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Property Tax Impacts of Current-Use Assessment of Forest and Other Rural Land in Tennessee

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SUMMARY

The "Agricultural, Forest and Open Space Land Act" was passed by the Tennessee legislature in 1976. Its purpose is to help prevent the premature and forced development of rural lands. Toward this end, it authorizes assessment and taxation of qualified properties on the basis of current-use as opposed to fair market value. This study was initiated in 1980 to measure usage of the Act and to determine its effects on the taxes of participating and nonparticipating property owners. Results indicate that use varies considerably, but is, on the whole, quite low. In all sample counties, less than 3 percent of the eligible forest land and 4 percent of the eligible nonforest land was classified under the Act. However, those landowners whose properties were enrolled received significant tax relief. Average per-acre appraisals, assessments and taxes declined 56 percent for forest land and 41 percent for nonforest land. For the most part, this relief was achieved without significantly affecting either county tax revenues or the tax burden placed on nonparticipants. In the typical (i.e. mean) sample county, aggregate annual tax revenues declined by only 0.78 percent, and the proportion of the total annual property tax burden shifted to nonparticipants was only 0.74 percent.

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INTRODUCTION

Forests and other rural lands serve several important economic and social functions. These include the provision of food, fiber and opportunities for outdoor recreation. However, in recent years, rising property values caused by inflation, urbanization and other pressures have posed a growing threat to these land uses. Many rural landowners, finding themselves squeezed between rapidly rising property taxes and a relatively constant income, have been forced to sell or convert their properties to more intensive uses. In an effort to slow this process, many states have enacted special laws for taxing rural lands. These have assumed a variety of forms, but those substituting current-use assessment for fair market value assessment have been the most common. A recent survey indicates 43 states have laws of this nature (Gloudemans 1979). Of these, 27 include forest land as a class of eligible property (Forest Industries Committee on Timber Valuation and Taxation 1980).

In Tennessee, four classes of rural property became eligible for use value assessment with passage of the Agricultural, Forest and Open Space Land Act of 1976 (Tennessee Code Annotated, Sections 67-650 through 67-658).[1] As implied by the Act's title, these included:

- *Agricultural land*—defined as tracts of 15 or more acres, inclusive of intermixed woodland or wasteland, which are devoted to growing crops or animals as a farm unit.
- *Forest land*—defined as tracts of 15 or more acres which are devoted to growing trees under a sound program of management.
- *Open space land*—defined as tracts of other than agricultural or forest land that are three or more acres in size, characterized by natural conditions and designated by the State Planning Office or appropriate local planning commission as areas that should be left undeveloped.

The fourth classification—*open space easement*—consists of otherwise unqualified rural properties whose development has been restricted, by contract with the State Commissioner of Conservation, for a period of at least 10 years.

Enrollment under the Tennessee Act is strictly voluntary. Interested owners must file a written application with the tax assessor in the county where their property is located. If all statutory requirements are met, their land, but not the improvements thereon, is assessed and taxed on the basis of its current-use value. This is defined to mean market value assuming there is no possibility of the land being utilized for anything but its present use.[2] Such treatment continues, without further application, until the property is either sold, developed for a higher use or withdrawn from participation. In the event of a sale, the new owner may apply for continued use valuation if eligibility is retained. However, properties developed or withdrawn from participation revert to market based assessment. In addition, owners who develop their properties are subject to a rollback tax. For agricultural or forest land, it equals the taxes saved (i.e. fair market value taxes minus current-use value taxes) over the preceding 3 years. For open space land, it equals the taxes saved over the preceding 5 years. No interest penalty is added to the rollback tax.

As they have grown in number and importance, use value assessment laws like Tennessee's have become increasingly controversial. One area of controversy

[1]Two other special provisions relating to the taxation of rural lands were adopted in 1973. The first exempts all growing crops, including timber, from the property tax (Tennessee Code Annotated, Section 67-502). The second classifies all real property according to use and set a specific assessment ratio for each class. This provision provides that all farm, forest and recreational lands are to be classified as "farm property" and assessed at a ratio of 25 percent of fair market value (Tennessee Code Annotated, Sections 67-601, 67-606 and 67-611).

[2]The Act provides that in determining the current-use value of agricultural or forest land the assessor shall consider farm income, soil productivity, topography, susceptibility to flooding, rental value, replaceability as agricultural land for the production of food and fiber, and any other factors which may serve to determine value for agricultural or timber production purposes.

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has concerned propriety. Critics contend that such laws are undesirable on both economic efficiency and equity grounds. Regarding efficiency, it is argued they interfere with the free functioning of the real estate market, and thus preclude achieving an optimum allocation of resources (Hady 1970, Waldrop 1976). As regards equity, it is argued they violate the principle that equals, in terms of their ability to pay, should be taxed equally (Atkinson 1977).[3]

A second area of controversy has concerned effectiveness. Critics contend there are at least two reasons why use value laws are likely to be of limited usefulness as a means of preserving rural lands. The first is that too many property owners will be unable to resist the potentially large capital gains realizable through land sales and development (Coughlin et. al. 1978, Henke 1974, Keene et. al. 1976). The second is that the tax subsidy represented by use value assessment, since it will likely be capitalized into higher land values, will only influence the development decisions of initial property owners (Atkinson 1977).

Finally, a third area of controversy has concerned the fiscal impacts of current-use assessment statutes. Critics contend that besides the possibility of increased administrative expenses, these impacts may take 1 of 2 forms. Which form is incurred will depend on whether or not the responsible units of government increase tax rates above pre-use valuation levels. If rates are not raised, total tax revenues will decline as the value of the assessment base is reduced. This implies that ineligible and nonparticipating property owners will likely receive fewer public services for their tax expenditures. If rates are raised, these same property owners will bear a larger portion of the total annual property tax burden.

In this study, the fiscal impacts of Tennessee's Agricultural, Forest and Open Space Land Act were evaluated. Specific objectives were: (1) to determine the extent of use and nature of the users; (2) to determine the effects on property appraisals, assessments and taxes; (3) to evaluate the potential impacts on county tax revenues, and (4) to evaluate the possible tax-shifting implications. In addressing these objectives, not only were the total fiscal impacts of the Act estimated—but also the proportions specifically attributable to participating forest and nonforest lands.

METHODS

Data Collection

Two levels of sampling were required to keep the size of the data collection task within manageable bounds. First, a sample of study counties had to be chosen. Secondly, for those counties where the Act was being used, a sample of participating properties had to be selected.

Study counties were chosen by means of simple random sampling. As each selection was made, the local assessor was contacted to determine if any properties had been classified under the Act. This process was continued until 20 counties with participating properties were identified. As indicated in figure 1, 45 selections were required to reach this target. The sample that was obtained was reasonably well distributed

[3]Proponents of this argument consider wealth, not income, to be the appropriate indicator of ability to pay.

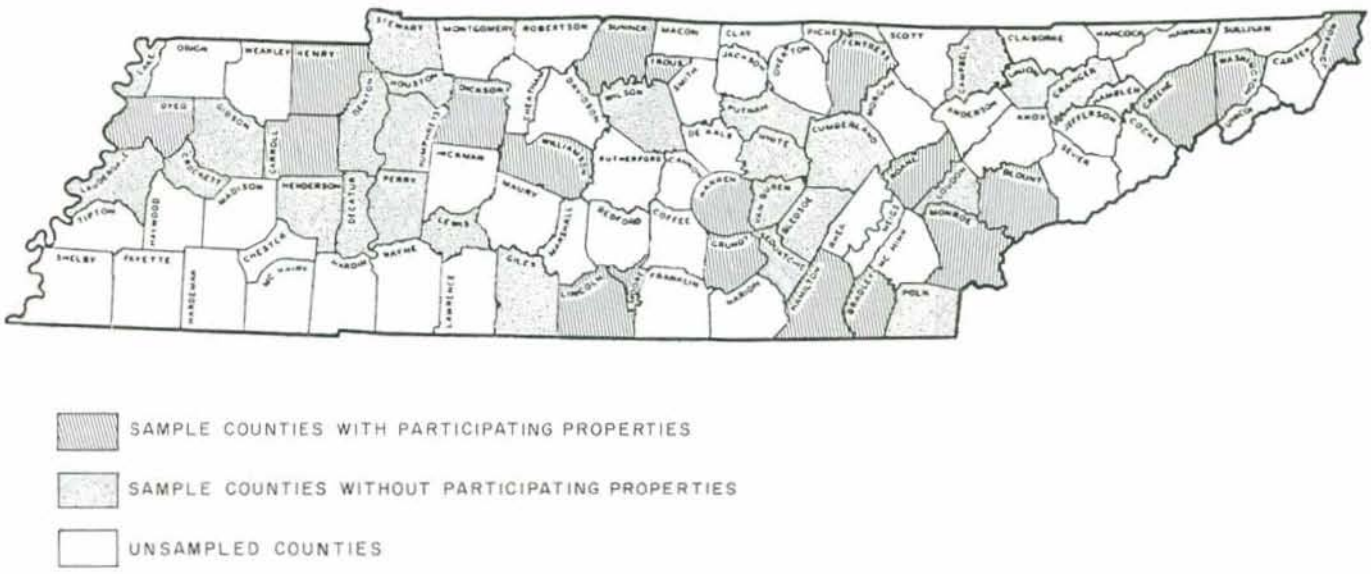

Figure 1.—*Map of Tennessee showing location of sample counties.*

throughout the state, and included a fairly representative mix of both rural and urban counties.

In counties where the number of participating properties was less than or equal to 100, data were recorded for each. In all other cases, stratified random sampling was employed. Strata corresponded to the four land use classes recognized in the Act. The sampling intensity, and thus total sample size, varied with the number of "parcels" enrolled.[4] In counties with between 101 and 200 parcels, a 50 percent sample was taken; in those with between 201 and 300 parcels, the sampling intensity was 33 percent; in those with between 301 and 400 parcels, a 25 percent sample was taken, and so on. The total sample, however large, was allocated among strata on the basis of the proportion of participating properties in each land use class.

Data were ultimately obtained for 698 parcels. For each this consisted of: (1) the land use class, (2) the name and address of the owner, (3) the total acreage, (4) the total fair market value assessment, (5) the total current-use value assessment, (6) the forest acreage, (7) the forest fair market value assessment, (8) the forest current-use value assessment and (9) the applicable tax rate. In addition, the total assessed value of all taxable property was recorded for each county visited. All of this information was readily available since assessors are required, by law, to keep two sets of records for all properties classified under the Act (Tennessee Code Annotated, Section 67-657). These show assessments and taxes in both fair market and current-use value terms.

Data Analysis

Distinctions between the four land use classes identified in the Act were preserved only to the extent required for estimating valid population totals in counties where stratified random sampling was employed. In accordance with the objectives of the study, three different classes of land were recognized for purposes of presenting study results. These were "forest", "nonforest" and "total" (i.e. forest and nonforest lands combined). This reorganization of the data was possible because county tax records disaggregated the "total" acreage and assessment figures of all enrolled parcels into certain component parts, one of which was forest land.

Determining Extent of Use and Nature of Users.—Usage of the Act was measured in terms of the number of participating properties, acreage of participating properties, and acreage of participating properties as a percentage of total eligible acreage. The first measure was determined directly from county tax records. The second had to be developed from the acreage information collected during sampling. In this regard, since separate "total" and "forest" acreage figures were available, it was possible to calculate the amount of participating "nonforest" land as a residual. Finally, the third measure was derived from the second and from estimates of the amounts of each type of land eligible for enrollment under the Act. The latter were computed using data from several sources.[5] For purposes of these computations, the "total" amount of eligible land was defined as the total area of a county less the acreages under water, in towns and cities, or in federal or state ownership; the amount of eligible "forest" land was defined as the acreage of commercial forest held by industrial, farmer and miscellaneous private owners; and the amount of eligible "nonforest" land was defined as the difference between the two preceding values—i.e. the total eligible acreage minus the eligible forest acreage.

Only two user characteristics were considered in the study. These were ownership class and average parcel size. The first was inferred from the name and address information collected during sampling. The second was determined by dividing the amount of each type of enrolled land by the number of participating parcels.

Determining Effects on Appraisals, Assessments and Taxes.—The effects of the Act on the valuation and taxation of participating properties were evaluated by calculating average per acre appraisals, assessments and taxes in both fair market and current-use value terms—and then subtracting the latter from the former. These calculations were performed using the assessment, tax rate and acreage data collected during sampling. Appraisals were derived by multiplying assessments by a factor of four.[6] Taxes were calculated by dividing assessments by 100 and multiplying the quotient by the tax rate.[7] The acreage figures were used to express all values on a per acre basis. Since "forest" as well as "total" acreage and assessment data were available, it was possible to develop averages for each land type—including "nonforest".

[4]In Tennessee, property tax records are kept on the basis of "parcels". Throughout the paper this word is used interchangeably with the words "property" and "properties." None of them should be interpreted as representing a single owner's entire land holdings. A "parcel" is simply one contiguous tract held by a single owner. While many ownerships occur as single tracts, others do not. Where an owner holds multiple tracts, each one constitutes a separate "parcel" with its own set of records.

[5]Estimates of the total amount of eligible land were obtained using information from three sources—the USDA Economics, Statistics, and Cooperatives Service; The Division of Planning and Development, Tennessee Department of Conservation; and the Tennessee Wildlife Resources Agency. Estimates of the amount of eligible forest land were determined from U.S. Forest Service survey statistics (Earles 1973).

[6]As noted earlier, all Tennessee "farm property"—which includes agricultural, forest and open space land—is assessed at a ratio of 25 percent.

[7]Tax rates in Tennessee show dollars of tax per $100 of assessed valuation.

Evaluating Potential Tax Revenue and Tax-Shifting Implications.—The effects of the Act on county tax revenues and tax-shifting were evaluated under the assumption that the responsible units of government had raised tax rates so as to stabilize annual tax revenues. Consistent with this assumption, the first part of the analysis did not seek to estimate the actual revenue declines experienced in each study county because these, by definition, would have been equal to zero. Instead, attention was focused on estimating the declines that would have occurred had tax rates been held constant as the Act was implemented. In this sense, the revenue impact analysis dealt with potentialities only. This is not true of the tax-shifting analysis, however. Tax-shifting was measured in three ways: the average increase in tax rates required to keep revenues stable, the total dollar amount of taxes shifted, and the percentage of the total tax burden shifted. Given that the study's basic premise is valid, each of these measures provides an estimate of the actual redistributive consequences of assessing farm, forest and open space land on the basis of current-use.

Additional details concerning the procedures employed in all phases of the study are available in the appendix.

RESULTS AND DISCUSSION

Extent of Use and Nature of Users

Extent of Use.—Key findings relating to use of the Agricultural, Forest and Open Space Land Act are presented in table 1. Several points warrant emphasis.

First, usage is quite variable. At one extreme, in 56 percent of the sample counties (i.e. 25/45 × 100), no one has taken advantage of the Act. At the other extreme, in Williamson County, 2,194 parcels totaling 258,234 acres have been enrolled. This represents fully 73 percent of the eligible land in the county.

Secondly, the Act, on the whole, is not being widely utilized. Considering all 45 sample counties, the average county contains only 100 participating parcels having a combined acreage of 9,871 acres. This represents only 3.23 percent of the eligible land. Even if attention is limited to the 20 study counties where the law is being employed, the average use level is not high. The mean values for the various measures are 225 participating parcels, 22,210 acres of enrolled land and 7.27 percent of all eligible land.

Finally, the amount of nonforest land classified under the Act generally exceeds the amount of forest land. Indeed, this is true in both absolute and relative terms. Over all sample counties, enrollments averaged 5,578 acres, or 3.64 percent, of the eligible nonforest land as opposed to only 4,293 acres, or 2.96 percent, of the eligible forest land. For just those counties where the law has been applied, the comparable averages are 12,552 acres, or 8.19 percent, for nonforest land and 9,659 acres, or 6.66 percent, for forest land.

The generally low levels of use appear to be attributable to several factors. One is the relative newness of the Act and consequent unfamiliarity with it. Another is that landowners in many counties presently have little or no incentive to seek a change in their valuation basis. In some instances this is because the highest and best use of most eligible land is for agricultural, forest or open space purposes. In other cases it is due to the fact that fair market value assessments have been allowed to fall substantially behind actual fair market values. Data provided by the State Board of Equalization indicate that, for 1980, the average ratio of appraised to market value was less than or equal to 0.50 in 10, and 0.75 in 34, of the study counties.[8] Finally, two other factors which may be operative in limiting use are: (1) resistance to change on the part of local tax officials; and (2) landowner reluctance, because of the penalty that would accompany subsequent changes in land use, to have their properties classified under the Act.[9]

The reasons why usage of the Act varies substantially among counties are largely unclear. Based on the rationale for its passage and the results of an earlier study of its adoption by farmland owners (Klindt and Graham 1979), it was hypothesized that usage would be greater in urban counties and counties where fair market value assessments accurately reflected current market values. However, testing aimed at evaluating these hypothesis failed to demonstrate their importance. With regard to the first, of three variables tested—total population, percent of county population urban and population per square mile—none were found to be significantly correlated ($\alpha = 0.05$) to the total acreage participation percents. With regard to the second, while both of the variables tested—years since reappraisal[10] and average ratio of appraised to market value—were found to be significantly related ($\alpha = 0.05$) to the total acreage participation percents; neither of the correlation coefficients was particularly high. The values were −0.32 for the number of years

[8]For any county, the ratios being referred to show what percentage of actual market value, as determined from transactions evidence, is typically being reflected in current assessments. Ideally the ratio should be 1.000, thus indicating that properties are being assessed at 100 percent of fair market value.

[9]Logically the penalty should not be a deterrent to participation. No interest charges are added to the rollback taxes, and in cases where the property is sold, and tax will normally fall on the subsequent owner.

[10]Reappraisals are conducted periodically for the purpose of bringing all property valuations within a given county up to 100 percent of fair market value.

Table 1.—*Alternate measures of the extent to which the Agricultural, Forest and Open Space Land Act is being utilized in selected Tennessee counties, 1980*

County	Participating parcels	Amount of participating property			Proportion of eligible land participating		
		Forest land	Nonforest land	Total	Forest land	Nonforest land	Total
	number	*acres*			*percent*		
Blount	12	.....	460.8	460.8	.....	0.48	0.21
Bradley	59	1,492.7	3,988.4	5,481.1	1.40	4.17	2.71
Carroll	188	1,227.2	6,926.6	8,153.8	0.92	3.81	2.59
Dickson	219	9,992.4	13,952.0	23,944.4	6.26	10.13	8.05
Dyer	20	44.0	1,540.0	1,584.0	0.07	0.59	0.49
Fentress	1	.....	30.0	30.0	.....	0.04	0.01
Greene	43	438.6	2,162.9	2,601.5	0.44	0.92	0.78
Grundy	23	519.8	1,794.0	2,313.8	0.28	6.37	1.08
Hamilton	106	926.6	4,461.0	5,385.6	0.56	4.70	2.06
Henry	8	155.2	455.2	610.4	0.15	0.19	0.18
Johnson	4	11.6	79.2	90.8	0.02	0.13	0.07
Lincoln	7	.....	186.2	186.2	.....	0.08	0.05
Monroe	1,436	61,121.2	56,735.8	117,857.0	38.96	51.08	43.98
Moore	4	.....	296.0	296.0	.....	0.63	0.38
Roane	5	26.6	120.4	147.0	0.03	0.15	0.08
Sumner	97	358.9	6,838.5	7,197.4	0.37	3.27	2.35
Trousdale	5	34.5	223.0	257.5	0.15	0.50	0.38
Warren	3	.....	102.9	102.9	.....	0.06	0.04
Washington	149	1,639.0	7,628.8	9,267.8	3.63	7.59	6.36
Wiliamson	2,194	115,185.0	143,048.8	258,233.8	79.77	68.80	73.30
Means[1]	225	9,658.6	12,551.6	22,210.2	6.66	8.19	7.27
Means[2]	100	4,292.7	5,578.5	9,871.2	2.96	3.64	3.23

[1]Column totals divided by 20 (i.e. number of sample counties with participating properties).
[2]Column totals divided by 45 (i.e. total number of counties sampled).

since reappraisal and 0.33 for the average ratio of appraised to market value. While both coefficients suggest that usage is directly related to the accuracy of assessments, either variable by itself would account for only about 10 percent of the observed variation in use.[11]

Nature of Users.—Within the sample counties, only nonindustrial private owners were found to be taking advantage of the Act. As might be expected given this situation, average parcel sizes tended to be small (table 2). For forest and nonforest lands combined, the range was from 22.7 acres in Johnson County to 117.7 acres in Williamson County. The mean, over all counties, was 98.4 acres. Of this total, 55.6 acres, or 57 percent, was nonforest land, and 42.8 acres, or 43 percent, was forest land.

Responses provided by the major corporate forest landowners in the state indicate that the Act has not been used because most industry lands are located in rural areas where their highest and best use is for

[11]Since both variables are highly intercorrelated (−0.85), only one could be incorporated into a regression equation to predict use. For either, the amount of variation which it would explain can be estimated by squaring its correlation coefficient. See: F. Freese. 1967. Elementary Statistical Methods For Foresters. U.S. Dept. Agric. Agric. Handb. 317. 87p.

Table 2.—*Average acreage of participating parcels in selected Tennessee counties, 1980*

County	Class of property		
	Forest land	Nonforest land	Total
	ac/parcel		
Blount	.....	38.4	38.4
Bradley	25.3	67.6	92.9
Carroll	10.4	58.7	69.1
Dickson	45.6	63.7	109.3
Dyer	2.2	77.0	79.2
Fentress	.....	30.0	30.0
Greene	10.2	50.3	60.5
Grundy	22.6	78.0	100.6
Hamilton	8.7	42.1	50.8
Henry	19.4	56.9	76.3
Johnson	2.9	19.8	22.7
Lincoln	.....	26.6	26.6
Monroe	42.6	39.5	82.1
Moore	.....	74.0	74.0
Roane	5.3	24.1	29.4
Sumner	3.7	70.5	74.2
Trousdale	6.9	44.6	51.5
Warren	.....	34.3	34.3
Washington	11.0	51.2	62.2
Williamson	52.5	65.2	117.7
Means[1]	42.8	55.6	98.4

[1]Weighted average of figures shown. Weights correspond to the number of participating parcels in each county.

timber production.[12] If future development should alter this situation, most companies would seek classification. There were exceptions, however. One firm indicated it would not apply for use valuation because it was convinced that such an action would be injurious from a public relations standpoint.

Effects on Property Appraisals, Assessments, and Taxes

All study findings pertaining to the effects of the Act on the valuation and taxation of participating properties are presented in tables 3, 4 and 5. Table 3 shows average per acre appraisals, assessments and taxes in fair market value terms; table 4 provides equivalent information in current-use value terms, and table 5 indicates the differences between the two sets of figures—i.e. the value and tax impacts attributable to the Act.[13]

Fair Market Values.—Average total fair market value appraisals vary from $393.80 per acre in Henry County to $4,071.04 in Roane County. The mean is $661.68. Not surprisingly, nonforest land values are considerably higher than those for forest land. Appraisals for the former range from $523.36 per acre in Moore County to $2,768.24 in Roane County; the mean is $885.60. Appraisals for the latter range from $162.76 per acre in Greene County to $4,443.60 in Roane County, with the mean being $368.76.

Fair market value assessments, being 25 percent of appraisals, show the same relationships. Average total assessments vary from $98.45 per acre to $767.85. The mean is $165.42. Nonforest land assessments, except for Roane County, exceed those of forest tracts. The respective means are $221.40 per acre and $92.19 per acre.

The taxes that participating property owners would pay without use valuation are substantial. For all enrolled lands, the range is from $2.24 per acre in Moore County to $25.31 in Roane County; with the mean being $4.45. For nonforest land alone, the average tax is $6.09 per acre and the range is from $3.18 to $22.80. Finally, forest land alone, taxes are lowest in Grundy County, $1.29 per acre, and highest in Roane County, $33.65. The mean of all counties is $2.34. This is considerably higher than the average tax paid by industrial forest landowners throughout the South. The latter has been estimated at $1.35 per acre (Hargreaves 1978).[14]

Current-Use Values.—Surprisingly, average total use value appraisals vary widely, from $231.40 per acre in Henry County to $1,145.80 per acre in Hamilton County. The mean is $372.28. Forest appraisals, reflecting the more limited income producing potential of such lands, are consistently below those for nonforest land. The means are $163.40 per acre and $525.64 per acre, respectively.

The constant assessment ratio causes use value assessments to parallel appraisals. For forest and nonforest lands combined, they range from $57.85 per acre to $286.45, with the mean being $93.07. Comparable figures for forest land alone are $15.62, $106.57 and $40.85, respectively. For nonforest land, assessments vary from a low of $64.95 per acre to a high of $323.68 per acre. The mean is $131.41.

Considering all enrolled land within the study counties, the average use value tax is $2.41 per acre. Participating property owners in Blount County pay the highest tax, $11.26 per acre, while those in Monroe County pay the lowest, $1.70 per acre. The mean tax on forest land is just under a dollar per acre. Johnson County imposes the heaviest burden, $3.19 per acre, Henry County the lightest, 68 cents per acre. Taxes on nonforest land, without exception, are greater than those on forest land. They range from $1.81 per acre in Moore County to $12.24 per acre in Hamilton County. The mean is $3.50.

Value Changes.—Use valuation causes average total appraisals to decrease markedly within the sample counties. The mean decline is $289.40 per acre. Reductions range from $122.36 per acre in Monroe County to $2,497.48 per acre in Roane County. Except for Trousdale County, the declines are greatest on nonforest lands. For such property, reductions range from $114.52 to $2,131.44 per acre; the mean is $359.96. By comparison, declines in forest appraisals vary from nothing in Dyer County to $4,156.40 per acre in Roane County. The overall average is $205.36 per acre.

Because of the fixed relationship between the two variables, changes in assessments parallel those in appraisals. The mean reductions for each type of land—total, nonforest and forest—are $72.35, $89.99 and $51.34 per acre, respectively.

Turning finally to the tax change figures, it is apparent that participating property owners are receiving

[12]By chance, the sample counties failed to encompass some important concentrations of industrial forest ownership. The southwestern corner of the state is a good example.

[13]Two points should be kept in mind when interpreting the figures presented in this paper. First, the fair market value figures are probably not representative of most rural lands in the study counties. Logically the properties enrolled under the Act should be those of higher value. Secondly, in some counties the number of participating parcels was small. Consequently the figures are based on only a few observations.

[14]The actual figure reported by Hargreaves was $0.88 per acre and was for the year 1975. To make it comparable to the other figures reported in this paper, it has been adjusted to account for the impact of inflation over the interval from 1975 to 1980. Adjustments were made using annual changes in the consumer price index.

Table 3.—*Average per acre fair market value appraisal, assessment, and tax data for participating properties in selected Tennessee counties, 1980*

County	Appraisals			Assessments			Taxes		
	Forest land	Nonforest land	Total	Forest land	Nonforest land	Total	Forest land	Nonforest land	Total
	$/ac.			$/ac.			$/ac.		
Blount	.....	1,535.64	1,535.64	.....	383.91	383.91	.....	15.90	15.90
Bradley	265.12	743.12	612.96	66.28	185.78	153.24	2.29	6.56	5.40
Carroll	260.00	815.48	731.88	65.00	203.87	182.97	2.05	6.40	5.74
Dickson	356.68	677.16	543.40	89.17	169.29	135.85	2.10	3.98	3.19
Dyer	225.44	1,239.12	1,210.96	56.36	309.78	302.74	1.57	9.71	9.48
Fentress	.....	1,500.00	1,500.00	.....	375.00	375.00	.....	11.27	11.27
Greene	162.76	741.48	643.92	40.69	185.37	160.98	1.99	9.42	8.17
Grundy	297.00	1,005.68	846.48	74.25	251.42	211.62	1.29	4.37	3.68
Hamilton	602.60	1,682.72	1,497.44	150.65	420.68	374.36	4.66	15.97	14.03
Henry	223.52	451.88	393.80	55.88	112.97	98.45	2.56	5.43	4.70
Johnson	811.04	1,466.68	1,382.92	202.76	366.67	345.73	7.24	16.28	15.12
Lincoln	.....	1,199.84	1,199.84	.....	299.96	299.96	.....	13.10	13.10
Monroe	310.16	723.36	509.08	77.54	180.84	127.27	1.36	3.18	2.24
Moore	.....	523.36	523.36	.....	130.84	130.84	.....	3.65	3.65
Roane	4,443.60	2,768.24	3,071.04	1,110.90	692.06	767.85	36.65	22.80	25.31
Sumner	451.88	869.44	848.64	112.97	217.36	212.16	4.38	9.37	9.13
Trousdale	521.72	708.32	683.32	130.43	177.08	170.83	4.64	6.51	6.26
Warren	.....	736.44	736.44	.....	184.11	184.11	.....	9.65	9.65
Washington	247.28	930.24	809.44	61.82	232.56	202.36	2.28	8.43	7.34
Williamson	403.20	948.72	705.40	100.80	237.18	176.35	2.85	6.70	4.98
Means[1]	368.76	885.60	661.68	92.19	221.40	165.42	2.34	6.09	4.45

[1]Weighted average of figures shown. Weights correspond to the acreages of each type of participating property in each county.

Table 4.—*Average per acre current-use value appraisal, assessment, and tax data for participating properties in selected Tennessee counties, 1980*

County	Appraisals			Assessments			Taxes		
	Forest land	Nonforest land	Total	Forest land	Nonforest land	Total	Forest land	Nonforest land	Total
	$/ac.			$/ac.			$/ac.		
Blount	.....	1,088.32	1,088.32	.....	272.08	272.08	.....	11.26	11.26
Bradley	180.08	412.08	349.40	45.02	103.20	87.35	1.55	3.57	3.02
Carroll	175.76	564.08	505.64	43.94	141.02	126.41	1.37	4.38	3.93
Dickson	233.48	478.08	376.00	58.37	119.52	94.00	1.37	2.81	2.21
Dyer	225.44	700.56	687.36	56.36	175.14	171.84	1.57	5.39	5.28
Fentress	.....	500.00	500.00	.....	125.00	125.00	.....	3.73	3.73
Greene	103.12	393.40	344.48	25.78	98.35	86.12	1.26	4.59	4.03
Grundy	254.32	673.28	579.16	63.58	168.32	144.79	1.11	2.93	2.52
Hamilton	426.28	1,294.72	1,145.80	106.57	323.68	286.45	2.84	12.24	10.63
Henry	62.48	289.00	231.40	15.62	72.25	57.85	0.68	3.25	2.60
Johnson	353.12	736.96	687.92	88.28	184.24	171.98	3.19	8.07	7.44
Lincoln	.....	389.92	389.92	.....	97.48	97.48	.....	4.09	4.09
Monroe	189.00	599.76	386.72	47.25	149.94	96.68	0.83	2.64	1.70
Moore	.....	259.80	259.80	.....	64.95	64.95	.....	1.81	1.81
Roane	287.20	636.80	573.56	71.80	159.20	143.39	2.41	5.22	4.71
Sumner	313.52	551.04	539.20	78.38	137.76	134.80	3.05	5.90	5.76
Trousdale	217.40	593.80	543.36	54.35	148.45	135.84	1.94	5.46	4.99
Warren	.....	327.60	327.60	.....	81.90	81.90	.....	3.53	3.53
Washington	141.80	587.56	508.76	35.45	146.89	127.19	1.31	5.29	4.58
Williamson	141.04	471.40	324.04	35.26	117.85	81.01	1.00	3.33	2.29
Means[1]	163.40	525.64	372.28	40.85	131.41	93.07	.99	3.50	2.41

[1]Weighted average of the figures shown. Weights correspond to the acreages of each type of participating property in each county.

Table 5.—*Average decline in per acre appraisals, assessments, and taxes for participating properties in selected Tennessee counties, 1980*

County	Appraisals			Assessments			Taxes		
	Forest land	Nonforest land	Total	Forest land	Nonforest land	Total	Forest land	Nonforest land	Total
	$/ac.			$/ac.			$/ac.		
Blount	.....	447.32	447.32	.....	111.83	111.83	.....	4.64	4.64
Bradley	85.04	331.04	263.56	21.26	82.58	65.89	0.74	2.99	2.38
Carroll	84.44	251.40	226.24	21.06	62.85	56.56	0.68	2.02	1.81
Dickson	123.20	199.08	167.40	30.80	49.77	41.85	0.73	1.17	0.98
Dyer	0.00	538.56	523.60	0.00	134.64	130.90	0.00	4.32	4.20
Fentress	.....	1,000.00	1,000.00	.....	250.00	250.00	.....	7.54	7.54
Greene	59.64	348.08	299.44	14.91	87.02	74.86	0.73	4.83	4.14
Grundy	42.68	332.40	267.32	10.67	83.10	66.83	0.18	1.44	1.16
Hamilton	176.32	388.00	351.64	44.08	97.00	87.91	1.82	3.73	3.40
Henry	161.04	162.88	162.40	40.26	40.72	40.60	1.88	2.18	2.10
Johnson	457.92	729.72	695.00	114.48	182.43	173.75	4.05	8.21	7.68
Lincoln	.....	809.92	809.92	.....	202.48	202.48	.....	9.01	9.01
Monroe	121.16	123.60	122.36	30.29	30.90	30.59	0.53	0.54	0.54
Moore	.....	263.56	263.56	.....	65.89	65.89	.....	1.84	1.84
Roane	4,156.40	2,131.44	2,497.48	1,039.10	532.86	624.46	34.24	17.58	20.60
Sumner	138.36	318.40	309.44	34.59	79.60	77.36	1.33	3.47	3.37
Trousdale	304.32	114.52	139.96	76.08	28.63	34.99	2.70	1.05	1.27
Warren	.....	408.84	408.84	.....	102.21	102.21	.....	6.12	6.12
Washington	105.48	342.68	300.68	26.37	85.67	75.17	0.97	3.14	2.76
Williamson	262.16	477.32	381.36	65.54	119.33	95.34	1.85	3.37	2.69
Means[1]	205.36	359.96	289.40	51.34	89.99	72.35	1.35	2.59	2.04

[1]Weighted average of figures shown. Weights correspond to the acreages of each type of participating property in each county.

significant tax relief as a consequence of the Act. For all enrolled land, the average decline in taxes is $2.04 per acre. Reductions are greatest, $20.60 per acre, in Roane County and smallest, 54 cents per acre, in Monroe County. In general, taxes on nonforest land have decreased more than those on forest land. For the former, the mean tax savings is $2.59 per acre. Reductions in individual counties vary from 54 cents per acre to $17.58 per acre. For the latter, the mean savings is only $1.35 per acre. Declines in individual counties range from zero to $34.24 per acre.

The figures in table 5 show that, in absolute terms, nonforest owners are receiving greater tax relief under the Act than forest owners. In percentage terms, however, the opposite relationship generally exists. Considering all study counties, the mean reduction in per acre appraisals, assessments and taxes was 56 percent for forest land as opposed to only 41 percent for nonforest land (table 6).[15] For both types of land combined, the comparable figure was 44 percent.

Table 6.—*Average percentage decline in per acre appraisals, assessments, and taxes for participating properties in selected Tennessee counties, 1980*

County	Class of property		
	Forest land	Nonforest land	Total
	percent		
Blount	.....	29.15	29.15
Bradley	32.16	44.89	43.36
Carroll	32.68	31.07	31.12
Dickson	34.61	29.40	30.78
Dyer	0.00	43.80	43.59
Fentress	.....	66.75	66.75
Greene	36.65	48.38	47.89
Grundy	14.23	33.02	31.56
Hamilton	32.53	23.16	23.73
Henry	72.51	37.41	42.39
Johnson	56.29	49.98	50.44
Lincoln	.....	67.93	67.93
Monroe	39.03	17.05	24.06
Moore	.....	50.38	50.38
Roane	93.50	77.04	81.35
Sumner	30.54	36.76	36.61
Trousdale	58.28	16.16	20.42
Warren	.....	58.15	58.15
Washington	42.62	36.98	37.30
Williamson	64.98	50.31	54.05
Means[1]	56.36	41.28	44.44

[1]Weighted average of the figures shown. Weights correspond to the

Effects on Tax Revenues and Tax-Shifting

Tax Revenues.—The impacts which the Act would have had on aggregate annual tax revenues if tax

[15]The percentages were obtained by dividing the values in table 5 by the corresponding fair market values in table 3 and multiplying the

rates had been held constant at pre-use valuation levels are shown in table 7. As can be seen, in most study counties the declines are quite small. The mean reduction is $42,113. Of this total, $30,066, or 71 percent, is attributable to participating nonforest land and $12,047, or 29 percent, to participating forest land. While this may seem like a significant loss, it represents only 0.78 percent of the $6,195,060 in property tax revenues collected annually in the average study county. The largest decline, an estimated $636,816, occurred in Williamson County where almost three-quarters of the eligible land had been enrolled under the Act. The smallest decline, an estimated $224, occurred in Fentress County where there was only one participating parcel.

Tax-Shifting.—The estimated tax-shifting effects of the Act have been set forth in table 8. As can be seen, in most study counties the redistributive consequences are fairly minor. The following observations pertaining to the typical (i.e. mean) sample county confirm the validity of this point.

- The taxes of individual nonparticipants increase by only $2.08 per $10,000 of assessed valuation (i.e. 0.0208 × 10,000/100). Of this amount, 61 cents is attributable to the use valuation of forest land and $1.47 to nonforest land.
- The total amount of additional taxes collectively borne by all nonparticipants is only $39,191. Of this sum, $11,077, or 29 percent, is traceable to participating forest land and $28,114, or 71 percent, to participating nonforest land.
- The increase in the proportion of the aggregate annual property tax burden borne by all nonparticipants is only 0.74 percent. Of this increment, the portions attributable to forest and nonforest land are 0.23 and 0.51 percent, respectively.

Williamson was the only study county where a substantial degree of tax-shifting was observed. Here nonparticipating property owners pay an additional $23.65 in taxes per $10,000 of assessed valuation (i.e. 0.2365 × 10,000/100). The total tax shift is $587,341; which implies that nonparticipants collectively bear an additional 7.72 percent of the total property tax burden.

A comparison of the dollar tax-shifts in table 8 with the potential revenue losses in table 7 indicates that the latter are not avoided entirely at the expense of ineligible and nonparticipating property owners. This is because even participants are taxed at the higher rates required to avoid revenue declines. These rates apply to the value of their land, which is subject to use valuation—and also the value of any improvements, which are subject to market valuation. However, in some study counties the value of participating proper-

Table 7.—*Analysis of potential effects of current-use assessment on aggregate annual tax revenues in selected Tennessee counties, 1980*

County	Potential revenue decline by land type			Total annual property tax revenues	Total decline as percent of total ann. prop. tax revenues
	Forest land	Nonforest land	Total		
	dollars				*percent*
Blount	.....	2,133	2,133	10,003,364	.02
Bradley	1,097	11,379	12,476	6,091,952	.20
Carroll	799	13,454	14,253	2,929,489	.05
Dickson	7,161	16,148	23,317	2,215,286	1.05
Dyer	0	6,362	6,362	2,777,832	.23
Fentress	.....	224	224	677,196	.03
Greene	305	8,786	9,091	5,524,999	.16
Grundy	96	2,584	2,680	652,450	.41
Hamilton	1,511	16,050	17,561	52,950,234	.03
Henry	281	832	1,113	2,489,674	.04
Johnson	57	626	683	1,774,788	.04
Lincoln	.....	1,582	1,582	2,799,238	.06
Monroe	31,280	29,614	60,894	1,538,142	3.96
Moore	.....	543	543	485,717	.11
Roane	908	2,107	3,015	3,480,991	.09
Sumner	529	23,212	23,741	9,590,326	.25
Trousdale	96	234	330	479,520	.07
Warren	.....	453	453	2,299,686	.02
Washington	1,552	23,472	25,024	7,537,094	.33
Williamson	195,284	441,532	636,816	7,603,230	8.38
Means[1]	12,047	30,066	42,113	6,195,060	.79

ty was such a minute part of the total value of all taxable property—that the tax-shift though small, were essentially complete.

The results of the tax revenue and tax-shifting analyses are entirely consistent with the other study findings. Investigators (Gloudemans 1979, Keene et. al. 1976) have shown that in any taxing jurisdiction, the revenue and redistributive effects of a use value law are directly related to two factors: (1) the average reduction in assessments for participating properties, and (2) the percentage of the original tax base which is in participating property—i.e. the level of use. In the sample counties assessment reductions were generally substantial, but usage of the Act, except in Williamson and Monroe counties, was extremely low.

CONCLUSIONS

This investigation highlights a dilemma associated with all differential assessment laws. On the one hand, the less they are utilized the less effective they tend to be in achieving the goal of preserving rural lands. On the other hand, the more they are utilized the more costly they tend to be in terms of their impacts on tax revenues and tax-shifting. Assuming such statutes are viewed as serving a valid public purpose, the solution to this dilemma is to encourage their use—but only by the intended beneficiaries.

In Tennessee, to the extent that the Agricultural, Forest and Open Space Land Act is not being used because of the rural character of some counties, there is no problem requiring corrective action. In such areas, preferential assessment is simply not needed at the present time. However, where the low level of use is due to a lack of landowner awareness of the law, steps should be taken to increase such awareness. Failure to take appropriate action perpetuates an environment in which some rural lands, contrary to legislative intent, may be unnecessarily lost to development.

Looking to the future, there is every reason to believe that usage of the Act will increase—particularly if a conscientious effort is made to make more landowners aware of its existence. Information provided by the State Division of Property Assessments indicates that 26 counties are scheduled to undergo reappraisal within the next 4 years. As this occurs, assessed property values will be brought into line with current market values and many individuals will be confronted with higher tax bills. Of course as usage increases, so will the Act's impacts on tax revenues and tax-shifting (i.e. on nonparticipants). To minimize these costs, enrollment should be limited to those people interested in the sustained production of food and fiber, or the preservation of open space land. Usage by land speculators should be precluded to the extent possible.

Table 8.—*Results of the tax-shifting analysis for selected Tennesee counties, 1980*

County	Increase in tax rate required because of current-use assessment			Amount of taxes shifted because of current-use assessment			Percentage of total tax burden shifted because of current-use assessment		
	Forest land	Nonforest land	Total	Forest land	Nonforest land	Total	Forest land	Nonforest land	Total
	$/$100			*dollars*			*percent*		
Blount	.....	0.0009	0.0009	.....	2,131	2,131	.....	0.02	0.02
Bradley	0.0006	0.0065	0.0071	1,094	11,348	12,442	0.02	0.19	0.21
Carroll	0.0008	0.0143	0.0151	789	13,308	14,097	0.03	0.45	0.48
Dickson	0.0076	0.0170	0.0246	6,990	15,770	22,760	0.32	0.71	1.03
Dyer	0.0000	0.0070	0.0070	0	6,343	6,343	0.00	0.23	0.23
Fentress	.....	0.0010	0.0010	.....	224	224	.....	0.03	0.03
Greene	0.0003	0.0074	0.0077	305	8,769	9,074	0.01	0.15	0.16
Grundy	0.0003	0.0068	0.0071	95	2,561	2,656	0.01	0.40	0.41
Hamilton	0.0001	0.0011	0.0012	1,510	16,033	17,543	***[2]	0.03	0.03
Henry	0.0005	0.0015	0.0020	281	832	1,113	0.01	0.04	0.05
Johnson	0.0001	0.0016	0.0017	57	625	682	***	0.04	0.04
Lincoln	.....	0.0024	0.0024	.....	1,581	1,581	.....	0.05	0.05
Monroe	0.0358	0.0338	0.0696	27,207	25,756	52,963	1.77	1.67	3.44
Moore	.....	0.0031	0.0031	.....	543	543	.....	0.11	0.11
Roane	0.0008	0.0020	0.0028	908	2,107	3,015	0.03	0.06	0.09
Sumner	0.0002	0.0104	0.0106	527	23,111	23,638	0.01	0.24	0.25
Trousdale	0.0007	0.0018	0.0025	96	234	330	0.02	0.05	0.07
Warren	.....	0.0008	0.0008	.....	453	453	.....	0.02	0.02
Washington	0.0007	0.0113	0.0120	1,543	23,339	24,882	0.02	0.31	0.33
Williamson	0.0725	0.1640	0.2365	180,137	407,204	587,341	2.37	5.35	7.72
Means[1]	.0061	.0147	.0208	11,077	28,114	39,191	.23	.51	.74

[1]Arithmetic average of the figures shown.
[2]Negligible.

One change in the Tennessee law that would help to restrict its provisions to the intended beneficiaries would be the addition of an interest charge to the rollback tax that is collected at the time of a change in land use.[16] Many state statutes authorizing current-use assessment include such a provision (Gloudemans 1979). Also, the number of years considered in computing the rollback tax could be extended. In a somewhat different vein, the requirements for eligibility might be tightened. To illustrate, the law could be amended to require that participating property owners derive a certain minimum percentage of their income from their properties; or that they must devote their land to some qualified use for a specified number of years prior to seeking classification.

A final point which deserves to be mentioned concerns the need for review. The Agricultural, Forest and Open Space Land Act, like all public policies, should be periodically re-evaluated to verify that it is functioning as intended. Towards this end, the state should monitor such things as: (1) the acreage and geographical distribution of participating properties, (2) the acreage and geographical distribution of those properties being withdrawn from classification and (3) the length of time between the classification and declassification of participating properties. If such records reveal that a large percentage of the enrolled land is located outside of areas threatened by development or is being declassified within a few years of enrollment, the rationale for continuing the Act should be re-examined.

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[16]To be effective the interest charge must be greater than the rate at which a landowner could borrow from a commercial lending institution.

Appendix

This appendix describes in detail the procedures used to develop the area based measures of the Act's usage and to determine its effects on: (1) appraisals, assessments, and taxes of participating properties; (2) county tax revenues; and (3) tax-shifting. To the extent possible, the procedures are presented in equation form.

Notation

Notation for the data collected from county tax records is presented below:

- ta_{ij} = "total" acreage of the "i"th parcel in the "j"th land use class (i.e. strata).
- fa_{ij} = "forest" acreage of the "i"th parcel in the "j"th land use class (i.e. strata).
- $tfmvas_{ij}$ = "total" fair market value assessment of the "i"th parcel in the "j"th land use class (i.e. strata).
- $ffmvas_{ij}$ = "forest" fair market value assessment of the "i"th parcel in the "j"th land use class (i.e. strata).
- $tcuvas_{ij}$ = "total" current use value assessment of the "i"th parcel in the "j"th land use class (i.e. strata).
- $fcuvas_{ij}$ = "forest" current use value assessment of the "i"th parcel in the "j"th land use class (i.e. strata).
- r_{ij} = current (i.e. adjusted) tax rate applicable to the "i"th parcel in the "j"th land use class (i.e. strata).
- n_j = number of parcels sampled in the "j"th land use class (i.e. strata).
- N_j = number of parcels enrolled in the "j"th land use class (i.e. strata).
- TASVATP = total assessed value of all taxable property in the county. (Participating properties are included on the basis of their current use values.)

Other notation will be introduced and defined as necessary.

Developing the Area Based Measures of Usage

In counties where data were available for every enrolled parcel, the following formulas were used to determine how much of each type of land was classified under the Act.

$$TA = \sum_i \sum_j ta_{ij}$$

$$FA = \sum_i \sum_j fa_{ij}$$

$$NFA = \sum_i \sum_j ta_{ij} - fa_{ij}$$

Where:

- TA = "total" acreage classified under the Act.
- FA = "forest" acreage classified under the Act.
- NFA = "nonforest" acreage classified under the Act.

In counties where the participating properties were sampled, the desired acreage figures were calculated as indicated below:

$$TA = \sum_j N_j \left[\frac{\sum_{i=1}^{n_j} ta_{ij}}{n_j} \right]$$

$$FA = \sum_j N_j \left[\frac{\sum_{i=1}^{n_j} fa_{ij}}{n_j} \right]$$

$$NFA = \sum_j N_j \left[\frac{\sum_{i=1}^{n_j} ta_{ij} - fa_{ij}}{n_j} \right]$$

Once the aggregate amount of each type of participating property has been determined, the corresponding participation percentages are easily computed by expressing — for each type of land — the acreage enrolled under the Act as a percentage of the estimated acreage eligible for enrollment.

Determining the Effect on Appraisals, Assessments, and Taxes of Participating Properties

In counties that were completely enumerated, average per acre fair market value appraisals, assessments, and taxes — for each type of land — were calculated by means of the following formulas:

$$\overline{\text{TFMVAP}} = \frac{\sum_i \sum_j 4(\text{tfmvas}_{ij})}{\text{TA}}$$

$$\overline{\text{TFMVAS}} = \frac{\sum_i \sum_j \text{tfmvas}_{ij}}{\text{TA}}$$

$$\overline{\text{TFMVTX}} = \frac{\sum_i \sum_j r_{ij}\,(\text{tfmvas}_{ij} \div 100)}{\text{TA}}$$

$$\overline{\text{FFMVAP}} = \frac{\sum_i \sum_j 4(\text{ffmvas}_{ij})}{\text{FA}}$$

$$\overline{\text{FFMVAS}} = \frac{\sum_i \sum_j \text{ffmvas}_{ij}}{\text{FA}}$$

$$\overline{\text{FFMVTX}} = \frac{\sum_i \sum_j r_{ij}\,(\text{ffmvas}_{ij} \div 100)}{\text{FA}}$$

$$\overline{\text{NFFMVAP}} = \frac{\sum_i \sum_j 4\,(\text{tfmvas}_{ij} - \text{ffmvas}_{ij})}{\text{NFA}}$$

$$\overline{\text{NFFMVAS}} = \frac{\sum_i \sum_j \text{tfmvas}_{ij} - \text{ffmvas}_{ij}}{\text{NFA}}$$

$$\overline{\text{NFFMVTX}} = \frac{\sum_i \sum_j r_{ij} \left[\dfrac{\text{tfmvas}_{ij} - \text{ffmvas}_{ij}}{100} \right]}{\text{NFA}}$$

Where:

$\overline{\text{TFMVAP}}$ = average per acre "total" fair market value appraisal.

$\overline{\text{TFMVAS}}$ = average per acre "total" fair market value assessment.

$\overline{\text{TFMVTX}}$ = average per acre "total" fair market value tax.

$\overline{\text{FFMVAP}}$ = average per acre "forest" fair market value appraisal.

$\overline{\text{FFMVAS}}$ = average per acre "forest" fair market value assessment.

$\overline{\text{FFMVTX}}$ = average per acre "forest" fair market value tax.

$\overline{\text{NFFMVAP}}$ = average per acre "nonforest" fair market value appraisal.

$\overline{\text{NFFMVAS}}$ = average per acre "nonforest" fair market value assessment.

$\overline{\text{NFFMVTX}}$ = average per acre "nonforest" fair market value tax.

In counties that were sampled, the desired appraisal, assessment, and tax figures were derived using the relationships indicated below:

$$\overline{\text{TFMVAP}} = \frac{\sum_j N_j \left[\dfrac{\sum_{i=1}^{n_j} 4(\text{tfmvas}_{ij})}{n_j} \right]}{\text{TA}}$$

$$\overline{\text{TFMVAS}} = \frac{\sum_j N_j \left[\dfrac{\sum_{i=1}^{n_j} \text{tfmvas}_{ij}}{n_j} \right]}{\text{TA}}$$

$$\overline{\text{TFMVTX}} = \frac{\sum_{j} N_j \left[\frac{\sum_{i=1}^{n_j} r_{ij} \, (\text{tfmvas}_{ij} \div 100)}{n_j} \right]}{\text{TA}}$$

$$\overline{\text{FFMVTX}} = \frac{\sum_{j} N_j \left[\frac{\sum_{i=1}^{n_j} r_{ij} \, (\text{ffmvas}_{ij} \div 100)}{n_j} \right]}{\text{FA}}$$

$$\overline{\text{FFMVAP}} = \frac{\sum_{j} N_j \left[\frac{\sum_{i=1}^{n_j} 4(\text{ffmvas}_{ij})}{n_j} \right]}{\text{FA}}$$

$$\overline{\text{NNFMVAP}} = \frac{\sum_{j} N_j \left[\frac{\sum_{i=1}^{n_j} 4(\text{tfmvas}_{ij} - \text{ffmvas}_{ij})}{n_j} \right]}{\text{NFA}}$$

$$\overline{\text{FFMVAS}} = \frac{\sum_{j} N_j \left[\frac{\sum_{i=1}^{n_j} \text{ffmvas}_{ij}}{n_j} \right]}{\text{FA}}$$

$$\overline{\text{NFFMVAS}} = \frac{\sum_{j} N_j \left[\frac{\sum_{i=1}^{n_j} \text{tfmvas}_{ij} - \text{ffmvas}_{ij}}{n_j} \right]}{\text{NFA}}$$

$$\overline{\text{NFFMVTX}} = \frac{\sum_{j} N_j \left[\frac{\sum_{i=1}^{n_j} r_{ij} \left[\frac{\text{tfmvas}_{ij} - \text{ffmvas}_{ij}}{100} \right]}{n_j} \right]}{\text{NFA}}$$

Average per acre appraisals, assessments, and taxes — in current use value terms — were calculated in the same manner as their fair market value counterparts. The only modifications required in the formulas are that the "$tcuvas_{ij}$'s" are substituted for the "$tfmvas_{ij}$'s" and the "$fcuvas_{ij}$'s" for the "$ffmvas_{ij}$'s". As noted in the text, the average valuation and tax impacts of the Act were determined by deducting all current use values from the corresponding fair market values.

Determining the Effect on County Tax Revenues

To evaluate the potential effects of the Act on county tax revenues, it was first necessary to estimate the fair market value assessment of all taxable property. This was done as follows:

$$FMVASATP = TASVATP - TCUVAS + TFMVAS$$

Where:

- FMVASATP = fair market value assessment of all taxable property.
- TASVATP = total assessed value of all taxable property. (As indicated earlier, this figure was obtained from county tax records and includes participating properties on the basis of their current use values.)
- TCUVAS = total current use value assessment of all participating properties. (This is $\overline{TCUVAS} \times TA$.)
- TFMVAS = total fair market value assessment of all participating properties. (This is $\overline{TFMVAS} \times TA$.)

The estimated fair market value assessment of all taxable property was then used to determine the tax rate which, in the absence of the Act, would yield the same level of revenues as are actually being generated with use valuation in effect. The specific formula employed to calculate this so-called "unadjusted" rate, was as follows:

$$\bar{t} = \frac{\bar{r}\,(TASVATP)}{FMVASATP}$$

Where:

- $\bar{t}$ = average former (i.e. unadjusted) tax rate.
- $\bar{r}$ = average current (i.e. adjusted) tax rate. This equals:

$$\frac{\sum_i \sum_j r_{ij}\,(tcuvas_{ij})}{\sum_i \sum_j tcuvas_{ij}}$$

Finally, the "unadjusted" tax rate is used to obtain the desired estimates of the potential revenue impacts attributable to the Act. For each type of participating property, the revenue impacts are computed as follows:

$$\Delta TTX = \bar{t}\,[(TFMVAS - TCUVAS) \div 100]$$
$$\Delta FTX = \bar{t}\,[(FFMVAS - FCUVAS) \div 100]$$
$$\Delta NFTX = \bar{t}\,[(NFFMVAS - NFCUVAS) \div 100]$$

Where:

- ΔTTX = "total" change in county tax revenues.
- ΔFTX = change in tax revenues attributable to "forest" land.
- ΔNFTX = change in tax revenues attributable to "nonforest" land.
- FFMVAS = total fair market value assessment of all participating "forest" land. (This equals $\overline{FFMVAS} \times FA$.)
- FCUVAS = total current use value assessment of all participating "forest" land. (This equals $\overline{FCUVAS} \times FA$.)
- NFFMVAS = total fair market value assessment of all participating "nonforest" land. (This equals $\overline{NFFMVAS} \times NFA$.)
- NFCUVAS = total current use value assessment of all participating "nonforest land". (This equals $\overline{NFCUVAS} \times NFA$.)

Determining the Tax-Shifting Effects

As noted in the text, tax-shifting was measured three ways in each study county. The first measure — i.e. the average tax rate adjustment required to maintain revenue stability — was determined as indicated below:

$$\Delta TXR = \bar{r} - \bar{t}$$

Where:

- ΔTXR = average change in tax rate required to maintain revenue stability.

The second measure — i.e. the amount of taxes shifted in dollar terms — was estimated in five steps.

Step 1.—First, the total assessed value of all nonparticipating property was calculated as follows:

$$TASVNPP = TASVATP - TCUVAS$$

Where:

TASVNPP = total assessed value of all nonparticipating property. (This is the fair market value assessment of all taxable property exclusive of the land on participating properties.)

Step 2.—Secondly, assuming that differential assessment is unavailable, the taxes that would be collected from each of two classes of property—participating and nonparticipating—were determined.

The taxes that would be obtained from participating property are given by:

$$TXPP_{wo} = \bar{t}\ (TFMVAS \div 100)$$

Where:

$TXPP_{wo}$ = total tax revenues obtained from participating property without differential assessment.

The taxes that would be obtained from nonparticipating property are given by:

$$TXNPP_{wo} = \bar{t}\ (TASVNPP \div 100)$$

Where:

$TXNPP_{wo}$ = total tax revenues obtained from nonparticipating property without differential assessment.

Step 3.—Thirdly, the Act is assumed to be available, and once again the taxes that would be collected from the two classes of property—participating and nonparticipating—are determined.

In this case, the taxes that would be collected from participating property are given by:

$$TXPP_{w} = \bar{r}\ (TCUVAS \div 100)$$

Where:

$TXPP_{w}$ = total tax revenues obtained from participating property with differential assessment.

The taxes that would be collected from nonparticipating property are given by:

$$TXNPP_{w} = \bar{r}\ (TASVNPP \div 100)$$

Where:

$TXNPP_{w}$ = total tax revenues obtained from nonparticipating property with differential assessment.

Step 4.—Fourthly, the dollar tax-shift attributable to the use valuation of all participating property is estimated. This can be computed by using either of the following formulas:

$$TTXS = TXPP_{wo} - TXPP_{w}$$
$$TTXS = TXNPP_{w} - TXNPP_{wo}$$

Where:

TTXS = "total" tax-shift in dollar terms.

Step 5.—Lastly, the dollar tax-shifts attributable specifically to participating "forest" and "nonforest" lands are determined. The steps required to calculate the shift caused by the use valuation of "forest" lands parallel those employed to estimate the "total" shift; the only difference is that "forest" assessment figures are used in place of "total" assessment values. The tax-shift due to participating "nonforest" land is represented by the portion of the "total" shift which cannot be attributed to enrolled "forest" lands.

The third and final tax-shifting measure—i.e. the percentage of the aggregate tax burden shifted—can now be readily determined from the information at hand. First, the proportion of total tax revenues collected from each class of property—participating and nonparticipating—is calculated for both the "without" and "with" differential assessment cases.

When it is assumed that the provisions of the Act are not in force, the percentage of tax revenues obtained from each class of property can be computed as follows:

$$PTXPP_{wo} = \frac{TXPP_{wo}}{TXPP_{wo} + TXNPP_{wo}} \times 100$$

$$PTXNPP_{wo} = \frac{TXNPP_{wo}}{TXPP_{wo} + TXNPP_{wo}} \times 100$$

Where:

$PTXPP_{wo}$ = percentage of total tax revenues obtained from participating property without differential assessment.

$PTXNPP_{wo}$ = percentage of total tax revenues obtained from nonparticipating property without differential assessment.

When it is assumed that the provisions of the Act are in force, the percentage of the total tax revenues obtained from each class of property are calculated as indicated below:

$$PTXPP_{w} = \frac{TXPP_{w}}{TXPP_{w} + TXNPP_{w}} \times 100$$

$$PTXNPP_{w} = \frac{TXNPP_{w}}{TXPP_{w} + TXNPP_{w}} \times 100$$

Where:

$PTXPP_w$ = percentage of total tax revenues obtained from participating property with differential assessment.

$PTXNPP_w$ = percentage of total tax revenues obtained from nonparticipating property with differential assessment.

The "total" percentage tax-shift attributable to the Act can now be computed by using either of the following formulas:

$$TPTXS = PTXPP_{wo} - PTXPP_w$$
$$TPTXS = PTXNPP_w - PTXNPP_{wo}$$

Where:

TPTXS = "total" tax shift in percentage terms.

The percentage tax-shift caused by the use valuation of participating "forest" lands can be calculated in a similar manner. The only difference is that "forest" tax figures are used in place of "total" tax figures. The percentage shift attributable to participating "nonforest" lands is ultimately determined as a residual.

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1982. Property tax impacts of current-use assessment of forest and other rural land in Tennessee, U.S. Dep. Agric. For. Serv. Res. Pap. SO-180, 17 p. South For. Exp. Stn., New Orleans, La.

The Tennessee legislative act to help prevent the premature and forced development of rural lands is analyzed regarding its usage and its effect on taxes of participating and nonparticipating property owners.

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