ANALYSIS OF FACTORS RELATED TO PER ACRE PRICES OF BARE LAND: NORTH CAROLINA 1975-1976

William J. Vollink

Per acre land prices are observed to vary from one sale to the next. Reynolds and Timmons [5] found that differences in land prices could be partially explained by net farm income, government farm programs, technological advance, farm enlargement, pressure from an increasing population, and capital gains. Other studies [1, 3, 6, 7, 8] identified tobacco and peanut allotments and spatial shifts of industrial and urban development as major factors affecting differences in land prices. An additional factor which has not been addressed fully in the literature is the relationship between the lending agency which finances the land sale and the per acre sale price of the land. Identification of the magnitude of the relationship between the foregoing and other factors and bare land prices may provide useful information to policymakers and land appraisers. For example, policymakers could determine the impact on per acre land prices of altering the size of per acre flue-cured tobacco allotments. Appraisers could adjust the price of a recently observed land sale to reflect an expected market value for characteristics of the property being appraised.

The objective of this study is to identify the magnitude of the per acre price relationships that have been observed in North Carolina land sales for selected factors related to land prices. The analysis examines the relationship of selected factors to the per acre price of bare land (i.e., land without house or building improvements).[1]

DATA AND METHOD

The Federal Land Bank of Columbia collects information on bona fide farm sales in its district.[2] This farm sales data base[3] provides most of the data used in this study. These data are supplemented with information obtained from the Federal-State Crop and Livestock Reporting Service, Raleigh, North Carolina, on per acre farm cash receipts in each county [4].

North Carolina is partitioned into four land markets in an attempt to obtain sales data from regions of relatively homogeneous agricultural conditions (Figure 1). Sales data selected for this study include reported North Carolina farm sales during 1975 and 1976. Detailed sales data were not available before 1975. Only farm sales with tillable acres greater than zero were selected. On the basis of these criteria for selecting farm sales, 165 sales were observed in the Mountain region, 351 sales in the Piedmont region, 604 sales in the Coastal Plain region, and 204 sales in the Tidewater region.

Characteristics of Reported Farm Sales

The average per acre sale price of bare land differs among regions (Figure 1). The price ranges from a high of $1,201 per acre in the Mountain region to a low of $883 per acre in the Tidewater region for the reported sales during the 1975-1976 period. These prices are simple averages of all sales reported. No adjustment is made for locational or physical characteristics of the properties except for house and building value.

Average characteristics of farm sales in North Carolina during 1975-1976 are summarized by region in Table 1. These average characteristics differ among regions. For example, 16.2 percent of the reported farm sales in the Tidewater region were in the excellent or good area class where as 29.6 percent of the reported farm sales in the Piedmont region were in that area class. The area class is a rating of the com-

William J. Vollink is Research Associate, Farmbank Services, Denver, Colorado.

[1]In most observed farm sales, the property included a house or buildings. The bare land sale price of the property was calculated by subtracting the appraised value for the house and buildings from the total sale price of the property.

[2]North Carolina, South Carolina, Georgia, and Florida are serviced by the Federal Land Bank of Columbia.

[3]This farm sales data base is very accurate and complete because of care which Federal Land Bank appraisers use in collecting their data and the rigorous computerized data editing routines used by the FLB. One deficiency of the FLB sales data is the large number of times classification variables are reported in the data base where a continuous variable may be more meaningful. Another deficiency of the FLB sales data base is that data on loan terms (i.e., interest rates, length of loan, repayment schedules) of farm sales financed by other lenders are not collected.

FIGURE 1. AREA DESIGNATION FOR THE STATE OF NORTH CAROLINA

Region:	Mountain	Piedmont	Coastal Plain	Tidewater
Average Price Per Acre:	$1201	$921	$916	$883

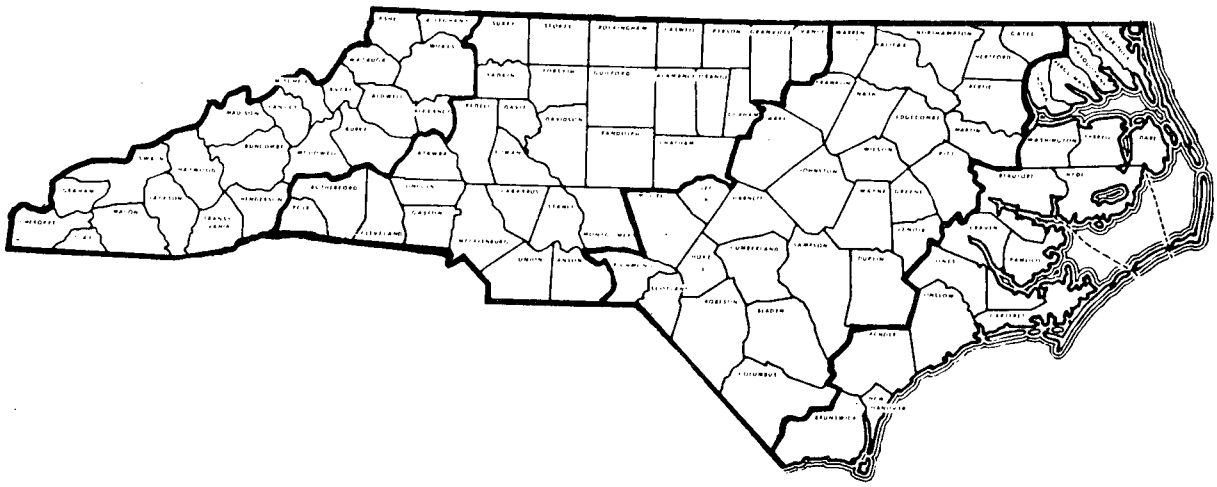

TABLE 1. CHARACTERISTICS OF NORTH CAROLINA FARM SALES WITH CULTIVATED ACRES GREATER THAN ZERO, BY REGION, 1975-1976

		Mountain Region (165 Sales)		Piedmont Region (351 Sales)		Coastal Plain Region (601 Sales)		Tidewater Region (204 Sales)	
		Number Of Sales	Percent of Sales	Number of Sales	Percent of Sales	Number of Sales	Percent of Sales	Number of Sales	Percent of Sales
Area Class									
	Excellent	1	.6	---	--	---	---	--	--
	Good	40	24.2	104	29.6	149	24.7	33	16.2
	Fair	124	75.2	246	70.1	455	75.3	171	83.8
	Poor	---	---	1	.3	---	--	--	--
	Total	165	100.0	351	100.0	604	100.0	204	100.0
Security Class									
	Excellent	1	.6	---	--	--	--	--	--
	Good	37	22.4	62	17.7	62	10.3	15	7.3
	Fair	127	77.0	286	81.5	539	89.2	188	92.2
	Poor	---	---	3	.9	3	.5	1	.5
	Total	165	100.0	351	100.0	604	100.0	204	100.0
Major Product									
	Cattle	51	30.9	36	10.3	--	--	1	.5
	Hogs	--	--	--	--	1	.2	1	.5
	Poultry	3	1.8	10	2.8	3	.5	--	--
	Dairy	3	1.8	1	.3	--	--	--	--
	Flue-cured Tobacco	18	10.9	132	37.6	489	81.0	95	46.8
	Air-cured Tobacco	30	18.2	--	--	--	--	--	--
	Peanuts	--	--	--	--	29	4.8	10	4.9
	Other	60	36.4	172	49.0	82	13.5	97	47.3
	Total	165	100.0	351	100.0	604	100.0	204	100.0
Non-farm Influence									
	Commercial	2	1.2	7	2.0	7	1.2	2	1.0
	Highway	3	1.8	2	.6	3	.5	--	--
	Urban	--	--	16	4.6	2	.3	1	.5
	Combination	1	.6	11	3.1	32	5.3	4	2.0
	Recreational	1	.6	1	.3	--	--	--	--

	Mountain Region (165 Sales)		Piedmont Region (351 Sales)		Coastal Plain Region (601 Sales)		Tidewater Region (204 Sales)	
	Number Of Sales	Percent of Sales	Number of Sales	Percent of Sales	Number of Sales	Percent of Sales	Number of Sales	Percent of Sales
Residential								
Great	--	--	9	2.6	4	.7	1	.5
Moderate	30	18.2	73	20.8	19	3.1	3	1.5
Slight	31	18.8	58	16.5	10	1.7	4	2.0
No Influence	97	58.8	174	49.6	527	87.3	189	92.7
Total	165	100.0	351	100.0	604	100.0	204	100.0
Reason for Purchase								
Establish	101	61.2	170	48.4	194	32.1	69	33.7
Expand	47	28.5	147	41.9	349	57.8	122	60.0
Investment	7	4.2	14	4.0	31	5.1	6	2.9
Rural Dwelling	1	.6	3	.9	1	.2	--	--
Non-Ag Development	2	1.2	4	1.1	10	1.7	2	1.0
Other	7	4.2	13	3.7	19	3.2	5	2.4
Total	165	100.0	351	100.0	604	100.0	204	100.0
FLB Financed (# of farm sales)	83	50.3	198	56.4	367	60.8	103	50.5
Size of tract (avg. # of acres per sale)	71.6	--	66.5	--	97.0	--	131.1	--
Percent acres cultivated (avg. per sale)	37.3	--	52.5	--	54.8	--	63.7	--
Annual Average Farm Cash Receipts per Acre for County in which Sale Property is Located	$113.19	--	$133.41	--	$222.19	--	$183.91	--

munity in which a farm property is located. The four area class rating are excellent, good, fair, and poor. An area class of excellent means the income associated with the geographic area is relatively high and dependable and the community has a reputation for stability (i.e., operators and tenants of the land do not change often). An area class of poor means the income from the geographic area is relatively low and erratic and the community lacks stability. Standards for the area class are developed and maintained by the Federal Land Bank of Columbia. Land Bank appraisers use these standards to assign an area class to a property.

The Mountain region had the highest percentage of farm sales reported with an excellent or good security class (23.0 percent) and the Tidewater region had the lowest (7.3 percent). The security class of the property reflects the relative income-generating capacity and income stability of the property being sold and indicates the desirability of the property as collateral on a real estate loan. In addition, the security class reflects the relative salability or rentability of the specific property. The four security classes are excellent, good, fair, and poor. A security class of excellent means the property generates relatively high and stable income and can be readily sold or rented. A security class of poor means the property generates relatively low and erratic income and cannot be readily sold or rented. Standards for the security class are developed and maintained by the Federal Land Bank of Columbia. Land Bank appraisers use these standards to assign a security class to a property.

Cattle was the major product reported for farm sales in the Mountain region (30.9 percent of the farm sales). Flue-cured tobacco was the major product reported for farm sales in the Piedmont, Coastal Plain and Tidewater regions. Flue-cured tobacco was associated with 37.6 percent of the sales in the Piedmont, 81.0 percent of the sales in the Coastal Plain, and 46.8 percent in the Tidewater.

Residential influence was reported for 37.0 percent of the farm sales in the Mountain region and 39.9 percent of the farm sales in the Piedmont region. In contrast, in the Coastal Plain and Tidewater regions only 5.5 and 4.0 percent, respectively, of reported sales had residential influence. In the Coastal Plain and Tidewater regions, approximately 10.0 percent of the farm sales had nonfarm influences.

Farm establishment was the reason for purchase of 61.2 percent of the reported farm sales in the Mountain region and 48.4 percent of the sales in the Piedmont region. Expansion was the major reason for purchase associated with reported farm sales in the Coastal Plain (57.8 percent) and Tidewater regions (60.0 percent).

Investment was reported as the reason for purchase for 2.9 percent of the sales in the Tidewater region and for 5.1 percent of the sales in the Coastal Plain region.

The Piedmont region had the smallest average size of reported farm sale (66.5 acres per sale). The largest average size of reported farm sale (131.1 acres per sale) was in the Tidewater region.

The average percentage of the property under cultivation for the reported sales ranged from 37.3 percent in the Mountain region to 63.7 percent in the Tidewater region.

The Federal Land Bank financed 50.3 percent of the reported farm sales in the Mountain region, 56.4 percent of the reported sales in the Piedmont region, 60.8 percent of the reported sales in the Coastal Plain region, and 50.5 percent of the reported sales in the Tidewater region. The remaining farm sales were financed by other lenders which include commercial banks, insurance companies, and seller contracts.

Annual farm cash receipts per acre for the county in which the sale property is located ranged from $113.19 in the Mountain region to $222.19 in the Coastal Plain region.

Bare Land Price Model

Multiple linear regression is used to estimate the relationships between bare land prices and the factors related to bare land prices. These relationships are estimated for each of the four agricultural regions in North Carolina. The general function model of bare land price for each of the four regions is:

(1) $BLP_{ijklmt} = f(AC_{it}, SC_{jt}, NFI_{kt}, RFP_{lt}, FLB_{mt}, AS_t, PAC_t, FTA_t, ATA_t, CR_t, QT_t)$

where

BLP_t = bare land price per acre
= [total purchase price of property − value of house and building]
[total acres purchased]

AC_{it} = area classification of property, i = 1, 2
AC_{1t} = 1 if area class is excellent or good, 0 otherwise
AC_{2t} = 1 if area class is fair or poor, 0 otherwise

SC_{jt} = security classification of property, j = 1, 2
SC_{1t} = 1 if security class is excellent or good, 0 otherwise
SC_{2t} = 1 if security class is fair or or poor, 0 otherwise

NFI_{kt} = nonfarm influence, k = 1, 2, ... 7
NFI_{1t} = 1 if commercial influence, 0 otherwise
NFI_{2t} = 1 if major highway influence, 0 otherwise
NFI_{3t} = 1 if urban influence, 0 otherwise
NFI_{4t} = 1 if recreational influence, 0 otherwise
NFI_{5t} = 1 if combination of influences, 0 otherwise
NFI_{6t} = 1 if residential influence, 0 0therwise
NFI_{7t} = 1 if no nonfarm influences, 0 otherwise

RFP_{lt} = reason for purchase, 1 = 1, 2, ... 6
RFP_{1t} = 1 if for farm establishment, 0 otherwise
RFP_{2t} = 1 if for investment, 0 otherwise
RFP_{3t} = 1 if for rural dwelling, 0 otherwise
RFP_{4t} = 1 if for nonagricultural development, 0 otherwise
RFP_{5t} = 1 if for other reasons, 0 otherwise
RFP_{6t} = 1 if for expansion, 0 otherwise

FLB_{mt} = financier of sale, m = 1, 2
FLB_{1t} = 1 if financed by Federal Land Bank, 0 otherwise
FLB_{2t} = 1 if financed by other lenders, 0 otherwise

AS_t = number of acres sold in tract

PAC_t = percentage of property acres which are tillable

FTA_t = pounds of flue-cured tobacco allotment per tillable acre

ATA_t = pounds of air-cured tobacco allotment per tillable acre

CR_t = annual farm cash receipts per acre for county in which property is located

QT_t = quarterly time trend,
1st quarter 1975 = 0
.. .. ..
1st quarter 1976 = 4
.. .. ..
etc.

The subscript t signifies the appropriate time period. The variables AC, SC, NFI, RFP, and FLB are classification variables and are

represented by 0-1 dummy variables. The remaining exogenous variables (i.e., AS, PAC, FTA, ATA, CR, and QT) are all continuous variables. A continuous variable was not used for NFI_{2t} (major highway influence) because data such as miles from a major highway were not readily available. The exogenous variables used in this model were selected because the Federal Land Bank of Columbia considers them important factors in determining land values and collects data on each of these factors for bona fide farm sales in its district. Data on these factors are used by the Bank to aid in farm land appraisals.

To avoid a singular matrix during inversion, the variables AC_{2t}, SC_{2t}, NFI_{7t}, RFP_{6t}, and FLB_{2t} are deleted from the model and used as bases for measuring the relationships of the other classification variables.

The following relationships between per acre bare land prices and the exogenous variables are hypothesized. A property with an excellent or good area class is expected to have a higher per acre sale price than a property with a fair or poor area class because of the relatively better agricultural economic condition of the geographic area in which the property is located. A property with an excellent or good security class is expected to have a higher per acre sale price than a property with a fair or poor security class because of relatively better quality (i.e., income stability) of the property being sold. Nonfarm influences of commercial, urban, residential, and recreational demands are expected to have positive relationships to per acre land prices as nonfarm demands for real estate created by an expanding population are capitalized into the land price. No *a priori* relationship is hypothesized for the combination nonfarm influence. Farms purchased for etablishment are expected to have lower sale prices than farms purchased for expansion because fixed machinery ownership costs cannot be spread over as many acres. However, farms purchased for investment, rural dwellings, and nonagricultural development are expected to have higher per acre prices than farms purchased for expansion as real and expected nonfarm demands for real estate are capitalized into the land price. No *a priori* relationship is hypothesized between per acre bare land prices and land sales financed by the Federal Land Bank versus sales financed by other lenders.

Per acre land prices are expected to be higher for smaller tracts of land than larger tracts [2]. Per acre land prices are expected to be higher for properties which have relatively more tillable acres. Tobacco allotments are expected to have positive relationships to per acre land prices [1, 3, 6, 7]. Per acre land prices are expected to be related positively to annual farm cash receipts per acre as increased returns are capitalized into the price of land.

The quarterly time trend is included to indicate whether per acre sale prices continue to increase after accounting for nonfarm influences, farm cash receipts, and other factors related to land prices.

RESULTS

Estimated coefficients for each of the four bare land price models are presented in Table 2.[4] These coefficients[5] represent the average value added to the per acre sale price of bare land associated with selected property characteristics in North Carolina.

The bare land price models explain a significant portion of the price variation in the four regions. The amount of price variation explained ranges from 50 percent in the Mountain region to 62 percent in the Tidewater region.

Flue-cured tobacco allotments significantly increased the sale price of bare land in the Coastal Plain and Tidwater regions. The tobacco allotments increased the sale price of bare land per tillable acre by $.93 per pound of allotment in the Coastal Plain region and $.38 per pound of allotment in the Tidewater region. The flue-cured tobacco allotment variable in the Mountain region had a positive estimated coefficient of $.30 per pound of allotment, but was not significant. These positive estimated coefficients for the flue-cured tobacco allotment are consistent with results reported by Seagraves [6, 7] but are slightly lower. The air-cured tobacco allotment variable had no impact on per acre land prices in the Mountain region.

Reported farm sales with commercial or residential influences had higher estimated average per acre sale prices in all four regions than farm sales without nonfarm influences. The large number of farm sales with residential influence in the Coastal Plain region provided the opportunity to test whether the degree of

Correlation among the exogenous variables was not a problem in estimating the bare land price models. The highest correlation in each region was between the area class and the security class of the property which ranged from .52 in the Coastal Plain region to .53 in Tidewater region. Most correlations among the variables were less than .3.

[5]Estimated coefficients for the continuous variables in Table 2 are included in the model if the coefficient had a t-statistic significant at the 20 percent level and had the correct hypothesized sign. Several of the classification variables (i.e., nonfarm and reason for purchase variables) were not significant in all regions but are included in the model because they indicate potential directional impacts of these factors. Insignificant classification variables are not eliminated from the models because it would not be meaningful to compare a nonfarm influence such as residential to a base composed of combined highway, recreational, urban, and no influences even though no statistical difference was found between these nonfarm influence groups.

TABLE 2. AVERAGE VALUE ADDED TO PER ACRE SALES PRICE OF BARE LAND RELATED TO SELECTED FACTORS IN NORTH CAROLINA, BY REGION, 1975-1976

Factors that are related to per acre prices of bare land	Mountain Region	Piedmont Region	Coastal Plain Region	Tidewater Region
Area class:				
excellent and good	664.63*	190.82*	87.17*	147.42*
	(5.16)[b]	*(3.29)*	*(2.15)*	*(1.72)*
Security class:				
excellent and good		182.42*	121.68*	389.06*
		(2.73)	*(2.18)*	*(3.41)*
Flue-cured tobacco allotment (per pound)	0.30		0.93*	0.38*
	(1.24)		*(10.78)*	*(2.40)*
Air-cured tobacco allotment (per pound)		a/	a/	a/
Non-farm influences:				
Commercial	1613.34*	282.61*	199.85	435.25*
	(3.14)	*(1.69)*	*(1.35)*	*(1.67)*
Highway	329.15	-409.63	114.10	a/
	(0.93)	*(1.43)*	*(0.56)*	
Urban	a/	- 54.92	-295.49	834.65*
		(-.50)	*(-1.14)*	*(2.10)*
Recreational	45.00	-228.94	a/	a/
	(0.07)	*(-.57)*		
Combination	1239.95*	228.88*	456.27*	-20.54
	(1.98)	*(1.81)*	*(6.93)*	*(-.11)*
Residential	405.22*	217.61*		391.75*
	(3.79)	*(4.49)*		*(2.61)*
Great			566.68*	
			(3.14)	
Moderate			448.13*	
			(5.23)	
Slight			371.44*	
			(3.23)	
Reason for purchase:				
Farm establishment	-65.23	96.50*	- 8.93	55.63
	(-.58)	*(2.05)*	*(-.28)*	*(1.01)*
Investment	197.17	248.67*	159.31*	63.59
	(0.71)	*(2.14)*	*(2.31)*	*(0.38)*
Rural Dwelling	345.33	388.04*	a/	a/
	(0.55)	*(1.66)*		
Non-Ag Development	-612.32	296.38	822.79*	1420.72*
	(-1.18)	*(1.45)*	*(6.34)*	*(4.80)*
Other	-348.57	360.44*	156.26	897.48*
	(-.54)	*(1.93)*	*(1.24)*	*(4.27)*
FLB financed	-254.18*	-74.09	-80.83*	-85.59*
	(-2.41)	*(-1.59)*	*(-2.58)*	*(-1.65)*
Size of tract (acres)	-.58*	-.79*	-.18*	
	(-2.68)	*(-3.99)*	*(-2.85)*	
Percent of acres cultivated	7.26*	4.38*	8.91*	8.82*
	(3.93)	*(5.22)*	*(13.86)*	*(9.37)*
Cash receipts per acre			0.52*	2.03*
			(2.74)	*(4.17)*

Factors that are related to per acre prices of bare land	Mountain Region	Piedmont Region	Coastal Plain Region	Tidewater Region
Time trend (quarterly)	36.91 *(1.57)*	13.28 *(1.34)*	30.74* *(5.05)*	22.04* *(1.84)*
Constant	644.50	486.63	-19.46	-254.40
R^2	0.50	0.60	0.56	0.62

*Significant at the 5% level.

[a]These coefficients could not be estimated because no observations were available.

[b]The numbers in parentheses are t-values for the regression coefficients.

residential influence affected the average per acre sale price. As expected, the average per acre sale price of bare land increased as the degree of residential influence increased. Farm sales with a high degree of residential influence in the Coastal Plain region had an average per acre sale price $566.68 higher than sales without residential influences in the region. Those sales with moderate and slight degrees of residential influence had average per acre sale prices $448.13 and $371.44 higher, respectively, than sales without residential influences.

Reported farm sales which were purchased for investment had average per acre sale prices greater than farm sales purchased for expansion in all four regions of North Carolina. These per acre sale price differences ranged from $63 in the Tidewater region to $249 in the Piedmont region.

Reported farm sales financed by the Federal Land Bank had significantly lower per acre sale prices than farm sales financed by other lenders in all regions. The estimated coefficients for this variable may reflect more favorable lending terms.[6] offered by other lenders. An alternative interpretation is that the Federal Land Bank has not contributed as much to increased land values in North Carolina as other lenders.

As the size of the tract sold increased, the per acre sale price of bare land decreased in all regions except the Tidewater region where farm size had no impact on per acre sale price. Each additional acre sold per farm sale decreased the per acre sale price by $.18 in the Coastal Plain region, $.58 in the Mountain region, and $.79 in the Piedmont region. These estimated coefficients are consistent with results reported by Clonts and Gibson [2].

The average per acre sale price increased in all regions as the percentage of tillable farm sale acres increased. For each 1 percent increase in tillable acres, the average sale price per acre increased by amounts ranging from $4.38 in the Piedmont region to $8.91 in the Coastal Plain region.

Farm cash receipts per acre significantly increased the per acre sale prices in the Coastal Plain and Tidewater regions. For each additional dollar of cash receipts, the per acre sale price of bare land increased by $.52 in the Coastal Plain region and $2.03 in the Tidewater region. However, farm cash receipts per acre appeared to have no effect on per acre sale prices in the Mountain or Piedmont regions.

The quarterly time trend indicates that general land inflation occurred in all four regions of North Carolina during 1975 and 1976. On an annual basis, the rates of inflation were 12.3 percent in the Mountain region, 5.8 percent in the Piedmont region, 13.4 percent in the Coastal Plain region, and 10.0 percent in the Tidewater region.

SUMMARY AND CONCLUSIONS

The Federal Land Bank of Columbia farm sales data base provides detailed information on all bona fide farm sales in its district. A farm land sale price model and regression analysis were used to identify the magnitude of the per acre price relationships that have been observed in North Carolina farm land sales for selected factors related to land prices. The land price model explained a significant portion of the farm land price variation observed in four regions in North Carolina.

The relationships between bare land price and the factors influencing land prices could be used by land appraisers to adjust the price of a recently observed land sale to reflect characteristics of the property being appraised. Regular re-estimation of the price relationships (i.e.,

[6]More favorable lending terms may include lower downpayment requirements, seller contracts with low interest rates and balloon payments, or a higher percentage of the appraised value loaned to part-time farmers and investors.

quarterly, annually) could indicate whether these relationships are changing over time, and how.

The significance of the positive relationships between farm land prices and flue-cured tobacco allotments indicates that government agricultural policy toward the tobacco industry has supported farm land prices above levels that would have been observed without the allotment program by capitalizing allotment rights into land prices [6, 7]. Increased land values attributable to allotments also have been observed for peanuts [1, 3]. This positive relationship may indicate that government agricultural programs (i.e., set aside or allotments) designed to restrict production of other agricultural commodities would also support land prices above levels that would occur without such government programs. Policymakers should not ignore this potential impact on land price when developing agricultural programs to support farm income.

This analysis identifies two areas that warrant further investigation. First, farm sales financed by the Federal Land Bank had significantly lower per acre bare land sale prices than sales financed by other lenders. Can this difference be explained by more favorable lending terms such as lower interest rates or customized loans offered by other lenders? Does this difference exist only in North Carolina or does it occur throughout the Federal Land Bank of Columbia district? Does this difference occur in other states or districts of the Farm Credit System? Second, farm land sale prices in North Carolina continued to trend upward in 1975 and 1976 after accounting for other factors including residential influence and farm cash receipts per acre. Is there some factor such as continued expected land price appreciation which can explain this upward trend in farm land prices?

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