half of the Ohio counties have detailed soils information available. Many farms have individual SCS farm plans which include the detailed maps.

configuration, or weed infestations are not accounted for either.

Implementation of the system is a rather major and basic change in tax assessment procedures. The Ohio law as presently conceived will require the owner to petition the county auditor for initial inclusion and to procure annual renewal. The application fee will be $10.00 and annual renewal fee $2.00. The application process requires the landowner to provide the Land Capablitiy map of his farm. The county auditor is obligated to maintain assessment for both current market value and agricultural use value. The legislature did not expect these fees to cover the additional costs, but thought they would eliminate meaningless inquiry.

Work is continuing in Ohio to simplify the procedure for gathering farm income information and for providing it on a current basis. The status of the Board of Tax Appeals indicates that the system is being endorsed along with an update technique. It appears that the method will be described in the Board of Tax Appeals rules for guidance of the county auditors and the detailed update referred to as an annual schedule or annual memorandum.

Table 1 Performance of Eight Investment Alternatives, 1955-1968, Michigan

	Price Returns		Income Returns		Total Returns	
	Average Yearly Return	Standard Deviation	Average Yearly Return	Standard Deviation	Average Yearly Return	Standard Deviation
	Percentages					
Equity Assets						
Farm Real Estate	6.8	3.8	5.2	1.8	12.0	4.5
425 Indus. Stocks	11.8	14.2	5.6	1.1	17.4	14.4
55 Utility Stocks	8.6	16.6	6.8	1.5	15.4	16.1
5 Income Mut. Funds	6.7	12.1	5.6	.7	12.3	12.3
5 Growth Mut. Funds	15.7	26.3	2.4	.9	18.1	26.6
Fixed Income Assets						
20 Yr. Corporate Bonds	-1.3	2.9	3.0	.0	1.7	2.9
15 Yr. Gov't. Bonds	- .4	2.3	2.8	.0	2.4	2.3
4 Yr. Gov't. Bonds	- .1	1.1	3.5	.8	3.4	1.2

Table 2. Capitalized Cropland Values by Capability Class and Soil Productivity Index, Ohio, 1973 (10% Capitalization Rate)

Soil Productivity Index	Land Capability Class							
	I	II	III	IV	V	VI	VII	VIII
	Dollars per Acre							
141	580	460	324	188	171	103	34	17
136	559	444	312	182	165	99	33	17
130	535	425	299	173	157	94	31	16
124	511	405	286	165	150	90	30	15
118	485	386	271	157	143	86	28	15
112	461	365	258	149	136	81	27	13
106	436	346	243	142	128	77	25	13
100	411	327	230	133	121	73	24	12
94	387	307	217	125	114	68	23	11
88	362	288	202	117	106	64	23	11
82	338	267	189	109	100	59	19	10
76	312	248	174	102	92	56	18	8
71	264	213	150	87	79	47	16	8
65	242	194	136	79	71	42	15	7

Table 3. Capitalized Cropland Values by Capability Class and Soil Productivity Index, Ohio, 1973 (11% Capitalization Rate)

Soil Productivity Index	Land Capability Class							
	I	II	III	IV	V	VI	VII	VIII
	Dollars per Acre							
141	527	418	294	171	155	94	31	15
136	508	404	284	165	150	90	30	15
130	486	386	272	157	143	85	28	15
124	465	368	260	150	136	82	27	14
118	440	351	246	143	130	78	25	14
112	419	332	234	134	124	74	24	12
106	396	315	220	129	116	70	22	12
100	374	297	209	121	110	66	21	11
94	352	279	197	114	103	62	21	10
88	329	262	184	106	96	58	21	10
82	307	243	172	99	91	54	17	9
76	284	255	158	93	84	51	16	7
71	240	194	136	79	72	43	15	7
65	220	176	123	72	65	38	14	6

*Index prices paid - Increase 1972-1973 14%
Index prices received - Increase 1972-1973 35%
Relative net increase - 21%

Table 4. Capitalized Pastureland Values by Capability Class and Soil Productivity Index, Ohio, 1973 (10% Capitalization Rate)

Soil Productivity Index	Land Capability Class						
	I	II	III	IV	V	VI	VII
	Dollars per Acre						
141	257	217	204	171	137	103	34
136	247	230	197	165	132	99	33
130	236	220	189	157	126	94	32
124	225	209	180	150	120	90	30
118	214	200	172	143	114	86	28
112	203	190	162	136	109	81	27
106	192	179	154	128	103	77	25
100	182	169	145	121	97	73	24
94	171	160	137	114	91	68	23
88	160	149	128	106	85	64	22
82	149	139	119	99	80	59	19
76	138	128	110	92	74	56	18
71	129	120	103	86	69	52	17
65	119	110	94	79	63	47	16
59	108	100	86	71	57	42	15

Table 5. Capitalized Pastureland Values by Capability Class and Soil Productivity Index, Ohio, 1973 (11% Capitalization Rate)

Soil Productivity Index	Land Capability Class						
	I	II	III	IV	V	VI	VII
	Dollars per Acre						
141	233	197	185	155	124	94	31
136	224	209	179	150	120	90	30
130	214	200	172	143	114	85	29
124	204	190	163	136	109	82	27
118	194	182	156	130	104	71	25
112	184	173	147	123	99	74	24
106	174	163	140	116	94	70	23
100	165	154	132	110	88	66	22
94	155	145	124	104	83	62	21
88	145	135	116	96	77	58	20
82	135	126	108	90	73	54	17
76	125	116	100	84	67	51	16
71	117	109	94	78	62	47	15
65	108	100	85	72	57	43	14
59	98	91	78	64	52	38	13

Table 6. Capitalized Woodland Values by Capability Class and Soil Productivity Index, Ohio, 1973 (10% Capitalization Rate)

Soil Productivity Index	Land Capability Class							
	I	II	III	IV	V	VI	VII	VIII
	Dollars per Acre							
141	330	210	74	34	34	34	34	17
136	309	194	62	33	33	33	33	16
130	285	175	44	31	31	31	31	15
124	261	155	36	30	30	30	30	15
118	235	136	28	28	28	28	28	14
112	211	115	27	27	27	27	27	27
106	174	96	25	25	25	25	25	25
100	161	77	24	24	24	24	24	24
94	137	57	23	23	23	23	23	11
88	112	38	22	22	22	22	22	11
82	88	19	19	19	19	19	19	10
76	62	18	18	18	18	18	18	18
71	17	17	17	17	17	17	17	9
65	16	16	16	16	16	16	16	8
59	15	15	15	15	15	15	15	7