THE MARKET VALUE OF FLUE-CURED TOBACCO QUOTA

Fred E. Williams

Congress has seriously considered elimination of the tobacco program during recent congressional debates to extend and/or modify tobacco legislation. One issue in these debates has been compensation of current owners of tobacco quota for their loss of net worth should the tobacco program be eliminated.

Tobacco quota is a goverment-authorized right to market a given quantity of tobacco. This marketing quota replaced the acreage allotment in 1965 as the effective quantity control on tobacco production. As the progeny of the acreage allotment, quota was attached to a particular tract of farmland. Because quotas could not be sold separately from farmland (except when the land can no longer be legally used for agricultural production), no market price tobacco quota existed until 1982.[1]

Economic theory has long recognized that farmland values will increase if valuable government programs are attached to the land. Expected future returns from the government program will be capitalized into a higher sale value for farmland. This study estimated the capitalized value of tobacco quota by using multiple regression to analyze Federal Land Bank farm sales data.

RELATED LITERATURE

Agricultural economists have attempted to determine the capitalized value of tobacco quota for 20 years. Estimated values fluctuated from county to county and year to year, reflecting peculiarities of county markets and annual supply and demand or political circumstances.

Maier, Hedrick, and Gibson studied the value of tobacco allotments by analyzing farm sales data available from county tax records. They encountered multicollinearity among the independent variables and eliminated the least important variables to reduce its effects. The estimated value per acre of tobacco allotment ranged from $1,673 to $2,500 per acre.

Seagraves and Manning used Census of Agriculture county aggregate data to estimate a value for tobacco allotments. Their model forced a zero intercept term for value of farmland, using the logic that a farm with no land or buildings would have no value. Data from the Census of Agriculture was available only at five-year intervals, thus requiring interpolation for the intervening years. They estimated the quota to be worth $1.75 per pound in 1962.

Williams used both Census of Agriculture and Federal Land Bank sales data to estimate a value of tobacco quota. The only year common to both data sets was 1974. Estimates for tobacco quotas for 1974 were not identical for both data sources, but there was an overlap in the 95-percent confidence intervals for both estimates. Multicollinearity was reduced in the analysis by increasing the number of observations and constraining the value of an acre of farmland to a time trend. The 1974 estimated value of tobacco quota was $1.64 per pound using census sales data and $2.86 per pound using Federal Land Bank sales data.

The studies indicate that farm sales data are a reliable data source for estimating the capitalized value of tobacco quota. They also suggest that defining a homogeneous market for quota may be an alternative to increasing the number of observations when trying to control for intercorrelations among the independent variables. Constraining the values of independent variables other than tobacco quota may also be used to control for intercorrelations among the independent variables. Annual variations in capitalized values of tobacco quota based on market and political circumstances should be expected.

ANALYSIS AND RESULTS

Data were obtained from Federal Land Bank records of farm sales in 26 counties in the flue-cured tobacco producing area of eastern North Carolina. Preliminary analysis suggested a reduction in the area of study to include 11 counties in the coastal plain that represented a more homogeneous market for quota, based on profitability of growing tobacco and quota rental rates. The 11 tobacco counties chosen had an

Fred E. Williams is an Assistant Professor, Department of Agricultural Economics and Agribusiness, Louisiana State University.

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[1] Recent (1982) legislation allows quota to be sold separately from the land within a county but not across county lines. The data and analysis for this study were conducted prior to this legislation.

average rental rate per pound of tobacco quota of about 50 cents per pound compared to about 35 cents per pound for the remaining counties. The higher rental rates for quota indicate that the 11 counties studied were the most productive flue-cured tobacco counties in the coastal plain area of North Carolina. A more detailed description of quota rental rates is found in Seagraves and Williams.

The data available from Federal Land Bank records include sale value of the farm and acres of land, cropland, and other land. Estimated values of buildings and standing timber were also reported. The value of buildings and timber was subtracted from the farm's sale value to remove the effect of these extraneous factors from the analysis. Production and/or quota values for various crops (including tobacco) grown on the farm were also reported. Date of sale and county location data were used to group the 737 observations by year and county.

Table 1 indicates that in four of six years for 1974–80, farm values in the 11 tobacco counties increased more than the increase in farm values for the state as a whole. The nominal compound annual percentage increase for the 1974–80 period was 8.2 percent for North Carolina farms, compared to 13.2 percent for the 11 tobacco counties, and 13.7 percent for the USDA *Farm Real Estate Index*. North Carolina farm values did not increase at a rate equal to the USDA *Farm Real Estate Index* or the inflation rate as measured by the *Consumer Price Index*. Farm values for the 11 tobacco counties increased at a compound annual rate slightly below the USDA *Farm Real Estate Index,* but at a real rate of 3.9 percent in excess of inflation. In terms of capital gains on farmland, the average farmer owning land in the 11 tobacco counties fared better than those in other areas of the state.

The 1974–80 period was characterized by sporadic inflation, usually at historically high rates, resulting in large nominal capital gains in most assets including farmland. The USDA *Farm Real Estate Index* was used to adjust the sale value of farms for each year to a constant 1980 value to eliminate the effects of inflation from the analysis.

"Real" 1980 estimated values per acre of farmland for each year are shown in Table 2. The real value of an acre of farmland increased from $1,430 per acre in 1974 to a peak of $1,575 per acre in 1977, but declined to $1,404 per acre in 1980. United States flue-cured tobacco quota was reduced by 21.5 percent from 1974 to 1980. This declining trend in tobacco quota is apparent in Table 2. The increase in quota per acre that occurred in 1980 may be due to carryover marketing of 1978 and 1979 quota that was unused due to poor growing conditions in those years.[2]

The correlation coefficients shown in Table 3 indicate that multicolinearity existed in these data. Acres of all land in the farm (ALF) is more highly correlated with both acres of cropland (ACL) and acres of other land not used as cropland (AOL) than it is with the dependent variable, real value of land (RVLF). Acres of cropland is highly correlated (0.67) with pounds of tobacco quota (PTQ).

Several models were examined in an effort to minimize the effects of multicollinearity, while maintaining the applicability of the model to real-world situations and observations. Each model was com-

Table 1. Annual Rates of Change of the CPI, the U.S. Farm Real Estate Index, the Value of Land and Buildings, in North Carolina, and the Average Value of Land from Farm Sales Data for 11 Tobacco Counties in Eastern North Carolina, 1974–80.

Year	U.S. Consumer Price Index (1967 = 100)	Percent Change from Previous Year	USDA Farm Real Estate Index[a] (1967 = 100)	Percent Change from Previous Year	North Carolina values of land and buildings[a] ($/ac)	Percent Change from Previous Year	Farm sales data averages of 11 tobacco counties, ($/ac)[b]	Percent Change from Previous Year
1974	147.7		187		551		662	
1974	161.2	9.1	213	14	590	7	720	9
1976	170.5	5.8	242	14	637	8	920	28
1977	181.5	6.4	283	17	675	6	1,103	20
1978	195.4	7.7	308	9	694	3	1,097	0
1979	217.4	11.3	351	14	819	18	1,240	13
1980	247.6	13.9	404	15	885	8	1,404	13
Annual percentage compound rates of increase from first to last year:								
	Nominal	9.0		13.7		8.2		13.3
	Real, deflated with CPI:			4.3		-0.7		3.9

[a] Source: Farm Real Estate Market Developments, 1967-80. Index includes farm improvements.
[b] Based on 737 bona fide sales for the 11 counties recorded by the Federal Land Bank. The 11 tobacco counties are: Duplin, Edgecombe, Green, Johnston, Lenoir, Martin, Nash, Pitt, Sampson, Wayne and Wilson.

[2] Tobacco quota not sold during the marketing year may be carried over to the next marketing year. Consequently, a farmer with carry-over quota could sell more than 100 percent of his annual quota. Quota cannot be carried forward for more than three years.

Table 2. Estimated "Real" Values of Land, Tobacco Quota and Tobacco Quota Per Acre of Farmland, 11 Tobacco Counties of Eastern North Carolina, 1974–80.

Year	Number of observations, sales	"Real" value of land in 1980 dollars per acre[a/]	Estimated values of tobacco quota (PTQ)[b/]	Tobacco quota pounds per acre of farmland
1974	64	1,430	5.13 (1.40)	114
1975	119	1,366	6.64 (0.49)	106
1976	104	1,536	5.55 (0.37)	120
1977	85	1,575	6.59 (0.62)	99
1978	101	1,439	5.64 (0.59)	85
1979	152	1,427	4.56 (0.40)	81
1980	112	1,404	3.24 (0.60)	98

[a] The USDA Farm Real Estate Index was used to adjust values from Table 1 to 1980.
[b] Standard errors are given in parentheses under the estimates.

Table 3. Means, Standard Deviations and Correlation Coefficients for 737 Farm Sales Observations Used in the Regression Analysis.

Items		"Real" value of land per farm, RVLF	Acres of all land per farm, ALF	Acres of cropland per farm, ACL	Acres of other land per farm, AOL	Pounds of tobacco quota per farm, PTQ
Means		121,346	84	41	43	8,299
Standard deviations		117,131	102	47	63	8,906
Correlation coefficients						
	RVLF	1	.82	.85	.70	.81
	ALF		1	.90	.95	.57
	ACL			1	.72	.67
	AOL				1	.43

pared with other less restrictive models by means of an F test to determine whether the additional restriction was desirable. Each restriction was designed to reduce the effects of multicollinearity through different combinations of variables to use for land (acres of all land, acres of cropland and/or acres of other land not used for cropland), various time trend restrictions on the coefficients of the independent variables, selection of an intercept term (ranging from no restriction to a zero intercept), and regional grouping of county observations. This technique was described by Wallace as "pretest estimation." A more detailed description of the model selection process is found in Seagraves and Williams. The model selected may be expressed algebraically as:

$$RVLF_{ij} = 2{,}000 + \beta_1 T_j AOL_{ij} + \sum_r (\beta_{2r} + \beta_{3r} T_j^{1/2})\, g_r ACL_{ijr} + \beta_4 T_j ACL_{ij} + \sum_j \beta_5 d_j PTQ_{ij} + \sum_k \beta_k c_k ALF_{ijk} + e_{ij}.$$

Where

$RVLF_{ij} = (VLF_{ij}) \frac{FREI_{1980}}{FREI_j}$ = value of land in each farm standardized to 1980 using the U.S.D.A. *Farm Real Estate Index*,

AOL_{ij} = acres of other land not used for cropland,
ACL_{ij} = acres of cropland,
PTQ_{ij} = pounds of tobacco quota attached to that farm,
ALF_{ij} = acres of all of the land in that farm,
VLF_{ij} = nominal sale price of farm - building value - timber value,
$FREI_{ij}$ = U.S.D.A. *Farm Real Estate Index* for year j,
T_j = a time trend number for years, T = 1, 2, . . . , 7 for 1974, . . . , 1980,
d_j = dummy variables for each year which equal 1 for each observation that comes from the jth year and zero otherwise,
c_k = dummy variables for each county which equal 1 if the observation comes from the kth county and zero otherwise,
g_r = dummy variables for each of three regions which equal 1 if the observation comes from the rth region and zero otherwise.
i = individual farm observation,
j = year of sale, and
k = county location of the farm.

The 2,000 constant term was included in the model to account for the fact that small acreages may appeal to a different set of buyers than larger acreages. Small acreages may have been purchased primarily as a rural residence, whereas larger acreages could be expected to be purchased primarily for agricultural production. The effect of the constant term would decrease as the acreage in the farm increases. While 2,000 is an arbitrary figure, it is more realistic than either a zero value or 5,404, estimated by a similar model. The coefficients for both ACL and AOL are constrained to follow their respective time trends. The coefficients for ACL are estimated by regions to allow for greater flexibility in their determination. The coefficient for tobacco quota is allowed to vary for each year. The value of an acre of farmland is distributed among the coefficients for AOL and ACL. However, ALF values are determined separately for each county to represent the market characteristics of each county. It is reasonable to assume that each county is a separate market for two reasons: (1) because of transportation costs, farmers will buy additional land only if it is close to their present operation, and (2) tobacco quota cannot be rented and grown outside of the county in which the land to which it is attached is located. The estimated coefficients of the equation are summarized below.

$$RVLF = 2{,}000 + \underset{(18.35)}{62.86}\, T_j AOL_{ij} + \text{for region 1}[\underset{(1{,}414)}{-1{,}991} + \underset{(1{,}450)}{2{,}908}\, T_j^{1/2}]\, ACL_{ij}$$

$$+ \text{ for region 2}[-2{,}680 \underset{(1{,}461)}{} + 3{,}351\ T^{1/2}_j]\ ACL_{ij} \underset{(1{,}475)}{}$$

$$+ \text{ for region 3}[-1{,}858 \underset{(1{,}487)}{} + 2{,}856\ T^{1/2}_j]\ ACL_{ij} \underset{(1{,}481)}{}$$

$$- 627\ T_j ACL_{ij} + 1{,}258\ ACL_{i1974}$$
$$(363) \qquad (475)$$
(only applies to 1974)

$+ PTQ_{ij}$ X (estimated values of tobacco quota found in Table 2)

$+ ALF_{ij}$ X (base values of farmland for each county found in Table 4)

Table 4. Estimated Base Values of Farmland for Each County.[a]

County	Base values of farmland for each county (ALF)
Region 1:	
Edgecombe	-42.86
Martin	260.88
Nash	16.32
Pitt	51.41
Region 2:	
Greene	124.91
Lenoir	308.40
Wayne	122.83
Wilson	0.53
Region 3:	
Duplin	39.37
Johnston	41.91
Sampson	224.03

[a] 1980 dollars.

This model explained 90 (R^2 = 0.8996) percent of the variation of the real value of farms (RVLF) recorded by the Federal Land Bank from 1974 to 1980 in the 11 counties studied. The real 1980 value of a pound of tobacco quota followed an erratic trend upward from $5.13 per pound in 1974 to $6.59 per pound in 1977. From 1977 to 1980, the real 1980 value of tobacco quota dropped to approximately half of the 1977 value.

IMPLICATIONS

A farmer who has purchased a farm with 15,000 pounds of tobacco quota in 1977 would have paid $98,850 (15,000 lbs. × $6.59/lb.) in 1980 dollars for the 15,000 pounds of tobacco quota. Had he sold the same farm with the 15,000 pounds of tobacco quota in 1980, he would have received only $48,600 (15,000 lbs. × $3.24/lb.) for the tobacco quota, a capital loss of $50,250.[3] Farmers who did not sell their farms would have experienced a similar loss in net worth and ability to finance purchases of farm inputs.

Part of the capital loss on the ownership of quota would have been offset by annual profits for producing (or renting) quota. Assuming that the farmer rented 15,000 pounds of tobacco quota in 1978, 1979, and 1980, he would have made a total return of $25,200 if the real rental rate in 1980 dollars were 52 cents, 70 cents, and 46 cents per pound, respectively.[4] Over the period from 1977, when the farm was purchased, to 1980, when the farm was sold, the farmer would have suffered a real dollar net loss of $25,050 (quota rental income of $25,200 minus capital loss of $50,250). Table 2 indicates that the farmer would have also suffered a real capital loss of $171 per acre on the land resource apart from the value of tobacco quota.

Studies by Williams; and Seagraves have indicated that increasing confidence in the tobacco program has led to higher capitalized values for quota. Higher capitalized values indicate that a larger percentage of the benefits of the tobacco quota program are accruing to owners of farmland with quota attached, and subsequently less to farmers who grow tobacco (unless they are also owners).

Conversely, increasing uncertainty about the future of tobacco program funding in an era of tightening budgets and free market orientation could reduce the capitalized value of tobacco quota. This may cause some economic hardship for recent purchasers of tobacco quota and for those who depend on quota as an important source of their income. It could lead to a lower tax base in these 11 counties, and, to a lesser extent, other tobacco-producing counties in the nation. Growers who rent tobacco quota may benefit from the increasing uncertainty by receiving a larger share of the benefits of the program than owners. However, annual quota rental rates may still transfer most of the benefits to quota owners.

Owning tobacco quota is far from being a riskless investment. This study has demonstrated that capital losses can occur in real terms on both quota value and land value. It was demonstrated, however, that farmland in the 11 tobacco producing counties was a better investment than farmland in North Carolina as a whole.

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[3] The capital loss calculated in 1977 dollars would have been $35,177.

[4] These rental rates were calculated by taking the nominal rental rates reported in Seagraves and Williams and multiplying them by the appropriate USDA *Farm Real Estate Index* to convert them to 1980 values.

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