RELATIONSHIP OF SELECTED PARAMETERS TO FARM SALE VALUES IN THREE VIRGINIA COUNTIES

by

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INTRODUCTION

> . . . the soil survey is designed as
> a practical tool to be used mainly
> for applied objectives (Cline, 1963).

This study identifies and analyzes some of the factors which affect farm land values as reflected by sale price in three Virginia counties. Special attention is given to the effect of soil productivity and related agronomic factors. It is anticipated that information and ideas presented in this study will be helpful in the assessing of agricultural land in Virginia for taxation.

Legislation recently enacted in Virginia authorizes the use of the Soil Conservation Service (SCS) land capability classification system as an instrument for rating agricultural land for tax assessment (Section 58.796.11, Code of Virginia). This law establishes an advisory committee charged with the duty of determining and publishing suggested values for each of the eight SCS land capability classes for the various areas of the state. The procedure being used in arriving at these suggested values relies primarily on the income capitalization method. It has been suggested (Gibson, 1970) that procedures for arriving at agricultural use-value assessment should utilize both the income capitalization method and the comparable sales method of assessment.

This study was carried out with the following objectives:

1. To determine the extent to which soil productivity and landscape characteristics affect the sale value of farmland exchanged without the influence of shifts in land use within the Piedmont and Coastal Plain physiographic regions of Virginia.

2. To test the effectiveness of the SCS land classification system as a means of rating farms as to their value as indicated by sale price.

3. To test the effectiveness of crop yield ratings and other indices of soil productivity in the same manner. The SCS land classification system characterizes soil mapping units as to their potential use, but not necessarily to their productivity. In the process of preparing soil surveys, each soil mapping unit is rated as to its yield potential for each of the major crops to which it is suited. It is hypothesized that yield ratings may more accurately reflect land values than SCS land classes.

4. To identify and quantify, to the extent possible, the major factors affecting farm sale prices occurring in the absence of the influence of a shift in land use.

LITERATURE REVIEW

Ring (1970) defines land as the original and basic factor in production. Land, in a physical sense, is the solid portion of the earth's surface. It has value both as a factor in production and as a consumption good.

Soils are three dimensional natural bodies which occur on a portion of the land's surface to a depth ranging from a few centimeters to several meters. The nature and properties of these soils affect both the productive and the consumptive utility of land.

Historical accounts indicate that man has long recognized soils to be an important factor affecting the value of land. It is reported (Lee, 1921) that soil productivity was used in China over 4,000 years ago as the basis for tax assessment. Under the Yao dynasty, soils were divided into nine categories. Differentiating criteria for these groupings included texture, color, and structure.

The employment of V. V. Dokuchaiev in 1882 by the Nizhni-Novgorod Province, Russia, to classify and survey the soils led to the establishment of pedology as a separate science (Simonson, 1962). The original stated intent of this work was to form a more equitable basis for tax assessment (Simonson, 1962). According to Simonson (1962):

> Dokuchaiev divided the assignment into two parts: (1) the establishment of a natural system of classification and (2) the grading of the

soils according to their agricultural potentiality.

The program carried out under the direction of Dokuchaiev involved field studies of soil morphology, laboratory analysis, construction of soil maps, and the measurement of crop yields on various soils. The soil units were graded on a scale ranging from 15 for the soil having the lowest productivity to 100 for the soil with the highest productivity. These ratings were used as a basis for tax levies. This procedure varies very little from that being used today in Illinois and Iowa (Elbere and Oschwald, 1974) (T. E. Fenton, 1969, Use of conservation needs inventory data in developing guides for land valuation, unpublished mimeograph, Iowa State University, Ames).

The value of soils information for the appraisal of agricultural land is noted in modern texts on the subject. Murray (1961) devotes three chapters to subjects such as soil maps, soil inventories, soil ratings, topography, soil capability classifications, and other indices of soil productivity in his fourth edition of Farm Appraisal and Evaluation. The Rural Appraisal Manual (1967) advises rural appraisers to review available soil surveys and soil maps which have been prepared by state and federal agencies.

A number of studies involving the statistical analysis of factors (including soil factors) that affect the sale value of agricultural land have been carried out over the last 60 years. G. C. Haas (1922) correlated the sale prices of 160 farms in Blue Earth County, Minnesota, sold in 1916-19 with type of land, crop yields, value of buildings per acre, distance from market, size of adjacent city or village, and road type. By making adjustments for the latter two variables, the former four variables gave a multiple correlation coefficient of 0.81.

Henry Wallace (1926) found a multiple correlation coefficient of 0.92 between four variables and the 1925 federal census estimates of land values without buildings for the 99 counties of Iowa. These four factors were 10 year average corn yields, percentage of land in corn, percentage of land in small grain, and percentage of land not plowable.

Eighty-one percent of the variation in sale price per acre for bona fide sales of farmland occurring between 1960-1962 in Woods Co., Ok. was accounted for by four variables according to Ahmed and Parcher (1964a). The four variables considered were number of acres in the farm, soil productivity rating, population of nearest town and the distance to a principle city. In the case of the first variable, a negative correlation was found between the size of the farm and sale price per acre. The effect of inflation was taken into account by converting all sale values to a standard dollar value on the basis of the Land Price Index for the state of Oklahoma published by the Economic Research Service (USDA).

In a second study by Ahmed and Parcher (1964b) of farm land near Tulsa, Ok., six variables gave R^2 values of 0.89 in one area and 0.85 in another area. These six variables were the number of acres in a farm, soil productivity, distance to Tulsa, distance to a paved road, mineral rights, and road type.

In a third study of land values in Oklahoma, Abdel-Bodie and Parcher (1967) used multiple regression and discriminate analysis to study the relationship of 15 variables to the sale price of 293 bona fide sales in a 10 county area in western Oklahoma. In this study, only 51% of the variation could be accounted for by variables studied. The most important variables were size in acres, type of land, productivity index, mineral rights, distance to Oklahoma City, and wheat allotment acreage.

In a study of 1,378 land values in 17 counties of the Mississippi delta in three states, 95% of the variation in sale price was accounted for by three variables (Penn, Bolton and Wolf, 1968). These three variables were acres of cropland, acres of timberland, and acres of cotton allotment.

A detailed explanation of multiple linear regression and its application to real estate appraisal is given by Davis (1965). In one example cited by Davis, 18 variables were used to account for 95% of the variation in the sale price of 38 vineyards in California. The variables included the Storie soil index, soil moisture, soil pH, land slope, drainage, land capability class, and gravitational water.

A high correlation was found between land value as reflected by bona fide sales and corn suitability ratings in two Iowa counties (Phillips, 1968). Three variables, corn suitability rating, location, and year in which the sale took place accounted for 96% of the variation of sale price of 223 sales in Adam County, Iowa, occurring over a five year period between 1962 and 1966. The same variables accounted for 98% of the variation occurring in 189 sales in Humbolt County, Iowa, during the same period. Equally high correlations were found when corn suitability ratings were replaced with what the author called a corn yield-slope index.

Climate was found to be highly related to farmland sale price per acre in a study of 2700 sales of unimproved farmland in South Dakota (Westin, et al., 1973). Eighty-four percent of the variation in average county land values could be explained by a linear regression equation involving only precipitation. A polynomial equation involving precipitation explained 95% of the variation. Eighty-six percent of the variation in average county land values could be explained on the basis of a polynomial regression involving total annual county averages of total annual dollar value of crops. A high correlation was also found

(R^2 = 0.84) between precipitation and total annual dollar value of crops.

A much lower percentage of the variation in sale price per acre could be explained when the 2700 sales were analyzed on an individual basis. A multiple regression equation including variables for precipitation, air temperature, soil slope, and soil texture (texture criteria at the family level) explained 54% of the variation in sale price per acre. Precipitation alone explained 50% of the variation. Although significant correlations were found between soil slope and sale price, and between soil texture and sale price, neither accounted for more than 12% of the variation in sale price per acre. According to the author, soil texture and soil slope had a greater effect on sale price per acre on a local basis than was evidenced when viewed on a state-wide basis. The size of the farm and the year of the sale accounted for essentially no variation in sale price per acre. The sales in this study occurred over a three year period.

A second study by Westin (1974) using data from over 4800 land sales in South Dakota were used to test the relative homogenity in terms of the coefficient of variation in sale price per acre of various levels of abstraction of the U.S. Comprehensive Soil Classification System. An increase in homogenity was found with descending levels of abstraction. For instance, the following coefficients of variation (CV) were found at different levels of abstraction with the order of Mollisols: Mollisol (CV = 56%), Borolls (CV = 47%), Argiborolls (CV = 43%), Typic Argiborolls (CV = 33%), Typic Argiborolls fine Montmorillonitic (CV = 27%). In this same study, Mollisols were found to have a higher average price per acre than Ardisols which, in turn, had a higher average price per acre than Entisols.

The assumption that information gained by the classification and mapping of soils can be utilized in estimating the value of land rests on three other assumptions: (1) that both the productivity of the taxonomic units and mapping units can be assessed with some acceptable level of accuracy (this assumes that both the range of crops that can be grown on a given soil unit and the potential yields can be adequately estimated); (2) that there is a relationship between soil productivity and net farm income; and (3) that there is a relationship between net farm income and land values. All of these assumptions are valid only under certain conditions. Each of these assumptions will be dealt with briefly.

As was indicated earlier, activity in soil classification and soil survey has been motivated by an interest in soil productivity (Simonson, 1962). In a review paper, Riecken (1963) makes the following observation:

> From its inception, organized soil classification in the United States was expected and did attempt to serve as a

> medium for the organization of knowledge about soil differences, as well as a medium for discussion and extension of knowledge on use, management, productivity, and conservation of different soils.

According to Odell (1958), accurate yield predictions can be made for a specific soil from information gathered from farm records, surveys, and experimental plots. According to Rust and Odell (1957), 50 observations are necessary to make satisfactory crop yield estimates.

The inherent characteristics of the soils are but one of the factors which affect crop yields. Perhaps the single factor which most complicates assessments of soils as to their productivity is management. Any measurement of yield reflects the level of management. It also reflects the level of technology that is available at any point in time.

Early attempts were made to rate soils as to their productivity in the virgin state (Borners, 1935)(Ablieter, 1937). With advances in technology, it rapidly became apparent that such a procedure was of questionable value. Present procedure involves the estimation of yield potential at some more or less defined level of management (Aandahl, 1949). As was pointed out by Aandahl (1958), estimates of productivity can be useful only when the kind of use is clearly defined together with the nature and level of intensity of management. He also notes that soil survey interpretations must deal with economic as well as natural aspects of production.

Studies in South Dakota (Westin, et al., 1973) and in North Carolina (Sopher, McCracken, and Mason, 1973) have shown climatic factors to be very important in explaining crop yield differences. As climate is one of the five factors of soil formation, soil units at the lower levels of abstraction, such as the series level, have tended to occur over a limited range in climate. The present system used in the United States has an intended climatic basis at all but the highest level of abstraction. Soils grouped in the same series are limited as to the range in climate over which they may occur.

Odell (1958) points out that measurements of yield must be taken over a period of years in order to reflect the climate of an area as opposed to the effects of yearly variation in the weather.

According to Chryst (1965), farmland prices in the United States during the first half of the twentieth century tended to rise and fall with the price of farm products. However, since 1950, land prices have risen much more rapidly than the prices of farm products (Montgomery and Tarbet, 1968) (Chryst, 1965). The most obvious explanation for this latter situation is the rapid increase in the demand for non-agricultural land that has occurred since World War II. According to Chryst (1965), speculation for future non-agricultural uses may extend for one hundred miles from major metropolitan areas.

It has been noted, however, that land prices have also risen out of proportion to farm commodity prices in areas of near zero urban influence (Montgomery and Tarbet, 1968)(Chryst, 1965). Chryst (1965) argues that technological advances and government income and price support programs interact in such a manner as to have strong positive influence on land prices. Scofield (1964) points out that while land prices may appear high, relative to average farm returns in an area, these averages may understate the prospective returns of a few large, wealthy, better than average farmers who largely comprise the effective demand for land. Findings by Montgomery and Tarbet (1968) were in agreement with Scofield's speculations.

According to Tabor (1971), estimates of the agronomic potential of land based on soil surveys have been biased upward due to the failure to consider the effects of landscape and soil distribution patterns. Tabor found the effect of size and shape of fields, as necessitated by soil distribution patterns, reduced net income in three soil associations in Tennessee by an average of 48% from that which was predicted. This was based on the assumption that each mapping unit could be used at its highest potential intensity. As Riecken (1963) pointed out, this is because soil survey interpretations are usually based on the implicit assumption that the appropriate vertical technology can be applied to all areas of each soil mapping unit. In reality, the level of production that is possible is determined by horizontal constraints on the attainable level of technology.

Riecken (1963) found that the landscape and soil association patterns in portions of Tama County, Iowa, allowed acreages of Tama silt loam level phase to be used at its full potential while this tends not to be the case in other areas. Shrader and Riecken (1961) found that, on high yielding soil series, corn could be produced at a lower cost when the soil association patterns allowed soil mapping units to be combined into fields large enough to allow for the use of large scale machinery.

Oschwald (1965, 1966) estimated that corn production potential in two counites in Iowa was reduced by 30 to 40% when the effect of size and shape or the feasibility of application of technology was taken into consideration.

Oschwald (1965) and Runge and Riecken (1967) each developed indices for rating soil landscape patterns as to the degree to which they facilitate the application of appropriate technology.

In the past, soil surveys have been used as an aid in tax assessment only in areas where soil productivity had a strong effect on fair market value. The advent of use-value assessment creates a situation in which soil surveys provide valuable information to the tax assessor in areas where land prices no longer bear any relationship to agronomic productivity.

As of November 1973, 31 states had enacted some form of use-value assessment of differential taxation of certain classes of land (Hady and Schold, 1974). Hady and Schold (1974) classify use-value assessment laws into three categories: (1) preferential assessment, (2) deferred taxation, and (3) restrictive agreement. The main difference between preferential assessment and deferred taxation is that in the latter case a penalty tax is enacted if and when land use shifts to a non-qualifying use. Ten states have restrictive agreements whereby landowners agree to restrict use of their land in return for differential assessment. In some states use-value assessment applies only to farmland while, in other states, forestland, open space land, recreational land, and lands of unusual historical, scenic, or ecological value are also eligible.

The methods by which tax assessors are directed by law to arrive at assessed values for the different qualifying use differ among states. In many cases, they are not clearly stated. For instance, the law in Illinois calls for estimating the price a property would bring in a fair, voluntary sale for use by the buyer for farming or agricultural purposes (Hady and Sibold, 1974). Oregon's law calls for the use of comparable sale providing the sale meets the test of "a prudent investment for farm use." In the absence of such sales the income capitalization approach is to be used. As mentioned previously, Virginia law favors the use of the income capitalization method.

METHOD AND MATERIALS

Two sample areas consisting of three Virginia counties were selected for this study. Charlotte County was selected in the Piedmont physiographic region. Lancaster County and adjacent Northumberland County were selected in the Coastal Plain physiographic region. Sample areas were selected in the Piedmont and Coastal Plain regions as most of the urban growth is taking place in these two regions of the state. Criteria for selection of sampling locations included: (1) counties as far removed as possible from areas of rapid urban development; and (2) counties with modern soil surveys.

Study Areas

Charlotte Court House, the county seat of Charlotte County, is located 121 km southwest of Richmond, 64 km northeast of Lynchburg, 250 km south of Washington, D.C., and 217 km west of Norfolk. Charlotte County has an area of about 121,500 ha (300,000 acres). The population was less than 13,000 in 1970. Farming is the main industry. The production of forest products is an important source of income. About 71% of the county is in woodland (Van Dine) and Sledjeski, 1974). Charlotte County has two small textile factories. Agriculture is typical of the southern Piedmont with tobacco being the main cash crop. Livestock farming, primarily beef cattle, is important in certain areas of the counties.

The topography is undulating to rolling. The soils are primarily Hapludults, Paleudults, and Dystrochrepts. Low natural fertility and erosion hazards are the primary physical restraints to agronomic production.

Lancaster and Northumberland Counties occupy the eastern portion of the northern neck area. Heathville, the county seat of Northumberland County, is located about 161 km southeast of Washington D.C. Lancaster, the county seat of Lancaster County, is located about 24 km southeast of Heathville, 89 km northeast of Richmond, and 105 km north of Norfolk. The combined land area of these two counties is 88,700 ha. Farming is the primary industry of the county. Other industries include fishing, oystering, and crabbing. Tourism and sport fishing are becoming increasingly important in this area. Much of the water frontage (Chesapeake Bay) is being developed for retirement and summer homes.

The primary type of farming is cash grain production. The main crops are corn, soybeans, wheat, and small grains. Double cropping of small grains and soybeans is becoming increasingly common. Tomatoes are also becoming an important cash crop. Livestock production is of minor importance.

Data Collection

The receipt books of the county court clerk in each county were searched for bona fide sales of farmland. In Lancaster and Northumberland Counties, sales occurring between January 1, 1968 and December 31, 1973 were considered. In Charlotte County, sales between January 1, 1968 and December 31, 1972 were considered. All sales of less than 16.2 ha (40 acres) were arbitrarily omitted. Analysis of sales showed that most transfers of less than 16.2 ha were not transfers of land for farming, but were actually purchases of large home sites.

All transfers that were not believed to represent bona fide sales were eliminated. Sales between close relatives, sales with deeds that included the term "love and affection," and sales to religious or charitable organizations were excluded from the sample. An effort was made to determine which of the bona fide sales actually represented transfer of farmland for which a shift in land use was not eminent. The county commissioners of revenue, county court clerks, county extension agents, Agriculture Stabilization and Conservation Service (ASCS), county office managers, and SCS district conservationists were used as sources of information in determining bona fide sales of farmland. The deeds for each transaction were read as an additional source of information in this regard. In a few cases the buyers were contacted to obtain information as to the nature of the transfer and future intended use.

All transfers included in this sample were located on the land identification maps or plat books for the county. Using either the identification maps (Scale 1:10,000) or the plat books and the deed descriptions, the boundaries of each farm were plotted on published soil survey sheets. Additional information on each farm was obtained from the records of the local offices of the ASCS and from the county land books. Data so collected for each sale include hectares of crop land, dark tobacco base, hectares and kilograms of flue cured tobacco, assessed value of buildings and land, property tax, and date of sale.

Soil Map Analyses

The hectarage of each mapping unit on each farm was measured and recorded. Measurements were made with dot grid acreage calculators. A planimeter was used to spot check the accuracy of measurements. The total hectarage of each farm was determined by both a grid and a planimeter and compared with the total hectarage of all mapping units in the farm. Measurements were also made of the hectares of cleared land and of the hectares that appeared to be forested.

Computer Analysis

The hectares of each mapping unit were punched on IBM cards along with certain data taken from the soil survey reports relevant to that mapping unit. This information included capability class, subclass, and management unit, productivity rating for corn, soybeans, small grains, hay crops and pastures, and fertility management groups. Statistical analysis and data manipulation were performed on an IBM 360 using the Statistical Analysis System developed by Barr and Goodnight (Service, 1972).

A budget was computed for each farm. The assumption was made that each mapping unit could be used at its highest and best use. Although this is a questionable assumption, it was assumed that such data might have a comparative value. Yield estimates were based on ratings taken from the published soil survey reports. Cost data were taken from "Cost and Returns Guide for Crops in Virginia" (Extension Division, V.P.I. and S.U., 1974). Only crop enterprises were considered in these budgets. Yield ratings for Lancaster and Northumberland Counties were increased for corn, soybeans, and wheat in order to bring them in line with present technology. Corn ratings were increased by 70%, soybean ratings by 20%, and wheat ratings by 80% based on current levels of production.

The most intensive cropping program currently recommended by the SCS in cooperation with V.P.I. and S.U. was used in calculating these budgets. Commodity prices used in calculating receipts were those given by the "Cost and Return Guide for Crops in Virginia" (Extension Division, V.P.I. and S.U., 1974). Both the commodity prices and the cost value taken from this publication were outdated at the time of the synthesis of these budgets. However, it was assumed that the relative relationship of cost to receipt had changed only slightly. The actual calculations were performed with an IBM 360 Computer using a combination of Fortran and the Statistical Analysis System language (Service, 1972).

RESULTS

A search of court records in Lancaster and Northumberland Counties revealed the occurrence of over 100 sales of tracts of land over 16.2 ha between January 1, 1969 and December 31, 1973. Of these 100 sales, only 40 were considered to be bona fide sales of farmland. Thirty-eight of these were included in this study. The remaining two sales were excluded because of difficulties in determining the exact location of farm boundaries. The records of the ASCS in Lancaster and Northumberland Counties show the combined total of farms of more than 16.2 ha in these two counties to be about 550. Thus, the average yearly rate of turnover of farms greater than 16.2 ha via bona fide sales was less than 2% for the five year period 1969 through 1973.

A similar search of court records in Charlotte County, which occurs in the Piedmont physiographic region, revealed that over 300 sales of tracts in excess of 16.2 ha occurred between January 1, 1968 and December 31, 1972. Of these 300 sales, 92 were considered to be bona fide sales of farmland. Eighty-four of these sales were used in this study. Six farms were excluded for technical reasons, four because of difficulties in determining farm boundaries, one was excluded because personal property (livestock and farm machinery) was included in the transaction, and one was deleted because the sale involved widely separated tracts of land. As was the case in Lancaster and Northumberland Counties, the yearly rate of turnover of farms via bona fide sales was approximately 2%. ASCS records indicate there are about 1100 farms of over 16.2 ha in Charlotte County.

The 84 farms in Charlotte County ranged in size from an arbitrarily selected minimum of 16.2 ha to 385 ha. Sale price per ha ranged from $155 ($63/acre) to $1102 ($445/acre). When expressed in terms of 1975 dollars, inflated on the basis of the index of average price per unit area of farmland in Virginia (ERS, 1974), this represented a range from $295 ($119/acre) to $2945 ($1070/acre) per ha. The average size of farms included in this study was 67 ha (166 acres) with farms of less than 16.2 ha being arbitrarily excluded. The average price per ha was $452 ($183/acre) or approximately $985 ($399/acre) when expressed in terms of 1975 dollars. The percentage of farm that was in cropland ranged from 5 to 90% with an average of 32%. The average percentage of farm in cropland is believed to be typical for the southern Piedmont of Virginia. Of the 84 farms, 55 had flue cured tobacco bases ranging from 377 to 10,360 kg of base.

The 38 farms in Lancaster and Northumberland Counties were nearly equally divided between the two counties. These farms ranged in size from the arbitrarily selected minimum of 16.2 ha (40 acres) to a maximum of 108 ha (267 acres) and averaged 37 ha (82 acres). The total farm sale price ranged from $1800 to $175,000. Average price per ha ranged from $190 ($70/acre) to $2627 ($1,064/acre) with an average of $1018 per ha ($412/acre). In terms of 1975 dollars, the range in sale price would be approximately $408 ($165/acre) to $3815 ($1543/acre) per ha with an average of $1810 ($732/acre) per ha.

Effect of Inflation

Inflation was a major factor affecting real estate prices in Virginia, as well as the rest of the United States, during the time period of this study (Table 1). Between the years 1968 and 1973, the average price of farmland (census definition of farmland) in Virginia increased by 71% (ERS, 1974). Consumer Price Index for all goods and services increased by 27% during this same time period. Thus it may be observed that farmland in Virginia was increasing in value at a much more rapid rate than that of inflation.

The effect of inflation on farmland sales used in this study was readily evident. Considering the progression of time as either a numerical or a dummy variable, significant correlations were found between the date of sale and sale prices per hectare in both sample areas. The sales in this study occurred over a five year period. In order to treat dates of sale as a numerical variable,

Table 1. Average price per unit area and indices of average value per unit area for Virginia farms 1960-1974.*

Year	Dollars/ha	Dollars/acre	Index
1960	368	149	67
1965	469	190	85
1967	551	223	100
1968	573	232	104
1969	596	241	108
1970	707	286	121
1971	771	312	132
1972	870	352	149
1973	948	404	171
1974	1304	528	223

*The data in this table taken from "Farm Real Estate Market Developments," July, 1974, published by the Economic Research Service, U.S.D.A., Washington, D.C. (ERS, 1974).

sales were numerically coded from 1 to 60 depending on the month in which the sale occurred. The influence of sale data on sale price was also analyzed by treating time as a set of dummy variables in which the five years were treated as levels of an effect.

The positive relationship between the progression of time and land values was more pronounced in the Lancaster and Northumberland Counties studies than in the Charlotte County study. Treating the month of sale as a numerical variable, a linear correlation coefficient of 0.61** was found for Lancaster and Northumberland Counties. In Charlotte County the correlation coefficient was 0.32*. Both of these correlation coefficients were statistically significant, although less than 10% of the variation in sale price per hectare was accounted for in Charlotte County.

Analysis of variance gave F values which were highly significant when the year of sale was treated as a level of an effect in both study areas (Tables 2 and 3). Year of sale, when treated as a dummy variable or a numerical variable, accounted for 36% of the variation in sale price per hectare in Lancaster and Northumberland Counties. This was one percent less than the amount of variation that was

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*Indicates significance at the .05 level throughout the text.

**Indicates significance at the .01 level throughout the text.

Table 2. Effect of sale date on average sale price per hectare for thirty-eight farm sales in Lancaster and Northumberland Counties.

Year	N	Dollars/ha
1969	7	385
1970	7	959
1971	5	996
1972	14	1275
1973	5	1290

F = 4.69**

LSC (.01) = 640 LSD (.05) = 477

R^2 = .036** (33 d.f.)

**Indicates significance at the .01 level.

Table 3. Effect of sale date on sale price per hectare of eighty-four farm sales in Charlotte County.

Year	N	Dollars/ha
1968	8	492
1969	17	351
1970	9	324
1971	19	437
1972	31	546

F = 3.99**

LSD (.01) = 178 LSD (.05) = 133

R^2 = 0.17** (79 d.f.)

**Indicates significance at the .01 level.

accounted for by the linear correlation of price per hectare with month of sale. In Charlotte County, 21% of the variation in sale price per hectare was accounted for by the year of sale when treated as a dummy variable. This was nearly three times the variation that was accounted for by the linear relationship between date of sale and sale price per hectare. In short, the relationship between date of sale and sale price per hectare was essentially linear in Lancaster and Northumberland Counties but this was not the case in Charlotte County.

Although the effect of inflation of farmland values is of interest in this study, its analysis is not a primary intent of this study. Rather, the analysis of the effects of soil productivity on farmland values is a primary intent of this study. The inflation of land prices during the five year period in which the sales occurred was of concern in that it tended to mask or cloud the effect of other factors on the value of farmland.

In an effort to better understand the effect of variables other than time on farmland within the two study areas, the absolute dollar values for each sale was "deflated" to standard dollar values. The sale prices for all sales were converted to constant 1967 dollars using the index of average value per hectare for the state of Virginia published by the Economic Research Service of the USDA (ERS, 1974). This procedure appeared to be fairly effective in reducing, if not eliminating, the effect of inflation in Charlotte County as the linear correlation between sale price per hectare and date of sale was reduced to zero and the amount of variation that could be accounted for by time, when treated as a dummy variable, was sharply reduced. In Lancaster and Northumberland Counties highly significant correlations were obtained between time and sale price per hectare even after the latter was converted to standard or "deflated" dollars. It may be seen from Table 2 that Lancaster and Northumberland Counties' farm sales increased at an average rate of 35% per year from 1969 to 1973. This compares with a state-wide average of 14%. In brief, average farm land values per unit area increased at a more rapid rate in Lancaster and Northumberland Counties than in the state as a whole. Conversion of absolute dollar values to constant dollars seems to be fairly effective in eliminating the effect of inflation on sale price in Charlotte County. This was not the case in either Lancaster or Northumberland County.

In the analysis of variables other than time, sale values were adjusted to 1967 dollars using the method previously outlined. Actually, all variables were analyzed using both constant and unadjusted dollar values but only the former were herein recorded. It was assumed that, by converting all sales to constant dollar values, at least a portion of the effect of inflation would be removed.

Correlation Analyses

In order to determine the factors which influence farmland sale values considered in this study, correlation and regression analyses were performed on over 50 variables which were considered to be related to either total sale price, sale price per unit area, or both. Either total sale price or sale price per unit area was considered as the dependent (Y) variable. All other variables were considered as independent (X) variables. In addition to date of sale, independent variables considered in this study included the assessed value of buildings, amount or proportion of cropland, estimated income, amount of flue cured tobacco base (Charlotte County). Other independent (X) variables analyzed included various crop productivity ratings, soil fertility management groupings of soil by series and slope, and amount or proportions of each of the SCS land capability classes. The crop productivity ratings used in this study were those given in the soil survey reports of Lancaster and Northumberland Counties (Elder and Henry, 1963), and Charlotte County (Van Dine and Sledjeski, 1974). The mapping units included in each of the SCS land capability classes in each county and a definition of the land classes may be found in the same references. The soil fertility management groupings are those given in "Soil Fertility Guide for the Coastal Plains Region of Virginia" (Epperson and Hawkins, 1966).

Total Sale Price

Factors that were found to be positively correlated with total sale price at the 0.01 level of significance in both study areas included: (1) size of farm, (2) hectares of Class II land, (3) hectares of Class III land, (4) estimated total farm income, (5) hectares of cropland, and (6) assessed value of buildings (Tables 4 and 5).

Kilograms of flue cured tobacco base were found to correlate significantly with sale price per hectare in Charlotte County, however, the correlation coefficient of 0.26 is considerably lower than had been reported in previous studies (Maier, Hendrick, and Gibson, 1960).

Logically, the size of a farm was a primary factor affecting total sale price. Hectares of total cropland, estimated farm income, hectares of Classes II and III land were highly correlated with the size of the farm (Table D).

In Table 5, it may be seen that the variables which were most highly correlated with sale price in Charlotte County included: (1) combined total hectares of Class II and III land (0.93**), (2) hectares of Class III land (0.91**), (3) estimated farm income (0.88**), (4) hectares of Class II land (0.87**), (5) total hectares in farm

Table 4. Correlation of inflation adjusted† sale price with indices of soil productivity and other variables in Lancaster and Northumberland Counties.

N = 38		
X - Variables	R	R^2
Class I land + Class II land + Class III land	0.93**	0.86
Size of farm (ha)	0.90**	0.81
Class II land	0.89**	0.79
Class III land	0.88**	0.77
Estimated net income	0.85**	0.72
Cropland (ha)	0.78**	0.61
Class VI land + Class VII land	0.77**	0.59
Class VII land	0.76**	0.58
Class VI land	0.48**	0.23
Assessed value of buildings	0.40**	0.16
Class IV land	0.36*	0.13
Class I land	0.30‡	0.09

*Indicates significance at the .05 level.

**Indicates significance at the .01 level.

†Sale values adjusted to standard dollar values using the land price index for Virginia (ERS, 1974). Sales took place from 1969 through 1973.

‡Indicates significance at the 0.10 level.

Table 5. Correlation of inflation adjusted† total sale price with indices of soil productivity and other variables in Charlotte County.

N = 84		
X - Variables	R	R^2
Class II land + Class III land	0.95**	0.90
Class III land	0.92**	0.84
Estimated net income	0.88**	0.77
Class II land	0.88**	0.77
Hectares in farm	0.88**	0.77
Hectares of cropland	0.84**	0.70
Assessed value of bldgs.	0.67**	0.45
Class IV land	0.57**	0.32
Class VI land	0.55**	0.30
Class VI land + Class VII land	0.51**	0.26
Kilograms of tobacco base	0.29*	0.08
Class VII land	0.16	0.03
Average land class	0.16	0.03
Soybean productivity rating	0.13	0.02
Small grain productivity rating	0.11	0.01
Corn productivity rating	0.11	0.01
Hay productivity rating	0.10	0.01
Tobacco productivity rating	0.10	0.01

*Indicates significance at the .05 level.

**Indicates significance at the .01 level.

†Sale values adjusted to standard dollar values using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

(0.86**), (6) hectares of cropland (0.84**), and (7) assessed value of buildings (0.67**). Other variables which were significantly correlated with the total sales prices in Charlotte County were: (1) hectares of Class IV land (0.54**), (2) hectares of Class VI land (0.55**), and (3) hectares of flue cured tobacco base (0.26*).

In Lancaster and Northumberland Counties (Table 4), variables most highly correlated with total sale price were: (1) size of farms (0.90**), (2) combined total hectares of Classes I, II, and III land (0.90**), (3) hectares of Class II land (0.90**), (4) estimated total farm income (0.85**), (5) hectares of cropland (0.78**), and (6) hectares of Class VII land (0.75**). Other variables that were significantly correlated with sale price included: (1) hectares of Class VI land (0.54**), (2) assessed value of buildings, (3) hectares of Class VIII land (0.43**), (4) hectares of Class IV land (0.38*), and (5) hectares of Class I land (0.37*).

Excepting the assessed value of buildings, the variables that were highly correlated with sale price were also relatively highly correlated with size of farm. Too great a significance should not be attached to the high correlations of Classes II and III land with sale price as these variables were also highly correlated with the size of the farm. Logically, large farms tend to sell at a higher total price than small farms and will obviously tend to have more hectares of cropland or any of the SCS land classes. In fact, all of the SCS land classes had significant positive correlation coefficients with sale price in both counties with the exception of Class VII land in Charlotte County. In both study areas, however, Classes II and III land were more highly correlated with sale price than the size of farm while the reverse tended to be true of the higher SCS land classes indicating that the buyers tended to place a premium on these land types.

In the case of those variables which are highly correlated with size of farm, it seems more revealing to look at the relationship of sale price per hectare to the relative proportion of these variables. The only numerical variables significantly correlated (both positively) with sale price per hectare in both study areas were assessed value of buildings per hectare (assessed value of buildings divided by the hectares in the farm) and the percentage of the farm in cropland. Date of sale was significantly correlated with sale price per hectare in both study areas when considered as a dummy variable.

Sale Price per Hectare

Variables significantly correlated with the inflation adjusted sale price per hectare in Lancaster County and Northumberland County (Table 6) included: (1) percent of cropland (0.60**), (2) date of sale (0.43*), (3) percent of

Table 6. Correlation of inflation adjusted† sale price per hectare with indices of soil productivity and other variables in Lancaster and Northumberland Counties.

N = 38		
X - Variables	R	R^2
Percent cropland	0.60**	0.36
Percent Class II + III land	0.44**	0.19
Percent Class VI + VII land	-0.43**	0.18
Percent Class VI land	0.42**	0.18
Percent Class II land	0.40**	0.16
Assessed value bldgs.	0.39*	0.15
Percent Class I + II + III land	0.37*	0.14
Estimated net income/ha	0.35*	0.12
Wheat productivity rating	0.33*	0.11
Soybean productivity rating	0.29‡	0.08
Corn productivity rating	0.27‡	0.07
Average land class	0.26	0.07
Percent Class III land	0.20	0.04
Hay productivity rating	0.20	0.04
Percent Class I land	+0.17	0.03
Percent Class VII land	-0.17	0.03
Percent Class IV land	0.02	<0.01

*Indicates significance at the .05 level.

**Indicates significance at the .01 level.

†Sale values adjsuted to standard dollar values using the land price index for Virginia (ERS, 1974). Sales took place from 1969 through 1973.

‡Indicates significance at the 0.10 level.

Table 7. Correlation of inflation adjusted† sale price per hectare with agronomic factors and indices of soil productivity and other variables in Charlotte County.

N = 84		
X - Variables	R	R^2
Assessed value bldgs.	0.58**	0.34
Percent farm in cropland	0.41**	0.17
Hay productivity rating	0.36**	0.13
Average land class	-0.28**	0.08
Soybean productivity rating	0.27*	0.07
Percent Class IV land	0.21*	0.04
Percent Class II + III land	0.20‡	0.04
Small grain productivity rating	0.20‡	0.04
Tobacco productivity rating	0.20‡	0.04
Percent Class II + III land	0.20‡	0.04
Percent Class VII land	0.18‡	0.03
Estimated net income	0.13	0.02
Percent Class III land	0.11	0.01
Corn productivity rating	0.10	0.01
Slope class	0.10	0.01
Pasture productivity rating	0.09	<0.01
Site index-loblolly pine	0.08	<0.01
Tobacco base/ha	0.05	<0.01

*Indicates significance at the .05 level.

**Indicates significance at the .01 level.

†Sale values adjusted to standard dollar values using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

‡Indicates significance at the 0.10 level.

Class VI land (-0.42**), (4) percent of Class II land (0.40**), (5) assessed value of buildings per hectare (0.39**), (6) estimated farm income per hectare (0.35**), and (7) small grain productivity rating (0.33*).

It was assumed that the combined percentages of Classes I, II, and III land would provide a measurement of the land having the highest use potential for farming while the combined total of Classes VI and VII land would provide a measure of land having a low use potential for farming (the amount of Class VIII land in Northumberland County and in Lancaster County was negligible).

The percentage of Classes VI and VII land was negatively correlated (-0.43**) with sale price per hectare while the percentage of Classes I, II, and III land combined was positively correlated (0.38**) with sale price per hectare.

Variables that were not significantly correlated with sale price per hectare in Lancaster and Northumberland Counties included: (1) percent of Class I land, (2) corn productivity rating, (3) soybean productivity rating, (4) hay productivity rating, (5) size of farm, (6) woodland suitability rating for loblolly pine, and (7) V.P.I. and S.U. extension service fertility management groupings of soils (Epperson and Hawkins, 1966).

Variables positively correlated with sale price per hectare at the 0.01 level of significance in Charlotte

County were: (1) assessed value of buildings per hectare (0.58**), (2) percent of farm in cropland (0.41**), (3) productivity ratings for hay (0.36**), and (4) soybean productivity rating (0.28**) (Table 7). Average land class was negatively correlated (-0.30**) with sale price per hectare at the 0.01 level of significance. The sign is logical in this case as this is a coded value. Low values for average land classes indicates that a high proportion of the farms consist of the lower SCS land classes (Classes I, II, and III) and vice versa. The percent of the farm in Class IV land was also negatively correlated (-0.22*) with sale price per hectare.

Variables which were correlated with sale price per hectare at the 0.01 level of significance included: (1) the percent of the farm in Class VII land which was negatively correlated (-0.20), (2) estimated net income (0.20), and (3) the percent of Classes II and III land (0.20).

Variables which were not found to be correlated with sale price per hectare at the 0.01 level of significance in Charlotte County included: (1) flue cured tobacco base per hectare, (2) dark flue cured tobacco base, (3) average corn productivity rating, (4) average small grain productivity rating, (5) average flue cured tobacco productivity rating, (6) average dark fire cured tobacco productivity rating, (7) coded averages for extension service management groupings of soils for any of five crops, (8) pasture productivity ratings, (9) average soil ratings of site index for loblolly pine, and (10) size of farm.

Although several of the variables tested were significantly correlated with sale price per hectare, no variable accounted for more than 34% of the variation in Y. As for the various indices of soil productivity tested in Charlotte County, none accounted for more than 13% of the variation in Y.

Effect of Location

Analysis of variance of inflation adjusted sale price per hectare for the farm sales in Lancaster and Northumberland Counties showed the magisterial districts in which the farm sales occurred to significantly affect sale price per hectare (Table 8). The regression of magisterial district, treated as a set of dummy variables, accounted for 41% of the variation in sale price per hectare. The mean average sale value per hectare varied from $616 for the three farms in the Wicomico magisterial district to $2569 for the five farms in the White Chapel magisterial district. The farm sales were fairly well distributed among the seven magisterial districts with a maximum of ten sales occurring in the Mantua magisterial district. The White Chapel, the White Store, and the Mantua magisterial districts are in Lancaster County with the remaining four magisterial districts being in

Northumberland County. No difference was found in average sale price per hectare between the farm sales in Lancaster County and those in Northumberland County.

In Charlotte County, a significant relationship was not found between magisterial district and mean average sale price per hectare (Table 9). Less than 6% of the variation in mean average sale price per hectare for the farms in Charlotte County could be accounted for on the basis of sale price per hectare.

Various other efforts were made to ascertain any effects of location on sale values per hectare. The farm sales were divided into those occurring north and south of Drakes Branch. The means of these two groups differed by two dollars per hectare. The case was essentially the same when the farms were separated into those east and west of Charlotte Court House. Plotting all sales on a large map of the county showed no systematic effect of location.

Occupation of Buyer

The buyer of each farm was characterized as being either a full or part time farmer. The source for this information included the county extension director, the ASCS office managers, the commissioners of revenue and, in a few cases, the buyers themselves. No attempt was made to take into account the part time farmers. It was assumed that anyone owning a farm is, in effect, at least a part time farmer.

Table 8. Effect of magisterial district on the inflation adjusted† sale price per hectare of thirty-eight farm sales in Lancaster and Northumberland Counties.

Magisterial district	N	Dollars/ha‡
White Chapel	5	2549
Lottsburg	7	2385
Heathsville	8	1975
Fairfield	3	1739
Mantua	10	1403
White Store	2	1159
Wicomi	3	616

F = 3.64

LSD (.01) = 1287

LSD (.05) = 958

R^2 = 0.41**

**Indicates significance at the .01 level.

†All farm sale prices were converted to constant dollar values using the index of average value for the state of Virginia (ERS, 1974) prior to statistical analyses.

‡The adjusted dollar values in this column are arbitrarily expressed in terms of 1975 dollars.

Table 9. Effect of magisterial district on the inflation adjusted* sale price per hectare of 84 farm sales in Charlotte County.

Magisterial District	N	Dollars/ha†
Walton	14	990
Roanoke	19	951
Midway	11	943
Bacon	14	833
Central	5	757
Madison	21	738
	$F = 0.97$	
	LSD (.01) = 412	
	LSD (.05) = 311	
	$R^2 = 0.06$	

*Sale values adjusted to standard dollar values using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

†The adjusted dollar values in this column are arbitrarily expressed in terms of 1975 dollars.

No difference was found in average sale price per hectare or in total sale price in either county between full time farmers and those buyers who were not full time farmers. Neither county showed a difference of more than twenty dollars per hectare in the means for these two groups.

Purpose of Purchase

A number of farms were purchased by adjacent land owners. In other cases the buyers owned nearby farms. The farm sales in each study area were separated on the basis of whether or not the purchase resulted in an addition to a presently existing farming enterprise. If the buyer owned a viable farming operation within five miles of the purchase, it was considered to be an addition to his farming operation. In neither county were there anything but trivial differences in sale price per hectare, total sale price, or size of farm sold for the farm sales in these two categories.

Analysis of Farm Sales by Soil Association in Lancaster and Northumberland Counties

Elder and Henry (1963) identified ten soil associations in Lancaster and Northumberland Counties. Farmland sales occurred within six of these soil associations.

The average price per hectare for each soil association is shown in Table 10. Prices are expressed in terms of 1975 dollars.

Analysis of variance indicates that there is an overall effect of soil associations on sale price per hectare (Table 10), however, no significant differences among means for the different soil associations is shown by Duncan's new multiple range test. Such differences are indicated by the LSD obtained in the analysis of variance but its use in unplanned non-orthogonal comparisons, such as these, is questionable.

The analysis and interpretation of the effect of soil associations on sale price per hectare is complicated by the greatly unequal number of farm sales that occurred within the different soil associations. From Table 10, it may be seen that a majority of the sales occurred within one soil association while only two sales occurred in each of the other two soil associations.

Multiple regression of soil association on sale price, treating the six soil associations as dummy variables, gives an R^2 of 0.36**.

Sassafras Thick Surface Phase--Woodstown

The two farm sales which occurred in the Sassafras thick surface phase-Woodstown soil association averaged $2958 per hectare (Table 10). This soil association, which occurs only in Lancaster County, covers about 10% of the county. About 50% of this soil association is made up of what Elder and Henry (1963) refer to as Sassafras-thick

Table 10. Effect of soil association on the inflation adjusted* sale price per hectare of thirty-eight farm sales in Lancaster and Northumberland Counties.

Soil Association	N	Dollars/ha†
Sassafras thick sandy phases-Woodstown association	2	2958
Woodstown-Dragston	5	2354
Othello-Fallsington	4	1830
Sassafras-Sandy land	24	1665
Beltsville-Kempsville	2	1531
Mattapex-Bertie	1	647
F =	1.70	
LSD (.01) =	1336	
LSD (.05) =	1000	

*All farm sale prices were converted to constant dollar values using the index of average value for the state of Virginia (ERS, 1974) prior to statistical analyses.

†The adjusted dollar values in this column are arbitrarily expressed in terms of 1975 dollars.

surface phase. Current studies (Personal communication with Carl Robinette, Soil Scientist, Warsaw, Virginia) indicate that similar soils in adjacent Richmond County have mineral compositions which are not compatible with the present definition of the Sassafras series. It is possible that this soil may be more fertile than had previously been assumed. These soils are well to excessively well drained with loamy sand surface textures and sandy loam to sandy clay loam subsoils. Most of these soils are now in rowcrops. The primary limitation of these soils in rowcrop production is their low water holding capacity. These sandy soils are well suited to vegetable production. The level to nearly level sloping topography of these soils, which occur on low lying broad flat terraces adjacent to the Rappahannock River, is compatible with efficient grain crop production.

Woodstown-Dragston

The six farm sales in the Woodstown-Dragston soil association had a mean average price per hectare of $2354. About 35% of this soil association, which covers approximately 12% of the two county area, is made up of Woodstown soils. These level, moderately well drained soils have sandy loam surface textures, loam to clay loam B horizons and are of medium fertility. Corn yield data in Maryland (Robinette, 1975) show this soil series to be one of the more productive in the Chesapeake Bay area. The somewhat poorly drained Dragston soils, while similar to the Woodstown soil, are less well drained. When drained and properly managed, they are nearly equal to the Woodstown soil in productivity for grain production. These soils make up 25% of this association. The moderately well drained Mattapex soils, which cover about 15% of this soil association, are similar to the Woodstown soils but differ in being fine textured. Steep and sandy land make up about 10% of this soil association with other soils making up about 20%. The soils in this soil association occur on broad, flat low terraces or "necklands" which extend out into the Chesapeake Bay and the Potomac and Rappahannock Rivers allowing for large fields of rowcrops. The average price per hectare for this soil association would have been even higher had not all farm sales with water frontage been eliminated.

Othello-Fallsington

The four farm sales which occurred in the Othello-Fallsington soil association averaged $1830 per ha (Table 10). This soil association, which covers about 80% of this study area, is characterized by poorly drained, fine to moderately coarse textured soils which also occur on the broad flat low terraces. Wetness is the primary factor limiting the productivity of these soils. Drainage is almost essential for rowcrop production.

Beltsville-Kempsville

The two sales occurring in the Beltsville-Kempsville soil association averaged $1531 (Table 10). This soil association is characterized by well drained to moderately well drained soils with fragipans occurring on the high terraces. Fragipans are compacted impervious subsoil layers which limit root penetration and restrict soil water movement. The soils (Beltsville soils) in this association having fragipans occurring above 75 cm are of limited value for rowcrop production.

The majority (25) of the farm sales occurred in the Sassafras-Sandy land soil association which covers about 45% of Lancaster and Northumberland Counties. This soil association is characterized by the well drained Sassafras soils which occur on broad nearly level to gently sloping ridgetops (high terraces) with excessively well drained sandy soils occurring on moderately steep to steep sideslopes. Sassafras soils are moderately deep and have sandy loam surface textures with clay loam textures occurring in the B horizon. They are of medium fertility and are well suited to rowcrop production. The Sandy land is poorly suited to cultivation due to slope and low water holding capacity. About 10% of this soil association is made up of alluvial soils which occur in narrow units along the drainage ways that dissect the uplands. These soils are generally not in cultivation because of wetness and their close association with the steep Sandy land does not allow for efficient utilization for crop production. Farmland in this soil association averages $1665 per hectare.

Mattapex-Bertie

One farm sale occurred in the Mattapex-Bertie soil association and sold for an average price per hectare of only $647. This particular farm was made up primarily of somewhat poorly drained Bertie soils and poorly drained Othello soils. In addition to these "wet" soils, the low per unit price of the farm was probably due to its lack of improvements and its inaccessibility. Over 50% of this farm was cut over timberland.

Sassafras-Sandy Land

Statistical analysis of the 24 farm sales occurring in the Sassafras-sandy loam soil association showed 7 of the 30 variables analyzed to be significantly correlated with sale price per hectare (Table 11). Variables which were positively correlated with sale price per hectare and which were adjusted for inflation included: (1) assessed value of buildings per hectare (0.68**), (2) percent of the farm in cropland (0.58**), and (3) percentage of Classes I, II, and III land (0.40*). Negative correlations were obtained for percent of Class VI land (-0.64**) and for percent of Classes VI and VII land (0.40*). Month of sale,

Table 11. Correlation of inflation adjusted† sale price per hectare for the Sassafras-Sandy land soil association in Lancaster and Northumberland Counties.

N = 24

X - Variables	R	R^2
Assessed value bldgs./ha	0.68**	0.46
Percent Class VI land	-0.63**	0.40
Percent cropland	0.58**	0.34
Percent Class I + II + III land	0.40*	0.34
Percent Class VI + VII land	0.39*	0.15
Wheat productivity rating	0.30	0.09
Soybean productivity rating	0.29	0.08
Percent Class II land	0.28	0.08
Estimated net income	0.28	0.08
Hay productivity rating	0.28	0.08
Average land class	-0.27	0.07
Percent Class III land	0.27	0.07
Corn productivity rating	0.25	0.06
Percent Class IV land	-0.11	0.01
Percent Class I land	0.05	<0.01
Percent Class VII land	0.00	0.00

*Indicates significance at the .05 level.

**Indicates significance at the .01 level.

†Sale values adjusted to standard dollar values using the land price index for Virginia (ERS, 1974). Sales took place from 1969 through 1973.

when correlated with sale price per hectare and unadjusted for inflation gave a correlation coefficient of 0.50**.

Variables which were not significantly correlated with sale price per hectare included productivity ratings for corn, soybeans, small grains, pasture, hay, and tomatoes. Other variables which were not significantly correlated included "extension service" fertility groupings of soil types and estimated farm income per hectare. Although the combined percentages of Classes I, II, and III land were significantly correlated with sale price per hectare, this was not the case when any of the three land classes were considered individually.

Twenty variables were regressed against sale price per hectare (unadjusted for inflation) using the stepwise regression procedure.

It may be seen from Table 12 that 75% of the variation in sale price per hectare for the 24 farms in the Sassafras-Sandy land soil association could be accounted for by four variables. These variables, in order of partial F statistics were: (1) assessed value of buildings per hectare, (2) month code, (3) combined percentages of Classes I, II, and III land, and (4) estimated net farm income.

The single variable giving the highest R^2 value (0.33**) was the percentage of farm in cropland. This model was, however, not included in the model that was deemed "best" according to the criteria of this procedure. The addition of the percent of cropland to the four variable model in Table 12 gives a model accounting for 77% of the variation in sale price per hectare with the partial statistic for percent cropland being significant at the 0.12 level.

When considered alone, estimated net income gives an r value of 0.28 which is significant at only the 0.2 level and accounts for less than seven percent of the variation in sale price per hectare but its addition to the three variable model in Table 12 results in an increase in the R^2 value from 0.70 to 0.75 and has a partial F statistic that is significant at the 0.07 level. Regression of all twenty variables against sale price per hectare results in an R^2 value of 0.79 which is an increase of only 0.02 over the "best" four variable model.

The 24 soils in the Sassafras Sandy land soil association were separated into farms having less than 40% steep or sloping Sandy land and those with greater than 40% Sandy land.

Fifteen of the 24 farms had less than 40% Sandy land. Variables significantly correlated with sale price per hectare were: (1) assessed value of buildings (0.56**), (2) month code (0.51**), and (3) combined percentages of Classes I, II, and III land (0.48**).

Table 12. Stepwise regression of unadjusted sale price per hectare* for Sassafras-Sandy land soil association in Lancaster and Northumberland Counties.

Number	R-Square	X-Variables in Model
1	0.33†	Cropland
2	0.47†	Cropland, Month of sale
3	0.71†	Value bldgs./ha, Class I + II + III land
4	0.75†	Value bldgs./ha, Estimated net income/ha, Class I + II + III land, Month of sale.

N = 24
F Value = 14.53
Probability F = 0.01
Intercept =-201.49

Variable	Partials
Value bldgs/ha	3.09
Month of sale	6.37
Class I + II + III land	817.03
Income	-5.19

Variable	Sequential SS	F Value	Probability >F
Value bldgs./ha	171347.82	19.88	<0.01
Month of sale	233268.41	27.07	<0.01
Class I + II + III land	65197.49	7.56	0.01
Income	31084.05	3.61	0.07

Table 12 (Continued)

Variable	Partial SS	F Value	Probability >F
Value bldgs./ha	214804.76	24.92	<0.01
Month of sale	235758.73	27.35	<0.01
Class I + II + III land	82644.01	9.59	0.01
Income	31084.05	3.61	0.07

*Sales took place from 1969 through 1973.

†Indicates significance at the 0.10 level.

Application of the stepwise regression procedure as described previously resulted in a three variable model which accounted for 86% of the variation in sale price per hectare (unadjusted for inflation). These variables, in order of descending partial F statistics, were: (1) assessed value of buildings per hectare, (2) month of sale (coded), and (3) combined percentages of Classes I, II, and III land.

Among the nine farms having more than 40% Sandy land, month of sale was found to be significantly correlated (0.60*) with sale price per hectare (unadjusted for inflation). No other variables, either adjusted or unadjusted for inflation, were significantly correlated with sale price per hectare. Less than 45% of the variation in sale price could be accounted for by any of several multiple regression models tested.

The month of sale and the percent of the farm in cropland were found to be correlated with sale price per hectare for the five farms in the Woodstown-Dragston soil association. The correlation coefficient of month of sale with sale price per hectare was 0.97** regardless of whether dollar values were adjusted or unadjusted for inflation. Percent of farm in cropland had a correlation coefficient of 0.89* with sale price per hectare dollar values being adjusted for inflation. A correlation coefficient of -0.85 was found between sale price per hectare and total hectares in farm which is significant at the 0.06 level. A negative correlation between size of farm and sale price per unit area was reported in two studies in Oklahoma (Ahmed and Parcher, 1964). This was the only case in which this trend was indicated in this study. Four of the five farms in the Woodstown-Dragston soil association were purchased as additions to presently existing farm operations with the remaining farm being purchased for a summer home.

Only four farm sales occurred in the Othello-Fallsington soil association which was too few for meaningful statistical analysis. However, high negative correlations were found between sale price per hectare and Class VII land (0.97*) as well as with Class VI land (0.96*). No more than two sales occurred in any of the remaining soil associations in either Lancaster or Northumberland Counties.

Analysis of Farm Sales by Soil Association in Charlotte County

Seven soil associations were identified in the soil survey report for Charlotte County (Van Dine and Sledjeski, 1974). Farm sales analyzed in this study occurred in six of these soil associations. The means of the average sale price per hectare of the farms occurring in each of these soil associations in shown in Table 13.

Exactly half (42) of the sales occurred in a single soil association, the Cecil-Appling, which covers more than half of Charlotte County. No more than fifteen sales occurred in any other single soil association with only three sales occurring in the Iredell-Vance-Helena soil association. No sales occurred in the Creedmoor-Iredell-Pinkston soil association.

Results of an analysis of variance do not show an effect of soil association on sale price that is significant at the 0.05 level. Duncan's new multiple range test does not show any of the means of the average sale price of any of the six soil associations to be significantly different. Multiple regression of soil association against sale price per hectare, treating soil association as a set of dummy variables, gives an R^2 value of 0.08 which is significant at the 0.3 level. However, the addition of soil association as a set of dummy variables to a multiple regression equation which includes: (1) date of sale, (2) assessed value of buildings, and (3) percent of farm in cropland, results in an increase of R^2 value from 0.37** to 0.47**.

The relative ranking of the means of the average sale price of the six soil associations (Table 13), although not significantly different, are in agreement with the manner in which they might be rated if they were rated as

Table 13. Effect of soil association on the inflation adjusted* sale price per hectare of eighty-four farm sales in Charlotte County.

Soil Association	N	Dollars/ha†
Chewacla-Congaree-Turbeville	7	964
Cecil-Appling	42	939
Appling-Vance-Cecil	9	880
Iredell-Vance-Helena	3	868
Georgeville-Herndon	15	756
Cullen-Madison	8	653

F = 0.96
LSD (.01) = 409
LSD (.05) = 305

*All farm sale prices were converted to constant dollar values using the index of average value for the state of Virginia (ERS, 1974) prior to statistical analyses.

†The adjusted dollar values in this column are arbitrarily expressed in terms of 1975 dollars.

to relative overall soil or agronomic productivity with two exceptions.

Chewacla-Congaree-Turbeville

The seven farm sales in the Chewacla-Congaree-Turbeville soil association had the highest mean average sale price. Over half of this soil association is made up of level to nearly level soils which occur on or adjacent to the floodplains of the Roanoke River and its tributaries. This soil association contains some of the most productive soils in the southern Piedmont of Virginia. About 70% of this soil association is in cultivation.

The Cullen-Madison soil association might, in terms of overall soil productivity, be ranked after the Chewacla-Congaree-Turbeville soil association. Nonetheless, it had the lowest mean average sale price per hectare.

Iredell-Vance-Helena

The Iredell-Vance-Helena soil association may be considered the least productive of the six soil associations in Charlotte County in which sales occurred. The mean of the average sale price per hectare of the three farms in this soil association was third highest of the six soil associations. However, three farms do not constitute a meaningful sample.

The relative relationship of the other three soil associations in terms of near average sale price per hectare, and in terms of their overall soil productivity, is in general agreement. These soil associations are: (1) Cecil-Appling, (2) Appling-Cecil-Vance, and (3) Georgeville-Herndon.

Cecil-Appling

Forty-two farm sales occurred in the Cecil-Appling soil association. It was felt that correlation and regression analysis of factors or variables affecting sale price within a single soil association might be meaningful. In addition, correlation and regression analyses were also performed on the 15 sales in the Georgeville-Herndon soil association. Only correlations were performed on the nine sales in the Appling-Vance-Cecil soil association and the eight sales in the Cullen-Madison soil association. The number of sales occurring in the other soil associations was not adequate to permit this type of analysis.

The Cecil-Appling soil association consists of deep, well drained, undulating to hilly soils which are low in fertility and medium to low in water holding capacity. The Cecil soils are one of the most frequently occurring soils of the Piedmont. Both soils are considered to be excellent for flue cured tobacco with Appling being generally preferable. Assuming they are well fertilized and have adequate rainfall, the Cecil and Appling soils produce good corn and soybean yields. Row crops do not fare well on these soils during years of low rainfall. The rainfall pattern in the southern Piedmont of Virginia makes these slightly droughty soils more suitable for small grains. Row crop production in this soil association is also limited by slope.

Correlation analyses were performed on the 42 farms that occurred in the Cecil-Appling soil association (Table 14). Variables found to be positively correlated with inflation adjusted sale price per hectare included: (1) assessed value of buildings (0.77**), (2) percent of farm in cropland (0.4**), and (3) hay productivity rating (0.4**). The percent of the farm in Class IV land was negatively correlated with sale price per hectare (-0.31*). Date of sale, treated as a coded numerical variable, was positively correlated with sale price per hectare when expressed in terms of "raw" or unadjusted dollar values (0.32*).

Variables found to be correlated with total sale price (Table 15) included: (1) hectares of cropland (0.73*), (2) assessed value of buildings (0.64**), (3) combined hectares of Classes II and III land (0.64**), (4) hectares of Class III land (0.58**), (5) hectares of Class II land (0.57**), (6) total hectares in farm (0.55**), (7) estimated net farm income (0.52**), (8) hay productivity rating (0.32*), and (9) average land class index (0.30*). The correlation coefficient for the productivity ratings for soybeans, corn

Table 14. Correlation of inflation adjusted† sale price per hectare with indices of soil productivity and other variables for the Cecil-Appling soil association in Charlotte County.

N = 42

X - Variables	R	R^2
Assessed value bldgs./ha	0.77**	0.59
Percent farm in cropland	0.42**	0.18
Hay productivity rating	0.39**	0.15
Average land class	-0.33*	0.11
Soybean productivity rating	0.31*	0.10
Percent Class VII land	-0.30*	0.09
Percent Class IV land	-0.30*	0.09
Small grain productivity rating	0.29	0.08
Percent Class II + III land	0.22	0.05
Percent Class II land	0.19	0.04
Percent Class VI + VII land	0.16	0.03
Estimated net income/ha	0.15	0.02
Tobacco base/ha	0.15	0.02
Percent Class III land	0.14	0.02
Percent Class VI land	0.06	0.01

*Indicates significance at the .05 level.

**Indicates significance at the .01 level.

†Sale prices adjusted to standard dollar values using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

Table 15. Correlation of inflation adjusted† sale price for the Cecil-Appling soil association in Charlotte County.

N = 42

X - Variables	R	R^2
Cropland (ha)	0.73**	0.53
Assessed value bldgs.	0.64**	0.41
Class II + III land	0.63**	0.40
Class III land (ha)	0.58**	0.34
Class II land (ha)	0.57**	0.32
Size of farm (ha)	0.55**	0.30
Estimated net income	0.51**	0.26
Hay productivity rating	0.32**	0.10
Average land class	0.30*	0.09
Soybean productivity rating	0.29‡	0.08
Corn productivity rating	0.28‡	0.08
Small grain productivity rating	0.28‡	0.08
Class VI + VII land	0.26‡	0.06
Tobacco base (ha)	0.26‡	0.06
Class VI land	0.23	0.05
Tobacco productivity rating	0.22	0.05
Class VII land	0.18	0.03
Class IV land	0.09	<0.01

*Indicates significance at the .05 level.

**Indicates significance at the .01 level.

†Sale values adjusted to standard dollar values using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

‡Indicates significance at the 0.10 level.

and small grains was 0.28 in each case which was significant at the 0.06 level.

Variables which were not significantly correlated with either total sale price or price per hectare included: (1) kilograms of either flue cured or dark fire cured tobacco, and (2) productivity ratings for either type of tobacco.

Regression of seventeen x-variables against inflation adjusted sale price per hectare resulted in an R^2 value of 0.75**. Three of these 17 variables were selected by the stepwise regression technique (Table 16). This three variable model had an R^2 value of 0.67** and each variable was deemed significant at the 0.1 level. These three variables were, in order of descending magnitude of sequential squares: (1) assessed value of buildings per hectare, (2) hay productivity rating, and (3) estimated net farm income. The signs of the variable betas or partials was positive in each case as might be expected since each is positively correlated with sale price per hectare when considered alone.

A stepwise regression of 17 variables against total sale price in the Cecil-Appling soil association farm sales resulted in the selection of a four variable model that accounted for 94% of the variation in Y (Table 17). These four x-variables, in order of magnitude of sequential sum of squares, were: (1) size of farm in hectares, (2) assessed

Table 16. Stepwise regression on the inflation adjusted sale price† per hectare for the Cecil-Appling soil association in Charlotte County.

Number	R-Square	X-Variables in Model‡
1	0.60**	Value bldgs./ha
2	0.65**	Value bldgs./ha Hay rating
3	0.67**	Value bldgs./ha Hay rating Estimated net income/ha

N = 42
F Value = 36.12
Probability F = 0.01
Intercept = 92.46

Variable	Partials
Value bldgs./ha	6.21
Hay rating	72.70
Estimated net income/ha	1.23

Variable	Sequential SS	F Value	Probability >F
Value bldgs./ha	129007.34	69.20	0.01
Hay productivity	11681.99	6.26	0.02
Estimated net income/ha	5224.71	2.80	0.09

Variable	Partial SS	F Value	Probability >F
Value bldgs./ha	115207.28	55.64	0.01
Hay productivity	10962.82	6.04	0.02
Estimated net income/ha	4224.71	2.81	0.09

*Indicates significance at the .01 level.

†Sale values adjusted to standard dollars using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

‡All variables in these models are significant at the 0.10 level.

Table 17. Stepwise regression on inflation adjusted sale price† in the Cecil-Appling Soil Association in Charlotte County.

Number	R-Square	X-Variables in Model‡
1	0.53**	Cropland
2	0.70**	Value of buildings, Cropland
3	0.76**	Income, Value of buildings, Cropland
4	0.78**	Hay rating, Income, Value of buildings, Cropland
5	0.79**	Soybean rating, Hay rating, Income, Value of buildings, Cropland

N = 42
F Value = 27.15
Probability >F = <0.01
Intercept = -38622.84

Variables	Partials
Cropland	193.58
Value of buildings	5.59
Income	3.32
Hay rating	21987.36
Soybean rating	-666.08

Variable	Sequential SS	F Value	Probability >F
Cropland	5328232599.45	91.49	<0.01
Value/bldgs.	1672655464.08	28.72	<0.01
Income	571987188.21	9.82	<0.01
Hay rating	229223182.08	3.94	0.05
Soybean rating	104898269.37	1.80	0.19

Table 17 (Continued)

Variable	Partial SS	F Value	Probability >F
Cropland	729445878.42	12.52	<0.01
Value/bldgs.	1905837140.76	32.72	<0.01
Income	663809102.75	11.40	<0.01
Hay rating	278909440.03	4.79	0.03
Soybean rating	104898269.37	1.80	0.19

**Indicates significance at the .01 level.

†Sale values adjusted to standard dollar values using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

‡All variables in these models are significant at the 0.10 level.

value of buildings, (3) estimated net farm income, and (4) hectares of farm in Classes VI and VII land (Table 17). The sign of the beta values was positive in the case of the first two variables and negative for the latter two variables. The illogical negative sign for income is likely due to the high correlation between estimated net income and size of farm. Perhaps a "better" model is the three variable model shown in Table 19 where, although not shown, the partials in this case are all positive. The three x-variables are: (1) size of farm, (2) hectares of farm in cropland, and (3) combined hectares of Classes II and III land. This model has an R^2 value of 0.89**.

Georgeville-Herndon

Fifteen farm sales occurred in the Georgeville-Herndon soil association. This soil association had the lowest sale price per hectare of the six soil associations in Charlotte County having farm sales. The only variable found to be significantly correlated with sale price per hectare in the case of the fifteen sales in the Georgeville-Herndon soil association (Table 18) was the kilograms of flue cured tobacco base expressed on a per hectare base. The correlation coefficient was negative (-0.49). Flue cured tobacco is not an unimportant crop in this soil association. The 15 farm sales in the Georgeville-Herndon soil association had tobacco bases ranging from zero to

Table 18. Correlation of inflation adjusted† sale price per hectare with indices of soil productivity and other variables in the Georgeville-Herndon soil association in Charlotte County.

N = 15

X - Variable	R	R^2
Tobacco base/ha	-0.49*	0.24
Estimated net income/ha	0.47‡	0.22
Soybean rating	0.35	0.12
Class VI + VII land	0.35	0.12
Class II land	0.33	0.11
Average land class	-0.32	0.10
Percent cropland	0.28	0.08
Percent Class IV land	0.27	0.07
Percent Class VII land	-0.27	0.07
Assessed value bldgs./ha	0.24	0.06
Hay productivity rating	0.24	0.06
Percent Class VI land	0.22	0.05
Percent Class III land	-0.13	0.02
Percent Class II + III land	0.05	0.01

*Indicates significance at the .05 level.

†Sale values adjusted to standard dollar value using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

‡Indicates significance at the 0.10 level.

2160 kg (4800 lbs.) and averaging 1029 kg (2286 lbs.). This was the second highest of the six soil associations in Charlotte County in which sales occurred. Although the correlations were not significant, flue cured tobacco base was negatively correlated with hay, corn, soybean, and small grain productivity ratings as well as to the percent of farm in Class II land. It appeared that farms having the larger tobacco bases had a high proportion of less productive soils. The Georgeville-Herndon soil association is made up primarily of deep, well drained strongly acid soils which are low in fertility and medium to low in water holding capacity. Yields on these soils are usually below that of Cecil or Appling soils.

Variables significantly correlated with sale price among the sales in the Georgeville-Herndon soil association included: (1) the size of the farm (0.95**), (2) hectares of Class II land (0.94**), (3) estimated net farm income (0.85**), (4) hectares of Class IV land (0.82**), (5) hectares of Class III land (0.73**), and (6) average land class (-0.52*).

In the case of the sale price per hectare in the Georgeville-Herndon soil association, the stepwise regression procedure selected from 17 available x-variables gave a three variable model which had an R^2 value of 0.79** (Table 19). The three x-variables were: (1) percent of

Table 19. Stepwise regression on inflation adjusted sale price† per hectare in the Georgeville-Herndon soil association in Charlotte County.

Number	R-Square	X-Variables in Model‡
1	0.24**	Tobacco base/ha
2	0.46**	Tobacco base/ha Cropland
3	0.79**	Size of farm Tobacco base/ha Cropland

N = 15
F Value = 13.82
Probability >F = <0.01
Intercept = 118.31

Variables	Partials
Size of farm	0.25
Cropland	282.05
Income/ha	-5.30

Variable	Sequential SS	F Value	Probability >F
Size of farm	9751.40	12.64	<0.01
Cropland	12165.38	15.76	<0.01
Income/ha	10087.89	13.07	<0.01

Variable	Partial SS	F Value	Probability >F
Size of farm	14854.69	19.25	<0.01
Cropland	17074.71	22.13	<0.01
Income/ha	10087.89	13.07	<0.01

**Indicates significance at the .01 level.

†Sale values adjusted to standard dollar values using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

‡All variables in these models are significant at the 0.10 level.

farm in cropland, (2) estimated net farm income, and (3) size of farm. All variables had partials that were positive.

In the case of total sale price, a three variable model was selected by the stepwise procedure which accounted for 96% of the variation in sale price. These three variables were: (1) size of farm, (2) size of tobacco base, and (3) hectares of farm in cropland. The x-variable partials were positive except for tobacco base. The negative sign in this case is not illogical considering the negative relationship between tobacco base and sale price per hectare for these fifteen farms.

Cullen-Madison

Eight farm sales were in the Cullen-Madison soil association which occurs in north central Charlotte County. This soil association is made up up undulating to hilly, well drained, heavy textured soils of medium fertility and medium water holding capacity. The Cullen soils were formerly mapped as Lloyd. Previously, dark fire cured tobacco was an important crop in this part of Charlotte County. A considerable amount is still grown but some farmers have allowed these dark tobacco bases to be lost due to disuse and others have given away the yearly rental rights in order to preserve the bases. Normal rental value of bases is very low. Flue cured tobacco was not grown extensively in these soil associations as the soils were considered to be too clayey and too infertile for production of good quality flue cured tobacco. Some of the better livestock farms in the county are in this soil association. The only variables significantly correlated with sale price per hectare were: (1) percent of farm in Class II land (0.76*), and (2) estimated net farm income per hectare (0.71*). Percent of Classes II and III land (0.62) and percent cropland (0.61) were both positively correlated with sale price per hectare at the 0.1 level.

In the case of the Cullen-Madison sales, variables significantly correlated with total sale price (Table 20) included: (1) hectares of Class III land (0.90**), (2) size of farm (0.87**), (3) assessed value of buildings (0.84**), (4) hectares of Class VI land (0.87*), (5) hectares of Classes VI and VII land (0.81*), (6) hectares of Classes II and III land (0.80*), and (7) estimated net farm income (0.69*). As only eight sales occurred in this soil association, multiple regression analysis was not performed.

Appling-Vance-Cecil

Nine farm sales occurred in the Appling-Vance-Cecil soil association. Although flue cured tobacco is grown throughout the county, the soil association coincides with the most intensive flue cured tobacco growing area of Charlotte County. The Appling soils are generally considered

Table 20. Correlation on inflation adjusted† sale price per hectare for the Cullen-Madison soil association in Charlotte County.

N = 8

X-Variables	R	R^2
Percent Class III land	0.74*	0.55
Estimated net farm income	0.71*	0.50
Percent Class IV land	-0.67*	0.45
Percent Class II + III land	0.62‡	0.38
Percent cropland	0.58	0.34
Soybean productivity rating	0.42	0.18
Assessed value bldgs./ha	0.40	0.16
Corn productivity rating	0.39	0.15
Hay productivity rating	0.35	0.12
Percent Class VI land	0.32	0.10
Average land class	-0.32	0.10
Percent Class VI land	-0.31	0.10
Tobacco base/ha	-0.24	0.06
Tobacco productivity rating	0.19	0.04
Percent Class II land	0.15	0.02
Percent Class VI + VII land	-0.12	0.01

*Indicates significance at the .05 level.

†Sale values adjusted to standard dollar value using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

‡Indicates significance at the 0.10 level.

to be the best for flue cured tobacco production. The nine soils in this soil association had tobacco bases ranging from 511 kg (1135 lbs.) to 10,360 kg (22,380 lbs.) for an average of 2802 kg (6185 lbs.), nearly three times that of any other soil association.

Not surprisingly, the two variables most highly correlated with sale price per hectare, when considering only the nine farm sales in this soil association, were quantity of flue cured tobacco base (0.65) and flue cured tobacco productivity rating (0.64). Both were significant at the 0.06 level. Assessed value of buildings was positively correlated (0.61) with sale price per hectare at the 0.1 level of significance (Table 21).

The correlation coefficient obtained between quantity of flue cured tobacco base and total sale price was 0.97**. Also highly correlated with total sale price were: (1) estimated net income (0.98**), (2) size of farm (0.98**), (3) hectares of Class II land (0.98**), (4) hectares of Class III land (0.97**), and (5) hectares of cropland (0.91**). It was felt that the low number of sales which occurred in this soil association precluded any meaningful analysis by multiple regression. It is interesting to note that flue cured tobacco base and the soil productivity rating for flue cured tobacco base accounted for 63% of the variation in sale price per hectare.

Table 21. Correlation of inflation adjusted* sale price per hectare for the Appling-Vance-Cecil soil association in Charlotte County.

N = 9

X - Variables	R	R^2
Tobacco base/ha	0.65†	0.42
Tobacco productivity rating	0.64†	0.41
Assessed value bldgs./ha	0.49†	0.36
Percent cropland	0.45	0.20
Percent Class VI + VII land	-0.42	0.18
Estimated net income/ha	0.38	0.14
Corn productivity rating	0.29	0.08
Average land class	-0.29	0.08
Percent Class VI land	-0.29	0.08
Soybean productivity rating	0.24	0.06
Percent Class VII land	-0.23	0.05
Percent Class IV land	0.21	0.04
Percent Class II land	0.11	0.01
Percent Class II + III land	0.05	<0.01
Percent Class III land	0.02	<0.01

*Sale price adjusted to standard dollar value using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

†Indicates significance at the 0.10 level.

Relationship of Assessed Value to Sale Value

All parcels of land in Virginia are reassessed every six years as part of a general reassessment for the particular county in which the tract of land occurs. The actual year in which the reassessment occurs for any particular tract of land depends on the county in which the tract occurs. In the years in which there is no general reassessment, the county commissioner of revenue is charged with the responsibility of making any necessary adjustments in appraised values for any or all tracts of land within that particular county.

All real property in Virginia is appraised at fair market value. The actual assessed value is expressed in terms of a specified percentage of the fair market value which differs from county to county. This is true even for those farms that have qualified for use-value assessment. In these counties, it is also required that tracts of land found to qualify under Section 58.796.11 Code of Virginia must be assessed by the procedures prescribed therein.

The procedure for assessing real property in Charlotte County calls for assessing all real property at 17% of its fair market value. In both Lancaster and Northumberland Counties, all real property is theoretically assessed at 27% of its fair market value.

In the case of the 84 farm sales in Charlotte County, the average assessed value to sale price ratio expressed on a percentage basis was 11.4% with a standard deviation of 4.7 (CV = 41%). According to the Commissioner of Revenue in Charlotte County (Personal Communication, Aylene Tucker, Charlotte County Court House, Va.), the average assessed value to sale price ratio for Charlotte County has been, in reality, about 10%. Thus it would appear that the assessed value to sale price ratio for farmland is about on par with all real property in Charlotte County. It should be pointed out that the assessed value referred to here is not based on the most recent general reassessment in Charlotte County which occurred in 1973. The assessed value used here is the value at which the property was assessed at the time the sale occurred. The individual farms in Charlotte County had assessment value to sale ratios ranging from 3.8% to 28%.

Correlation of total sale price with assessed value resulted in an r value of 0.90** for the Charlotte County sales, thus accounting for 81% of the variation in total sale price. A considerably lower correlation coefficient of 0.56** was obtained with assessed value per hectare which accounts for 31% of the variation in Y (Table 22).

Sales analyzed in this study in Charlotte County occurred from 1968 through 1972. The most recent general

Table 22. Correlation of selected variables with assessed variables per hectare.

X - Variables	r	r^2
Lancaster and Northumberland Counties N = 38		
Adjusted sale value‡/ha	0.33	0.11
Sale value/ha	0.25	0.06
Percent cropland	0.20	0.04
Size of farm (ha)	-0.18	0.03
Hay productivity rating	-0.15	0.02
Wheat productivity rating	0.06	<0.01
Soybean productivity rating	0.06	<0.01
Corn productivity rating	0.06	<0.01
Percent Class I + II + III land	0.04	<0.01
Average land class	-0.04	<0.01
Percent Class VI + VII land	-0.03	<0.01
Charlotte County N = 84		
Adjusted sale value‡/ha	0.67	0.45
Sale value/ha	0.55**	0.30
Percent cropland	0.43**	0.18
Hay productivity rating	0.32**	0.10
Average land class	-0.20†	0.04
Soybean productivity rating	0.20†	0.04
Corn productivity rating	0.18†	0.03
Percent Class II + III land	0.18†	0.03
Size of farm (ha)	-0.15	0.02
Tobacco base (kg)	0.13	0.01
Percent Class VI + VII land	0.11	0.01
Estimated net income/ha	0.10	0.01

**Indicates significance at the .01 level.

†Indicates significance at the 0.10 level.

‡Sale values adjusted to constant 1967 dollars using the index of average price per unit area for Virginia (ERS, 1974).

assessment of real property in Charlotte County, prior to this time period, was 1967. Theoretically, assessed values are updated annually. It was found that the adjustment of sale price per hectare to "deflated" 1967 dollars on the basis of the land price index for Virginia increased the r value obtained, when assessed value was correlated with sale price, from 0.55** to 0.67**.

Both Lancaster and Northumberland Counties theoretically assess all real property at 27% of its fair market value. The average assessed to sale value ratio expressed as a percentage was 20.5% for the 38 farm sales in Lancaster and Northumberland Counties combined. The standard deviation was 14.2 giving a CV of 69%. The individual farms had assessed value to sale value ratios, expressed as a percentage, ranging from a low of 2.7% to a high of 66.7%.

The correlation of assessed value with total sale value gave an r^2 of 0.83**. The correlation of assessed value per hectare with sale price per hectare resulted in an r-value of only 0.25 which was not significant at the 0.1 level (Table 22). In other words, only 6% of the variation in sale price per hectare for the 38 sales in these two counties was correlated with assessed value on a per unit basis.

The sales that occurred in each county were also analyzed separately. In the case of the 17 farm sales in Lancaster County, the assessment to sale value ratio, expressed as a percent, ranged from 8 to 67%, averaging 21% with a standard deviation of 14%. Correlation of total assessed value with total sale price gave a correlation coefficient of 0.86** and an r-value of 0.74. Correlation of sale value per hectare with assessed value per hectare resulted in a correlation coefficient of 0.56* or an r^2 value of only 0.31.

The 21 farm sales in Northumberland County had an average assessed value to sale value ratio, expressed as a percentage, of 20% with individual values ranging from 3 to 58%. The standard deviation was 14%. The correlation coefficient obtained by correlation of sale value with assessed value was 0.82, giving an r^2 value of 0.67.

Correlation of sale value per hectare with assessed value per hectare gave an r-value of only 0.14 which accounts for less than 2% of the variation in sale price per hectare.

Regression Analysis

Regression analysis was performed in order to determine the degree to which variation in sale price, both in total and on a per unit basis, could be explained by the variables considered in this study. Additionally, regression analysis provided information on the nature of the relationship of certain variables to sale price and to each other.

Stepwise regression techniques were utilized in the initial phase of this portion of the data analysis. Five different stepwise techniques (Service, 1972) were initially utilized. The equation for only one of these is reported here. In brief, this procedure first selects the single variable model which gives the highest R^2 value providing the partial F statistic is significant at a given level (0.1 in this case). Next, the two variable model is selected which results in the highest R-square value, providing both variables have significant partial F statistics. This procedure continues to add variables to the model as long as there are variables available for selection which meet the conditions for inclusion in the model. Table 23 gives the results of the stepwise regression procedure for the dependent variable sale price per hectare (unadjusted for inflation) for the Lancaster and Northumberland Counites sales. Seventeen independent variables were considered for possible inclusion in the models selected. This particular stepwise procedure first selects the single variable model which gives the highest R-square value, providing the partial F statistic for that x-variable is significant at the 0.1 level. Next, the two variable model which gives the highest R^2 value is selected providing that both x-variables have F statistics significant at the 0.1 level. This procedure continues as long as there are

Table 23. Stepwise regression for unadjusted sale price per hectare† in Lancaster and Northumberland Counties.

Number	R-Square	X-Variables in Model‡
1	0.38**	Month of sale
2	0.53**	Cropland, Month of sale
3	0.48**	Class I + II + III land, Cropland, Month of sale.
4	0.64**	Cropland, Class I + II + III land, Month of sale, Soybean rating
5	0.68**	Value bldgs./ha, Cropland, Class I + II + III land, Month of sale, Soybean rating

N = 38
F Value = 13.43
Probability > F = <0.01
Intercept = 215.62

Variable	Partial
Month of sale	6.31
Cropland	332.40
Class I + II + III land	1449.06
Soybean rating	-9.59

Table 23 (Continued)

Variable	Sequential SS	F Value	Probability >F
Month of sale	706236.66	37.58	< 0.01
Cropland	289530.33	15.41	< 0.01
Class I + II + III land	85696.68	4.56	0.03
Soybean rating	109409.63	5.82	0.02
Value bldgs./ha	69999.63	3.73	0.06

Variable	Partial SS	F Value	Probability >F
Month of sale	332719.67	17.71	< 0.01
Cropland	104390.86	5.56	0.02
Class I + II + III land	147900.06	7.87	0.01
Soybean rating	88963.91	4.73	0.04
Value bldgs./ha	69999.63	3.73	0.06

**Indicates level of significance at the .01 level.

†Sales occurred from 1969 through 1973.

‡All variables in these models are significant at the 0.10 level.

x-variables which meet the criteria for inclusion or until no further improvement in R-square is possible.

This procedure resulted in the selection of a five variable model which accounted for 68% of the variation in sale price per unit area (Table 23). In order of selection by the stepwise procedure these variables were: (1) month of sale (coded value), (2) percent of Classes I, II, and III land, (3) percent of farm in cropland, (4) soybean productivity rating, and (5) assessed value of buildings per hectare. The signs of all of the partial correlation coefficients were logical in this model except the soybean yield rating which was negative. Considered individually, it was positively correlated with sale price per hectare. The illogical sign is possibly a result of the high correlation (0.95**) between the soybean yield rating and the percentage of farms in the better three land classes.

As stated previously, the single variable most highly correlated with unadjusted sale price per hectare was the month of sale which accounted for 38% of the variation in the Y variable. The "best" two variable model was month of sale and percent of farm in cropland, accounting for 53% of the variation in Y. The addition of the combined percentages of Classes I, II, and III land resulted in these two variables giving an R square value of 0.58**. Regression of all 15 variables on sale price per hectare gave an R square value of 0.71.

The stepwise regression techniques do not readily facilitate the consideration of non-numerical or dummy variables. Thus, various models which included dummy variables were constructed and tested in a trial and error fashion.

Four dummy variables were considered. These were: (1) magisterial district (effect of location), (2) soil association, (3) occupation of buyer, and (4) whether or not the buyer was adding to an existing farming operation. Only the first of these variables was found to make a significant contribution when added to previously selected regression models.

Eighty percent of the variation in sale price per hectare for farms in Lancaster and Northumberland Counties was accounted for by a regression model which included: (1) month of sale (numerical value), (2) percent of farm in cropland, (3) combined percentages of Classes I, II, and III land, (4) assessed value of buildings per unit area, and (5) the magisterial district in which the farm was located. In the case of the last variable, each of the six magisterial districts in Lancaster and Northumberland Counties were treated as levels of an effect. All of the variables, including the dummy variable, had F statistics that were significant at the 0.1 level.

Regression models were tested in which the numerical month code was replaced with a year code and treated as a dummy variable. In all cases, these models had lower R-square values. In Charlotte County quite the opposite was true.

Table 24 presents a four x-variable model selected by the stepwise regression procedure from fifteen available x-variables with the Y variable being correlated with total sale price for the farms rather than sale price per hectare. The four x-variables, in order of sequential sums of squares, were: (1) combined hectares of Classes I, II, and III land, (2) month code (date of sale), (3) estimated net farm income, and (4) assessed value of buildings. Eighty-eight percent of the variation in sale price for the 38 farms in Lancaster and Northumberland Counties was accounted for by this model. The sign of the third variable, estimated net farm income, was negative which, though seemingly illogical, is a result of the high correlation of this variable with the first variable. All of the x-variables in this model were deemed significant at the 0.01 level.

The regression of the combined total hectares of Classes I, II, and III land accounted for 75% of the variation in sale price. Combining the variables with the month code, which is a measure of the effect of inflation, gave an R^2 value of 0.91.

Table 24. Stepwise regression on inflation adjusted sale price† in Lancaster and Northumberland Counties.

Number	R-Square	X-Variables in Model‡
1	0.83**	Class I + II + III land
2	0.85**	Class I + II + III land Value of buildings
3	0.87**	Value of buildings Income Class I + II + III land

N = 38
F Value = 76.28
Probability>F = <0.01
Intercept = -6059.95

Variables	Partials
Class I + II + III land	1112.05
Income	-6.70
Value of buildings	2.86

Variable	Sequential SS	F Value	Probability >F
Class I + II + III land	25720851346.65	217.91	<0.01
Income	797440984.12	6.76	0.01
Value of bldgs.	491512942.97	4.17	0.04

Table 24 (Continued)

Variable	Partial SS	F Value	Probability >F
Class I + II + III land	4337320383.28	36.75	<0.01
Income	1091052300.55	9.24	<0.01
Value of bldgs.	491612942.97	4.17	0.04

**Indicates significance at the .01 level.

†Sale values adjusted to standard dollar values using the land price index for Virginia (ERS, 1974). Sales took place from 1969 through 1973.

‡All variables in these models are significant at the 0.10 level.

Seventeen numerical variables were regressed against sale price per hectare, both adjusted and unadjusted for inflation, using four different stepwise regression procedures. The results of one of these procedures is shown in Tables 25 and 26.

It may be seen from Table 25 that these variables accounted for 44% of the inflation adjusted sale price per hectare for the farm sales in Charlotte County. These three variables were: (1) assessed value of buildings per hectare, (2) hay suitability rating, and (3) percent of farm in cropland. The inclusion of each of these three variables in this model was deemed significant at the 0.1 level. The signs of all partials were positive.

Substitutions of the soybean productivity rating, the small grain productivity rating, or the average land class index for the hay productivity rating in this model slightly reduces the R square value obtained or the significance of the variable into the model. It is assumed that the role of the hay productivity rating in this model serves to produce a soil productivity measurement. The model serves as a measurement of: (1) the value of buildings or improvements, (2) the portion of the farm used for farming, and (3) the soil productivity. The effect of inflation was considered in this model.

It may be seen from Table 26 that the same three variables were selected by this stepwise regression

Table 25. Stepwise regression on inflation adjusted sale price† per hectare in Charlotte County.

Number	R-Square	X-Variables in Model‡
1	0.34**	Value bldgs./ha
2	0.42**	Value bldgs./ha Hay rating
3	0.44**	Value bldgs./ha Hay rating Percent cropland

N = 84
F Value = 21.30
Probability > F = 0.01
Intercept = -101.37

Variables	Partials
Value bldg./ha	3.89
Hay productivity	82.69
Percent cropland	54.91

Variable	Sequential SS	F Value	Probability >F
Value bldgs./ha	125915.05	48.92	<0.01
Hay productivity	31202.18	12.12	<0.01
Percent cropland	7378.59	2.87	0.09

Variable	Partial SS	F Value	Probability >F
Value bldgs./ha	76279.24	29.64	<0.01
Hay productivity	22931.19	8.91	<0.01
Percent cropland	7378.59	2.87	0.09

**Indicates significance at the .01 level.

†Sale price adjusted to standard dollar using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

‡All variables in these models are significant at the 0.10 level.

Table 26. Stepwise regression on sale price† per hectare in Charlotte County.

Number	R-Square	X-Variables in Model‡
1	0.22**	Value bldgs./ha
2	0.35**	Value bldgs./ha Hay rating
3	0.37**	Value bldgs./ha Hay rating Percent cropland

N = 84
F Value = 14.68
Probability > F = <0.01
Intercept = 175.36

Variables	Partials
Value bldgs./ha	3.72
Hay rating	127.48
Percent cropland	78.15

Variable	Sequential SS	F Value	Probability >F
Value bldgs./ha	135293.01	28.54	<0.01
Hay rating	72817.52	15.36	<0.01
Percent cropland	14846.48	3.15	0.08

Table 26 (Continued)

Variable	Partial SS	F Value	Probability >F
Value bldgs./ha	69677.79	14.70	<0.01
Hay rating	54497.27	11.50	<0.01
Percent cropland	14946.48	3.15	0.08

**Indicates significance at the .01 level.

†Sale price unadjusted for inflation. Sales occurred from 1968 through 1972.

‡All variables in these models are significant at the 0.10 level.

technique when price was not adjusted for inflation. The R^2 value was 0.39 compared with 0.44 when the price was adjusted for inflation.

The addition of the year of sale as a dummy variable into the model in which sale price is not adjusted for inflation results in an increase in the R^2 value of 0.44 for an otherwise identical model when time of sale was accounted for by adjusting sale price to standard dollars based on the land price index for Virginia.

Fifty percent or more of the variation in sale price in Charlotte County was accounted for in all of the regression models. Regression of 17 numerical variables against sale price per hectare, adjusted for inflation, gave an R^2 value of 0.50 with several of the individual partials having illogical signs.

Fifty-six percent of the variation in sale price per hectare could be accounted for by a regression model which included three numerical variables and three dummy variables. The three numerical values were: (1) assessed value of buildings per hectare, (2) hay productivity rating, and (3) percent of farm in cropland. The three dummy variables were: (1) year of sale, (2) magisterial district, and (3) soil association. The significance of the contribution of the latter two dummy variables is questionable. Other dummy variables which did not result in any increase in R^2

values in models were the occupation of the buyer and whether the land was purchased as an addition to a presently existing enterprise.

The regression of 17 variables against total sale price, adjusted for inflation, using the stepwise regression procedure outlined by Service (1972), resulted in the selection of a six x-variable model which accounted for 94% of the variation in Y with the entry of each x-variable into the model at a significance level of 0.1 (Table 27). The six x-variables were: (1) combined total units of Classes I and II land, (2) assessed value of buildings, (3) estimated farm income, (4) combined hectares of Classes VI and VII land, (5) soybean yield rating, and (6) tobacco base. The signs of the partials were all positive except in the case of the soybean yield rating and combined hectares of Classes VI and VII land. Thus, all the signs seem quite logical except for the negative sign for the soybean yield rating. The illogical sign of this variable is likely a result of its high correlation with certain other x-variables.

It should be noted that the regression of the combined hectares of Classes I and II land against total sale price in Charlotte County alone gives an R^2 value of 0.90 and that three other variables in the six x-variable regression equation in Table 27 each individually account for 70% or more of the total variation in sale price.

Table 27. Stepwise regression on inflation adjusted sale price† in Charlotte County.

Number	R-Square	X-Variables in Model‡
1	0.91**	Class II + III land
2	0.92**	Value of buildings Class II + III land
3	0.93**	Income Value of buildings Class II + III land
4	0.94**	Income Value of buildings Class II + III land Class VI + VII land
5	0.94**	Soybean rating, Income, Value of bldgs., Class II + III land, Class VI + VII land
6	0.94**	Soybean rating, Income, Value of bldgs., Tobacco base, Class II + III land, Class VI + VII land

N = 84
F Value = 195.79
Probability > F = <0.01
Intercept = 7383.05

Variables	Partials
Class II + III land	149.73
Value of buildings	4.96
Income	2.02
Class VI + VII land	-216.67
Soybean rating	-680.52
Cropland	100.74
Size of farm	86.39

Table 27 (Continued)

Variable	Sequential SS	F Value	Probability >F
Class II + III land	137014216607.30	1310.46	<0.01
Value of buildings	2796242071.77	26.74	<0.01
Income	1284244566.15	12.28	<0.01
Class VI + VII land	539868996.25	5.16	0.02
Soybean rating	572175463.37	5.47	0.02
Cropland	391803080.34	3.74	0.05
Size of farm	692754603.52	6.63	0.01

Variable	Partial SS	F Value	Probability >F
Class II + III land	1011965833.55	9.68	<0.01
Value of buildings	1834390119.61	17.54	<0.01
Income	364795002.72	3.49	0.06
Class VI + VII land	1715053746.68	16.40	<0.01
Soybean rating	658362623.12	6.30	0.01
Cropland	846706160.34	8.10	0.01
Size of farm	692754603.52	6.63	0.01

**Significant at 0.01 level.

†Sale values adjusted to standard dollar values using the land price index for Virginia (ERS, 1974). Sales took place from 1968 through 1972.

‡All variables in these models are significant at the 0.10 level.

DISCUSSION

Results of this study indicate that soil productivity, as indicated by SCS land capability classes and crop yield ratios, was a significant factor affecting farm sale prices in both areas studied. Farm sale prices rose rapidly in both study areas during the five year time span studied, especially in the two Coastal Plain counties. This tended to overshadow the effect of other parameters on sale price and complicated the analysis of sales data. The effects of improvements, land use (proportion of farm in cropland), and location on sale price also tended to overshadow that of soil productivity.

Analysis of the effect of soil productivity on sale price is complicated by the diversity of soils and landscapes which normally occurred on a single farm. Evaluation of the effect of soil productivity on sale price was dependent on the statistical analysis of indices of soil productivity such as SCS land capability classes and crop yield ratings averaged or aggregated for each farm.

SCS land capability classes are intended to group soils according to the agricultural uses to which they are suited but not necessarily as to their yield potential for any crop. Crop yield ratings, on the other hand, are "best" estimates of the yield potential of soil mapping units for a particular crop. Considering this, it was hypothesized that crop yield ratings for the major crops in each of the study areas would be more closely related to sale price per hectare than would be any of the SCS land capability classes or any combination of these classes. Such was the case in Charlotte County but not in Lancaster and Northumberland Counties.

In Charlotte County (Table 7), yield rating for hay was more closely related to sale price per hectare than any of the other indices of soil productivity. The average soybean rating for each farm was also significantly correlated with sale price per hectare. Although none of the SCS land capability classes was significantly correlated with sale price, the arithmetic average of all land classes for each farm was significantly correlated with sale price. In Lancaster and Northumberland Counties (Table 6) the SCS land classes were more closely related to sale price per hectare than the crop yield ratings. The wheat productivity rating was significantly correlated with sale price per hectare in Lancaster and Northumberland Counties.

These differences between the two counties can be explained partially on the basis of the differences in topography and type of farming. Somewhere between a third and a half of the land area in Lancaster and Northumberland Counties are suited to grain production. The main crops in Lancaster and Northumberland Counties are corn, soybeans, small grain and tomatoes which are primarily sold for cash. Very little land is devoted to forages or pasture. Soils not suited for row crops or small grains are generally left in forest. Thus it seems likely, and the results of this study indicate, that farmers place a high premium on cropland when purchasing land, and they place a minimal value on land which is not suited for grain production. The soils on topographies too steep for cultivation are also generally unsuited for forage production. Thus the total of Classes I, II, and III land is significantly positively correlated with sale price per hectare. The total of Classes VI and VII land is significantly negatively correlated with sale price per hectare. This reasoning does not explain why yield ratings, excepting wheat, were not significantly correlated with sale price per hectare. It seems logical that the yield ratings for corn and soybeans would be more closely related, to sale price per hectare than the lower or "better" SCS land classes as they should be more discriminating in assessing land for these crops. Soybean rating was significantly correlated with sale price per hectare at the 0.10 level but accounted for only 8% of the variation in Y.

One possible explanation is that buyers generally viewed all cropland as equal in value. Another conceivable explanation is that these crop yield ratings are not realistic. Seventeen of the soil mapping units occurring in Lancaster and Northumberland Counties were recently included in a corn yield study in Maryland (Robinette, 1975). The correlation coefficient between the yield ratings listed in the soil survey report for Lancaster and Northumberland Counties for these 17 mapping units and the yields that were obtained in this Maryland study was 0.71.

Surprisingly, Class I land was less significantly correlated with sale price per hectare than either Class II or III land. The amount of Class I land in these two counties was significant. This may be due, in part, to coincidence. For example, the percentage of farms in Class I land was negatively correlated with the time of sale. That is, more farms having a high percentage of Class I land were sold during the initial time period of this study. As previously noted, land prices spiraled during the time span studied. Another explanation for this poor showing of Class I land is that some of the more productive soils for corn and soybeans were rated as Class II land. Robinette's (1975) data and a survey of Virginia yield data indicate that the moderately well drained soils, such as Woodstown, frequently give higher corn or soybean yields than their well drained analogs, such as Sassafras. Although not conclusive, there is some evidence (Table 10) that farmers tended to pay a premium for these level moderately well drained soils and only slightly discounted the somewhat poorly drained soils. The primary mapping unit which constituted the Class I land was nearly level Sassafras which occurred on the higher terraces. Farmland tended to sell higher on the lower terraces. This was possibly due to both soil differences and to location. The lower terraces were nearer the Chesapeake Bay. Finally, the percentage of farms in Class I land was negatively correlated with the percentage of the farms in Class II land. It was also negatively correlated with the combined percentages of the farm in Classes I, II, and III land. It is not certain whether this occurred by chance or as a reflection of the typical soil association pattern in these two counties.

Although row crops are important in Charlotte County, the topography and soils do not lend themselves to extensive rowcrop production. Livestock is raised on most farms. Although the potential for forage crop production does not appear to be fully utilized in Charlotte County, forage production is considerably more important than in the other study area. The fact that Classes I and II land, whether considered singly or in combination, were not significantly correlated with sale price per hectare was interpreted as being partially due to the lesser emphasis placed on soils suitable for row crops. It is also probably a result of greater variation in the yield potential of Classes II and III land in Charlotte County (there is no Class I land in Charlotte County). This would partially explain the superiority of yield ratings in Charlotte County. For example, gently sloping Iredell and level Congaree are both rated as Class II land. The former has limitations for corn or soybean production while the latter is one of the most productive soils for corn in the Piedmont.

The yield rating for hay was more closely related to sale price per hectare than any other crop. This is not considered to be due to the importance of forage crops in Charlotte County. It seems more likely that the hay rating does a better job of rating soils as to their overall productivity than do the ratings for either corn or soybeans. Only those soils which are suitable for row crop production have ratings for corn. All other soils are, in effect, rated at zero value for corn.

A more pronounced effect of soil productivity on farm sale values was reported in previous studies in Iowa (Phillips, 1968) and in Illinois (Eberle and Oschwald, 1974). In both cases, the studies were of farm sales in areas of much more intensive farming than in this study. In these areas, soil and topography were much better suited to intensive row crop production. In addition, the systems of farming in both of these studies in the Corn Belt were much less diverse than is the case for the Piedmont area of this study.

Farming, in the areas studied in Iowa and Illinois, consisted primarily of the production of corn and soybeans which was either sold for cash or fed to hogs or feeder cattle. This is not totally unlike the system of farming practiced in the areas studied in the Coastal Plain, but farming in Charlotte County in the southern Piedmont is considerably more diverse. Indices of soil productivity were more closely related to sale values in the Coastal Plain counties than in Charlotte County. The areas studied in Iowa and Illinois were areas that differed from the Coastal Plain of Virginia, not so much in the type of farming practiced, but rather that they were considerably more productive soils and had a much higher percentage of area suitable for intensive row crop production.

It seems logical that it would be more difficult to find a single index of soil productivity which would measure the effect of the physical properties of land on sale values in an area of somewhat diversified farming such as Charlotte County.

It also seems likely that non-farm influences were more pronounced in this study than in the midwestern studies. This may be an additional reason for the less pronounced relationship between soil productivity and sale price. For instance, the production of pulpwood is second only to farming as a source of income in Charlotte County and it is important in both Lancaster and Northumberland

Counties. More importantly, it appears that there was a more pronounced tendency to purchase land as either a hedge against inflation or for its consumptive value than was the case in the Iowa and Illinois study.

The percentage of the farm in cropland was more highly correlated with sale price per hectare than any of the indices of soil productivity in either study area. Of course, the percent of cropland and the indices of soil productivity were highly correlated with one another (Tables A and C). In general, the proportion of the farm cleared for farming is indicative of the proportion of the farm suitable for farming, but such was not always the case in this study. At least five farms in Lancaster and Northumberland Counties had a considerable number of hectares of Classes I and II land in forest. Generally, these farms sold for less than was predicted from regression equations. Although this study provides minimal supportive evidence, it is suggested here that buyers may be generally poor judges of the potential crop productivity of land still in forest. The high cost of clearing land for cultivation may also explain the buyers' tendency to discount equally all forest land.

Location was a significant factor affecting sale values in Lancaster and Northumberland Counties. In some cases, the effect of location was, in part, a reflection of the favorable soils and topography of a particular area.

It was apparent, however, that locality, considered alone, was a factor affecting sale values.

Analysis of variance of farm sales by magisterial districts (not a very refined method of analyzing the effect of location) revealed a highly significant effect of location on farm sales (Table 8). The effect of location was more pronounced than the effect of soil association on sale price per hectare (Table 10). Regression of the magisterial districts, treated as a set of dummy variables, after five other variables, resulted in an increase in R^2 value that was highly significant.

Locational effects in Charlotte County were not observed. Analysis of farm sales by magisterial districts did not reveal any effect on location. It was hypothesized that the locations of south of Drakes Branch were deemed less desirable. Analysis of farm sales on this basis did not lend any credence to this hypothesis. Other examinations of farm sales by location detected no effect of location on sale values. This is not to say that all of the locations were of equal desirability, all other things being equal. It does appear, however, that the effect of location on farm sale values was somewhat diffuse in Charlotte County.

Previous studies (Maier, Hedrick, and Gibson, 1960) (Gibson, Arnold, and Aigner, 1962) have shown that the future benefits of flue cured tobacco allotments were capitalized into the selling price of farmland, and were a major factor affecting the price of farmland in the flue cured tobacco belt of Virginia and North Carolina.

The present regulations of the ASCS allow holders of flue cured tobacco bases to lease the rights to these bases to other holders of tobacco bases on a yearly basis, providing both tobacco bases are within the same county.

Flue cured tobacco bases in Charlotte County had an average yearly rented value ranging from 22 to 35 cents per kilogram. Thus, the right to grow flue cured tobacco should have value to any holder because of this liquidity.

Flue cured tobacco is the most important farming enterprise in Charlotte County. Although the quantity of flue cured tobacco allotments was found to be significantly correlated with total sale price, the correlation coefficient was not clearly as great as had been reported in other studies (Maier, Hedrick, Gibson, 1960). No significant relationship was found when both sale price and tobacco allotment were expressed on a per unit basis. There was some evidence that the relationship between flue cured tobacco base and farm sale value was marked or distorted by other factors. On a per unit basis, flue cured tobacco allotment was found to be negatively correlated with percent of farm in cropland and some indices of soil productivity, but none of these relationships were statistically significant (Table C). The most intensive flue cured tobacco production area in Charlotte County occurs on the Appling-Vance-Cecil soil association. Tobacco allotment was highly correlated with sale price regardless of whether both variables were expressed on an entire farm or a per unit basis (Table 21). In fact, when both sale price and tobacco allotment were expressed on a per hectare basis, the only variables significantly correlated with sale price per hectare were flue cured tobacco allotment per hectare and the flue cured tobacco yield rating. Thus it appears that tobacco allotments strongly affect sale values in areas of intensive production.

It would seem that the most logical explanation for the lack of a strong relationship between sale price and tobacco allotment on a county-wide basis is that the larger tobacco allotments tend to occur on otherwise less "desirable" farms. There is some evidence of this but it is by no means convincing. In general, the quantity of tobacco allotments was unrelated to other indices of values.

A previous study (Gibson, Arnold, and Aigner, 1962) showed that farmers tended to use a high discount rate when capitalizing the value of tobacco allotment. This was assumed to reflect their state of confidence in the security of tobacco allotment programs. It seems quite possible that farmers might consider the future of the tobacco allotment program less secure today than in the early 1960's in light of the concerns of tobacco on health and the decline of the political influence of the agricultural sector. In addition, farmers are especially concerned about the escalation of costs, particularly the cost of labor in tobacco production.

As expected, dark fire cured tobacco allotments were not found to affect sale price. The rental rights to dark fire cured tobacco are frequently sold for a nominal fee. It appears that the marginal value of dark fire cured tobacco allotment is near zero.

The agreement obtained between sale values and the values at which farms are appraised for taxation at fair market value is logically a measurement of the quality of assessment.

The agreement between sale value per hectare and assessed value, expressed on a per hectare basis, was not high in either county. Agreement between assessed and sale values was much higher in Charlotte County than in Lancaster or Northumberland Counties (Table 22). In fact, only about one-tenth of the variation in sale price per hectare could be accounted for by the assessed values in Lancaster and Northumberland Counties. This compares with 45% in Charlotte County. The ratio of assessed to sale value varied as much as twenty fold in Northumberland County and by about eight fold in Lancaster and Charlotte Counties (Table 22). The overall assessed to sale value ratio was about 50% of that prescribed by law in Charlotte

County and about 75% in the cases of Lancaster and Northumberland Counties. This is primarily a result of the failure of assessed values to be increased as rapidly as was the yearly increase in sale values. This is also evidenced by the increased agreement between sale values and assessed values when the former are converted to constant 1967 dollars.

According to the Commissioner of Revenue in Charlotte County (Personal communication, Aylene Tucker, Charlotte Court House, Virginia) the assessed value averaged 10% of the sale value for all sales of real estate in Charlotte County in 1972. This compares with 9% for the farm sales in this study. Thus it would appear that farmland is assessed about on par with all real property in Charlotte County.

Gibson (1970) pointed out that one of the difficulties in using the comparative sales approach to use-value of farms is the small number of farms that are exchanged via bona fide sales without the influence of a shift in land use within any given locality.

In both of the areas analyzed in this study, less than 2% of the farms were, on the average, exchanged through bona fide sales in a given year. A 2% annual turnover would result in the average farm being involved in a bona fide sale only once every 50 years.

Additionally, there is the question as to whether or not the population of farms that sell in any given time period are representative of the total population of farms in that area. Although this study provides no quantified information in this regard, casual observations led to the hypothesis that certain types of farms had a more rapid rate of turnover than others. The more productive farms, and the farms that are well improved, sell less frequently than either marginal or unimproved farmland.

Nearly 50% of the variation in sale price per hectare was unaccounted for by any of the regression models tested in Charlotte County compared to only 15% in the case of Lancaster and Northumberland Counties. It seems likely that there were factors which significantly affect sale price per hectare in Charlotte County which were either not considered or are inadequately accounted for in this study. One variable, which may have been inadequately accounted for, was location as its effect was unclear. In Lancaster and Northumberland Counties, it appeared that location caused certain land to sell at a premium. A similar trend was not easily discernible in Charlotte County. This may imply that the prime locations were scattered throughout the county.

One important factor affecting land values in Charlotte County was the value of standing timber at the time of sale. Timber is second only to tobacco as a means of income in Charlotte County. In the process of searching the court records for land values, cases were observed in which tracts of land were purchased by timber companies and subsequently resold at reductions up to 25%, in terms of real or deflated dollars, after the marketable timber had been removed. This would indicate that standing timber can contribute a considerable portion of the sale price to land in Charlotte County. Although none of these sales were included in this study, it seems probable that some farm sales included in this study had substantial amounts of standing timber when sold.

Farm sales in which there was evidence of a future shift away from agricultural use were excluded from this study. It was evident, however, that the land market in both areas was being affected by speculation, particularly in Charlotte County. A number of farms were purchased by non-county residents and by persons fully employed in other vocations who had no previous farming interest.

Both groups of buyers tended to buy less productive farmland, thus tending to drive up the price of this less desirable farmland. Thus, it became more difficult to relate the sale value of this type of land to indices of soil productivity or other factors affecting farm income. In this study, variations in sale price could be accounted for to a greater degree in the areas of more productive farmland. The topography and soils of Lancaster and Northumberland Counties were better suited for more intensive rowcrop production than was the case in Charlotte County. Eighty percent of the variation in sale price per hectare could be accounted for in Lancaster and Northumberland Counties while only 50% could be accounted for in Charlotte County.

This same pattern was evident in the 24 farms in the Sassafras-Sandy land soil association in Lancaster and Northumberland Counties. These farms were divided into two groups. One group was made up primarily of nearly level and gently sloping Sassafras soils while the other consisted of sloping Sassafras soils and steep Sandy land. Indices of soil productivity were more closely related to sale price per hectare in the former group. A three variable model, including variables to account for time of sale, value of improvements, and soil productivity accounted for 86% of the variation in sale price per hectare for this group. Less than 50% of the variation could be accounted for when considering the less productive sloping Sassafras soils and steep Sandy land.

No relationship was found in this study between sale values per hectare and whether or not the buyer was a full time farmer. This was not surprising. While it is true that the entry of non-farmers into the market tends to drive up the price, this result equally affects all potential buyers. No relationship was found between either size of farm or total sale value of farm and whether or not the buyer was a full time farmer. Thus, there was no evidence that non-farmers, as a group, tended to buy smaller farms or farms that were less expensive in terms of sale price.

In Lancaster and Northumberland Counties, over 50% of all farms were purchased by full time farmers. In Charlotte County, only 25% of all farms were purchased by full time farmers. Factors which affect agricultural productivity were found to be more highly related to sale values in Lancaster and Northumberland Counties where over 50% of the buyers were full time farmers. These two facts were not considered to be coincidental occurrences.

One of the primary criteria for selection of the two areas included in this study was that they be rural areas as removed from the urban influence as possible. It is evident, however, that there was some urban influence affecting both study areas.

The Chesapeake Bay and its estuaries surround Lancaster and Northumberland Counties. Land adjacent to the coast is being intensively developed for retirement and recreational home sites. Although areas adjacent to the water were not included in this study, this influence affected the value of most, if not all, of the farmland in the northern neck of Virginia. Farmers who sell this land for development frequently seek other farmland which increases the demand of the land relative to the supply and thus drives up the price. In addition, some surmise that once the "best" land is developed, this or that area will be the next in line.

In Charlotte County the reason for a strong speculative influence is less obvious but, nonetheless, its influence on sale values may have been even more pronounced. In general, land was considerably lower in price in Charlotte County than in either Lancaster or Northumberland Counties. This lower value per unit area frequently made such land more attractive to buyers seeking the land for its consumptive value and to the investor-speculator. In other words, such land frequently had a higher value in uses other than strictly commercial farming.

According to Otte (1974) major metropolitan areas may affect land values for a distance of one hundred miles in any or all directions. Both study areas, and most of eastern Virginia, is within a hundred miles of a major metropolitan area.

All of the taxing jurisdictions in Virginia that have opted for use-value assessment are located in the urban fringe areas. If an analysis of farm sale values, such as this, is to be of benefit in arriving at use-value assessment, it is necessary to avoid areas in which land values are influenced by urban effects. It appears questionable that such areas still exist in much of Virginia. Furthermore, if they do exist, the problem of extrapolating information obtained in these areas to the urban fringe areas is considerable.

All of these problems point to a greater dependency on the income capitalization approach. This makes it all the more imperative that estimates of potential net income be as accurate and realistic as possible. This, in turn, requires that estimates of soil productivity be as accurate as potentially possible.

It is suggested that a serious study of the yield potential of Virginia soils is needed. Such a study should include those soil series that are extensive and are agronomically important. More importantly, such a study should be designed so that the data could be extrapolated to soils not included in this study with maximum reliability. It is imperative that such a study include measurements of crop yields both under controlled systems of management, such as exists in experimental plot work, and those systems of management which occur in commercial farming. It is argued that yield measurements may be misleading as an indicator of the productivity of a particular soil because of the effects of management or weather, or both. While true, it is possible to account for at least part of the effects of these two factors. A first step might be the analysis of presently existing yield data in relationship to soil type and soil properties. Considerable yield data has previously been collected as the result of variety trials, fertility experiments, and other experimental work. The value of empirical data is that it points out erroneous assumptions about the effects of soil properties on yield. An example is the assumption that all well drained soils are more productive for any crop than their moderately well drained analogs.

SUMMARY AND CONCLUSIONS

Soil productivity was found to be a significant but secondary factor affecting farm sale values in two localities in Virginia. Factors affecting farm sale values in both localities were, in order of their perceived importance: (1) inflation, as evidenced by the continual rise in sale value with the progression of time; (2) value of improvements; (3) proportion of farm in cropland; and (4) soil productivity. Location was an important factor affecting sale values in the two Coastal Plain counties studied. Quantity of tobacco base was found to significantly affect sale values in Charlotte County but the effect was greatly diminished from that which was reported for an adjacent southern Piedmont County in a study conducted in 1960 (Maier, Gibson, and Hedrick, 1960). Both quantity of flue cured tobacco allotment and soil yield rating for tobacco were, however, highly correlated with sale price per hectare in the Appling-Vance-Cecil soil association which constituted the area of most intensive production of flue cured tobacco in Charlotte County. The quantity of dark fire cured tobacco allotment was not found to be related to sale values.

Eighty percent of the variation in sale value per hectare could be accounted for by a five variable regression model in the case of the 38 farm sales in two Coastal Plain counties of Lancaster and Northumberland. Only about 50% of the variation occurring in sale price per hectare of the 84 Charlotte County farm sales could be accounted for by multiple regression equations.

Indices of soil productivity were found to be more highly correlated with sale price per hectare in Lancaster and Northumberland Counties than in Charlotte County. The soils and topography in Lancaster and Northumberland Counties are better suited to intensive crop production than the soils and topography of Charlotte County. Farming in Lancaster and Northumberland Counties is dominated by relatively large commercial operations engaged primarily in the production of grain for cash. Farming operations in Charlotte County are generally smaller and more diverse with tobacco being the primary enterprise. Comparisons between soil associations also show sale values to be closely related to soil productivity and other factors affecting the potential productivity in those soil associations where soils and topography permit intensive farming. Land values per hectare were considerably higher in Lancaster and Northumberland Counties than in Charlotte County. On the average, about 2% of the farms in both study areas were involved in bona fide sales in any one year.

Farm sale values increased rapidly over a five year period, especially in Lancaster and Northumberland Counties where sale values per hectare increased at an annual rate of 47% from 1969 through 1973. This spiralling inflation increased the difficulty of analyzing the influence of other factors which affected, or were hypothesized as affecting, sale values.

It is suggested that "non-farm" influences significantly affected sale values in both localities. This was manifested in the effects of location in Lancaster and Northumberland Counties. The effects were less easily quantified in Charlotte County but they were perceived to be more important in determining sale price. The lower land prices in this county made the purchase of farms more attractive to speculators, investors, persons seeking part time farms, and those seeking the rural life.

In addition, the value of standing timber and the potential value of land for timber and recreation were important factors affecting sale values, especially in Charlotte County, which were either not accounted for or inadequately accounted for in this study. It is suggested that any future studies of land values in the southern Piedmont take into account these factors.

Crop yield ratings were more closely related to sale values per hectares than were SCS land capability classes in Charlotte County, while the opposite was true in Lancaster and Northumberland Counties.

Yield ratings for hay were found to be superior to yield ratings for other crops in Charlotte County. It appears that hay yield ratings more accurately reflect the relative valuation that farmers placed on the entire range of soil types. Corn yield ratings were found to be inferior to yield ratings for all other crops in both counties, possibly because corn rating severely discounts soils not suited to frequent cultivation.

In Lancaster and Northumberland Counties there was a significant positive relationship between the proportion of the farm in SCS land classes which are suitable for either row crop or small grain production and sale price per hectare. While the farmers in these two Coastal Plain counties appeared to place a high premium on cropland, they did not appear to be highly discriminating in evaluating cropable soils that differed considerably in their yield potential for crops or soybeans. There was some evidence that they did value the moderately well drained soils rather than the well drained soils. This is in disagreement with the findings of a recent yield study in Maryland (Robinette, 1975).

It is suggested that considerable improvements could be made in many of the crop yield ratings of most Virginia soils. It is further suggested that a study with this goal be undertaken.

While the results of this study indicate that farm sale values are significantly affected by soil productivity and related factors, the use of farm sales as a tool in arriving at use-value assessment seems questionable.

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APPENDIX

Table A. Correlation Matrix I: Lancaster and Northumberland Counties

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1 Price/ha*	1.00	0.96	0.54	-0.14	0.34	0.19	-0.04	-0.38	-0.12	0.32	-0.35	-0.35	0.21	0.22	0.23	0.27	0.24	0.33	0.06	0.33	0.43	0.48
2 Price/ha†		1.00		-0.22	0.34	0.29	-0.02	-0.38	-0.08	0.29	-0.32	0.32	0.17	0.19	0.20	0.24	0.24	0.29	0.06	0.25	0.61	0.32
3 % cropland			1.00	-0.15	0.42	0.06	0.13	-0.41	-0.23	0.37	-0.35	-0.46	-0.33	0.38	0.39	0.44	0.06	0.46	0.24	0.20	0.39	0.22
4 % Class I land				1.00	-0.57	-0.29	-0.10	-0.05	-0.17	0.19	-0.16	-0.18	-0.40	0.40	0.33	0.30	0.35	0.48	-0.05	0.01	0.21	0.16
5 % Class II land					1.00	0.07	-0.23	-0.23	-0.21	0.65	-0.58	-0.60	-0.48	0.51	0.56	0.58	0.45	0.36	-0.12	0.03	0.07	-0.08
6 % Class III land						1.00	-0.06	-0.34	0.08	0.15	-0.16	-0.15	0.05	-0.11	-0.04	-0.04	-0.09	-0.17	-0.06	-0.02	0.24	-0.10
7 % Class IV land							1.00	-0.04	0.14	-0.41	0.38	0.09	0.29	-0.32	-0.29	-0.29	0.21	-0.33	-0.15	0.05	0.11	0.00
8 % Class VI land								1.00	-0.15	-0.41	0.45	0.52	0.28	-0.31	-0.34	-0.35	-0.04	-0.33	0.17	-0.07	-0.21	-0.16
9 % Class VII land									1.00	-0.77	0.70	0.76	0.85	-0.80	-0.82	-0.81	-0.04	-0.33	0.18	0.02	0.17	0.10
10 % I + II + III land										1.00	-0.99	-0.93	-0.95	0.94	0.96	0.96	0.18	0.82	-0.20	0.04	-0.03	0.02
11 % IV + VI + VII land											1 00	0.94	0.93	-0.91	-0.93	-0.90	-0.24	-0.80	0.20	-0.42	0.04	-0.03
12 % VI + VII land												1.00	0.91	-0.89	-0.93	-0.92	0.18	-0.78	0.26	-0.03	0.00	-0.02
13 Ave. land class													1.00	-0.98	-0.99	-0.98	-0.12	-0.87	0.21	-0.24	0.11	-0.04
14 Corn rating														1.00	0.99	0.99	0.15	0.93	-0.20	0.06	-0.07	0.01
15 Soybean rating															1.00	0.99	0.18	0.89	-0.21	0.06	-0.07	0.01
16 Wheat rating																1.00	0.15	0.90	-0.22	0.06	-0.03	0.00
17 Hay rating																	1.00	0.15	0.04	0.15	0.00	0.06
18 Income/ha																		1.00	-0.21	0.76	0.03	0.11
19 Farm size																			1.00	-0.17	0.09	-0.19
20 Assessed value/ha																				1.00	0.09	0.36
21 Date of Sale																					1.00	-0.09
22 Bldg./ha																						1.00

$r > 0.39$ significant at 0.01 level
$r > 0.31$ significant at 0.05 level
$r > 0.26$ significant at 0.10 level

*Sale prices adjusted to constant dollar values
†Unadjusted sale price. Sales occurred 1969-1973.

Table B. Correlation Matrix II: Lancaster and Northumberland Counties

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Sale price*	1.00	0.99	0.90	0.78	0.37	0.90	0.56	0.38	0.54	0.76	0.91	0.73	0.77	0.85	0.45	0.86	0.23
2 Sale price†		1.00	0.87	0.75	0.30	0.57	0.57	0.36	0.47	0.76	0.87	0.72	0.75	0.80	0.40	0.83	0.33
3 Farm size			1.00	0.79	0.48	0.91	0.55	0.44	0.74	0.83	0.96	0.92	0.93	0.92	0.36	0.80	0.06
4 Cropland				1.00	0.35	0.85	0.51	0.40	0.57	0.48	0.85	0.58	0.60	0.85	0.27	0.65	0.22
5 Class I land					1.00	0.22	0.02	0.27	0.38	0.24	0.55	0.39	0.36	0.66	0.60	0.51	-0.13
6 Class II land						1.00	0.53	0.33	0.61	0.69	0.93	0.73	0.78	0.86	0.22	0.76	0.12
7 Class III land							1.00	0.02	0.19	0.61	0.53	0.50	0.50	0.41	0.10	0.35	0.18
8 Class IV land								1.00	0.42	0.32	0.37	0.45	0.43	0.37	0.18	0.44	0.11
9 Class VI land									1.00	0.43	0.65	0.79	0.80	0.65	0.22	0.48	-0.11
10 Class VII land										1.00	0.71	0.88	0.89	0.60	0.22	0.63	0.15
11 I + II + III land											1.00	-0.33	0.80	0.98	0.41	0.83	0.07
12 IV + VI + VII land												1.00	0.99	0.75	0.23	0.66	0.02
13 VI + VII land													1.00	0.73	0.26	0.67	0.04
14 Income/ha														1.00	0.45	0.81	0.07
15 Bldg./ha															1.00	0.64	0.01
16 Assessed value/ha																1.00	0.13
17 Date of sale																	1.00

$r > 0.39$ significant at 0.01 level
$r > 0.30$ significant at 0.05 level
$r > 0.26$ significant at 0.10 level

*Sale price adjusted to constant dollar values.
†Unadjusted sale price. Sales occurred 1969-1973.

Table C. Correlation Matrix III: Charlotte County

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1 Price/ha*	1.00	0.94	0.40	0.17	0.11	-0.21	-0.01	-0.17	0.20	-0.10	-0.12	-0.28	-0.10	0.26	0.27	0.28	0.36	0.12	0.07	0.04	0.15	0.03	0.58	0.67	-0.04
2 Price/ha†		1.00	0.40	0.22	0.06	-0.20	0.00	-0.20	0.19	-0.12	-0.13	-0.33	-0.07	0.30	0.30	0.32	0.41	0.12	0.06	0.06	0.14	0.07	0.47	0.56	0.27
3 % Cropland			1.00	0.06	0.31	-0.20	-0.10	-0.12	0.26	-0.17	-0.16	-0.24	-0.03	0.30	0.36	0.23	0.26	0.12	0.13	-0.06	0.30	0.01	0.38	0.43	-0.02
4 % Class II land				1.00	0.06	-0.21	-0.22	-0.40	0.71	-0.42	-0.45	-0.65	-0.39	0.59	0.61	0.56	0.62	0.33	0.54	0.11	0.29	-0.09	0.04	0.18	0.32
5 % Class III land					1.00	-0.50	-0.28	-0.16	0.74	-0.36	-0.34	-0.35	-0.20	0.36	0.37	0.34	0.25	0.17	0.31	-0.13	0.01	0.01	0.10	0.09	-0.19
6 % Class IV land						1.00	-0.27	0.00	-0.50	-0.26	-0.24	0.16	-0.01	-0.10	-0.18	-0.03	-0.28	-0.09	-0.01	-0.03	-0.21	0.04	-0.12	-0.19	0.02
7 % Class VI land							1.00	-0.16	-0.35	0.75	0.77	0.46	0.28	-0.53	-0.46	-0.55	-0.26	-0.26	-0.05	0.08	-0.05	0.01	-0.01	0.02	0.02
8 % Class VII land								1.00	-0.38	0.51	0.49	0.54	0.53	-0.46	-0.45	-0.49	-0.47	-0.29	-0.47	-0.06	-0.02	0.01	0.00	-0.10	-0.20
9 % II + III land									1.00	-0.55	-0.54	-0.68	-0.44	0.65	0.67	0.62	0.60	0.37	0.59	-0.02	0.21	-0.05	0.09	0.18	0.08
10 % IV + VI + VII land										1.00	0.95	0.74	0.43	0.30	-0.67	-0.27	-0.50	-0.28	-0.16	0.66	0.06	0.78	-0.02	-0.13	-0.09
11 % VI + VII land											1.00	0.75	0.41	0.27	-0.69	-0.29	-0.53	-0.26	-0.18	0.64	0.05	0.77	-0.01	-0.11	-0.10
12 Average class												1.00	0.53	-0.96	-0.94	-0.94	-0.83	-0.61	-0.15	-0.01	-0.21	-0.05	-0.07	-0.20	-0.23
13 Average % slope													1.00	-0.64	-0.70	-0.60	-0.49	-0.45	-0.54	-0.05	-0.61	-0.03	0.10	0.01	-0.12
14 Corn rating														1.00	0.98	0.95	0.75	0.56	0.80	-0.06	0.27	0.01	0.06	0.18	0.24
15 Soybean rating															1.00	0.89	0.82	0.62	0.83	-0.09	0.34	0.03	0.05	0.19	0.24
16 Small grain rating																1.00	0.75	0.50	0.89	0.00	0.08	0.03	0.12	---	0.23
17 Hay rating																	1.00	0.50	0.70	-0.09	0.21	-0.03	0.13	0.32	0.26
18 Pasture rating																		1.00	0.77	0.03	0.17	-0.04	0.03	0.03	0.10
19 Tobacco rating																			1.00	0.14	---	0.03	0.11	0.20	0.15
20 Tobacco base/ha																				1.00	0.30	-0.21	0.14	0.14	0.06
21 Income/ha																					1.00	-0.06	-0.08	0.10	0.18
22 Farm size																						1.00	-0.12	-0.15	0.12
23 Bldg./ha																							1.00	0.91	0.22
24 Assessed value/ha																								1.00	-0.16
25 Date of sale																									1.00

$r > 0.27$ significant at the 0.01 level.
$r > 0.20$ significant at the 0.05 level.
$r > 0.17$ significant at the 0.10 level.

*Sale prices adjusted to constant dollar values.
†Sale prices unadjusted. Sales occurred 1968-1972.

Table D. Correlation Matrix IV: Charlotte County

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Sale price*	1.00	0.99	0.85	0.84	0.87	0.92	0.57	0.55	0.17	0.93	0.52	0.28	0.87	0.67	0.91	0.11
2 Sale price†		1.00	0.87	0.83	0.87	0.91	0.60	0.57	0.19	0.93	0.51	0.29	0.89	0.64	0.90	0.21
3 Farm size			1.00	0.79	0.87	0.85	0.83	0.74	0.46	0.90	0.77	0.33	0.93	0.52	0.90	0.09
4 Cropland				1.00	0.73	0.81	0.45	0.76	0.25	0.81	0.68	0.04	0.85	0.67	0.89	0.04
5 Class II land					1.00	0.83	0.65	0.53	0.19	0.95	0.49	0.33	0.89	0.51	0.84	0.14
6 Class III land						1.00	0.55	0.56	0.18	0.96	0.50	0.34	0.89	0.55	0.84	0.00
7 Class IV land							1.00	0.49	0.45	0.63	0.57	0.37	0.70	0.23	0.61	0.11
8 Class VI land								1.00	0.35	0.57	0.91	-0.02	0.68	0.50	0.75	0.06
9 Class VII land									1.00	0.19	0.73	-0.04	0.28	0.12	0.34	0.02
10 II + III land										1.00	0.51	0.35	0.93	0.55	0.87	0.07
11 VI + VII land											1.00	-0.02	0.64	0.43	0.71	0.05
12 Tobacco base/ha												1.00	0.30	-0.03	0.17	0.10
13 Income													1.00	0.50	0.87	0.14
14 Bldg.														1.00	0.82	-0.11
15 Assessed value															1.00	0.05
16 Date of sale																1.00

r > 0.27 significant at the 0.01 level.
r > 0.20 significant at the 0.05 level.
r > 0.17 significant at the 0.10 level.

* Sale price adjusted to constant dollars.
† Unadjusted sale price. Sales occurred 1968-1972.

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RELATIONSHIP OF SELECTED PARAMETERS TO
FARM SALE VALUES IN THREE
VIRGINIA COUNTIES

by

Harvey Luce

Thirty-eight farm sales occurring over a five year period in two adjacent Coastal Plain counties and 84 farm sales in a Piedmont county were studied in an effort to identify and analyze factors affecting sale price. The effect of soil productivity and landscape characteristics were of particular interest in this study.

The effect of soil productivity on farm sale values was found to be significant in both study areas but was somewhat overshadowed by other considerations. Factors affecting sale price in the Coastal Plain study area were: (1) inflation, (2) location, (3) proportion of farm in cropland, (4) soil productivity, and (5) value of improvements. Eighty percent of the variation in sale price per hectare could be accounted for by a multiple regression equation which included variables representing each of these factors. Factors affecting sale price in the Piedmont study area were: (1) value of improvements, (2) proportion of farm in cropland, (3) inflation, (4) soil productivity, and (5) size of flue cured tobacco allotment. A multiple regression equation including variables representing each

of the factors accounted for slightly less than 50% of the variation in sale price per hectare. The effect of tobacco allotment on sale price was found to be considerably diminished from that found by previous studies.

Crop yield ratings were more highly correlated with sale price per hectare than were SCS land capability classes among the Piedmont farm sales. The opposite was true for Coastal Plain sales. Classes I, II, and III lands were found to be positively correlated with sale price per hectare while Classes IV, VI, and VII were negatively correlated with sale price per hectare in the case of Coastal Plain farm sales. None of the three land capability classes were significantly correlated with sale price per hectare in the case of the Piedmont farm sales. A weighted average of all land classes occurring on each farm was found to be significantly related to sale price. Crop yield ratings for forages, soybeans, and small grains were found to be significantly related to sale price in the case of the Piedmont farms. Yield ratings for small grains were also found to be significantly related to sale price in the case of the Coastal Plain soils.

Indices of soil productivity were found to be more highly correlated with sale price among the Coastal Plain farm sales than was the case among the Piedmont sales. The soils and topography of the Coastal Plain are more conducive to intensive crop production. In both study areas a closer relationship was found between soil productivity and sale price in those soil associations which were well suited to intensive cropping.

Farm sale prices rose rapidly in both study areas during the five year period studied. Farm sale values increased at an average annual rate of 47% in the Coastal Plain sales. In both study areas, about 2% of all farms were involved in bona fide sales within a given year.